



# PC ADVISOR

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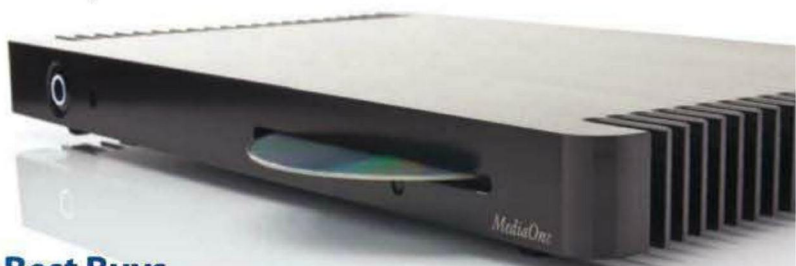
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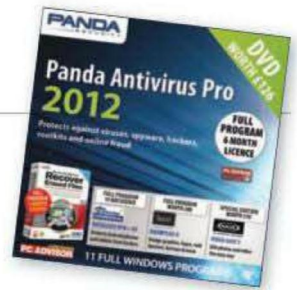
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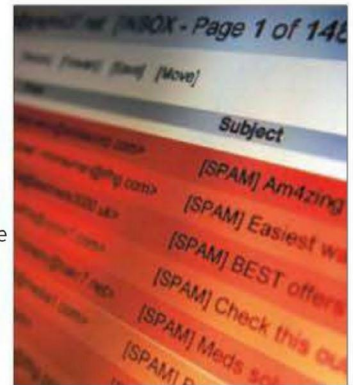
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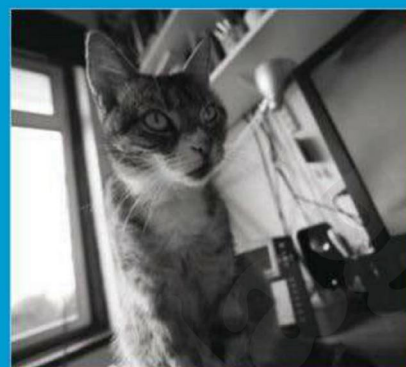


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MATT EGAN

# Post-PC world? We're just getting started

We're soon to see the most exciting event in personal computing history since Sinclair launched the ZX Spectrum 30 years ago. But why is Windows 8 so important?

The imminent launch of Windows 8 is set to be as significant a date in the history of the PC as that of the Sinclair ZX Spectrum, 30 long years ago (see page 90). This is not least because it will post a significant marker in the ongoing debate as to what exactly a PC is, and what future the PC has, if any.

Wintel desktop or netbook, tablet, smartphone, laptop and all points in between - here at *PC Advisor*, we define a personal computer as all those devices and more. To limit the definition to just Windows boxes would be as absurd as the prediction unfairly attributed to former IBM executive Tom Watson that there would one day be 'a world market for about five computers'.

The last device you use at night, and the first in the morning, is one that sits in your pocket all day. There is no more personal a computer than a smartphone (see our group test on page 52).

“Without the Spectrum there would be no personal computer as we now know it”

That the launch of Windows 8 matters is principally down to the descendents of the biggest rival to Sir Clive Sinclair's game-changing 'speccy'. That rival PC was the BBC Micro, made by Acorn, antecedent of ARM: chip maker to the stars and a leading technological reason for the explosion in phones and tablets.

You could argue that without the Spectrum there would be no personal computer as we now know it. The games industry would certainly look a lot different. It is a fact that there'd be no iPad without ARM, and you can rest assured that Microsoft wouldn't be about to launch a touch-orientated Windows - complete with ARM version - without the staggering success of the iPad.

Windows 8 is the first flavour of Microsoft's platform designed equally for mobile devices as for X86 PCs. It represents a tacit admission from the Redmond giant that the Windows PC is, if not consigned to history, pushed toward the margins as part of a spectrum of devices that make up each individual's personal computing arsenal.

We can assume that Windows 8 for smartphone will follow at some stage, and then, for the first time, Windows users will be able to access the same interface, tools and apps across a variety of devices of their choosing, ranging in screen size from 3in to 50in and beyond. As Apple's OS X and iOS slowly merge, and Google stakes a claim for laptops via Chrome, and smaller kit through Android, the choice of platforms is becoming more varied at every level (I'm not discounting other flavours of Linux, or BlackBerry, whose PlayBook tablet is now a *PC Advisor* Best Buy - see page 65).

What Steve Jobs chose to define as the "post-PC world", Microsoft calls PC+. The traditional Windows PC and laptop remain important, but are no longer the only games in town. Far from it. In fact, the PC+ era recognised by the changes Microsoft is making to Windows will see personal computers of all shapes and sizes, and is as exciting a period as that ushered in by the dear old Spectrum, 30 years ago. ☒



## Reader letters



Whether it's with useful tips, pithy observations, or a good old moan, we're always happy to hear from PC Advisor readers. For your chance to appear here, keep in touch via email, our forums, comments on our news stories, and via Facebook, Google+, Twitter and LinkedIn

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### Bulldozing elephant

I'd like to know how and why AMD's Bulldozer processor is falling on deaf ears and looking very much like a big white elephant, despite the company claiming that the CPU is a major advancement in PC technology. Seems a crying shame to me.

Ross Wood

### Memory problem

Why aren't manufacturers like Nokia including a memory card in their Windows phones? Is Microsoft trying to force all Windows Phone users to use its SkyDrive cloud storage system?

Benjamin Van Der Merwe

### FaceBing

I think Facebook's integration with Microsoft Bing is an interesting feature, but I don't think enough people will use it for it to work very well. I also sense yet more cries over privacy.

Antony D'Andrea

[pcadvisor.co.uk](http://pcadvisor.co.uk)

### Facebook phone

Social-networking giant Facebook intends to launch its own smartphone by 2013, we reported at [tinyurl.com/cgo3q7u](http://tinyurl.com/cgo3q7u). "Lord, have mercy on us! Will this mean all our conversations with everyone will appear on Facebook? Am I alone in thinking the world is slowly losing the plot?" asked Paul.

### Apple doesn't want your money

According to Jonathan Ive, Apple's senior vice-president of industrial design, Apple's goal is not to make money but to design the very best products ([tinyurl.com/7t2merh](http://tinyurl.com/7t2merh)). *jvk57* doesn't believe a word of it. "If this is true, why are Apple products so expensive?" he asked. *Maccyroo* agreed: "Do me a favour," he wrote, "Apple's sitting on one of the largest cash piles on the entire planet."

### Come get a career in IT

Baroness Neville-Jones has branded UK cybersecurity professionals "too old", suggesting more children should be encouraged to follow a career in IT (see [tinyurl.com/cn84w6y](http://tinyurl.com/cn84w6y)). From *AlanKent321*'s response, we just can't understand why they wouldn't want to do so... "Companies



never value the IT department. IT staff are unimportant within the company until the computers or network goes wrong, then they are seen as the problem," he wrote.

### BlackBerry's back

When we posted our BlackBerry Curve 9320 review ([tinyurl.com/7442dxo](http://tinyurl.com/7442dxo)), *Ash* thought it a welcome change to see a positive BlackBerry review. He wrote: "The industry needs diversity to keep competition and innovation alive. RIM has always ploughed its own furrow, but it's lost its position as the darling of the business community. If a cheap and cheerful handset helps to keep the wolf from the door, that's a good thing."

## Flagged: Star letter

### Tablets to replace PCs

Given the success of its hugely popular iPad, Apple CEO Tim Cook might be on to something with his theory that the tablet will eventually replace the PC for some users ([tinyurl.com/dycb42b](http://tinyurl.com/dycb42b)). However, that kind of remark is probably more credible to ordinary consumers than to techies and long-term computer users.

Those of us who started using PCs and Macs in the 80s or 90s will probably carry on using them for word processing and spreadsheets, for which desktops and laptops are optimised. People who started using computers after 2005, for whom web

surfing, social media, online purchasing and media consumption are the main uses, may well find that a tablet does pretty much everything they want.

*Martin Turner*

*Marie Brewis, managing editor, replies: PCs and laptops still have their place for certain tasks, Martin. At home I use only my tablet for web browsing, but I wouldn't dream of writing a review on anything other than my laptop, nor laying out or editing a page of this magazine on anything other than my iMac. Here's another use for your PC: a Crucial m4 SSD is currently on its way to your door.*



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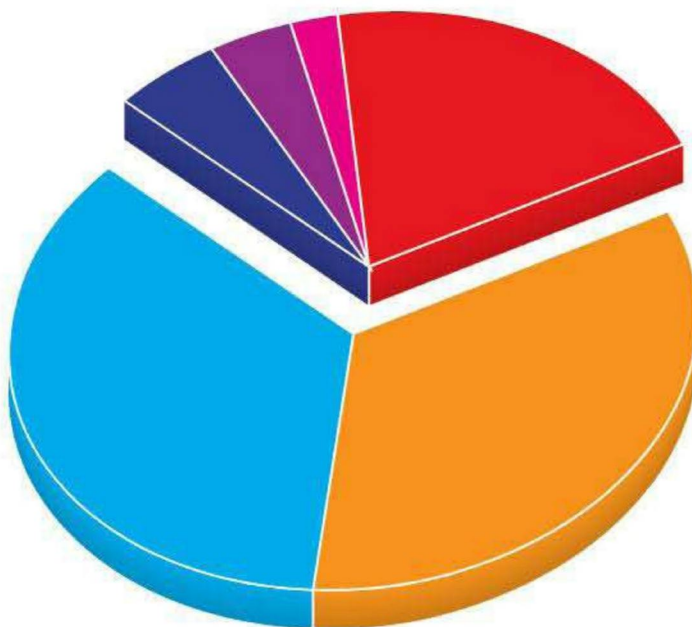
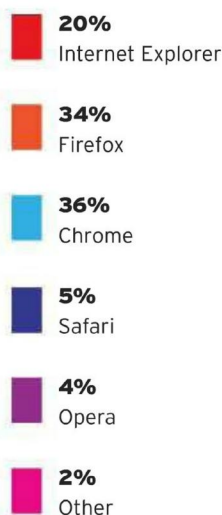




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tinyurl.com/d28d477

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### Web browser

Last issue we published *Battle of the browsers*, in which Chrome and Firefox came out on top. But one man's trash is another man's treasure, so we wanted to find out what browsers you were using and why. The results of our poll (left) suggest a similar theme, yet Speakers Corner appears to be hoarding a number of Internet Explorer fans, too (see [tinyurl.com/bucyae8](http://tinyurl.com/bucyae8)).

**AitchBEE** "I use Microsoft's Internet Explorer 8.0 all the time, and would give it douze points."

**ams4127** "I mostly use Internet Explorer 9.0 on my PC, but on my iPad Opera Mobile is lightning-fast and beats Safari hands down."

**mordwydd** "I use Google Chrome for everything, but I still say Netscape was the best!"

**WhiteTruckMan** "I made the switch to Chrome a few months ago, and I feel like I've got my machine back - it's such an improvement. Microsoft is going to have to seriously raise its game if I'm ever to move back."

**Input Overload** "I use Firefox 12.0 in Windows and Linux, and Internet Explorer for updating Windows. I no longer use Chrome as I find it too intrusive."

**Condom** "I tend to use Firefox for most things, but I still use Internet Explorer for banking. There's no particular reason behind this, only that it's what I'm used to."

**spuds** "I use Firefox as my main browser, Chrome for PCA, and Internet Explorer is on standby."

**Flak999** "I use Chrome all the time. It's far and away the best and most secure browser."

## letters@pcadvisor.co.uk

### My name's Alan, and I don't back up

So, back up, back up, back up, you repeatedly tell us, and yet the editor of *PC Advisor* magazine doesn't even back up his own data. What a complete and utter hypocrite! Only joking - for I, too, am guilty. But thanks to your *Backup superguide* (August issue, page 84), I might just start. *Alan Bream*

### Green eyes

Every month in your *News* section you run story after story about ISPs launching broadband services that promise faster-than-ever download speeds. Are you trying to make me jealous? I'm still clinging on to hope that one day I'll receive 2Mbps. *Tom A*

### Windows 8 in Windows 7

I read with great interest your feature about software alternatives (July issue, page 92). Of particular interest to me was Better Explorer, which brings the new Windows Explorer interface and functionality found in Windows 8 to Windows 7 for free. For those of us who aren't interested in the new touchscreen features and Metro interface, this freeware program is likely to prove very popular. *Maccyroo*

### Can gift a Kindle e-book

*Outbox* (July issue, page 146) is misleading. It is possible to lend a Kindle e-book, you simply need to remove the DRM protection first. This can be easily done with the free Calibre program and a couple of plug-ins. If you buy a paperback book you can do as you wish with it; the same applies to a Kindle e-book. *George Clarke*

### Backing the underdog

I read *Windows Phone beats Android & iPhone, yet few buy it* (August issue, page 23) with interest. I'm an avid Windows Phone user, and still hold out hope that it will become more popular with users and that more handsets carrying the platform will be produced. As you say, it's fast and has received critical acclaim, and history is proof that backing the underdog isn't always a bad idea. *Gregory Smith*

### A different view

I'm glad I read your ViewPad 10e review (August issue, page 38). Being a tight wad, I saw the 9.7in IPS screen in its specification and thought 'ooh, cheap iPad'. Thank you for saving me from my greediness. *James K* ☒





# MICROSOFT UNVEILS TWO SURFACE TABLETS

Hopes to take on Apple's iPad and Google Android slates with its own-brand Windows 8 tablets

Microsoft has announced that it will be releasing a series of in-house tablets. The tech giant announced not one, but two new 10.6in Surface-branded tablets at a special event in Los Angeles. The tablets are called Surface RT and Surface Pro. The Surface RT is an ARM-powered tablet, and the Pro sports an Intel x86 processor.

Microsoft has not yet released prices for either of the tablets. However, the company did give rough guidelines for when each tablet will be available. Surface RT will go on sale at the same time as the launch of Windows 8, which is expected this autumn. The Surface Pro tablet will hit the shops three months later.

It's no secret that Microsoft has been working on a multi-platform Windows OS but, at the last-minute press event, the tech heavyweight officially announced that it will rival Apple and Amazon by releasing its own tablet device on the market.

Steven Sinofsky, president of Windows at Microsoft, said: "We see a tablet that's designed the way Windows has been designed. A tablet that works and plays the way you want to. A tablet that's a great PC. A new type of computing: Surface. USB 2.0, thin, feels natural in hand. The first PC with a VaporMg Case.

"It has a permanent scratch- and wear-resistant surface. It accentuates the unique feel of Surface, and it has access to all the Windows apps for entertainment. It has an optically bonded 10.6in display that will minimise glare and make it good for reading," he said.

The Microsoft Surface RT, as the name suggests, comes with Windows RT - the version of the operating system designed specifically to run on tablets with ARM processors. Breaking with Android and iPad tradition, the Surface has a 10.6in screen with a scratch- and wear-resistant surface.

Its specifics are comparable to the iPad at 9.3mm thick and 676g.

The Microsoft Surface Pro is similar to the Surface RT, but with very different specifications. It's in essence an Ultrabook-type laptop squeezed into a tablet. It also has a 10.6in screen, but with a full-HD resolution. It's powered by a third-generation Intel Ivy Bridge Core i5 processor and has up to 128GB of storage. Microsoft claims it has the capability to play modern games such as Diablo 3.

For console lovers, both Surface tablets will come with Xbox Video, Xbox Music and the Xbox Companion apps.

Microsoft has developed two innovative covers for the Surface tablets; like the iPad's Smart Cover, these are attached using magnets. The Touch Cover has flat, pressure-sensitive keys that can detect when you're typing, while the Type Cover has mechanical keys and a multitouch trackpad.



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# WINDOWS 8 RELEASE PREVIEW GOES LIVE

Microsoft's final pre-release version of Windows 8 includes user interface changes and new apps

Microsoft has launched Windows 8 Release Preview, the last iteration before the full version OS goes on sale this autumn.

The tech giant released the latest version of the operating system for PCs, laptops and tablets on 31 May. The Windows 8 Release Preview is the final pre-release version and is available to download in 14 languages.

The Release Preview includes Windows 8, Internet Explorer 10.0, new Windows 8 apps and hundreds of new and updated apps in the Windows Store.

According to the firm, millions now use the OS on a daily basis since the first preview was released last year, meaning hundreds of millions of hours of testing.

The Windows Experience Blog said of the Release Preview: "There are many improvements and refinements across the Windows 8 Release Preview that folks will see right away, while others are under the hood. For instance, you will find more personalisation options for the Start screen (including more colours), improved multi-monitor support, and new Family Safety features to name just a few."

Looking forward, Microsoft said: "Our next milestone is traditionally called Release to Manufacturing (RTM) and from today until RTM, we will still



change Windows 8, as we have done in past releases of Windows."

It seems as though we are fast approaching the full RTM release of Windows 8 with Microsoft adding that it will enter the final phase in the summer. "If we are successful in that, then we are tracking to our shared goal of having PCs with Windows 8 and Windows RT available for the holidays," said Microsoft.

"Delivering the highest quality Windows is the most important criteria for us at this point - quality in every dimension. The RTM process is designed to be deliberate and

maintain the overall engineering integrity of the system."

As of 2 June, Microsoft started a Windows Upgrade Offer, so anyone who buys a machine that comes preinstalled with Windows 7 Home Basic, Home Premium, Professional or Ultimate will be able to upgrade to Windows 8 Pro for \$14.99, when it is fully launched.

Although there is no set date for the launch, it is widely expected to happen in October. Microsoft added it will be ultimately up to its partners as to when PCs with Windows 8 will be available on the market.

## Apple iOS 6.0 platform previewed ahead of autumn launch

Apple adds 3D Maps, extra Facebook integration and Siri to the iPad with iOS 6.0 operating system

Apple has previewed iOS 6.0, which will arrive on iPhone, iPad and iPod touch in autumn.

As expected, the firm announced the latest version of its mobile operating system at its worldwide developer conference (WWDC) in June. It comes with over 200 new features, according to Apple, and will be a free upgrade later this year.

"iOS 6.0 continues the rapid pace of innovation that is helping Apple reinvent the phone and create the iPad category, delivering the best mobile experience available on any device," said Scott Forstall, Apple senior vice-president of iOS software.

Apple has ditched Google Maps in favour of its own Maps app, with vector-based elements for smoothness. It also offers



turn-by-turn navigation with real-time traffic information, 3D views and local search.

"We can't wait for hundreds of millions of iOS users to experience the incredible new features in iOS 6.0, including the new Maps

app, expanded Siri support, deep Facebook integration, Shared Photo Streams and the innovative new Passbook app," said Forstall.

With the release of iOS 6.0, Siri - the voice-recognition software that was exclusive to the iPhone 4S - will now make its way on to the iPad. Siri has new features, including the ability to open apps, retrieve sport scores and dictate posts to Facebook and Twitter. It also has an 'eyes-free' feature, which means the iPhone can be controlled purely by voice.

Integration with Facebook has been ramped up and is "the best ever in a mobile device", according to the firm. Users can sign in and post from the Notification Center, Siri and Facebook-enabled apps, including Photos, Safari and Maps.



## Virgin offers free Wi-Fi on the tube

Virgin Media has switched on free Wi-Fi internet at four London Underground stations. The service has been put in place ahead of the London 2012 Olympic Games and is now live at King's Cross, Warren Street, Oxford Circus and Green Park. Virgin Media has promised a total of 80 connected stations by the end of July and 120 by the end of the year.

**MORE:** [tinyurl.com/c6Ltfj8](http://tinyurl.com/c6Ltfj8)



## Greene King pubs join The Cloud

Greene King has struck a deal with The Cloud to bring Wi-Fi to its pubs, restaurants and hotels. The deal will see the firm's 2,400 locations fitted with free Wi-Fi for customers to use on smartphones, tablets and laptops. The service will be available from the summer, with no time constraints and a typical fair-usage policy.

**MORE:** [tinyurl.com/btrtgbj](http://tinyurl.com/btrtgbj)

## No-contract 3G broadband for ThinkPad laptops

Select ThinkPad laptops with an integrated 3G modem can now access a no-contract mobile-broadband service, Lenovo announced in June. The pay-as-you-go service is called Lenovo Mobile Access and is available in the US and nine European countries, including the UK, France and Germany.

**MORE:** [tinyurl.com/6tkwysq](http://tinyurl.com/6tkwysq)

# BT ACCUSED OF MAKING BROADBAND MONOPOLY

Government threatens telecommunications giant with structural separation

BT may have to split into two companies after being warned it is making a monopoly out of super-fast broadband.

The warning comes from shadow business minister Chi Onwurah, who said UK ministers are risking "sleepwalking into another monopoly". Onwurah gave evidence to a committee inquiry into broadband at the House of Lords in May.

"I think structural separation is something we are going to have to look at," she said. "It's a significant intervention and BT would rightly complain, but monopoly provision of super-fast broadband just isn't an acceptable option."



BT has rejected the claim that it has a monopoly on broadband, pointing toward the fact that Virgin Media's network covers half the UK.

However, a problem area is the £980m that will go towards upgrading copper wires to fibre. This sum includes £530m that

only BT and Fujitsu are bidding for at the moment.

Virgin Media said that it doesn't simply want the money to go to it rather than BT. The firm said that in urban areas competition has led to faster speeds and better prices for consumers, but it's concerned that the money is likely to go to BT and reinforce its monopoly in rural areas where it already dominates.

"The government is doing so much to get competition into the NHS where nobody really wants it, and doing so little to get competition into telecoms where everybody agrees it is the best way," added Onwurah.

## UK BROADBAND USERS CHEATED OVER INTERNET SPEEDS

UK broadband users are paying for vastly exaggerated internet speeds, receiving an average of 7Mbps compared to their providers' promised 12Mbps. This equates to an average of 5Mbps lost between the claim and the actual usage.

A *Guardian* online survey of 3,000 readers found most users pay for better broadband access than they receive.

The worst-performing ISPs were Sky and TalkTalk, where

users reported a 60 percent shortfall between what these providers advertised and what users experienced.

Sky subscribers bought into advertised broadband speed rates averaging 12Mbps, but received a mere 4.8Mbps.

TalkTalk customers were promised an average 8Mbps speed, but reported just 5Mbps.

Virgin subscribers fared better, but the gap between advertised and actual rates were

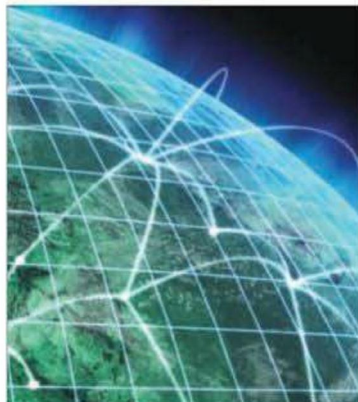
still 41 percent apart - they got 17.7Mbps instead of 30Mbps.

Much-maligned former public telecoms provider BT came out on top of the satisfaction charts, with a sizeable but still below-average shortfall of 27 percent on BT's popular PlusNet service.

Ofcom defines 'broadband' as 2Mbps or over, which is the minimum bandwidth needed for video services such as the BBC's iPlayer.

## O2 and Vodafone join forces for 4G rollout

Firms will create shared network for improved coverage



Vodafone and O2 owner Telefonica are aiming to roll out 4G faster by joining their mobile networks into one shared grid in the UK.

The mobile operators will pool their basic infrastructure to improve coverage and speed up the rollout of the 4G service. The firms are planning to achieve two competing nationwide 4G networks two years ahead of Ofcom's requirement of 98 percent coverage by 2017.

Ronan Dunne, CEO of Telefonica UK said: "This partnership is about working smarter as an industry, so that we can focus on what really matters to our customers - delivering a super-fast network up to two years faster than Ofcom envisages and to as many people as possible."

O2 and Vodafone will combine their networks into one jointly operated grid, which will run their independent spectrums. ☐



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- 2.) Anatomy: the crown of the head
- 3.) Astronomy: a point in the sky towards which a star stream appears to move
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  - b. continually sets the bar for SSDs each year
  - c. the culmination of SSD expertise, obsession, and evolution
  - d. does not follow the lead of another to obtain greatness; trailblazer



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# How spammers stay ahead of the law

Email spam may be on the wane, says Cameron Scott, but criminals are becoming smarter to keep the money coming in

**W**hen Microsoft slayed the notorious botnet Rustock, which had been sending as much as 40 percent of all spam worldwide, in March 2011, it forced the volume of spam into a decline from which it has never fully recovered.

But while spammers lost a major weapon in their arsenal with the Rustock seizure, they have proven adept at changing their tactics. In the past few years, security experts say, spammers have embraced more sophisticated means of tricking users into following links. They have also followed users from email on to social networks.

At its peak in late 2008, spam accounted for more than 90 percent of all email sent worldwide, with more than 5 trillion messages sent each week. In 2011, spam accounted for about 75 percent of email with 294 billion messages a week, according to Symantec's 2011 Internet Security Threat Report.

## The money-spinner

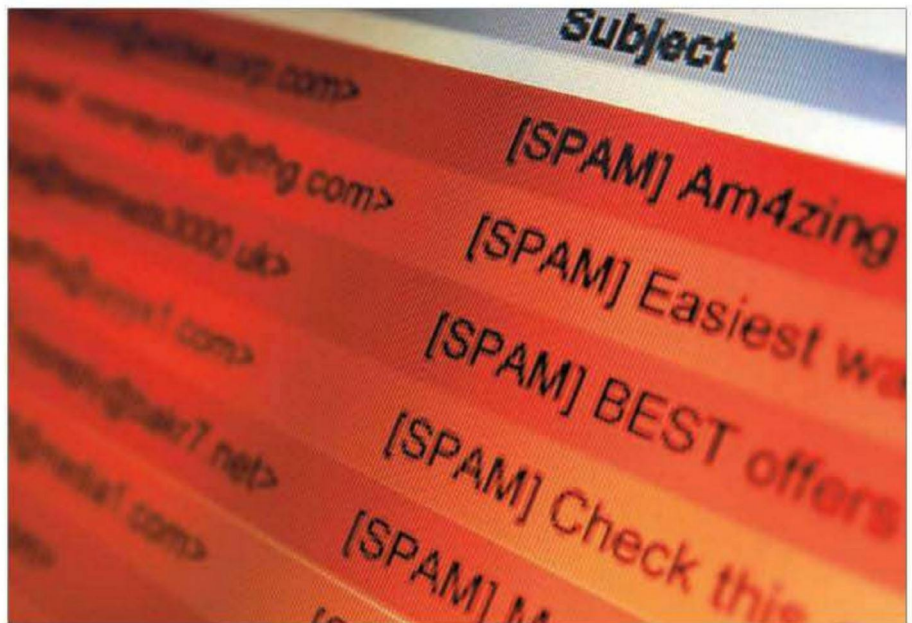
Spammers have seen their incomes fall since the boom times, yet the major players can still make a million dollars a year from each major advertising client, according to Stefan Savage, a University of California San Diego computer scientist whose research into pharmaceutical spam has provided some of the most concrete information available about the underground spam economy.

Of course, in the spam world, as in the real world, not everybody is a big dog.

"There are a small number of people who make a lot of money and then it drops off precipitously," said Savage.

The money comes from those people who decide to buy cheap Viagra or a fake Rolex, or perhaps a discounted cancer drug. In most cases, spam experts say, the suckers receive a product in the post that may not even work. About three quarters of all spam messages promote real products.

A spammer gets a 35- to 50 percent commission for each purchase made on a website that comes via a custom link that identifies them as the source of traffic. The spammer commandeers more of the profit than the seller, according to Savage. In order to make such an arrangement, the product must have a high-profit margin to begin with, which explains why unlicensed generic drugs, pornography, pirated



software and casinos are popular topics of spam messages.

To send messages, a spammer uses a stockpile of bogus email accounts that have been hacked into or created for the purpose. They might also purchase valid accounts – the going rate, according to Savage's research, is 1 cent for a Hotmail account and 7 cents for a Gmail account. These transactions are organised on underground forums such as BlackHatWorld, over internet relay chat, or even on websites such as Freelance.com.

Spammers also purchase lists of would-be recipients' email addresses. Cybercriminals gather these addresses using keylogging software on infected computers or by scraping them out of a compromised database on another website. They may also download PDFs that contain addresses and pay lackeys to enter them into a database. A tried-and-tested technique involves crawling the web in search of email addresses.

An A-list spammer usually controls his own botnet using a server called a command-and-control centre. If a spammer doesn't own a botnet, he will rent one to send his emails.

"Botnets are the ultimate tools of trade in the cybercrime ecosystem and are capitalised in many ways, but what's common is the fact that the botmasters always get the lion's share," said Catalin Cosoi, chief security researcher at Bitdefender.

The same botnet may simultaneously launch another spam attack or distribute malware. Spammers who are willing to tolerate the increased risk of arrest that dealing in malware brings, may load malware programs or links to infectious websites into the same email that has the advert.

## Inside the operations

Researchers don't often get to peek into spammers' operations. A few instances in which they managed to do so suggest that for every 10 million spam emails sent out, more than 7.5 million are rejected at the ISP level. At least 2.45 million are blocked by email systems' spam filters. (The major filters enjoy success rates higher than 98 percent.) Just 50,000 emails reach a user. At best, half of those are opened. Roughly 300 people click on a link, with just 55 buying something. A spammer would make more than \$2,000 from those clicks, though. A phenomenal success would consist of getting 2 percent of the email's recipients to click on a link.

Volume is key for commercial email spam, so the technique is known as "spray and pray", said Chester Wisniewski, a senior security advisor at Sophos.

Malware gets more attention than commercial spam because it ostensibly causes more damage. But it makes up just 3 percent of all email and largely plays a



“

**Botnets are the ultimate tools of trade in the cybercrime ecosystem and are capitalised in many ways**

”

supporting role to commercial spam. By bringing more computers into the botnet, it provides the firepower to send all those commercial emails.

When Microsoft destroyed Rustock, spammers lost control of a huge network of unknown size (estimates ranged from about 850,000 to more than 2 million infected computers). In the months following the take-down, the percentage of spam emails carrying malware, not including messages that pushed users to links that would deliver it, rose significantly according to Eric Park, an abuse analyst at Symantec. The trend suggested that spammers were trying to regain the firepower they'd lost.

Because malware plays the vital role of “botting” more machines, the spammers devote their craftiest messages to it. Significant innovation has occurred in this area, possibly as a result of pressure on the command-and-control centres from law enforcement and companies, including Microsoft, filing civil actions.

Gone are the days of misspellings and amateur graphics. And emails often play on human psychology to ensure a click-through to the website that downloads the malware. One email purporting to come from the US Postal Service notifies you of a package sent using a label charged to your credit card. The recipient will want to track the payment and obtain a refund, but the link simply promises to provide more information.

### Abusing social networks

Spammers are also increasingly using social networks such as Facebook and Twitter to drive users to their adverts. Paul Judge, Barracuda's chief research officer, said the reason was simply “more eyeballs”.

Say a spammer has the maximum of 5,000 friends on Facebook. If he uploads a photo and tags it with the maximum of 50 people, Judge said, he can reach 250,000 people with a single photo and accompanying link - five times more views than result from 10 million emails.

But in some ways the problem of spam on social networks is more intrinsic than that. The sites' core function is to bring people together. They make it easy to join and easy to share content. In fact, the URL shorteners that are used to further ease sharing on social networks have been a boon to spammers because they create multiple links to the same page while concealing the domain name.

Spammers that have created a personal account - Judge estimates that as many as 30 percent of Facebook accounts are fakes that belong to spammers - can buy a Twitter follower for 2 cents, a Facebook friend for 3 cents or a ‘Like’ for 4 cents. Facebook accounts are also frequently hacked, allowing the spammer to fabricate a public recommendation for his product.

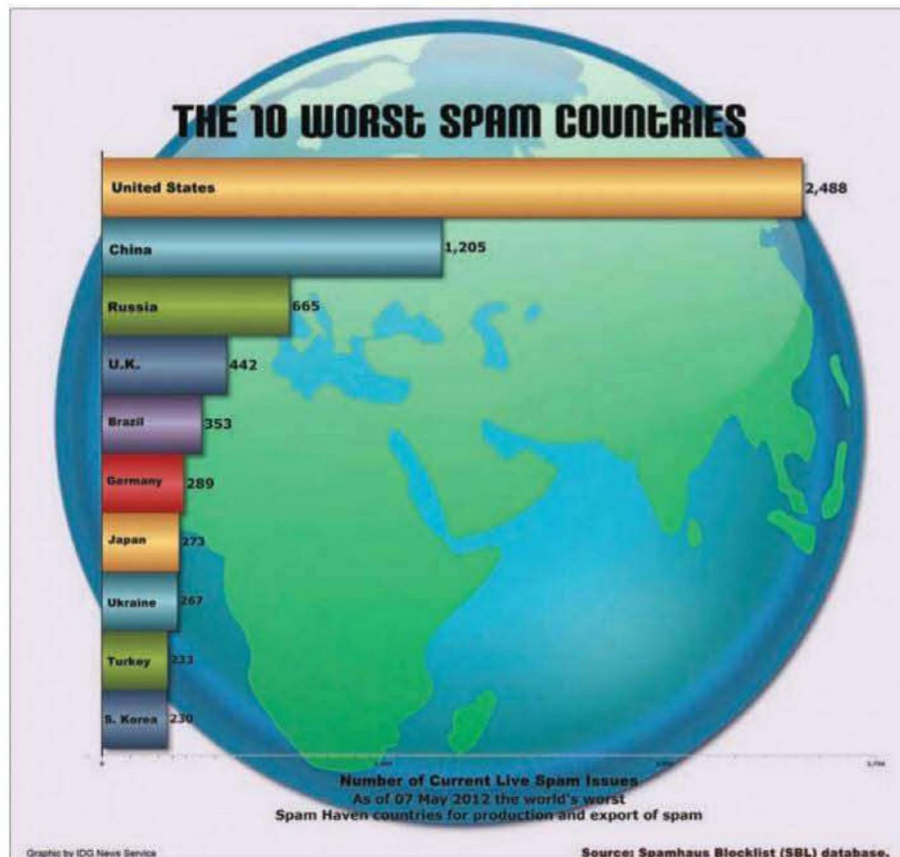
According to Chris Grier, a computer scientist at the University of California at Berkeley who researches spam on social networks, the number of social spammers continues to grow, suggesting that they are making money.

The new cohort of spammers is not yet established enough to run their operations on botnets, said Grier. But security companies have seen some botnets repurposed to run this kind of spam. Malware is relatively rare, largely because the social networks take more aggressive action against it than they do commercial spam.

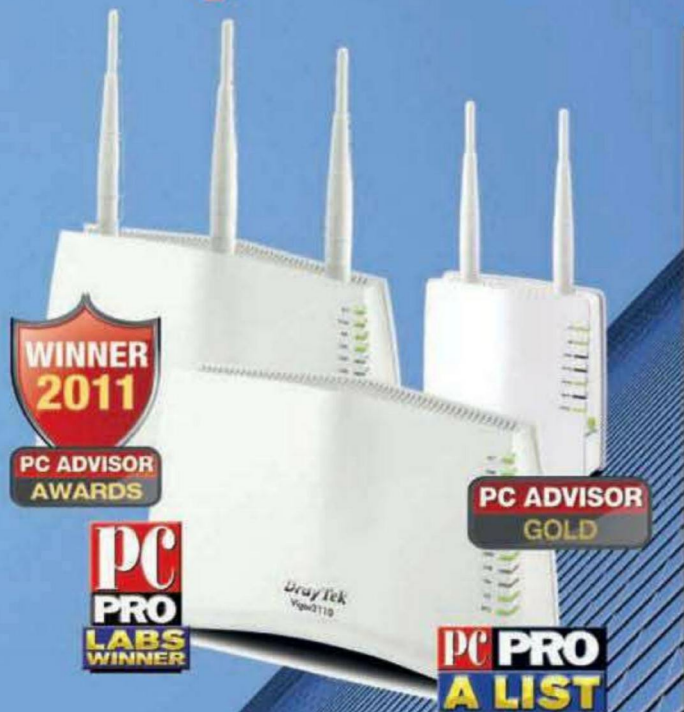
Experts say social-networking sites are already becoming more serious about spam. Facebook recently announced a partnership with several security companies to give users access to free antivirus software for six months. While Twitter has brought legal action against spammers on its platform.

The evolution is a familiar one. Webmail providers such as Hotmail were initially hostile to security companies' overtures to help with spam, said Wisniewski. But when the problem began to hurt their bottom line, they opened up to the companies. He expects Facebook and Twitter to act more aggressively against spam if it begins to drive users away.

But Grier offered the flipside of the comparison to email spam. “As the defences get better, we'll see more sophisticated tools. We'll see the same sort of evolution on social networks” that we did on email. Which means users could be in for a long ride. ☒







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## Intel vs ARM: which is best for Windows 8?

Intel and ARM are both keen to make the case for why the upcoming Windows operating systems are better on devices with their processors. Agam Shah meditates

**W**ith the big release of Microsoft's Windows 8 OS fast approaching, the war of words between Intel and ARM has become more heated as the rivals gear up for the release of new touch-based devices with their processors.

The companies used the Computex trade show in Taipei as a sounding board about why the forthcoming Windows OS was superior on tablets and laptops running on their processors. Intel said Windows virtually grew up on its x86 processors, painting ARM as the new kid on the block that can't yet be trusted. ARM said that Windows devices based on its processors will attract a fresh user base with few ties with legacy PCs.

Microsoft's forthcoming Windows OS will come in the Windows 8 edition for x86 chips and Windows RT for ARM devices. ARM dominates the tablet market, but Windows RT provides a path for Microsoft to establish a foothold and to compete with Apple's iOS and Google's Android.

### A threat at ARM's length

The few ARM-based Windows RT devices shown at Computex took some attention away from Intel-based Windows 8 tablets and Ultrabooks, which dominated the show. Asus announced Tablet 600, a Windows RT tablet running on nVidia's Tegra 3 chip, and Acer said it would ship Windows RT devices in the first quarter of 2013. Qualcomm gave users a hands-on with prototype RT devices. And just a few weeks later Microsoft demonstrated two tablets, both called 'Surface', one with an Intel chip, the other ARM.

Microsoft had to re-engineer Windows to work on ARM chips. Windows 8 and RT share common features, such as the touch interface, but the apps are platform-specific.

### Intel: fighting talk

Intel has already started the rhetoric against ARM around Windows 8, with Intel's CEO Paul Otellini in May saying that ARM devices will be incompatible with existing Windows applications and drivers. Intel echoed that belief at Computex.



"Windows will run best on Intel architecture," said Hermann Eul, president of Intel's Mobile Communications Group.

Intel architecture has been optimised for Windows for generations, and there's a large developer ecosystem for Windows on x86. Intel chips will run a wider range of utilities and apps on both tablets and Ultrabooks, said the firm. Perhaps more importantly, though, is the legacy software customers will continue to use on Intel devices.

### Legacy software

But tablets with ARM processors became popular without Intel's help, and that story becomes more compelling with Windows RT, said Simon Segars, executive vice-president of the processor and physical intellectual property divisions at ARM.

"Tablets achieved a 10 percent penetration rate in the US in less than two years. If legacy software was a problem, that wouldn't have happened. I don't see that for Windows," Segars said. "It's just not been an barrier to tablet adoption so far."

Calling the legacy software issue "overblown", Segars said there are always levels of incompatibility with every new OS.

But that issue is trumped by the low-power consumption and long battery life of tablets running ARM processors. That's going to be compelling to a lot of people, and particularly developers, he said.

### Worth a gamble?

Acer is taking a pragmatic approach, saying Windows on Intel is well-established, while Windows RT on ARM is a beginner where opportunities have yet to be explored.

But the PC maker has high hopes for Windows RT devices, said Jim Wong, corporate president of Acer. "We have to give it a try. Users who have no burden of legacy software will be able to enjoy a brand-new experience," he said.

Users are dumping legacy software and moving forward, and ARM will bring a low-power and long-battery-life element to devices that Acer finds attractive, Wong said.

The ARM platform will also be cheaper compared to the x86 architecture, but whether it is successful has yet to be seen.

"This isn't going to happen overnight. It's going to be good business. But this is good for the whole industry and there will be winners in the end," Wong said. ☒





# Experts question the need for a Facebook phone

Cost, competition and lack of demand makes Facebook's entry into the smartphone hardware market a difficult proposition, argues Mikael Ricknäs

**M**obile technology will play an important role for Facebook as it tries to find new sources of revenue, but analysts say building its own device doesn't make sense when competition is tough in the smartphone market.

Mobile users already represent a big chunk of Facebook's traffic. At the end of March, Facebook had 901 million monthly active users, and 488 million of those used its mobile products. In April, the number of mobile users surpassed 500 million.

However, Facebook's initial public offering (IPO) has put the spotlight on the company's earnings and the uphill battle it may have to monetise its user base. That's especially true in the mobile market, where it has almost no revenue.

To improve its fortunes, the social network is planning to release a smartphone by 2013. It's picked former Apple engineers to help it with the effort. Facebook has not responded to queries about the phone.

"I question whether Facebook needs to make its own hardware. Google needed to extend search across mobile devices with Android, whereas Facebook already has a huge amount of engagements on mobile," said Geoff Blaber, who leads mobile device software research at CCS Insight.

Blaber isn't the only analyst questioning how wise it would be for Facebook to get into the hardware business.

"I don't see a huge demand for a specific Facebook phone, for the single reason that Facebook is already available on every

smartphone," said Francisco Jeronimo, research manager at IDC.

Considering the cost and resources needed to develop a smartphone, it's difficult to see how the sums add up to favour Facebook – particularly when the state of the smartphone market is factored in.

"It is a hugely intensive undertaking to develop phones, because life cycles are extremely short – particularly in the Android world. There is an awful lot of margin pressure, and you have to ensure that you are competitive with every release. It is absolutely relentless," said Blaber.

By putting out its own phone, Facebook also risks alienating other smartphone manufacturers, according to Roberta Cozza, principal analyst at Gartner.

## HTC backing

The social network has already worked with partners such as HTC to develop phones with tight software integration and a dedicated Facebook button, but they never succeeded.

Reports in the *New York Times* and All Things D say that Facebook and HTC weren't put off by the failure of their ChaCha and Salsa devices, and are now working on new jointly developed handsets. That makes more sense than going at it alone, Cozza said.

But a smartphone isn't the only route Facebook can choose if the company is bent on having its own hardware. A tablet is an alternative, because the tablet market isn't as set as the smartphone market. Of course, tablets aren't as popular with young people.

An alternative route to having more control over mobile phones is the further development of HTML5, which Facebook is also pushing hard. The vision for HTML5 is that applications can be developed to run in the browser rather than directly on the smartphone, and they will be compatible with all devices. Changes made by Facebook would therefore affect more users than just those of its own smartphone.

A recent report stated that Facebook is planning to use some of the money from the IPO to buy Norwegian web browser developer Opera Software, which would help Facebook boost its web efforts.

"There is a very strong argument that Facebook is in a far better position to drive and dictate disruption using HTML5 than it is through creating its own smartphone hardware," said Blaber.

By purchasing Opera, Facebook would get commercial relationships with many of the world's largest mobile operators, according to market research company Strand Consult. Opera also has a presence in the mobile advertising market, an app store, and it knows a lot about what is going on in countries such as India, Russia and Brazil, and regions such as Africa and Asia.

However, the continued rumours that Facebook is indeed working on a phone seem to have some weight.

"As much as my view is that Facebook doesn't need a hardware presence at this point, that doesn't mean it won't go down that route," said Blaber. ☒



## Intel provides a glimpse into the future of Ultrabooks

Intel says sight, sound and touch are key to the future of Ultrabooks. Agam Shah reports

Intel provided a look into the future of Ultrabooks at Computex in June. It said the next big thing for the emerging class of thin-and-light laptops is natural interaction through sight, sound and touch.

Future Ultrabooks will be equipped with voice recognition, face tracking and touch features, which will secure the laptops and make them easier to use, according to Tom Kilroy, senior vice-president at Intel. The chip maker is promoting the development of sensors, screens and other technologies that will enable natural interaction with Ultrabooks.

"We're raising the bar on more natural interaction," said Kilroy.

### Stop! Thief!

Intel representatives on stage at Computex showed how sensors enabled an Ultrabook to sound an alarm if it was touched by a thief. They also talked about how Ultrabooks could be used for biometric sensing, health assessment and eye tracking.

Intel also demonstrated using voice commands to open a browser window or post Facebook updates. The firm earlier this year announced a partnership with Nuance; Kilroy didn't say when the technology would become available, but said it isn't far off.

"This is just the tip of the iceberg. There's so much more possible," said Kilroy.

But of all the forms of natural interaction, touch is the most important to Ultrabooks. It's a real game-changer and adds a new dimension to Ultrabook usage.

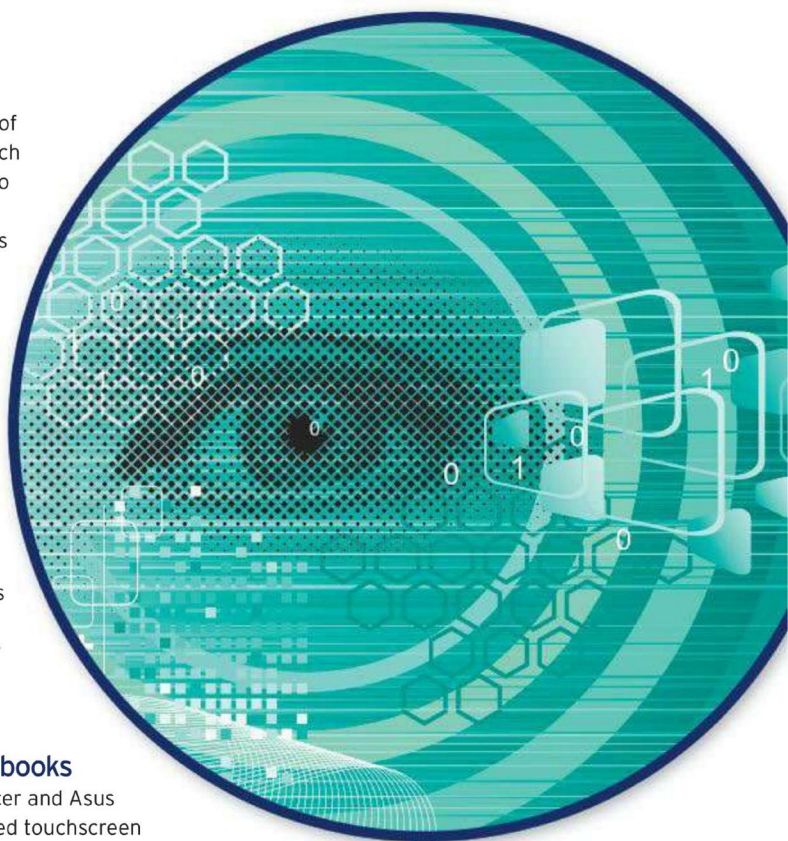
"We all know touch is just around the corner with Ultrabooks because Windows 8 will enable touch," Kilroy said. Combined with Microsoft's forthcoming OS, touchscreen Ultrabooks could provide the flexibility of a tablet for media and a traditional laptop for power users.

### Touchscreen Ultrabooks

PC makers including Acer and Asus have recently announced touchscreen Ultrabooks running Windows 8, while Lenovo, HP and Dell have announced Ultrabooks with standard screens. All the top PC manufacturers have committed to ultimately adding touchscreens to Ultrabooks as a new form of input.

The latest Ultrabooks run one of Intel's Ivy Bridge Core processors, which provide a 22 percent improvement in processor performance, 15 percent lower power consumption and two times better media and 3D graphics than the previous Sandy Bridge chips. Intel expects around 110 Ivy Bridge Ultrabook models to go on sale by 2013, of which 30 will have touchscreens.

Intel is the biggest backer of Ultrabooks, which it defines as a category of thin-and-light laptops with tablet-like features, such as touchscreens, long battery life and always-on connectivity. Intel hopes that Ultrabooks will reinvigorate the slumping PC market, which has been hurt by the growing sales of tablets.



"We strongly believe consumers are going to gravitate toward Ultrabook convertibles," said Kilroy.

Given its expectation that touchscreen demand will jump, Intel has partnered with TPK, Wintek, Cando and HannsTouch to expand production capacity for 13in-plus touchscreens. The partnership is expected to increase the production capacity by somewhere between three and five times.

Pricing may initially be an issue for touchscreen Ultrabooks, but could come down over time as the availability of systems increases. Ultrabooks have been subject to criticism in the past for high starting prices of around £800, but that number has recently come down to £650.

In addition to bringing new forms of interaction, Intel hopes to improve Ultrabooks' security and connectivity features, while reducing their size. The Ivy Bridge Ultrabooks have improved security features and content can be updated even when the Ultrabook is in sleep mode. Ultrabooks will come with Windows only, Intel said. ☒





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## Microsoft at E3: SmartGlass, Halo 4 and IE on Xbox

Microsoft outlined its Xbox game plan for 2012, introduced software called SmartGlass, and promised to conquer your living room. Ian Paul reports



**M**icrosoft took centre-stage at the E3 Expo, introducing new software called SmartGlass, which is designed to simplify sharing content across devices such as a game console, tablet and smartphone. The tech giant also announced a slew of new game titles, most notably Halo 4, and shared details for porting Internet Explorer to the Xbox 360 console.

Microsoft's overriding theme was to make the Xbox the central hub for your entertainment needs, reaching beyond the console to work with Windows PCs, iOS devices, Android tablets and forthcoming Windows 8 PCs. Microsoft is also using the Xbox to take a stab at Google TV, with Internet Explorer headed to the console. And coming soon to Xbox 360 are a number of additions to popular game franchises, including Gears of War and Call of Duty.

### SmartGlass

With SmartGlass technology Microsoft is aiming to make Xbox a seamless entertainment experience that lets you easily transfer content between devices, no matter which platform you're using. SmartGlass software can transform the devices you already know and love, said Mark Whitten, Microsoft's Xbox Live chief.

With SmartGlass technology, you'll be able to start watching a movie on your tablet and then transfer the content to your Xbox 360 in a single tap, without losing your spot in the film. While you watch via your Xbox, your tablet will then display information about the film you're watching, such as cast and crew credits.

In another demo, Microsoft showed how you could watch 'Game of Thrones' on your TV while your tablet shows you an interactive

map of Westeros (the imaginary land where 'Game of Thrones' takes place). The map tracks where you are in the show's timeline, and lets you see where other major characters are in their journeys.

SmartGlass can also turn your tablet into a controller. Microsoft showed a video demo of using

SmartGlass on a tablet to play Madden NFL by designing plays and controlling your team.

The new SmartGlass app will be available for Windows 8 devices, Windows Phone, iOS and Android devices.

### Xbox as an entertainment hub

Forget about Zune, Microsoft is turning the Xbox into its all-in-one entertainment brand. Coming soon will be Xbox Music, an online music service featuring more than 30 million tracks and available on Windows 8 PCs and tablets, Windows Phone and Xbox 360.

Microsoft also announced new video content partners for Xbox, such as Paramount Pictures, Univision and Machinima. The NHL and NBA online subscription streaming packages will be available on Xbox 360 for each sport's new season later this year. ESPN is also expanding its Xbox offerings with live programming from ESPN channels.

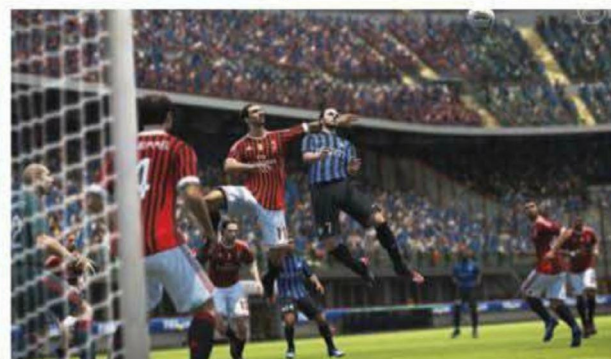
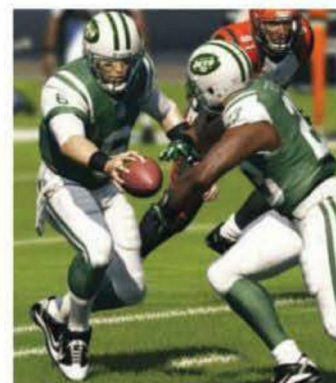
Microsoft is also expanding the reach of the Xbox brand by including apps for Xbox games, video, music and Xbox SmartGlass on Windows 8 tablets and PCs when the new OS launches, expected later in 2012.

### Internet Explorer

Microsoft's web browser is coming to the Xbox 360 later this year with a new Web hub that lets you navigate online content using Kinect voice and motion control, or use the SmartGlass app to turn your mobile device into a virtual touchpad. Internet Explorer will







have the same Metro-style look as Internet Explorer 10.0 in Windows 8. IE on Xbox 360 turns any TV into a SmartTV, Microsoft said.

## The games

**Halo 4:** The next instalment in the popular gaming series for Xbox heralds the return of John 'Master Chief' 117 as the main character. Due out 6 November 2012.

**Gears of War: Judgment:** A prequel to the original Gears of War coming in 2013.

**Call of Duty: Black Ops II:** The latest in this franchise will launch first on Xbox 360. The video during Microsoft's E3 event showed a section of the game taking place in LA where terrorists are wreaking havoc, while G20 leaders the world over are under attack.

**Madden NFL 13:** EA has some big plans for this year's version of Madden NFL. EA is making the biggest investment in gameplay in franchise history. You'll be able to use Kinect voice-recognition to call plays, audibles, "set, hike", or give direction to individual players. You can also use Kinect voice to power your defence. Madden NFL hits the shops on 28 August 2012.

**FIFA 13:** Another big hit from EA with Kinect voice-recognition lets you give your team clear commands for attack and defence. There is also a referee-feedback feature that keeps track of how you react to calls and

how often you swear at calls and have other negative reaction to the game.

**Splinter Cell Blacklist:** The latest game in this popular series is set on the Iran-Iraq border where you battle terrorists who have a list of US targets called the Blacklist. Your job is to stop the next Blacklist killing. Blacklist will feature Kinect voice control to let you control your team and do classic Splinter Cell moves, such as saying, "Hey, you" to lure a terrorist towards you, and then finishing him off. Splinter Cell Blacklist ships in spring 2013.

**Fable The Journey:** A fantasy game that uses Kinect motion control. Expected to hit the shops this summer.

**Nike Plus Kinect Training:** A personal Training-style program that guides you through workouts, assesses your performance and gives you feedback with reports on how you're doing. This one's due out this summer.

**Forza Horizon:** A new action racer that mixes Forza motorsports with open road racing. Shipping in autumn 2012.

**Tomb Raider:** Lara Croft is back with a new mature direction for Tomb Raider, due out in 2013. Game makers Crystal Studios also announced that the first piece of downloadable content for the

new Tomb Raider will come first exclusively to Xbox 360.

**Resident Evil 6:** Capcom showed off the latest version of its dramatic horror franchise, coming in late 2012.

**Wreckateer:** A new Kinect-powered slingshot game coming exclusively to Xbox Live. The basic idea is to wreck castles using a giant slingshot. Launching this summer.

**South Park: The Stick of Truth:** This RPG looks like a giant mash-up of everything you've ever seen on South Park. And it's no wonder. South Park co-creator Matt Stone said during Microsoft's event that he and partner Trey Parker wanted to create a game that made you feel as though you were in an episode of South Park. The game looks just like the show and involves you trying to become the fifth member of the gang. Coming March 2013.

**Dance Central 3:** Kinect-powered with moves from the past and the present, coming this autumn.

There were also teases for three new Xbox 360 exclusive franchises coming in 2013, including an Asian-style demons-and-dragons adventure game called Ascend New Gods, LocoCycle from Twisted Pixel, and a Tron-like maze game called Matter from filmmaker Gore Verbinski. ☒



Chris Martin reveals some of the hottest gadgets money can buy, including Apple's brand-new MacBook Pro with Retina display



## MacBook Pro with Retina display

### Laptop

The latest MacBook Pro from Apple now comes with a Retina display. Unlike previous Pro models, only a 15.4in-screen version is available - but with an eye-popping resolution of 2880x1800 pixels. It's powered by a 2.3GHz Intel Ivy Bridge processor and has a 256GB solid-state drive.

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## << Toshiba AT300

### Tablet

The AT300 is Toshiba's first Android 4.0 Ice Cream Sandwich tablet and successor to the AT200. It has a 10.1in LED screen and is powered by an nVidia Tegra 3 quad-core processor.

It will initially be available only with Wi-Fi connectivity, while a 3G model is set to launch later this year.

**£329 inc VAT (16GB Wi-Fi-only)**

**toshiba.co.uk**

## >> Sony NEX-F3

### Digital camera

The NEX-F3 aims to bring high-quality photographic results from a pocket-sized body with interchangeable lenses and a 16.1Mp Exmor APS HD CMOS sensor. The camera features a flip-out 3in LCD screen for self-portraits and a built-in pop-up flash to save you carrying one separately.

**£499 inc VAT**

**sony.co.uk**



## >> HTC Desire C

### Smartphone

The Desire C is HTC's latest budget smartphone running Google's Android 4.0 Ice Cream Sandwich operating system. It's a compact phone with a 3.5in screen. Despite the Desire C's small price tag, it comes with a near-field communications (NFC) chip.

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**htc.com/uk**



## Sonos Sub



### Subwoofer

The simply named Sub is a wireless hi-fi subwoofer that can be added to an existing Sonos system. It features a gloss black finish, with a matt version due to go on sale in October. The Sub has two 'force-cancelling' speakers, which are positioned face-to-face and can be set up with one button.

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## >> Logitech K760

### Keyboard

This compact wireless keyboard requires no batteries; instead, it takes its power from solar energy. It has a concave key design and uses Bluetooth for wireless connections. The K760 can be used with an Apple Mac, iPhone or iPad.

£69 inc VAT

[logitech.com/en-gb](http://logitech.com/en-gb)



## HP Spectre XT



### Laptop

HP has opted for an all-metal design for the Spectre XT. It fits Intel's Ultrabook requirements, measuring in at a slender 14.5mm and 1.4kg. Specifications include a third-gen Intel Ivy Bridge Core i5 processor, a 128GB or 256GB SSD and a 13.3in HD LED-backlit display.

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[hp.com/uk](http://hp.com/uk)

## > OSO Space Mount

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## Kodak ESP 3.2



### Printer

The ESP 3.2 is an all-in-one inkjet printer that costs less than £100. It has a 2.4in touchscreen and supports wireless printing from mobile devices such as smartphones and tablets. The Kodak aims to save you money, with the lowest average printing costs of any inkjet.

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Apple MacBook Pro with Retina display

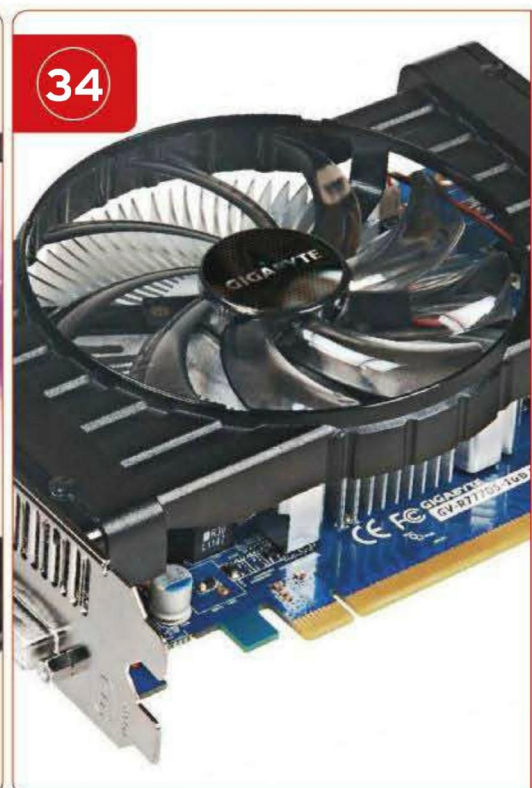
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ANDREW  
HARRISON

## Specs bomb

Ivy Bridge processors from Intel were still thin on the ground at press time – in their mobile form at least. But we're just starting to see the first laptops sporting Intel's new chip line trickle on to the market.

First to hit the *PC Advisor* test lab was a gaming machine from Dell's sci-fi gaming subsidiary, the moody Alienware M14x (page 36). The second was Apple's unprecedented MacBook Pro with Retina display (overleaf). The two machines are streets apart in style – and buying audience, too, I'd wager – but share a niche at the top end of the market for people who take their portable computing seriously.

For spec followers, they also curiously have in common a near-identical choice of Core i7 quad-core CPU and nVidia graphics processor, and similar Samsung mSATA solid-state storage. Yet the machines couldn't be more different.

Alienware manages to make a 38mm-thick chassis weighing nearly 3kg look chic, in its inimitable Area 51 kind of way. More than just a lightshow to entertain the cat, the backlit keyboard and those Knight Rider underlamps alert you that something potent lurks within its futuristic frame. It's a gimmick, but an impressively colourful development of the backlit keyboard technology Apple started with its PowerBook G4 laptops in 2003.

Contrast the dark angular aesthetic of Alienware with Apple's clean minimalism. A zen-like purity that now stretches to near-silent operation, thanks to the application of clever cooling-fan science.

In the MacBook Pro with Retina display, the inch-thick case of the original unibody has been milled down to 18mm, the weight reduced to 2kg. And somehow, Apple still finds room for a supercharged 99Wh battery, 50 percent larger than Alienware's or the older Pro.

And it needs that extra juice to help power the main attraction, a 2880x1800-pixel display that stands today as the highest-resolution monitor you'll find on any computer, desktop or laptop.



At the risk of repeating previous musings in this section introduction, such hyper-res displays will soon become the norm across the industry. Retina-like displays are long overdue, and they will shake off the legacy of fuzzy LCDs that should have been obsolete years ago. Considering the amazing advances in both processor and graphics performance, and storage capacity and speed, why have we been forced to peer into our computers' graphical interface at 20th-century resolutions?

The question's not entirely rhetorical: operating system support is one answer, as the popular Windows and OS X systems have had mixed results with resolution-independent interfaces. That's set to change this year, too, with today's OS X Lion and this summer's Mountain Lion already optimised for high-resolution displays; and Microsoft's Windows 8 should add some support for HiDPI monitors when it appears in the autumn. ☒

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#### Specification

2.3GHz Intel Core i7-3615QM; Apple OS X 10.7.4 Lion; 8GB DDR3L memory; 256GB Samsung mSATA 6GBps SSD; 15.4in (2880x1800) glossy IPS display; nVidia GeForce GT 650M with 1GB GDDR5 and Intel HD Graphics 4000; dual-band 802.11a/b/g/n with 3x3:3 Mimo antennae; Bluetooth 4.0; 2x Thunderbolt; 2x USB 3.0; HDMI; SD/SDXC slot; 720p FaceTime webcam; stereo speakers; 3.5mm headset jack with Toslink optical output; buttonless multitouch glass trackpad; Apple iLife 11 software; 99Wh lithium-polymer non-removable battery; 85W MagSafe 2 power adaptor; 359x247x18mm; 2.02kg

Build: ★★★★★

Features: ★★★★★

Performance: ★★★★★

Value: ★★★★★



## LAPTOP

### Apple MacBook Pro with Retina display

When it comes to Apple's latest breakthrough, the clue is in the name of the 15in MacBook Pro with Retina display. Two models are available prêt à porter, with either 2.3GHz or 2.6GHz Intel Core i7 Ivy Bridge processors. We road-tested one for an all-too-short week of effortless computing.

The updated MacBook Pro is very thin and light, only 1mm thicker than the Air and weighing just 2.02kg.

The build quality is simply outstanding. Lifting the satin aluminium lid – a perfect balance between flappy and stiff – reveals a very clean deck. The power button has been moved to the keyboard to save spoiling the effect.

The keyboard is like that fitted to the Air: black keys, white legends, backlit when desired with the help of a concealed light sensor. Typing remains a first-class experience.

It's extremely quiet in operation, too. By subtly staggering the pitch of the blades of two internal fans, a single resonance has been softened into a spread of frequencies. And remember, there are no other moving parts in the entire machine.

We tried stressing the MacBook with a heavy workload. Using Handbrake, we transcoded several MPEG4 TV programmes for use on an Apple TV. Handbrake used all available cores – four physical and four virtual – raising the load to 600 percent from a theoretical maximum of 800 percent.

At this point, we sensed a draught of warm air streaming from the hinge area. And in the quiet of midnight, could just discern the sound of the flowing air. At all other times, this laptop barely purred.

In use, we were rarely left waiting for anything: apps launched in a fraction of a second, web pages loaded almost instantly.

#### Ports and connectivity

The arrival of USB 3.0 is long overdue. The entry-level model may have 'only' 256GB of storage, but it's now a doodle to add capacity in the form of any number of fast and affordable external drives.

**PC ADVISOR**  
**GOLD**



Two Thunderbolt ports are also fitted, and a desktop-class Intel Cactus Ridge Thunderbolt chip suggests there are two independent 10Gbps high-speed buses.

Legacy ethernet, infra-red and FireWire are out. You can buy a Thunderbolt-to-gigabit-ethernet adaptor for £25; the FireWire 800 dongle should cost the same when it becomes available.

The bigger letdown in connectivity is wireless. We're not knocking Bluetooth 4.0, which promises better battery life for mice and keyboards (once Apple updates to the low-power standard...).

No, we're disappointed that in the same month that the first hardware featuring 802.11ac is launching, the Retina is saddled with 802.11n.

Nevertheless, a Broadcom BCM4331 chip gives the MacBook about the fastest 802.11n wireless you'll find, thanks to its three-stream capability through 3x3 antennae. In our tests, we saw file transfer up to 270 Mbps using short-range 5GHz.

#### Display

That super-resolution display really is the main attraction. It's stupendously gorgeous, but also slightly flawed.

'Retina' is so much more than a marketing term. The screen is a joy to behold, relieving eyestrain with sharp text. Colour depth from this in-plane switching (IPS) panel is so rich and saturated that it makes twisted-nematic screens look anaemic and fuzzy by comparison.

But it's a glossy screen, fronted with reflective glass. This MacBook Pro won't make as good a mirror as the standard model, however, and the wealth of detail, great contrast and deep colours go some way to make up for its distracting shine.

Apple says the new Retina display has 75 percent less glare than the standard MacBook models. If you put the standard model against a Retina, you'll notice a double reflection from the former from its sandwich of two reflective panels; the Retina's integrated one-piece panel has a single surface.

You can select between five different resolutions – 1024x640, 1280x800, 1440x900, 1680x1050 and 1920x1200. Absent is the panel's native 2880x1800, although we did get an idea of how fantastically small onscreen elements could be when running OS X as a virtual machine in VMware Fusion.

The other resolutions are remarkably usable. Set at 1680x1050 or 1920x1200 in particular, you get an exceptionally detailed and clear interface. Switch back to 1440x900, though, and you'll appreciate the razor-sharp HiDPI mode. Third-party apps can unlock the native resolution, although you'll need a powerful pair of specs to read from the screen.

To get the best out of the Retina technology, the software must first be prepped. Mac OS X itself, in the current Lion edition, is practically all-Retina now – as are several of Apple's own software titles, such as Final Cut Pro X and Aperture.

It's not all rosy – we started writing this review in the Apple Pages word processor, only to find pixellated fonts. So we switched back to the basic TextEdit, which benefits from keen rendering.

#### Performance

The necessary Windows drivers for testing the MacBook Pro with our usual benchmarks weren't available at press time. Instead, we ran the





2.3GHz model with a 256GB SSD through a raft of different tests.

As a guide, the only Ivy Bridge laptop we've benchmarked with WorldBench 6 is the Alienware M14x (page 36). With a similar specification, but slightly faster processor, the M14x hit 168 points. We estimate this MacBook Pro would follow with around 160.

Geekbench rates processor and memory performance. Over six runs, the MacBook scored an average of 11,969 points, putting it on a par with a Mac Pro with two quad-core 3.2GHz Intel Xeon X5482 processors.

In Cinebench R10, it scored 4,766 points with a single thread, rising to 18,569 in multiprocessor mode, and returned a multiprocessor speedup of x3.9. We expected in excess of x4, although Turbo boost can bump up a single core to a higher frequency.

Cinebench R11.5's OpenGL car-chase rendering test ran at 34.5fps, a fine result. From the same program, a single CPU core scored 1.31 points, while

combined cores resulted in 6.15 points, giving a multiprocessor speedup of x4.68.

We tested the speed of the internal SSD with QuickBench and Blackmagic Disk Speed Test. Quickbench showed sequential speeds up to 411MBps write and 488MBps read. Blackmagic's test indicated sustained speeds of 404MBps and 451MBps respectively - all sterling figures.

And thanks to the mSATA SSD's Samsung 830-based controller, write performance isn't compromised by the type of data.


Apple markets the IPS panel with 29 percent higher contrast than its predecessor. We don't have test results for that laptop to which we can compare the new MacBook Pro. However, our benchmarks indicated an 850:1 ratio. The maximum brightness was 314cd/m<sup>2</sup>, while the colour and luminance uniformity were excellent across the panel.

Colour was consistent to less than 1 percent variation at most brightness settings; the worst-case luminance was 18 percent at half-brightness, and rarely discernible to the eye. No light bleed was visible.

Comparing the colour gamut, the display could show 99 percent of sRGB, 68 percent NTSC and 74 percent AdobeRGB. Delta-E across 48 swatches showed colour accuracy averaging a low figure of 0.66. Excluding one 1F cyan test, the colour results never peaked beyond 1.6.

The viewing angles are outstanding, with the screen image remaining uncannily solid at the acutest of angles. The specs list 178-degree viewing, and the panel delivered. If you use this laptop in a public place, be aware that whatever's on your screen is now visible to a wide audience.

## Verdict

More than just light and thin, Apple's first retina-class Mac is a triumph in portable computing. We'd like to see an anti-glare option, but its very viewability almost makes us forgive the shiny screen. The MacBook Pro Retina is a greater achievement than we'd hoped. It's such a comfortable laptop to use - an engineering advance that excites the heart as much as the mind. But its £2,399 brother, which doubles the SSD storage and uprates the Core i7 to 2.6GHz, will be even better still.  **Andrew Harrison**



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£140 inc VAT

**Contact**

■ [fritzbox.eu](http://fritzbox.eu)

**Read more**

■ [tinyurl.com/cevdxrd](http://tinyurl.com/cevdxrd)

**Specification**

ADSL 2+ wireless modem router; 4x 10/100Mbps ethernet; 1x USB 2.0; 802.11a/b/g/n; 2.4GHz, 5GHz frequencies; FritzOS software; 2x2:2 MIMO antenna configuration; IPv6 support; VPN; WPS; 8W power consumption; 210x155x25mm

Build: ★★★★★

Features: ★★★★★

Performance: ★★★★★

Value: ★★★★★



## WIRELESS ROUTER

### AVM FritzBox WLAN 3270

AVM's flagship model, the FritzBox 7390, is one of the most impressive wireless routers around. It offers strong range and performance on both 2.4GHz and 5GHz wireless networks, has a particularly well-designed and user-friendly software interface and comes with a range of extra telephony functions. It costs around £200, though, which is more than many people are willing to spend on a router.

The mid-range FritzBox 3270 is a less expensive version, with fewer functions. It has the same red-and-silver design, with two detachable antennae now located on the outside. Unlike the 7390, it can't be used as a base station for cordless telephones, and it has fewer ports, too, with no connectors for analogue phones. While the 7390 can completely manage your landline telephone calls – with an answering machine, address book and smartphone app to route calls to an iPhone or Android phone – the 3270 is a much simpler device, restricted to just SIP VoIP services.

The 3270 is more limited when used as a router as well. Although it supports both 2.4GHz and 5GHz wireless frequencies, it can't operate simultaneously on both.

Its four LAN ports are also constricted to fast ethernet speeds (100Mbps), rather than gigabit

(1,000Mbps) of all modern routers.

There's a built-in ADSL modem, and the 3270 can be used for cable broadband, too. There's no dedicated WAN port, so one of the four LAN ports has to be used, leaving just three for your other devices.

The admin interface is excellent, though, one of the best we've seen on any networking product. A clear setup process greets new users, and all the settings are easy to find, within clearly labelled menus.

Troubleshooting wizards are just as straightforward. There are some great features here as well, such as a page with a graph that shows local interference on each wireless radio channel, helping you find the least congested. AVM regularly updates its software with new firmware, and this installs from within the router's software, without needing to manually upload from a PC.

We connected a storage device to the 3270 and measured its wireless performance up close, and long-range distances behind a thick wall.

At a distance of 1m, when using a 2.4GHz wireless network, we measured 72Mbps – a respectable, but not class-leading performance.



At long range, the 3270 managed 26Mbps. When we switched to 5GHz, short-range performance was closer to 100Mbps. This is likely to be the fastest speed you'll see, due to the restriction of the ethernet ports, not to mention the two-stream MIMO antennae array.

Decisions made by AVM in the design of the 3270 are questionable. Gigabit ethernet is now present on £20 routers, so it's disappointing that a £140 product should lack this feature. And simultaneous 2.4GHz and 5GHz wireless operation is available on far cheaper models, too.

## Verdict

Limiting routing and telephony functions makes sense if you don't need these advanced features on a broadband router. But crippling wired and wireless performance is less welcome, given the high price of this model. If you're tempted by an AVM wireless router, we'd suggest looking at the 7390 instead.

✉ Orestis Bastounis

£110 inc VAT

**Contact**

■ [uk.gigabyte.com](http://uk.gigabyte.com)

**Read more**

■ [tinyurl.com/bwj7bL9](http://tinyurl.com/bwj7bL9)

**Specification**

1GB GDDR5 RAM; 1,100/1,250MHz core/memory clock; 128bit interface; 640 stream processors; DirectX 11.1; DVI; HDMI; 2x Mini-DP

Build: ★★★★★

Features: ★★★★★

Performance: ★★★★★

Value: ★★★★★



## GRAPHICS CARD

### Gigabyte HD 7770 OC

AMD's Radeon HD 7770 is the larger brother of the HD 7750 that we recommend in our sub-£150 Top 5 chart (page 144). It's not as long as you might think, though. AMD's reference board measures 210mm, yet this Gigabyte version stretches only to 198mm and boasts an improved cooling system. This overclocked version barely even registered on our sound meter, a testament to the job that Gigabyte has done on the reference design.

The 7770 itself fits into the Cape Verde line-up, named after the Pacific Southern Islands.

Like other 2012 models, it's crafted using the more efficient 28nm process. In most respects,

the 7770 is like a tweaked version of the 7750, offering a 128bit memory interface and 1GB of GDDR5 RAM.

That's not a patch on the 2GB or 3GB of memory offered by the £250-plus cards, but it's no less than is found on the other cards at the 7770's price point. The memory interface is slightly disappointing but, as the figures will show, the 7770 is still capable of some solid game framerates.

The standard 7770 also shares the 7750's memory clock of 1,125MHz (4.5GHz DDR effective), although Gigabyte's overclocked version pushes this to 1,250MHz (or 5GHz, DDR effective). This means that, in spite of the meagre

128bit interface, the 7770 works with a memory bandwidth figure of 80GBps – noticeably higher than the 7750's 72GBps, but still not particularly impressive.

The 7770 brightens up when it comes to the core-clock speed. The default figure of 1GHz (itself 200MHz up on the 7750's figure) is boosted, again by Gigabyte, to an even more emphatic 1,100MHz.

And the 7770 also pushes up the number of texture units from 32 (in the case of the 7750) to 40. This allows the card to offer a texture fill-rate of 44GTps – a huge improvement on the 7750's 25.6GTps. Combine this with more stream processors, from 512 to 640,



**£220** inc VAT**Contact**■ [philips.co.uk](http://philips.co.uk)■ [Read more](#)■ [tinyurl.com/6mja2ns](http://tinyurl.com/6mja2ns)**Specification**

23.6in monitor; 1920x1080; 16:9; TN technology; tilt-adjusting stand; white LED backlight; 300cd/m<sup>2</sup> brightness; 1,000:1 (typical); 20,000,000:1 (dynamic) contrast ratio; 170/160-degree (H/V) viewing angles; 2ms response time; VGA; 2x HDMI; 3-year warranty; 578x443x194mm; 5.1kg

Build: ★★★★★  
 Features: ★★★★★  
 Performance: ★★★★★  
 Value: ★★★★★

**23.6in MONITOR****Philips 248X3LFHSB/00**

The Philips 248X3LFHSB/00 monitor brings a little bit of sunshine to your desktop with its eye-soothing Lightframe technology. This stylish, slimline and decidedly home-friendly 23.6in display is a premium model, aimed at those who value graceful design and are prepared to pay a bit more for a metallic trim and gentle curves.

Featuring a design aesthetic dubbed 'Moda', it's a great-looking monitor from all angles. The black rear panel is finished to a high gloss, and apparently deemed too beautiful to sully with a Vesa mount.

It incorporates a stick-thin aluminium stand, which arcs into a circular die-cast base unit. However, it's the Lightframe 2-enabled front bezel that really makes this display stand out. Philips has surrounded the display with a frame of soft blue light. It's no coincidence that this particular blue is a good match for the default Windows 7 wallpaper, in effect extending its reach right to the very edge of the monitor. Three levels of intensity let you tune the effect to your preference.

Three display inputs are provided, with two HDMI ports and a single VGA connector. No speakers are built in, but an analogue audio output enables you to pass the sound from an HDMI source to a pair of external speakers.

The display is controlled and configured by a row of control switches situated centrally below the screen. The onscreen menu is large and easy to read, and the usual brightness and colour controls are supplemented by a selection of custom image enhancements.

**Performance results**

At its default settings, the Philips performs much as you would expect from a decent twisted nematic (TN) monitor. Its colour accuracy and viewing angles won't rival a multiple vertical alignment or an in-plane switching display, but its high brightness (326cd/m<sup>2</sup>) and good contrast (800:1) make it pleasant to use and powerful enough for watching video at some distance from the screen.

During calibration, the display required adjustment to bring the colour temperature in line with the sRGB standard, but overall it was very consistent and could be relied on to correctly reproduce colours. We measured 98 percent of sRGB and 76 percent of Adobe RGB.

Although Philips claims viewing angles of 170 degrees horizontally and 160 degrees vertically, which



is standard, if improbable, for a TN display, we noticed viewing-angle issues more on this display than with similar products. We're being picky here, but if poor off-axis performance bothers you then you may notice it more than you'd like on this monitor.

Power consumption was especially low – just 21W at full brightness and 12W at 120cd/m<sup>2</sup>.

**Verdict**

Philips' 248X3LFHSB/00 is a good-looking monitor, rendered all the more interesting by its blue illuminated Lightframe bezel. Designed to reduce eye fatigue and stress, we found this feature works as described, making the display relaxing to use. However, at £220, the price is considerably higher than that of the average 23.6in display – especially when you can find superior in-plane switching displays below £150. **Paul Monckton**



and you have a very promising card that should offer a real improvement for that extra £25.

In real-world testing, the 7770 OC proved to be several notches up on the 7750. In BattleForge, the 7770 scored 40.5- and 36fps at resolutions of 1680x1050 and 1900x1200 respectively. This

compared with 31.3- and 27.5fps in the case of the 7750 – and those differences of 8- to 9fps could prove significant in allowing you to play games at a decent resolution.

The differences weren't so great in Crysis 2, where figures were low to start with. The 7770 scored 25.1- and 23.9fps, as opposed to 19.9- and 18.2fps from the 7750.

Stalker: Call of Pripyat saw the 7770 return to lead in the region of 7- to 8fps, with its figures of 37.3- and 35.8fps an impressive winner over the 7750's 30.8- and 27.3fps.

Note that the old Radeon 6850 – available for a similar price – recorded slightly higher figures. These differences never amounted

to more than a couple of fps, but the 6850 was consistently faster.

**Verdict**

The superior specifications and improved fan are well worth the extra money, and the 7770 OC offers playable game framerates in today's titles, provided that you aren't expecting fireworks – you'll still need to spend £250 or more for strong framerates in titles such as Crysis. The 6850 remains a slightly faster bet if you can find it, although the difference is marginal, and the 7770 OC's architecture may see it improve in future games. As a value prospect, the 7770 OC is an excellent card. **Robbin Morris**



£1,398 inc VAT

Contact

■ [alienware.co.uk](http://alienware.co.uk)

Read more

■ [tinyurl.com/cLgscmv](http://tinyurl.com/cLgscmv)

Specification

2.6GHz Intel Ivy Bridge Core i7-3720QM; Windows 7 Home Premium; 8GB DDR3 1,600MHz RAM; Samsung 64GB mSATA SSD; 500GB SATA HDD; 14.1in (1600x900) glossy display; nVidia GeForce GT 650M with 1GB of GDDR5 RAM; DVD  $\pm$  RW SuperMulti slot-load drive; 1.3Mp webcam; 2x USB 3.0; USB 2.0; VGA; HDMI; Mini Display Port; SD slot; microSD card slot; Kensington slot; gigabit ethernet; mic; headset jack; line-level in; 337x258x38mm; 2.94kg  
**WorldBench 6 score: 168**  
**Battery life: 307 mins**



LAPTOP

# Alienware M14x

PC ADVISOR  
RECOMMENDED

Alienware is renowned for its high-end gaming systems and individual design. If you're familiar with previous iterations of Alienware's laptops, there will be a distinct sense of déjà vu when it comes to this year's Ivy Bridge-wielding models: the exterior design is unchanged.

It's not that we don't like the design, but it was and still is a bit on the chunky side. We were hoping the M14x would come in a new and more slender chassis. We measured the laptop at 38mm thick and it weighs just under 3kg. Yet the M14x is now the smallest and most portable of the range since the company decided not to update the M11x.

Our review sample came in a matt black finish called 'cosmic black', but it's also available with a more standout 'nebula red' chassis.

The laptop has the distinct Alienware design combination of sleek yet aggressive lines. The finish feels like a cross between plastic and rubber, which feels nice to the touch and helps with grip in areas such as the wrist support.

The keyboard and trackpad are both of a decent size, and there are unearthly lights spread all around the laptop. These include four light-up sections underneath the keyboard and trackpad, which can be customised in hue and react to action on the screen.

## Build quality

Robust is the best word we can think of to describe the build quality of the Alienware M14x. The chassis feels solid in all aspects, with the screen offering a small - but not worrying - amount of flexibility. Our only concern is with the long-term durability of the coating, particularly on the lid - this could get marked if

care isn't taken. Alienware does a plush suede bag for storage.

## Hardware

The M14x is available built-to-order, and specifications vary greatly - one of the advantages introduced after Dell bought Alienware.

One of the most customisable areas is the choice of storage, with traditional drives, SSDs and hybrid combinations available. Prices can start at £999 if you drop below the default specifications.

Our Alienware M14x was powered by an Intel Ivy Bridge Core i7-3720QM processor clocked at 2.6GHz, rising to 3.6GHz in Turbo mode. This was backed with 8GB of DDR3 1,600MHz RAM. You can opt for a faster Core i7-3820QM and up to 16GB of RAM. Adding to the performance was a 64GB mSATA SSD, dedicated to Windows Home Premium, plus a 500GB hard drive for traditional storage.

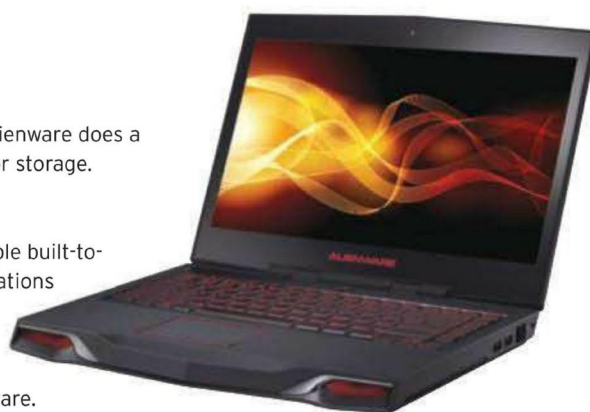
In our WorldBench 6 real-world benchmark test the Alienware M14x scored a fantastic 168 points - the highest score we've ever seen from any laptop PC. For comparison, the Apple MacBook Pro (late 2011) scored 133 and the Samsung Series 7 Chronos got 138 points.

This Ivy Bridge chip has integrated Intel HD 4000 graphics, but the Alienware M14X also has a dedicated nVidia GeForce GT 650M graphics processor. As standard, this has 1GB of GDDR5 memory, but you can double this for an extra £50.

## Performance

The Alienware M14x breezed through our basic Fear gaming test, as we expected it to, with an average framerate of 84fps; the lowest level to which we saw it drop was 41fps. Stepping things up to the next level, we ran Crysis at 1024x768 resolution with Low detail and DirectX 9. Here, the Alienware managed 107fps.

In Stalker: Call of Pripyat, the M14x hit 109fps in the Day setting (1280x720, Medium), and even managed 60fps when using its native screen resolution and Ultra settings.



As the name suggests, the M14x has a 14.1in screen. A relatively high pixel count of 1600x900 gives a 16:9 aspect ratio. The screen offers crisp detail but has a glossy finish, which makes viewing the display difficult under certain conditions. It reflects things like windows and lights all too easily; we would prefer a matt anti-glare option here.

Connectivity is well-rounded, with VGA, HDMI, Mini DisplayPort, USB 2.0, microphone, headset and headphone ports, plus a full-size SD slot and microSD slot, all on the left side of the body.

On the right is a Kensington lock slot, gigabit ethernet, two USB 3.0 ports and a slot-loading optical drive. On our sample this was a DVD  $\pm$  RW type, but it can be optionally upgraded to Blu-ray.

Standard wireless connectivity is provided by an Intel Centrino Wireless-n 2230, and for an extra £15 you can get a Killer Wireless-n 1202 802.11a/g/n 2x2 Mimo card designed for gaming and video. Both come with Bluetooth 4.0.

## Power and battery life

We recorded power consumption at 35W when idling with the screen at half brightness. When put under stress during our Crysis benchmark, the M14x needed 98W.

We managed to get just over five hours (307 mins) from the 63Wh battery in the MobileMark 2007 Productivity test.

## Verdict

Although the Alienware M14x looks the same as its predecessor - and still looks cool - it's what's on the inside that counts here. This Alienware offers style, high levels of gaming performance and plenty of connectivity inside a portable shell with a screen big enough for gaming sessions. ☒ Chris Martin





**£420** inc VAT**Contact**■ [samsung.com/uk](http://samsung.com/uk)**Read more**■ [tinyurl.com/7kan7bw](http://tinyurl.com/7kan7bw)**Specification**

2.2GHz Intel Core i3-2330M; Windows 7 Home Premium 64bit; 4GB DDR3 RAM; 500GB HDD; 15.6in (1366x768) matt LED display; Intel HD 3000; gigabit ethernet; 802.11b/g/n; Bluetooth; 3x USB 2.0; HDMI, VGA; 8x DVD  $\pm$  RW DL; SD slot; 1.3Mp webcam; 48Wh lithium-ion battery; 368x243x33mm; 2.3kg  
**WorldBench Score: 101**  
**Battery life: 321 mins**

**LAPTOP****Samsung NP300E5A-A01DX**

These days an entry-level laptop can crunch most tasks with ease. This cheap 15in Samsung laptop makes that point, delivering lashings of processing power and a useful set of features for just £420.

The Samsung doesn't look as cheap as some budget models, and the silver-black casing looks businesslike. But it does feel like a lightweight model, and this isn't necessarily a plus. The lid is very thin, and felt brittle - we were nervous it might snap. It is, however, effective at switching itself on and off as you fasten the lid.

Battery life is solid, and lasted almost 5.5 hours (321 mins) in the MobileMark Productivity test.

The keyboard has nicely spaced keys, although their stiff feel won't satisfy serious typists.

The touchpad is rather large, which also means there's little space in front to rest your wrist; it's not easy to use without accidentally touching it, sending the pointer skittering off in all directions.

Connection options are somewhat limited. Gigabit ethernet, 802.11b/g/n and Bluetooth 3.0 are included, as is HDMI and an SD Card slot. But the USB ports are 2.0-only and there's no eSATA.

The 15.6in screen is a good size, although just 1366x768 pixels is miserly for a 15-incher. It has a matt screen, which means you aren't distracted by annoying reflections. On the down side, neither do you get the infusion of colour offered by a glossy panel. Onboard speakers are typical for low-budget laptops. They'll do the job for email notifications, but tinny sound makes them an unlikely choice for musical enjoyment.

The NP300E5A-A01DX comes with a 2.2GHz Intel Core i3-2330M, which is one of last year's Sandy Bridge dual-core chips.

The Samsung is reasonably fast for its price, and secured 101 points in WorldBench 6 - one of the highest scores of any budget machine.



Intel HD 3000 graphics lack the firepower of discrete solutions, so forget about detailed action gaming. It delivered just 12fps in Fear at Maximum settings, although we saw up to 40fps and 67fps with High and Medium settings respectively.

**Verdict**

The Samsung packs considerable pace for its price, although build quality suffers. If supplies of this one are low, it's worth keeping an eye out for its more powerful brother, the NP300E5A-S01UK, at around £500. **✉ Robin Morris**

**£980** inc VAT**Contact**■ [vibox.co.uk](http://vibox.co.uk)**Read more**■ [tinyurl.com/7kn972a](http://tinyurl.com/7kn972a)**Specification**

3.4GHz Intel Core i5-3570K; Windows 7 Home Premium 64bit; Gigabyte GA-Z77X-UD3H; 8GB DDR3 RAM; 1TB SATA; 120GB SSD; CM Storm Enforcer case; 600W PSU; Sapphire Radeon HD 7850 with 2GB VRAM; 802.11b/g/n; 22x DVD  $\pm$  RW drive; 8x USB 3.0; 2x USB 2.0; 2x eSATA; DVI; VGA; 2x HDMI; DisplayPort; 2x Mini DisplayPort  
**WorldBench 6 score: 186**

**DESKTOP PC****Vibox Fantasy**

Vibox is a brand that's new to PCA, but its Fantasy system stands as a tidy showcase for many of today's fast but affordable PC components. The beating heart is its third-gen Intel Core i5-3570K processor. It's a 3.4GHz chip, with Turbo boost up to 3.8GHz. The flamboyant 8GB of Corsair Vengeance memory is suited to high speeds.

A WorldBench 6 score of 186 points doesn't match the YoYoTech Warbird ([tinyurl.com/6trfbak](http://tinyurl.com/6trfbak)), but that PC is vendor-overclocked. The K-type processor here can also be wound up if required. A Samsung 1TB drive gives useful storage space, joined by a Kingston SSDNow V+200 solid-state drive. Such SSDs greatly enhance responsiveness, but are often limited in capacity: this SSD measures a usable 120GB.

The 2GB-memory Sapphire version of the AMD Radeon HD 7850 does a great job of pumping out impressive framerates. It notched up a pulsing 379fps at Maximum settings in the simple Fear game.

Crysis is more of a challenge, but even here it excelled, posting scores of 186 and 138fps at Low and Medium settings. Ratcheted up to 1680x1050, it was still able to do more than 140fps. Push the detail settings to the max and you'll see more modest framerates of 46fps.

The Cooler Master Storm Enforcer is an eye-catching case. Its brutal black shading makes for an uncompromising look. The memory and PCI slots are pleasingly free of obstructions, and there are two spare DIMM slots available.

A 600W Xigmatek power supply is adequate here. The Vibox consumed around 72W when idle, moving to 163W playing Crysis. This is high, but impressive, compared to older gaming rigs. Sound levels aren't particularly high either, with the system adding around 12.5dB to background ambient.

Eight USB 3.0 ports (two mounted on the front) are offered, along with a pair of USB 2.0 on the front and two eSATA at the



back. Video output comprises two HDMI, DisplayPort and two Mini DisplayPorts.

The ample support includes a three-year labour warranty, and there's a free collect-and-return service for the first 90 days.

**Verdict**

The Fantasy isn't the most heart-stopping system we've seen, but it performs well in important gaming areas. The base speed is smart and the graphics performance very capable indeed. Storage space is good, and power consumption reasonably low. **✉ Robin Morris**



£99 inc VAT

Contact

■ seagate.com

Read more

■ tinyurl.com/c5L8ak2

Specification

Hard drive adaptor;  
1x Thunderbolt port;  
75x123x28.5mm; 94g  
(355g with 1.5TB drive)



## THUNDERBOLT ADAPTOR

### Seagate GoFlex Thunderbolt

Seagate's GoFlex series of external hard drives has a range of connection options to fill just about any computer port. With a snug clip-on adaptor, you can transform Seagate's FreeAgent hard disk into a USB 3.0, FireWire 800 or eSATA drive. Now Seagate has a GoFlex Thunderbolt adaptor to match.

It's much larger than the previous end-cap-style converters, comprising a sled-like board that sits under an attached drive; inside this underbelly are the electronics that translate between a disk's SATA language and the PCI Express of Thunderbolt. There's only a single Thunderbolt port, which is the standard for bus-powered Thunderbolt devices.

We tested a Seagate GoFlex FreeAgent drive using the Blackmagic Disk Speed Test on a MacBook Pro. The GoFlex Thunderbolt could sustain sequential transfers of 90MBps. We also tested the USB 3.0 adaptor in the same setup, and here also saw circa-90MBps read and write speeds.

With Thunderbolt's theoretical speed of 10Gbps, and USB 3.0 specified to 5Gbps, it's no surprise that a SATA disk could easily reach its peak performance. The Seagate GoFlex adaptors can be far more versatile, though, and able to accept naked standard-issue 2.5in SATA drives - disk or solid-state.

We stretched both Thunderbolt and USB 3.0 adaptors to their limits using a Patriot Wildfire 240GB. This third-gen SATA SSD was found to peak at 106MBps for writes and 163MBps for reads via USB 3.0.

Using the same SSD plugged into the GoFlex Thunderbolt adaptor, we saw writes and reads up to 146MBps and 163MBps respectively. We did experience some disconnections, likely due to peak current demands of the drive exceeding a strict limit provided by the Thunderbolt power bus. Both adaptors fell short of their respective standards' available performance. But neither of the



Thunderbolt or USB 3.0 adaptors will present any hindrance when using the system as designed with Seagate's matching GoFlex Ultra-portable disk drives.

#### Verdict

The Seagate GoFlex Thunderbolt adaptor is an ingenious attachment that allows speedy access to data. It also works with unboxed 2.5in SATA drives, although not necessarily with SATA Revision 3.0 SSDs with their higher power requirements. Apple is the leader in Thunderbolted PCs, making this Thunderbolt adaptor of particular interest to Mac users. However, since a June refresh, most Macs now also include USB 3.0, reducing the market for this unit.

✉ Andrew Harrison

## WIRELESS EXTENDER

### Netgear Universal Wi-Fi Range Extender WN3000RP

£49 inc VAT

Contact

■ netgear.co.uk

Read more

■ tinyurl.com/cr3jnz8

Specification

802.11b/g/n; 2.4GHz frequency; 2x2 antenna configuration; 100Mbps ethernet port; reset switch; wireless toggle; WPS; 112x74x45mm



Wireless networking's Achilles' heel is weak reception as your devices move further from the router's antennae. Wireless 'hotspots' are also common - areas within range, yet where performance drops. One way to extend an SSID to cover a larger area is with a wireless extender.

This Netgear is a small box that plugs directly into a mains socket, with an antenna on each side and four status LEDs at the front. There's a 100Mbps ethernet port and buttons to reset the router and disable its Wi-Fi, plus a reset button.

It works on the 2.4GHz band, and supports 802.11b/g/n devices.

To set up the WN3000RP, you simply press its WPS button, along with one on your router. This automatically copies across your SSID name and security details. You can also manually configure it.

Correctly positioning the Netgear is more difficult. The extender has to be within range of an existing wireless network, and its range must overlap with your existing

one. An LED at the front provides a visual cue to its signal strength. We positioned the Netgear within 15m of our router, behind a thick wall.

At this range, a file transfer using our original wireless network came through at 4.4MBps. When we switched to using the Netgear's wireless network, the transfer speed dropped to 2.6MBps.

We also tested the performance 10m from the WN3000RP. Here, the file transferred at 2MBps, where the laptop couldn't even connect to our network. This relatively small performance decrease is pleasing.

We moved the WN3000RP closer to the router and, at this range, the original wireless network managed 8.9MBps; the Netgear's performance dropped to 4.9MBps.

At 15m from the wireless extender, we recorded a transfer rate of 4.1MBps - again, showing only a small drop in performance, even though we were now 20m away from the main router and connecting from outside the building.



#### Verdict

It's clear that using a wireless extender such as the WN3000RP won't produce the same results as your router's in-range wireless. However, the minimal performance drop when testing the Netgear WN3000RP at long range is welcome. ✉ Orestis Bastounis



**£69** inc VAT**Contact**■ [trekstor.de](http://trekstor.de)**Read more**■ [tinyurl.com/bLw4fut](http://tinyurl.com/bLw4fut)**Specification**

6in E Ink ebook reader; 4GB internal flash storage; microSD/SDHC slot; TrekStor eReader software; Adobe Digital Editions DRM support; USB 2.0; 1-week battery life; six font sizes, auto-rotate, margin adjust; ePub, PDF, Jpeg, bitmap, .txt viewing, search, bookmark; lithium-polymer battery; 167x124x9mm; 216g

Build: ★★★★★

Features: ★★★★★

Performance: ★★★★★

Value: ★★★★★

**E-BOOK READER****Trekstor Pyrus**

The Trekstor Pyrus seeks to make its mark on the budget-end of the e-book market, but lacks the support of a large retail chain such as WHSmith with its Kobo Touch. The Pyrus comes with 4GB of storage and adds a microSD slot for expansion. As with most e-readers, the Trekstor Pyrus has bland looks.

At 216g, it's heavier than the plasticky Kindle. As with other 6in models, the Pyrus is rather broad (124mm) and not easy to hold in the palm of a hand. With no Wi-Fi support it relies on a USB connection to transfer books and photos from a Windows PC or Mac. Alternatively, you can load up a microSD card and have the Trekstor read files from there.

Items appear in the newly added menu when you next use the device. We found that only two of our PDF images we transferred via USB appeared in the Pyrus' menu, with no sign of the five Jpegs we'd hoped to be able to view either. We had no such issue viewing the same set of

images on our other e-book readers (Kobo, BeBook and Kindle 3).

Adobe DRM-protected books can be viewed on the Pyrus. An account needs to be created on your PC, where downloads are saved before you copy them across to the reader.

There is also Trekstor-specific e-book-management software for Windows and Mac. Both the terms and conditions and user interface are currently only in German. However, it includes an Adobe Digital Editions installer, and then links you through to the rather clunky Eason online shop.

Getting around the Pyrus is straightforward. There's a four-way navipad, a home button, and a library list view button. The thumbnail view option selectable here displays items as generic book items until they've been opened, at which point their cover image is shown. Kindle-esque elongated forward and back buttons on the sides are used for page turns. The Trekstor supports six font sizes,



screen rotation from portrait to landscape and auto flip.

**Verdict**

The Trekstor Pyrus would make a good choice of e-book reader if you're happy to manually hunt down and install titles. The navigation is generally well-implemented, and you get a generous 4GB of storage. The Pyrus is solidly built and easy to use.

✉ **Rosemary Hattersley**

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## GRAPHICS SOFTWARE

## Xara Photo &amp; Graphics Designer MX 2013

£69 inc VAT

## Contact

■ xara.com/uk

## Read more

■ tinyurl.com/c75ux62

## System requirements

700MHz processor;  
Windows XP/Vista/7;  
500MB RAM; 300MB  
drive space

Usability: ★★★★★

Features: ★★★★★

Value: ★★★★★



Xara Photo & Graphic Designer, formerly Xara Xtreme, is a multifaceted program that offers photo- and vector-image editing, as well as some text and page-layout tools for desktop publishing.

Xara's attractive Swiss-army knife approach is matched by affordable pricing, particularly as it has a number of existing tools that compare favourably with those found in the more recent versions of Adobe's Creative Suite applications.

## Better selection

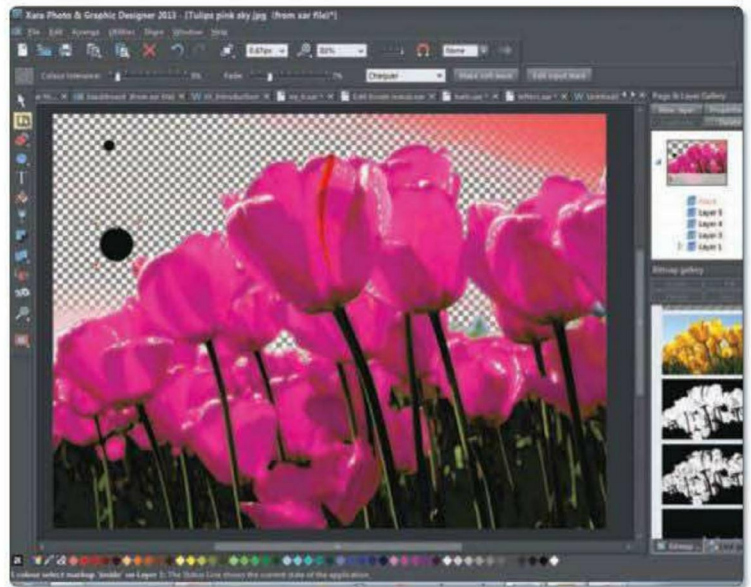
New in this edition is the Color Select/Erase tool. As the name suggests, this can select or erase (make transparent) parts of photos based on colours. Because natural objects are seldom the same overall colour, this isn't a one-shot process – you'll need to make a few selections using the tool to cover all shades and hues of your target colour.

Helpfully, multiple markers can be positioned on the image and then moved (or deleted) if the selection begins to bleed into unwanted areas. You can then click to delete the selected area, or use the 'Make Soft Mask' button to restrict subsequent adjustments made using the Enhance Photos tool (such as brightness or blur) to affect only those selected areas.

The tool offers a quick and effective method of selection, without you messing about with colour channels. We did encounter a couple of program crashes while using this function, however.

The Soft Mask and Color Select tools also let you tint selected parts of the image by using the new hue-adjustment feature, another timesaver, which offers a colour palette and strength slider for controlling the effect in real time.

The **ERASER** tool has some interesting abilities when used with vector shapes



**COLOR SELECT/ERASE** removes part of an image based on its colour

Also new is the Magic Erase button's ability to use content-aware cloning. This allows you to patch an area using surrounding material (an effect similar to Xara's existing content-aware scaling).

It's very quick and effective – so much so that, if you're moving in the direction of a Photoshop upgrade, consider this as a cost-effective (and compatible) alternative to some of its content-aware features.

The Eraser itself has an interesting set of abilities when it comes to vector objects. With the Softness setting at zero you can use it as a hard-edged eraser to nudge inwards the outline of the vector shape, or by swiping it across an object you can create two separate shapes – clicking and holding the mouse on an object will punch a hole in it. Increase the softness setting and you can make transparent the edge of an object, with the slider value determining the softness of its edges.

## Text support

Text support is enhanced with Photo & Graphics Designer's introduction of Text Styles. The ability to apply consistent text formatting is a standard feature of modern desktop-publishing packages, so it's surprising that it's taken Xara this long to implement it. Nevertheless, it's a welcome addition, as are the live previews that present how

selected text would look as you hover the mouse cursor over styles.

There are some web-based features, too, such as increased integration with Dreamweaver for round-trip editing of images, and an enhanced ability to import content from a web page. The improvements here concern the reproduction and positioning of graphics and text; the result is pretty faithful, although copyright laws mean this will be of limited use if you're not working with your own material.

Flash is also well supported; adding to the ability to export animations as Flash files, you can drop Flash files on to web pages.

In addition, most flavours of the SVG vector animation format can now be imported or used in web authoring with the application.

## Verdict

There are several low-cost (but worthy) graphics applications on the market, ranging from the free Gimp to packages such as Serif Draw Plus that occupy roughly the same price and feature category. The latter, in particular, offers many similar features to Xara's cheaper application, although it doesn't match the speed and bitmap-editing power in evidence here. While the new features alone won't warrant an upgrade from previous versions, they do enhance an already strong package. **Michael Burns**



iPHONE APP

## National Rail Enquiries

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**Contact**

■ [itunes.apple.com](https://itunes.apple.com)  
■ [tinyurl.com/7uxyjLg](https://tinyurl.com/7uxyjLg)

**System requirements**  
iOS 4.2 or later

Usability: ★★☆☆☆

Features: ★★☆☆☆



This is the official train app sold by National Rail Enquiries, developed by Fortune Cookie. It offers similar functionality to the market leader – the renamed UK Train Times – and also comes free, with advertising.

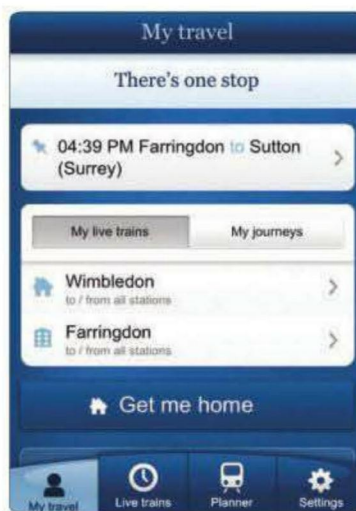
Four tabs run across the bottom. My travel lists your recent searches, divided into live updates for a particular train and station-to-station travel plans.

The second tab finds live train information. Tap in the station name (or three-letter BR code), then press Go to retrieve the latest reports. You can view arrivals, too.

The third tab, Planner, lets you map journeys. An Advanced option can specify Via, Avoiding, Change at, and 'Don't change at' variations.

The Settings tab is where you manage alerts. You can set an alarm for late-running trains or to wake you before you reach your stop.

We tried this feature by asking the app to 'wake' us 5 minutes before a Sutton-bound train arrived at London St Pancras. It didn't.



**NATIONAL RAIL ENQUIRIES** helps you plan train journeys on the move

A 'Get me home' feature uses your iPhone's GPS to calculate your location, then suggests the best route to your designated station.

Omissions include clickable stations when viewing a journey's span end-to-end. With UK Train Times, you can jump to any station and view its status. Nor does this app give departure information for in-between stations. And it's slow.

National Rail Enquiries is free with ads or £4.99 without.

### Verdict

This is a free train-times app for those who can tolerate advertising. Its user interface is usable, but its design is unwieldy. As a paid-for option, National Rail Enquiries isn't a patch on UK Train Times.

✉ **Andrew Harrison**

GAME

## Botanicula

**£6.99** inc VAT

**Contact**

■ [botanicula.net](https://botanicula.net)  
■ [tinyurl.com/7wt3xnx](https://tinyurl.com/7wt3xnx)

**System requirements**  
1.6GHz processor;  
Windows XP/Vista/7/Mac OS X; 1GB RAM; 700MB drive space

**OVERALL**

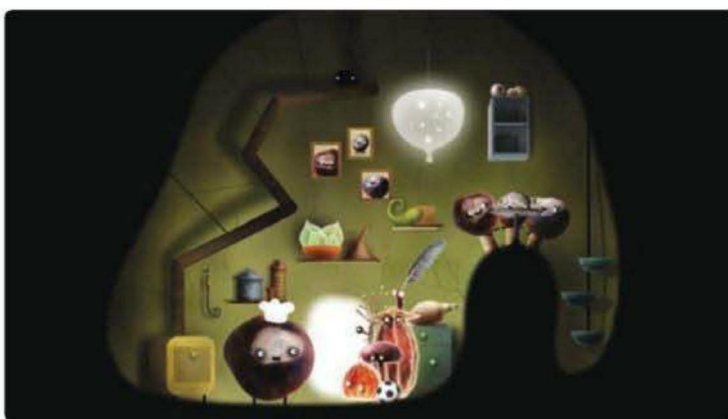


Botanicula is a puzzle game, but in practice it's more like a recreation of those moments in Disney films where a princess wanders through a country setting as its flora and fauna dances and chatters in her wake.

Run your cursor across one of Botanicula's many hand-painted screens and its strange, pretty plant-world will come alive, with a cavalcade of actions and reactions for no reason other than that it's perfectly charming.

From the creators of Samorost and Machinarium, Botanicula is the tale of five plant-creatures exploring a sprawling cellulose world in an attempt to best the sinister plans of invading spider-beasts.

Each character has a different ability when you ask them to interact with what may or not be part of that area's solution. There's a certain logic if you squint a bit, but the game's appeal comes from trying out each creature purely for the joy of seeing what happens. Bespoke and elaborate animations



**BOTANICULA** is a strange but beautiful and very charming plant-world

abound, leading to the abiding sense that you're wandering through some strange European cartoon rather than point-and-click puzzling.

It's a lovely thing to behold, visually rewarding almost every attempt at interaction, but its vagueness can work against it. With a great many screens to troop your plant-chaps through, and no real hint as to what's necessary for progression, there can be many frustrating moments. Where to go and where you are is rarely clear.

Botanicula needs to be played in the spirit in which it was created – the cheerful, slow meandering of a curious and playful mind. Even the music, with all its clicks, squeaks and whirrs, emphasises that Botanicula is a toy as much as it is a game.

### Verdict

Botanicula is dripping with so much charm that it's impossible to get annoyed when you don't know where you are or what you're supposed to be doing. ✉ **Alec Meer**



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## INTERNET SECURITY

# Kaspersky One

**£40** inc VAT (3 devices)  
**£80** inc VAT (5 devices)

### Contact

■ [kaspersky.co.uk](http://kaspersky.co.uk)  
Read more  
■ [tinyurl.com/bsmc92a](http://tinyurl.com/bsmc92a)

### System requirements

1GHz processor; Windows XP/Vista/7; 1GB RAM; 480MB drive space

Usability: ★★★★★

Features: ★★★★★

Value: ★★★★★



As the computing market grows more diverse, there's increased demand for multi-platform internet security products. Kaspersky One offers protection on five platforms.

Kaspersky supports Windows and Mac PCs, Android and Symbian tablets and smartphones, plus BlackBerry. You can buy either a three- or five-device licence.

On the PC the control interface is simple, but smart. The main screen provides core status information with a scrolling menu of options below. These include scanning the PC, updating databases, parental control and tools, right down to logs of application activity, a network monitor and a virtual keyboard. Separate buttons offer access to scan reports and program settings.

We scanned a 50GB test partition in just over 48 mins. Kaspersky reportedly examined 174,103 files, giving a scan rate of 60.1 files per second. In this regard, it's the fifth slowest among the products we've reviewed in the past year.

Kaspersky One fared much better in our footprint test, where running a scan in the background increased the copy time of our file transfer by only 46 percent - the third-best in the same group.

AV-Test rates Kaspersky Internet Security, which represents the Windows PC component of this suite,



**KASPERSKY ONE** offers multi-platform protection for all your devices

at 16.5/18. It scored 100 percent on the Repair section of its tests, which covers the detection and removal of widespread malware, including rootkits. It lost 0.5 points in the Protection section, with just 4 percent of all threats, including zero-day malware, going undetected. It also dropped one point in usability, with a slightly greater slow-down than average, but it gave no false warnings of legitimate applications.

The Mac version of the internet security application, Kaspersky Anti-virus for Mac, has a simplified interface. It doesn't contain some of the PC extras, such as parental control or a network monitor.

The Android app is Kaspersky Mobile Security 9.0 and this ran fine on our Samsung Galaxy Mini, although it also works on Symbian and BlackBerry devices. As well as

antivirus scanning, it includes anti-theft protection.

If a protected phone falls into the hands of a thief, the owner can remotely lock the handset, wipe the data stored on it, and even retrieve its new phone number if the SIM is replaced. We found it easy to use, although some aspects were frustrating. While setting up the keycode, we misspelled the email address to which Kaspersky should send the details of a forgotten code, and found no way to alter it.

## Verdict

Kaspersky One is a comprehensive and flexible security solution for many devices - one we expect several vendors to emulate. It offers good protection for your PC or mobile device and is easy to configure and use. **Simon Williams**

## DATA-RECOVERY TOOL

# Kroll Ontrack EasyRecovery 10.0 Home

**£69** inc VAT

### Contact

■ [krollontrack.co.uk](http://krollontrack.co.uk)  
Read more  
■ [tinyurl.com/c2zk253](http://tinyurl.com/c2zk253)

### System requirements

1GHz processor; Windows XP/Vista/7/Mac OS X; 512MB RAM

Usability: ★★★★★

Features: ★★★★★

Value: ★★★★★



Ontrack is a brand name that brings back nothing but good memories. Back in the early days of home computing, if you wanted to get down and dirty with data on a hard drive you needed one of Ontrack's utilities to do the housekeeping and, if necessary, recover your lost files.

Ontrack is now Kroll Ontrack, and its main data-recovery software is EasyRecovery. Version 10.0 of this utility is available in Home (reviewed here), Professional and Enterprise iterations. There's also a Mac version.

The software is designed to be easy to use. Although some technical knowledge will prove useful, the program will recover files with little more than a couple of

clicks - you simply tell it what files you need it to recover and where they were located.

The main control screen offers five options: Hard Drive, Memory Device, Optical Media, Multimedia/Mobile Device and Raid System, although the latter isn't available in the Home version of the program.

Click on any of the other four options and the program guides you through selecting the recovery type and the target drive.

To test the software's recovery ability, we took the 50GB bundle of files we use when evaluating internet security software and copied them to a 320GB external drive. The bundle is divided into five

identical folders, each containing 1,753 files in 278 sub-folders, making a total of 8,765 files.

We deleted the files in Windows Explorer, then ran EasyRecovery Home on the drive.

The program took more than three hours to complete its scan, then produced a folder tree of the discovered files. The structure of this tree initially led us to think it hadn't recovered our test bundle. EasyRecovery intelligently groups files by type - we found individual folders of zip, text and image files. On closer inspection, though, we also found the five folders we were looking for, with all 8,765 files and 278 sub-folders intact.



## MAINTENANCE UTILITY

## PC Tools Performance Toolkit 2.0

**£40** inc VAT (3 PCs)**Contact**

■ ptools.com

**Read more**

■ tinyurl.com/74sacct

**System requirements**

Windows XP/Vista/7;

1GB RAM (XP 128MB);

500MB drive space

Windows PCs slow down over time, so Performance Toolkit is designed to keep your machine in top shape.

A crowded dashboard offers a system health dial and a one-click optimisation tool on the left, while the right side of the screen lists various statistics under its Performance, Privacy, Recovery and Settings headings.

Performance offers to scan and compact the Windows Registry, with preset profiles for disk defragmentation and optimisation.

The Privacy tab allows you to clear the Windows and browser history, and permanently erase deleted files.

The Recovery section can hunt down lost or duplicate files and repair some disk errors.

We tested the program using its 1-Click Optimization button, then ran some of the manual utilities, such as the Registry compactor and disk defragmenter, and switched from the Balanced to Performance profile.

The Performance profile trims out some parts of Windows itself, changing the physical appearance of the operating system's interface. We timed Windows startup and shut down, plus the time it took Avast to perform a quick scan.

Once the one-click optimiser had done its work, Performance Toolkit recommended that we cleared the

Usability: ★★★★★

Features: ★★★★★

Value: ★★★★★

★★★★★

**PERFORMANCE TOOLKIT** is said to boost the operation of your system

document history, bleached free disk space and defragmented the system drive. We did as we were told, but it continued to provide this advice.

The results weren't good. Windows' startup time was unchanged by the one-click optimiser, and was reduced by only 9 percent following additional tuning. The shut down time was reduced by 8 percent following the one-click utility, but our further efforts to speed the task were futile.

The antivirus quick scan time was reduced by 7 percent, but it also scanned fewer files and folders. The scan rate increased by just five files per second, from 68 to 73. Following our additional optimisation, the rate reverted to 68 files per second.

PC Tools heralds its duplicate file removal, but this is a manual process. The program presents the

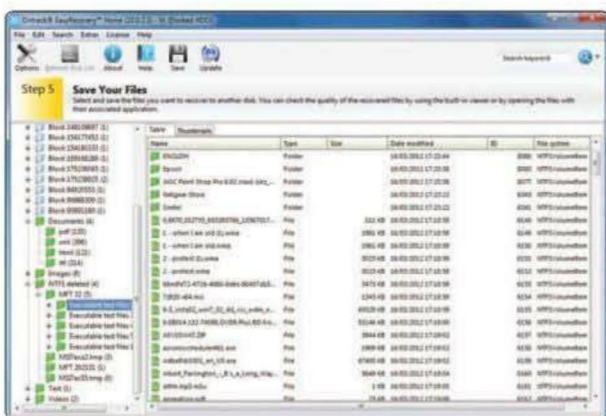
duplicates and you decide whether to consign them to the Recycle Bin.

On our test machine, it spotted 87 duplicate files, totalling 108MB. However, since it matches them based only on their file name, they won't necessarily be duplicates. It can take a long time to go through and check every reported duplicate and, unless you regularly edit video, where file sizes can be substantial, a few extra copies are harmless.

**Verdict**

We measured marginal performance improvements after running PC Tools' Toolkit. We saw little difference to startup and shut down times and, with storage prices currently low, it's hard to see any value in the duplicate file finder. Nothing here warrants a £40 outlay.

✉ Simon Williams

**EASYRECOVERY** recovers accidentally deleted files

The extra files found on our drive appeared because its previous owner had neglected to securely wipe its contents before selling it on.

We 'Quick' reformatted the drive and repeated the process. The program had little difficulty in recovering the files a second time.

Following a full format under Windows 7, EasyRecovery was unable to recover any of the drive's contents. This is to be expected: a full format can wipe a hard drive, leaving nothing to be recovered.

The program includes a file viewer. This lets you quickly preview text and image files to decide whether you want to recover them. A good range of file formats are supported, too.

As ever with this type of software, there are plenty of warnings not to recover files to

the original drive from which they were deleted or damaged.

**Verdict**

Kroll Ontrack EasyRecovery 10.0 Home does what it says. It recovered inadvertently deleted data, and files from drives that had been reformatted. If the drive has been wiped, physically damaged or is making strange noises, though, consider handing it over to a specialist recovery service. The program is very easy to use and can handle CDs/DVDs and USB drives, as well as hard drives. The price might seem steep for a one-year licence, but if you value your data it will be a good investment. ✉ Simon Williams



GAME

# Max Payne 3

£28 inc VAT

Contact

■ [rockstargames.com](http://rockstargames.com)

Read more

■ [tinyurl.com/6mj2Lxo](http://tinyurl.com/6mj2Lxo)

System requirements

2.4GHz Intel dual-core processor; Windows XP/Vista/7; 2GB RAM; 16GB drive space; nVidia 8600 GT with 512MB video RAM

## OVERALL



**MAX PAYNE 3** is almost equal parts shooting and storytelling



Max Payne 3 is the third chapter in the game's story, involving a mid-life crisis on the sun-kissed, gang-wracked streets of Brazil.

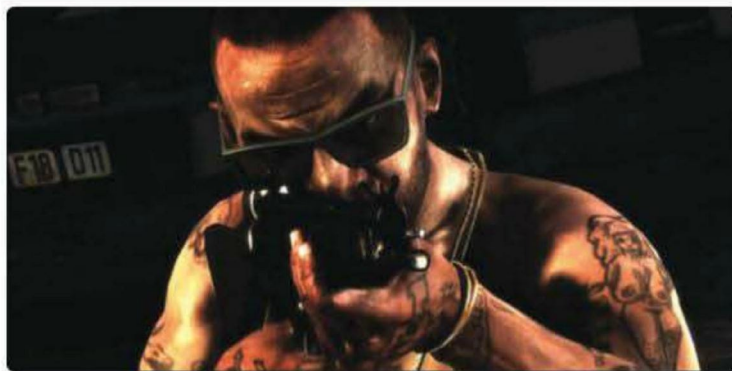
It's best known as a noir tale of a haunted cop delivering brutal justice to the streets and warehouses of New York. As it turns out, shooting hundreds of men in slow-motion is as well suited to broad daylight in Rio de Janeiro as it is to the permanent twilight in the Big Apple.

### Get shooting

A third-person action adventure, Max Payne 3 is almost equal parts shooting and storytelling. No real knowledge of the previous games is required – all you need to know is that Max is a bitter, middle-aged ex-cop, who's moved to Brazil to work as private security for the super-wealthy. Before too long, kidnappings and assassinations see him up to his neck in blood, not to mention nursing potentially crippling addictions to booze and painkillers.

Fortunately, he's able to tap into his own adrenaline to enter a bullet-time slo-mo mode, which is there for dramatic multi-man take-outs. You'll be tactically dealing with overwhelming odds, rather than having any illusions about following a narrative. So it's business as usual for Max Payne, but with brighter shirts, sunshine and a targeting system that offers far more freedom of aiming and precision than previous third-person shooters.

On a high-end Windows PC, it's one of the most incredible-looking games of this generation, rendering faces and hair with spectacular, gorgeous detail. There's a sadness in this: it offers such a wonderful world, but all you can do is



**MAX** is a bitter, middle-aged ex-cop, working as security for the super-rich

repeatedly shoot infinite armies of Brazilians with machine guns.

### Gameplay

A similarly uncomfortable juxtaposition exists in the dissonance between action and narrative. Max can soak up a thousand bullets to the head in the game, but a single shot to the arm in a cutscene has him staggering and near to death.

On top of that, the over-regular interruption of the action with yet another lovingly rendered talky sequence can muck up the game's flow at times. If only it spent even a fraction of the effort and time it puts into jabbering away into more diverse challenges.

Also getting in the way of what should be insistent forward progress is a smattering of collectibles and 'grinds', specific challenges such as slow-diving for a number of seconds. This can mean Max is too busy rummaging through trash or pointlessly jumping off ledges when he's supposed to be saving someone's wife from certain death or fleeing an exploding building.

As it is, Max Payne 3 winds up being a somewhat vanilla, bang-bang-bang action game that just about manages to

be memorable, thanks to the gorgeously detailed technicolour location – and Max's reimagined role as a charming grump. His wry moaning is a constant, nay welcome companion, and being a middle-aged ex-pat rather than a tortured cop frees him from stereotype. There's less "oh, my poor family" and more "these kids today, with their noisy dance music". He's remarkably fleshed-out for a character who began life as a cop movie pastiche.

The same's true of the game as a whole. Where once it was in essence all about Matrix-aping slow motion and a fluttering raincoat, now it's a meaty, serious shooter with a semi-believable setting. It's also reasonably challenging, which has become a sad rarity for shooters' singleplayer modes of late.

### Verdict

Max Payne 3 isn't for everyone. It's a tad long, excruciatingly difficult at times, and very mature, which is what makes it so great. Max is a messed-up guy, but your ability to relate to him helps ease the pain of vicariously living such a tragic life. Everything flows together exceptionally well and makes Max Payne 3 one of the best action shooters to date. **Alec Meer**





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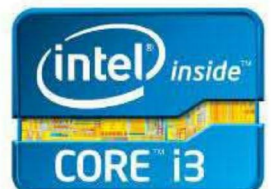
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£41 ex VAT  
£50 inc VAT

#### Contact

■ [kingsoftstore.co.uk](http://kingsoftstore.co.uk)  
Read more  
■ [tinyurl.com/crLvuu6](http://tinyurl.com/crLvuu6)

#### Specification

266MHz processor;  
Windows XP/Vista/7;  
128MB RAM; 200MB  
drive space

## PRODUCTIVITY SOFTWARE

### Kingsoft Office Suite Professional

Kingsoft Office Suite delivers robust word processing, spreadsheets and presentations for a fraction of the cost of Microsoft Office.

Kingsoft's productivity suite consists of three modules: the aptly named Writer, Spreadsheets and Presentation. They're fully file-compatible with Microsoft Word, Excel and PowerPoint; we had no trouble loading existing documents or saving new ones in Microsoft formats.

On the feature front it matches up pretty well, and it has an ace up its sleeve: a tabbed view for documents - something Microsoft Office still lacks.

Each open document gets its own tab, just like different websites' tabs in your browser. This makes switching between them easier.

Three versions of the office suite are available, but our advice is to start with the free one. Its interface is immediately familiar to anyone fluent in Microsoft Office 2003, and the only significant feature it lacks is macro support. The free version also lacks the ability to save documents in Office 2007/2010 formats, such as .docx, although it can open them.

That said, if your employees are already accustomed to Microsoft's Ribbon interface, consider investing



in Kingsoft Standard or Professional. Both give you a choice between the aforementioned Office 2003-style interface or one that looks as though it came straight out of Microsoft Office 2010. You can also switch back and forth between the two, which is a nice touch.

To learn more, visit the website ([kingsoftstore.co.uk](http://kingsoftstore.co.uk)) where a page is devoted to the differences between the Office Free, Standard and Professional versions.

We've been using both the Free and Professional versions on different machines, and found both to be excellent. But we prefer Pro,

mostly because of its options for a Ribbon-style interface.

And at £41 (£50 inc VAT), Kingsoft Office Suite Professional costs considerably less than Microsoft Office Professional 2010. Granted, the latter also includes Outlook, Publisher and Access.

#### Verdict

If you don't need the extra tools provided by Microsoft Office, such as an email client and personal information manager, but do need a word processor, spreadsheet and presentation tools, Kingsoft Office is worth a look. **✉ Rick Broida**



## DATABASE APP

### Bento 4 for iPad

Bento 4 for iPad is a significant update to what was already a powerful personal database app. A completely redesigned user interface makes it easier to create and add data to your databases with 40 Retina-ready themes.

You're no longer required to have a Mac version of Bento to create sophisticated databases. Bento 4 is a standalone iOS app that is just as capable of creating and managing collections of information as its desktop counterpart.

Databases are called libraries, queries are called collections, and any database you create using Bento is known as an app. While this may prove frustrating to anyone with real

database experience, it's unlikely that anyone in Bento's target audience will notice or care.

Bento ships with about 25 templates, including everything from exercise logs and recipe books to time billing and donation databases. Each can be used as they are, or you can customise them to accommodate your needs. New is a built-in link to Filemaker's Bento Template Exchange, an online resource from which you can download user-designed templates and templates created by Filemaker.

Whether you're creating libraries from scratch or using one of the templates, Bento 4 offers excellent tools for creating new fields and

adding them to your forms. Tap the form editor while viewing any form and a new column appears on the left side of the screen with three headings: View Fields, New Fields, Add Objects. Tap View Fields to see a list of fields available in the current library that don't yet appear on the form. Tap New Fields to see a selection of all the field types you can add to your library. Finally, tap Add Objects to see items that you can add to a form so they will be the same for every record in your library.

The brilliance of this design is immediately evident once you start adding fields to your library. Drag a new field on to a form and Bento will ask you to give it a name and change





**£75** ex VAT  
**£90** inc VAT

#### Contact

■ [samsung.com/uk](http://samsung.com/uk)  
Read more  
■ [tinyurl.com/ccLszdm](http://tinyurl.com/ccLszdm)

#### System requirements

Mono laser printer;  
1200x1200dpi print  
resolution; quoted/actual  
print speed: 29/22.2ppm;  
USB 2.0; ethernet;  
802.11b/g/n; 250-sheet  
input tray + single sheet;  
64MB memory; toner  
cost: £67; print yield  
(pages): 2,500;  
348x338x197mm; 7.2kg

Build: ★★★★★  
Features: ★★★★★  
Performance: ★★★★★  
Value: ★★★★★



## PRINTER

### Samsung ML-2955W

**PC ADVISOR**  
**GOLD**

Simple, effective and surprisingly well connected, the Samsung ML-2955DW perfectly personifies the modern mono-laser printer.

Many lasers may qualify as chunky and unattractive, but the Samsung's delicately curved edges and lack of garish colour combinations make for a swish printer that blends in nicely with the office furniture. It's not terribly loud either, and lacks the endless droning sound of many cheaper printers.

Paper is fed into a stiff but reasonably secure 250-sheet drawer, situated in the printer's base. A single-page feed adds a touch of versatility, although you can't upgrade beyond this.

Prints are spat out laser-style into the top-mounted output tray. This can be folded down when not in use. The feeding mechanism generally worked effectively in our testing, although we experienced one or two problems with paper jams. The Samsung is very good at informing you when it's experiencing an issue, so problems can usually be resolved in a timely fashion.

Buttons are kept almost to a minimum, with just two main buttons and another pair dedicated to Eco and WPS modes. Besides the standard USB 2.0 connection, you

can also hook up this printer to ethernet and 802.11b/g/n networks.

A MobilePrint feature lets you send files from mobile devices. The printer drivers are straightforward to install, and the software bundle includes Easy Print Manager, a simple means of monitoring the printer.

Considering the price, the Samsung is rather swift in operation. It didn't get close to its stated 29 pages per minute (ppm), but our 10-page test printed at 22.2ppm.

The Samsung's text quality is very pleasing. Characters aren't the thickest, but they retain elegance and are pleasingly free of the defects you sometimes see from low-price mono lasers. The Samsung's subtle shading means even images are well reproduced.

It obviously won't be a first choice for graphics, but you can coax very palatable images from this model. It's not fast, though, falling to just 3ppm when faced with detailed picture files.

Auto-duplexing mode saw the speed drop to a mere 11.3ppm, almost halving the print speed. Eco Mode uses duplex and halves



the size of the image, printing more than one page on each side of the paper. This didn't save time – it reduced the speed from 22.2ppm to 18.75ppm – but it may be a useful option for when you want to print a multipage draft with less paper.

Using high-capacity 2,500-page toner cartridges, the Samsung costs around 2.7p per text page. This is reasonable for a budget mono laser.

The £60 Brother HL-2130, for instance, will set you back around 3p a page, while the colour Oki C110 will set you back around 3.6p a time (see our Top 5 charts on page 139).

#### Verdict

The Samsung ML-2955DW ticks almost every box. Discreet but easy to slot into wired and wireless networks, fast and capable of very decent text quality, it'll prove a wise acquisition for many a small or medium business. **✉ Robin Morris**



the options for that field type. If you want to remove a field you simply drag it off and it returns to the list of fields available within your library.

While we'd prefer layouts to be more freeform, we found the revised

form and library-creation tools to be better than those in both the previous iOS app and the Mac app.

Bento offers three options for viewing your data: Form, Table, or Split view, all of which can be presented in full-screen mode.

While there's much to love about Bento 4, some further changes are in order. At the top of that list is printing directly from an iPad.

Bento's syncing feature still deletes anything you've created on your iPad the first time you sync Bento with your Mac. To make matters worse, you can email only the data in your libraries, not the libraries themselves, so there's no way to save forms you've created.

We're not keen on Bento's calculation editor. The app uses non-standard editing tools, which make it difficult to see where your cursor is while editing. There's no loupe or other visual feedback until you take your finger off the iPad, which, until we learned how it worked, was very frustrating.

#### Verdict

While we do have some quibbles, none are insurmountable. Bento 4 for iPad is a great app for collecting and managing all your personal data, and a significant improvement to what was already the best personal database app for the iPad.

**✉ Jeffery Battersby**



## ACCOUNTING SOFTWARE

# Intuit QuickBooks Online Essentials

**£18** ex VAT/month  
**£22** inc VAT/month

### Contact

■ [intuit.co.uk](http://intuit.co.uk)  
Read more  
■ [tinyurl.com/7rs8okc](http://tinyurl.com/7rs8okc)

### Specification

Internet-connected PC/  
iPhone/Android/  
BlackBerry/Windows  
Phone

Usability: ★★★★★  
Features: ★★★★★  
Value: ★★★★★

Intuit is looking to expand its QuickBooks Online offering to the UK market, and is attracting a healthy number of new sign-ups every month. It's billed as the number-one online software service in the US by rating and sales.

Designed for use by a small number of users and an accountant, QuickBooks' online accounting service comes in three forms.

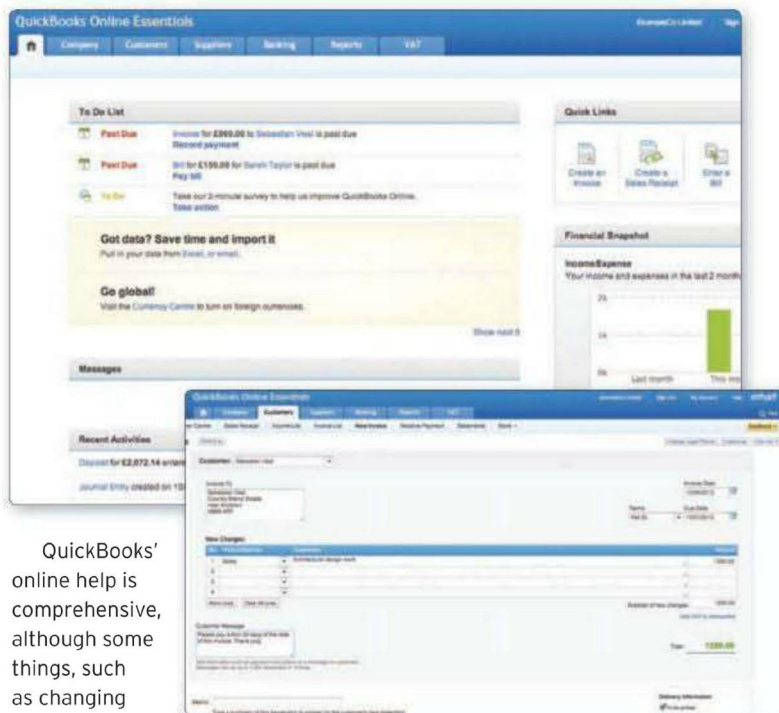
The Online Simple Start solution, priced at £9 per month ex VAT, is the most basic package: users can track cash flow, expenses and sales, and create professional-looking invoices.

Online Essentials, which we focus on here, is the next step up. Priced at £18 per month ex VAT, it has the same features as the Simple Start, but also allows users to prepare and file VAT returns, handle multiple currencies and view a company snapshot.

For full business and financial management, Online Plus includes everything in Online Essentials, along with the ability to create budgets, purchase orders, extra business reports and track the cost of every single job - all for £29 per month ex VAT.

For many small and medium businesses, QuickBooks Online Essentials will be the solution with the necessary functionalities to adequately take care of their bookkeeping and accounting needs.

For users setting up their business accounts for the first time, Essentials is able to import data from, say, Excel, but the process isn't always as easy as it could be.



QuickBooks' online help is comprehensive, although some things, such as changing a company's name, have to be carried out in a roundabout and confusing way. Other tasks, such as setting up customers and suppliers, are far more straightforward to complete.

Journal entries are one way to set up opening balances, although it's recommended that users with no accounting experience enlist the help of an accountant or bookkeeper when setting up business accounts.

## Features

Despite being potentially awkward to set up and use at first, once you navigate your way around the system you should find that QuickBooks contains a lot of solid features that will be appreciated by a variety of small businesses.

The invoices created by the software look highly professional and are instantly emailed to clients or customers with a similarly professional message (customisation of this is optional). Tracking income and expenditure is easy, and sales can be recorded

in the appropriate categories for businesses offering a variety of products and services. It thus makes it easier for owners to analyse how each product or service is performing, especially using the reports QuickBooks can generate.

VAT returns for HMRC can be prepared and filed online through the software, and recording payments both to suppliers and from customers is straightforward.

## Mobile accounting

iPhone and iPad users can access the software on the go, and the mobile interface is aesthetically pleasing, colourful and easy to use.

## Verdict

Many users, even experienced accountants, may find Intuit QuickBooks Online Essentials confusing to set up, although the online help is comprehensive. It is recommended that users who don't have any accounts or bookkeeping experience enlist the help of a professional accountant or bookkeeper when using this service. Nonetheless, with a decent line-up of features, it should work for a variety of small businesses, even if the only business tax supported is VAT. The software does become easier to use over time, and its versatility is impressive. **Santhie Goundar**





**£100** ex VAT  
**£120** inc VAT

#### Contact

■ [hp.com/uk](http://hp.com/uk)

Read more

■ [tinyurl.com/7eeqjht](http://tinyurl.com/7eeqjht)

#### Specification

Fax/copier/printer/scanner; colour inkjet (HP Thermal Inkjet); max monthly duty cycle: 12,000 impressions; 600x1200dpi (mono)/4800x1200dpi (colour) print resolution; 600x600dpi copy resolution; 1200dpi scan resolution; 464x557x252mm; 7.8kg

Build: ★★★★★  
Features: ★★★★★  
Performance: ★★★★★  
Value: ★★★★★



## PRINTER

### HP OfficeJet 6600 e-All-in-One

The HP OfficeJet 6600 multifunction inkjet printer is a puzzler. Priced at £120, it's handsome, has an easy-to-use LCD control panel, and it offers excellent performance and decent output. But, for some bizarre reason, HP has removed manual duplexing support, thumbnail pages and every other kind of layout from the driver.

Such features are so common that many purchasers just assume they are available. £120 for a multifunction that won't print to two sides of a sheet? We think not.

If it weren't for the stunted driver, the HP would be a nice mid-volume office unit. It has a 250-sheet input tray, 75-sheet output, and a 35-sheet ADF for the A4 scanner. We found no option in the control panel to scan or copy in duplex either.

The LCD is an odd duck, but ultimately satisfying. It's a resistive touchscreen and, once you get used to it, the tactile feedback is pleasing.

Other than the hobbled driver, the bundled software is good. It supports push-scanning (scanning

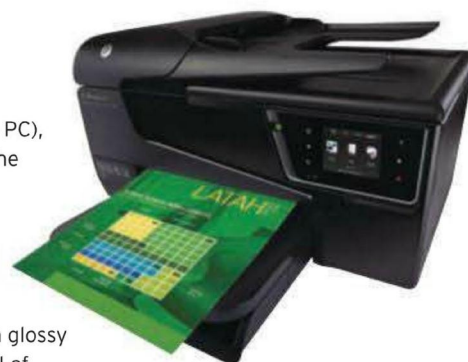
from the control panel to a PC), as well as printing across the web via ePrint.

In our tests, text output was very nice – black and sharp. Photos on plain paper had a washed-out appearance, while those on glossy paper exhibited a high level of contrast, applying an unrealistic cast to human faces.

Mono pages printed at 10 pages per minute (ppm) on our PC and 9.6ppm on a Mac. Snapshot (4x6in) photos printed to plain paper at 3.4ppm and to glossy paper at 1ppm. Full page photos printed at 0.4ppm, and copies exited quickly at 5.1ppm.

The HP uses a four-cartridge ink system (cyan, magenta, yellow, black) that's average in cost with the regular-capacity supplies, but cheaper than most printers in its class with high-capacity cartridges.

The regular, £12 black cartridge lasts for 400 pages, for a slightly below-average cost of 3p per page, for example. Colours last 330 pages.



The £18 XL black lasts for 1,000 pages (1.2p per page), and the £8 XL colour cartridges each last 825 pages (just shy of 1p per page, per colour). Less than 5p for a four-colour page is cheap, although these prices are ex VAT.

Despite good performance and cheap high-capacity supplies, a £120 multifunction without duplexing support should be avoided.

#### Verdict

A complete lack of support for two-sided printing is a deal-killer for the HP OfficeJet 6600 e-All-in-One – an otherwise competent small-office multifunction printer. **Jon Jacobi**

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# Smartphones

It's increasingly difficult to find a phone that doesn't let you browse the web, read email and take great photos, but not all are created equal. We round up some of this year's best smartphones

Contributors: Marie Brewis, Matt Egan, Andrew Harrison, Chris Martin

**T**he smartphone category as we now know it started in June 2007 with the launch of the first touchscreen smartphone. There had been stylus-clickable handsets before, but the iPhone spearheaded multitouch to empower the fingers and make sophisticated device-use a doddle.

Google redesigned Android and has since caught up with Apple in market share; and now Microsoft is eager to join the party, bailing out the troubled Nokia so it could make Windows Phone handsets.

The iPhone is still the pacesetter for the complete smartphone experience, but in most pay-monthly contracts it commands a premium price over the competition. So if you're looking for a cheaper option, what do you need to know?

All smartphones now have a touchscreen interface, able to respond to intuitive finger movements such as pinch-to-zoom and swipe gestures. Cheaper handsets were once fitted with resistive screens, but now most sport the more usable capacitive technology.

## Processor

There's only one relevant processor architecture in use: ARM chips from the Cortex-A series. These designs are licensed to many chip makers, integrated with graphics processors into a system-on-a-chip (SoC). They're then rebranded as, for example, Qualcomm Snapdragon, nVidia Tegra, Samsung Exynos and Apple A5.

The processor clock speeds and number of cores give a rough idea of performance, but these are not reliable indicators to a phone's subjective 'speed'. More important is the integration of software to silicon, which is why an iPhone 3GS with its single-core 600MHz processor will feel much slicker than many recent Android phones, packing dual-core 1GHz and faster processors.

Google's hardware partners are now fitting quad-core processors that allow Android phones to feel more responsive. Windows phones have lesser requirements, and in fact Windows Phone 7.5 doesn't even support multicore processors.

## Battery

Decent battery life is the key to making a smartphone work for you. To take away the uncertainty of making it through even one working day, demand at least two days' usable battery life. Android phones often feature apps that try to extend battery life by switching off parts of the phone when not in use or abruptly dimming the screen, although they can somewhat hinder the phone's usability.

The interface must be clear and simple to navigate. Android has come a long way since its inception, and now has an intuitive

graphical interface. Microsoft has taken an even simpler interface with Windows Phone, which majors on oversized gaily coloured rectangles. It may have few apps available to download, but integration with social networks makes it attractive to some people.

## Pricing

Consider the total cost of ownership (TCO) for any mobile phone. This is the sum of the initial purchase price and the amount that you pay your mobile operator for calls, texts and data during the lifetime of the smartphone.

As with anything in life that headlines with the word 'free', be wary of contracts that offer to provide a free handset. A cash-free handset that contractually obliges you to pay, say, £35 a month for the next two years will have a TCO of £840.

Compare this to a SIM-only pay-monthly deal, which includes all airtime and data, from around £10 per month. You can couple this with a premium handset such as the £499 iPhone 4S to hit a two-year TCO of £739. Not only will you pay less, you find your choice of actual smartphone is much greater, and you're no longer locked to the same network for years on end.

Pay-as-you-go (PAYG) deals let you acquire phone hardware at slightly subsidised prices, with the telco expecting you to line its pockets over the life of the handset through calls charged at 1990s-style premium rates - 25p per minute for landline calls is a common rate, and 12p for every text. These PAYG phones can often be used with a SIM-only contract after your first month's top-up, but the handset may be locked to the network from which you bought it.

Beware of telco-installed crapware on subsidised handsets. Most networks build custom versions of the phone's operating system, allowing them to put their choice of apps and features on the phone - not always to the benefit of the user. Examples are branded web browsers, and sponsored software such as eBay and Facebook. The best user experience and best value is typically found from unlocked SIM-free handsets, in conjunction with SIM-only voice/data plans.











## HTC ONE X

**£480** inc VAT • [htc.com/europe](http://htc.com/europe) • [tinyurl.com/czcjes7](http://tinyurl.com/czcjes7)

The One X is HTC's top-end Android handset. It boasts impressive hardware and software, encased in a polycarbonate shell. The phone feels robust and comfortable in the hand, despite a huge 4.7in screen.

The screen and touch-sensitive buttons lie flush with the subtly curved chassis. The only intrusion to the One X's 8.9mm profile is a large protruding lens, whose position makes it difficult to compose landscape shots without a finger in view. Metal contacts on the rear dock with a custom station, and there's a Micro-SIM tray on top.

Inside is a 1.5GHz nVidia Tegra 3 quad-core processor, and we couldn't fault this smartphone's speed. There's no memory card slot, although HTC provides a decent 32GB of internal storage.

The 720x1280 Super IPS touchscreen is one of the best we've seen on an Android smartphone. A high 312ppi pixel density means text and images are super sharp, and colours look vibrant, too. The screen ripples when the phone is squeezed, however.

With a pair of earphones connected, a Beats option appears in the notifications bar. For those with Beats headphones, this raises the volume and boosts the bass. Connectivity options include Micro-USB, Bluetooth 4.0, dual-band Wi-Fi and near-field communications (NFC).

The 8Mp rear camera has a 28mm lens, a BSI sensor for low-light use, a f2.0 aperture and a dedicated imaging chip. Holding down the shutter button triggers a burst mode, and stills can be captured during full-HD recording. A 1.3Mp front camera is good for video chat.

The One X runs Android 4.0 Ice Cream Sandwich, with HTC's smooth and good-looking Sense interface. A customisable app tray sits at the screen bottom, and there's an extensive choice of widgets.

The app menu is rather cluttered, with a range of software including Navigation, Dropbox, SoundHound and TuneIn Radio. The latest update to Sense opens recent apps in a separate window.

It came as little surprise that the screen was the main culprit behind the battery drain, guzzling more than 50 percent of power. We found the HTC One X would last a day with typical usage.

**VERDICT:** The HTC One X is a superb Android 4.0 Ice Cream Sandwich smartphone that offers smooth performance, a stunning screen and a nifty camera. The only real down side is its battery life.

**PC ADVISOR  
RECOMMENDED**



## HUAWEI ASCEND G 300

**£110** inc VAT • [vodafone.co.uk](http://vodafone.co.uk) • [tinyurl.com/d5oq55x](http://tinyurl.com/d5oq55x)

Huawei's Ascend G 300 is a budget Android smartphone that offers attractive value and good performance. It's available from Vodafone for £100 on a pay-as-you-go basis (with a £10 top-up), or from £15.50 per month on contract. No SIM-free version is officially available.

The Huawei's two-tone silver-and-white plastic case looks cheap, but it feels sturdy and comfortable in the hand. There's a volume rocker on the left, a power button and headphone jack on top, and Micro-USB underneath. Three touch-sensitive buttons below the screen accommodate Android's Menu, Home and Back functions.

The 4in capacitive touchscreen has a 480x800 resolution and a pixel density of 233ppi. The screen is adequate for browsing web pages and reading text, but it felt unresponsive at times.

The G 300 has a 1GHz Qualcomm single-core processor and 512MB of memory, bringing its performance into line with some of the best of last year's Android handsets and above that of the budget smartphones with which it competes. There's just 2.5GB of storage, but a microSD slot lets you supplement this capacity.

The Ascend runs Android 2.3.6 Gingerbread, with an update to Ice Cream Sandwich promised this summer. The standard Android interface has been tweaked, with an application launcher running along the bottom of its five home screens. Usefully, you can continuously scroll through these home screens.

The circular lock screen is interesting - you slide to the right to unlock the handset, to the bottom to open the camera, to the left to access your messages and up for the call log. Several times we accidentally launched the camera when we tried to unlock the phone.

A 5Mp camera has an autofocus and LED flash, but the Huawei captures only VGA-quality video and there's no front-facing camera for video chat. Connectivity stretches to wireless 802.11n and Bluetooth 2.1, alongside 2G/3G cellular.

Battery life is very good, and a power-saving mode lets you prolong the runtime. A fast-boot option reduces startup to seconds.

**VERDICT:** With a promised upgrade to Ice Cream Sandwich, a 4in capacitive touchscreen and usable performance and battery life, the Ascend G 300's £110 price is appealing.



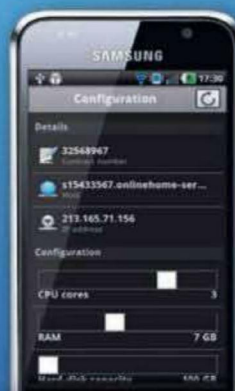
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Build	★★★★★
Features	★★★★★
Performance	★★★★★
Value	★★★★★
Overall	★★★★★



## LG L3

**£123** inc VAT • [lg.com/uk](http://lg.com/uk) • [tinyurl.com/buvpd9n](http://tinyurl.com/buvpd9n)

The L3 is the smallest, lightest and least expensive member of LG's trio of L-Style smartphones. It has a solid yet short and stumpy build, with squarish corners, a glossy black bezel and a silver metallic shell. There's a hardware Home key, to which touch-sensitive Menu and Back buttons sit either side. The battery, SIM and microSD slot are concealed by a textured plastic rear panel.

An 800MHz Qualcomm Snapdragon single-core processor drives the phone. The storage capacity is meagre at just 1GB, but the LG is redeemed by the microSD slot that allows for an additional 32GB.

We were impressed with how quickly apps launched, and found the L3 noticeably faster than HTC's budget One V ([tinyurl.com/cgL6nn9](http://tinyurl.com/cgL6nn9)). The LG also coped well with browsing desktop versions of web pages, with little lag evident when scrolling and zooming.

Given this smartphone's compact dimensions, LG has managed to fit only a 3.2in screen – that's tiny when compared to its competitors in this group test. More disappointing, though, is the display's low 240x320 resolution. App icons and widgets look rough around the edges, and viewing angles are terribly limited.

Connectivity runs to Wi-Fi and Bluetooth; there's also a Micro-USB port and a 3.5mm audio jack. A single camera is limited to 3Mp, and produced grainy images in our tests.

The L3 runs the Android 2.3 Gingerbread OS, with the company's Optimus 2.0 Lite user interface. Optimus offers easy access to connectivity and music-player controls via Android's notification bar, but not a lot else.

Our sample included only a few preinstalled apps, and made a refreshing change from handsets that are overcrowded with bloatware. The 1GB of storage may well have restricted LG here.

We got a good couple of days' use out of the LG L3's 5.5Wh removable battery. Heavy users could always carry a spare if they demand a longer runtime.

**VERDICT:** The LG L3 is cheap and has decent battery life, but there's nothing else here to capture our attention. It runs old software with a lacklustre set of hardware, and the screen is very disappointing. The Huawei Ascend G 300 is a significantly better phone, and it costs less.

Build	★★★★★
Features	★★★★★
Performance	★★★★★
Value	★★★★★
Overall	★★★★★



## NOKIA LUMIA 900

**£480** inc VAT • [nokia.co.uk](http://nokia.co.uk) • [tinyurl.com/bthbnsn](http://tinyurl.com/bthbnsn)

The Lumia 900 is Nokia's flagship Windows Phone handset. It doesn't come cheap, at around £500 SIM-free or £30 per month.

A 4.3in AMOLED touchscreen makes this the biggest Lumia Windows Phone to date. It's responsive, colourful and offers good contrast, but it's not the sharpest screen we've seen.

Although plastic to the touch, the Lumia feels solid in the hand. It's large, and weighs 162g, but it feels slim – even at 11.5mm thick.

The Lumia is generally well built, but has cheap-feeling volume, camera and power buttons and a rattling SIM tray. You can neither swap out the battery nor add storage. The 16GB onboard will fill up fast, so Microsoft's offer of 25GB of cloud storage is welcome.

The Nokia runs Windows Phone 7.5 Mango. On this screen, Windows' cascading tiles and 3D transitions are a feast for the eyes. Sign into Twitter or Facebook and updates and photos appear all over the phone. The onscreen keyboard is intuitive, and typing on it is a pleasant experience. You can do little to personalise the OS, however.

Windows Phone has relatively modest hardware needs, and the Lumia's 1.4GHz single-core processor is sufficiently zippy in use. The Nokia is more akin to a budget Android handset in web browsing, though – it's not slow, but complex pages take a while to pull down.

The lack of Adobe Flash support is noticeable, although H.264 YouTube videos play via the mobile site. Paucity of apps remains a problem for Windows Phone, however.

The Lumia is less convincing as a camera than it is a phone. Despite its Zeiss lens and 8Mp sensor, our snaps looked soft around the edges, and whites had a yellowish tinge. In low light we saw some noise; in bright light some colours were over-saturated. There's a front-facing webcam for 720p video chat, too.

We got a full day's moderate use out of the 6.77Wh battery, which isn't unusual for a high-spec smartphone.

Note that the UK version has a DC-HSPA 3G modem, so modern networks should enable faster access than standard 3G.

**VERDICT:** The Nokia Lumia 900 is beautiful inside and out, easy to use and fun. But the camera and web-browsing performance are so-so and app support remains limited.



**PC ADVISOR  
BEST BUY**

Build	★★★★★
Features	★★★★★
Performance	★★★★★
Value	★★★★★
Overall	★★★★★



## SAMSUNG GALAXY S III

**£500** inc VAT • [samsung.com/uk](http://samsung.com/uk) • [tinyurl.com/cq4fm7x](http://tinyurl.com/cq4fm7x)

The Galaxy S III is the most anticipated Android smartphone ever, and hotly tipped to give the iPhone 4S a run for its money in the popularity stakes. It has a similar chassis to the Galaxy Nexus (see [tinyurl.com/7jrsech](http://tinyurl.com/7jrsech)), with smooth lines and rounded corners.

Currently available in white, with a blue version to follow, the S III is large, but also thin and light. It's well built and comfortable to hold, but use with one hand requires a lot of finger stretching.

A too-thin Home button is straddled by touch-sensitive Back and Menu keys, and you hold the Home button to access recent apps. There's a power button on the right, volume on the left, Micro-USB on the bottom and a 3.5mm headphone jack on the top.

The S III runs Samsung's Exynos 4 Quad, a 32-nanometre ARM processor clocked at 1.4GHz. We experienced no lag when scrolling across or zooming in on text-heavy websites.

For storage, the S III copies the iPhone 4S with 16-, 32- and 64GB options. Unlike the iPhone, there's a microSD slot for expansion.

A stunning 4.8in Super AMOLED screen has a 720x1280 resolution. Colours are bright and punchy, and blacks are truly black.

Connectivity options include dual-band Wi-Fi, Bluetooth 4, NFC and Micro-USB. Wireless charging is promised later this year.

The 8Mp rear camera has an LED flash, and the front 1.9Mp camera can record HD video. The S III supports HDR, a 20-shot burst mode and Best Shot. Our test pictures were sharp, with rich colours.

Android 4.0 Ice Cream Sandwich is coupled with Samsung's revised TouchWiz interface. A tray offers shortcuts to your four most-used apps and the apps menu.

S Voice is Samsung's answer to Siri. It sometimes worked, but was slow and often couldn't understand us. There's also Smart Stay eye-tracking technology, which prevents the display timing out while you're looking at it, and Smart Alert, which informs you of missed calls as you pick up the phone. Turning over the phone mutes alerts.

A whopping 7.9Wh battery allows the S III to last up to two days.

**VERDICT:** The Galaxy S III is an excellent smartphone. A strong build and impressive hardware translates to smooth performance.

Build	★★★★★
Features	★★★★★
Performance	★★★★★
Value	★★★★★
Overall	★★★★★



## SONY XPERIA S

**£360** inc VAT • [sony.co.uk](http://sony.co.uk) • [tinyurl.com/cyjyga](http://tinyurl.com/cyjyga)

The Xperia S is Sony's - now Ericsson-free - flagship Android smartphone. It has a rectangular build, with square edges and a curvy rear. A transparent strip of plastic at the bottom houses Back, Home and Menu labels, but the buttons themselves can be unresponsive.

The build quality is good, but there's room for improvement. The handset feels durable, but it's let down by a flimsy rear plastic cover that conceals the Micro-SIM. The battery isn't removable and there's no way to expand the 32GB of internal storage.

Whereas many top-end Android handsets are now packing quad-core processors, the Xperia S pairs a 1.5GHz Qualcomm dual-core chip with 1GB of memory. The phone struggled with zooming in on text-heavy websites.

The screen is a competitor for the iPhone 4S and HTC One X. At 4.3in, it strikes a good balance between useful size and usability. It has an impressive 720x1280 resolution, with a high density of 341ppi.

Other features include dual-band Wi-Fi, Bluetooth 2.1, Micro-USB, Micro HDMI and NFC. One selling point for the latter is Xperia SmartTags. These keyring-type devices can change the sound and connectivity settings and launch apps simply by touching the phone.

A 12.1Mp rear camera has an Exmor R CMOS sensor, autofocus and LED flash. The camera app can be launched from a dedicated button - from sleep you can take a photo in about two seconds. Our test shots were brilliantly sharp and we were impressed with the macro mode, too. The camera can automatically create a panoramic image using 3D Sweep Panorama, and record video in full-HD. A 1.3Mp front camera delivers reasonably clear images for video chat.

The Xperia runs Android 2.3 Gingerbread; we're told the handset is due an Android 4.0 upgrade. The interface runs smoothly, with a useful number of widgets, and you can group apps into folders. That's useful, since there's an awful lot of bloatware preinstalled.

Sony touts 8.5 hours of talk time. We got one day's operation with average use, although there is a customisable power-saving mode.

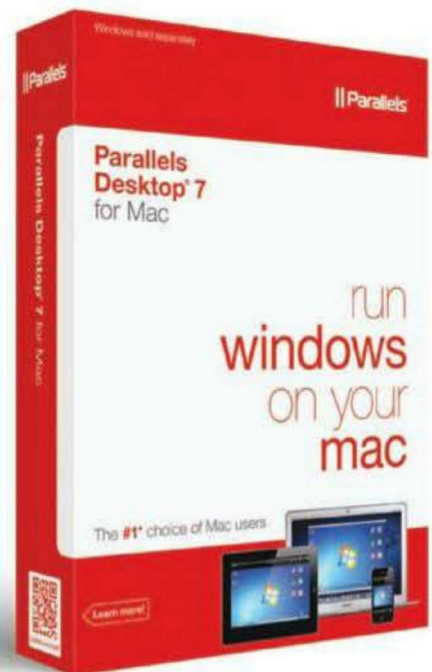
**VERDICT:** The Xperia S looks good and packs an excellent screen and camera. It's let down by too much software and poor control buttons.



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*– MacTech Labs: Virtualization Benchmarks, Fall 2011*

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*– Michael Zimmerman, Web Developer*

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# THE IPHONE INSPIRATION



FULL REVIEW:  
TINYURL.COM/62TEB9G

All modern smartphones owe their existence to the Apple iPhone. It was not the first internet-enabled smartphone, but it was the first phone that made the internet easily accessible from a pocketable device. Today's iPhone 4S was launched eight months ago in October 2011, making it positively teenage by the fast-paced standards of modern handsets.

Compared to the six other handsets here, it still has a faster and more fluid interface, although the Nokia and Samsung models are now nearly as smooth in many operations. No other smartphone can yet match the overall user experience of Apple's phone, from the number and quality of apps

available to the seamless support through Apple's network of high-street shops. When any app is developed by a bank or airline, for example, you can be sure the iPhone version will be the first available.

Security is another key advantage that Apple's iOS has over Google's Android: for freedom from malware and sheer peace of mind in use, the iPhone is a much more secure proposition.

Stacked up against the competition, it has a relatively small display at 3.5in, albeit with one of the highest resolutions of 326ppi. Its processor performance is more than good enough, and its graphics processor is the fastest available.



	<b>APPLE</b> <b>£499 inc VAT</b> 	<b>HTC</b> <b>£480 inc VAT</b> 	<b>HUAWEI</b> <b>£110 inc VAT</b> 
	<b>PC ADVISOR GOLD</b>	<b>PC ADVISOR GOLD</b>	<b>PC ADVISOR RECOMMENDED</b>
Product name	<b>iPhone 4S</b>	<b>One X</b>	<b>Ascend G 300</b>
Processor	1GHz Apple A5 (ARM Cortex-A9 dual-core)	1.5GHz nVidia Tegra 3 (ARM Cortex-Ax quad-core)	1GHz Qualcomm MSM7227A
Graphics	PowerVR SGX543MP2	nVidia ULP GeForce	N/A
Display	3.5in (960x640, 326ppi)	4.7in (720x1280, 312ppi)	4in (480x800, 233ppi)
Display type	IPS	IPS	TFT
Operating system	Apple iOS 5.1	Google Android 4.0.3	Google Android 2.3.6
Memory	512MB	1GB	512MB
Storage	16/32/64GB	32GB	2.5GB
Card slot	N/A	N/A	MicroSDHC (up to 32GB)
Wi-Fi	802.11b/g/n	802.11a/b/g/n	802.11b/g/n
Bluetooth	4	4	2.1
Cellular	GSM 850/900/1,800/1,900MHz, UMTS/HSDPA	GSM 850/900/1,800/1,900MHz, HSPA/WCDMA 850/900/1,900MHz	GSM 850/900/1,800/1,900MHz, HSDPA 900/2,100MHz
SIM type	Micro-SIM	Micro-SIM	SIM
GPS	A-GPS, Glonass	A-GPS	A-GPS
Camera(s)	8Mp rear camera with BSI sensor and LED flash, 0.3Mp front camera	8Mp rear camera with BSI sensor, 1.3Mp front camera	5Mp camera with LED flash
Video	1920x1080	1920x1080	480x640
Headphones	3.5mm AHJ headset jack	3.5mm headset jack	3.5mm headset jack
Ports	30-pin dock	Micro-USB/MHL	Micro-USB
Other	Dual mics, Siri, AirPlay	NFC	FM radio
Battery	5.25Wh lithium, non-removable	6.7Wh lithium, removable	5.7Wh lithium, removable
Dimensions	59x115x9mm	70x134x9.5mm	63x122.5x10.5mm
Weight	141g	135g	130g
Geekbench 2.2.8	622	592	525



## Conclusion

If the Apple iPhone 4S had been in this group, it would garner the Best Buy award again, even if its imitators have gained more ground in the past few months. At the budget end of this range, the Huawei and LG represent usable phones for under £130, with the Huawei Ascend G 300 showing great value. It can only be readily found locked to Vodafone, though, so calculate your TOC carefully.

The HTC and Samsung are from a new generation of quad-core Androids with huge screens. We were pleasantly surprised to find that Samsung has tackled its perennial battery problem, while the similarly priced HTC is more in step with last year's ephemeral models. Sony's new range of Xperia phones show some promise,

although its flagship S model - relatively cheap at £360 - falls well short of other high-end phones.

If you fancy a walk on the wild side, Nokia's most advanced smartphone takes Microsoft's fledgling Windows Phone 7.5 software. The hardware is solid, perhaps too solid for some in weight and size, and there is no software upgrade path to Windows Phone 8 in the future. But software updates are far from assured for Google Android smartphones either, with the vast majority of handsets still running the two-year-old Android 2.3 Gingerbread platform rather than 4.0 Ice Cream Sandwich.

Read all our smartphone reviews at [tinyurl.com/cqwuzqu](http://tinyurl.com/cqwuzqu). ☒

LG £123 inc VAT ★★★★★	NOKIA £480 inc VAT ★★★★★	SAMSUNG £500 inc VAT ★★★★★ PC ADVISOR BEST BUY	SONY £360 inc VAT ★★★★★
<b>L3</b>	<b>Lumia 900</b>	<b>Galaxy S III</b>	<b>Xperia S</b>
800MHz Qualcomm Snapdragon (ARM single-core)	1.4GHz Qualcomm APQ8055 (ARM single-core)	1.4GHz Exynos 4212 Quad (ARM Cortex-A9 quad-core)	1.5GHz Qualcomm MSM8260 (ARM dual-core)
Qualcomm Adreno 200	Qualcomm Adreno 205	ARM Mali 400 MP	Qualcomm Adreno 220
3.2in (240x320, 125ppi)	4.3in (480x800, 217ppi)	4.8in (720x1280, 306ppi)	4.3in (720x1280, 342ppi)
TFT	AmoLED	Super AmoLED	TFT
Google Android 2.3.6	Microsoft Windows Phone 7.5	Google Android 4.0	Google Android 2.3.7
384MB	512MB	1GB	1GB
1GB	16GB	16/32/64GB	32GB
MicroSDHC (up to 32GB)	N/A	MicroSDXC (up to 64GB)	N/A
802.11b/g/n	802.11b/g/n	802.11a/b/g/n	802.11a/b/g/n
3	2.1	4.0.4	2.1
GSM 850/900/1,800/1,900MHz, HSDPA 900/2,100MHz	GSM 850/900/1,800/1,900, DC-HSPA+	GSM 850/900/1,800/1,900MHz, UMTS/HSPA+ 850/900/1,900/2,100MHz	GSM 850/900/1,800/1,900MHz, UMTS/HSPA 850/900/1,900MHz
SIM	Micro-SIM	Micro-SIM	Micro-SIM
A-GPS	A-GPS, Glonass	A-GPS, Glonass	A-GPS
3Mp rear camera	8Mp rear camera with dual-LED flash, 1Mp front camera	8Mp rear camera with AF and LED flash, 1.9Mp front camera	12.1Mp rear camera with Exmor R CMOS and LED flash, 1.3Mp front camera
Yes	1280x720	1920x1080	1920x1080
3.5mm headset jack	3.5mm AHJ headset jack	3.5mm headset jack	3.5mm headset jack
Micro-USB	Micro-USB	Micro-USB/MHL	Micro-USB
FM radio	dual mics, FM radio	NFC	NFC
5.55Wh lithium, removable	6.77Wh lithium, non-removable	7.77Wh lithium, removable	6.48Wh lithium, non-removable
62x103x11.9mm	68x128x11.5mm	70x137x8.9mm	64x128x10.6mm
109g	162g	133g	144g
434	N/A	1,779	922



## Low-cost tablets

Not everyone can afford an iPad, and there are plenty of cheaper alternatives for less than £200. Martyn Casserly reviews six budget tablets to find out whether they're the bargains they appear



**T**ablets are becoming increasingly common in the workplace, the home, and even at the top of children's Christmas lists. Just about every company has jumped on the bandwagon, and Microsoft is hoping Windows RT will help it finally crack this tough market.

But despite their popularity, tablets remain expensive. The iPad costs from £399 for the 16GB Wi-Fi-only model, and the chances are you'll need the pricier 32- or 64GB model to avoid running out of storage space. Android tablets tend to be a little cheaper, and usually have microSD slots for storage expansion, but the major

rivals to the iPad's crown, including the Samsung Galaxy Tab 10.1 and the Asus Transformer Prime, also cost £399-plus.

It is possible to pick up a tablet for less than £200, and still get most of the features you'd expect from a premium model. Budget tablets might not turn heads like an iPad, but they still have lots to offer.

### Tasks

When deciding which tablet to buy, how you intend to use the device is probably the most important factor to consider. If you simply want to watch YouTube on the sofa, catch up on Facebook or Twitter, send some emails

and indulge in a spot of internet browsing, almost any tablet will do the job.

Multimedia fans would be wise to choose a platform such as Android, with its huge choice of apps, or possibly even wait for Amazon's Kindle Fire to be released in the UK. If you're looking for something the children can use, Archos' forthcoming £99 Child Pad looks promising. LeapFrog and V-Tech also sell tablets for children.

### Size

By their very nature tablets are ultraportable devices, with a circa-10in screen the standard. This is ideal for use at home





Photography by Dominik Tomaszewski

when you're sat at a table or in a comfy armchair, but holding something that big for an extended period of time can become tiring. A tablet won't easily fit into a handbag or jacket pocket either. If you intend to carry your tablet with you, consider a 7in-screen model; these offer a great compromise between functionality and portability.

### Screen

Performance aside, the most important feature of a tablet is its screen. An unresponsive touchscreen will ruin the user experience (note that lag can also be caused by a slow processor). The screen resolution is also crucial, especially on smaller-screen tablets, since higher resolutions make small text easier to read. This is also important if the tablet will mostly be used for watching video and displaying photos. All tablets support zoom, but you won't want to use the feature every time you need to read something.

### Storage

With the notable exceptions of Apple's iPad and BlackBerry's PlayBook, most tablets allow you to expand the storage capacity through removable memory cards. While 16GB of internal storage is standard for high-end tablets, budget devices tend to offer just 4- or 8GB. Get as much storage space as you can, since a wealth of video and apps will quickly gobble up that capacity. Around 32GB is a sensible amount, with a 16GB microSD card costing as little as £7.

### Warranty

Unlike desktop PCs, tablets aren't user-upgradable. You won't be able to fit a new screen, swap out the battery or upgrade the processor, for example. This also means that if something breaks, you'll need reassurance that the manufacturer will fix it. Most have one-year warranties, but be sure to check the terms and conditions.





Build	★★★★★
Features	★★★★★
Performance	★★★★★
Value	★★★★★
Overall	★★★★★

## AICS FUSION 5

**£155** inc VAT • [a1csLtd.co.uk](http://a1csLtd.co.uk) • [tinyurl.com/dytunn](http://tinyurl.com/dytunn)

The Fusion 5 is a 10.1in widescreen tablet from Durham-based AICS. At £155, its specification seems too good to be true: it has a capacitive touchscreen and runs Android 4.0 Ice Cream Sandwich.

It will come as no great surprise that this budget tablet is no rival for high-end models such as the Asus Transformer Prime. The hardware buttons feel cheap and have some odd functions: the large silver button on the front doesn't take you to the Home screen - rather, it's a Back button. And the rocker switch on the tablet's side isn't a volume control; it takes you to the Home or Settings screen, depending on which way you press it. To control the volume you have to hold down the power button while using the rocker switch, a process that resulted in us accidentally turning off the tablet.

Given that the device's Android operating system provides always available software buttons at the bottom of the screen, we can only assume the Fusion 5 was built with a different OS in mind.

The screen itself is good. The wide-form-factor makes it ideal for watching films, although the viewing angles are somewhat tight. Colours appear a little cool at times and text isn't as crisp as we'd have liked, due to the relatively low resolution. Games look good, though, and played surprisingly well.

Temple Run flew along at a breakneck pace and racing games didn't seem to trouble the 1.2GHz processor. However, in general use the Fusion 5 occasionally felt sluggish, and was slow to wake from sleep or respond to button presses.

We were also concerned about the build quality. Ripples appeared on one corner of the screen when pressed gently. This would suggest that the slim profile is too tight for some of the components inside and could be a potential failure point in future.

The battery lasted a respectable 7 hours in our video playback test, and a microSD slot is useful for expanding the 8GB of built-in storage. Unlike some budget tablets, the Fusion 5 has a Google Play app that gives you access to the full range of Android apps.

**VERDICT:** On paper the Fusion is an attractive offering. If you want a large-screen tablet for the odd video or game then it's not a terrible choice. But the buttons are frustrating and the build is sub-par.



Build	★★★★★
Features	★★★★★
Performance	★★★★★
Value	★★★★★
Overall	★★★★★

## ARNOVA 9 G3

**£175** inc VAT • [arnovatech.com](http://arnovatech.com) • [tinyurl.com/d64ksng](http://tinyurl.com/d64ksng)

The Arnova 9 G3 joins the growing ranks of cheap, large-screen tablets running Android 4.0 Ice Cream Sandwich. This emergent market has yet to throw up any champions and the Arnova, while usable, does little to upset the balance.

Sporting an iPad-size 9.7in, 4:3-format screen, the device is rather a handful. Its grey plastic case is home to Micro-USB and microSD slots, plus the unusual option of a USB 2.0 connection. We plugged in a flash drive and were able to watch movies stored on it; it's a welcome addition if you don't want to fill up the Arnova's tiny 4GB of internal storage with large video files.

The display has a 1024x768 resolution, but it lacks crispness. Text is readable in larger fonts, but it falls foul of pixellation when browsing text-heavy websites. Video playback also looks patchy, with colours not blending seamlessly. The colours aren't as vibrant as on the best budget screens, such as Samsung's Galaxy Tab 2.

We managed to squeeze only 5 hours of video playback from the 9 G3 before the battery gave in. That's not to say you couldn't use the tablet for a spot of casual YouTube perusing, but you'll have to do so via the browser - Arnova hasn't preinstalled the YouTube app, nor the Google Play app store. There's no BBC iPlayer app either, and streaming from the BBC's desktop site resulted in choppy, unwatchable programmes.

Arnova provides an alternative App store, AppsLib, but it has very few good apps. This holds back the 9 G3 in the usability stakes. It's one thing to not have the power to run apps, but it's another to be prevented from installing them.

Thankfully, Skype is present, giving you the opportunity to use the front-facing camera to make video calls. It suffers from lag, but gets the job done. Among the other few premium apps are various Angry Birds incarnations, which played fine in our tests.

**VERDICT:** The Arnova 9 G3 could have been a decent low-cost tablet for general use, but the lack of the Google Play app store is a big stumbling block. We like the ability to connect USB flash drives for accessing your movies and music, but it's not enough to make up for the lack of decent apps.





## BLACKBERRY PLAYBOOK

**£199** inc VAT • [uk.blackberry.com](http://uk.blackberry.com) • [tinyurl.com/79qb7pp](http://tinyurl.com/79qb7pp)

When BlackBerry released the PlayBook it had some curious issues. Native email, contacts and calendar apps were missing, the app store was barren, and the price matched the iPad at £399.

BlackBerry has since addressed these problems, making the PlayBook a far more tempting package. The PlayBook OS 2.0 operating system incorporates the missing apps, there are more apps to choose from, and the price has been cut aggressively.

The 7in screen is housed in a metal casing with a rubberised back, which makes the device comfortable to grip. Everything about the PlayBook feels solid and reliable, from the pair of front-facing speakers, which produce impressive sound quality, to the compact and well-balanced chassis that's light enough to hold for extended periods, but sturdy enough to withstand the occasional knock.

The 5Mp rear camera is decent for snapshots, but noise spoiled our test shots. Video is captured at 1080p; it's respectable, but not remarkable. Switching to the 3Mp front-facing camera gleans acceptable results for video calling, although Skype is absent from BlackBerry's App World (alternative video-calling apps are available).

The standout feature is the screen, which displays a 1024x600 resolution with vibrant colours and impressive detail. Viewing angles are also excellent – an important factor on a screen this small. The touchscreen is accurate, responsive, and we love the touch-sensitive bezel, which lets you swipe in from beyond the screen's edge.

Swipe up from the bottom edge and you're shown the active applications, swipe left and right to move through them, and down to access settings. In use it's fast, simple and one of the best navigation systems we've used.

Battery life is the best on test in our round-up of budget tablets, and the PlayBook lasted 8.5 hours in our looped movie test.

Our one gripe is the dearth of apps. Facebook, Twitter, YouTube, BBC iPlayer and several games are now available, but there's little else to choose from. Neither is there a memory card slot.

**VERDICT:** The PlayBook is a lovely device to hold and use. It's small and light enough to carry anywhere, and the display is impressive. It's a true bargain at £199, but we'd like to see more apps available.



## DISGO 8104

**£161** inc VAT • [mydisgo.com](http://mydisgo.com) • [tinyurl.com/73pd4rv](http://tinyurl.com/73pd4rv)

Disgo's 8104 is a widescreen tablet that's lightweight and, thanks to a textured plastic construction, easy to hold. Its 1.2GHz single-core processor seems to labour under the weight of Android 4.0 Ice Cream Sandwich, and you'll often find yourself waiting for the device to catch up with you, even when typing.

This was borne out in our testing, where the Disgo 8104 took a foot-tapping 12,085ms to complete the SunSpider JavaScript test. Lag is also a problem with the front-facing VGA camera, even before you connect to Wi-Fi and try to talk to someone.

The 8104 has Mini-HDMI and Mini-USB ports, plus a microSD slot to expand the device's 4GB of internal memory. There are Home, power and volume hardware controls, too.

If there's one element you cannot afford to get wrong with a tablet, it's the screen. The Disgo 8104 has a 10.1in capacitive touchscreen and should be the device's greatest asset.

Unfortunately, it isn't. Its resolution of 1024x600 is the same as many 7in tablets and results in text looking blocky and blurry. It's not the brightest, either, and has a grainy appearance. Narrow viewing angles compound the problem, as colours shift as soon as you move your head from directly in front of the screen.

Several times during our testing, the touchscreen refused to recognise that an icon had been pressed and, when in a browser, it would detect something entirely different to the link chosen or simply zoom in for no apparent reason.

One last nail in the coffin is that the unit ships without the Google Play app, greatly diminishing the choice of apps available. Instead, you get a link to the Disgo store, which contains 20 apps. There's Facebook, Twitter and Skype, but many of them should come on the device as standard. There's also the SlideMe Market, which has a much wider selection, but it isn't replete with top-notch titles.

**VERDICT:** The Disgo 8104 is an enormously frustrating device to use. The touchscreen is one of the worst we've experienced and the choice of apps is very poor. We desperately sought to find positives, but the simple fact is you can get so much more for your money. This is another budget tablet best avoided.





Build	★★★★★
Features	★★★★★
Performance	★★★★★
Value	★★★★★
Overall	★★★★★

## ORANGE TAHITI

**£20/month** (24 months) • [orange.co.uk](http://orange.co.uk) • [tinyurl.com/753tvjg](http://tinyurl.com/753tvjg)

The idea of paying a large sum of money up front for a tablet isn't all that appealing to many of us, so Orange has a solution. Its slim, attractive 7in Tahiti tablet is worth around £300, but you can pay £20 a month on a 24-month 3G data contract.

You can choose the data package that suits you best: £20 per month buys you 250MB of data, while £25 nets you 1GB, plus an extra 1GB for use between midnight and 4am. There's Wi-Fi built-in, and you also get unlimited access to BT's Openzone Wi-Fi hotspots.

The Tahiti itself is well made and looks like a small iPad, thanks to a silver metal case and black screen bezel. Orange joined forces with Huawei to produce the Tahiti, and the design work shows promise.

Something that needs attention, though, is the camera. The rear camera has a 5Mp sensor, but our test photos exhibited poor colours and too much noise. Recorded video is worse, with muted tones and audio creating an underwater effect. The front-facing 1.3Mp camera is fine for video calling with Skype, but that's about it.

Running on Android 3.2 Honeycomb, the Tahiti's 1.2GHz dual-core processor zips along at a speedy rate. Using the Tahiti was mostly a trouble-free experience: apps crashed occasionally, but we've seen that across all Android devices.

The battery life was a healthy 7 hours when watching video, and the 1280x800 touchscreen produces clear and detailed results for films, books and general browsing. Typing on the Tahiti isn't as enjoyable, since the screen responsiveness is hit and miss; for short bursts or searching Google Play it's capable.

Gaming was a success: racing games played smoothly, apps like Draw Something benefitted from the 7in of screen space, and 3D shooters avoided lag but did struggle slightly when a high level of accuracy was required.

**VERDICT:** The Tahiti is a mixed bag. On one hand it's a capable, handsome and portable device; on the other is a poor rear camera and 24-month contract (which will set you back £480 for the cheapest option or £600 for the more sensible 1GB package). It's very likeable, but we think you'll tire of the Tahiti before the contract ends.



Build	★★★★★
Features	★★★★★
Performance	★★★★★
Value	★★★★★
Overall	★★★★★

**PC ADVISOR  
RECOMMENDED**

## SAMSUNG GALAXY TAB 2 7in

**£250** inc VAT • [samsung.com/uk](http://samsung.com/uk) • [tinyurl.com/7tfku8y](http://tinyurl.com/7tfku8y)

If you're after a small, lightweight tablet, the Galaxy Tab 2 7in could be ideal. At 345g, it's one of the lightest devices in its class, and the elegant curves of its metal-rimmed body fit effortlessly into the hand.

One slight disadvantage with all this sveltiness is that the grey plastic back cover is so smooth it can be hard to hold on to. You'll need a proper stand for hands-free use, since leaning it against something will invariably end in the Tab sliding on to its back.

The 7in screen has a 1024x600 resolution, which looks sharp and offers great colours. Text is crisp and easily readable, but it lacks the precision of the BlackBerry PlayBook's screen.

Interacting with the Tab is a fluid experience, thanks to an accurate touchscreen and the inclusion of Android 4.0 Ice Cream Sandwich. Apps open quickly and you're rarely left hanging while the dual-core 1GHz processor does its job.

The camera app utilises the 3Mp rear camera, with dedicated Panorama and Smile modes. Our test results varied, but were generally acceptable; stills tended to offer better colour than video.

With access to the Google Play store, the Galaxy Tab 2 has no shortage of apps to download. All the social-media regulars are present, including Facebook, Twitter and Google+, as are various movies you can stream for a modest fee. We found a 7-hour battery life in our video-playback tests.

Games ran very smoothly on the Tab 2. 3D action shooters showed no signs of stuttering, while driving sims played nicely, thanks to the Tab's light body and responsive accelerometers.

The Kindle app turns the Tab 2 into a decent e-book reader and the BBC iPlayer site lets you catch up on TV - although we couldn't find a way of streaming in HD, which was slightly disappointing.

Although it's more expensive than the BlackBerry PlayBook, the Galaxy Tab 2 has a two-year warranty. Hunt it down online and you can pick up the 8GB version of the Tab 2 for just £200.

**VERDICT:** Samsung has done well to pack a fast, fun and useful package into such a slimline case. The screen is good, but we wish it had a higher resolution. Overall, the Tab 2 is a great budget choice.



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## Conclusion

If you're willing to make a few compromises, there are some very good tablet options below £200. But you must be cautious: the Arnova, A1CS and Disgo offer impressive specs, but fall down in key areas, such as the availability of apps, speed and responsiveness.

If connectivity on the go is a primary concern, the Tahiti is an attractive and capable device that covers most bases. Thanks to an Orange 3G contract, you'll be able to work anywhere you have a signal. The overall cost is high, but usefully spread over two years.

The Galaxy Tab 2 impressed us with its versatility, slim form and nippy performance. It's a very tempting proposition – particularly if you've used Android before – and is highly recommended.

For sheer quality, though, the BlackBerry PlayBook stands out. The screen is excellent, the operating system is intuitive and the build quality is top-notch. Our only concerns are with the storage capacity and the availability of apps. With no memory card slot you're limited to 32GB, and you won't be able to access the same apps as you would on an iPad or Android tablet. Even with these caveats, and the uncertainty over RIM's future plans for the PlayBook, this tablet should be top of your list.

## How we test

To compare battery life, we fully charge each tablet and loop a movie with volume and brightness levels set to 50 percent. Wi-Fi is turned on, but Bluetooth and GPS are disabled. This test also allows us to assess to the quality of the screen and speakers.

We use the SunSpider JavaScript benchmark to compare the speed of each tablet when browsing the web (a lower score is better), and the Geekbench 2 app (where Google Play is preinstalled) for general system performance (a higher score is better).

Graphics performance and touchscreen responsiveness are subjectively assessed using demanding 3D games. We test the accuracy of the touchscreen with general typing and navigation, especially on text-heavy websites that require more precision when selecting options and clicking links.

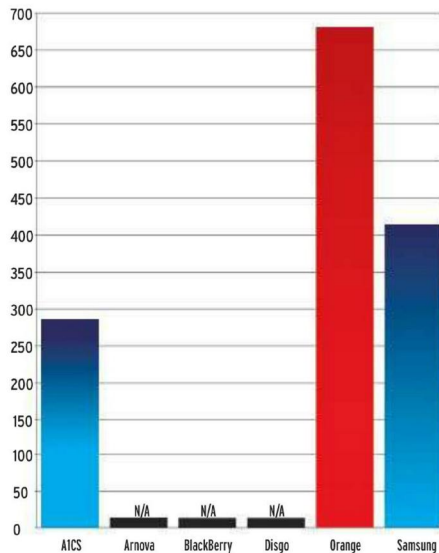
If a tablet is capable of multitasking we run several apps simultaneously to ascertain how well it copes and what affect the multitasking has on the tablet's overall performance.

We also test the device's front and rear cameras by taking pictures and video in a range of environments to examine the speed and fidelity of the focus, colour and sound capture. ☒

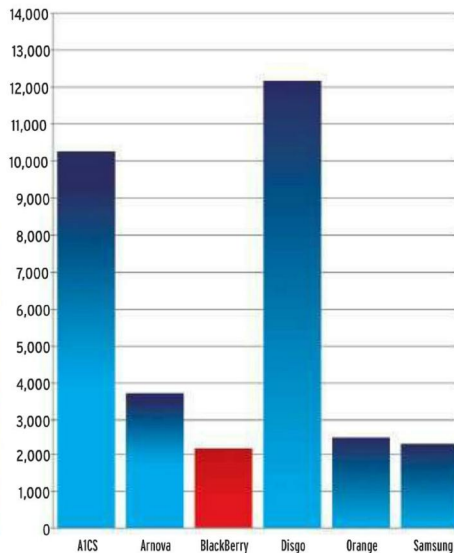
	<b>A1CS</b> £155 inc VAT ★★★★★	<b>ARNOVA</b> £175 inc VAT ★★★★★	<b>BLACKBERRY</b> £199 inc VAT ★★★★★	
Product name	<b>Fusion 5</b>	<b>9 G3</b>	<b>PlayBook</b>	
Product code	FUSION5	502063	PlayBook 32GB	
Screen	10.1in (1024x600)	9.7in (1024x768)	7in (1024x600)	
Operating system	Google Android 4.0 Ice Cream Sandwich	Google Android 4.0 Ice Cream Sandwich	BlackBerry Playbook OS 2.0	
Capacity tested	8GB	4GB	32GB	
Expandable memory	MicroSD (up to 32GB)	MicroSD (up to 32GB)	N/A	
Connectivity	802.11b/g, USB for 3G dongle	802.11b/g/n	802.11a/b/g/n, Bluetooth 2.1 +EDR	
Processor	1.2GHz single-core	1.2GHz single-core	1GHz dual-core	
RAM	1GB	1GB	1GB	
Camera (front & rear)	2Mp (front)	N/A	5Mp (rear), 3Mp (front)	
Video support	1080p (playback only)	1080p (playback only)	1080p	
GPS receiver	No	No	Yes	
Ports	Micro-USB, Micro-HDMI, USB 2.0	MicroSD, Micro-USB, USB 2.0	Micro-USB, Micro-HDMI	
Dimensions	267x164x12mm	239x184x12.5mm	194x130x10mm	
Weight	739g	630g	425g	
Warranty	1-year return-to-base	1-year return-to-base	1-year return-to-base	
Geekbench 2 score	292	N/A	N/A	
SunSpider score	10,187	3,813	2,155	
Battery life	6 hrs 55 mins	4 hrs 58 mins	8 hrs 21 mins	



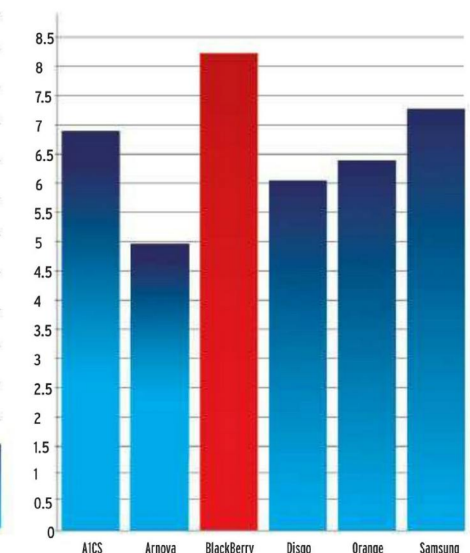
Geekbench 2 score



SunSpider score (lower is better)



Battery life (hours)

**DISGO**  
£149 inc VAT**8104**

0108C

10.1in (1024x600)

Google Android 4.0 Ice Cream Sandwich

4GB

MicroSD (up to 32GB)

802.11b/g/n

1.2GHz single-core

512MB

0.3Mp (front)

1080p (playback only)

No

Mini-USB, microSD, MiniHDMI

266x169x9mm

640g

2-year return-to-base

N/A

12,085

6 hrs 1 min

**ORANGE**  
£20/month**Tahiti**

Tahiti

7in (1280x800)

Google Android 3.2 Honeycomb

8GB

MicroSD (up to 8GB)

802.11 b/g/n, Bluetooth 2.1, 3G HSDPA

1.2GHz dual-core

512MB

5Mp (rear), 1.3Mp (front)

720p @30fps

Yes

MicroSD, MiniHDMI, Micro-USB

190x124x10.5mm

400g

2-year return-to-base

686

2,527

6 hrs 44 mins

**SAMSUNG**  
£250 inc VAT**Galaxy Tab 2**

GT-P3113TSYXAR

7in (1024x600)

Google Android 4.0.3 Ice Cream Sandwich

8GB

MicroSD (up to 32GB)

802.11b/g/n, Bluetooth 3.0

1GHz dual-core

1GB

3Mp (rear), VGA (front)

1080p @30fps

Yes

MicroSD

194x122x10.5mm

345g

2-year return-to-base

413

2,246

7 hrs 26 mins



# Media PCs

Whether it's listening to music or watching video, you can manage all your entertainment needs from the comfort of your sofa with a media centre. Paul Monckton looks at six lifestyle machines

**A** PC can make an excellent multimedia entertainment centre: recording, storing and playing back all your media from a single easy-to-use interface. When hooked up to a TV or projector, a properly designed system will allow seamless enjoyment of all manner of audiovisual entertainment from the comfort of your sofa.

While you can do this with just about any Windows-, Linux- or Mac-based system, a proper media-centre PC will embody very different design criteria from a standard desktop PC.

Loud, whirring fans and crunching hard drives are most unwelcome when listening to music and can obscure movie dialogue. Large tower cases with flashing lights are another unwanted distraction. You want to be able to forget that the PC is there while you're enjoying your media, and when it isn't in use you want it to blend in with your living room décor.

There are many custom-made PC housings designed specifically for use as a media centre. The tiny footprint of Chillblast's Fusion Vacuum Mini means you can pick it up and put it anywhere, while the thin-and-wide format of the Quiet PC and Tranquil PC systems will blend in with traditional hi-fi audiovisual equipment. Each offers a level of luxury and build quality higher than that of a standard PC. They also employ a fanless construction for silent operation.

However, choosing such a special-purpose case will limit the choice of the components you can fit inside. Maybe you want multiple tuners or you'd like to play games on your TV as well as watch movies. To house multiple add-in cards or large, powerful graphics adaptors you'll need a 'full-size' PC case. There are plenty of cases around, such as Zalman's HD503, which is designed to be quiet and stylish as well as compatible with standard PC upgrades. You also get a useful illuminated LCD readout and a large volume-control knob.

Windows Media Center, bundled with some versions of Windows 7, offers an interface that's easy to operate via remote control. Many of the PCs here are supplied with a remote, and some can also be controlled using a mobile app. Media PCs can require more technical knowledge and time to set up than standard desktops; we recommend checking what level of support is offered.

## Specification

Don't look for the fastest processor you can afford. You'll want to strike a delicate balance between power requirements and performance. Intel's latest Core i3 and Core i5 processors offer excellent performance with low power consumption; special

low-power versions with 'S' and 'T' designations are ideal for media centres. They also offer more than enough built-in graphics power if you don't expect to play the latest games.

## Cooling

You want to listen to music and video, not your PC, so minimise the number of fans and moving parts. Fanless systems can be built using large passive heat sinks, often aided by multiple heat pipes designed to draw heat away from core components to an external radiator.

Where cooling fans are your only option, ultra-quiet fans have intelligent spin speeds to balance cooling with noise.

Graphics cards and hard drives can also be the source of noise, with whirring fans and spinning platters respectively. For a little extra cost you can plump for a quiet graphics card and SSD storage. It can be a good idea to use a small, silent SSD in your PC and locate all your media externally,

typically on a NAS device located elsewhere in the house. A speedy SSD will also make the PC feel quicker and more responsive.

For components that can't be silenced, sound-proofing material and enclosures can provide an effective solution.

Internal PCI or external USB TV tuners allow you to watch and record live TV. Dual or twin tuner cards let you watch and record different channels simultaneously.

While most media PCs will come with a basic remote control, it can be useful to have a wireless keyboard with a built-in pointing device for web browsing and typing.

Blu-ray playback is standard on many media PCs. Expect to find a BD-ROM/DVD combo drive.







Photography by Dominik Tomaszewski



## ARBICO 5300-HD MEDIA CENTRE

**£849** inc VAT • [arbico.co.uk](http://arbico.co.uk) • [tinyurl.com/d695gm7](http://tinyurl.com/d695gm7)

Arbico's 5300-HD Media Centre takes the traditional PC format and turns it on its side. Its micro-ATX size Silverstone GD05B Grandia Black multimedia case not only looks serious, but also offers enough space for upgrades with standard PC components. Full-height graphics cards can be used, along with standard ATX PSUs; there's room for a pair of 3.5in hard drives, along with a 2.5in SSD and even an external 5.25in bay. Yet, on the outside, it's brushed-metal finish gives it a look that's much more 'AV' than 'IT'.

This is, however, a fan-cooled system and can't claim to be completely silent, despite the use of some passively cooled components inside, such as the fanless Asus GeForce GT 430 graphics card. This card proves to be an important differentiator for Arbico, since it makes the 5300-HD Media Centre the most graphically powerful system in this test by some margin.

Arbico has plumped for a powerful quad-core 3.4GHz Intel Core i5-3570K processor, which enables it to race past the competition in our WorldBench 6 benchmark. It does, however, break into a sweat in doing so, consuming around double the power of Quiet PC's system, which is very nearly as fast. Its fast OCZ Vertex SSD ensures fast boot times and a 1TB hard drive provides decent local storage for media and recorded TV.

A dual-channel Compro VideoMate E750 tuner card provides access to Freeview, although not Freeview HD. A Blu-ray drive is also included. And in addition to the standard media-centre remote control,

Build	★★★★★
Features	★★★★★
Performance	★★★★★
Value	★★★★★
Overall	★★★★★



you get a Logitech K400 wireless keyboard with a built-in touchpad, so you can navigate Windows from your lap.

**VERDICT:** This system is reasonably quiet, good-looking and powerful for a media PC, making it useful for many other day-to-day tasks such as gaming. It's easily upgradable and offers fast SSD performance, as well as copious internal storage. The CPU, however, could do with being replaced by a low-power version.

## BRAEBO PERSEUS

**£799** inc VAT • [braebo.com](http://braebo.com) • [tinyurl.com/bmq5o2](http://tinyurl.com/bmq5o2)

Big, but also clever, Braebo's Perseus combines standard hardware with living-room friendly looks and unique special features to turn this PC into a powerful media centre.

Hinged doors to the right hide the included Blu-ray player, multiformat memory card reader and I/O ports when not in use. On the left is a large volume control, flanked by two rows of small control buttons. These operate the PC via an illuminated LCD display and enable you listen to music without turning on your TV or monitor. Inside, the Perseus looks much like any other PC, fans and wires abound, although special quiet ones have been installed. There are also three vibration-damped 3.5in hard drive bays available, one of which comes preinstalled with a 2TB SATA drive.

Live TV is available thanks to an AVerTV CaptureHD H727 card, which also offers the ability to capture HD video input from other devices such as games consoles. Those of you who like to multitask will then be able to watch TV and play games at the same time, using the Picture in Picture mode. Two remote controls are included, one standard MCE model and one from Zalman, which also operates the supplied iMon software via the LCD display. You also get a Logitech K400 wireless keyboard with a built-in touchpad.

The only AMD-powered PC of the group, the Perseus uses a triple-core 2.1GHz A6-3500 processor coupled with a Radeon HD 6450 graphics card. While application performance isn't up to the standard of the Intel-based PCs, graphics performance is rather

Build	★★★★★
Features	★★★★★
Performance	★★★★★
Value	★★★★★
Overall	★★★★★



good, beating all but Arbico's 5300-HD Media Centre. Power consumption is unfortunately rather high.

**VERDICT:** Braebo's Perseus looks more expensive than you'd expect for the £799 price, and it can be operated without a TV or a monitor, thanks to the built-in LCD display. It offers only a single-channel TV tuner, but can capture video from other sources such as games consoles. It performs well, but is a little power-hungry.



## CHILLBLAST FUSION VACUUM MINI

**£999** inc VAT • [chillblast.com](http://chillblast.com) • [tinyurl.com/bqm62qh](http://tinyurl.com/bqm62qh)

With its ultra-compact housing, Chillblast's Fusion Vacuum Mini is undeniably cute thanks to the black brushed-aluminium construction of its Streacom FC8 case. Unlike many less impressive systems, the FC8's use of aluminium is more than cosmetic: with the entire case constructed from the material, heat can be diverted away from the internal components via passive heatpipes rather than fans. This allows the PC to operate noiselessly, save for when the built-in Blu-ray combo drive is in use.

A case this small requires the use of a Mini-ITX motherboard, and Chillblast has selected the Asus P8H77-I, into which a low-power 3.1GHz Intel Core i5-3450S quad-core processor has been installed. Performance is very good and the processor's built-in graphics processor is more than ample for multimedia use, meaning the Fusion Vacuum Mini will turn its hand to most tasks except high-level gaming.

Storage is provided by a 240GB Mushkin SSD, which will allow some local TV recording, but you'll still need to provide external storage if you have even an average-sized media collection. A BlackGold dual TV tuner is installed internally that allows for watching one programme while recording another. It also supports HD broadcasts via Freeview HD.

No remote control is included. Instead, Chillblast has supplied the diminutive Xebec HTPC keyboard. This wireless device, about the size of a game console controller, incorporates a full set of tiny keys alongside a touchpad so you can use the full Windows interface.

Build	★★★★★
Features	★★★★★
Performance	★★★★★
Value	★★★★★
Overall	★★★★★

**PC ADVISOR**  
**BEST BUY**



We'd recommend buying a full-size keyboard though, if you envisage the need for any more than the minimum of typed input.

**VERDICT:** This is a proper media PC with expensive looks, superb build quality, great performance and totally silent operation. It incorporates the latest Intel processor technology and supports Freeview HD out of the box. Its 240GB SSD is the largest here, but you'll still need some external storage for all your media.

## PALICOMP ALPHA MEDIA BLAZE

**£549** inc VAT • [palicomp.co.uk](http://palicomp.co.uk) • [tinyurl.com/c6353mr](http://tinyurl.com/c6353mr)

Palicomp's Media PC is a world apart from what we're used to seeing in this category. Its Palicomp-branded media-centre chassis is a rather unimpressive steel-bodied ATX case that doesn't come close to the level of build quality of the competition.

Aside from its horizontal format and dual TV tuner, the Alpha Media Blaze incorporates few of the key features we'd expect from a media PC. It uses a powerful 3.4GHz quad-core Intel Ivy Bridge processor, which is fine for overall system performance but too power-hungry for a media centre. Arbico's 5300-HD Media Centre uses the same chip, but Palicomp hasn't included a third-party cooler, opting instead for the noisier and less-efficient standard Intel model.

A Blu-ray combo drive is included, together with a Peak dual TV tuner, which allows playback and recording of two channels simultaneously. It supports Freeview, but not Freeview HD. It comes with a remote control and a Xenta wireless keyboard with a built-in touchpad and media-transport controls. A video collection can take up a large amount of space, so Palicomp has included a handy 2TB of internal storage to take care of it. Many would opt to keep their files on an external device such as a NAS drive, but keeping everything in one box can help to cut down on costs - and this is the one area where Palicomp's Alpha Media Blaze makes an impact.

The system comes without the SSD or graphics card of Arbico's model, but at only £549 it's considerably less expensive than any alternative in this round-up. If money is tight, it may be all you

Build	★★★★★
Features	★★★★★
Performance	★★★★★
Value	★★★★★
Overall	★★★★★



can afford, but be aware that you'll be missing out on a significant proportion of what a media PC can deliver.

**VERDICT:** The Alpha Media Blaze is really a budget PC with some multimedia components to enable it to function as a media centre. The system case is simply not good-looking enough to sit in a living room and it doesn't use a low-power processor. It is, however, much less expensive than any of the media-centre PCs here.



## QUIET PC STREACOM FC5-Z77 FANLESS MEDIA PC

**£1,491** inc VAT • [quietpc.com](http://quietpc.com) • [tinyurl.com/d9gp87x](http://tinyurl.com/d9gp87x)

Quiet PC's excellent Streacom FC5-Z77 Fanless Media PC shows just what can be achieved if you spend a little more.

Externally, it's similar to the Tranquil PC Media One. Both are housed in impressive super-slim cases designed to sit harmoniously within your living environment. There are, however some key differences: whereas Tranquil PC employs a bespoke aluminium unibody housing, Quiet PC has gone for the stylish Streacom case. This all-aluminium system allows for either a mini-ITX or a micro-ATX format motherboard to be used. The front facial is blank apart from a power switch and a discreet slot for loading Blu-ray discs.

With little room for upgrades, the FC5 creates a media centre that is more of an appliance than a standard PC. You won't be delving inside tinkering and adding cards, but you will benefit from entirely silent operation, thanks to a set of built-in heat pipes that link the low-voltage Intel Core i7-3770T processor to a row of fins that run from front to back on the exterior of the PC. This is a very powerful, yet power-efficient processor from Intel's latest Ivy Bridge range, which helps the PC to achieve nearly the same performance as Arbico's system while consuming only around half the power.

With an absence of cooling fans and storage provided by a 128GB Crucial SSD, the only sound emanating from this PC will come from



**PC ADVISOR**  
RECOMMENDED



the Blu-ray combo drive when it's in use. This means you can listen to music or watch movies at low volume without audible distractions.

**VERDICT:** The Quiet PC is silent in operation, yet delivers superb performance and can handle up to four TV channels simultaneously. It is, however, expensive and you will need external storage to complement the 128GB SSD installed.

	ARBICO £849 inc VAT ★★★★★	BRAEBO £799 inc VAT ★★★★★	CHILLBLAST £999 inc VAT ★★★★★ PC ADVISOR BEST BUY
Model name	5300-HD Media Centre	Perseus	Fusion Vacuum Mini
Processor	3.4GHz Intel Core i5-3570K (quad-core)	2.1GHz AMD A6-3500 (triple-core)	3.1GHz Intel Core i5-3450S (quad-core)
RAM	8GB DDR3	16GB DDR3	8GB DDR3
Storage	128GB OCZ Vertex 4 SSD, 1TB HDD	2TB HDD	240GB Mushkin SSD
Power supply	400W Xigmatech	Silent PSU	External 150W Pico (fanless)
Motherboard	Asus P8H77-M LE	ASRock A55 Pro3	Asus P8H77-I
CPU cooler	Xigmatech Apache	Standard AMD cooler	Passive cooler
USB	4x USB 3.0, 12x USB 2.0	2x USB 3.0, 6x USB 2.0	2x USB 3.0, 8x USB 2.0
TV tuner	Compro VideoMate E750	AVerTV CaptureHD H727	BlackGold BGT3620 Dual HD Tuner
Graphics card	Asus nVidia GeForce GT430	AMD Radeon HD 6450, 1GB VRAM	Integrated Intel HD 4000
Media centre software	WMC	WMC, CyberLink BD Solution	WMC
Connectivity	802.11n, gigabit ethernet	Gigabit ethernet	802.11n via adaptor, gigabit ethernet
Optical drive	Samsung 12x BD-ROM/DVD±RW	BD-ROM/DVD±RW	Sony BD-ROM/DVD±RW
Operating system	Windows 7 Home Premium 64bit	Windows 7 Home Premium 64bit	Windows 7 Home Premium 64bit
Ports	S/PDIF, HDMI, DVI, VGA	S/PDIF, HDMI, Composite video	S/PDIF, HDMI, VGA
Case	Silverstone GD05B Grandia Black	Zalman HD503	Streacom FC8 Black fanless case
Keyboard and mouse	Logitech K400	Logitech K400	Xebec
Extra features	Remote control	Zalman remote and TV tuner remote	Remote control
WorldBench 6 score	176	98 (estimated)	169
Gaming performance (fps) <sup>1</sup>	105/51	67/43	40/19
MediaEspresso time	5 mins 26 secs	22 mins 36 secs	1 min 57 secs
Power consumption (Idle/Max)	57W/132W	70W/112W	26W/73W
Dimensions	440x150x325mm	450x170x455mm	240x250x100mm
Warranty	2-year RTB (1-year C&R parts & labour)	1-year RTB	2-year C&R

<sup>1</sup>Tested in Crysis at 720p, Low/Medium settings • RTB: return-to-base • C&R: collect-and-return



## TRANQUIL PC MEDIA ONE

**£1,009** inc VAT • [tranquilpc.co.uk](http://tranquilpc.co.uk) • [tinyurl.com/c4npq5f](http://tinyurl.com/c4npq5f)

Housed in a bespoke slimline case hewn from a single piece of aeronautical-grade aluminium, the Tranquil PC Media One exudes quality. It's a horizontal-format passively cooled PC, similar in external appearance to Quiet PC's system, but considerably smaller.

Being custom made, there's very little space inside the case - it's designed as a perfect fit for the components. However, there is room for you to add a 2.5in hard drive or SSD to supplement the speedy but rather low-capacity mSATA drive preinstalled into the Intel DH61AG motherboard. A slot-loading optical drive is included, but it's a CD/DVD combo writer that doesn't support Blu-ray playback. The lack of a Blu-ray player is one of only a few features that disappointed us.

A TV tuner is also notably lacking from the specification. There simply isn't room inside the case to install one. It's a trivial task to add your own USB tuner externally, but you'll miss out on that pre-configured, out-of-the-box experience if you want to watch TV.

The Media One is designed to deliver a pure media-centre experience, which it does admirably. The system boots directly into Windows Media Center, bypassing the Windows desktop. If you want to use the PC for more general computing tasks, then you'll also need to order a keyboard and pointing device - neither were included with our review sample.



**PC ADVISOR**  
RECOMMENDED



The Media One's performance is slower than the competition - Tranquil PC has selected a 2.5GHz Intel Core i3-2100T Sandy Bridge processor, but you don't need a lot of processor power in a media PC.

**VERDICT:** The custom-made chassis places the Media One in a league of its own for build quality. You will, however, have to store your media externally and supply your own TV tuner and Blu-ray player.

<b>PALICOMP</b> <b>£549 inc VAT</b> ★★★★★	<b>QUIET PC</b> <b>£1,491 inc VAT</b> ★★★★★	<b>TRANQUIL PC</b> <b>£1,009 inc VAT</b> ★★★★★
<b>Alpha Media Blaze</b>	<b>Streacom FC5-Z77 Fanless Media PC</b>	<b>Media One</b>
3.4GHz Intel Core i5-3570K (quad-core)	2.5GHz Intel Core i7-3770T (quad-core)	2.5GHz Intel Core i3-2100T (dual-core)
8GB DDR3	8GB DDR3	4GB DDR3
2TB HDD	128GB Crucial SSD	80GB mSATA SSD
650W Ace	External 160W Pico (fanless)	External 19V DC supply (fanless)
Gigabyte Z77-D3H	Gigabyte GA-Z77M-D3H	Intel DH61AG
Standard Intel cooler	Heatpipes built into case	Tranquil cooling solution
4x USB 3.0, 6x USB 2.0	2x USB 3.0, 4x USB 2.0	2x USB 3.0, 2x USB 2.0
Peak dual TV tuner	TBS 6284 Quad DVB-T2	None
Integrated Intel HD 4000	Integrated Intel HD 4000	Integrated Intel HD 2000
WMC	WMC, ArcSoft TotalMedia Theatre 5.0	WMC
Gigabit ethernet	Gigabit ethernet	Gigabit ethernet
LG BD-ROM/DVD±RW	Sony BD-ROM/DVD±RW	Sony Optiarc CD±RW/DVD±RW
Windows 7 Home Premium 64bit	Windows 7 Home Premium 64bit	Windows 7 Home Premium 64bit
S/PDIF, HDMI, DVI-D, VGA	HDMI, VGA, DVI	S/PDIF, HDMI, DVI-I
Palicomp Media Centre Case	Streacom FC5	Tranquil PC Media One chassis
Xenta	Microsoft Wireless Desktop 3000	None
Remote control	Streacom remote control	AIM Media Centre Remote control
169	172	123
48/30	48/31	27/13
1 min 56 secs	1 min 42 secs	4 mins 14 secs
50W/116W	28W/74W	19W/45W
451x368x149mm	435x325x60mm	395x225x40mm
3-year RTB	2-year C&R	3-year RTB

>> How we test and our conclusion



## Conclusion

Media PCs are available to suit most needs and budgets. A low-end system should set you back around £500, provide a dual-channel TV tuner and cope perfectly well with recording and playing back all sorts of multimedia content, including HD video and Blu-ray.

If you wish to retain compatibility with standard PC components and keep down costs, you can opt for a horizontal-format ATX-sized case. Palicomp's Alpha Media Blaze is just such a system, but beware that this PC offers few of the ergonomic features we would expect from a good media centre. Arbico's 5300-HD offers a similar case format but with far superior build quality. It

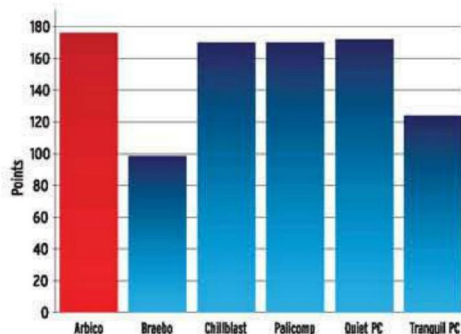
also offers much better performance in both application and graphics performance, making it suitable for gaming and general-purpose use. Braebo's Perseus also comes in a large-format chassis, but makes good use of the size by adding physical media controls such as a volume knob and an LCD display, used to control the PC without turning on the screen.

All these systems, however, use fans to cool their internal components and are therefore not completely silent. The best media PCs are able to function more like multimedia appliances rather than traditional PCs, and will make no noise other than the spinning sound of Blu-ray drives.

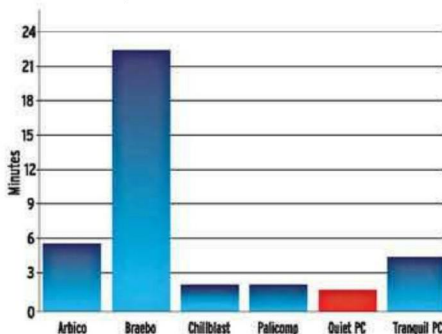
Chillblast, Quiet PC and Tranquil PC have submitted entirely silent systems. They use external power supplies and employ aluminium cases using heatpipe technology to transfer heat to the outside of the case.

Tranquil PC's Media One goes a step further by avoiding the use of any air vents, thereby all but eliminating any concerns over dust build-up. Those systems using low-power processors also fare much better when left running for extended periods, requiring less cooling and costing you less money. If you want to watch Freeview HD, make sure you choose a PC with a DVB-T2 tuner (many do not).

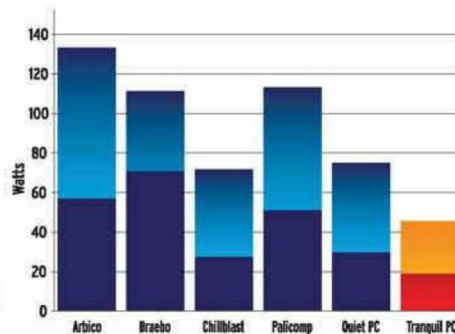
WorldBench 6 score



MediaEspresso time



Power consumption (idle/max)



## How we test

### Application performance

Core system performance is measured using WorldBench 6. This customised test suite runs several desktop Windows applications with real-world workloads, mimicking how PCs are used on a daily basis.

These workloads include tasks such as editing documents and images, compressing files, browsing the web and encoding video. Some tasks are then run simultaneously to form an additional test of the PC's multitasking capabilities.

In total, eight applications are used: Adobe Photoshop Creative Suite 2.0, Autodesk 3ds Max 8.0, Firefox 2.0, Microsoft Office 2003, Microsoft Windows Media Encoder 9.0, Nero 7.0 Ultra Edition, Roxio ViewWave Movie Creator 1.5 and WinZip Computing WinZip 10.0.

Results from 10 individual tests are combined and weighted to produce a numerical score relative to a baseline PC.

Our baseline configuration runs a 2.4GHz Core 2 Duo E6600 processor, 2GB of DDR2 RAM, an nVidia GeForce 7900 GS graphics card, twin Western Digital Caviar WD3200KS hard drives in a striped Raid array, and Windows Vista Home Premium 32bit. This PC scored 100 points in WorldBench 6.

### Transcoding performance

Because you'll often be working with more than one video file format, we set each PC the task of converting a batch of 1080p Mpeg4 video clips for use on the iPad 2 and recorded how long it took to complete. We used CyberLink's MediaEspresso software.

This software is able to make use of hardware-accelerated decoding and encoding built into graphic cards and CPUs with integrated graphics-processing capabilities. These techniques can often shorten conversion times by a factor of 10. Multiple CPU threads are also fully exploited, allowing quad-core CPUs to shine when compared to dual-core versions.

### Gaming performance

As entertainment centres plugged into your TV, media PCs might be used to play games. Power and noise requirements usually prohibit the use of the best graphics cards, so we tested each PC running Crysis at 720p, 'Low' and 'Medium' quality settings.

### Overclocking

We allow overclocked systems to be submitted only for our dedicated gaming PC reviews. All other components are run

at stock speeds, with the exception of factory-overclocked graphics cards designed and sold at boosted speeds. We do, however, allow underclocking for the purposes of reducing power consumption.

### Subjective assessment

We also pay close attention to the physical characteristics of each PC, its noise output and its build quality, delving inside the case and taking note of the quality of components used, cabling and airflow.

Good-quality peripherals are also important, and where they are supplied we note the ergonomics of the keyboard and mouse. A media PC also needs a remote control and, preferably, a keyboard that can be operated from the sofa.

### Support

Differences in warranty terms can impact our scoring. Long warranties are sought after, but we also look at the terms and conditions - specifically, whether faulty systems must be returned to the vendor at your own cost and if both parts and labour are included. Ensure the vendor offers full software support and preferably a home installation for more complex systems. ☒





# 10 ways to secure a new PC or laptop

The joy of owning a new PC can easily turn to heartache should it be compromised by malware or a scam. Matt Egan shares his tips on how to keep it safe

**Y**our PC or laptop will never be more secure than it is the moment you lift it out of its box: shiny, untainted and unconnected to anything that can do it any harm. To guarantee that it will remain in such a state, your only real option is to pop it straight back in the box or, at the very least, keep it away from web connectivity. But, these days, a PC without the web is less than a half a machine, and with a little judicious planning you can limit the risks to any computer.

We've put together a simple checklist of 10 key things to take care of when you first boot your new system. The basic principles apply to any computing device, but we've focused on Windows PCs for two reasons: they represent the biggest single group of computers, and they are under the greatest threat.

The key phrase here is 'limiting risk'. We don't guarantee security if you follow all of our suggestions, but we strongly suggest that you do. Virtually all internet security threats exist in order to part you from

your hard-earned cash, but criminals are by their very nature corner cutters. If you make it hard for them to defraud you, they will, with luck, simply move along to the sucker down the way, letting you enjoy your new computer with peace of mind.

## 1. Antivirus, antispyware and firewall

It sounds simple, and it is, but you'd be amazed at the number of people who still don't get this, so we'll say it once more. As the barest minimum level of security, every PC that is capable of being online should have antivirus, antispyware and a software firewall. It's critical that each is kept up to date, and that regular scans are scheduled.

The good news is that getting hold of good-quality security software has never been easier. All the important security vendors sell their wares in bundles known as 'internet security suites', and each of these will contain at least antivirus, antispyware and a firewall. What's more, you can download, install and purchase them direct from



the internet – although if that is your plan of action we suggest it is the first thing you do when getting online. Indeed, you may not even need to go that far, as most PCs ship with a trial version of a security suite, and your broadband supplier may even supply such software free of charge.

Proceed with caution here, however. Not all security programs are of the same quality, and the trial bundled on your PC is there principally because the software maker paid good money to the PC builder for the opportunity to collect your renewal fee when the trial expires. Read *PC Advisor's* reviews and our Top 5 chart (page 136) before making a decision, and don't skimp on this purchase – it could be the most important investment you make in your PC's career.

## 2. ...and all the other aspects of a good internet security suite

As we stated in the first tip, not all security software programs are equal. You could, should you choose to, grab individual antivirus, antispyware and firewall programs, perhaps even without paying a penny. And this might work fine, although you may find that programs from different vendors work against each other, rather than in concert.

You'd also be missing out on the additional benefits that a good, modern internet security suite offers. We're talking about behavioural security software and crowd-sourced antimalware, in conjunction with and in addition to traditional signature detection.

As a first line of defence, signature-based detection is unsurpassed. This is where the software signature of any program that tries to infiltrate your PC is compared to a database of known malware. Thus can the vast majority of viruses, Trojans and other

assorted filth be expelled from your PC with the minimum of fuss.

The trouble is that it takes very little effort to slightly alter a known virus to make it undetectable to traditional antivirus, and that's principally what cybercriminals spend their time doing. Signature-based detection should be seen as a time- and resource-saving triage tool: a means of weeding out the majority of malicious programs, without having to do much work. It is at this stage that behavioural security software should be employed, as well as the crowd-sourced opinions of a large group of PC users who have encountered a suspect file.

Top-level security suites all contain these types of features, with a varying degree of success. Again, we'd urge you to check our online security reviews and the Top 5 charts, and if you don't want to shell out for high-end software, at least additionally use a relatively inexpensive behavioural program such as Malwarebytes as a second line of defence.

## 3. Remove crapware, trials

Your PC may well arrive with all manner of 'free' software on it. Far from the boon this can seem to the unwary purchaser, it is usually an extension of the economic necessity that means you get a trial of security software. It's there because the software maker is paying the PC vendor to put it there, because it's the best way of selling software to new PC owners.

There's nothing essentially insecure about trial software, although it is an irritant. However, the 'pay-me' pop-ups that they trigger can be confusing and if you get used to them you may fail to spot an infection, while out-of-date software can contain holes for scammers to exploit. Try free tools such

as PC Decrapifier ([tinyurl.com/7Lvhn47](http://tinyurl.com/7Lvhn47)), or Revo Uninstaller ([tinyurl.com/6ms987u](http://tinyurl.com/6ms987u)) to rid yourself of this junk and start afresh.

## 4. Keep software up to date

It isn't only unwanted trials that can fade into antiquity, leaving you with a leaky PC. Lots of software requires regular updates to close loopholes exploited by malware writers. Popular programs such as Adobe's Flash, as well as Microsoft's own

Windows operating system, require regular patching, and those that don't update are vulnerable to attack.

Where possible, set your preferences to automatically update important programs, and never put off performing a critical update. If you're unsure of how to do this, a free program such as Secunia PSI ([tinyurl.com/83zdqzo](http://tinyurl.com/83zdqzo)) will take the load.

## 5. Take account of accounts

One of the simplest ways of boosting PC security is to prevent damaging changes from being allowed. To do so is simple: with any new Windows PC you should first create an administrator account, and set it so only that account can make critical changes to the system. Next add a password-protected standard user account, and make sure this is the one you use. As other users are added, they too can have standard user accounts, but the administrator account should be used only when you need to make significant changes.

This helps to prevent human intervention causing problems – of which more later. More importantly, it means that even if your PC is infested, it will be running in a standard user account, which can limit the damage.

## 6. Secure your network & browser

There are a couple of things that can reduce the risk before you even venture online. The first thing to do is secure your wireless network. Most PC users will be running home wireless broadband via a router provided by their ISP. Although all should come with WPA, WPA2 or WEP security, in many cases such routers come with a default password such as '1234' or '0000'.

Make sure your Wi-Fi is secure, ideally with WPA2, and change the password to something no-one can guess. Then use a web browser with robust security and privacy settings, such as Internet Explorer, Chrome or Firefox, and ramp up those settings to the max.

## 7. Set up System Restore

A System Restore point is a sort of bookmark that's created whenever you make a significant change to your PC. Windows Updates create restore points, as does the installation of many programs. Your PC will probably also be set to create such points at given intervals – once a week or once a fortnight, perhaps – regardless of anything else going on with your PC. If something goes wrong, you can revert to an earlier point without losing your files and folders.

You can view your existing System Restore points by going to Start, Control Panel in Windows XP or Computer, Control





IN ASSOCIATION WITH:



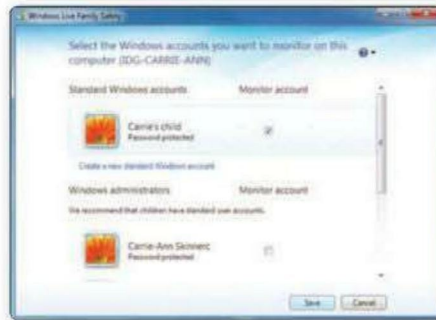
Panel in Windows Vista and Windows 7. Click 'Performance and Maintenance' and choose System Restore from the list on the left. Choose 'Create Restore point' to manually create a point. You can give this point a name, making it easier to identify later. And when you first use your new PC, make sure System Restore is up and running.

### 8. Educate all PC users

The biggest threat to any PC or network is the person using it. The easiest way to get a virus on to a system is to use greed or stupidity to trick the unwary user into downloading a file or clicking on a link.

Human frailties will never entirely be conquered, but you can limit the dangers by setting strict ground rules with all users of your new PC, including yourself. Especially where children are involved it makes sense to set time limits, and blacklist sites that you feel are inappropriate or risky. Windows Live Family Safety is an example of a free tool that can help in this way ([tinyurl.com/7ay2dLo](http://tinyurl.com/7ay2dLo)).

Keep admin rights only to yourself, and make sure that people know before they go



Set ground rules for kids using the PC with **WINDOWS LIVE FAMILY SAFETY**

anywhere near your PC that downloading dodgy files will not be tolerated, passwords must be robust and varied, and anyone forwarding on a round-robin email will be summarily banned from the computer.

### 9. Physical security

Something close to home, as we had a break-in at *PC Advisor* Towers not so long ago. Actually, 'break in' is too strong a term, as someone walked in off the street and made off with a valuable laptop. Computers,

particularly laptops, are easily some of the most nickable items in the home. It makes sense, then, to take two simple precautions.

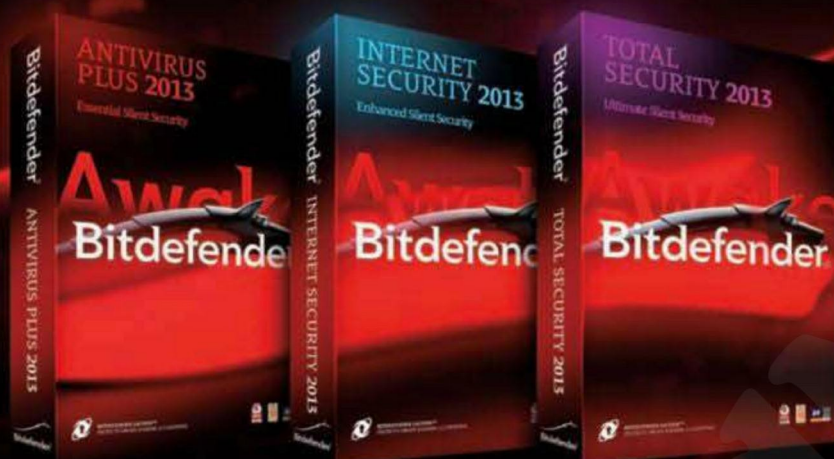
Firstly, keep your computer away from any windows. Wherever possible at night it should sleep upstairs with you, and it should definitely not be visible from the street. And get a Kensington Lock, or similar, to attach your PC to something immovable. You don't want to take all the above precautions only to find that your perfectly protected PC is physically stolen.

### 10. Be wary and wise

None of the above tips will guarantee security for your system, but taken together they should make it less than worthwhile for a cybercriminal to gain access to your PC, your data and - ultimately - the contents of your wallet. Key to it all is a sense of vigilance.

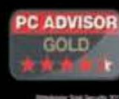
Your new PC is there to be enjoyed - the internet is a wonderful resource, and you shouldn't live in fear. But a dollop of healthy scepticism, and a modicum of care in all things related to your PC will help to keep it, and you, safe and secure. ☒

## The All-New Bitdefender 2013



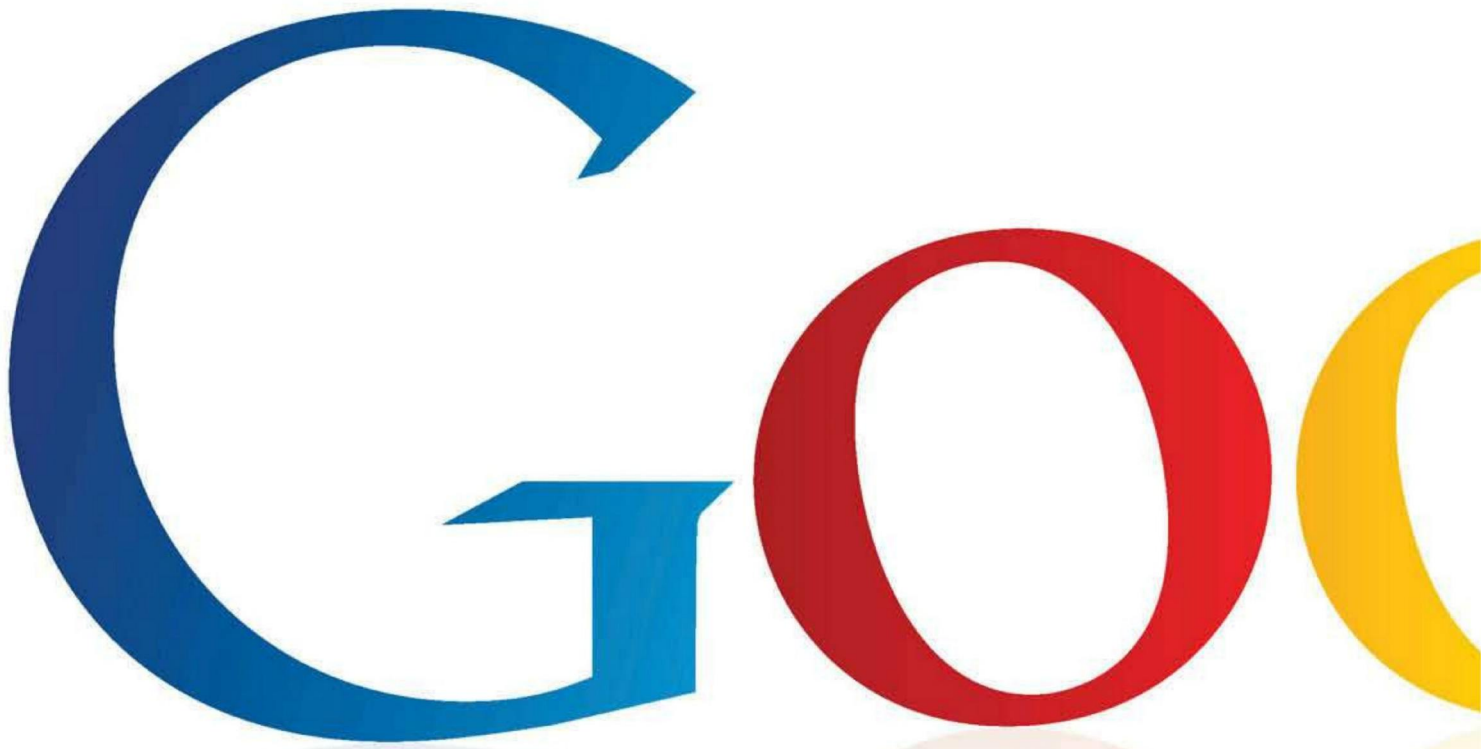
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## Ultimate guide to



There's a lot more to Google than a search engine. With email, online storage and scores of other free services on offer, Jim Martin reveals some great tools on which you might be missing out

**F**rom its humble beginnings in 1998, Google has become one of the biggest brands on the planet. Founded by computer-science students Larry Page and Sergey Brin during their time at Stanford University, Google's mission statement is 'to organise the world's information and make it universally accessible and useful'.

Not only is Google the most-used search engine on the internet, but the verb 'to Google' even appears in the dictionary. In fact, you're more likely to ask someone

whether they've tried Googling for an answer than you are to ask whether they've tried searching the web for a solution. People use the term regardless of the search engine, something Google is keen to discourage.

Of course, the company has come a long way in the past 14 years, and now has an impressive range of mostly free services. As well as online tools for everything from getting directions (Maps) to tracking visitors to your website (Analytics), there are also desktop applications such as Picasa, for editing and organising photos, and the

Chrome web browser. Plus, Google owns YouTube and Blogger, and has its own social networking site, Google+. It even has its own operating system, Android, which runs on a multitude of smartphones and tablets (see our smartphone and tablet group tests on pages 52 and 62 respectively).

Whether you already use Google's services or you don't yet have a Google account, we'll show you some of the company's best tools and services. If you like what you see and want to create a free account, simply head to [google.co.uk](http://google.co.uk) and click the Sign in button.







# WEBMAIL Gmail

Gmail is one of our favourite Google services: an email account with an ever-growing amount of free storage space (around 10GB at press time). You can check and send emails from the website (mail.google.com), but it's also accessible from many smartphones and tablets. If you prefer to use a desktop application such as Outlook or Incredimail to manage your email, it's easy to add your Gmail account details so that your email is directed there instead or as well.

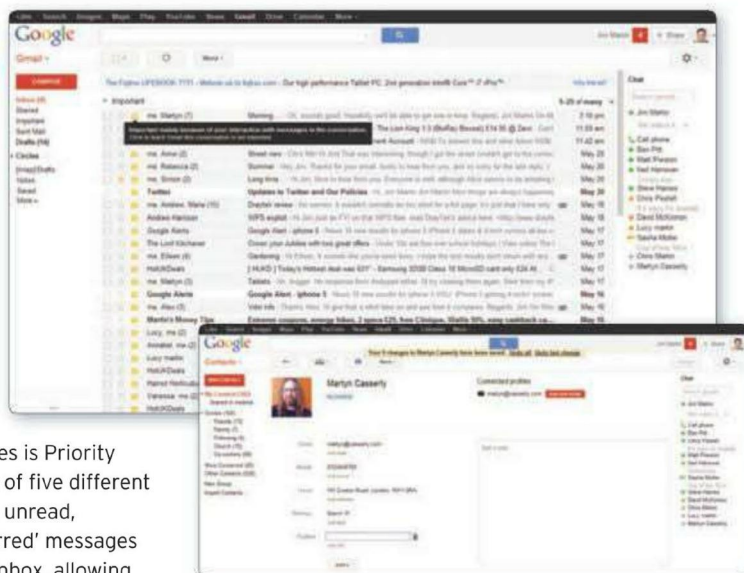
The website interface is perhaps the most convenient of all webmail services to use, not least because it uses Google's powerful search capability to find information in old messages. You can customise how your inbox looks, right down to the density of information, and it's possible to drag-and-drop attachments on to a new message.

There are lots of other useful features, including the ability to create 'labels' (folders into which you can move email). You can also create filters to automatically send incoming emails to these folders. Gmail has an excellent spam filter, and it's unlikely that

you'll ever see any. However, you can mark unwanted emails as spam to ensure Google knows to block similar messages in future.

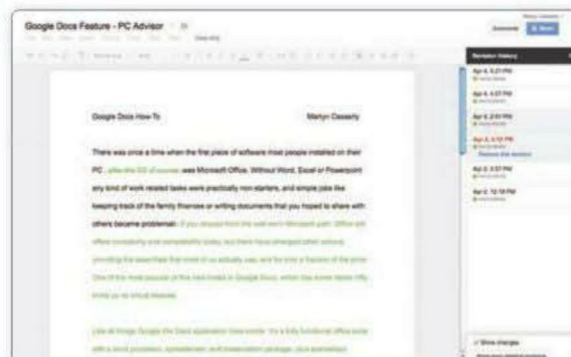
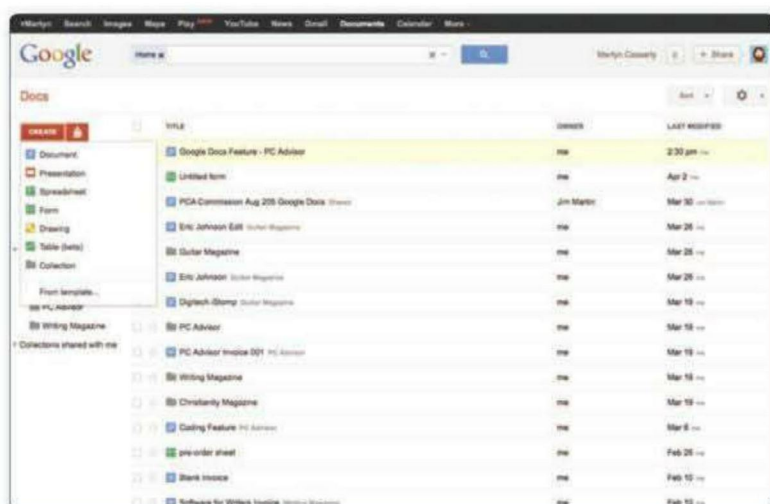
One of Gmail's best features is Priority inbox, which is one of five different inbox styles. It lists unread, important and 'starred' messages at the top of your inbox, allowing you to quickly find and deal with important messages. Alternatively, you can instruct Google to list what it thinks are important messages first.

As well as email, Gmail handles contact information and tasks (a todo list). To switch between these views, click the Gmail link below the Google logo in the top-left corner. It's also possible to tweak several of Gmail's



settings, which are accessible via the cog icon in the top-right corner.

Gmail incorporates an instant-messaging service, Chat. This appears to the right of your inbox and displays contacts as online, away or offline. Conversations appear under the Chats heading in the left column (you may have to click the More link to see this).



# PRODUCTIVITY Docs

Docs is Google's online productivity suite and a good free alternative to Microsoft Office for undemanding users. When you arrive at the docs.google.com homepage, you're presented with a list of your documents and the option to upload more from your PC or create a new document, spreadsheet, presentation, form, drawing or table.

Although some of the more advanced features of the latest version of Office are missing from Docs, there's enough here to keep most people happy. Plus, Docs lets you collaborate with others in real time. Several

people can simultaneously open and edit a document, and it's easy to see who's making changes or adding comments. There's also a chat column to the right, so you can discuss a document without adding comments.

If you frequently use Docs, its list of documents can quickly become unwieldy. A search bar lets you easily track down a specific document, and will even search its contents, but it's worth organising your work into folders (or 'Collections').

Currently, there's no easy way to edit documents offline, but a beta tool allows

you to view documents and spreadsheets in the Chrome web browser (see page 87). If you do need to edit something, it's simple to download the document: from the File menu choose Download as or 'Email as attachment'. Docs can output in a variety of common formats, and if you use Chrome you can send it directly to a printer.

When Google launched Drive, it increased Docs' 1GB of storage space to 5GB. You can also pay for extra space.

For more, see *Get started with Google Docs* (tinyurl.com/cpk9bbu).



# EVENTS CALENDAR

As the name suggests, Calendar is Google's online diary. You can launch it from the top menu bar when logged into your Google account. Calendar lets you choose between a variety of views, from a single day to an entire month.

Adding appointments and meetings is easy, since Calendar understands natural language. Click the arrow next to the Create button and type a sentence into the Quick Add box, such as 'lunch with John, 1pm on Friday' or 'team meeting, tomorrow 10am'. The event will be added to your calendar at the correct time and date.

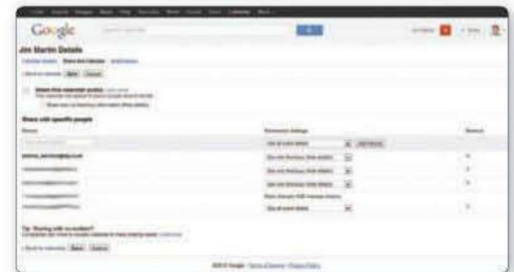
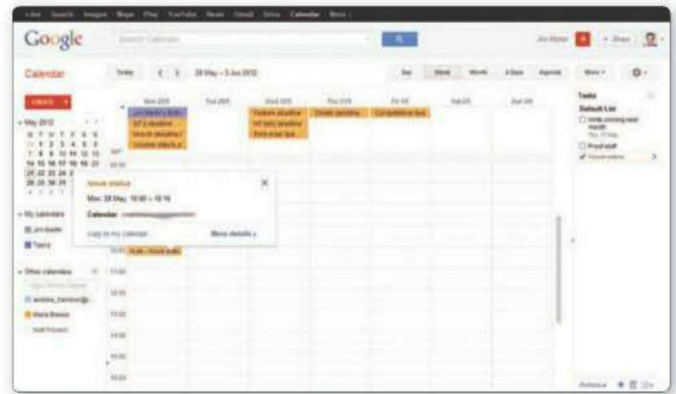
You can add more information, such as a location and a duration, by instead clicking the Create button. Here, you can also invite guests by entering their email addresses, and specify to which calendar the event is added. Multiple calendars are useful if you want to separate home and work events, for example.

In the main Calendar view you'll see all your calendars on the left side; you can show

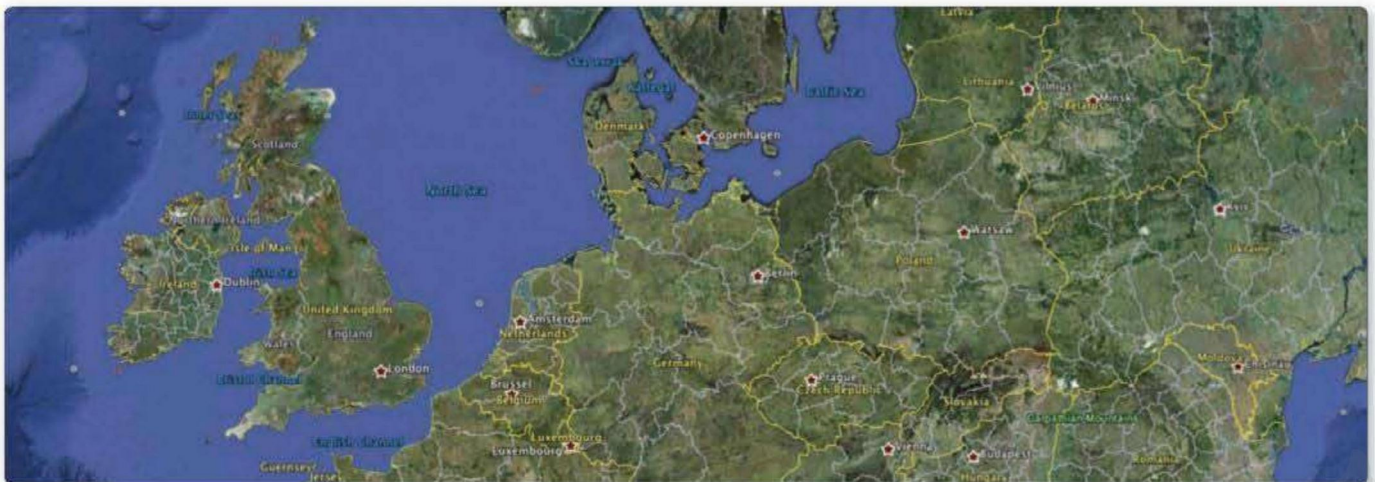
or hide your task list on the right by clicking the Tasks link. This is the same list you'll see in Gmail, so if you've set a deadline for a task it will appear in your calendar.

Usefully, you can share your calendars with other people. To do this, click the arrow next to the name of the calendar you want to share and choose 'Share this Calendar'. Simply enter an email address and choose what that person is able to see: all event details, or merely when you're free and busy. You can also give others the ability to edit your calendar and even manage who else can see it.

If you need to use Calendar without an internet connection, you can download the Google Calendar web app from Chrome's app



store. Unfortunately, this isn't supported in other web browsers.



# DIRECTIONS MAPS, EARTH

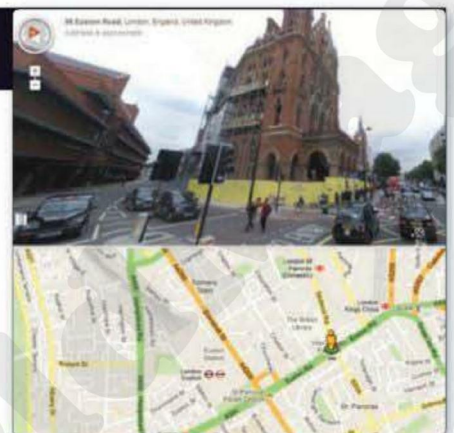
Maps (maps.google.co.uk) is one of the clearest mapping tools we've used. It's just been updated to include better 3D graphics, 3D photo tours and a 45-degree aerial view. The default top-down view can be changed to show satellite imagery, with roads overlaid. In Chrome, you can install the Google Earth plug-in to view maps in 3D (there's also a Google Earth desktop application).

One of the most useful tools in Maps is Street View. When you drag the orange man icon to the map, streets with Street View information are shown in blue. Drop the icon on to a blue street and the view will switch to 360-degree street-level photographs - you can zoom and pan, and even move

along roads. This is invaluable when you want to see what your destination looks like before setting off.

Click the Get directions button to help you navigate to a destination. You can enter a postcode, town, full address or even a station or tourist attraction and Maps will find it. You can choose driving, walking or public transport directions and alternative routes are shown to the left, even taking traffic congestion into account.

It's possible to print maps as well as driving directions, and you can share maps with friends by clicking the chain-link icon. This also gives you the option to embed an interactive map on your website - ideal for



showing visitors your exact location. If you sign in with your Google account details, you can save routes and locations and custom maps, too.



# SOCIAL NETWORKING GOOGLE+

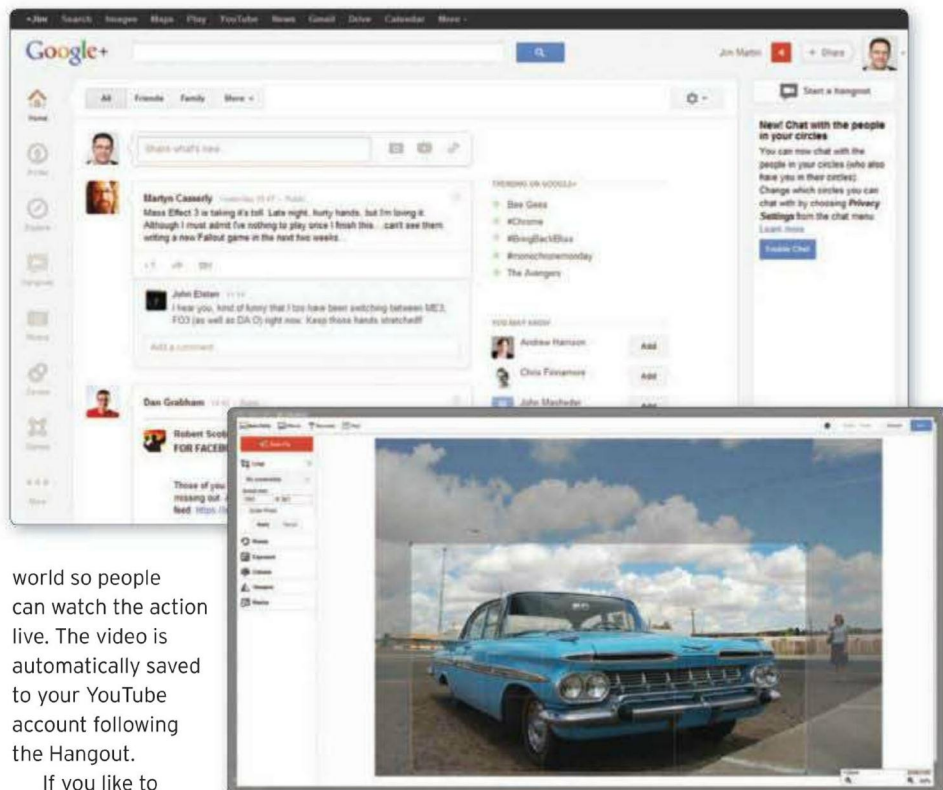
Google+ (plus.google.com) is Google's rival to Facebook. It differs from Facebook and other social networks in that it allows you to categorise your contacts in 'circles' and share posts with whichever circles you like. You can create as many as you want, perhaps for work, friends and family.

Google+ has recently undergone a facelift and is now more streamlined. Down the left side is a menu of sorts, with Home at the top. This shows the most recent posts from people in your circles, with a box at the top into which you can add your post.

Just as with Facebook, you can type a comment, upload a photo or video, or paste a link to a web page. People can comment on your post, and they can also '+1' it (the same as 'Liking' something on Facebook). Before you submit your post, select the circles with which you want to share it. You can send a message to an individual by entering their name, or make your post public so it's readable by all Google+ users.

Above the feed are buttons that let you choose which circle's posts to display. The default is All, but you can quickly find out what your friends are saying and sharing by clicking the Friends button.

Further down the left column is a Hangouts button. Click this to begin a video chat with up to nine people at once. You don't have to have a webcam for a Hangout - a microphone will do. During a Hangout you can chat or watch YouTube video together, or even play online games. Hangouts On Air lets you broadcast your Hangout to the



world so people can watch the action live. The video is automatically saved to your YouTube account following the Hangout.

If you like to share photos and albums, Google+ gives you unlimited free storage for high-resolution photos, which you can share with the people you choose. When you've uploaded images, you can edit them by clicking on them and choosing the Edit photo link at the top of the page. You can crop, rotate and sharpen images, and add effects, borders and even fake beards.

Google+ borrows from Twitter the idea of trending, and shows you what's popular on the social network to the right of your news feed. If you click the Explore button in the left menu you'll see a feed called 'What's hot on Google+'. A slider at the top allows you to alter how much of this feed is displayed on your home page.

# WEBLOG BLOGGER

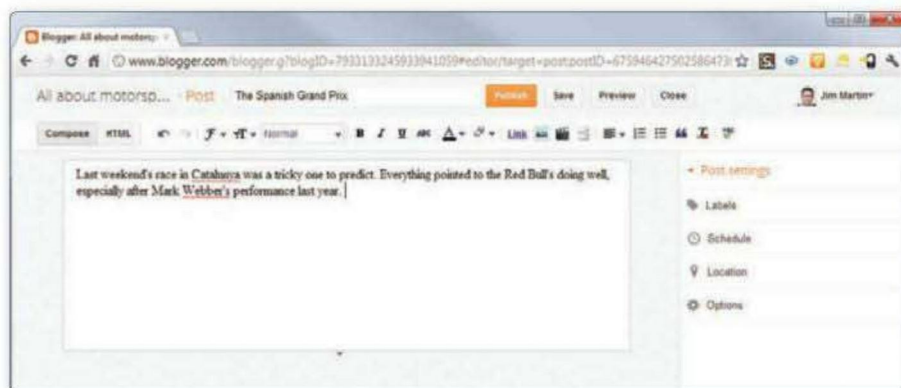
Publishing a blog is easy with Blogger. Google bought Blogger in 2003 and it's still free to use. Sign up at blogger.com using your usual Google account details; you'll then be prompted to choose a title and address for your blog, such as myname.blogspot.com.

Everything is hosted on Google's own servers and it's relatively easy to create new posts. We say 'relatively', since the process isn't as easy as it is with Tumblr (see page 112), but the blank canvas gives you more scope in what you can post.

You can add photos and video, including those from your YouTube account, and format text just as you would in a word processor. Advanced users can access an HTML view, while a menu on the right lets you add tags and a location to your post. Here, you can also specify whether comments are allowed. A preview option lets you check your post before it's published.

The main menu provides quick access to comments, stats and layout and template options. Blogger can automatically filter out spam comments, but it's worth checking the spam filter to ensure genuine comments haven't been accidentally removed.

You can earn money from your blog through AdSense (another Google service), which is enabled via the Earnings link. You'll start earning money when people click on the ads Google places on your blog.



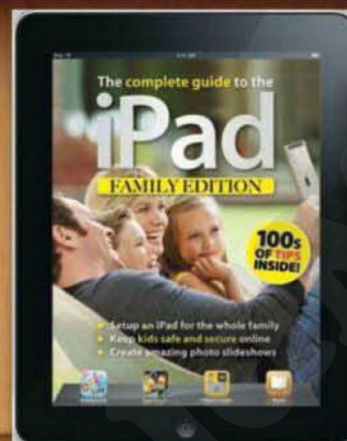
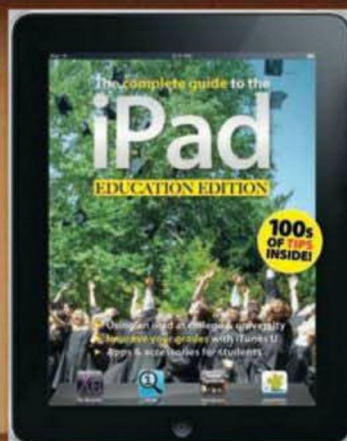
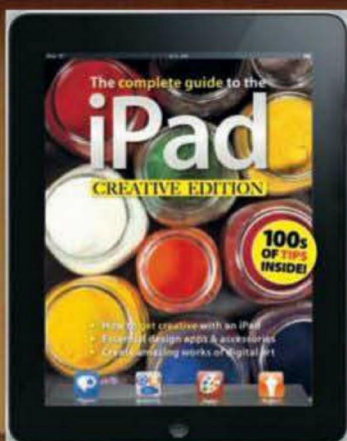
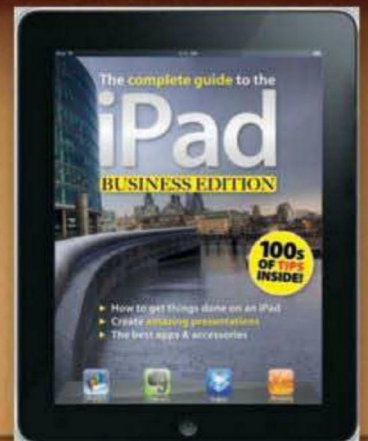
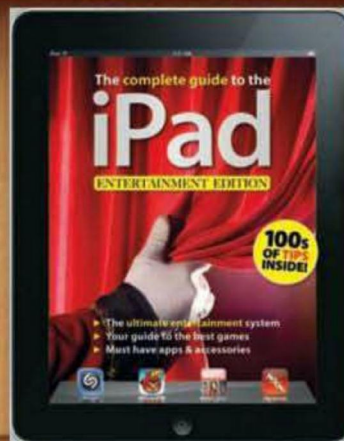
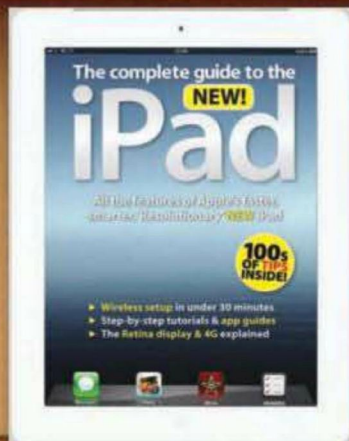


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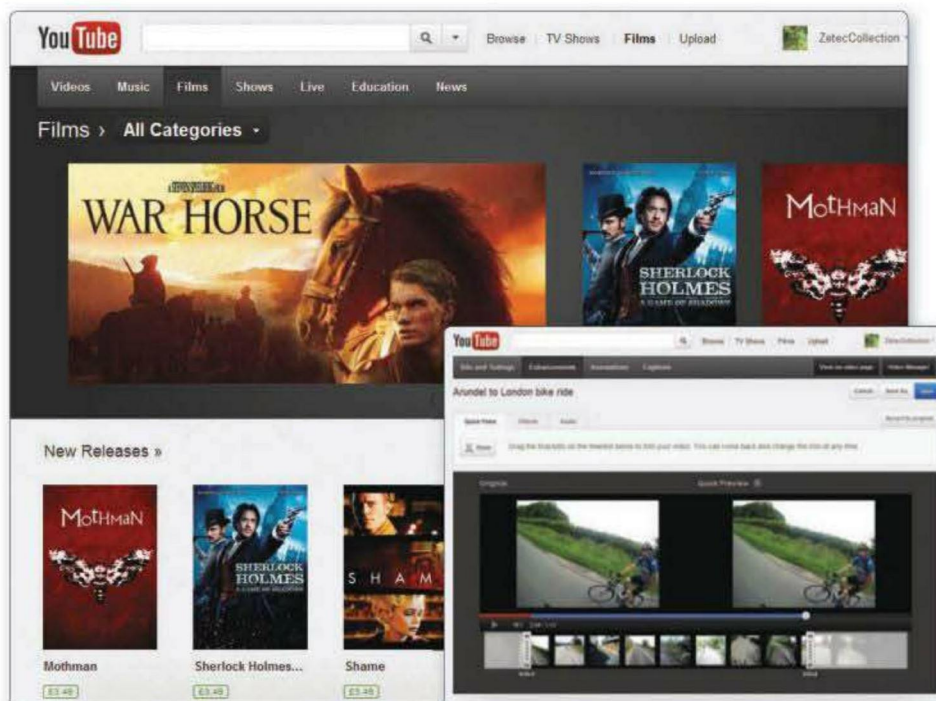


## VIDEO YOUTUBE

YouTube (youtube.co.uk) is one Google service that needs no introduction. Whatever you want to watch, there's a good chance you'll find it on YouTube. Swinging monkeys, people parking their cars badly and 'the coolest guy in the world' are all present.

However, as well as dipping into people's crazy homemade videos, you might not realise that you can also watch the latest TV shows and movies for a fee. Some older films are free, but most cost a couple of pounds. Many TV shows are available for free through the provider's catch-up service, but have a scattering of adverts.

If you want to upload your own masterpiece, YouTube supports most formats up to 1080p and 15 minutes in length (more depending on your account status). You can annotate your videos and even edit them once uploaded. Some new tools include the ability to trim your video, reduce camera shake and convert it to black-and-white. There are no storage limits, so you can upload as much footage as you like.



## STORAGE & SHARING DRIVE

Drive is Google's latest service and it aims to compete with the likes of Dropbox and Microsoft's SkyDrive. It's a cloud storage service to which you can upload files for storing, sharing and accessing from any web-connected computer, tablet or phone (iOS apps should be launched soon).

To sign up, head to drive.google.com. You'll see your list of documents from Google Docs, since Drive is their new home. It's worth noting that Drive in effect replaces Google Docs on the web, so navigating to docs.google.com will redirect you to

drive.google.com. Also, signing up for Drive will cause your documents to be split into two sections: those you created yourself (My Drive), and those that others own (Shared with me). You can still use the search bar at the top to quickly find the document you're looking for, though.

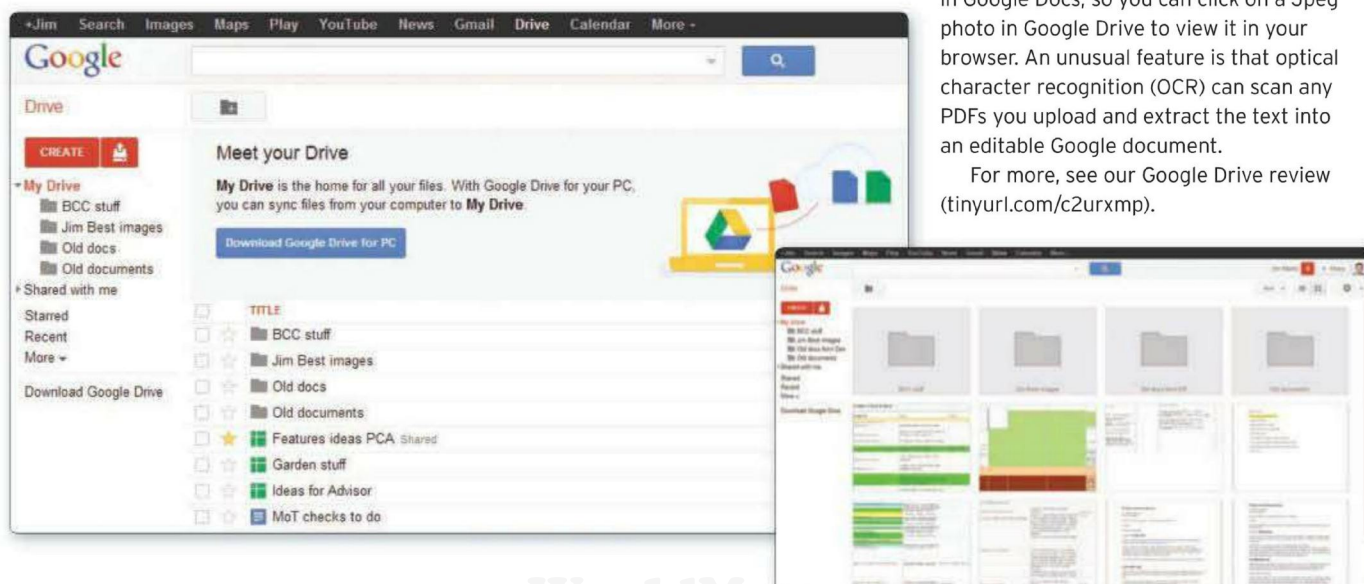
As with Dropbox, it's simple to synchronise files from your computer to Google Drive once you've installed the Windows, Mac or Android application. This adds a new folder to the Favorites section in Windows Explorer. Any files you copy to it will automatically be

uploaded to your 5GB of storage space. You can create sub-folders and copy files into them. While files are uploading you'll see a pair of blue arrows, which are replaced with a green tick when the transfer is complete.

In Windows, you'll also see a new icon in the Notification area. Click on it to see the current sync status, how much storage you're using and options to buy more. Upgrading to 25GB, for example, costs \$2.49 per month (around £1.50). This also upgrades your Gmail storage to 25GB.

Most common file types can be opened in Google Docs, so you can click on a Jpeg photo in Google Drive to view it in your browser. An unusual feature is that optical character recognition (OCR) can scan any PDFs you upload and extract the text into an editable Google document.

For more, see our Google Drive review (tinyurl.com/c2urxmp).







## CUSTOMISE iGOOGLE

If you're the sort of person who likes to set a home page for your web browser, it's worth trying out iGoogle. Head to [google.co.uk/ig](http://google.co.uk/ig) - you'll be prompted to sign in if you haven't already. Click the 'Create your own home page in under 30 seconds' link.

You can choose a theme for the page (there are many garish options) as well as things that interest you and your location. Once you've personalised your iGoogle page, you can add widgets by clicking the Add gadgets button near the top-right corner.

There are hundreds on offer, so it's best to search for specific things.

We recommend adding gadgets for Gmail, Maps, BBC News, YouTube, Wikipedia and Google Calendar. This way, you can see a lot of information on one page without having to visit those websites individually. You can also directly search Google, YouTube or Wikipedia from your home page.

You can rearrange gadgets by dragging-and-dropping them where you want them. Once you've finished, make sure you update



your browser's home page to iGoogle. In Google Chrome, click the spanner icon and choose Settings. Then, in the Home page section of the Basics page, click the radio button next to 'Open this page:' and enter <http://www.google.co.uk/ig>.

## WEB BROWSER CHROME

Google launched its Chrome web browser in 2008 and has released 18 versions since. It was the first browser to run each tab as a separate process, meaning you could carry on as normal when one tab crashed.

Chrome ([chrome.google.com](http://chrome.google.com)) is one of the fastest web browsers and its minimal interface leaves maximum room for content. It's easy to rearrange the order of tabs by dragging-and-dropping them, and you can even drag a tab out to create an independent browser window.

You can configure Chrome to start by showing your eight most-visited websites as thumbnails. At the bottom of a new tab you can switch from this view to Apps. The Chrome Web Store is full of useful free apps for you to install.

These include games such as Angry Birds and Cut the Rope, as well as more productive tools such as Evernote, TweetDeck, Google Mail Checker and Google Docs Offline. You'll find that some apps are merely shortcuts to sites, but they're simple to try and remove.

A particularly useful feature in Chrome is the ability to sign in using your Google account. This, along with the Sync function, lets you see your bookmarks, most visited sites and apps on any computer running Chrome. You can choose what to sync from a list that includes autofill information, passwords, themes, settings and search history. If you're worried about letting Chrome save passwords for websites, plus all your other synched data, bear in mind that you can tell it to encrypt everything in the Personal Stuff section on the Settings page.

Yet another handy feature is the Recently closed link, tucked away in the bottom-right corner. If you accidentally close a tab, or all tabs, you can click on this to show the 10 most recent sites you were looking at.







## ADMIN ANALYTICS

If you run a website, it's useful to know how many visitors it's attracting and where they came from. Analytics ([google.com/analytics](http://google.com/analytics)) is a great free reporting tool that does exactly that. When you sign up, Google will give you a small piece of JavaScript code to paste somewhere on your home page (the sidebar will do if you're using

Wordpress). After that, Google Analytics takes a day to start reporting.

When you log in you'll see a Visitors Overview, along with data such as the total number of visits, unique visitors, how long they stayed and how many were new rather than returning visitors. You can drill down further to find out in which country they

reside and what operating system and screen resolution their computer runs.

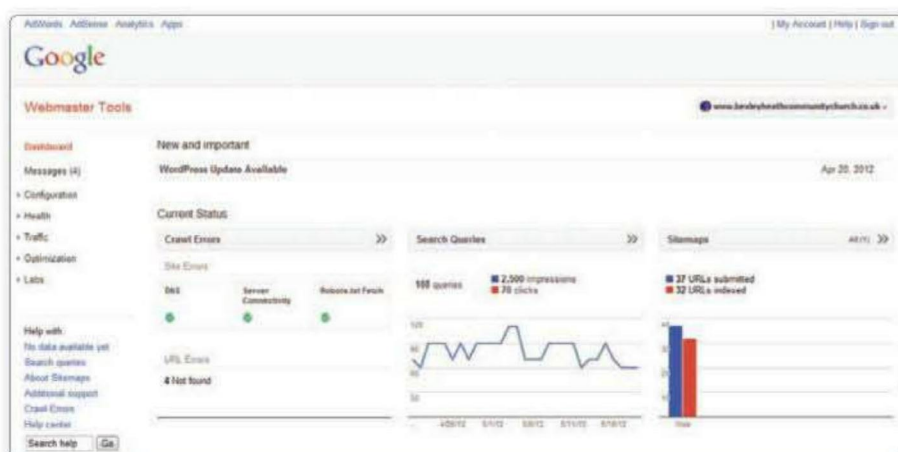
Whether you have a small website with largely static pages or a large dynamic site, Analytics will give you the information you need. It will cope with multiple sites, too. To switch between the sites you're monitoring, click the All Accounts button at the top-left.

## ADMIN WEBMASTER TOOLS

Analytics goes only so far, but Webmaster Tools is able to report on a whole host of useful website-related stats. Webmaster Tools is free to use and you can sign up at [google.com/webmasters/tools](http://google.com/webmasters/tools).

Once you've logged in, you can add your website. You'll have to verify that you own the site in order to use Webmaster Tools, usually by uploading an HTML file to the root of your server. With that done, you'll be able to check your website's health, see where it ranks for certain search terms and optimise how Google views your site.

Under the Health heading, for example, you can see whether there are any broken links that need fixing and if any malware has been found lurking on your site. In the Optimization section you can submit a site map, which helps to boost your search



ranking with Google. You can also see the keywords Google has found on your site, arranged in order of their significance.

If this list doesn't match your expectations, it'll instead serve as a useful notification that your site is in need of some maintenance.



## RSS FEEDS READER

One feature that's missing from Google's Chrome web browser is an RSS feed reader. RSS is a way for websites to tell you about new content, similar to a news feed. Subscribing to RSS feeds on your favourite websites is a great way to keep up with what's new, without having to visit those sites and search for new content.

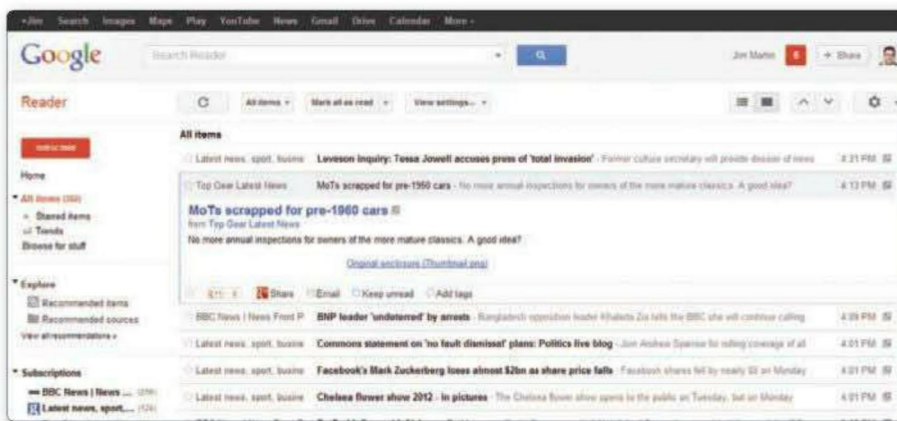
Reader ([google.com/reader](http://google.com/reader)) allows you to subscribe to feeds and view them in one place. You can subscribe within Reader by clicking the Subscribe button and entering the URL of a website or some search terms to find websites with relevant RSS feeds.

Another way to subscribe is to click the orange RSS icon when you're browsing a

website you like. This will take you to the website's RSS feed, where you can copy and paste the URL or subscribe directly if there's a button to do so. You can also drag-and-drop the Subscribe... bookmark from Google Reader's home page to your bookmark bar, which allows you to quickly add feeds by clicking the bookmark when you see a page you like.

When you've added some feeds, all you need to do is browse to the Reader home page to see the latest content from those websites. The interface is much like Gmail's: feeds are presented in a chronological list like emails, and each article is marked as 'unread' until you click on it.

Some RSS feeds include the entire story, but many are just a summary - you can click the headline to go directly to the website and read it. If you click the Trends link in the menu to the left, you'll be able to see how many items you've read, how many you've clicked on and those you shared.



## PHOTOS PICASA

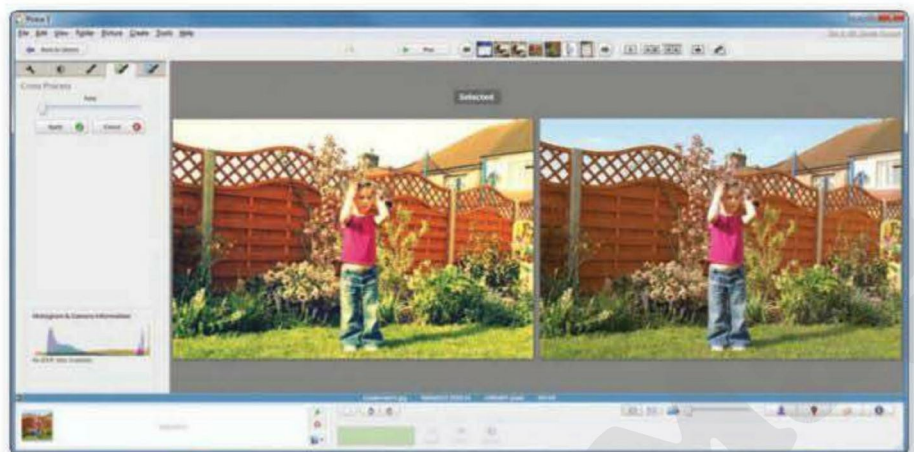
Picasa ([picasa.google.co.uk](http://picasa.google.co.uk)) is a desktop application that lets you organise and edit your photos. It's not as powerful as Adobe's Photoshop or Photoshop Elements image editors, but it allows you to crop, rotate and enhance photos at a basic level.

It's a non-destructive editor, which means you can revert to the original at any time if you aren't happy with your modifications. Alternatively, Picasa can save a new version of your edited image.

The latest version - 3.9 - integrates with Google+ and makes it easy to share photos with your circles. Anyone who doesn't use Google+ will get an email with a link to your album so they can still view it. There are also some new effects, such as the ability to add borders, vignettes and duo-tones.

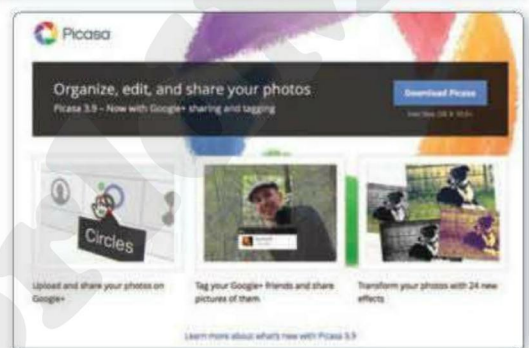
Another new tool is side-by-side onscreen editing, allowing you to compare the original and edited images.

Windows Explorer isn't a bad way of managing your photos, but Picasa makes it much easier to keep track of your snaps. Instead of having to open individual folders to see thumbnails, as you do in Windows, Picasa imports photos from the folders you specify and displays them in a scrollable



timeline. You can quickly jump to a particular month or year to find what you're looking for.

It's a good idea to tag your photos, since it makes them quicker to find later. Tagging a batch of recent holiday photos with their location - Barcelona, for example - means you can find them again (and any others with the same tag) by searching for 'Barcelona'. You can add as many tags as you like. ☑





# The computer comes home

As the ZX Spectrum - the UK's bestselling PC of all time - turns 30, Martyn Casserly takes a look back at the home computing scene of the early 1980s

**C**omputers are central to our lives, ranking alongside cookers, fridges and telephones as an essential item in any home. We use them at work, interact with them during our commutes - including train-ticket machines and the computers that manage our in-car entertainment systems - and, when the work day is over, we relax by surfing the web, playing games on a console and watching catch-up TV or recorded programmes on a PVR.

Thanks to the marvels of the internet, the whole world is available from the comfort of our living room; its chosen vessel is the computer. TVs now plug into the web, as do internet radios, Blu-ray players and even central-heating systems.

Smartphones talk to computers on the internet, and more recently our phones can even talk back to us when we ask them questions. Technology is embedded into the very fabric of modern living. But it wasn't always this way...





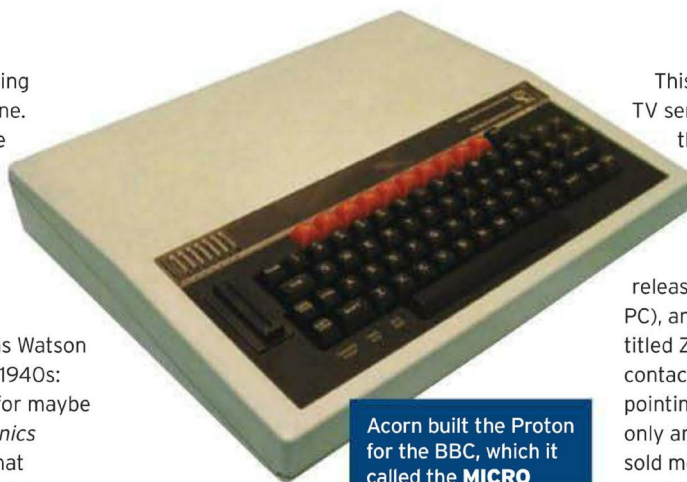
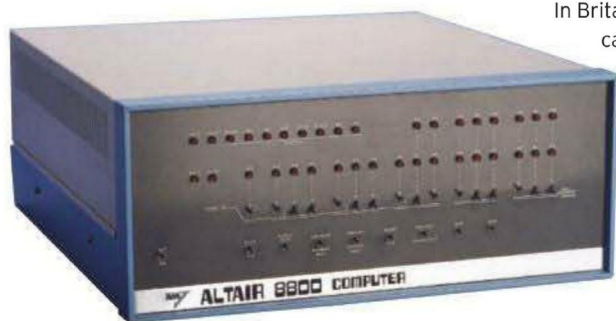


Thirty years ago, the idea of having a PC in your home was an odd one. The early 80s was the age of the mainframe - huge, room-filling computers, which needed to be kept in temperature-controlled environments and required trained professionals to operate them.

Indeed, IBM chairman Thomas Watson was believed to have said in the 1940s: "I think there is a world market for maybe five computers." *Popular Mechanics* magazine had also speculated that "Computers in the future may weigh no more than 1.5 tonnes." That prediction turned out to be correct, but the headline would have been considerably different had the writers foreseen just how small they'd become.

The rise of the microprocessor in the 70s changed everything. Prior to this, computer circuits would have their copious amounts of transistors individually soldered, which was time-consuming, costly and, due to the distance the signals had to travel, limited their computational speed. Replacing these boards with a single chip - one that could be mass-produced - paved the way for smaller, faster machines that would eventually find their way into our homes.

The **ALTAIR 8800** had to be manually assembled before it could be used



### Introducing the home computer

The first models were for truly dedicated users only. They came in kit-form and required the user to be a dab hand with a soldering iron. Probably the most significant of these was the Altair 8800, which appeared in the January 1975 issue of *Popular Electronics* magazine.

As a machine it was unremarkable. It had no keyboard - just a row of toggle switches, which you laboriously used to input programs. The display was merely a couple of rows of LEDs, which flashed in a manner akin to a 50s sci-fi movie. What made the Altair important, and guaranteed its place in history, was the fact it inspired Bill Gates and Paul Allen to write a Basic interpreter called Altair Basic, Microsoft's first product.

In Britain, we had our own innovators carving out the destiny of the home computer - and they were motivated by an unlikely source. At the start of the 80s the BBC, in its fine Reithian tradition, decided to create a computer literacy programme to teach people about the new machines, how they worked, and encourage them to learn how to program.

This would be accomplished by a 10-part TV series, and the corporation wanted their own branded PC to be the star.

The specifications were sent out to British manufacturers, including Cambridge-based Sinclair and Acorn. Sinclair had already developed and released the ZX80 (the UK's first sub-£100 PC), and was working on the unimaginatively titled ZX81. Clive Sinclair immediately contacted the BBC to pitch his new machine, pointing out that the ZX80, which was really only an enthusiast's endeavour, had already sold more than 40,000 units - a remarkable number at the time. The BBC decided against the prototype, though, due to concerns about its potential for upgrades and flexibility.

### The BBC Micro

Acorn's offering was the Proton, a computer that matched the required specifications and included the necessary room for expansion. There was only one problem: it didn't exist. The legend goes that the BBC spoke with Acorn on a Monday, and arranged to see the machine in action the following Friday. The team in Cambridge worked frantically to build a functioning version, successfully powering it on for the first time only a couple of hours before representatives from the BBC arrived.

Miraculously, it passed muster, and Acorn was awarded the contract for what we now know as the BBC Micro. Its machines were released at the end of 1981 as the Model A (16kB) and the Model B (32kB), showing as much flair in nomenclature as the large beige casing and black keyboard construction did in design. The drab looks did nothing to dampen enthusiasm for the computers, though, and they quickly became - aided in no small way by the new government subsidy programme - a resident fixture in most UK schools.

The initial cost of the BBC Micro was high, with the Model A priced at £235 and the Model B at £335. Supply problems and

## HOME COMPUTING TIMELINE

When Acorn released the BBC Micro more than 30 years ago, its uncool styling fitted perfectly with the educational market. That's no coincidence, since it was built by Acorn for the BBC's Computer Literacy Project. Compared to the cheaper, friendlier ZX Spectrum, the Micro had the unmistakable air of a geography teacher about it.

Acorn rallied with the cheaper Electron, but the Spectrum had already firmly established itself in the hearts and minds of the British public. So Acorn slowly slipped into obscurity...

Well, not quite. Pick up almost any handheld computing device today and the chances are that its processor is a direct descendant of that little Acorn computer. ARM chips can be found in just about

every mobile phone and tablet - even the Apple iPad's CPU is basically an ARM processor.

PDAs, iPods, iPhones and handheld games consoles have also used ARM chips over the past two decades. The energy-efficient processors have transformed modern technology and all owe their existence to the Acorn Risc Machine, which was built in 1985.

The revolutionary technology attracted interest from Apple who, alongside chip manufacturer VLSI, joined with Acorn to form ARM Holdings. ARM processors are now ubiquitous and look set to increase their dominance with the impending release of Windows 8 tablets. Big things do indeed grow from little Acorns.



increasing costs saw these prices quickly rise, making the investment a challenge for parents whose eyes were more likely fixed on the continued industrial action, inner-city riots and IRA bombings that dominated the news. If computers were to take hold in the home, they needed to be more affordable – and preferably bring some cheer into these dark days. Thankfully, Clive Sinclair had another machine up his sleeves, the ZX Spectrum.

### Gaming and the ZX Spectrum

The BBC launched *The Computer Programme* in January 1982, with Ian McNaught-Davis and Chris Serle exploring various real-life applications for computers. The first show even included a demonstration of how the BBC Micro could replace a punched card machine (see [tinyurl.com/cdf7xkj](http://tinyurl.com/cdf7xkj)).

Such was the interest in computers, and the paucity of choice in TV programming, that the show would go on to run for five years in different guises – most successfully as *Micro Live*, with the more glamorous Lesley Judd and perma-excited Fred Harris ([tinyurl.com/7yb9nap](http://tinyurl.com/7yb9nap)). But for all its educational value, the show lacked excitement. Kids weren't interested in industrial software firms or the British Rail Master Timetable. They wanted games.

In April 1982, Clive Sinclair released the ZX Spectrum in a cacophony of hype at the

Earl's Court Computer Show. Whereas the BBC Micro was bedecked in a hard plastic shell and boasted a proper keyboard, the diminutive Spectrum featured a design by Rick Dickinson: a single sheet of rubber keys overlaid with a thin metal plate. Each key was surrounded by several words, all of which were shortcuts to Sinclair Basic commands, and the chassis was black with a four-colour rainbow stripe on one side. It lacked the sophistication or durability of its more austere rival, but it was much cheaper (the 16kB model cost £125, while the 48kB version was priced at £175) and looked more fun. These proved to be enormously significant factors, and the 'Specsy', as it became affectionately known, soon became Britain's micro of choice.

Thanks to the successes of the ZX80 and ZX81, Sinclair had already begun to attract games developers who saw an opportunity in this rapidly growing market. The low entry cost and increasing sales figures for the Spectrum quickly turned this interest into actual products. Beam Software released a text adventure based on Tolkien's

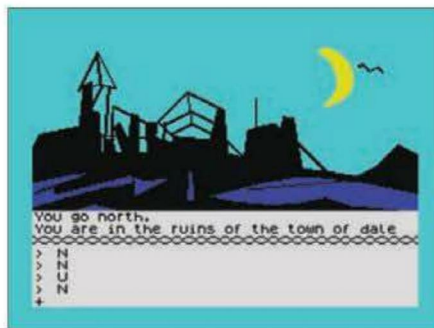


The **ZX SPECTRUM** had an unorthodox rubber keyboard, but it was much cheaper than the BBC Micro, and very popular

'The Hobbit'. The game featured several illustrations for locations, which would be drawn and then coloured onscreen. The limitations of the processor meant this could take a few seconds – but rather than spoil the game, it added a strange ambience to Bilbo's long walk. In many ways, this battle with the Sinclair's hardware was to become a hallmark of the Spectrum.

The internal speaker was capable of emitting only rudimentary beeps, but programmers could define their pitch and duration. This led to scores that sounded as though they could have been made only by the Spectrum. When Matthew Smith

Games such as **MATCH DAY**, **HOBBIT** and **JET SET WILLY** were popular at the time



Sinclair Instrument Ltd is established by Clive Sinclair	Acorn Atom is released	Commodore 64 is released	Apple Macintosh is released
	Sinclair releases the ZX80 in kit and assembled forms	ZX Spectrum is released and goes on to become the UK's bestselling PC of all time	Sinclair QL fails to catch on
			Sinclair repackages the Spectrum as the Spectrum+
1975	1978	1980	1981
	Acorn Computers Ltd is formed	IBM PC is launched	1982
		Sinclair ZX81 is released	
		BBC Micro is launched, with subsidised sales to schools	1983
			Acorn Electron is launched
			BBC starts <i>Micro Live</i> TV series
			1984



wrote his bestselling platform game, Manic Miner, it included a version of Greig's 'In the Hall of the Mountain King' from 'Peer Gynt'. Because the Spectrum needed to dedicate CPU time to the beeps, the tune became fractured, menacing, and ended up fitting the surreal atmosphere of the game superbly.

Smith would return with his even stranger sequel Jet Set Willy, which featured a drunk lord who wanted to go to bed after a right royal knees-up, but whose housekeeper demanded that he cleared up the mansion first. The lord's party must have been wild, because the house is awash with flying pigs, possessed egg whisks, and the kind of room design that would give Laurence Llewelyn Bowen a heart attack.

Graphical issues would also challenge the prospective Spectrum programmer. The way the machine displayed an 8x8-pixel character allowed for a background colour and a foreground colour. This was fine by itself, but when another colour was introduced – say, when aforementioned character walked in front of a building – the result would be a psychedelic freak-out. On football games such as Match Day, this became a problem – two players challenging for a ball would instantly turn into a rainbow, leaving the user with no idea what direction his player was facing.

These seeming imperfections only served to bring more closely together the Spectrum community. It was a true DIY computer, one of the first of its kind, and bedroom



The cover images of **CRASH** magazine were hand-painted

programmers embraced the ideals with more and more outlandish concepts.

In Ah Diddums, a teddy bear tried to escape its toy box to comfort its crying owner; Cookie had a chef trying to subdue his unruly ingredients, while Potty Pigeon cast the player as a bird trying to build its nest, armed only with exploding poo to destroy any cars that got in its way.

This free-spirited nature even spread into publishing. *Crash* magazine began life as a mail-order games company in Ludlow, but after trying its hand at writing it soon became the true herald of Sinclair's baby. Games reviews were written by local teenagers, the covers were incredible paintings by artist Oliver Frey, and *Crash* wisely steered clear of the pages of code that magazines such as *Sinclair User* and *Your Sinclair* printed for readers to learn

programming (or, more accurately, learn how to bang their heads against a wall until the corrections were published in the next issue).

Alongside the madness, there were also some truly innovative games being written. Ultimate released hit after hit, including Jet Pac, Lunar Jetman, Atic Atak, Sabre Wulf, Knightlore and Alien 8. Kevin Thoms invented a genre when he wrote the original Football Manager, while Mike Singleton's The Lords of Midnight took the graphical limitations of the Spectrum and turned them into a positive advantage, with beautiful wireframe illustrations marking his Lord of the Rings-style epic. Text adventures flourished, none better than those written by Level 9 Computing, and combat games were shown the future with Way of the Exploding Fist.

The BBC Micro would also generate some classics, with one in particular standing out above all others – Elite. The space-trading game had a sense of scale and freedom that gamers had never before experienced. Developed by Ian Bell and David Braben, it allowed the player to trade goods between space stations, buy improvements for their ship, and dabble with the moral choice of smuggling. It was an instant classic that had some reviewers saying it was worth buying a BBC Micro just to play.

## Rival challengers

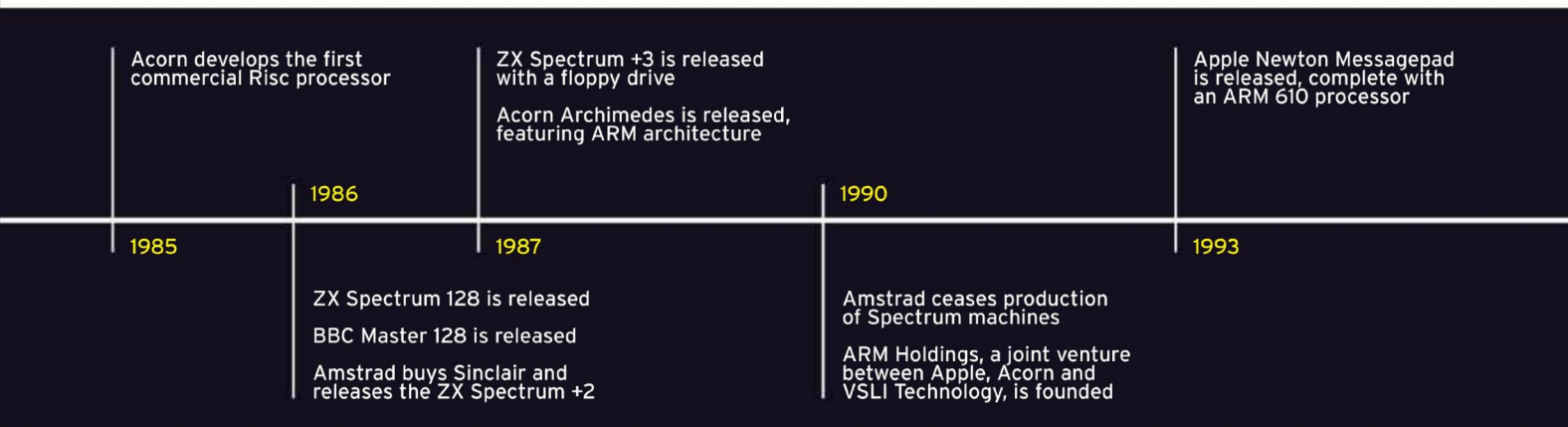
Other systems tried their hand at breaking into the home market. Amstrad's CPC made a respectable stand, as did Acorn's 'BBC-lite' effort: the Electron. Meanwhile, the Oric Atmos, Dragon 32, Jupiter Ace and others fell by the wayside.

From overseas, the Commodore-64 was the Spectrum's strongest rival, causing many a schoolyard dispute over which was better, but the tiny Sinclair was always able to hold its own in bigger company.

As the 80s progressed, and new 16bit machines began appearing on the market, the



The **ELECTRON** was nowhere near as popular as the BBC Micro





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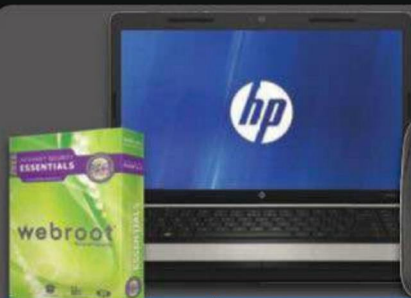
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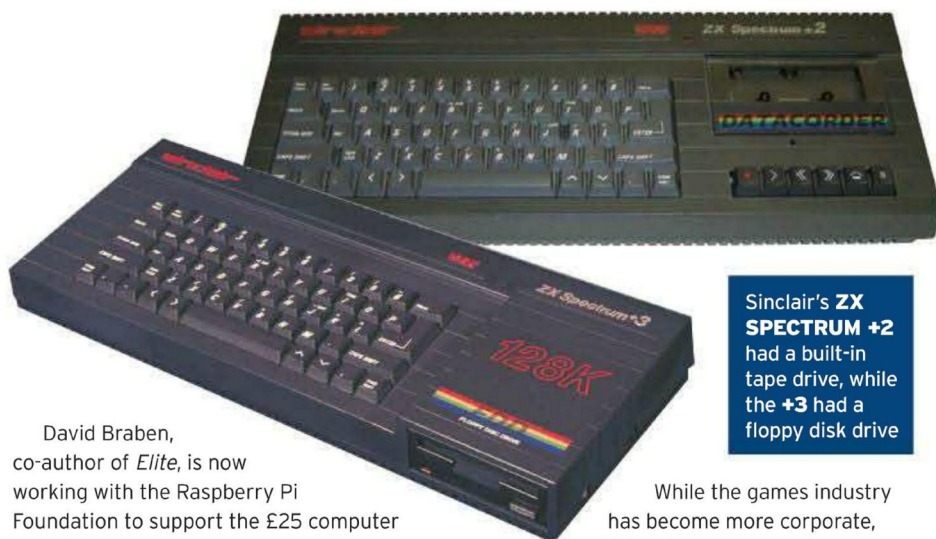


Spectrum's time at the top was drawing to a close, despite a couple of minor revisions, with the Spectrum+ and +2. When Sinclair sold the brand to Amstrad in 1986, it was merely a temporary reprieve; in 1990 the little machine, which did so much to bring computers into the homes of Britain, was gone.

The BBC Micro also retired gracefully around the same time, having amassed sales of more than 1.5 million units - a respectable showing, but one dwarfed by the Spectrum's 5 million sales.

### A true legend

Thirty years on, the legacy of those early British machines is still keenly felt. Professor Steve Furber CBE and Sophie Wilson were early pioneers working for Acorn when the company built the BBC Micro. While researching its successor, the Archimedes, they developed what would become known as ARM processors. These chips now power most smartphones, tablets and handheld electronic devices.



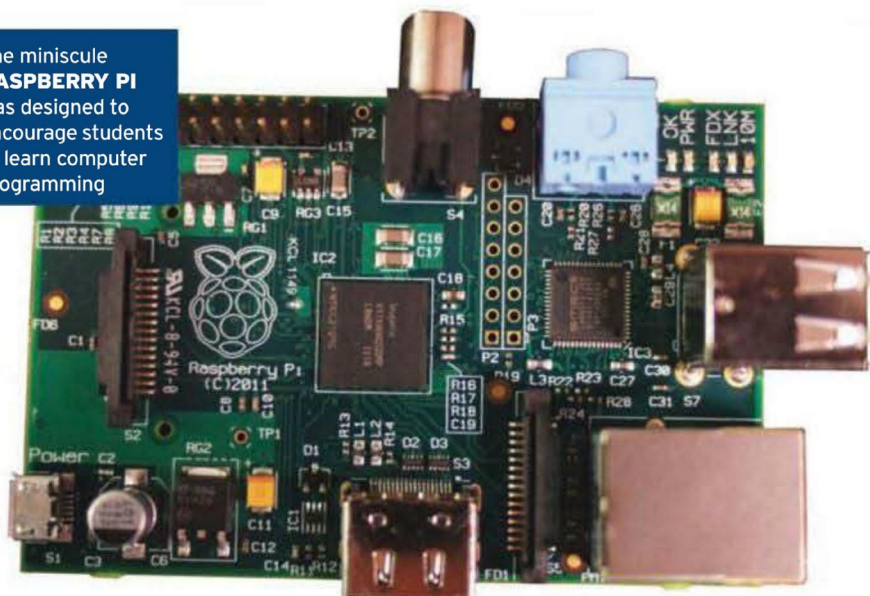
Sinclair's **ZX SPECTRUM +2** had a built-in tape drive, while the **+3** had a floppy disk drive

David Braben, co-author of *Elite*, is now working with the Raspberry Pi Foundation to support the £25 computer aimed at encouraging people to learn programming. Software legend Ultimate became Rare, and continues to make platform games, while Codemasters has gone on to develop titles such as Colin McRae Rally and Lord of the Rings Online.

While the games industry has become more corporate, and development costs have risen to dizzying levels, something of the Spectrum's 'you can do it' spirit is also to be found in the strong independent software development that is growing once more. Outlets such as the Xbox Live Arcade and the mobile platforms of iOS and Android are giving bedroom coders the chance to make an impact, while freeing them from the restraints of corporate identity and over-cautious legal advisors looking to protect their intellectual property. Hopefully, this will lead to consumers being given a choice that offers gameplay and invention over glitz and production values - something Spectrum programmers learned 30 years ago.

Indeed, if you truly want to visit the glory days, then a range of emulators are available for the PC and Mac, while even iOS has apps that include classic Spectrum games Skool Daze, Trashman, Jet Set Willy and Jetpac. Not bad for a machine that had dodgy graphics, ropey sounds, but a ton of personality. In many ways, the ZX Spectrum feels a little like that other old classic, Bagpuss. It was a bit ragged, and loose at the seams, but we loved it.

The miniscule **RASPBERRY PI** was designed to encourage students to learn computer programming



More than 50 million ARM-licensed products are sold

ARM announces that it has shipped more than 1 billion microprocessor cores

1998

2001

2002

2004

The first iPod is released, with two ARM7 TDMI-derived CPUs

Nintendo releases the DS with two ARM processors



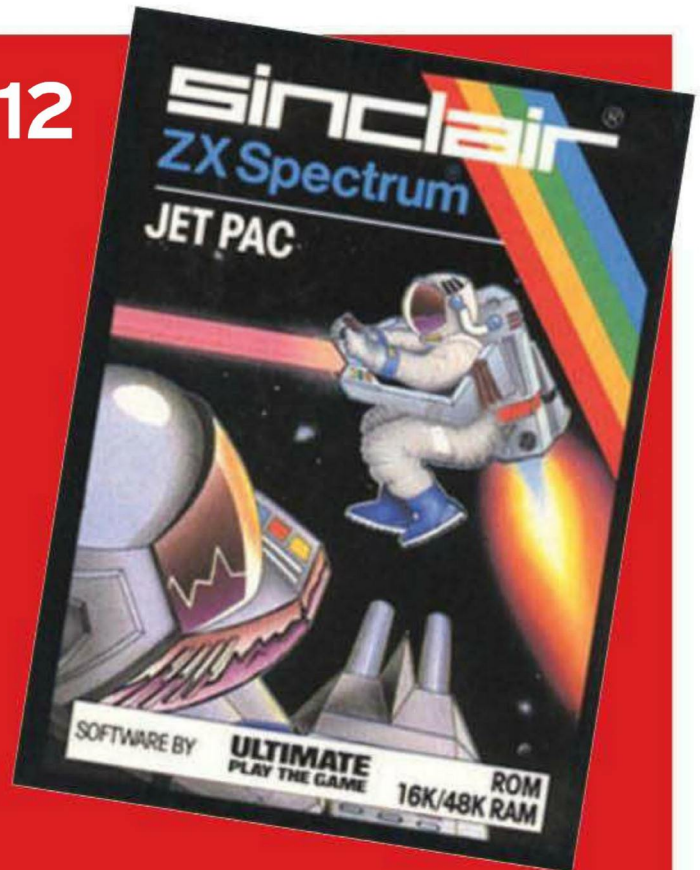
# FROM 1980 TO 2012

Kids growing up in the early 80s had precious little choice when it came to which computer they wanted for their birthday present. Those with relatively well-off folks would go for a BBC Micro Model B - its £335 price is roughly £1,200 in today's money. That's the same as a 10-year-old asking for a MacBook Pro.

The Spectrum 48kB blazed its trail by being considerably cheaper at £175 (around £480 today), which is still iPad territory. Recent reports of Apple's tablet being the most requested Christmas present by kids isn't as unreasonable as it first sounds.

Game development has also seen a few monetary adjustments, although prices have gone up rather than down. When Call Of Duty: Modern Warfare 3 was released last year it had a rumoured development cost of over £30m (£125m including advertising). The game had a full voice cast, musical score and vast swathes of programmers, and it sold nearly 10 million copies on its release day, raking in a staggering £622m.

It was a slightly different story when Chris Stamper and his brother Tim sat down to create Jetpac for the Spectrum. Their new company, Ultimate - Play The Game, had only two other staff members, all of whom worked together in a small house. The development costs are uncertain, but Jetpac went on to become one of the Spectrum's most successful releases. It sold more than 300,000 copies, netting £1m (£2.75m today) in profit.



There's still a remnant of that frontier spirit left in gaming today, as high-speed internet connections have enabled independent developers to reach an audience without the added cost of manufacturing, storage and physical distribution that traditional media demanded. The Humble Indie Bundle has been a fine example of developers offering their games on a donations basis, and has seen healthy uptakes on the offers.

The burgeoning mobile phone app market has seen a renaissance of the bedroom programmer, with low overheads and the possibility of selling directly to millions proving attractive propositions. Microsoft's Xbox Live Arcade service has also opened the door to smaller companies lacking the resources of Activision or EA. Rather fittingly, it even saw the return of Ultimate's Jetman in 2007, when an updated version of the classic was released as Jetpac Refuelled. ☒

An estimated 98 percent of all mobile phones sold contain an ARM processor

ARM ships its 10 billionth chip

Microsoft is due to release ARM-based Windows RT tablets

2007

2010

2005

2008

2012

The five billionth ARM processor is shipped to the mobile device market

The Apple iPhone is released with a Samsung 32bit Risc ARM CPU

Apple launches the first iPad, with an ARM Cortex-A8 chip known as the Apple A4



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JIM MARTIN



## Lock down your accounts

Plenty of high-profile websites have been in the news of late for their user accounts being hacked. If you're in the habit of using the same password for every website, you're making it easy for criminals to access all your accounts, even your bank account. It's hard to remember a different password for each website, but the free KeePass utility (see page 108) does the job for you and securely stores all your logins. We recommend you start using it immediately.

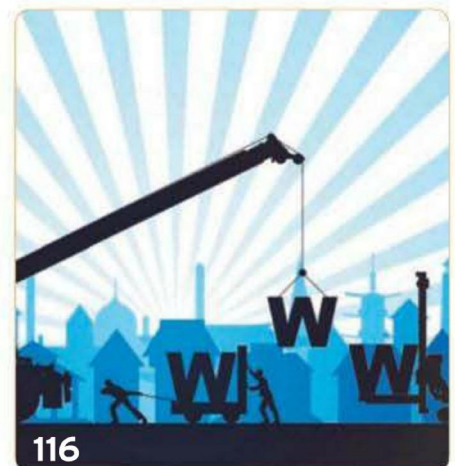
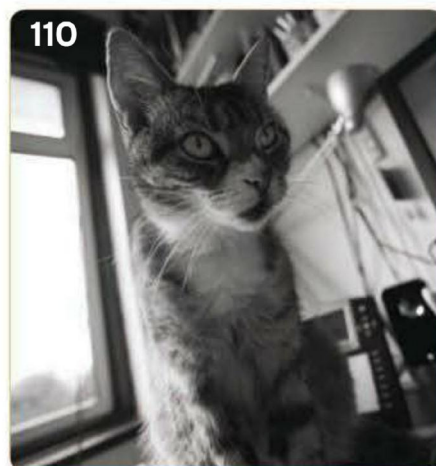
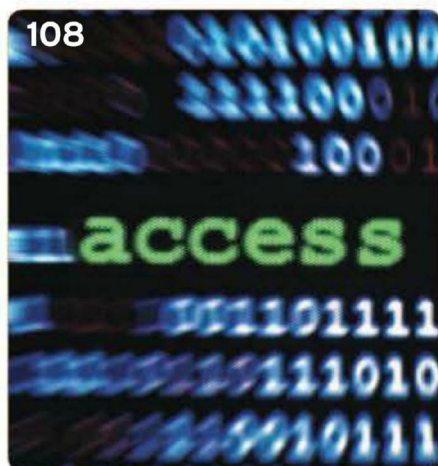
Staying with the free theme, we show you how to create your own website in 30 minutes with Jimdo (see page 116). It's very easy to use, and you can have a good-looking website in next to no time with no prior knowledge.

Troubleshooter (page 100) deals with ways to increase your smartphone's battery life, without simply using it less. You should be able to eke out at least an extra hour or two with our tips – and they won't cost you any money either!

Adobe's Photoshop Elements is an immensely powerful photo editor, and it can be hard to know what some of its tools do. This issue we look at adjustment layers, masks and blend modes, and show you how to use them to improve your photos (page 110).

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## QUICK TIP: CONVERT VIDEO FOR FREE WITH FREEMAKE

Converting or encoding video is a tricky business. Often, you'll want to watch a particular video on a handheld device, but it doesn't support the format your video is coded in. There are plenty of free applications that can convert it, but many are hard to use or produce poor results.

One of our favourites is Freemake (freemake.com). Freemake is very easy to use, with a clear interface and many presets for common devices. To convert a video, simply drag-and-drop it from its folder into Freemake and click the appropriate output button at the bottom of the screen.

For example, if you have an iPad and you want to use it to watch a home video that was captured by your AVCHD camcorder, click the 'to Apple' button, then select your iPad model from the drop-down menu.

Freemake can also burn video files to DVD and Blu-ray discs if your computer has a DVD or Blu-ray writer installed. The program even supports nVidia CUDA – if your graphics card is CUDA-capable, you'll benefit from very fast encoding.



Freemake doesn't limit you to video: you can burn a photo slideshow to DVD, convert audio files to MP3, or convert a home-made DVD to a format suitable for YouTube. It supports all the latest video formats, including MKV and HTML 5. ☑



## Boost your smartphone's battery life

Robert Strohmeier investigates ways of saving precious power to make your phone last longer

**F**or all their power and versatility, smartphones are cursed with abysmal battery life. Unless you use your phone sparingly, many handsets won't last a full day away from the mains. But with the right apps and a little insight, you can double your smartphone's battery life.

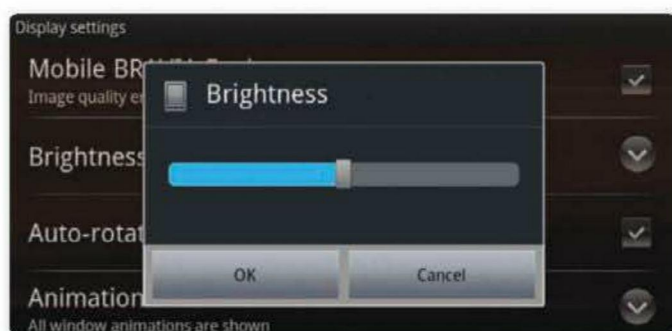
Although some phones live a little longer than others on a single charge, all smartphones suffer from the same problem:

they do too much. Any battery small enough to fit into your phone's tiny chassis stands no chance of lasting multiple days under a steady workload of running apps, browsing the web, sending email and making calls.

Most smartphone batteries are rated at around 5Wh, meaning they can deliver a constant charge of 1W over a period of 5 hours. If your phone uses 1W per hour and you unplug the charger at 7am, you can

expect it to be dead by lunchtime. The key to increasing battery life is to reduce the amount of power the handset uses per hour.

One obvious way to reduce your phone's energy draw is to use it less. A more practical approach is to manage the phone's power consumption by turning off or adjusting various features. Along with the other tricks and apps we outline here, this will help extend the time between charges.



### Dim the screen

You love your smartphone's large, colourful display, but it's the battery's mortal enemy. More than any other component of your phone, the display consumes battery power at a devastating pace. Most phones include an auto-brightness feature that automatically adjusts the screen's brightness to suit ambient lighting levels and system activity. This mode uses less power than does constantly running your screen at full brightness, but you'll get better results by turning down the brightness to the lowest setting you can tolerate.



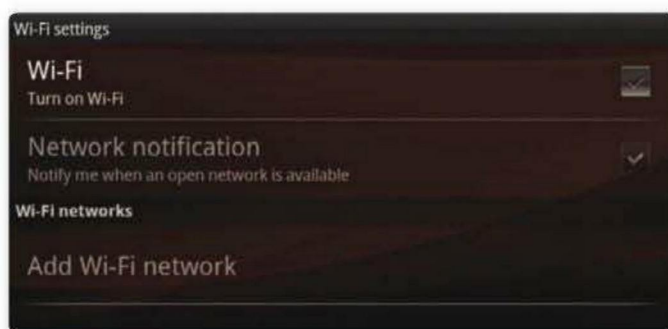
### Shorten the screen timeout

You should find an option labelled Screen Timeout, Auto Lock or something similar under your phone's Display settings menu. This setting controls how long your smartphone's screen stays lit after receiving input, such as a tap. Every second counts here, so set your timeout to the shortest available time. On most Android phones, the minimum is 15 seconds. On an iPhone, it's one minute. If your screen timeout is currently set to 2 minutes, consider reducing that figure to one minute or even 30 seconds if possible.



### Turn off Bluetooth

No matter how much you love using Bluetooth to transfer files or make handsfree phone calls, nobody needs the feature turned on all the time. When enabled, the Bluetooth radio is constantly listening for signals from the outside world. When you aren't in your car, or when you aren't expecting a call that you'll want to take via a headset, turn off the Bluetooth radio. By turning off Bluetooth when you're not using it, you can add an hour or more to your smartphone's battery life.



### Turn off Wi-Fi when not in use

As with Bluetooth, your phone's Wi-Fi radio is a serious battery drainer. While you almost certainly prefer the improved speed and reduced cost of your Wi-Fi connection to your mobile network's 3G broadband for data services, there's no point leaving Wi-Fi turned on when you're out and about. Toggle it off when you go out the door, and turn it back on only when you want to use data services within range of your Wi-Fi network. Android users can add the Wi-Fi toggle widget to their home screen to make this a one-tap process.

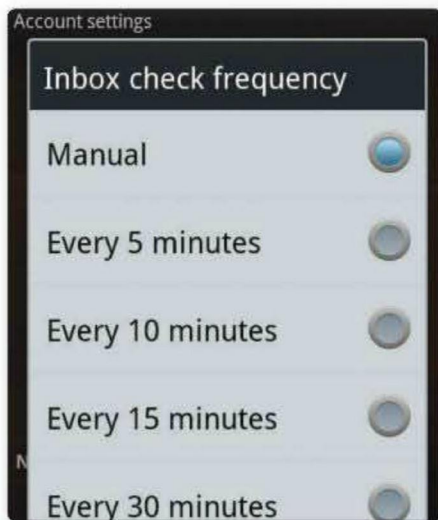


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## Tech Help



### Disable push email

When Wi-Fi or 3G and mobile data are enabled, apps will use those connections for various purposes. Email is one of them, and many phones support (and default to) push email. If you don't need to reply to emails instantly, it's worth changing your settings from push to fetch, and selecting a relatively long period between fetches.



### Go easy on the GPS

Another big battery drainer is your phone's GPS receiver, which receives signals from satellites to obtain your phone's location. Various apps access your phone's GPS to provide services, and will often ask for permission to do so during installation. When in doubt, say no - particularly if it's an app that has no business knowing your location.



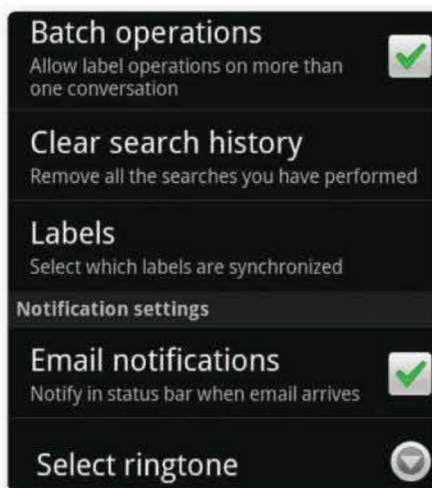
### Kill extraneous apps

Multitasking burns energy, but by killing apps you aren't using you can drastically reduce the CPU's workload and power consumption. Android users could take advantage of Advanced Task Killer's auto-kill feature. In iOS, double-tap the Home button until the multitasking tray appears, hold an icon until an X appears, and tap the X to close the app.



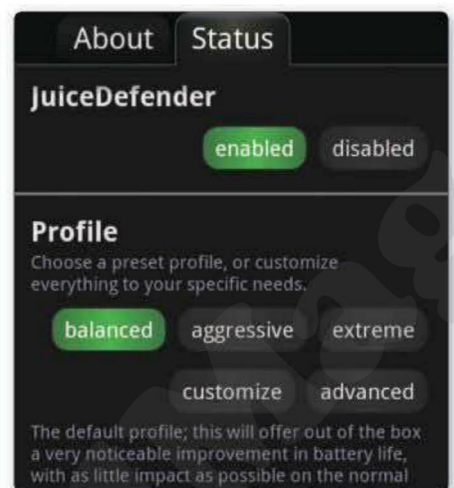
### Don't use vibrate

Some of us prefer to have our phone alert us to incoming calls by vibrating rather than playing a ringtone. Unfortunately, vibrating uses much more power than playing a ringtone. If you don't want to be audibly disturbed, consider turning off all notifications and leave the phone in view so you can see when a new call is coming in.



### Turn off notifications

It seems as though almost every other app now trawls the internet in search of updates, news, messages and other information, then either chimes, lights up your screen and displays a message, makes your LED blink, or all of the above. All these things consume energy. Turning off superfluous notifications will help your battery last a little longer.



### JuiceDefender for Android

By manually adjusting all your phone's settings, you may be able to squeeze a few extra hours out of your battery. But if that's too much effort, consider downloading an app that manages battery use for you. We like JuiceDefender, which automatically toggles on and off your radios and manages your phone's CPU usage. ☒





YOUR QUESTIONS ANSWERED

## Expert computing advice

**Paul Monckton** tackles readers' hardware and software conundrums

### ROUTER PASSWORD

**Q** I can't work out how to change the default username and password to access the web interface for my Asus RT-N56U wireless router. Even tech support were unable to help me. I'd be surprised if it wasn't possible, however, since it's a basic security requirement. Can you help me?  
*Gordon Wright*

It is indeed possible to change the admin password for your Asus router, Gordon. Open the web interface and click the Advanced Setting tab at the side of the window. Choose Administration, then select System from the row of tabs in the main panel. Enter your new password, re-type it below, then click Apply to save your changes.

### PC ON TV

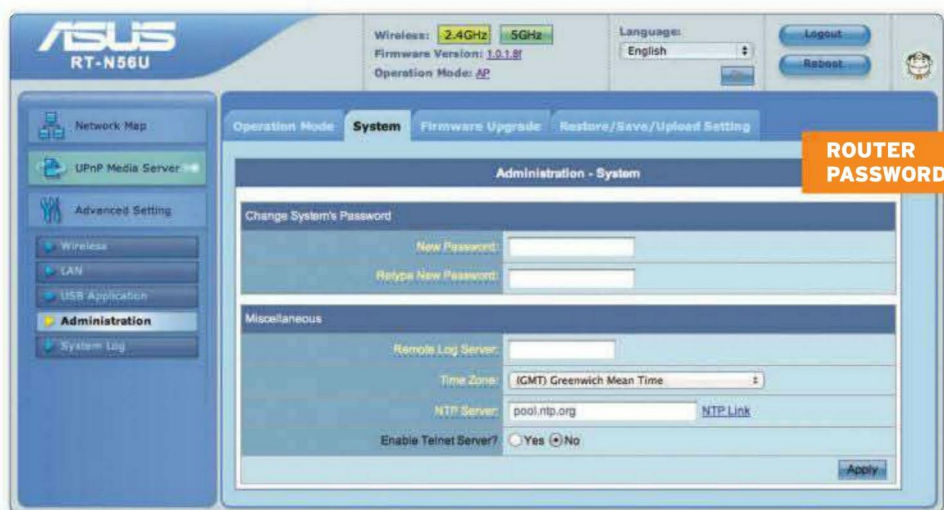
**Q** I have an LG 50PQ6000 TV, which has a USB input, and a Dell Dimension 2400 desktop PC with 1GB of memory and a TP-Link PCI network adaptor. Is there a USB device that can enable the PC desktop to appear on the TV? *Jim Melvin*

There are a few ways in which you could use your TV as a large monitor for the PC, but not through its USB port. This connection is used only for reading and displaying media files from an external device, such as a USB flash drive or a hard disk.

In general, the best way to hook up a PC or laptop to a digital TV is via an HDMI cable. This connection is able to carry both HD video and audio. Unfortunately, your Dell Dimension desktop is too old to have an HDMI connection.



PC ON TV



ROUTER PASSWORD

Your TV also has a VGA input, which you can use to hook it up via the PC's standard monitor connector. Note that you won't be able to use the monitor and TV simultaneously, and that VGA is unable to carry audio. It's useful for showing static images on a larger screen, but you'll need a separate cable for sound.

An alternative solution is to fit an HDMI connection to your PC by way of a graphics card upgrade. The Dell Dimension 2400 has only PCI expansion slots, so you'll need to buy a suitably equipped graphics card, which are increasingly hard to find. PCI Express is today's preferred interface, for which many low-cost upgrade options are available.

A workaround is to buy a USB-to-HDMI adaptor, such as Lindy's £65 USB 2.0 to HDMI 1080p Adapter ([tinyurl.com/caucrxr](http://tinyurl.com/caucrxr)). This plugs into a spare USB 2.0 port on your PC, and you can then connect an HDMI cable to your TV.

Note that your PC is unlikely to be sufficiently powerful to play full-HD video. For this, you would need a graphics card capable of accelerating such playback.

### LAPTOP GRAPHICS UPGRADE

**Q** My HP Compaq NX 9420 laptop runs Windows 7 Ultimate. It has AMD Mobility Radeon graphics with 256MB of VRAM. Can I upgrade the graphics card, enabling me to play Need For Speed: Run? *Castro Mzizi*

In most cases, it isn't possible to upgrade a laptop's graphics. Not only does it tend to be a rather complicated procedure, but it's

difficult to obtain a compatible replacement via the normal channels. Note that an upgrade will usually void your warranty.

The AMD Mobility Radeon X1600 is a replaceable part for your laptop, but the only compatible alternative is another 256MB board: the nVidia Quadro FX 1500M. Since Need For Speed lists 512MB of video memory as a minimum requirement, you're still out of luck. And even if there was a better option, the fastest available processor for your laptop (2.33GHz) doesn't meet the game's 2.4GHz requirement.

Details of your laptop's internal components can be found in the service manual at [tinyurl.com/cr5a8qu](http://tinyurl.com/cr5a8qu).

### DISRUPTED VIDEO PLAYBACK

**Q** When playing video received as an email attachment, any video movement is heard to disrupt the associated sound. How can I correct this fault? I have a Dell Dimension 8100 with Windows XP Professional and 2GB of RAM. *Keith Donald*

We're not sure exactly what problem you're describing here, Keith. If you're having problems with video playback, check to see whether any major system updates occurred around the time the problem started. If so, uninstalling that update may solve the problem. We would also suggest installing the latest graphics drivers for your PC.

If neither of our suggestions fix the problem, try installing a Codec pack, such as the K-Lite Basic pack (free from [tinyurl.com/2ttyvs](http://tinyurl.com/2ttyvs)).



## BEFORE YOU SELL UP

**Q** I'm selling a six-month-old laptop and want to remove the Windows login so the new owner can set their own. How can I do this, please? *Julius44*

You can remove the password via Control Panel, User Accounts, 'Remove your password'. However, your laptop is also likely to contain personal data, which you don't want falling into the wrong hands. This could include your usernames, passwords, internet browsing history, banking details, photos and documents.

Most laptops have an option that lets you restore to factory settings, erasing all user data. You can also use a program such as CCleaner ([tinyurl.com/bqe2s6j](http://tinyurl.com/bqe2s6j)) to be sure that all sensitive data has been removed.

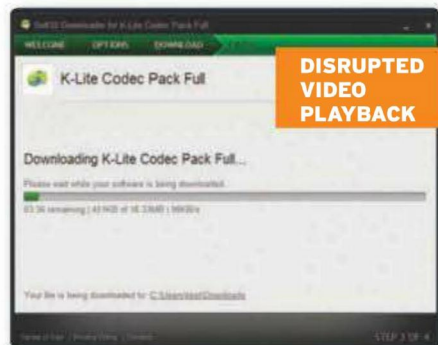
It's worth the effort: the new owner can start afresh, and you'll be able to rest assured that your personal data is secure.

## WINDOWS 7 WON'T STAY ASLEEP

**Q** My Windows 7 PC has developed a problem with sleep mode, often waking for no apparent reason. I don't think it's the mouse or router disturbing the PC, since the problem began only recently. Can you help? *Scrivers*

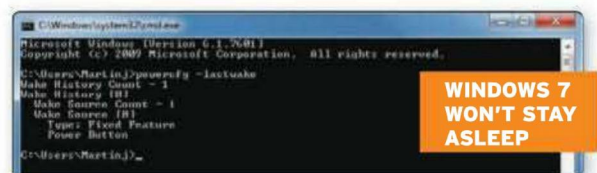
There are many reasons why your PC might wake from sleep mode. The mouse is the most common culprit, since it's able to detect small movements, but it's not the only stone under which you should look.

Windows keeps track of the events that cause it to wake from sleep mode; you can access this information using the `powercfg` command from the command prompt (type `cmd` in the Start menu Search box and press Enter to display a command prompt).



The specific command you will need is `powercfg -lastwake`, which will return information on the device that woke your machine. You can then locate the culprit in Device Manager and turn off its ability to wake up the PC. Choose Properties, Power Management and deselect 'Allow this device to wake up the computer'.

You can often enable or disable wake-up events within your PC's Bios, too. Have a look there and make sure that all unnecessary wake-up events are disabled. Look for an onscreen message when your PC is booting to learn how to access the Bios; you usually need to press Del or F1.



## LOW DISK SPACE ON PARTITION

**Q** My HP Pavilion laptop reports low disk space on drive D, which is the HP Recovery partition. It's 9.47GB in size, but only 32MB is free. Why is this partition filling up, when nothing is knowingly stored there? *Buel*

HP's recovery system won't add files to the partition once it has been created, so it sounds as though another utility is using

drive D. Browse the partition in Windows Explorer to see whether any filenames listed are a clue to what utility is responsible.

If you don't see any extra files, they may be hidden. To reveal hidden files and folders, open Windows Explorer and press Alt to bring up the File menu. Click Tools, Folder Options, then select the View tab and select the relevant option. You could also turn off 'Hide protected operating system files (Recommended)'. Windows will give you a warning about this, but go ahead and be sure to reverse the setting after you've completed your investigations.

Likely culprits are backup programs, such as Windows Backup and Recovery or Norton Backup, which you may find are configured to store files on a drive other than the PC's primary disk.

If you're not sure what the extra files are, move them to another drive rather than simply deleting them.

## 3G NETWORKING

**Q** I'm unable to have a landline where I live, so I get my PC and laptop online using a Vodafone 3G dongle and a Belkin network adaptor. How can I add a Nintendo Wii and a Samsung Smart TV to this network, and will I be able to access the internet on these devices? *Murghalador*

Your 3G dongle is designed to attach a single computer to the internet. Although you can - and already do - share its web connection, it can become cumbersome as more and more devices need to get online.

The simplest solution is to connect all your devices wirelessly, with adaptors available for those that don't have the connectivity built-in. The term wireless is commonly associated with home broadband, but 3G broadband can also be wireless.

Vodafone sells a Mobile Wi-Fi R205 portable hotspot (see [tinyurl.com/dyfv3pu](http://tinyurl.com/dyfv3pu) for our review), which acts as a wireless router to share your 3G connection with up to five devices. If you're subscribing to the Vodafone connection on a contract basis, it





may be worth investigating whether you can upgrade your contract to get the R205.

Alternatively, Vodafone sells a £49 Sharing Hub. This works on the same basis as the R205, but it isn't as neat a solution. Rather than inserting your SIM under the battery cover, as you would with the R205, you plug your dongle into its USB port. The Sharing Hub lets you connect up to four wireless devices.

Alternatively, a wired connection is possible through a broadband router with a built-in ethernet switch and support for a 3G failover. We can't comment on the compatibility of specific models without knowing the details of your 3G dongle, but you may like to look at a product such as the FritzBox 3270 (reviewed in *Hardware*, from page 30), which has four ethernet ports.

This would be more expensive to buy, but you'd save money by not needing to purchase wireless adaptors for your wired equipment. Once the Wii and TV are connected to your network, they will both be able to get online.

## UPDATES AT EVERY SHUTDOWN

**Q** My desktop PC runs Windows 7. Every time I log out or shut down it reports that two updates are in progress and tells me not to turn off the PC. This has occurred repeatedly for eight days. Am I doing something wrong or do I need to take some other action? *Westgolf*

Windows updates can fail to install properly, causing Windows to try repeatedly to install them each time it's shut down.

You can try to fix this problem using Microsoft's System Update Readiness Tool ([tinyurl.com/c8ph9zt](http://tinyurl.com/c8ph9zt) for the 32bit version or [tinyurl.com/69q6egd](http://tinyurl.com/69q6egd) for 64bit). It will take a few minutes to run, but will then attempt to fix any problems that may be preventing



your updates from automatically installing. If it's unable to fix your problem, you'll need to investigate your update history and search for a failed update.

You can identify which updates are failing and manually install them. Go to Control Panel, Windows Update, 'View Update History'. This will bring up a list of installed updates. Most of the updates in the Status column should be marked as successful; scroll down until you find one that has failed.

Look at the update description and jot down the KnowledgeBase number at the end, for example KB2676562. Next, head to the Download Center ([tinyurl.com/6vgcw8d](http://tinyurl.com/6vgcw8d)) and enter the code into the search box.

The page you are taken to will allow you to manually download and install the update. Following a successful installation,

Windows will no longer try to install the update at shutdown.

Repeat this process for any other failed updates you find. They may need to be installed in a particular order or require other updates to be installed first, to which the KnowledgeBase article will alert you.

## TASKBAR WON'T LOCK

**Q** The Windows Taskbar on my laptop disappears when I click in another window or move my cursor away from it. The 'Lock the Taskbar' option in its context menu doesn't fix the problem, so what should I try next? *Nick*

The 'Lock the Taskbar' option doesn't provide the function you require, instead preventing you from accidentally moving or re-sizing the Taskbar. The Taskbar disappears because the 'Auto-hide the Taskbar' option is enabled. Disable this option and your problem should be fixed.

## USING 6GB OF RAM IN XP MODE

**Q** I'm looking to build a PC for use as a Windows 7 Professional CAD workstation. It will probably have 8- or 16GB of RAM. I have legacy software running on XP. Can you tell me if all the RAM will be available in XP Mode? *Anon*

The Windows XP emulation mode offered with Windows 7 Professional runs a 32bit version of XP. The maximum amount of memory available to the guest operating system is 3,712MB.

If you use another virtualisation program, such as the free VirtualBox from Oracle, you will be able to run 64bit guest operating systems, including Windows XP 64bit. However, you will need to purchase a copy of Windows XP 64bit to do so.

It's important to consider that with both options, your virtual Windows XP PC will use a pre-allocated chunk of system memory from your host PC. You wouldn't want to allocate too much system memory to XP Mode, since it would deplete the resources of your host Windows 7 operating system.

You don't say which legacy applications you need to run under XP. If it's your CAD applications that require XP, we recommend setting up a dual-boot system that allows you to run a native installation of XP at full speed. The graphics capabilities of a virtual Windows XP installation will be considerably slower than a native installation.

Given enough disk space, you could install both a dual-boot system and a virtualised system. This would enable you to conveniently run your XP applications





without rebooting, but with the option of booting into your native XP installation for intensive sessions where performance is key.

## WINDOWS 7 CLEAN INSTALL

**Q** Three years ago I bought an HP laptop running Vista with a free upgrade to Windows 7. The upgrade consisted of two discs: HP Upgrade Manager, which I had to run first, and a Windows 7 disc, marked 'For use only as an upgrade to a qualifying HP Windows 7 Upgrade PC'. The Windows 7 disc has a valid Microsoft product key sticker. My overloaded laptop is now grindingly slow and it's time to reformat the hard drive and reinstall the OS. Can I do this in the same way as the original upgrade, or will the fact Vista no longer exists on the computer cause problems? *Anon*

Before starting this procedure, it's vital that you've backed up everything you need from your system. The Windows 7 upgrade disc should consider an existing installation of Windows 7 a valid operating system from which to 'upgrade'. Don't reformat your hard drive before you start. Instead, insert the Windows 7 upgrade disc and run the installation from Windows.

You can choose to complete either an upgrade or a custom installation. The upgrade option will perform what used to be known as a repair installation, leaving your programs and settings intact, but returning the operating system to its original state.



You'll need to reinstall any Windows updates and drivers following the installation.

However, a custom installation won't clear out the bloat from the Registry. We'd advise opting for the custom installation. This will leave you with a fresh version of Windows, without your documents and applications, but with your previous installation backed up in a 'Windows.old' folder from which you can recover that data.

You may run into trouble if you wipe your hard drive before you begin the procedure. The upgrade key is unlikely to activate your installation if a valid upgrade hasn't taken place. There are workarounds for this, such as installing Windows 7 twice or employing a Registry hack to fool the system into thinking it's a valid upgrade. However, we

recommend avoiding this; while no problems have been reported so far, it's feasible that Microsoft might flag up such activations as invalid in the future.

The HP Upgrade Manager disc contains versions of HP's preinstalled software that were previously compatible only with Vista. It's designed to manage the upgrade process for you. It may be wise to start by running this disc first as HP may have customised the installation discs, making them slightly different in operation from the standard Windows installation media.

## 32- TO 64BIT WINDOWS UPGRADE

**Q** I have recently upgraded my PC from XP to Windows 7 Ultimate 32bit edition. I understand that the disc and activation code can be used again, so how can I activate the 64bit version using a 32bit-labelled disc? *Ron Hassett*

There is no way to perform an upgrade from a 32- to a 64bit version of Windows; instead, you need to complete a clean installation of Windows 7 64bit. However, if your disc contains only the 32bit edition, you can't use it to install 64bit Windows.

If your copy of Windows didn't come with two discs (one 32bit, the other 64bit), you may find your product key isn't valid for a 64bit installation. This will depend on the exact version of Windows 7 you purchased and whether it's an upgrade, OEM or a full retail copy. Full retail copies should include a code for 64bit installations, but you'll still need the relevant disc - perhaps a friend has one you could borrow.

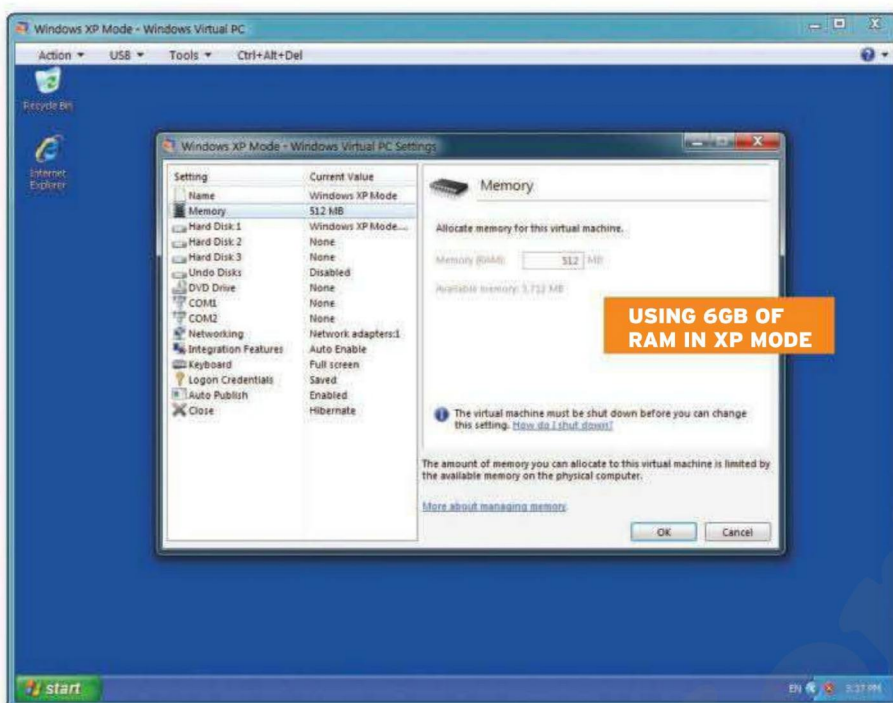
If you haven't already checked, ensure your processor supports 64bit operation. If you're not sure, use the free CPU-Z utility (cpuid.com). Look for support for EM64T in the section marked Instructions.

## DVI CONFUSION

**Q** I bought a graphics card with a DL-DVI output and need to get a new monitor for use with it. Would a monitor with a DVI-D input work? *Anon*

A DVI-D-equipped monitor would almost certainly be compatible. This is the most common case for DVI ports and nearly always works, but there are some caveats.

We assume that by DL-DVI you mean a dual-link DVI connector. This is a type of DVI connection that allows very high screen resolutions of the type found on 30in and some 27in displays (typically 2560x1600 or 2560x1440). These dual-link connectors are required on any graphics card that needs to be able to supply these high resolutions over





a DVI cable and will require a dual-link DVI cable (a standard cable won't work).

Most modern graphics cards have dual-link DVI connectors as standard. The graphics card connector will look the same for single- and dual-link versions, but the dual-link version will have all the internal pin sockets active.

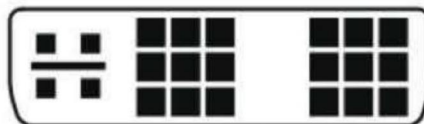
If you want to use standard resolutions, such as 1920x1080 pixels or lower, you can use a single-link DVI cable regardless of the connector on your graphics card.

The important point to consider is that there are two common forms of single-link DVI cable. DVI-I cables can carry either digital or analogue signals, but DVI-D cables carry only digital information. DVI-I cables have four extra pins and will not fit into a DVI-D socket.

You can tell DVI-I and DVI-D cables apart by looking at the pins inside the connector. On the left side of the connector is a large flat 'pin'. If this pin is flanked by two pairs of smaller pins and arranged in a square, you have a DVI-I cable. If the flat pin is alone, it's a DVI-D cable.

All this means if you purchase a DVI-D cable, you will be able to use your graphics card with a monitor supporting DVI-D. ☒

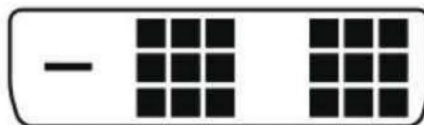
#### DVI CONFUSION



DVI-I (Single Link)



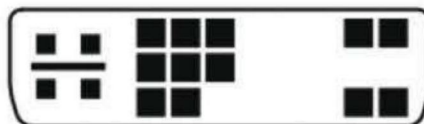
DVI-I (Dual Link)



DVI-D (Single Link)



DVI-D (Dual Link)



DVI-A

## CONTACT US

Email your Helproom questions to [helproom@pcadvisor.co.uk](mailto:helproom@pcadvisor.co.uk). Please use 'Helproom' as the subject header and give your full name, the operating system you're using and other product details. We will let you know by email if your query has been selected for inclusion in these pages. If your query is urgent, you may find it useful to visit our forum at [pcadvisor.co.uk/helproom](http://pcadvisor.co.uk/helproom).

Helproom aims to give you the best assistance possible. But, given the

limitations of this type of advice, we can't guarantee what we say will work and we can't accept responsibility for any damage arising as a result.

Always back up your system before you make any changes, including software installations.

Please note that we are unable to respond to letters or telephone requests, but we will endeavour to answer queries submitted by email or via our Helproom forum.

For more PC help go to:  
[pcadvisor.co.uk/helproom](http://pcadvisor.co.uk/helproom)



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Alternatively, you can ask for help from the experts on our online forums. Sign up to be a registered user - which is free - and then browse to one of the discussion forums. In the Helproom your first stop should be the searchable database of frequently asked and previously answered queries. With more than 1.5 million forum posts, you'll almost certainly find your answer in this archive of queries - just enter a few keywords.

If our online database can't solve your problem, try posting a question in the Helproom forum, where more than 200 queries are answered every day. The forum is manned by our team of Helproom Angels, who are ready and willing to lend a hand with anything from system crashes to virus alerts.

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## Managing your login credentials



We have to remember scores of usernames and passwords these days. Mike Bedford shows how a simple free utility can safely store them for you



Living an increasingly online lifestyle means managing a number of accounts. From internet banking and billing, email access to online shopping, each website requires you to remember a username and a password. It's tempting to use the same login details for each site, but it isn't a good idea.

If you use the same password for each account, a fraudster needs to hack only one of your accounts to gain access to them all. And such a scenario isn't as unlikely as you might think.

Most reputable websites prevent automated scripts from cracking your password by entering common security codes at random. If you enter an incorrect password a set number of times in succession, for example, most banks will deny any further attempts to gain access. A small e-tailer might not have the same security measures in place, however.

The sensible solution is to use a different username

and strong password (see *Create a secure password*, right) for each account, but remembering all those logins can be difficult. You could jot them down, but your details are then only as secure as that list.

A better option is to store your passwords in an encrypted database, accessible using a single master password. KeePass (free; [keepass.info](http://keepass.info)) provides exactly this service, and more.

In the following workshop we'll explain how to store your login details in a KeePass database, then retrieve and enter them into a website's login fields when required.

Your KeePass database can be stored on a PC or a USB flash drive, with the latter allowing you to take your login details with you.

If you're worried about storing your sensitive account details in free software, rest assured that, unlike other password managers, KeePass won't store your login credentials in the cloud.

## KEEP TRACK OF YOUR PASSWORDS WITH KEEPASS



**START**

First, you'll need to create a database. If several users are sharing a PC, each should have their own database. Launch KeePass and select File, New. Enter a master password, then re-type it when prompted. Use a strong password, since gaining unauthorised access to KeePass will reveal all your logins.



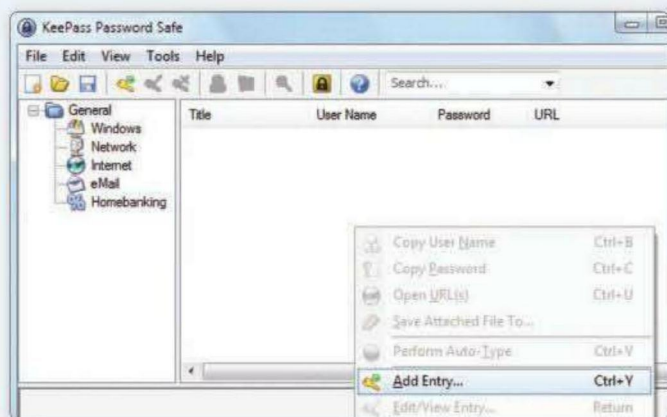
**4** Delete the default password. Enter your password or click the two-key button to generate one (remember that you'll also need to update your password at the relevant website if you do so). Click the three-dot button to toggle on and off the ability to view your passwords within KeePass.

## CREATE A SECURE PASSWORD

KeePass provides security for your password database, plus the convenience of you not having to remember a multitude of logins for the various sites you use, but its own password must be impenetrable. You'll also need to use strong passwords for individual sites if you want to prevent a hacker easily gaining access to them. For a start, you should avoid 'password', 'QWERTY', '123456' and 'Letmein', which are top of a hacker's list of passwords to try.

Never use information that the hacker may have to hand. For example, if your name is Fred Bloggs, don't use 'Fred' or 'Bloggs' as your password. The names of your spouse, children and pets, plus

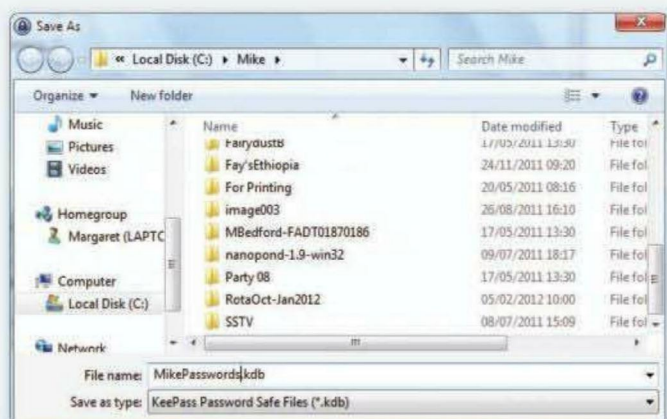




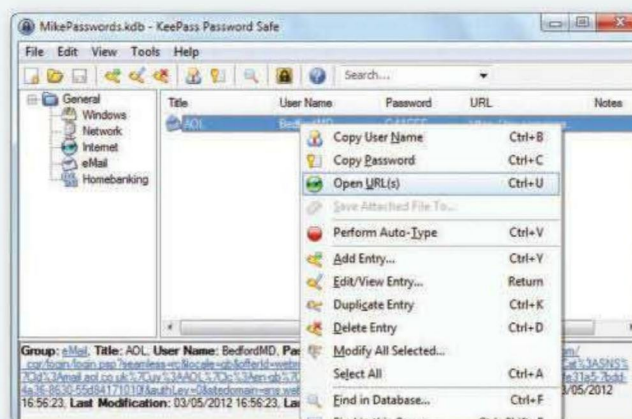
**2** Right-click in the white space in the right panel, then select 'Add Entry...' from the menu. An Add Entry dialog box will appear onscreen, into which you can enter your login credentials for a particular website. Repeat this step for each site for which you want to add its login details to your database.



**3** Account details are stored in groups. Initially, you'll have only a General group, with Windows, Network, Internet, eMail and Homebanking sub-groups, but you can also create your own. Select a group in the Add Entry dialog, then enter a descriptive title, a username and the site's URL. You can also add notes.



**5** Save your database when you've finished entering the login credentials for each of the sites you use. Choose File, Save, enter a name for your database, specify the save location and click Save. You can alter the encryption algorithm used via File, Database Settings, although the default settings should suffice.



**6** In future, you'll be able to log into KeePass using your master password. When manually logging into a site, you can view the password by choosing the appropriate entry in the View menu. Alternatively, right-click the entry and choose Open URL(s) to browse to the site, or Perform Auto-Type if you're already there. ☒

birthdates should also be avoided. In fact, anything that might be discoverable through a social-networking site, personal website or public directory is unadvisable.

Hackers can use software that enters words from the dictionary at random to try and break in, so avoid using a real word as your password. A way to get around this is with alphanumeric passwords, substituting some letters for numbers or symbols. You should also use a mix of upper- and lower-case letters and, if the website allows you to do so, insert spaces. We recommend using at least eight characters, although the longer your password is the more secure it

will be. The beauty of KeePass is it can remember these long strings of characters for you.

There may be some sites you frequently use that you'd prefer to not have to use KeePass to access. A good idea here is to start with a memorable sentence that includes numbers, then take the first character of each word. For example, 'Bradford is 32 miles from Manchester' becomes B132mfM.





## Create faded and monochrome photos



Nik Rawlinson explains how to age your digital photos and convert them to black-and-white using layers in Photoshop Elements



Digital photos never age – only their subjects do. The snaps you shoot today will look as sharp and fresh in a week as they will a decade from now. The corners won't crease and the colours won't fade, and your photos won't age and mature in the same way as a printed picture.

The inherent perfection of digital photos could well be their biggest flaw, though, since they're rarely able to evoke the nostalgic sentiment of traditional prints.

It's easy to recreate the faded imperfections of old snaps using layers, masks and blend modes in Photoshop Elements. We'll show you how to apply two treatments: the first produces an uneven, faded finish, reminiscent of the 70s and 80s; the second results in a punchy black-and-white portrait.

Even novice users can create these effects using adjustment layers. These let

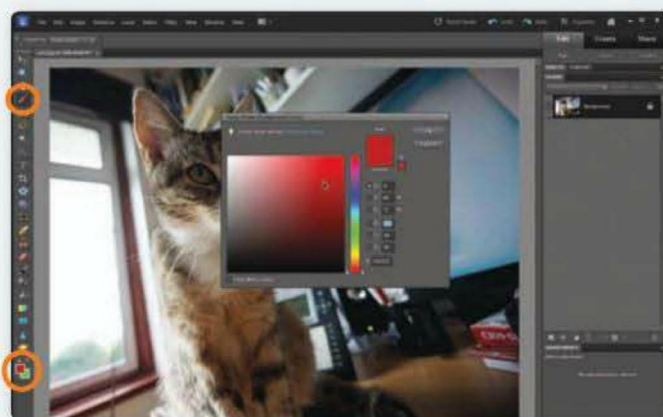
you place colour, contrast and lighting controls on top of your original image. They apply to every layer that sits below them in the layer stack, but not to any of those above.

The primary benefit of applying adjustments this way is that you can finely control the strength of the effect by altering the layer opacity and using different blend modes.

Every adjustment layer is accompanied by a mask, which blocks out any areas to which you don't want the effect applied. By default the mask is empty, so your chosen adjustment will be applied across the whole frame. You can paint in black to create the mask, in white to delete areas of it, and in various shades of grey to alter the opacity of the effect.

The best way to get to grips with layers, adjustments, blend modes and masks is to play around with them, so let's get started.

## USING LAYERS, MASKS & BLEND MODES IN PHOTOSHOP ELEMENTS



**START**

We're going to unevenly fade a photo to make it look like a 70s-style printed picture. Decide whether you want to fade the red, green or blue channel, then use the Eyedropper tool to select the two remaining colours. These will appear as the fore- and background colours at the bottom of the toolbar.



**4**

To make a punchy black-and-white photo, select the Image menu at the top of the window and choose Mode, Grayscale. Flatten the image when prompted. Next, click the Adjustments icon in the Layers palette and choose Levels. Drag the mid-tones marker toward the right to darken your image.

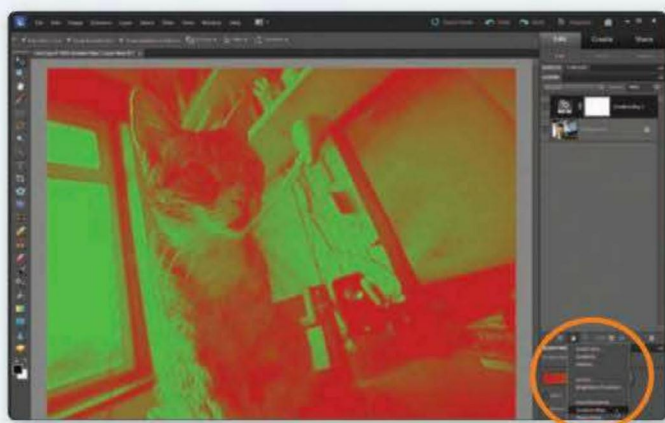
## BLEND MODES

Blend modes, such as the Soft Light referred to in Step 3 of our walkthrough, control how Photoshop Elements mixes the contents of one layer with the layers below. Some of their functions, such as Darken and Lighten, are self-explanatory, but what do Hard- and Soft Light and Overlay mean?

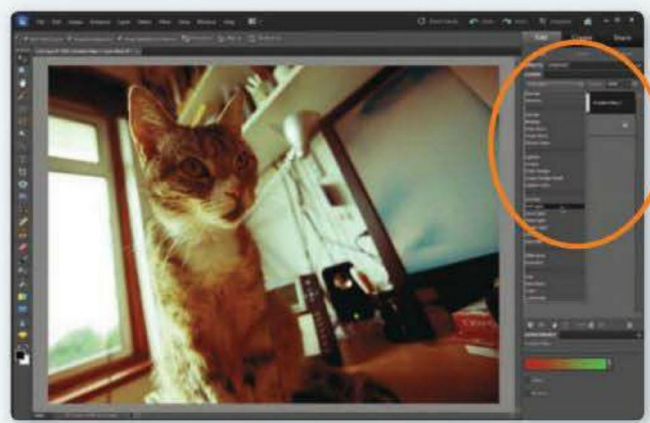
Overlay is used to apply one layer to another, while preserving the highlights and shadows of the lower layer. It's a great way to apply, say, a rippling box to a flag to make it look like it's flapping.

Hard- and Soft Light darken or lighten the underlying layer (depending on the colour you're laying on top of it) to varying

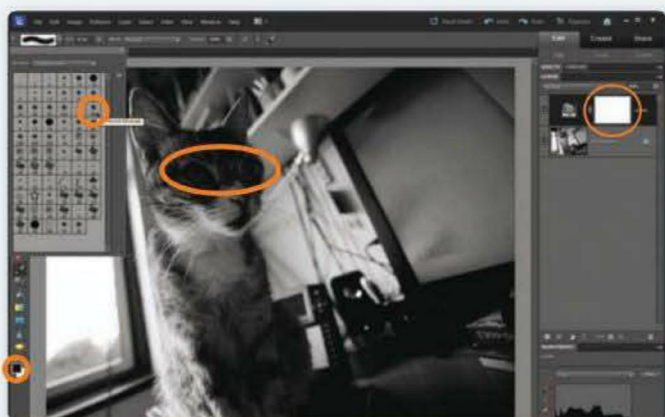




**2** Open the Layers palette and click the Adjustments icon (the black and white circle) at the bottom. Select Gradient Map. This will apply the foreground colour (red in our example) to the darker areas of your image, and the background colour (green in our example) to the lighter areas.



**3** The effect is too strong in its default state, so you'll need to change the blend mode (displayed at the top of the Layers palette) to Soft Light. Also use the opacity slider to the right to adjust the strength of the effect. This won't affect your original image, only the adjustment layer.



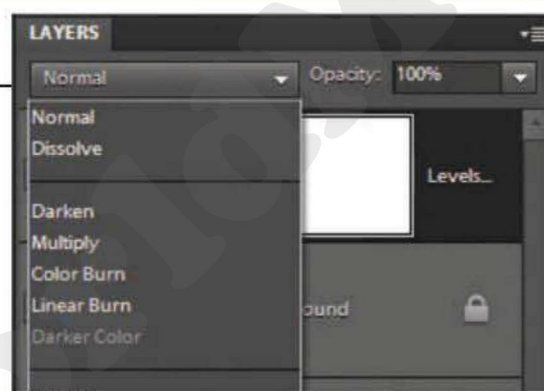
**5** In the Layers palette, select the white box in your adjustment layer. This is the mask. Select a soft brush, set the foreground colour to black, and paint on to the image. This will remove the effect from any areas where details have been lost in the shadows. In our example, we will paint over the cat's eyes.



**6** To create our finished image we applied a second adjustment layer. We clicked the Adjustments icon in the Layers palette and chose Levels, then dragged the mid-tones slider to the left and repeated step 5 to draw over the cat's eyes. Finally, we pressed Ctrl, I to invert the mask. ☒

degrees. As their names suggest, Soft Light applies the adjustment in a diffused manner, while Hard Light is more direct. The best way to picture this is to think of the difference between a naked lightbulb (Hard Light) and one seen through a paper lampshade (Soft Light).

Although they are great for producing creative results, blend modes are often best used as corrective tools. For example, if an image is overly light, you can create a Curves adjustment layer that dials down the highlights, and change the blend mode to Luminosity. This will preserve the colours of your original image, but use the adjustment layer as the reference point where brightness is concerned. Adjusting the layer's opacity lets you tweak the strength of the effect.





## Social blogging with Tumblr



Martyn Casserly guides you through the art of micro-blogging with Tumblr, a free service that's well-suited to multimedia and ideal for mobile use



Blogging is more popular than ever, but the sheer number of services offering to host your blog can make it difficult to choose between them. There's no shortage of free options, replete with powerful design tools to tailor the site to your aesthetic whim. One that has risen to prominence in the past few years is Tumblr.

Whereas classic blogs have traditionally focused on writing, Tumblr's visual approach makes the site immediately attractive to visitors. And it suits the content type, given that blog entries often comprise pictures, video or artwork. Tumblr also lets you paste in chunks of text, of course.

In some respects, Tumblr is similar to Pinterest (see [tinyurl.com/89q7tup](http://tinyurl.com/89q7tup)), but it's more akin to Twitter. The real focus of the site is on the ability to quickly share interesting things with interested people. You can post text, a photo, a video, a link, a quote or audio, and there's even a chat option.

You can follow blogs, with their feeds appearing on your

dashboard. There's also the option to re-blog, favourite or comment on blogs you like.

This social element is an important part of Tumblr's appeal. Although many of its features are mirrored by Google+, Pinterest, Twitter and Facebook, Tumblr combines them in a clean and beautiful package.

The ability to tag your content also means blogs that interest you are easy to find. Click the Explore Tumblr button and a convenient menu lists the most popular subject categories. If you're interested in fashion, for example, simply click the relevant box and any trend-setting blogs will be presented in a chronological feed. This also helps you to know which tags to use if you want to get your own site noticed.

Tumblr is perfectly suited to micro-blogging from a smartphone or tablet as you go about your business. Simply download the app for your platform, snap a picture on the device's camera, add a comment, then post your thoughts for the world to see.

## GET STARTED WITH TUMBLR



**START**

Head to [tumblr.com](http://tumblr.com) and click Sign Up to create a free account. You'll need to enter an email address, a password and a unique username. Millions of people already use Tumblr, so you may have to try a few usernames to find one that isn't already taken. Finally, click Start to begin.



**4**

Click the Preview button to see how the post will appear to your followers. Close the Preview window and adjust the text if necessary, then click Create Post when you're happy. Before people find and read our blog, however, we want to change our blog name from Untitled and add an author picture.

## ALTERNATIVES TO TUMBLR

If Tumblr's visual approach isn't what you're looking for, there is a wealth of other options available to the emerging blogger. The free-to-use WordPress ([wordpress.org](http://wordpress.org)) is one of the most popular, since it has some powerful tools at its disposal. Hundreds of free templates are available to download, and you can transform your humble words into magazine-style websites or simple two-column affairs with image backgrounds in minutes.

You can also add a WordPress widget to your Facebook account, with any new posts automatically appearing in your Timeline. WordPress provides detailed statistics of traffic to your blog, which



Tech  
Help

**2** Tumblr's dashboard is simple to use. Across the top of the screen is a set of clearly labelled icons, and you simply select the appropriate icon for the type of content you wish to add. The main area below these icons displays any new posts from your own blog or those you subscribe to.



**3** The content-entry screen you see is dependent on the type of content you wish to post. We chose to add a quote, and were presented with a field in which to write our pithy remark and another below for its source. Options on the right let you schedule the post and add tags.



**5** Return to the dashboard, then click 'Pick Avatar' under your profile icon. Follow the instructions to change your picture. Next, click the 'Untitled' tab in the top-right corner, which will select that blog's page. Choose the Customize Theme option, with which you can set about personalising your blog.



**6** The menu shows the current theme you're using and information about your blog. Title and Description boxes let you change the name and tagline for your blog; you can also link to your Facebook and Twitter accounts. Click Themes at the top-left to display and choose one of the many options available. ☐

may go some way to explain why 49 of the world's top 100 bloggers choose to use its platform.

If you're a fan of Google's services, Blogger (blogger.com) is a fine choice. Much like WordPress, it offers plenty of free templates, but the real jewel in its crown is its integration with other Google services. For example, you can configure your blog posts to automatically appear on the Google+ social network, while Google AdSense could potentially bring in some extra income by placing adverts on your blog. A Facebook widget is also available, letting you link your blog to the social-media behemoth.

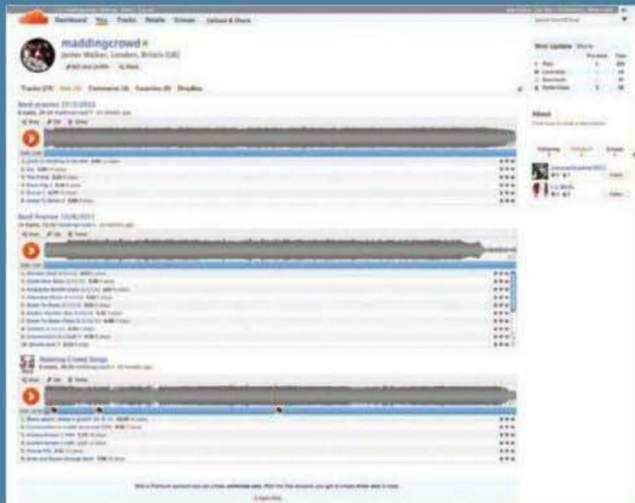




## Access the best new music online



Rosemary Hattersley explains how to use SoundCloud, a brilliant way to show off your musical talents through social media



SoundCloud is a legitimate forum for showcasing and sharing your musical talents. The site offers a good alternative to MySpace, using social networks to spread music uploaded by its members – widgets can be embedded in a Facebook page, shared on Foursquare or via a Twitter feed. MySpace simply drives fans to music hosted on its own site.

SoundCloud has more than 10 million registered users. Many are artists, but most are music or podcast fans keen to explore what's on offer. Where SoundCloud differs from MySpace is that it isn't simply a personal band page, where fans can get an early preview of unreleased songs, but a means of sharing the tracks and getting feedback.

You could, of course, use Facebook or Twitter to achieve this end, but one aspect of SoundCloud sets it apart: as well as offering support for a range of popular music mixing apps, it acts as a mechanism for artists to

interact and work together on tracks without needing to be in physical proximity.

Ten years ago, this idea was a pipe dream. Band members attempting to work together over the web would each record their instruments separately, but poor web connections meant playing together didn't really work. SoundCloud doesn't fix this, but it does let you privately share tracks and invite honest feedback with comment tags appended to specific sections.

Once you're happy with a track, you can upload it to SoundCloud and have other users give you constructive criticism. Tracks are displayed as waveforms, just as they are in an audio editor. SoundCloud users can comment on specific portions of a song.

Rather than wait for someone to stumble across your tracks, you can directly share them with other members. Up to 100 shares are offered for free, while a Dropbox widget lets you share as much as you like.

## GET STARTED WITH SOUNDCLOUD



**START** Create a free account at SoundCloud.com and log in. You need to confirm your email address before you can add content to the site. Alternatively, you can use Facebook to log in. The dashboard provides an overview of your activity, from your own profile to the tracks you've saved and shared.



**4** You can provide constructive criticism for specific portions of a song, which may then be tweaked by the artist before the final track is released. Users often point out mixing errors or where the lyrics have become mangled. To add a comment, click the speech bubble and type in your feedback.

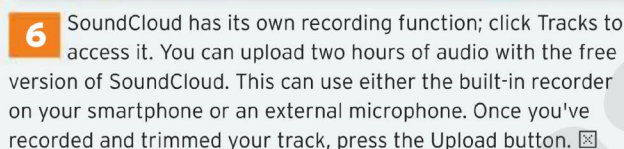
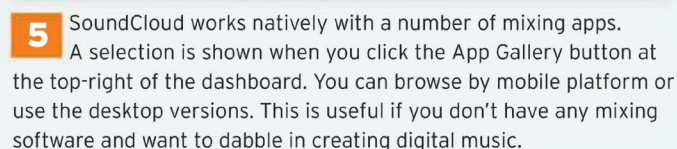
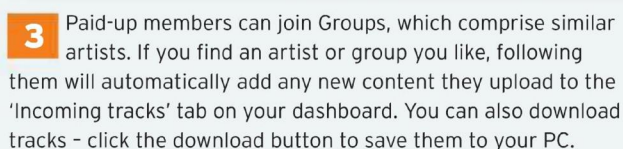
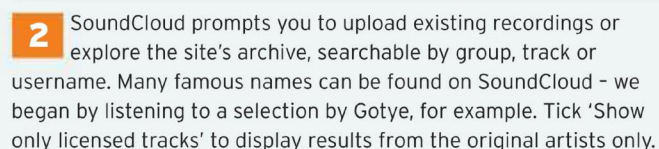
## GET MORE FROM SOUNDCLOUD

Apps are what really make SoundCloud, with more than 100 to choose from. Some are fairly pricey, but others, such as SunVox, cost only a couple of pounds and let you record and directly upload tracks to SoundCloud. If you're not comfortable creating original mixes, you can mix items from an extensive Creative Commons Licence menu.

You may not immediately want to share details of everything you've been working on, but there's the ability to share up to 100 tracks with trusted people via the free version of the software.

Once you're happy with your tracks, use the BandPage app to showcase everything on Facebook. If you're using one of the





If you install the free SoundCloud software on your iPad or Android tablet you gain an instant music player filled with all the tracks you've earmarked on the SoundCloud website. Commenting is less fiddly, too, since you get a larger pop-up commenting box.



## Build a website in 30 minutes



Getting an online presence for your business is easier than ever. Jim Martin explains everything you need to know to get up and running in no time



Creating your own website is both cheap and easy, and it's a great way to boost business. Instead of reaching only local customers, you can attract a far wider audience online.

Of course, it isn't only businesses that need websites. You might run a club that would benefit from a platform for new members to sign up, current members to interact, or simply to provide details of events. Or perhaps you're getting married - a website can be useful for providing your guests with details of the church and reception, driving instructions, a list of nearby hotels, a guest book for them to sign, and more.

You don't need to understand complicated programming languages such as HTML, CSS and JavaScript to build a website that looks fabulous and ranks well in Google Search listings. Neither does such a site have to cost the earth. If you don't mind a few adverts scattered about, many hosting services will even offer you free web space for your site.

Only if you want a personal domain name - for example, [pcadvisor.co.uk](http://pcadvisor.co.uk) rather than [pcadvisor.wordpress.com](http://pcadvisor.wordpress.com) -

will you need to spend a little money per month. This has added benefits of more space in which to store your website, a personal email address, such as [jim\\_martin@pcadvisor.co.uk](mailto:jim_martin@pcadvisor.co.uk), higher bandwidth limits (which allows more people to visit your website) and no adverts littering your pages.

If you plan to sell products on your site, some packages are better suited than others. Some are ideal for selling just a few items, while others are built for importing huge product catalogues. If you're selling on a small scale, it's cheaper to use PayPal or Google Checkout than a merchant bank account to handle your transactions (don't miss our guide to Google Checkout in the next issue).

Here, we'll show you how to create a website using Jimdo's Pro package, which costs £5 per month. It's very easy to use and ideal for novice website designers. We'll also explain how to list items for sale and ensure that your site appears in your customers' search results.

You should be able to build a simple website in less than half an hour, so there's really no excuse not to give it a try.

## CREATE A WEBSITE WITH JIMDO



**START**

Head to [jimdo.com](http://jimdo.com). Enter a name for your site and your email address in the fields provided. Note that the domain names of sites hosted by Jimdo Free will end with [jimdo.com](http://jimdo.com); to lose this suffix you'll need to sign up for a Pro or Business account. To continue with the free account, click 'Create my free site!'



**4**

Choose whether you want to create a new site or work on an existing one, then click Order. Specify whether you want to pay one or two years in advance (you'll save £10 with a two-year subscription), then enter your billing information. The Pro package comes with 5GB of space for your site, plus a 10GB email account.

## SELLING ITEMS ON YOUR SITE

Selling goods on your Jimdo site is as simple as adding a new page element: Store Item. You might want to create a new page for each item to keep things neat (you'll be able to add other page elements such as videos or downloadable PDFs), or you may want to add one or two Store Items to your home page so visitors can immediately see what's available.

Type in the item name and a description. Click the Photo tab to upload images of your product, and specify the size they should appear. Visitors will be able to zoom in on the image by hovering



Tech  
Help

Which Jimdo option is best for you?

	£180 per year Basic Information	£60 per year More Information	free Sign Up Now
Prices including 19% VAT			
Your Own Domain	1 Domain	1 Domain	✗
Email Account	25 Email Accounts (10GB each)	1 Email Account (10GB)	✗
Email Forwarding	Unlimited	2 Aliases	✗
Designs	Business Designs	Pro Designs	Basic Designs
Support	24 hours	24 hours	✗
Storage	Unlimited	1 GB	100 MB
Password Protection	Unlimited	1 Section	1 Section
Store	✗	✗	✗

**2** We want to choose our own domain name for our site, so have signed up for a Jimdo Pro account. It costs £5 per month, but includes top-level domains such as .com, .info, .org, .net, .biz and .de. Note that .co.uk domains cost £15 extra, but you can always transfer a domain you already own.

Pro makes the difference.  
JimdoPro exceeds all the standards of a professional site.

Choose a domain name:  
bexley-spanish-tutor.co.uk

The domain name bexley-spanish-tutor.co.uk is available and you can purchase it from just **£15.00/year**. You can also use the domain name with Jimdo.

☐ I accept the Privacy Policy and the Terms of Use

Get questions?

All the Advantages

- Custom URL**: Your own domain name, for example: [www.jimdo.com](http://www.jimdo.com)
- Email Account**: An email address at [yourdomainname@jimdo.com](mailto:yourdomainname@jimdo.com) with 10GB of email storage
- Email Aliases**: Forward your email messages to another address or to a mailing list
- More Designs**: Even more professional designs, for JimdoPro and JimdoBusiness users
- 24-hour Support**: Pro and Business users get priority support
- Storage**: Room to grow: plenty of storage for Pro and Business
- Password Protection**: Put pages behind password protection
- Store**: Start your online store now. It's easy!

**3** Click Pricing in the menu at the top, then More Information at the bottom of the Pro column. Enter your desired website name into the box to find out whether it's available. Accept the terms and conditions, then click Next. You'll be given the choice of upgrading an existing free site or starting a new one.

Your new website is online!  <http://bexley-spanish-tutor.jimdo.com>

Jimdo Team [billing@jimdo.com](mailto:billing@jimdo.com) via [jimdo-mailout.com](mailto:jimdo-mailout.com) to me  Apr 11

Hello Lucy!

Congratulations on your new website!

Your website is already online.

Temporary Web Address: <http://bexley-spanish-tutor.jimdo.com/> (until [bexley-spanish-tutor.co.uk](http://bexley-spanish-tutor.co.uk) is connected to Jimdo)

Password: **zamajabuvase**

Next Steps:

1. [Here's how easy it is to get started with Jimdo!](#)
2. Go to <http://bexley-spanish-tutor.jimdo.com/> and log in with your password: zamajabuvase
3. Start the domain assistant for [bexley-spanish-tutor.co.uk](http://bexley-spanish-tutor.co.uk) in Settings -> Domains - that's how you connect [bexley-spanish-tutor.co.uk](http://bexley-spanish-tutor.co.uk) with your JimdoPro site.
4. Now you can easily edit your site just by clicking and dragging.

We're here to help! Take a look in Jimdo's [help section](#) or drop us a line [by email](#).

You can review your payment status and invoice here: <https://a.jimdo.com/app/billing/checkout/billing/087367289360a8-4f8578454a587>

Sincerely, The Jimdo Team

**5** Once your order has been processed by Jimdo, you'll be sent an email that includes a temporary password and domain name for your site (note that this will end with .jimdo.com regardless of your subscription type). Click the link or copy and paste it into your browser's address bar to visit and log into your temporary site.

company

Change your password

Welcome to

1. 2. 3.

Old Password:

New password:

Repeat your entry:

Need help? Click on "help" in the toolbar on the right side of the page or visit our [help articles](#) directly. You can also write us directly at [pro@jimdo.com](mailto:pro@jimdo.com), we'll help!

**6** The first thing you should do is change your password to prevent anyone logging in and altering your site. Click the gear icon on the right panel to access the Settings menu, then scroll down to the Login section and click Password. There are many other settings here, most of which are self-explanatory.

their mouse cursor above it if you select Detailed View. Finally, click the Price tab to set a price, stock level and shipping time.

A Store section in Jimdo's Settings menu lets you set shipping costs and the current VAT rate, and enter the text for the automated emails that are sent out following an item being despatched.

Head to the Payment Options settings to specify what payment methods you accept, but note that the free account is limited to PayPal. You can have up to five items with the free account, 15 with Jimdo Pro and unlimited products with Jimdo Business.

Pure Evoke Mio DAB radio

Boasting 1950s retro chic with the latest green technology, this DAB radio not only looks great, but sounds fantastic too. Clad in two-tone leather and a suede effect finish, with contrast stitching on the carry handle - you can make a style statement wherever you place it.

Price: **£150.00**

price includes tax, free shipping

Available, Shipping Time: 1-3 days

It's important to enter a returns or refund policy in the Store settings. You can also dictate the compulsory fields that a customer must fill in to complete their order.





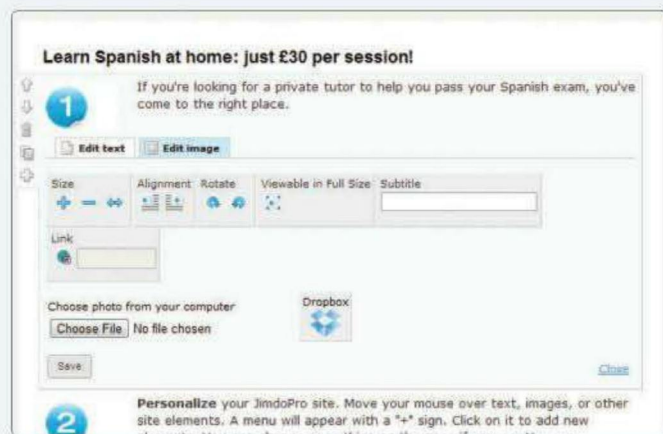
**7** Your next job is to register and activate your domain name. Open the Settings menu and click Domains, then choose Register and enter your details. This is your last chance to amend your domain name, so double-check that it doesn't contain any errors. The activation process can take up to 24 hours.



**8** If you opted to create a new website, it will currently be filled with placeholder text and images. You'll want to substitute these with your own content before the customers come knocking. Jimdo lets you click on an element to very simply edit it in place, with no separate editing and viewing modes to contend with.



**11** Click on the main page title and change it to something more appropriate. You can choose three heading styles. Controls on the left let you move the element up or down the page, while a + button lets you add a new page element. Click Save to update the page with your changes.



**12** Click the first paragraph to edit the text. You can control the font, colour and alignment, and add links to other web pages. Since this element includes an image, a second tab lets you edit the image. Notice that arrows appear when you hover your mouse over the elements, letting you adjust their position on the page.

## HOW TO BOOST YOUR GOOGLE RANKING

There's little point in having a website if no-one knows it exists. You'll need to put some effort into ensuring your site is visible in search-engine results before the visitors will come flocking.

One form of search engine optimisation (SEO) is to tweak your website's content so that it includes plenty of keywords. These are words or phrases that you think the kind of people you want to visit your site will be entering into Google's search bar. For example, our example site offers Spanish tuition, so we've made

sure that each page on our site mentions the words 'Spanish' and 'tutor' at least a couple of times.

You can use Google's Webmaster Tools to check your use of keywords. Sign up at [google.com/webmasters/tools](http://google.com/webmasters/tools), and the utility will show you how the search engine sees your site. You can also submit a sitemap, which can help your site's ranking.

It may sound obvious, but your website's domain name is crucial - not only for Google to see it as a relevant search result,





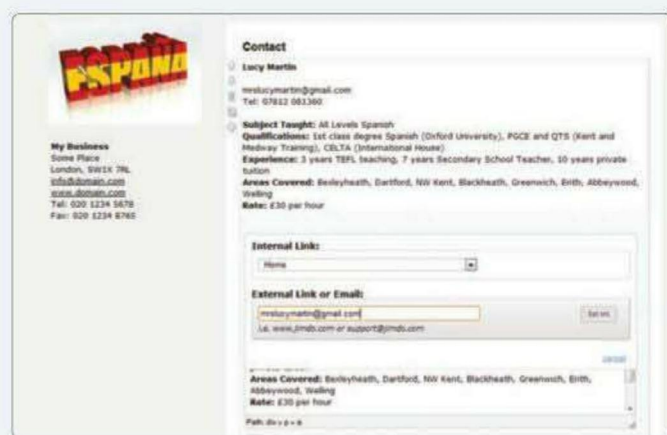
**9** To get a feel for how this works, hover your mouse cursor over the header of the website and click Edit Header. A series of tabs display the various options for selecting a different image, adjusting the side of the header and altering the title wording or adding a company logo. Click Close to save your changes.



**10** Your site will already be looking better, but you can change the template to achieve a rather different look. Click the top icon (Layout) in the right panel, then click Jimdo Pro to browse the premium templates. You can preview how a layout will look by clicking on it. If you don't like it, just click Cancel.



**13** Once you're finished with the home page you can tackle your site's navigation. Hover your mouse cursor over the navigation bar (its location will vary depending on your template) and click Edit Navigation. A tree view shows the structure of individual pages on your site. Click the dustbin icon to remove a page and + to add one.



**14** It's a legal requirement to include contact details on your website if you're selling goods or services. Your Jimdo website will contain a Contact us page by default. To edit this page and enter your own details, click on the page in the navigation bar. Edit the various elements just as you did on the home page. ☑

but for potential customers to think it's worth their time clicking on. Make sure you choose something that relates to the content on your site, ideally including one or more keywords. Clearly, it's foolish to call a site birminghambakery.com if it's for a car repair centre in Bradford.

You'll find a Search Engines section in Jimdo's settings, where you can edit page titles, descriptions, tags and alt text. It's worth taking a few minutes to fill these in properly, since they can affect whether your website appears on the first of forty-first page of Google's search results. Few people click past the first page.





## Panda Antivirus Pro 2012 FULL PROGRAM CD

**The Cover disc is free with print issues of PC Advisor magazine, available in all good newsagents**



### Installation details

Go to My Computer. Right-click the DVD icon and open the disc. Select Files 206\ Panda Antivirus Pro 2012 and open the install file

**Online registration required:** follow the links during installation. Offer ends 8 Aug 2012.

### System requirements

300MHz processor;  
Windows XP/Vista/7;  
512MB RAM; 256MB  
drive space

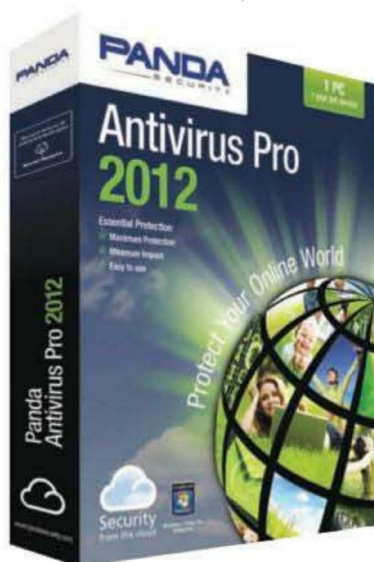
The new Panda Antivirus Pro 2012 offers the easiest and most intuitive protection for your computer. Install it and you can forget about viruses, spyware, rootkits, hackers and online fraud. You can chat, share photos and video, read your favourite blogs or browse the web with total peace of mind and without interruptions. Thanks to Collective Intelligence technology, Panda Antivirus Pro is safer, faster and more complete than ever.

**Maximum Protection:** Panda Cloud Technology offers a new protection model based on a user community where everyone contributes; the result is that your computer will always be up to date and protected. Additionally, your PC won't have limited detection capabilities as Panda's huge virus detection database is located on the internet (cloud).

**Minimum Impact:** because the database is located in the cloud and not on your PC, the resource consumption of Panda Antivirus Pro is dramatically reduced compared to similar products. The protection is high, while the impact on performance is kept to a minimum.

### Features

- Protection against all types of viruses and threats
- Collective Intelligence
- Personal Firewall
- Panda USB Vaccine
- Panda Safe Browser
- Virtual Keyboard
- Multimedia/Gaming Mode
- Home Network Manager
- Panda SafeCD
- Technical support by email, web or 0800 freephone number ☒



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SECURITY

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# iolo Search and Recover

## FULL PROGRAM (S)

The Cover disc is free with print issues of *PC Advisor* magazine, available in all good newsagents

**ONLINE  
REGISTRATION  
REQUIRED**

### Installation details

Go to My Computer. Right-click the DVD icon and open the disc. Select Files 206\iolo Search & Recover 5.4 and open the install file

### Online registration

**required:** click the 'Get it now' button in the 'Hints and Tips Today' box to visit the registration page. Offer ends 8 Aug 2012.

### System requirements

200MHz processor; Windows 2000/XP/Vista/7; 128MB RAM; 10MB drive space

Search and Recover from iolo Technologies instantly recovers deleted files, documents, email messages, photos, movies, and music from hard drives, floppy disks, CDs/DVDs, music players, cameras, memory cards and virtually any other portable device.

Precious data that you had thought to be gone forever is quickly rescued with one click in an easy-to-use interface. Proprietary StrongScan and SmartScan technologies allow recovery of information after the worst PC accidents and disasters - possibly even years after the data was lost.

Advanced data-imaging options enable creation and maintenance of virtual drives and backup copies from damaged or inaccessible media, as well as any hard drive, CD or DVD.



### Features

- **Recover data to a CD or DVD.** Create safe storage and backup for your important files
- **Secure file deletion.** Permanently erase sensitive information from your PC or digital device, so even Search and Recover can't find it
- **Immediate recovery.** Run rescue tools direct from the CD to prevent further damage to accidentally deleted data
- **Keep data safe.** Avoid future data loss by creating mirror copies of entire drives

# Serif DrawPlus 8.0

## FULL PROGRAM

**PHONE  
REGISTRATION  
REQUIRED**

### Installation details

Go to My Computer. Right-click the DVD icon and open the disc. Select Files 206\ Serif DrawPlus 8.0 and open the install file

### Phone registration

**required:** UK Freephone 0800 376 5467; International +44 115 914 5479; US 1-888-644-2766. Quote the installation number and code found in the registration wizard on the Help tab. Offer ends 8 Aug 2012.

### System requirements

Windows XP/Vista/7; 32MB RAM; 128MB drive space

Serif DrawPlus 8.0 is an award-winning creative suite for vector illustration, painting and image enhancement. Whether you're new to computer graphics or an experienced designer, DrawPlus has all the tools you need to create stunning artwork for print and the web. Use DrawPlus to design graphics, logos, web banners, buttons and more.

### Features

- **Professional drawing tools.** Draw straight and curved lines, create and customise shapes, and easily blend objects and colours together. Just three powerful drawing features in DrawPlus 8.0
- **Realistic painting.** Paint with natural-looking and pressure-sensitive media brushes such as charcoals, pastels, pencils, watercolours and more
- **AutoTrace Converter.** Automatically turn bitmap images into stunning vector graphics with DrawPlus' AutoTrace converter
- **Non-destructive image enhancements.** Enhance images with powerful adjustments, such as levels and curves, plus add blurs, glows, highlights and other outstanding effects
- **Instant 3D.** Visualise your designs by transforming text and vector shapes into stunning 3D objects - automatically





## Magix Video easy 3 SE

### FULL PROGRAM

The Cover disc is free with print issues of *PC Advisor* magazine, available in all good newsagents

ONLINE  
REGISTRATION  
REQUIRED

#### Installation details

Go to My Computer. Right-click the DVD icon and open the disc. Select Files 206\ Magix Video easy 3 SE and open the install file

#### Online registration

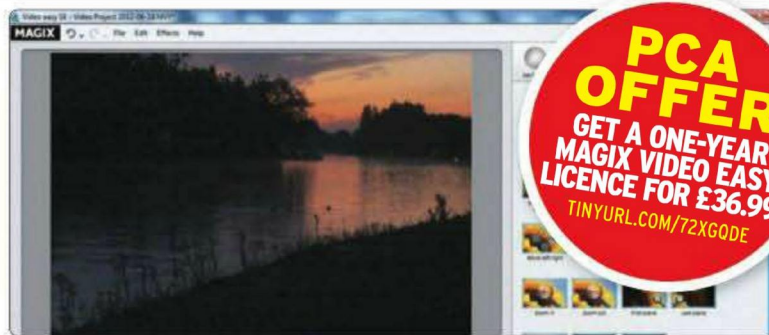
**required:** follow the links during installation. Offer ends 8 Aug 2012.

#### System requirements

1GHz processor;  
Windows XP/Vista/7;  
512MB RAM; 1GB HDD

Easy video editing is especially important for beginners. Someone who is just starting out will often spend a lot of money on a camcorder, not realising that most movie projects require some form of post-production on the PC to achieve the desired quality.

Digital post-production polishes up a movie's look and turns it into something people will want to see. Unfortunately, beginners have often shied away from editing their videos, considering it to be too difficult. Here's where Magix has developed the perfect solution: Magix Video easy, a program specifically designed for easy video editing.



This software guides users through all the steps needed to create the perfect movie, helping them exploit the full potential of their recordings. In a deliberate attempt to keep things as simple as possible, the Magix Video

easy interface is clearly laid-out. This allows you to easily connect your camera to your PC and transfer your video recordings. Then, simply save, edit, burn or upload your recordings to the internet. ☒

PCA  
OFFER  
GET A ONE-YEAR  
MAGIX VIDEO EASY  
LICENCE FOR £36.99!  
TINYURL.COM/72XGQDE

## OC Shield DataGard VPN + AV Mobile Security

### ANDROID APP

ONLINE  
REGISTRATION  
REQUIRED

#### Installation details

Download the app on to your smartphone from [tinyurl.com/7j64esx](http://tinyurl.com/7j64esx)

#### Registration required:

Go to Android Play on your smartphone, search for DataGard VPN + AV, download and install app. Open app and click Try for Free, then enter your email address and the promo code !PCADVISOR2WK! Offer ends 31 July 2012.

DataGard is the only smartphone internet security app that fully secures Wi-Fi hotspots to prevent phishing/malicious app attacks. DataGard could also help you save money by reducing your reliance on 3G by as much as 25 percent of your data plan. The display shows your 3G Saved, 3G Used and 3G Left and, since Wi-Fi is secure, DataGard helps you to increase your Wi-Fi usage and save money.

#### Features

- Secure Wi-Fi, anti-phishing, antivirus, all-in-one malware defence
- 25 percent automatic data plan savings
- 50 percent faster browsing and downloading
- View Netflix and BBC iPlayer from abroad ☒



PCA  
OFFER  
EXCLUSIVE: SAVE  
20% ON THE RRP  
OF DATAGARD!  
OCSHIELD.COM/MOBILE/PCA

## DISC INSTRUCTIONS

Place DVD in drive. Open the file 'Click here to begin.pdf' for extra information.

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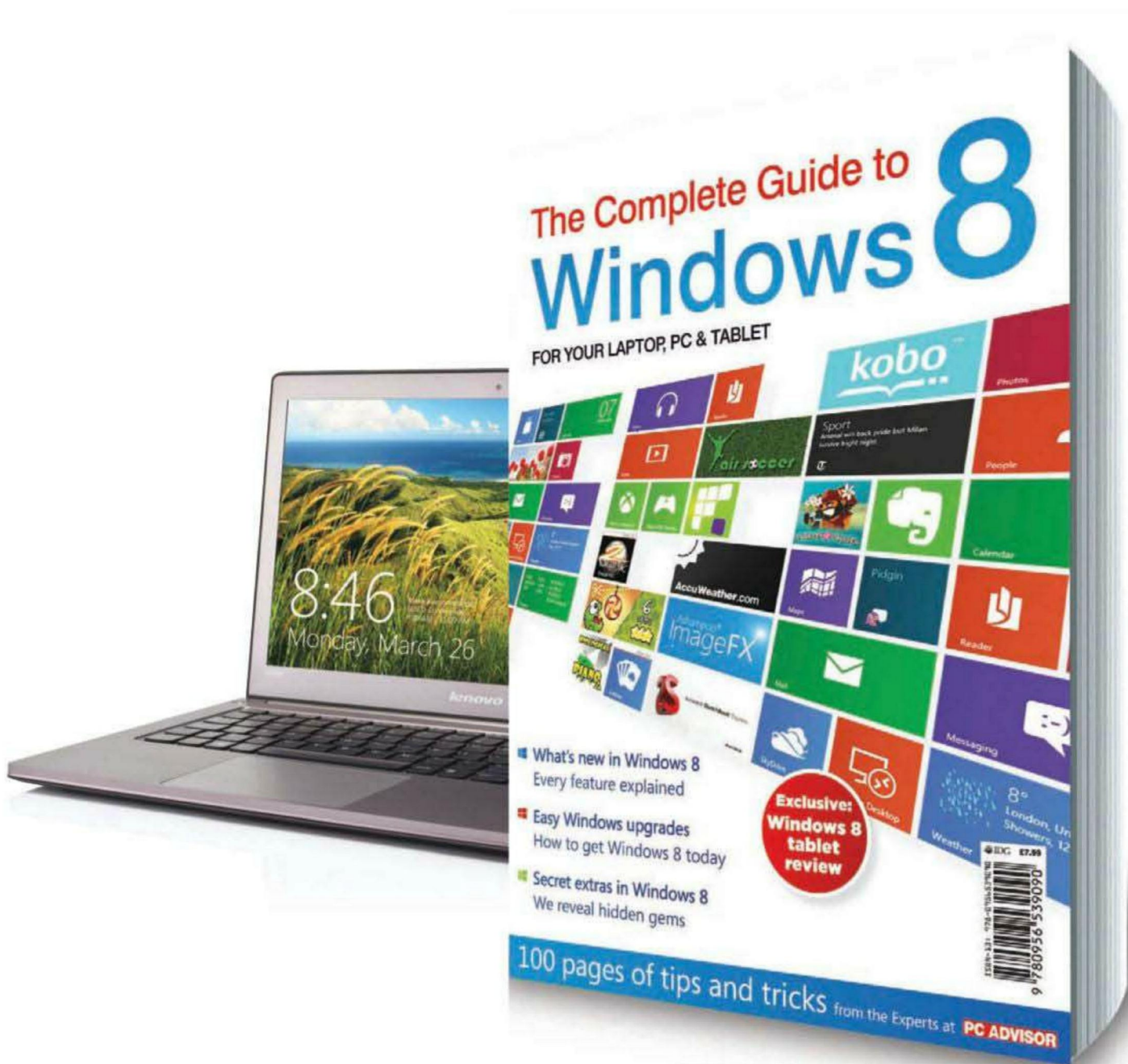


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Netbooks



Laptops



Business PCs



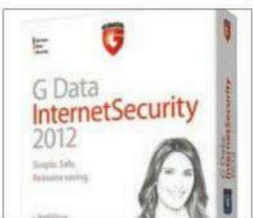
Family PCs



Gaming PCs



All-in-one PCs



Security software



Printers



Blu-ray drives



Wireless routers



USB drives



Projectors



Digital cameras



Graphics cards



Flat-panel displays

## Prices

### Laptops

Laptops up to £600  
£601 to £1,000  
£1,001 and over

### Printers

Printers under £150  
£151 and over

### Graphics cards

Graphics cards under £150  
£151 and over

### Flat-panels

Flat-panels under £200  
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Prices listed are those quoted by the distributor or manufacturer and include VAT. They are intended only as a guide and you may see products on sale for less or more than our quoted price.

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Netbooks	1	2	3	4	5
	Samsung NC110	Kogan Agora Pro	Samsung NS310	Acer Aspire One Happy 2	Dell Latitude 2120 Advanced
Price	£260 inc VAT	£300 inc VAT	£320 inc VAT	£250 inc VAT	£598 inc VAT
Website	Samsung.com/uk	Kogan.co.uk	Samsung.com/uk	Acer.co.uk	Dell.co.uk
Build rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Features rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Performance rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Value rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Processor	1.5GHz Intel Atom N550	1.3GHz Intel Pentium SU2700	1.5GHz Intel Atom N550	1.66GHz Intel Atom N570	1.5GHz Intel Atom N550
RAM	1GB DDR2	2GB DDR2	1GB DDR3	1GB DDR3	2GB DDR3
Storage	250GB hard drive	500GB hard drive	250GB hard drive	250GB hard drive	320GB hard drive
Screen size	10.1in	11.6in	10.1in	10.1in	10.1in
Screen resolution	1024x600 pixels	1366x768 pixels	1024x600 pixels	1024x600 pixels	1366x768 pixels
Graphics	Intel GMA 3150	Intel GS40	Intel GMA 3150	Intel GMA 3150	Intel GMA 3150
Video memory	N/A	N/A	N/A	N/A	N/A
Wireless	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n
Ethernet	10/100Mbps	10/100Mbps	10/100Mbps	10/100Mbps	Gigabit
Bluetooth	✓	✓	✓	✓	✓
USB	3x USB 2.0	3x USB 2.0	3x USB 2.0	3x USB 2.0	3x USB 2.0
FireWire	✗	✗	✗	✗	✗
Thunderbolt	✗	✗	✗	✗	✗
DisplayPort	✗	✗	✗	✗	✗
HDMI	✗	✓	✗	✗	✗
DVI	✗	✗	✗	✗	✗
VGA	✓	✓	✓	✓	✓
eSATA	✗	✗	✗	✗	✗
Media card slot	✓	✓	✓	✓	✓
Audio	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic
Optical drive	N/A	N/A	N/A	N/A	N/A
Extras	Webcam	Webcam	Webcam	Webcam	Webcam
Operating system	Windows 7 Starter 32bit	Ubuntu Linux 11.04	Windows 7 Starter 32bit	Windows 7 Starter 32bit	Windows 7 Pro 32bit
Bundled software	None	None	None	None	Microsoft Office Starter 2010
Fear (Max detail)	Not tested	Not tested	Not tested	Not tested	Not tested
Battery	48Wh lithium-ion	31Wh lithium-ion	Three-cell lithium-ion	42Wh lithium-ion	56Wh lithium-ion
Battery life	7 hrs 52 mins	2 hrs 22 mins	3 hrs 41 mins	Not tested	6 hrs 24 mins
WorldBench 6 score	36	N/A <sup>1</sup>	37	32	33
Dimensions	259x180x28mm	290x195x26mm	275x188x31mm	259x185x24mm	265x187x23mm
Weight	1.2kg	1.3kg	1.1kg	1.3kg	1.3kg
Warranty	1 year return-to-base	1 year collect-and-return	1 year return-to-base	1 year international	1 year collect-and-return
Verdict	<ul style="list-style-type: none"> <li>Attractive styling</li> <li>Excellent battery life</li> <li>Only DDR2 RAM</li> <li>Non-reflective 10in screen</li> </ul>	<ul style="list-style-type: none"> <li>Above average screen size</li> <li>2GB RAM</li> <li>Runs Ubuntu not Windows</li> <li>Battery life very poor</li> <li>Hi-res matt screen</li> </ul>	<ul style="list-style-type: none"> <li>1GB DDR3 RAM</li> <li>Only 250GB hard drive</li> <li>Glossy screen</li> <li>Low battery life</li> <li>Expensive for the spec</li> </ul>	<ul style="list-style-type: none"> <li>Good overall build quality</li> <li>Glossy screen</li> <li>Adequate performance</li> <li>A little hot in use</li> <li>Difficult to access innards</li> </ul>	<ul style="list-style-type: none"> <li>Business netbook</li> <li>2GB DDR3 RAM</li> <li>Average performance</li> <li>Windows 7 Professional</li> <li>Solid battery life</li> </ul>
FULL REVIEW	TINYURL.COM/7QZAPKM	TINYURL.COM/43MN2OB	TINYURL.COM/444SKTX	TINYURL.COM/7D4ZP3C	TINYURL.COM/7WNFF7T

<sup>1</sup>Not tested. Note: WorldBench 6 works only in Windows

## >> Buying advice



### Netbooks

A light, compact chassis is a mini laptop's main asset. Portability, lengthy battery life and a low price tag are these modest machines' main selling points.

**Processor:** Intel's Atom is a popular processor. It consumes little power and gets the job done. Just don't expect massive processing muscle.

**Storage:** Netbooks usually come with 160GB or 250GB hard-disk drives. Some have solid-state drives instead. Smaller, less fragile and quieter, these are also expensive and you'll have to settle for far less capacity.

**Memory:** Most netbooks come with 1GB of RAM, but you can upgrade to 2GB for around £20 (see [tinyurl.com/yerjwpc](http://tinyurl.com/yerjwpc)). A

smaller complement than found in more capable machines, this is just sufficient for single tasks.

**Wireless:** 802.11b/g was standard on netbooks, sometimes with Bluetooth, but most new models now also support the faster 802.11n standard. As they are designed to be used on the move, the faster wireless technology comes in handy when copying large files.



Sub-£600 laptops	1	2	3	4	5
	Lenovo G570	Samsung RV511	Lenovo IdeaPad S205-1038	Lenovo ThinkPad X121e 3045	MSI CR650
Price	£500 inc VAT	£510 inc VAT	£350 inc VAT	£492 inc VAT	£500 inc VAT
Website	Lenovo.com/uk	Samsung.com/uk	Lenovo.com/uk	Lenovo.com/uk	Uk.msi.com
Build rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Features rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Performance rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Value rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Processor	2.1GHz Intel Core i3-2310M	2.53GHz Intel Core i3-380M	1.6GHz AMD E350	1.4GHz Intel Core i3-2367M	1.6GHz AMD E350
RAM	6GB DDR3	6GB DDR3	4GB DDR3	4GB DDR3	4GB DDR3
Storage	750GB hard drive	640GB hard drive	500GB hard drive	320GB hard drive	500GB hard drive
Screen size	15.6in	15.6in	11.6in	11.6in	15.6in
Screen resolution	1366x768 pixels	1366x768 pixels	1366x768 pixels	1366x768 pixels	1366x768 pixels
Graphics	AMD Radeon HD 6370M	nVidia GeForce 315M	AMD Radeon HD 6310M	Intel HD Graphics 3000	AMD Radeon HD 6310M
Video memory	1GB	1GB	N/A	N/A	N/A
Wireless	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n
Ethernet	Gigabit	Gigabit	Gigabit	Gigabit	Gigabit
Bluetooth	✓	✓	✓	✓	✓
USB	4x USB 2.0	3x USB 2.0	3x USB 2.0	1x USB 3.0, 2x USB 2.0	3x USB 2.0
FireWire	x	x	x	x	x
Thunderbolt	x	x	x	x	x
DisplayPort	x	x	x	x	x
HDMI	✓	✓	✓	✓	✓
DVI	x	x	x	x	x
VGA	✓	✓	✓	✓	✓
eSATA	x	x	x	x	x
Media card slot	✓	✓	✓	✓	✓
Audio	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic
Optical drive	2x BD-ROM, 8x DVD ±R, 4x DVD ±RW, 8x DVD-ROM	8x DVD ±R, 4x DVD ±RW, 8x DVD-ROM	N/A	N/A	8x DVD ±R, 4x DVD ±RW, 8x DVD-ROM
Extras	Webcam	Webcam	Webcam	Webcam	Webcam
Operating system	Windows 7 Home Prem 64bit	Windows 7 Home Prem 64bit	Windows 7 Home Prem 64bit	Windows 7 Pro 64bit	Windows 7 Home Prem 64bit
Bundled software	None	None	None	None	None
Fear (Max detail)	32fps	33fps	18fps	13fps	19fps
Battery	48Wh lithium-ion	48Wh lithium-ion	48Wh lithium-ion	54Wh lithium-ion	48Wh lithium-ion
Battery life	5 hrs 1 min	5 hrs 15 mins	5 hrs 38 mins	6 hrs 15 mins	5 hrs 42 mins
WorldBench 6 score	96	105	53	72	54
Dimensions	377x250x35mm	382x256x34mm	290x168x29mm	289x208x24mm	383x250x38mm
Weight	2.6kg	2.4kg	1.5kg	1.57kg	2.3kg
Warranty	1 year return-to-base	1 year return-to-base	1 year return-to-base	1 year return-to-base	1 year return-to-base
Verdict	<ul style="list-style-type: none"> <li>• Blu-ray drive</li> <li>• Adequate performance</li> <li>• Can play some games</li> <li>• Now a 750GB hard drive</li> <li>• Heavy</li> </ul>	<ul style="list-style-type: none"> <li>• Good performance in WorldBench 6</li> <li>• Large hard disk</li> <li>• Light gaming potential</li> <li>• Reflective screen</li> </ul>	<ul style="list-style-type: none"> <li>• Extremely portable</li> <li>• More powerful than a netbook</li> <li>• Glossy screen</li> <li>• Rather slow</li> </ul>	<ul style="list-style-type: none"> <li>• Business portable</li> <li>• Excellent matt screen</li> <li>• No optical drive</li> <li>• Relatively lightweight</li> <li>• Good battery life</li> </ul>	<ul style="list-style-type: none"> <li>• Good sound quality</li> <li>• Comfortable keyboard</li> <li>• Not great for games</li> <li>• Weak processor</li> <li>• Expensive</li> </ul>
FULL REVIEW	TINYURL.COM/6FZZ4XE	TINYURL.COM/5TVT8AE	TINYURL.COM/6G5EKOK	TINYURL.COM/7R5WOAR	TINYURL.COM/5TRK7F4

All the models currently in our chart support 802.11n.

**Operating system:** Windows 7 Starter Edition is now standard, with slightly reduced performance compared to Windows XP. Some earlier netbooks instead ship with a Linux operating system. All those we've tested have struggled with Vista, but Windows 7 will run on an Atom processor.

**Display:** Netbooks' small screens and low resolutions, plus the lack of dedicated

graphics, mean they don't lend themselves to video playback or gameplay. However, most netbook screens are adequate for sending emails, web browsing and word processing.

**Keyboard:** Cramped keyboards go with the territory, and it's useful to try out typing on a netbook before you buy it. The keyboards on netbooks with smaller than 9in screens will make touch typing impossible. Watch out for non-standard layouts; mini laptops often sacrifice dedicated function keys.

**Extras:** To keep down cost and weight, mini-laptop manufacturers tend to compromise heavily on extra features – don't expect to get a CD/DVD drive, a FireWire port or an ExpressCard slot, for example. You'll usually find three USB ports, but they may be crammed together tightly, which can make plugging in two devices side by side tricky unless you use a USB hub or an extension cable.



£601-£1,000 laptops					
	1  PC ADVISOR BEST BUY	2  PC ADVISOR RECOMMENDED	3 	4  PC ADVISOR RECOMMENDED	5 
	Apple MacBook Air 11in	Dell XPS 14z	HP Folio 13-1000ea	Asus Zenbook UX31E-DH53	Toshiba Satellite Z830-10U
Price	£849 inc VAT	£949 inc VAT	£650 inc VAT	£999 inc VAT	£899 inc VAT
Website	Apple.com/uk	Dell.co.uk	Hp.com/uk	Uk.asus.com	Toshiba.co.uk
Build rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Features rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Performance rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Value rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Processor	1.6GHz Intel Core i5-2467M	2.8GHz Intel Core i7-2640M	1.6GHz Intel Core i5-2467M	1.8GHz Intel Core i7-2677M	1.6GHz Intel Core i5-2467M
RAM	2GB DDR3	8GB DDR3	4GB DDR3	4GB DDR3	6GB DDR3
Storage	64GB SSD	750GB hard drive	128GB SSD	256GB SSD	128GB SSD
Screen size	11.6in	14in	13.3in	13.3in	14in
Screen resolution	1366x768 pixels	1366x768	1366x768	1600x900	1366x768 pixels
Graphics	Intel HD Graphics 3000	nVidia GeForce GT 520M	Intel HD Graphics 3000	Intel HD Graphics 3000	Intel HD Graphics 3000
Video memory	N/A	1GB	N/A	N/A	N/A
Wireless	802.11a/b/g/n	802.11a/b/g/n	802.11b/g/n	802.11b/g/n	802.11a/b/g/n
Ethernet	100Mbps with USB adaptor	Gigabit	Gigabit	N/A	Gigabit
Bluetooth	✓	✓	✓	✓	✓
USB	2x USB 2.0	1x USB 3.0, 1x USB 2.0	1x USB 3.0, 1x USB 2.0	1x USB 3.0, 1x USB 2.0	1x USB 3.0, 2x USB 2.0
FireWire	x	x	x	x	x
Thunderbolt	✓	x	x	x	x
DisplayPort	✓	✓	x	x	x
HDMI	x	✓	✓	✓	✓
DVI	x	x	x	x	x
VGA	x	x	x	✓	✓
eSATA	x	x	x	x	x
Media card slot	x	✓	✓	✓	✓
Audio	Headphone jack, mic	Headphone jack, mic	Speakers, headphone jack	Headphone jack, mic	Speakers, headphone jack
Optical drive	N/A	8x DVD±R, 6x DVD-RW, 8x DVD+RW	8x DVD±R, 6x DVD-RW, 8x DVD+RW	N/A	N/A
Extras	HD webcam, multitouch trackpad, backlit keyboard	Webcam	Webcam	Webcam	Webcam
Operating system	Mac OS X 10.7 Lion	Windows 7 Home Prem 64bit	Windows 7 Home Prem 64bit	Windows 7 Home Prem 64bit	Windows 7 Home Prem 64bit
Bundled software	iLife 11	None	HP apps	None	None
Fear (Max detail)	17fps	46fps	13fps	Not tested	16fps
Battery	35Wh lithium-ion	58Wh lithium-ion	60Wh lithium-ion	50Wh lithium polymer	46Wh lithium-ion
Battery life	4 hrs 38 mins	6 hrs 46 mins	7 hrs 0 mins	7 hrs 17 mins	6 hrs 10 mins
WorldBench 6 score	111	143	112	119	106
Dimensions	300x192x13-17mm	335x234x23.8mm	319x220x18mm	326x223x18.1mm	316x227x16mm
Weight	1.07kg	2.1kg	1.5kg	1.4kg	1.09kg
Warranty	1 year return-to-base	1 year return-to-base	1 year return-to-base	1 year return-to-base	1 year return-to-base
Verdict	<ul style="list-style-type: none"> <li>Reasonable price tag</li> <li>Very light and compact</li> <li>Strong performance for size</li> <li>Great hi-resolution, low-glare screen</li> </ul>	<ul style="list-style-type: none"> <li>Modern and stylish looks</li> <li>Impressive battery life</li> <li>Good features for money</li> <li>Low-resolution screen suffers from glare</li> </ul>	<ul style="list-style-type: none"> <li>Superb looks</li> <li>Strong battery life</li> <li>Over-reflective screen</li> <li>Poor gaming speed</li> <li>Only 128GB storage</li> </ul>	<ul style="list-style-type: none"> <li>Superb design</li> <li>Nice range of connectors</li> <li>Impressive battery life</li> <li>MacBook Air is faster and has a better display</li> </ul>	<ul style="list-style-type: none"> <li>Highly portable</li> <li>Rather fragile</li> <li>Poor gaming speed</li> <li>Usable keyboard</li> <li>Only 128GB storage</li> </ul>
FULL REVIEW	TINYURL.COM/CCPOANM	TINYURL.COM/6P2AVFP	TINYURL.COM/6VBMNJM	TINYURL.COM/6PG68Z3	TINYURL.COM/7WTKM8G

## >> Buying advice



### Laptops

**Processor:** Intel processors remain the dominant force in our laptop charts. The best options are the Core i3, i5 and i7 processors, although budget laptops use slower Intel Celeron-branded chips. The Core i-series are very efficient, allowing

speedy performance and good battery life. Some Core i7 chips are also available as quad-core processors – look for a ‘Q’ after their part number.

Processors in Intel’s Core i3, i5 and i7 families include performance features such as Turbo Boost, for short-term

overclocking, and Hyper Threading, which enables dual-core CPUs to function like quad-core processors.

**Memory:** The minimum offering if you’re paying more than £600 should be 2GB of memory. Most laptops offer more. The more memory you have, the smoother your laptop will likely run.



£1,001+ laptops	 1 PC ADVISOR RECOMMENDED	 2	 3 PC ADVISOR RECOMMENDED	 4 PC ADVISOR GOLD	 5
	Apple MacBook Air 13.3in	Dell Latitude E6420 ATG	Rock Xtreme X685-i5-2540M	Apple MacBook Pro 15in	Toshiba Portégé Z830-104
Price	£1,349 inc VAT	£1,293 inc VAT	£1,229 inc VAT	£1,849 inc VAT	£1,099 inc VAT
Website	Apple.com/uk	Dell.co.uk	Rockdirect.com	Apple.com/uk	Toshiba.co.uk
Build rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Features rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Performance rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Value rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Processor	1.8GHz Intel Core i7-2677M	2.8GHz Intel Core i7-2640M	2.6GHz Intel Core i5-2540M	2.4GHz Intel Core i7-2760QM	1.7GHz Intel Core i5-2557M
RAM	4GB DDR3	4GB DDR3	6GB DDR3	4GB DDR3	4GB DDR3
Storage	256GB SSD	128GB SSD	500GB hard drive	750GB hard drive	128GB SSD
Screen size	13.3in	14in	15.6in	15.4in	13.3in
Screen resolution	1440x900 pixels	1366x768 pixels	1920x1080 pixels	1440x900 pixels	1366x768
Graphics	Intel HD Graphics 3000	Intel HD Graphics 3000	AMD Radeon HD 6990	AMD Radeon HD 6770M	Intel HD Graphics 3000
Video memory	N/A	N/A	2GB	1GB	N/A
Wireless	802.11a/b/g/n	802.11a/b/g/n	802.11a/b/g/n	802.11a/b/g/n	802.11a/b/g/n
Ethernet	N/A	Gigabit	Gigabit	Gigabit	Gigabit
Bluetooth	✓	✓	✓	✓	✓
USB	2x USB 2.0	3x USB 2.0	2x USB 3.0, 2x USB 2.0	2x USB 2.0	1x USB 3.0, 2x USB 2.0
FireWire	x	x	x	x	x
Thunderbolt	✓	x	x	✓	x
DisplayPort	✓	x	x	✓	x
HDMI	x	✓	✓	x	✓
DVI	x	x	✓	x	x
VGA	x	✓	x	x	✓
eSATA	x	✓	✓	x	x
Media card slot	✓	✓	✓	✓	✓
Audio	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic
Optical drive	N/A	8x DVD ±R, 2.4x DVD-RW, 4x DVD+RW, 8x DVD-ROM	6x BD-ROM, 8x DVD ±R, 2.4x DVD-RW, 4x DVD+RW	8x DVD ±R, 2.4x DVD-RW, 4x DVD+RW, 8x DVD-ROM	N/A
Extras	HD webcam, multitouch trackpad, backlit keyboard	Webcam, fingerprint reader	Webcam, fingerprint reader	HD webcam, multitouch trackpad, backlit keyboard	Webcam, fingerprint reader
Operating system	Mac OS X 10.7 Lion	Windows 7 Pro 32bit	Windows 7 Home Prem 64bit	Mac OS X 10.7 Lion	Windows 7 Pro 64bit
Bundled software	iLife 11	None	None	iLife 11	None
Fear (Max detail)	17fps	17fps	275fps	98fps	Not tested
Battery	50Wh lithium-ion polymer	60Wh lithium-ion	76Wh lithium-ion	77.5Wh lithium-ion	50Wh lithium polymer
Battery life	6 hrs 20 mins	6 hrs 24 mins	2 hrs 30 mins	5 hrs 11 mins	6 hrs 8 mins
WorldBench 6 score	130	155	124	133	117
Dimensions	325x227x17mm	352x241x35mm	376x256x43mm	364x249x24mm	314x226x17mm
Weight	1.3kg	2.7kg	3.1kg	2.6kg	1.1kg
Warranty	1 year return-to-base	3 years onsite	3 years onsite	1 year return-to-base	1 year return-to-base
Verdict	<ul style="list-style-type: none"> <li>• Thunderbolt, DisplayPort</li> <li>• Very strong performance</li> <li>• 256GB SSD</li> <li>• Exceptional build quality</li> <li>• Lengthy battery life</li> </ul>	<ul style="list-style-type: none"> <li>• Rugged build quality</li> <li>• Fantastic general speed</li> <li>• Lacklustre for gaming</li> <li>• Long battery life, given the performance</li> </ul>	<ul style="list-style-type: none"> <li>• Great performance</li> <li>• 2GB AMD Radeon graphics</li> <li>• Incredible gaming machine</li> <li>• Very poor battery life</li> <li>• Wonderful glare-free screen</li> </ul>	<ul style="list-style-type: none"> <li>• Multitouch trackpad</li> <li>• Good battery life</li> <li>• Thunderbolt connectivity</li> <li>• Solid unibody chassis</li> <li>• Quad-core power</li> </ul>	<ul style="list-style-type: none"> <li>• Great range of ports</li> <li>• Easy to carry around</li> <li>• Not particularly attractive</li> <li>• Slightly overpriced</li> </ul>
FULL REVIEW	TINYURL.COM/729FHEZ	TINYURL.COM/CBA725B	TINYURL.COM/BTZSQ97	TINYURL.COM/6LRTACR	TINYURL.COM/6NDX26W

**Hard drive:** It can be difficult to upgrade a laptop's hard drive, so get as much storage space as you can. For the best performance and increased reliability, look out for a solid-state drive. Expect lower capacity than with a hard drive, however.

**Screen:** If you're after a desktop-replacement machine, go for a model with at least a 15in screen. For film playback, 17in widescreen

models are even better. For ultraportables, 13in or smaller is best.

**Graphics card:** If you need a laptop as a design workstation or for playing games, you'll need a dedicated graphics processor. AMD and nVidia make more efficient chips for the task, such as the AMD Radeon HD 6700 series and nVidia GeForce 500 series, both ending with an 'M' suffix.

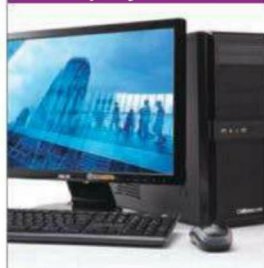
The integrated graphics in Intel Core i-series processors are now usable with some games, too. Older Intel GMA 4500M graphics are sufficient only for games played at low resolutions.

Some laptops feature switchable graphics, using the integrated graphics processor to maintain battery life and the discrete card for maximum performance.



Business PCs	1	2	3	4	5
	Chillblast Fusion Obsidian	Apple Mac mini	PC Specialist MPC-2120	Eclipse eBiz i321r755	Arbico FX4130 Office PC
Price	£549 inc VAT	£529 inc VAT	£539 inc VAT	£599 inc VAT	£500 inc VAT
Website	Chillblast.com	Apple.com/uk	Pcspecialist.co.uk	Eclipsecomputers.com	Arbico.co.uk
Build rating	★★★★☆	★★★★★	★★★★☆	★★★★☆	★★★★☆
Features rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Performance rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Value rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Processor	3.4GHz Intel Core i5-3570K	2.3GHz Intel Core i5-2415M	3.3GHz Intel Core i3-2120	3.1GHz Intel Core i3-2100	3.6GHz AMD FX-4100
RAM	8GB DDR3	2GB DDR3	4GB DDR3	8GB DDR3	8GB DDR3
Storage capacity	1TB SATA 6Gbps	500GB SATA	1TB SATA 6Gbps + 120GB SSD	1TB SATA 3Gbps	500GB SATA 6Gbps
Motherboard	Asus P8H61-M LE/USB3	Apple Mac mini board	Intel DH67CF	Asus P8H61-M LE/USB3	Asus M5A78L M/USB3
CPU cooler	Standard Intel cooler	Custom active cooler	Standard Intel cooler	Standard Intel cooler	Xigmatek Apache
Power supply	500W EZCool	85W Delta Electronics	160W Power Man	450W unbranded	650W Ace
Screen	21.5in Asus VE228T	N/A	N/A	2x 21.6in AOC F22+	N/A
Screen resolution	1920x1080 pixels	N/A	N/A	1920x1080	N/A
Graphics	Intel HD Graphics 4000	Intel HD Graphics 3000	Intel HD Graphics 2000	AMD Radeon HD 7750	Asus nVidia GT 430
Video memory	N/A	N/A	N/A	1GB	1GB
USB	2x USB 3.0, 8x USB 2.0	4x USB 2.0	2x USB 3.0, 7x USB 2.0	3x USB 3.0, 6x USB 2.0	2x USB 3.0, 4x USB 2.0
Sound	Onboard	Onboard	Onboard	Onboard	Onboard
Speakers	Built into monitor	Not supplied	Not supplied	Not supplied	Not supplied
Case	Cit Shade	Apple Mac mini unibody	In-Win BM643	Generic 437-16 series	Ace Ecco 250
Keyboard	Logitech MK260 (wired)	Bluetooth Keyboard, Magic Trackpad (optional)	Logitech K200 (wired)	Logitech MK120 (wired)	Logitech MK120 (wired)
Optical drive	24x Sony DVD±RW	N/A	8x Samsung DVD±RW	22x Samsung DVD±RW	24x Sony DVD±RW
Operating system	Windows 7 Professional 64bit	Mac OS X 10.7 Lion	Windows 7 Professional 64bit	Windows 7 Home Prem 64bit	Windows 7 Professional 64bit
Bundled software	Microsoft Office 2010 Starter	iLife	Microsoft Office 2010 Starter	Microsoft Office 2010 Starter	None
WorldBench 6 score	176	117	154	139	128 (est)
Power consumption	39W/97W/9,603J	9W	22W/55W/11,440J	43W/93W/48,081J	63W/163W/73,676J
Warranty	2-year collect-and-return	1-year collect-and-return	3-year RTB (labour only)	1-year RTB	2-year RTB (labour only)
Verdict	<ul style="list-style-type: none"> <li>Packs the latest Ivy Bridge processor</li> <li>Strong components and performance</li> <li>Superior 22in flat-panel</li> <li>HD 4000 a cut above the usual onboard graphics</li> </ul>	<ul style="list-style-type: none"> <li>Beautifully compact</li> <li>Good performance</li> <li>No DVD drive</li> <li>Very low power consumption</li> <li>Quiet and elegant</li> <li>Versatile OS X operating system</li> </ul>	<ul style="list-style-type: none"> <li>Small-form-factor PC takes up little desk space</li> <li>Very low power consumption</li> <li>Performance is adequate, but not stunning</li> <li>Graphics card only an onboard HD 2000</li> </ul>	<ul style="list-style-type: none"> <li>Dual-screen system</li> <li>Neither of the screens are of great quality</li> <li>CPU isn't very powerful</li> <li>Windows 7 Home Premium not aimed at office users</li> </ul>	<ul style="list-style-type: none"> <li>Sound-damping materials keep noise to a minimum</li> <li>Low price for a system with Windows 7 Professional</li> <li>Performance some way behind the fastest here</li> <li>No monitor included</li> </ul>
FULL REVIEW	TINYURL.COM/CNOALAZ	TINYURL.COM/88GUG5H	TINYURL.COM/CT9ZR4J	TINYURL.COM/CVFKRRZ	TINYURL.COM/CRTC8M8

## >> Buying advice



## Business PCs

Changes in exchange rates and component supply issues mean we can't guarantee PCs listed here will be available as specified. All our prices include delivery charges.

Provided you have sufficient RAM (at least 2GB, but preferably 4GB), any modern CPU will provide enough power for low-level admin tasks. Intel's Core i3 provides

ample performance for general use and come with integrated graphics, saving you the cost of buying an additional card.

In a typical networked business environment there will be storage available on the LAN, so you're unlikely to need a large hard drive. A 500GB drive should be ample.

Wireless keyboards and mice can cause issues in the workplace

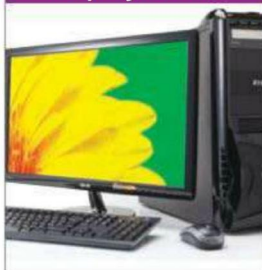
due to interference between adjacent workstations. A decent wired kit is ideal, while quiet-typing keyboards can be less distracting.

For small businesses with just one or two PCs, Windows 7 Home Premium is cheaper but can't connect to servers. The Pro edition is a better option for businesses, especially if you need compatibility with older software.



Family PCs	1	2	3	4	5
	Chillblast Fusion Longbow	PC Specialist Fusion FX-41	Arbico eXcel 2568HD	Eclipse Matrix i323R685	Quiet PC Nofan IcePipe A40-Z77
Price	£799 inc VAT	£649 inc VAT	£849 inc VAT	£699 inc VAT	£1,124 inc VAT
Website	Chillblast.com	Pcspecialist.co.uk	Arbico.co.uk	Eclipsecomputers.com	Quietpc.com
Build rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Features rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Performance rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Value rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Processor	3.4GHz Intel Core i5-3570K	3.6GHz AMD FX-4100	3.3GHz Intel Core i5-2500	3.3GHz Intel Core i3-2310	3.3GHz Intel Core i5-2500K
RAM	16GB DDR3	8GB DDR3	8GB DDR3	8GB DDR3	8GB DDR3
Storage capacity	1TB HDD	1TB HDD	1TB HDD, 60GB SSD	1TB HDD	120GB SSD
Motherboard	Asus P8H77-M Pro	Asus M5A78L-M	Asus P8Z68-V LX	Asus P8H61-M LE	Gigabyte GA-Z77-D3H
CPU cooler	Standard Intel cooler	Standard AMD cooler	Standard Intel cooler	Standard Intel cooler	Nofan CD-100A
Power supply	700W Cit	450W FSP	500W Cooler Master	650W EZCool	400W Nofan
Screen	23.6in Asus VS247H	23.6in Edge 10 M240	23.6in Hanns-G HH241H	23in AOC E2350SDA	N/A
Screen resolution	1920x1080 pixels	1920x1080 pixels	1920x1080 pixels	1920x1080 pixels	N/A
Graphics card	AMD Radeon HD 6850	Powercolor Radeon HD 7750	AMD Radeon HD 6870 OC	AMD Radeon HD 6850	Intel Graphics HD 3000
Video memory	1GB	1GB	1GB	1GB	N/A
Wireless	802.11b/g/n	802.11b/g/n	N/A	802.11b/g/n	N/A
USB	2x USB 3.0, 6x USB 2.0	2x USB 3.0, 4x USB 2.0	2x USB 3.0, 6x USB 2.0	2x USB 3.0, 6x USB 2.0	4x USB 3.0, 4x USB 2.0
Media card slot	✓	✓	✗	✗	✗
Sound card	Onboard	Onboard	Onboard	Onboard	Onboard
Speakers	2x Logitech S220	2x Logitech S220	2x Logitech S120	2x Logitech S220	N/A
Case	Cit Vantage	PCS Enigma Piano Black	Revoltex 67	Unbranded model 437-16	Nofan CS-30
Keyboard	Logitech Cordless MK260	Microsoft Optical Desktop 400	Logitech Cordless MK260	Microsoft Optical Desktop 400	Microsoft Wired Desktop 600
Optical drive	Samsung Blu-ray/DVD combo drive	Samsung Blu-ray/DVD combo drive	LG Blu-ray/DVD combo drive	LG Blu-ray/DVD combo drive	Samsung SH-S222 DVD drive
Operating system	Windows 7 Home Premium 64bit	Windows 7 Home Premium 64bit	Windows 7 Home Premium 64bit	Windows 7 Home Premium 64bit	Windows 7 Home Premium 64bit
Bundled software	Free utilities	Office 2010 Starter, BullGuard	CyberLink Power2Go	Office Starter 2010, BullGuard	N/A
Crysis (Low/Medium)	156/109	104/68	161/113fps	122/84fps	37/19
WorldBench 6 score	189	134 (estimated)	175	151	177
Warranty	2 years collect-and-return	3 years RTB (1 year parts)	1 year return-to-base	1 year return-to-base	2 years collect-and-return
Verdict	<ul style="list-style-type: none"> <li>Ivy Bridge technology</li> <li>Superb performance</li> <li>Great feature set includes 16GB of memory and a capable graphics card</li> <li>Strong display</li> </ul>	<ul style="list-style-type: none"> <li>Appealing price tag</li> <li>Good features for the money</li> <li>Speed figures not the highest in our tests</li> <li>Lengthy warranty</li> </ul>	<ul style="list-style-type: none"> <li>Fantastic gaming machine</li> <li>Top-notch all-round Windows performance</li> <li>SSD is fast, but the 60GB of storage needs management</li> <li>Speakers and peripherals not the best</li> </ul>	<ul style="list-style-type: none"> <li>Cheapest Intel system here</li> <li>AMD systems are better for tasks that benefit from multiple CPU cores</li> <li>Solid gaming capabilities</li> <li>Capable all-round list of components</li> </ul>	<ul style="list-style-type: none"> <li>Completely silent operation</li> <li>Strong overall performance</li> <li>Fast but small-capacity SSD, with no HDD to supplement storage needs</li> <li>High asking price</li> </ul>
FULL REVIEW	<a href="http://tinyurl.com/calep8w">TINYURL.COM/CALEP8W</a>	<a href="http://tinyurl.com/cwky96a">TINYURL.COM/CWKY96A</a>	<a href="http://tinyurl.com/bus9xjp">TINYURL.COM/BUS9XJP</a>	<a href="http://tinyurl.com/cpjr64t">TINYURL.COM/CPJR64T</a>	<a href="http://tinyurl.com/cfjj4j2">TINYURL.COM/CFJJ4J2</a>

## >> Buying advice



### Family PCs

Changes in exchange rates and component supply issues mean we can't guarantee PCs listed here will be available as specified. All our prices include delivery charges.

A family PC needs to offer decent performance in every area, able to cater for the needs of each individual - but there are some areas where you can cut costs.

If you're not itching to play the latest games, opt for integrated rather than dedicated graphics. AMD processors are more adept in this regard, while Intel CPUs offer faster application performance.

Intel's Core i5-3570K will form the core of a powerful home PC, although the older Core i5-2500K may be offered at lower cost and supports easy overclocking.

Consider 4GB of RAM and a 500GB hard drive as the minimum; both are easy to upgrade later.

Screen quality is crucial, with the best displays using IPS tech. A Blu-ray drive will help make the most of a 23.6in full-HD monitor.

For Skype, watching films and listening to music, decent speakers and a webcam are essential.

**READ MORE:** [TINYURL.COM/BL4UREB](http://tinyurl.com/bl4ureb)



Gaming PCs	1	2	3	4	5
	Chillblast Fusion Talisman	Quiet PC Serenity Z68 Gamer Xtreme	PC Specialist EnForcer-X	CyberPower Cobra	Yoyotech Warbird Dark Iron CS
Price	£1,299 inc VAT	£1,550 inc VAT	£1,379 inc VAT	£1,999 inc VAT	£979 inc VAT
Website	Chillblast.com	Quietpc.com	Pcspecialist.co.uk	Cyberpowersystem.co.uk	Yoyotech.co.uk
Build rating	★★★★☆	★★★★★	★★★★★	★★★★★	★★★★★
Features rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Performance rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Value rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Processor	3.3GHz (4.9GHz) Intel Core i5-2500K	3.3GHz (4.7GHz) Intel Core i5-2500K	3.3GHz (4.6GHz) Intel Core i5-2500K	3.4GHz (4.6GHz) Intel Core i7-2600K	3.3GHz (4.6GHz) Intel Core i5-2500K
CPU cooler	Thermolab Trinity	Zalman CNPS20LQ	Titan Fenrir	Advanced water cooling	Enermax ETS-T40 Cooler
Memory	8GB DDR3	8GB DDR3	16GB DDR3	16GB DDR3	8GB DDR3
Storage	30GB SSD + 1TB 3.5in HDD	60GB SSD + 1TB 3.5in HDD	80GB SSD + 1TB 3.5in HDD	128GB SSD + 1TB 3.5in HDD	60GB SSD + 500MB 3.5in HDD
Power supply	700W OCZ StealthXtreme	630W Nexus	650W Corsair TX650	Not specified	500W
Motherboard	Asus P8Z68-V	Gigabyte GA-Z68X-UD3H-B3	Asus P8Z68-V/GEN3	Asus P8Z68-V	Asus P8Z68-M Pro
USB	2x USB 3.0, 8x USB 2.0	3x USB 3.0, 7x USB 2.0	4x USB 3.0, 8x USB 2.0	2x USB 3.0, 8x USB 2.0	2x USB 3.0, 14x USB 2.0
Screen	24in Asus VS247H (1920x1080)	Not supplied	24in Iiyama E2473HDS (1920x1080)	24in AOC E2436VWA (1920x1080)	24in ViewSonic VA2448-LED (1920x1080)
Graphics	3GB Asus Radeon HD 7970	3GB Sapphire HD 7970	1.25GB Palit GeForce GTX 570	3GB Powercolor HD 7970	1GB Asus GeForce GTX 560 Ti
Sound	Onboard	Onboard	Onboard	Onboard	Onboard
Connectivity	Gigabit ethernet	Gigabit ethernet	Gigabit ethernet, Bluetooth	Gigabit ethernet, Bluetooth	Gigabit ethernet
VGA	×	✓	✓	×	✓
DVI	✓	✓	✓	×	✓
HDMI	✓	✓	✓	✓	×
DisplayPort	✓	✓	×	×	×
FireWire	×	✓	✓	×	×
eSATA	✓	✓	×	✓	✓
Case	Cooler Master Elite 430	AeroCool X-Predator Evil	Cooler Master Storm Enforcer	Cooler Master 690 II	Fractal Design Arc
Keyboard & mouse	Trust GXT 18 keyboard, Chillblast mouse	Not supplied	Razer Arctosa, Razer Death Adder ReSpawn	Razer Lycosa, Razer Death Adder	Microsoft Wireless Desktop 800
Optical drive	BD-ROM/DVD±RW	DVD±RW	DVD±RW	BD-R/DVD±RW	DVD±RW
Operating system	Windows 7 Home Premium	Windows 7 Home Premium 64bit	Windows 7 Home Premium	Windows 7 Home Premium 64bit	Windows 7 Home Premium 64bit
Extras	None	Fan-speed control, choice of four case colours	Nero 9.0 Essentials, Logitech H350 USB Headset	MS Office 2010 Starter, soundproofing	BullGuard Internet Security
WorldBench 6 score	203	203	217	217	199
Gaming performance <sup>1</sup>	107/65/59/112fps	103/65/59/110fps	78/47/37/78fps	105/65/58/100fps	67/39/30/66fps
MediaEspresso time	4 mins 27 secs	4 mins 47 secs	4 mins	5 mins 34 secs	4 mins 5 secs
Power Consumption <sup>2</sup>	96W/290W	60W/257W	119W/310W	125W/330W	100W/256W
Warranty	2 years collect-and-return	2 years return-to-base	1 year return-to-base	3 years return-to-base (parts)	1 year return-to-base
Verdict	<ul style="list-style-type: none"> <li>Maximum overclocking gives fantastic performance</li> <li>High-quality 24in Asus VS247H monitor</li> <li>Average system case and cooling</li> <li>8GB of RAM</li> </ul>	<ul style="list-style-type: none"> <li>Superb gaming performance</li> <li>Towering but practical case</li> <li>Extremely quiet</li> <li>No monitor, keyboard or mouse supplied</li> </ul>	<ul style="list-style-type: none"> <li>Very fast WorldBench 6 performance</li> <li>Gaming performance decent, but not great</li> <li>Tidy casing</li> <li>No Blu-ray drive</li> </ul>	<ul style="list-style-type: none"> <li>High price tag</li> <li>Very strong performance in all areas</li> <li>Watercooling setup</li> <li>Keyboard and mouse worth £125 alone</li> </ul>	<ul style="list-style-type: none"> <li>Low price tag</li> <li>Very decent performance for the money</li> <li>The main hard drive is a mere 500GB</li> <li>Many features better suited to general use rather than gaming</li> </ul>
FULL REVIEW	<a href="http://TINYURL.COM/88QE2ZG">TINYURL.COM/88QE2ZG</a>	<a href="http://TINYURL.COM/7PDJ52L">TINYURL.COM/7PDJ52L</a>	<a href="http://TINYURL.COM/84Q7VYF">TINYURL.COM/84Q7VYF</a>	<a href="http://TINYURL.COM/827QEY2">TINYURL.COM/827QEY2</a>	<a href="http://TINYURL.COM/7AZTOS8">TINYURL.COM/7AZTOS8</a>

<sup>1</sup>Tested in Crysis at 1080p, High (no AA)/V High (no AA)/V High (16x AA)/Stalker: Call of Pripyat at 1080p, Ultra <sup>2</sup>Tested when idle and in Crysis

## >> Buying advice



## Gaming PCs

Changes in exchange rates and component supply issues mean we can't guarantee PCs listed here will be available as specified. All our prices include delivery charges.

Gaming PCs put performance and upgradability before subtlety and quiet operation. Many run overclocked CPUs to eke out every bit of available speed.

Intel's Core i5-2500K is a popular choice of CPU, but will require a decent cooler and beefy PSU. The HyperThreaded i7-2600K is slightly faster, but dearer.

Cooling is essential for stability. Liquid-cooling systems, dust filters, fan-speed controls and good cable-management can aid airflow.

Most important of all is the graphics card; vendors will often

skimp on storage, networking and other features and throw all their budget at the graphics card.

AMD's Radeon HD 7970 delivers unparalleled performance - but at a price. Cheaper solutions include the nVidia GeForce GTX 560 Ti.

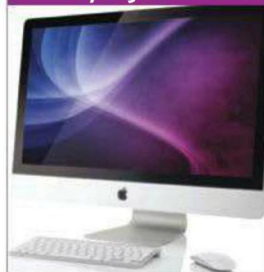
Look for wired peripherals and a headset. Good warranty terms are crucial for overclocked PCs.

**READ MORE:** [TINYURL.COM/CZXH443](http://TINYURL.COM/CZXH443)



All-in-one PCs	1	2	3	4	5
	Apple iMac 27in 2.7GHz	Asus ET2700INTS	Packard Bell oneTwo L i5871	Toshiba Qosimo DX730-10U	HP Touchsmart Pro 610
Price	£1399 inc VAT	£1,399 inc VAT	£950 inc VAT	£999 inc VAT	£1,200 inc VAT
Website	Apple.com/uk	Uk.asus.com	Packardbell.co.uk	Toshiba.co.uk	Hp.com/uk
Build rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Features rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Performance rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Value rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Processor	2.7GHz Intel Core i5-2500S	2.5GHz Intel Core i5-2400S	2.5GHz Intel Core i5-2400S	2.5GHz Intel Core i5-2450M	3.2GHz Intel Core i5-650
RAM	4GB DDR3	6GB DDR3	4GB DDR3	6GB DDR3	6GB DDR3
Storage capacity	1TB hard drive	2TB hard drive	1TB hard drive	1TB hard drive	1.5TB hard drive
Screen	27in IPS glossy	27in glossy	23in TN glossy touchscreen	23in TN glossy touchscreen	23in glossy touchscreen
Screen resolution	2560x1440	1920x1080	1920x1080 pixels	1920x1080 pixels	1920x1080 pixels
Graphics card	AMD Radeon HD 6770M	nVidia GT540M/Intel HD 2000	Intel HD Graphics 2000	Intel HD Graphics 3000	AMD Radeon HD 5570M
Video memory	512MB	1GB	N/A	N/A	1GB
Wireless	802.11a/b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n
Ethernet	✓	✓	✓	✓	✓
Bluetooth	✓	✗	✗	✓	✓
USB	4x USB 2.0	2x USB 3.0, 3x USB 2.0	2x USB 3.0, 4x USB 2.0	4x USB 3.0, 4x USB 2.0	2x USB 3.0, 4x USB 2.0
FireWire	✓	✗	✗	✗	✗
Thunderbolt	✓	✗	✗	✗	✗
HDMI	✗	✓	✗	✓	✓
Media card slot	SD	SD	SD	SD	SD/SDHC/MS/MS Pro/xD
Max disc speeds	8x DVD±R, 4x DVD±R DL, 8x DVD-ROM	6x BD-ROM, 8x DVD±R, 6x DVD±R DL, 8x DVD-ROM	8x DVD±R, 4x DVD±R DL, 8x DVD-ROM	6x BD-ROM, 8x DVD±R, 4x DVD±R DL, 8x DVD-ROM	4x BD-ROM, 8x DVD±R, 6x DVD±R DL, 8x DVD-ROM
Extras	Webcam, wireless keyboard	Remote control, webcam, wireless keyboard	Remote control, webcam, TV tuner, wireless keyboard	Remote control, webcam, TV tuner, wireless keyboard	Webcam, wireless keyboard, TV tuner, Beats Audio, remote
Operating system	Mac OS X 10.7 Lion	Windows 7 Home Premium 64bit	Windows 7 Home Premium 64bit	Windows 7 Home Premium 64bit	Windows 7 Home Premium 64bit
Power consumption	67W (idle), 180W (under load)	47W (idle), 114W (under load)	51W (idle), 84W (under load)	35W (idle), 44W (under load)	67W (idle), 112W (under load)
Crysis (720p)	133fps	99fps	29fps	39fps	72fps
Crysis (1080p)	12fps	6fps	Not tested	Not tested	36/22fps
WorldBench 6 score	147	140	137	133	122
Dimensions	650x517x207mm	660x508x233mm	557x421x299mm	561x190x439mm	584x103x450mm
Weight	13.8kg	13.4kg	8kg	8kg	11.8kg
Warranty	1 year return-to-base	1 year return-to-base	1 year return-to-base	1 year collect-and-return	1 year return-to-base
Verdict	<ul style="list-style-type: none"> <li>Peerless design and build quality</li> <li>Fantastic high-quality 27in screen</li> <li>Great general and gaming speed</li> <li>OS X operating system</li> </ul>	<ul style="list-style-type: none"> <li>Good-quality 27in panel</li> <li>Decent performance</li> <li>Rear design is ugly and impractical</li> <li>Not as good overall as iMac</li> </ul>	<ul style="list-style-type: none"> <li>Good speed</li> <li>TV tuner welcome addition for multimedia</li> <li>Touchscreen not as effective as it might be</li> <li>Plenty of software</li> </ul>	<ul style="list-style-type: none"> <li>Lots of memory and hard-drive space</li> <li>TV tuner</li> <li>Blu-ray drive</li> <li>Superior sound system</li> <li>Perfect for HD movies</li> </ul>	<ul style="list-style-type: none"> <li>Solid performer</li> <li>Generous 23in screen</li> <li>Nice Beats Audio sub-system</li> <li>Blu-ray playback</li> <li>TV tuner</li> <li>Two USB 3.0 ports</li> <li>Bulky design</li> </ul>
FULL REVIEW	<a href="http://tinyurl.com/7THNXU8">TINYURL.COM/7THNXU8</a>	<a href="http://tinyurl.com/7ZTAQH7">TINYURL.COM/7ZTAQH7</a>	<a href="http://tinyurl.com/7WSLOEK">TINYURL.COM/7WSLOEK</a>	<a href="http://tinyurl.com/7AQL5CY">TINYURL.COM/7AQL5CY</a>	<a href="http://tinyurl.com/69TVUKZ">TINYURL.COM/69TVUKZ</a>

## » Buying advice



## All-in-one PCs

Changes in exchange rates and component supply issues mean we can't guarantee PCs listed here will be available as specified. All our prices include delivery charges.

All-in-one PCs build into a large (21- to 27in) monitor all the components they require to run, making them an excellent and stylish solution for saving space.

However, with limited internal space for cooling, all-in-one machines tend to include less powerful components than traditional desktops. Expect to find integrated or laptop graphics processors and mobile CPUs inside.

All-in-ones aren't usually easy to upgrade, but many are pre-packed with Wi-Fi, Bluetooth, speakers and even Blu-ray players.

Touchscreen displays are likely to become more desirable once Windows 8 is released. If you buy one now, ensure the image quality hasn't been compromised and that it's sufficiently responsive to touch.

The quality of the supplied keyboard and mouse (usually wireless) is critical. TV tuners and HDMI ports are welcome additions.

**READ MORE:** [TINYURL.COM/87VW5KJ](http://tinyurl.com/87VW5KJ)

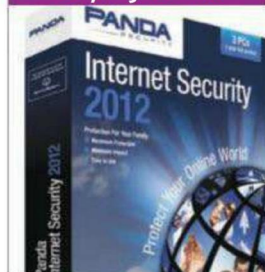


Internet security suites	    				
	1	2	3	4	5
	G Data IS 2012	Norton IS 2012	Bitdefender IS 2012	Kaspersky IS 2011	Trend Micro Titanium IS 2012
Annual price	£34 inc VAT	£49 inc VAT	£29 inc VAT	£39 inc VAT	£39 inc VAT
Licence terms	1 PC, 1 year	1 PC, 1 year	1 PC, 1 year	1 PC, 1 year	3 PCs, 1 year
Website	Gdatasoftware.co.uk	Uk.norton.com	Bitdefender.co.uk	Kaspersky.co.uk	Uk.trendmicro.com
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Signature-based detection	100 percent	99.9 percent	100 percent	99.3 percent	97.5 percent
Malware blocking (full)	100 percent	100 percent	96.2 percent	100 percent	92.3 percent
Malware blocking (partial)	N/A	N/A	0 percent	N/A	3.8 percent
Clean-up of malware	60 percent	50 percent	90 percent	60 percent	70 percent
On-demand scan speed	109 secs	68 secs	116 secs	71 secs	93 secs
On-access scan speed	116 secs	154 secs	265 secs	280 secs	314 secs
Interface design	Good	Very good	Superior	Very good	Very good
Verdict	<ul style="list-style-type: none"> <li>Excellent detection rates</li> <li>Good value</li> <li>Low impact on resources</li> <li>Confusing interface</li> </ul>	<ul style="list-style-type: none"> <li>Good all-rounder</li> <li>Fast scan times</li> <li>Clean interface</li> <li>Flagged some false-positives</li> </ul>	<ul style="list-style-type: none"> <li>Impacts system resources</li> <li>Very strong malware blocking and removal</li> <li>Intuitive interface</li> </ul>	<ul style="list-style-type: none"> <li>Strong block rate</li> <li>Above-average scan times</li> <li>Can affect PC performance</li> <li>Interface needs tweaking</li> </ul>	<ul style="list-style-type: none"> <li>Set-it-and-forget-it security</li> <li>Flagged some false-positives</li> <li>Reasonable scan speeds</li> <li>Ideal for novice users</li> </ul>
FULL REVIEW	<a href="http://tinyurl.com/7CZT5XB">TINYURL.COM/7CZT5XB</a>	<a href="http://tinyurl.com/CVVDWUR">TINYURL.COM/CVVDWUR</a>	<a href="http://tinyurl.com/75H3WUK">TINYURL.COM/75H3WUK</a>	<a href="http://tinyurl.com/6UEHPMW">TINYURL.COM/6UEHPMW</a>	<a href="http://tinyurl.com/7QTBAP6">TINYURL.COM/7QTBAP6</a>

GLOSSARY: • IS: Internet Security • SOS: Small Office Security

Antivirus software	    				
	1	2	3	4	5
	Norton AntiVirus 2011	Bitdefender Antivirus Pro 2011	G Data AntiVirus 2011	Kaspersky Anti-Virus 2011	Trend Micro Titanium AV+ 2011
Annual price	£39 inc VAT	£24 inc VAT	£34 inc VAT	£39 inc VAT	£39 inc VAT
Licence terms	3 PCs, 1 year	3 PCs, 1 year	3 PCs, 1 year	3 PCs, 1 year	3 PCs, 1 year
Website	Norton.com	Bitdefender.co.uk	Gdatasoftware.com	Kaspersky.co.uk	Uk.trendmicro.com
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Signature-based detection	98.7 percent	97.5 percent	99.4 percent	95.7 percent	98.4 percent
Malware blocking (full)	96 percent	68 percent	84 percent	88 percent	88 percent
Malware blocking (partial)	0 percent	20 percent	4 percent	4 percent	8 percent
Clean-up of active malware	80 percent	80 percent	80 percent	80 percent	80 percent
On-demand scan speed	121 secs	126 secs	111 secs	103 secs	187 secs
On-access scan speed	272 secs	327 secs	336 secs	310 secs	249 secs
Interface design	Very good	Very good	Very good	Very good	Very good
Verdict	<ul style="list-style-type: none"> <li>Smooth user interface</li> <li>Large 'Fix Now' button</li> <li>Moderate impact on system performance</li> </ul>	<ul style="list-style-type: none"> <li>Very good performance for malware removal</li> <li>Average scan speeds</li> <li>Three interface tiers</li> </ul>	<ul style="list-style-type: none"> <li>Strong malware detection, blocking and removal</li> <li>Good user interface, but poorly translated</li> </ul>	<ul style="list-style-type: none"> <li>Well-designed interface</li> <li>Easy to use</li> <li>On-demand single-file scans</li> <li>Impacts PC performance</li> </ul>	<ul style="list-style-type: none"> <li>Set-it-and-forget-it security</li> <li>Cloud-based protection</li> <li>Requires web connection</li> <li>Good performance</li> </ul>
FULL REVIEW	<a href="http://tinyurl.com/4P5YCXF">TINYURL.COM/4P5YCXF</a>	<a href="http://tinyurl.com/66SK77U">TINYURL.COM/66SK77U</a>	<a href="http://tinyurl.com/6BFXWCS">TINYURL.COM/6BFXWCS</a>	<a href="http://tinyurl.com/6HQA2WB">TINYURL.COM/6HQA2WB</a>	<a href="http://tinyurl.com/4HUORV3">TINYURL.COM/4HUORV3</a>

## >> Buying advice



## Security software

Every connected PC should have at least antivirus, antispyware and a firewall, and it's important that each is kept up to date. Avoid installing more than one real-time scanning component.

We work with world-renowned independent security testing lab AV-Test.org to evaluate the effectiveness of security software.

No security software is foolproof, but some are significantly better than others. And factors such as ease of setup, scan speeds, interface design and ability to deal with new threats set them apart.

The best products will offer parental controls, cloud protection, anti-phishing, anti-rootkit, virtual web browsers and keyboards, link

and file scanners, gaming modes, online backup and more.

The best value is usually offered by a three-user licence, but you can save some cash if your household has only one PC.

There are some good free antivirus products but, as in life, you get what you pay for.

[READ MORE: TINYURL.COM/7NR8FSM](http://tinyurl.com/7NR8FSM)



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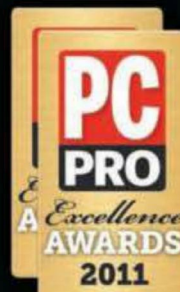
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# PC ADVISOR

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WorldMags.net



Sub-£150 printers	    				
	1	2	3	4	5
	Oki C110	Brother HL-2130	Kodak Hero 5.1	Canon i-Sensys LBP-7010C	Canon Pixma MG4150
Price	£120 inc VAT	£60 inc VAT	£77 inc VAT	£108 inc VAT	£100 inc VAT
Website	Oki.co.uk	Brother.co.uk	Kodak.co.uk	Canon.co.uk	Canon.co.uk
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Technology	Colour laser	Mono laser	Colour inkjet	Colour laser	Colour inkjet
Max print resolution	1200x600dpi	2400x600dpi	9600dpi	5760x1440dpi	4800x1200dpi
Actual print speed	B=15.8ppm/C=2.5ppm	B=20ppm	B=12.2ppm/C=6.8ppm	B=13ppm/C=3.3ppm	B=8.6ppm/C=3.8ppm
Scan/fax facilities	None	None	1200dpi scans	None	1200x2400dpi scans
Supported interfaces	USB 2.0	USB 2.0	USB 2.0, 802.11b/g/n, cloud	USB 2.0	USB 2.0, 802.11b/g/n
Cost per page	B=3.6p/C=5p	B=3p	B=1.8p/C=3.3p	B=3.8p/C=13.8p	B=2.8p/C=4.5p
Media card/auto duplex	xx	xx	✓✓	xx	✓✓
Input capacity	100 sheets	250 sheets	100 sheets	150 sheets	100 sheets
Dimensions	396x380x275mm	368x360x183mm	422x399x183mm	400x398x223mm	449x304x152mm
Weight	14.4kg	6.7kg	6.3kg	12.3kg	5.7kg
Warranty	3 years	1 year	1 year	2 years	2 years
Verdict	<ul style="list-style-type: none"> <li>Attractive pricing</li> <li>Performs better than an equivalent inkjet</li> <li>No duplex mode</li> </ul>	<ul style="list-style-type: none"> <li>20ppm mono laser printer</li> <li>Crisp text output</li> <li>3p per page</li> <li>Cheap for a laser printer</li> </ul>	<ul style="list-style-type: none"> <li>Printer/scanner/copier</li> <li>Lowest cost per print</li> <li>Built-in Wi-Fi</li> <li>Could be faster</li> </ul>	<ul style="list-style-type: none"> <li>Great value colour laser</li> <li>High-quality colour prints</li> <li>Slow colour performance</li> <li>Expensive replacement inks</li> </ul>	<ul style="list-style-type: none"> <li>Good connectivity</li> <li>Decent middle-mode speeds</li> <li>Complex control panel</li> <li>High text running costs</li> </ul>
FULL REVIEW	TINYURL.COM/YLNO5RV	TINYURL.COM/4YRRDJM	TINYURL.COM/6S5BW3B	TINYURL.COM/7TLXCBK	TINYURL.COM/6UJBGDJ

£151+ printers	    				
	1	2	3	4	5
	Kyocera Mita FS-1320D	Kyocera FS-C5250DN	Samsung ML-3710ND	Epson WP-4535 DWF	HP LaserJet Pro 400 M451nw
Price	£170 inc VAT	£450 inc VAT	£185 inc VAT	£174 inc VAT	£300 inc VAT
Website	Kyoceramita.co.uk	Kyoceramita.co.uk	Samsung.com/uk	Epson.co.uk	Hp.com/uk
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Technology	Mono laser	Colour laser	Mono laser	Colour inkjet	Colour laser
Max print resolution	1200x1200dpi	600x600dpi	1200x1200dpi	4800x1200dpi	600x600dpi
Actual print speed	B=26.1ppm	B=24.8ppm/C=18.3ppm	B=28.6ppm	B=15.4ppm/C=7.5ppm	B=14.3ppm/C=9.1ppm
Scan/fax facilities	none	none	none	Scanner and fax	none
Supported interfaces	USB 2.0	USB 2.0, ethernet	USB 2.0, ethernet	USB 2.0, 802.11b/g/n, ethernet	USB 2.0, 802.11b/g/n, ethernet
Cost per page	B=1.4p	B=1.2p/C=5.2p	B=1.4p	B=1p/C=3.6p	B=2.1p/C=11.3p
Media card/auto duplex	✓✓	x✓	x✓	x✓	xx
Input capacity	250 sheets	500 + 50 sheets	250 + 50 sheets	250 + 80 sheets	250 + 50 sheets
Dimensions	375x393x250mm	390x523x397mm	366x368x253mm	460x420x341mm	405x454x322mm
Weight	12kg	30kg	10kg	13.8kg	22.8kg
Warranty	2 years	2 years	1 year	1 year	1 year
Verdict	<ul style="list-style-type: none"> <li>No frills business laser</li> <li>Lacks Wi-Fi and ethernet</li> <li>Modest running costs</li> <li>Auto-duplex support</li> </ul>	<ul style="list-style-type: none"> <li>Blistering speed</li> <li>Huge paper capacity</li> <li>Colour printing isn't perfect</li> <li>Hefty</li> </ul>	<ul style="list-style-type: none"> <li>Fast mono page churn</li> <li>Modest running costs</li> <li>Ethernet and USB ports</li> <li>Generous paper trays</li> </ul>	<ul style="list-style-type: none"> <li>Exceptional value for money</li> <li>Great connectivity</li> <li>Very low running costs</li> <li>Text not up to laser-quality</li> </ul>	<ul style="list-style-type: none"> <li>Fast for its price</li> <li>Smart Install feature</li> <li>Strong for text</li> <li>Colour costs are high</li> </ul>
FULL REVIEW	TINYURL.COM/6GG9UKV	TINYURL.COM/7QMXVZA	TINYURL.COM/75RB5NZ	TINYURL.COM/C82FY6K	TINYURL.COM/7D366WF

GLOSSARY: • B: mono • C: colour • ppm: pages per minute

## » Buying advice



## Printers

Most printers are inkjet or laser models, and there are colour and mono flavours of each. Lasers tend to be more expensive to buy, but provide better-quality output, particularly where text is involved.

The price you pay in-store is only the beginning; also consider the cost of replenishing the ink and paper. Duplexing lets you print to

both sides of a sheet, saving paper but slowing output.

Multifunction printers can save you money if you also require scanning facilities; some models include copy and fax functions, too.

A USB port lets you connect a printer to a single PC, but built-in wireless networking allows it to join a home or office network.






A memory card slot will let you bypass a PC for printing.

Never trust a manufacturer's claimed print speeds; we run our own tests to properly assess each printer's performance.

High-capacity paper trays and auto document feeders are also worth looking for.

READ MORE: [TINYURL.COM/BUY9QM0](http://TINYURL.COM/BUY9QM0)



Blu-ray drives					
	 1 PC ADVISOR BEST BUY	 2 PC ADVISOR RECOMMENDED	 3 PC ADVISOR RECOMMENDED	 4 PC ADVISOR RECOMMENDED	 5
	<b>LG BE12LU38</b>	<b>LG BH10LS38</b>	<b>Asus SBW-06C1S-U Slim</b>	<b>Lite-On iHBS212</b>	<b>Buffalo BR3D-12U3</b>
Price	£125 inc VAT	£65 inc VAT	£130 inc VAT	£90 inc VAT	£199 inc VAT
Website	Uk.lge.com	Uk.lge.com	Uk.asus.com	Liteonit.eu	Buffalotech.com
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Blu-ray speeds	12x -R, 12x -R DL, 2x -RE, 12x -ROM	10x -R, 8x -R DL, 2x -RE, 10x -ROM	6x -R, 4x -R DL, 2x -RE, 6x -ROM	12x -R, 8x -R DL, 2x -RE, 8x -ROM	12x -R, 12x -R DL, 2x -RE, 8x -ROM
DVD speeds	16x ±R, 8x ±R DL, 6x -RW, 8x +RW, 12x -RAM, 16x -ROM	16x ±R, 8x ±R DL, 6x -RW, 8x +RW, 12x -RAM, 16x -ROM	8x ±R, 6x ±R DL, 6x -RW, 8x +RW, 5x RAM, 8x ROM	16x ±R, 8x ±R DL, 6x -RW, 8x +RW, 12x -RAM, 16x -ROM	16x ±R, 8x ±R DL, 6x -RW, 8x +RW, 5x -RAM, 8x -ROM
Max storage	50GB	50GB	50GB	50GB	50GB
Interface type	USB 2.0, eSATA (external)	SATA (internal)	USB 2.0 (external)	SATA (internal)	USB 3.0 (external)
Label technology	LightScribe	LightScribe	None	LightScribe	None
Software	PowerDVD, PowerProducer	(OEM - add £5 for software)	PowerDVD, PowerProducer	CyberLink Blu-ray Suite	PowerDVD, PowerProducer
Dimensions	163x260x50mm	146x170x41mm	157x142x21mm	146x170x41mm	160x220x50mm
Weight	1.38kg	749g	364g	650g	1.1kg
Warranty	1 year	1 year	2 years	2 years	2 years
Verdict	<ul style="list-style-type: none"> <li>• 12-speed external writer</li> <li>• Stocks now limited</li> <li>• Supports eSATA, USB 2.0</li> <li>• Awkward to carry</li> </ul>	<ul style="list-style-type: none"> <li>• 10-speed internal writer</li> <li>• Attractive front panel</li> <li>• Reliable performance</li> <li>• Very good value</li> </ul>	<ul style="list-style-type: none"> <li>• Super-slim six-speed drive</li> <li>• No power supply required</li> <li>• Portable</li> <li>• Slow but reliable</li> </ul>	<ul style="list-style-type: none"> <li>• 12-speed internal writer</li> <li>• Issues during testing</li> <li>• Noisy during operation</li> <li>• Average with 4x media</li> </ul>	<ul style="list-style-type: none"> <li>• 12-speed external writer</li> <li>• Power supply required</li> <li>• Bulky design</li> <li>• Expensive</li> </ul>
FULL REVIEW	TINYURL.COM/8YVFLFP	TINYURL.COM/8YTUJEF	TINYURL.COM/7S3WPV6	TINYURL.COM/65PXHUJ	TINYURL.COM/453BX7L

Wireless routers					
	 1 PC ADVISOR RECOMMENDED	 2 PC ADVISOR BEST BUY	 3 PC ADVISOR RECOMMENDED	 4	 5
	<b>Cisco Linksys E4200</b>	<b>AVM FritzBox Fon 7390</b>	<b>TP-Link TL-MR3020</b>	<b>DrayTek Vigor 2850Vn</b>	<b>Zyxel NBG4615</b>
Price	£132 inc VAT	£190 inc VAT	£40 inc VAT	£235 inc VAT	£60 inc VAT
Website	Linksysbycisco.com	Fritzbox.eu	Tp-link.com/en	Draytek.com/uk	Zyxel.co.uk
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Standards supported	802.11a/b/g/n	802.11a/b/g/n	802.11b/g/n	802.11a/b/g/n	802.11b/g/n
Frequency modes	2.4GHz/5GHz (dual mode)	2.4GHz/5GHz (non-concurrent)	2.4GHz	2.4GHz/5GHz (non-concurrent)	2.4GHz
WEP/WPA/WPA2	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓
USB port/Network port	✓✓	✓✓	✓✓	✓✓	✓✓
Firewall	NAT/SPI	NAT/SPI	NAT/SPI	NAT/SPI	NAT/SPI
Eco mode	x	x	x	x	✓
Ethernet ports	10/100 WAN, 4x gigabit LAN	4x gigabit LAN	1x 10/100 WAN/LAN	10/100 WAN, 4x gigabit LAN	10/100 WAN, 4x gigabit LAN
Throughput (near/far)	226/92Mbps	92/38Mbps	Not tested	120/111Mbps	94/32Mbps
Dimensions	225x160x25mm	226x160x48mm	74x67x22mm	241x166x44mm	162x106x28mm
Weight	335g	not specified	250g	360g	237g
Warranty	1 year	5 years	3 years	2 years	1 year
Verdict	<ul style="list-style-type: none"> <li>• Excellent wireless performance</li> <li>• Dual-band Wi-Fi</li> <li>• Guest login feature</li> </ul>	<ul style="list-style-type: none"> <li>• Supports landline and internet telephony</li> <li>• Dual-band Wi-Fi</li> <li>• USB port</li> </ul>	<ul style="list-style-type: none"> <li>• Portable 3G router</li> <li>• Tiny and lightweight</li> <li>• Mains-/USB-powered</li> <li>• Reliable performance</li> </ul>	<ul style="list-style-type: none"> <li>• Massive feature set</li> <li>• Good performance</li> <li>• Support for BT VDSL line</li> <li>• Setup process is complex</li> </ul>	<ul style="list-style-type: none"> <li>• Good-value router</li> <li>• Strong Wi-Fi performance</li> <li>• Single-band Wi-Fi</li> <li>• Compact design</li> </ul>
FULL REVIEW	TINYURL.COM/6Z7BDKM	TINYURL.COM/3QUJZBX	TINYURL.COM/85P7R9P	TINYURL.COM/D5QSWB3	TINYURL.COM/6HACKNN

## >> Buying advice



### Blu-ray drives

A single Blu-ray Disc holds the equivalent of 35 CDs or five DVDs. It might look like a DVD, but its shorter wavelength and narrow blue laser beam allow it to hold greater capacity. It's the storage method of choice for HD and 3D video content.

External drives are easier to install, portable, and can be shared

between PCs, but they will cost you considerably more than internal models, and may not be as quick.

If you opt for an internal drive, ensure you have enough space inside your PC. Most internal drives use the SATA interface, so check you've got a compatible port.

Look for a drive that also supports several DVD formats, but don't obsess about write speeds.

You should be able to get 16-speed DVD writing, but it's not worth paying more to save seconds.

You may find that the Blu-ray media currently on the market isn't fast enough to enjoy your chosen drive's maximum write speeds. Six-/eight-speed BD-R capabilities are standard, but even six-speed BD-R media is still rare.

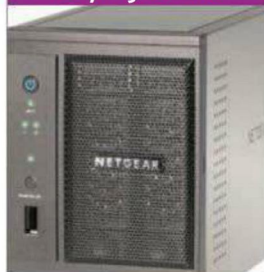
READ MORE: TINYURL.COM/70EPLY6



External hard drives	1	2	3	4	5
	PC ADVISOR BEST BUY	PC ADVISOR GOLD	PC ADVISOR BEST BUY		
	Seagate FreeAgent GoFlex	G-Tech G-Raid Thunderbolt	WD My Passport Studio	Buffalo MiniStation Extreme	lomega Prestige
Price	£190 inc VAT	£720 inc VAT	£140 inc VAT	£110 inc VAT	£100 inc VAT
Website	Seagate.com	G-technology.com	Wdc.com/en	Buffalotech.com	lomega.co.uk
Overall rating	★★★★☆	★★★★★	★★★★★	★★★★☆	★★★★☆
Capacity tested	3TB	8TB	1TB	1TB	1TB
Capacity range	1TB to 3TB	4TB to 8TB	500GB to 1TB	500GB to 1TB	1TB to 2TB
Disk size	3.5in	3.5in	2.5in	2.5in	3.5in
Spin speed	7,200rpm	7,200rpm	5,400rpm	5,400rpm	5,400rpm
Transfer speed	94MBps (USB 3.0)	329MBps	76MBps (FireWire 800)	94MBps (USB 3.0)	94MBps (USB 3.0)
Encryption	192bit	None	256bit	256bit	256bit
Other interfaces	Optional FireWire 800	None	FireWire 800, USB 2.0	None	None
Software	Memo Backup	None	WD utilities	Backup, RAMdisk	lomega Protection Suite
Dimensions	158x124x44mm	235x130x85mm	126x84x22mm	128x89x18mm	188x124x31mm
Weight	1kg	2.3kg	334g	230g	1kg
Warranty	2 years	3 years	3 years	2 years	3 years
Verdict	<ul style="list-style-type: none"> <li>Great speed for USB 3.0</li> <li>Great value for capacity</li> <li>Separate storage drive and USB 3.0 dock</li> </ul>	<ul style="list-style-type: none"> <li>Fast Thunderbolt interface</li> <li>Real-world speed can exceed 200MBps</li> <li>Pricy, but huge capacity</li> </ul>	<ul style="list-style-type: none"> <li>Superbly built</li> <li>FireWire 800 and USB 2.0 interfaces</li> <li>AES encryption</li> </ul>	<ul style="list-style-type: none"> <li>Military-grade rugged design</li> <li>Lightweight 2.5in drive</li> <li>Solid 256bit encryption</li> </ul>	<ul style="list-style-type: none"> <li>Good-value USB 3.0 drive</li> <li>256bit encryption</li> <li>Metal case</li> </ul>
FULL REVIEW	TINYURL.COM/BN2Z92F	TINYURL.COM/CXEF6MH	TINYURL.COM/6FAWBNE	TINYURL.COM/CE4Z9YM	TINYURL.COM/D4KALCW

NAS drives	1	2	3	4	5
	PC ADVISOR BEST BUY	PC ADVISOR RECOMMENDED	PC ADVISOR RECOMMENDED		
	Synology DS412+	Zyxel NSA325	Qnap TS-419P II	Netgear ReadyNAS Pro 6	lomega StorCenter px6-300d
Price	£520 inc VAT (diskless)	£145 inc VAT (diskless)	£492 inc VAT (diskless)	£877 inc VAT (diskless)	£576 inc VAT (diskless)
Website	Synology.com	Zyxel.co.uk	Qnap.com	Netgear.co.uk	Go.iomega.com
Overall rating	★★★★★	★★★★★	★★★★☆	★★★★☆	★★★★☆
Drive bays	4	2	4	6	6
Processor	2.13GHz Intel Atom D2700	1.6GHz processor	2GHz Marvell 88F66282	2.66GHz Intel Pentium	1.8GHz Intel Atom D525
Memory	1GB DDR3	512MB DDR2	512MB DDR3	2GB DDR2	2GB DDR3
Remote access	✓	✓	✓	✓	✓
eSATA	✓	x	✓	x	x
USB port	2x USB 3.0, 1x USB 2.0	2x USB 2.0	4x USB 2.0	2x USB 3.0, 1x USB 2.0	1x USB 3.0, 2x USB 2.0
Raid options	0/1/5/5+s/6/10/JBOD	0/1/JBOD	0/1/5/6/10/JBOD	0/1/5/6/10	0/1/10/5/5+s/6
Software	DSM 4.0	zPilot	TurboNAS 3.6.1	Netgear RAIDiator	EMC LifeLine, lomega Link
Dimensions	165x203x233mm	108x205x147mm	177x180x235mm	170x250x285mm	257x176x270mm
Weight	2kg	1.8kg	3kg	7.3kg	4.9kg
Warranty	2 years	1 year	2 years	5 years	3 years
Verdict	<ul style="list-style-type: none"> <li>Superb read/write performance</li> <li>Powerful options</li> <li>Attractive and intuitive</li> </ul>	<ul style="list-style-type: none"> <li>Cheapest drive here</li> <li>Decent performance and features for the money</li> <li>Complex interface</li> </ul>	<ul style="list-style-type: none"> <li>Well priced</li> <li>Robust cabinet construction</li> <li>Solid performance</li> <li>Old but effective interface</li> </ul>	<ul style="list-style-type: none"> <li>Most expensive NAS here</li> <li>Mostly strong performance</li> <li>Internal power supply</li> <li>Complex admin interface</li> </ul>	<ul style="list-style-type: none"> <li>High-quality construction</li> <li>Features suitable for home and business use</li> <li>Decent performance</li> </ul>
FULL REVIEW	TINYURL.COM/6UUL4DE	TINYURL.COM/7B9EPW8	TINYURL.COM/72N4GBN	TINYURL.COM/84JD226	TINYURL.COM/7AT8HA5

## >> Buying advice



## NAS drives

NAS drives are ideal for businesses or home users who require large amounts of dependable and secure storage, accessible to anyone logged into the local wired or wireless network.

Instead of connecting a hard disk directly to one PC, the NAS is typically connected to a network router. Many NAS drives are

typically supplied without disks, letting you add your own selection.

Most NAS drives allow virtual partitions, letting you keep data such as PC backups separate from media files. Home-oriented NAS drives also include media servers to allow easy streaming of content.

To augment data integrity, access speed, capacity, or all

three, individual hard disks can be combined in a number of Raid configurations. Raid 0 'stripes' data across multiple drives to increase access speeds. Raid 1 mirrors the contents of one drive on to another, providing a cloned backup. Raid 5 is available with three-plus drives and combines both advantages.

READ MORE: [TINYURL.COM/7H3HCNR](http://TINYURL.COM/7H3HCNR)

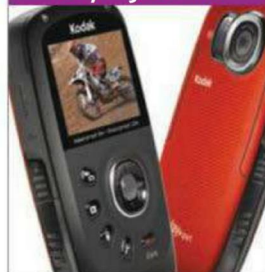


Projectors	 1	 2	 3	 4	 5
	<b>InFocus ScreenPlay SP8600</b>	<b>Vivitek Qumi Q2</b>	<b>Dell M110</b>	<b>NEC NP43</b>	<b>ViewSonic PJD7383i</b>
Price	£685 inc VAT	£435 inc VAT	£400 inc VAT	£610 inc VAT	£1,129 inc VAT
Website	Infocus.com	Vivitek.co.uk	Dell.co.uk	Nec-display-solutions.co.uk	Viewsoniceurope.com/uk
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Projection technology	DLP	DLP	DLP	DLP	DLP
Resolution (pixels)	1920x1080	1280x800	1280x800	1024x768	1024x768
Brightness <sup>1</sup> , Contrast	1,800, 5,000:1	300, 2,500:1	300, 10,000:1	2,300, 1,600:1	3,000, 3,000:1
Image size	300in	30-90in	80in	300in	30-300in
Supported aspect ratios	16:10, 16:9, 4:3	16:10, 16:9, 4:3	16:10, 16:9, 4:3	16:9, 4:3	4:3
Noise levels (dB)	30 (26 eco)	32 (28 eco)	36 (32 eco)	37 (32 eco)	32 (27 eco)
Connections	VGA, HDMI, CM, CP, SV, USB	VGA, HDMI, USB	VGA, HDMI, CM, CP, USB	VGA, SV, USB	VGA, CP, SV, USB
Lamp/lamp life	230W/4,000 hrs	LED/30,000 hrs	LED/10,000 hrs	200W/1,000 hrs	210W/4,000 hrs
Dimensions	326x254x104mm	162x102x32mm	105x104x37mm	246x72x177mm	290x126x254mm
Weight	3.4kg	635g	360g	1.7kg	3.5kg
Warranty	5 years	3 years	2 years	2 years	3 years
Verdict	<ul style="list-style-type: none"> <li>• Smooth video playback</li> <li>• Full-HD resolution</li> <li>• Great contrast levels</li> <li>• Bright, colourful image</li> </ul>	<ul style="list-style-type: none"> <li>• Now fantastic value</li> <li>• Lightest model here</li> <li>• DLP-Link enables 3D display</li> <li>• Exceptional lamp life rating</li> </ul>	<ul style="list-style-type: none"> <li>• Ultra-small and -light</li> <li>• Good colour</li> <li>• Long-life LED lamp</li> <li>• Remote control costs extra</li> </ul>	<ul style="list-style-type: none"> <li>• Portable business model</li> <li>• Strong Auto Focus</li> <li>• Customisable settings</li> <li>• Decent image quality</li> </ul>	<ul style="list-style-type: none"> <li>• Ultra-short throw</li> <li>• Gets very warm in operation</li> <li>• Lacks HDMI and DVI</li> <li>• Creston RoomView software</li> </ul>
FULL REVIEW	TINYURL.COM/3HQANPV	TINYURL.COM/3TXMWPK	TINYURL.COM/77S8D6D	TINYURL.COM/62W3796	TINYURL.COM/3BW7ZZW

<sup>1</sup>Ansi lumens GLOSSARY: • CM: component • CP: composite • SV: S-Video

Digital camcorders	 1	 2	 3	 4	 5
	<b>Kodak PlaySport Zx5</b>	<b>Sony Bloggie Touch MHS-TS20</b>	<b>JVC Everio GZ-HM650</b>	<b>Canon Legria HF R106</b>	<b>Kodak Playfull ZE1</b>
Price	£90 inc VAT	£90 inc VAT	£300 inc VAT	£275 inc VAT	£106 inc VAT
Website	Kodak.co.uk	Sony.co.uk	Jvc.co.uk	Canon.co.uk	Kodak.co.uk
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Maximum resolution	1920x1080	1920x1080	1920x1080	1920x1080	1920x1080
Aspect ratio	16:9	16:9	4:3, 16:9	16:9	16:9
Display	2in	3in	2.7in	2.7in	1.5in
CCD sensor	1/3.2in	1/2.5in	1/4.1in	1/5.5in	1/3.2in
Zoom	4x digital	4x digital	200x digital, 40x optical	80x digital, 20x optical	4x digital
Supported formats	Mpeg4, Jpeg	Mpeg4, Jpeg	Mpeg4, Jpeg	AVCHD, Jpeg	Mpeg4, Jpeg
Storage (media card)	128MB (SD/SDHC)	8GB (SD/MS)	8GB (SD/SDHC/SDXC)	none (SD/SDHC)	128MB (SD/SDHC)
Connections	Micro-HDMI, MicroUSB	HDMI, USB 2.0	HDMI, USB 2.0	HDMI, USB 2.0	Micro-HDMI, MicroUSB
Dimensions	58x112x18mm	47x9x106mm	51x55x111mm	60x64x124mm	42x100x16mm
Weight	125g	125g	195g	319g	95g
Warranty	1 year	1 year	1 year	1 year	1 year
Verdict	<ul style="list-style-type: none"> <li>• Ruggedised design</li> <li>• Comfortable to hold</li> <li>• 2in screen rather small</li> <li>• Takes AAA batteries</li> </ul>	<ul style="list-style-type: none"> <li>• Useful 8GB memory</li> <li>• Awkward to hold</li> <li>• Ideal for video; stills less so</li> <li>• No built-in flash</li> </ul>	<ul style="list-style-type: none"> <li>• Lightweight, easy to use</li> <li>• Excellent 40x optical zoom</li> <li>• 6.5-hour recording memory</li> <li>• Supports 32GB SDXC cards</li> </ul>	<ul style="list-style-type: none"> <li>• Excellent-value HD model</li> <li>• 2.7in flip-out LCD</li> <li>• Smooth 20x optical zoom</li> <li>• Great colour balance</li> </ul>	<ul style="list-style-type: none"> <li>• Simplicity itself to use</li> <li>• One-touch record and share</li> <li>• Tiny LCD</li> <li>• Rather toy-like</li> </ul>
FULL REVIEW	TINYURL.COM/3U3Y2CA	TINYURL.COM/332UOQJ	TINYURL.COM/453U838	TINYURL.COM/2VFVLQX	TINYURL.COM/79HCGJC

## >> Buying advice



### Digital camcorders

The quality varies enormously between low-cost camcorders, and we wouldn't be surprised if your smartphone took better stills and video. Still, it can be useful to have a weather- or waterproof model, or simply something cheap you can take to the beach.

Look for an optical zoom that lets you get closer to the action.

A flip-out LCD will also help you follow the action more easily.

Avoid models that don't support HD. Note that full-HD can refer to 1080i or 1080p, with the latter progressive scan preferable.

If you're paying a little more, look for some kind of image stabilisation feature and more control over your footage. A large






LCD can be useful here, with the more pixels the better.

Video is usually compressed with Mpeg4, and often wrapped in AVCHD. You'll need good software and a powerful PC to edit video.

Save room in your budget for a memory card, as most camcorders have little or no memory built-in.

READ MORE: [TINYURL.COM/7KQNLMB](http://TINYURL.COM/7KQNLMB)



Compact digital cameras	    				
	Nikon Coolpix S9100	Panasonic Lumix DMC-TZ20	Nikon 1 J1	Samsung MV800	Canon PowerShot G12
Price	£200 inc VAT	£180 inc VAT	£380 inc VAT	£170 inc VAT	£400 inc VAT
Website	Nikon.co.uk	Panasonic.co.uk	Nikon.co.uk	Samsung.com/uk	Canon.co.uk
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Megapixel rating	12.1Mp	14.1Mp	10.1Mp	16.2Mp	10Mp
Maximum resolution	4000x3000 pixels	4320x3240 pixels	3872x2592 pixels	4608x3456 pixels	3648x2736 pixels
Optical zoom	18x	16x	3x	5x	5x
Maximum aperture	f3.5-f5.9	f3.3-f5.9	N/A	f3.3-f5.9	f2.8-f4.5
LCD size	3in	2.8in	3in	3in	2.8in
Media card	SD/SDHC	SD/SDHC	SD/SDHC	MicroSD	SD/SDHC
Battery/life	1x lithium-ion/270 shots	1x lithium-ion/260 shots	1x lithium-ion/230 shots	1x lithium-ion/not specified	1x lithium-ion/370 shots
ISO range	160 to 3200	100 to 1600	100 to 3200	125 to 3200	80 to 3200
Dimensions	106x35x62mm	105x33x58mm	106x30x61mm	92x18x56mm	112x48x76mm
Weight	214g	219g	274g	124g	401g
Warranty	2 years	1 year	2 years	2 years	1 year
Verdict	<ul style="list-style-type: none"> <li>• Excellent photo quality</li> <li>• Longest zoom range here</li> <li>• 1920x1080-pixel video</li> <li>• Incredible 240fps slow-mo</li> </ul>	<ul style="list-style-type: none"> <li>• Comprehensive menu</li> <li>• Warm, natural colour range</li> <li>• GPS geotagging support</li> <li>• AVCHD or Mpeg video</li> </ul>	<ul style="list-style-type: none"> <li>• Mirrorless semi-compact</li> <li>• Solid construction</li> <li>• Good range of video modes</li> <li>• Deep colours</li> </ul>	<ul style="list-style-type: none"> <li>• Flip-up touchscreen LCD</li> <li>• Limited 5x optical zoom</li> <li>• Better for video than photos</li> <li>• Great panorama mode</li> </ul>	<ul style="list-style-type: none"> <li>• Comprehensive feature set</li> <li>• High dynamic range setting</li> <li>• Ideal step-up from compacts</li> <li>• Easy to use</li> </ul>
FULL REVIEW	TINYURL.COM/6E457PY	TINYURL.COM/6XNRWUO	TINYURL.COM/7ZC25FY	TINYURL.COM/83SSNQX	TINYURL.COM/4QHAF66

Compact system cameras	    				
	Nikon D5100 (18-55mm)	Panasonic DMC-G3 (14-42mm)	Sony Alpha NEX-5 (18-55mm)	Canon EOS 600D (18-55mm)	Olympus E-PM1 (14-42mm)
Price	£550 inc VAT	£450 inc VAT	£510 inc VAT	£600 inc VAT	£390 inc VAT
Website	Nikon.co.uk	Panasonic.co.uk	Sony.co.uk	Canon.co.uk	Olympus.co.uk
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Megapixel rating	16.2Mp	16Mp	14.6Mp	18Mp	12.3Mp
Maximum resolution	4923x3264 pixels	4592x3448 pixels	4592x3056 pixels	5184x3456 pixels	4032x3024 pixels
Optical zoom	3x	3x	3.1x	3x	3x
Maximum aperture	f3.5-f5.6	f3.5-f5.6	f3.5-f5.6	f3.5-f5.6	f3.5-f5.6
LCD size	3in	3in	3in	3in	3in
Media card	SD/SDHC/SDXC	SD/SDHC/SDXC	MS/SD/SDHC	SD/SDHC/SDXC	SD/SDHC/SDXC
Battery/life	1x lithium-ion/660 shots	1x lithium-ion/270 shots	1x lithium-ion/not specified	1x lithium-ion/440 shots	1x lithium-ion/330 shots
ISO range	100 to 6400	100 to 6400	200 to 12800	100 to 6400	200 to 12800
Dimensions	124x97x79mm	115x84x47mm	111x59x38mm	133x100x80mm	110x64x34mm
Weight	510g	336g	229g	570g	217g
Warranty	3 years	3 years	1 year	1 year	2 years
Verdict	<ul style="list-style-type: none"> <li>• Excellent stills and video</li> <li>• Suitable for novice and intermediate photographers</li> <li>• Plenty of lenses available</li> </ul>	<ul style="list-style-type: none"> <li>• Great dSLR alternative</li> <li>• Rotating touchscreen</li> <li>• Strong video-capture mode</li> <li>• Very fast autofocus</li> </ul>	<ul style="list-style-type: none"> <li>• Compact</li> <li>• Great performance</li> <li>• Great colour fidelity</li> <li>• Takes clean, sharp shots</li> </ul>	<ul style="list-style-type: none"> <li>• Top-notch photo results</li> <li>• Fully auto/manual modes</li> <li>• Articulated LCD screen</li> <li>• Strong video capture</li> </ul>	<ul style="list-style-type: none"> <li>• Compact camera</li> <li>• Likable art filter modes</li> <li>• High ISO suffers noise</li> <li>• No built-in flash or EVF</li> </ul>
FULL REVIEW	TINYURL.COM/6UTE9KK	TINYURL.COM/7JCXJCR	TINYURL.COM/37XOZX5	TINYURL.COM/72STE88	TINYURL.COM/BLMYMJW

## >> Buying advice



### Compact digital cameras

Compact cameras are available for as little as £50. Budget models don't necessarily entail reduced image quality, but they do tend to offer fewer features.

The sweet spot is around £120. At this price you should expect great photo and video quality, but not much in the way of manual control, such as depth-of-field.

It's not uncommon to find 14Mp-plus compacts for less than £100, but cramming so many pixels into a small sensor means less light falls on to each receptor. The ISO is increased to compensate for dim lighting, which can result in noisy (grainy) images.

A large 3in LCD screen is useful for image composition and review; a viewfinder is also useful in bright





sunlight. Look for a minimum 260,000-dot screen resolution.






The optical zoom is more important than a camera's digital equivalent, which merely crops in on images. Most compact cameras have a small optical zoom.

Be sure to include a memory card in your budget. Note that not all cameras support SDXC cards.

**READ MORE:** [TINYURL.COM/7Z0S7LP](http://tinyurl.com/7Z0S7LP)



Sub-£150 graphics cards	    				
	1	2	3	4	5
	MSI HD 6850	Sapphire Radeon HD 7750	PowerColor Radeon HD 6790	HIS Radeon HD 6770 IceQ X	Asus Radeon HD 6670
Price	£100 inc VAT	£85 inc VAT	£90 inc VAT	£99 inc VAT	£60 inc VAT
Website	Uk.msi.com	Sapphiretech.com	Powercolor.com	Hisdigital.com	Uk.asus.com
Overall rating	★★★★★	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Graphics processor	AMD Radeon HD 6850	AMD Radeon HD 7750	AMD Radeon HD 6790	AMD Radeon HD 6770	AMD Radeon HD 6670
Installed RAM	1GB GDDR5	1GB GDDR5	1GB GDDR5	1GB GDDR5	1GB DDR3
Memory interface	256bit	128bit	256bit	128bit	128bit
Core/memory clock	775MHz/1GHz	800MHz/1,125MHz	840MHz/1,050MHz	850MHz/1.2GHz	800MHz/900MHz
Ramdac	400MHz	400MHz	400MHz	400MHz	400MHz
Stream processors	960	512	800	800	480
Power connectors	1x 6-pin	None	2x 6-pin	1x 6-pin	None
Interface	PCI Express	PCI Express	PCI Express	PCI Express	PCI Express
DirectX	11.0	11.0	11.0	11.0	11.0
Digital interface	DVI, HDMI, DisplayPort	DVI, HDMI, DisplayPort	2x DVI, HDMI, DisplayPort	DVI, HDMI, DisplayPort	DVI, HDMI
Warranty	3 years	2 years	2 years	2 years	3 years
Verdict	<ul style="list-style-type: none"> <li>The best 6850 available</li> <li>Powerful card for the price</li> <li>Good memory bandwidth</li> <li>256bit memory interface</li> </ul>	<ul style="list-style-type: none"> <li>Better value for money than the 6790 and 6770</li> <li>Uses some 7970 architecture</li> <li>Light on power</li> </ul>	<ul style="list-style-type: none"> <li>Playable framerates</li> <li>Strong memory bandwidth</li> <li>6800-series cards faster</li> <li>256bit memory interface</li> </ul>	<ul style="list-style-type: none"> <li>1GB DDR5 video card</li> <li>128bit interface cuts speed</li> <li>Not very power-hungry</li> <li>6790 card is better value</li> </ul>	<ul style="list-style-type: none"> <li>Great-value video card</li> <li>800MHz core clock memory</li> <li>128bit memory limits appeal</li> <li>6570 card is a better deal</li> </ul>
FULL REVIEW	TINYURL.COM/3XRUQW5	TINYURL.COM/7ZB5OE3	TINYURL.COM/6P9B7KZ	TINYURL.COM/6FEQ6AP	TINYURL.COM/3LM8HGE

£151+ graphics cards	    				
	1	2	3	4	5
	nVidia GeForce GTX 670	Zotac GeForce GTX 680	XFX 7970 3GB GDDR5	Asus HD 7870 DirectCU II	Zotac GeForce GTX 570
Price	£330 inc VAT	£450 inc VAT	£410 inc VAT	£280 inc VAT	£270 inc VAT
Website	Nvidia.com	Zotac.com	Xfxforce.com	Uk.asus.com	Zotac.com
Overall rating	★★★★★	★★★★★	★★★★☆	★★★★☆	★★★★★
Graphics processor	nVidia GeForce GTX 670	nVidia GeForce GTX 680	AMD Radeon HD 7970	AMD Radeon HD 7870	nVidia GeForce GTX 570
Installed RAM	2GB GDDR5	2GB GDDR5	3GB GDDR5	2GB GDDR5	1,280MB GDDR5
Memory interface	256bit	256bit	284bit	256bit	320bit
Core/memory clock	915MHz/1,502MHz	1,006MHz/1,502MHz	925MHz/1,375MHz	1010MHz/1210MHz	732MHz/950MHz
Ramdac	400MHz	400MHz	400MHz	400MHz	400MHz
Stream processors	1,344	1,536	2,048	1,280	480
Power connectors	2x 6-pin	2x 6-pin	1x 6-pin, 1x 8-pin	2x 6-pin	2x 6-pin
Interface	PCI Express	PCI Express	PCI Express	PCI Express	PCI Express
DirectX	11.0	11.0	11.1	11.1	11.0
Digital interface	2x DVI, HDMI, DisplayPort	2x DVI, HDMI, DisplayPort	DVI, HDMI, 2x Mini-DisplayPort	DVI, HDMI, 2x Mini-DP	2x DVI, Mini-HDMI
Warranty	2 years	5 years	2 years	2 years	2 years
Verdict	<ul style="list-style-type: none"> <li>Almost on a par with 7970</li> <li>Low power consumption</li> <li>Same memory bandwidth as GTX 680</li> </ul>	<ul style="list-style-type: none"> <li>Fastest single-GPU card</li> <li>Low power consumption</li> <li>Better value than HD 7970</li> <li>Low on RAM</li> </ul>	<ul style="list-style-type: none"> <li>Good performance</li> <li>Not as powerful or as efficient as GTX 680</li> <li>Better value than HD 7870</li> </ul>	<ul style="list-style-type: none"> <li>Affordably priced</li> <li>Cheaper than GTX 670, but behind on framerates</li> <li>Modest power consumption</li> </ul>	<ul style="list-style-type: none"> <li>Now looking dated next to the GTX 670</li> <li>Impressive detail rendering</li> <li>320bit memory interface</li> </ul>
FULL REVIEW	TINYURL.COM/CRDW78J	TINYURL.COM/C6C37QO	TINYURL.COM/6UZRVXC	TINYURL.COM/BUFMAFF	TINYURL.COM/3UB8U3G

## >> Buying advice



## Graphics cards

The key feature of a graphics card is its GPU. Produced by AMD or nVidia, this determines the quality of images displayed and their refresh speed. The more powerful the GPU the better, but you can get away with a lesser card by turning down a game's detail levels.

Even those on a budget should be able to get at least 1GB of DDR

video memory. Look for GDDR5 rather than GDDR3 RAM. This in effect quadruples the clock speed (GDDR3 merely doubles it).

The memory interface (or bus) governs how much data can be sent at once, so a 256bit interface lets through twice as much data as a 128bit interface. Graphics cards with the best combination of memory interface size and

clock speed should produce the best performance.

DirectX 11.x support is required for advanced, modern games; cheaper cards lack the firepower to do such titles justice, however.

Check that a card will fit inside your PC and you have sufficient connections from the power supply unit before you buy.

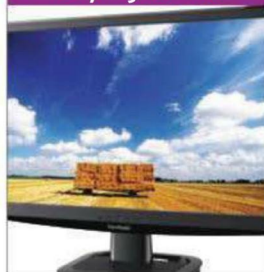
READ MORE: TINYURL.COM/7BPUHQE



Sub-£200 flat-panels	1	2	3	4	5
	Viewsonic VX2336s-LED	AOC i2352Vh	AOC i2353Fh	Hanns-G HL249DPB	Iiyama ProLite XB2472HD
Price	£132 inc VAT	£139 inc VAT	£145 inc VAT	£119 inc VAT	£190 inc VAT
Website	Viewsoniceurope.com	Aoc-europe.com	Aoc-europe.com	Hannsg.com	Iiyama.co.uk
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Screen size	23in	23in	23in	23.6in	24in
Panel type	In-plane switching	In-plane switching	In-plane switching 3D	Twisted nematic	Vertical alignment
Native resolution	1920x1080 pixels	1920x1080 pixels	1920x1080 pixels	1920x1080 pixels	1920x1080 pixels
Pixel pitch	0.27mm	0.27mm	0.27mm	0.27mm	0.28mm
Brightness	233cd/m²	258cd/m²	225cd/m²	247cd/m²	Not measured
Static contrast ratio	710:1	731:1	666:1	740:1	Not measured
Response time	14ms	5ms	5ms	5ms	8ms
Digital connector	DVI	DVI, HDMI, VGA	2x HDMI, VGA	DVI	DVI, HDMI
Dimensions	548x426x201mm	247x185x399mm	550x388x188mm	563x211x403mm	570x215x438mm
Weight	3.6kg	3.2kg	5.6kg	3.8kg	6.2kg
Warranty	3 years	3 years	3 years	3 years	3 years
Verdict	<ul style="list-style-type: none"> <li>• Excellent value IPS panel</li> <li>• Strong image quality</li> <li>• No HDMI or speakers</li> <li>• Slow response rate</li> </ul>	<ul style="list-style-type: none"> <li>• Good value IPS panel</li> <li>• Accurate colours</li> <li>• Plain styling</li> <li>• Few extras</li> </ul>	<ul style="list-style-type: none"> <li>• Wide viewing angles</li> <li>• Excellent colours</li> <li>• Attractive, slimline design</li> <li>• No DVI connection</li> </ul>	<ul style="list-style-type: none"> <li>• Extremely low price</li> <li>• Pleasing image quality</li> <li>• Low power consumption</li> <li>• Only a TN panel</li> </ul>	<ul style="list-style-type: none"> <li>• Wonderful 24bit colour reproduction</li> <li>• Viewing angles not great</li> <li>• Height-adjustable stand</li> </ul>
FULL REVIEW	TINYURL.COM/86JF4W2	TINYURL.COM/7HXTVPV	TINYURL.COM/7TWLB2A	TINYURL.COM/C95859A	TINYURL.COM/3DYX75Z

£200+ flat-panels	1	2	3	4	5
	ViewSonic VP2365-LED	Philips Brilliance 241P4QPYES	Acer V273HL	NEC MultiSync EA232WMI	ViewSonic VP2765-LED
Price	£205 inc VAT	£250 inc VAT	£220 inc VAT	£246 inc VAT	£360 inc VAT
Website	Viewsoniceurope.com/uk	Philips.co.uk	Acer.co.uk	Nec-display-solutions.co.uk	Viewsoniceurope.com/uk
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Screen size	23in	24in	27in	23in	27in
Panel type	In-plane switching	Advanced MVA	Twisted nematic	In-plane switching	Advanced MVA
Native resolution	1920x1080 pixels	1920x1080 pixels	1920x1080 pixels	1920x1080 pixels	1920x1080 pixels
Pixel pitch	0.27mm	0.28mm	0.31mm	0.27mm	0.31mm
Brightness	238cd/m²	299cd/m²	315cd/m²	Not measured	1,200cd/m²
Static contrast ratio	681:1	1,691:1	850:1	Not measured	378:1
Response time	6ms	12s	5ms	14ms	25ms
Digital connector	DVI	DVI, DisplayPort	DVI, HDMI	DVI, DisplayPort	DVI, DisplayPort
Dimensions	548x433x250mm	565x220x395-518mm	644x445x195mm	550x220x379mm	642x365x474-608mm
Weight	5.4kg	5.9kg	6.9kg	5.8kg	8.5kg
Warranty	3 years	3 years	3 years	3 years	3 years
Verdict	<ul style="list-style-type: none"> <li>• Premium IPS panel</li> <li>• Superb colour reproduction</li> <li>• Wide viewing angles</li> <li>• DVI port only</li> </ul>	<ul style="list-style-type: none"> <li>• Very strong image quality</li> <li>• Excellent viewing angles</li> <li>• Rotate, height adjustability</li> <li>• Four-port USB hub</li> </ul>	<ul style="list-style-type: none"> <li>• Large screen for the money</li> <li>• Average viewing angles</li> <li>• Reasonable colour quality</li> <li>• Functionality over style</li> </ul>	<ul style="list-style-type: none"> <li>• High-calibre IPS screen</li> <li>• Impressive colour depth</li> <li>• Poor 14ms response rate</li> <li>• Height/tilt-adjustable stand</li> </ul>	<ul style="list-style-type: none"> <li>• Large 27in display</li> <li>• Low resolution for size</li> <li>• Poor viewing angles</li> <li>• Slow response for games</li> </ul>
FULL REVIEW	TINYURL.COM/5WMJLR9	TINYURL.COM/6VVODAP	TINYURL.COM/7J3N055	TINYURL.COM/4CQGNVW	TINYURL.COM/86T3PFM

## >> Buying advice



### Flat-panel displays

You'll spend most of your working day staring at the screen, so it makes sense to choose one that's comfortable to view.

The panel size will largely depend on your budget and amount of desk space, but those measuring 22in and above tend to offer a full-HD resolution. All but the cheapest models also have at

least one digital interface (DVI, HDMI or DisplayPort). VGA (or D-Sub) is an analogue interface, and won't provide as clean a signal.

The panel technology is important. Twisted nematic (TN) is the budget option, offering fast response times but limited viewing angles. Multiple vertical alignment (MVA) and patterned vertical alignment (PVA) screens offer

better viewing angles and higher contrast ratios than TN, but slower response times. Advanced MVA screens are more responsive.

In-plane switching (IPS) panels offer excellent viewing angles, contrast and colour accuracy, but they can be rather pricey.

Get a matt rather than gloss coating for fewer reflections.

READ MORE: [TINYURL.COM/6RMBVR6](http://TINYURL.COM/6RMBVR6)





JIM MARTIN

## Could you switch to Windows Phone?

Buying apps for your smartphone ties you to the operating system in a similar way to camera lenses for a particular SLR system. With Windows Phone struggling to compete with iOS and Android, Microsoft needs more incentives to entice users to switch.

Back in the day, people thought nothing of upgrading their handset at the end of a mobile phone contract. Typically, the operator would offer a selection of phones that were free if you took out another contract.

Few people were loyal to a certain brand or operating system. It hardly mattered whether you had a Nokia handset running Symbian or a Sony Ericsson running Java - they all had the same limited functions.



### Why not offer Android and iPhone users a rebate?



Switching handsets involved little more than swapping over the SIM and importing your contacts into the new phone's memory. You then picked a ringtone and were good to go.

These days, things are a lot more complicated. Not only do we store more information on our smartphones, but we're tied to the operating system by the apps we use every day. From Angry Birds to commuting tools, apps are almost a minimum requirement when choosing a new phone.

There's some crossover between Google Play and Apple's App Store, so it's possible to switch between Android and iOS relatively painlessly. You'll have to buy the same apps again, however, since a licence for one platform doesn't cover the other.

Switching from Android or iOS to Windows Phone is an entirely different matter, with far fewer quality apps available for the platform. Developers tend to release an iOS app first, then one for Android, and then they might



consider Windows Phone. It's never Windows Phone first.

The availability of top-tier apps for Windows Phone is getting better, with Facebook, Twitter, eBay, Amazon and Skype all present in the Windows Marketplace. They need to improve in quality - the Twitter app has a 2.5-star average rating - but things are moving in the right direction.

How do you persuade more people to buy a Windows Phone, though? Not only is there little incentive for developers to produce Windows Phone apps, there's nothing to persuade the average punter to opt for a Lumia 900 over the Samsung Galaxy S III or iPhone 4S - all cost roughly the same over a 24-month contract.

It's harder still to tempt existing Android or iPhone owners, who will have to forfeit all their paid-for apps.

The Carphone Warehouse is on the right track by offering a £40 app voucher and some Monster headphones when you buy a Lumia 800 or 900, but this sort of deal needs to be universal, across all retailers and Windows Phones.

Plus, since Windows Phone apps tend to be more expensive, the voucher needs to be more generous.

With the next version of Windows Phone - Apollo - just around the corner, we have high hopes that it will rival iOS 5.1 and Android 4.0 Ice Cream Sandwich. But until there's a greater incentive to commit to Windows Phone, it won't cause Google and Apple to lose much sleep. ☒

## >> Next issue

ISSUE 207 ON SALE 9 AUGUST 2012



### Gaming PCs

PCs can be an awful lot of fun, especially if you've got the processing firepower to keep up with your favourite shoot-'em-up. We test the latest rigs specifically aimed at gaming excellence.



### 3DTVs round-up

Now's a great time to replace your old telly with a 3DTV. There's more 3D content around than ever, and prices are falling. We review six of the latest models.

### Delete and recover data

We show you how to securely delete your private data before selling or disposing of your old PC. We'll also explain how to recover accidentally deleted files.

### The personalised internet

Web searches are filtered to show you only the information you want to see. We investigate what's happening and explain why it may not be a good thing.

### Time-saving tips

From Windows and Microsoft Office shortcuts to power searching in Google and Gmail, we reveal scores of expert tips to make you more productive.



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### PALICOMP Alpha Detonator

★★★★★

£1,300 inc VAT

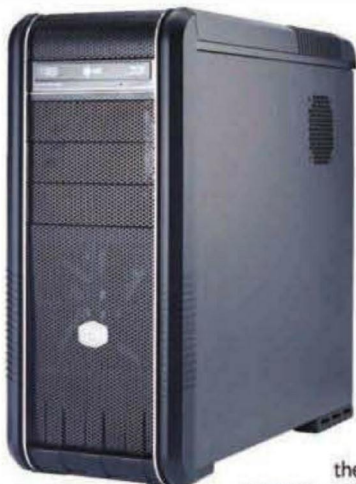
From Palicomp 01270 898104

Palicomp's Alpha Detonator is the first PC we've seen with one of Intel's third-generation Core 'Ivy Bridge' processors (see *What's New Components*, page 53). At £1,300 without a monitor, keyboard or mouse, this system is around twice the price of most Core i5-based gaming PCs. However, the high price is due to more than just the processor; this PC has an impressive specification all round.

Intel's Core i5-3570K processor is the natural successor to our beloved i5-2500K chip. In this PC, the processor has been overclocked to 4.7GHz from its native 3.4GHz, and it's a strong performer. The PC scored 153 overall in our 2D application benchmarks, making it even faster than the PCs we've seen with overclocked Core i5-2500K processors, which have scored around 140.

The graphics card is Nvidia's latest – a 2GB Nvidia GeForce GTX 680. It's massively powerful and typically costs around £400, which goes some way towards explaining the PC's high price. Its performance is certainly up to scratch, with frame rates of 116fps in *Dirt 3* and 50.5fps in *Crysis 2*, both at 1,920x1,080 and with Ultra detail levels. That's staggering by any definition.

The Detonator has a 2TB hard disk for storage and a 120GB SSD for the operating system to increase boot speeds, plus a Blu-ray reader/DVD re-writer. That's a lot of storage space, but there's room for even more in the three vacant 5¼in drive bays and four spare 3½in bays. The Gigabyte Z77X-D3H motherboard



has four SATA3 and four SATA2 ports, only three of which are in use. There's plenty of room for expansion cards, too. Although one PCI-E x1 slot is blocked by the graphics card, two more are accessible, as well as a pair of PCI-E x16 slots – which actually run at x8 and x4 respectively – and a PCI slot. All four memory slots are occupied, but the system's 16GB of 1,600MHz RAM should be enough for anybody. The PC has a good selection of rear ports, with six USB3 ports, two USB ports, a PS/2 port and 5.1 analogue and optical S/PDIF audio outputs. The case also has an extra external bay for a SATA drive on top, with two USB and two USB3 ports alongside it.

This is a phenomenally powerful gaming PC, but it's also very expensive for a base unit. Despite the brand-new processor – which turns out to be a minor upgrade over the powerful Core i5-2500K when

overclocked, rather than an epic game-changer – the graphics card is the real star. Gamers who want to be at the cutting-edge of technology will do well with this system and it's reasonably priced for what it is. However, unless you have a burning desire to own a PC that's more powerful than any current software or game really needs, you're better off spending less money on a full system such as Palicomp's Phoenix i5 Shinobi (*What's New, Shopper* 287), which costs £300 less and comes with a monitor, speakers and peripherals.

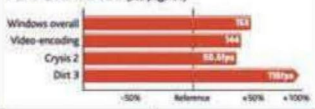
Kat Orphanides

#### SUMMARY

**VERDICT** A powerhouse of a PC, but most users don't need this much power

**DESKTOP PC** Intel Core i5-3570K, 16GB RAM, 120GB+2TB hard disk, 2GB Nvidia GeForce GTX 680, DVD+/-RW +/-DL, BD-ROM, Windows 7 Home Premium 64-bit, 495x210x525mm, three-year RTB warranty  
**POWER CONSUMPTION** 3W standby, 109W idle, 270W active  
**PART CODE** IVY1  
**DETAILS** [www.palicomp.co.uk](http://www.palicomp.co.uk)

#### PERFORMANCE (see page 64)



## Alpha Detonator Price = £1299.99 Code = IVY1

### CPU UPGRADE

FROM Ivy Bridge i5 3570K  
TO Ivy Bridge i7 3770K  
**£95 Inc Vat**

### RAM UPGRADE

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AOC 22" DVI, LED @ **£110**  
ASUS 22" HDMI, LED @ **£140**  
HKC 24" DVI, LED @ **£120**  
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ASUS 27" HDMI, LED @ **£230**

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ASUS P8Z77-V LX  
8GB DDR3 1600Mhz  
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**CPU BUNDLE 4**  
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Overclocked To 4.4Ghz  
ThermalTake Contac29  
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