1a $t = 2{,}5 \Rightarrow d = -10 \times 2{,}5 + 46 = 21$ (m).

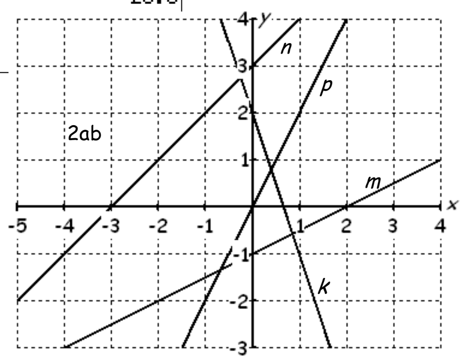
```
-10*2.5+46
                21
-10*1.75+46
              28.5
```

1b 1 minuut en 45 seconden geeft $t = 1{,}75 \Rightarrow d = -10 \times 1{,}75 + 46 = 28{,}5$ (m).

1c Per minuut wordt de diepte 10 meter minder.
Aan het begin van het opstijgen is Leon op een diepte van 46 meter.

1d $d = 0$ geeft $0 = -10t + 46$
$10t = 46$
$t = 4{,}6$ (minuten). Dus na 276 seconden.

```
46/10
               4.6
Ans*60
               276
```




2a Lijn $k$:

| $x$ | 0 | 1 |
|---|---|---|
| $y$ | 2 | -1 |

Lijn $m$:

| $x$ | 0 | 2 |
|---|---|---|
| $y$ | -1 | 0 |

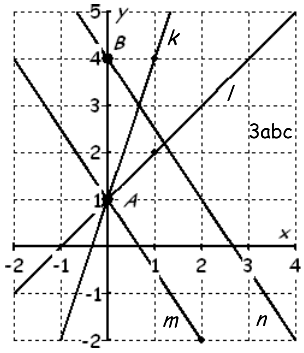
Lijn $n$:

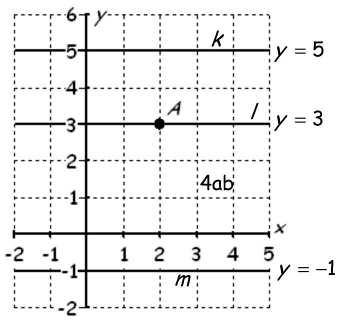
| $x$ | 0 | 1 |
|---|---|---|
| $y$ | 3 | 4 |

Lijn $p$:

| $x$ | 0 | 1 |
|---|---|---|
| $y$ | 0 | 2 |

2b $rc_k = -3$ $rc_m = 0{,}5$ $rc_n = 1$ $rc_p = 2$.



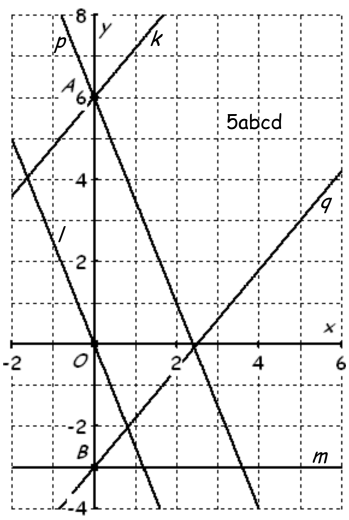

3a Zie de grafieken van de lijnen $k$, $l$ en $m$ hiernaast.

3b $k$: $y = 3x + 1$ $l$: $y = x + 1$ en $m$: $y = -1{,}5x + 1$.

3c Zie de grafiek van $n$ door $B(0, 4)$ met $rc_n = rc_m = -1{,}5$.
De formule van $n$ is: $y = -1{,}5x + 4$.

4a Zie de grafiek van de lijn $l$ door $A(2, 3)$ met $rc_l = 0$.

4b Zie de grafieken van $k$: $y = 5$ en $m$: $y = -1$ hiernaast.

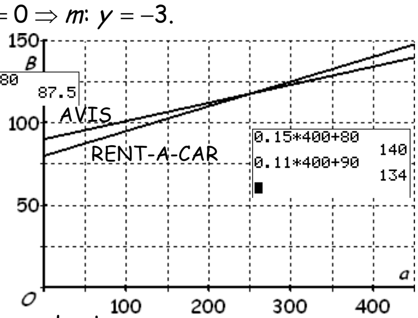



5a Zie de lijnen $p$: $y = -2{,}5x + 6$ en $q$: $y = 1{,}2x - 3$.

5b Zie de grafiek van $k$ door $A(0, 6)$ met $rc_k = rc_q = 1{,}2 \Rightarrow k$: $y = 1{,}2x + 6$.

5c Zie de grafiek van $l$ door $O(0, 0)$ met $rc_l = rc_p = -2{,}5 \Rightarrow l$: $y = -2{,}5x$.

5d Zie de grafiek van $m$ door $B(0, -3)$ met $rc_m = 0 \Rightarrow m$: $y = -3$.




6a $a = 50 \Rightarrow B = 0{,}15 \cdot 50 + 80 = 87{,}50$ (€).

```
0.15*50+80
              87.5
```

6b Bij $y = ax + b$ is de $x$-as de horizontale as.
(dus bij $B = 0{,}15a + 80$ is de $a$-as de horizontale as)

6c Zie de grafiek hiernaast ($a = 400 \Rightarrow B = 140$ ).
$a \geq 0$. (het aantal gereden km is nooit negatief)

6d 0,15 geeft de prijs per gereden km.
80 geeft het vaste bedrag aan. Dit bedrag moet je betalen onafhankelijk van het aantal gereden km.

6e Zie de grafiek van AVIS hierboven ($a = 400 \Rightarrow B = 0{,}11 \cdot 400 + 90 = 134$ ).

6f $a = 150 \Rightarrow B_{RENT\text{-}A\text{-}CAR} = 0{,}15 \cdot 150 + 80 = 102{,}50$ (€).
$a = 150 \Rightarrow B_{AVIS} = 0{,}11 \cdot 150 + 90 = 106{,}50$ (€). Het verschil is 4 euro.

```
0.15*150+80
             102.5
0.11*150+90
             106.5
```

6g $0{,}15a + 80 = 0{,}11a + 90 \Rightarrow 0{,}04a = 10 \Rightarrow a = \frac{10}{0{,}04} = 250$. Dus vanaf 250 km is AVIS voordeliger.

```
0.15-0.11
               .04
90-80
                10
10/0.04
               250
```

7a $h = -10t + 180$. ($h$ in cm en $t$ in minuten)

7b $l = -5t + 25$. ($l$ in cm en $t$ in uren)

7c $B = 15n + 40$. ($B$ in euro's en $n$ in dagen)

8 Per minuut komt het water 3 cm hoger te staan, dus $rc = 3$.
$\left.\begin{array}{l} h = 3t + b \\ \text{door } (18, 70) \end{array}\right\} \Rightarrow 70 = 3 \cdot 18 + b \Rightarrow b = 70 - 3 \cdot 18 = 16.$
Dus de gevraagde formule is: $h = 3t + 16$.

```
3*18
                54
70-54
                16
```

9a $L = 0{,}125t + 163$. (1,63 m = 163 cm en 1,25 mm = 0,125 cm)

9b $0{,}125t + 163 = 168 \Rightarrow 0{,}125t = 5 \Rightarrow t = \frac{5}{0{,}125} = 40$.
Dus in $1900 + 40 = 1940$.

```
168-163
                 5
5/0.125
                40
```

10a $l$: $y = ax + b$ met $a = \text{rc}_l = -2$.

$\left.\begin{array}{l} l\text{: } y = -2x + b \\ \text{door } A(-2, 3) \end{array}\right\} \Rightarrow 3 = -2 \cdot -2 + b$

$3 = 4 + b$

$-1 = b$. Dus $l$: $y = -2x - 1$.

10b $k$: $y = ax + b$ met $a = \text{rc}_k = \text{rc}_m = 4$.

$\left.\begin{array}{l} k\text{: } y = 4x + b \\ \text{door } B(-5, 21) \end{array}\right\} \Rightarrow 21 = 4 \cdot -5 + b$

$21 = -20 + b$

$41 = b$. Dus $k$: $y = 4x + 41$.

11a $p$: $y = ax + b$ met $a = \text{rc}_p = \text{rc}_q = -\frac{1}{3}$.

$\left.\begin{array}{l} p\text{: } y = -\frac{1}{3}x + b \\ \text{door } C(-18, 30) \end{array}\right\} \Rightarrow 30 = -\frac{1}{3} \cdot -18 + b$

$30 = 6 + b$

$24 = b$. Dus $p$: $y = -\frac{1}{3}x + 24$.

11b Snijden met de $x$-as ($y = 0$).

$-\frac{1}{3}x + 24 = 0$

$-\frac{1}{3}x = -24$

$x = 72$.

Dus $R(72, 0)$.

```
0-24
                -24
Ans/(-1/3)
                 72
```

Snijden met de $y$-as ($x = 0$).

$y = -\frac{1}{3} \cdot 0 + 24 = 24$

$S(0, 24)$.

12a $n$: $y = ax + b$ met $a = \text{rc}_n = \text{rc}_p = -2{,}5$.

$\left.\begin{array}{l} n\text{: } y = -2{,}5x + b \\ \text{door } A(18, 50) \end{array}\right\} \Rightarrow 50 = -2{,}5 \cdot 18 + b$

```
50+2.5*18
                 95
```

$95 = b$. Dus $n$: $y = -2{,}5x + 95$.

12b Snijden met de $x$-as ($y = 0$) $\Rightarrow$

$-2{,}5x + 95 = 0 \Rightarrow -2{,}5x = -95 \Rightarrow x = 38$. Dus $P(38, 0)$.

Snijden met de $y$-as ($x = 0$) $\Rightarrow y = -2{,}5 \cdot 0 + 95 = 95$. Dus $Q(0, 95)$.

```
-95/-2.5
                 38
```

12c $x_R = -20 \Rightarrow y_R = -2{,}5 \cdot -20 + 95 = 145$.

```
-2.5*-20+95
                145
```

12d $-2{,}5x + 95 = 45 \Rightarrow -2{,}5x = -50 \Rightarrow x = x_S = 20$.

```
45-95
                -50
Ans/-2.5
                 20
```

13 Invullen van $x = 8$ geeft $3x - 27 = 3 \cdot 8 - 27 = 24 - 27 = -3$ en $5 - x = 5 - 8 = -3$.
Dus Roland heeft gelijk.

```
3*8-27
                 -3
5-8
                 -3
```

14a $5x - 3 = -12$

$5x = -9$

$x = \frac{-9}{5} = \frac{-18}{10} = -1{,}8$.

```
-12+3
                 -9
Ans/5
               -1.8
```

14b $5x + 12 = 3x$

$2x = -12$

$x = \frac{-12}{2} = -6$.

```
5-3
                  2
-12/2
                 -6
```

14c $7x - 8 = 3x - 20$

$4x = -12$

$x = \frac{-12}{4} = -3$.

```
7-3
                  4
-20+8
                -12
Ans/4
                 -3
```

14d $1{,}8x + 0{,}6 = -1{,}2x + 3$

$3x = 2{,}4$

$x = \frac{2{,}4}{3} = 0{,}8$.

```
1.8+1.2
                  3
3-0.6
                2.4
Ans/3
                 .8
```

14e $2(x - 6) = 5 - 3x$

$2x - 12 = 5 - 3x$

$5x = 17 \Rightarrow x = \frac{17}{5} = \frac{34}{10} = 3{,}4$.

```
2+3
                  5
5+12
                 17
Ans/5
                3.4
```

14f $17(2x - 3) - 12x = 8 - (x - 10)$

$34x - 51 - 12x = 8 - x + 10$

$23x = 69 \Rightarrow x = \frac{69}{23} = 3$.

```
34-12+1
                 23
8+10+51
                 69
Ans/23
                  3
```

15a $-0{,}8x + 3 = 1{,}7x - 4{,}25$

$-2{,}5x = -7{,}25$

$x = \frac{-7{,}25}{-2{,}5} = 2{,}9$ en

$y = -0{,}8 \cdot 2{,}9 + 3 = 0{,}68$.

Dus $S(2{,}9;\ 0{,}68)$.

```
-0.8-1.7
               -2.5
-4.25-3
              -7.25
Ans/-2.5
                2.9
-0.8*Ans+3
```

15b Snijden met de $x$-as ($y = 0$)

$-0{,}8x + 3 = 0$

$-0{,}8x = -3$

$x = \frac{-3}{-0{,}8} = 3{,}75$.

Dus $A(3{,}75;\ 0)$.

```
0-3
                 -3
Ans/-0.8
               3.75
```

15c Snijden met de $x$-as ($y = 0$).

$1{,}7x - 4{,}25 = 0$

$1{,}7x = 4{,}25$

$x = \frac{4{,}25}{1{,}7} = 2{,}5$.

Dus $B(2{,}5;\ 0)$.

```
0+4.25
               4.25
Ans/1.7
                2.5
```

16a $-1{,}8x + 6 = 1{,}2x + 3{,}6$

$-3x = -2{,}4$

$x = \frac{-2{,}4}{-3} = 0{,}8$ en

$y = -1{,}8 \cdot 0{,}8 + 6 = 4{,}56$.

Dus $S(0{,}8;\ 4{,}56)$.

```
-1.8-1.2
                 -3
3.6-6
               -2.4
-2.4/-3
                 .8
-1.8*0.8+6
```

16b $-1{,}8x + 6 = 2{,}4$ en $1{,}2x + 3{,}6 = 2{,}4$

$-1{,}8x = -3{,}6$ ; $1{,}2x = -1{,}2$

$x_A = \frac{-3{,}6}{-1{,}8} = 2$. $x_B = -1$. Er geldt nu: $AB = x_A - x_B = 2 - -1 = 3$. ($y_A = y_B = 2{,}4$)

16c $m$ snijden met de $x$-as ($y = 0$) en $n$ snijden met de $x$-as ($y = 0$)

$-1{,}8x + 6 = 0$ ; $1{,}2x + 3{,}6 = 0$

$-1{,}8x = -6$ ; $1{,}2x = -3{,}6$

$x_C = \frac{-6}{-1{,}8} = \frac{1}{0{,}3} = \frac{10}{3}$. $x_D = \frac{-3{,}6}{1{,}2} = -3$.

Er geldt nu: $CD = x_C - x_D = 3\frac{1}{3} - -3 = 6\frac{1}{3}$. ($y_C = y_D = 0$)

17a $L_V = -0{,}95 \cdot 38 + 80{,}9 = 44{,}8$. Dus Floor zal naar verwachting $38 + 44{,}8 \approx 83$ jaar worden.

```
-0.95*38+80.9
               44.8
Ans+38
               82.8
```

17b In 2003 was Stephanie $20 - 4 = 16$ jaar $\Rightarrow L_V = -0{,}95 \cdot 16 + 80{,}9 = 65{,}7$.
Dus Stephanie zal naar verwachting $16 + 65{,}7 \approx 82$ jaar worden.

```
-0.95*16+80.9
               65.7
Ans+16
               81.7
```

17c $L_v = -0{,}95 \cdot t + 80{,}9 = 39{,}1 \Rightarrow -0{,}95 \cdot t = -41{,}8 \Rightarrow t = \frac{-41{,}8}{-0{,}95} = 44$ (jaar).

17d $L_m = -0{,}96 \cdot t + 76{,}2 = 18{,}6 \Rightarrow -0{,}96 \cdot t = -57{,}6 \Rightarrow t = \frac{-57{,}6}{-0{,}96} = 60$ (jaar).

17e $L_v = -0{,}95 \cdot 28 + 80{,}9 = 54{,}3$ en $L_m = -0{,}96 \cdot 28 + 76{,}2 = 49{,}32$
Dus Yvonne wordt naar verwachting $54{,}3 - 49{,}32 \approx 5$ jaar ouder dan Leon.

17f $L = L_m + t = -0{,}96 \cdot t + 76{,}2 + t = 0{,}04t + 76{,}2$.

```
39.1-80.9
          -41.8
Ans/-0.95
             44
```
```
18.6-76.2
          -57.6
Ans/-0.96
             60
```
```
-0.95*28+80.9
           54.3
-0.96*28+76.2
          49.32
54.3-49.32
           4.98
```

18a $0{,}6l - 40 = 65$
$0{,}6l = 105$
$l = \frac{105}{0{,}6} = 175$ (cm).

```
65+40
            105
Ans/0.6
            175
```

18b $1{,}1 \cdot (0{,}7l - 55) = 88$
$0{,}7l - 55 = 80$
$0{,}7l = 135$
$l = \frac{135}{0{,}7} \approx 193$ (cm).

```
88/1.1
             80
Ans+55
            135
Ans/0.7
    192.8571429
```

$1{,}3 \cdot (0{,}7l - 55) = 88$
$0{,}7l - 55 = \frac{88}{1{,}3}$
$0{,}7l = 55 + \frac{88}{1{,}3}$
$l \approx 175$ (cm).

```
88/1.3
    67.69230769
Ans+55
    122.6923077
Ans/0.7
    175.2747253
```

Dus Bas heeft een lengte tussen 175 en 193 cm.

18c Ideaal voor Peter is:
$G = 0{,}7 \cdot 180 - 55 = 71$ kg.
Hij weegt meer dan $1{,}40 \cdot 71 = 99{,}4$ kg.

```
0.7*180-55
             71
Ans*1.4
           99.4
```

18d $G(\text{Sophie}) + 3 = G(\text{Marco})$
$0{,}6l - 40 + 3 = 0{,}7l - 55$
$-0{,}1l = -18$
$l = \frac{-18}{-0{,}1} = 180$ (cm).

```
-55+40-3
            -18
0.6-0.7
            -.1
18/0.1
            180
```

19a $N_{aut} = 15\,760 - 360 \cdot t$ en $N_{all} = 4\,680 + 415 \cdot t$.

19b $15\,760 - 360t = 4\,680 + 415t$
$-775t = -11\,080$
$t = \frac{-11080}{-775} \approx 14{,}297$ (jaar na 1 jan. 1995).
Dus in april (4[e] maand) 2009.

```
-360-415
           -775
```
```
4680-15760
         -11080
Ans/-775
    14.29677419
(Ans-14)*12
    3.561290323
```

19c $N_{totaal} = N_{aut} + N_{all} = 20\,440 + 55t$.

```
15760+4680
          20440
415-360
             55
```

19d Er geldt: $0{,}6 \cdot N_{totaal} = N_{all}$
$0{,}6 \cdot (20\,440 + 55t) = 4\,680 + 415t$
$-382t = -7584$
$t = \frac{-7584}{-382} \approx 19{,}853$.
Dus aan het eind van 2014.

```
0.6*55-415
           -382
4680-0.6*20440
          -7584
Ans/-382
    19.85340314
```

20a Ga je 4 naar rechts, dan ga je 3 omhoog, dus ga je 1 naar rechts, dan ga je $\frac{3}{4}$ omhoog. Dus $rc_l = \frac{3}{4}$.

20b $x_B - x_A = 6 - 2 = 4$ en $y_B - y_A = 4 - 1 = 3$.

20c $rc_l = \frac{y_B - y_A}{x_B - x_A}$ $(= \frac{3}{4})$.

21a $l$: $y = ax + b$ met $a = \frac{\Delta y}{\Delta x} = \frac{y_B - y_A}{x_B - x_A} = \frac{4-1}{1--1} = \frac{3}{2} = 1{,}5$.
$\left.\begin{array}{l} y = 1{,}5x + b \\ \text{door } B(1, 4) \end{array}\right\} \Rightarrow 4 = 1{,}5 \cdot 1 + b$
$4 = 1{,}5 + b$
$2{,}5 = b$. Dus $l$: $y = 1{,}5x + 2{,}5$.

21b $k$: $y = ax + b$ met $a = \frac{\Delta y}{\Delta x} = \frac{0-5}{2--3} = \frac{-5}{5} = -1$.
$\left.\begin{array}{l} y = -1x + b \\ \text{door } D(2, 0) \end{array}\right\} \Rightarrow 0 = -1 \cdot 2 + b$
$2 = b$. Dus $k$: $y = -x + 2$.

21c $m$: $y = ax + b$ met $a = \frac{\Delta y}{\Delta x} = \frac{3-3}{-7-5} = \frac{0}{-12} = 0$.
$\left.\begin{array}{l} y = b \\ \text{door } E(5, 3) \end{array}\right\} \Rightarrow m$: $y = 3$

21d $n$: $y = ax + b$ met $a = \frac{\Delta y}{\Delta x} = \frac{250-360}{160-180} = \frac{-110}{-20} = 5{,}5$.
$\left.\begin{array}{l} y = 5{,}5x + b \\ \text{door } E(180, 360) \end{array}\right\} \Rightarrow 360 = 5{,}5 \cdot 180 + b$
$360 = 990 + b$
$-630 = b$. Dus $n$: $y = 5{,}5x - 630$.

```
5.5*180
            990
```

22a $k$: $y = ax + b$ met $a = \frac{\Delta y}{\Delta x} = \frac{2}{4} = 0{,}5$.
$\left.\begin{array}{l} y = 0{,}5x + b \\ \text{door } (1, 2) \end{array}\right\} \Rightarrow 2 = 0{,}5 \cdot 1 + b$
$1{,}5 = b$. Dus $k$: $y = 0{,}5x + 1{,}5$.

22b $l$: $y = ax + b$ met $a = \frac{\Delta y}{\Delta x} = \frac{20}{40} = 0{,}5$.
$\left.\begin{array}{l} y = 0{,}5x + b \\ \text{door } (50, 20) \end{array}\right\} \Rightarrow 20 = 0{,}5 \cdot 50 + b$
$-5 = b$. Dus $l$: $y = 0{,}5x - 5$.

22c $m$: $y = ax + b$ met $a = \frac{\Delta y}{\Delta x} = \frac{100}{4} = 25$.
$\left.\begin{array}{l} y = 25x + b \\ \text{door } (1, 350) \end{array}\right\} \Rightarrow 350 = 25 \cdot 1 + b$
$325 = b$. Dus $m$: $y = 25x + 325$.

23a $l$: $y = ax + b$ met $a = \frac{\Delta y}{\Delta x} = \frac{-9--5}{7--3} = \frac{-4}{10} = -0{,}4$.
$\left.\begin{array}{l} y = -0{,}4x + b \\ \text{door } B(7, -9) \end{array}\right\} \Rightarrow -9 = -0{,}4 \cdot 7 + b$
$-6{,}2 = b$. Dus $l$: $y = -0{,}4x - 6{,}2$.

```
-9+0.4*7
           -6.2
```

23b $m$: $y = ax + b$ met $a = \frac{\Delta y}{\Delta x} = \frac{155--125}{17--23} = \frac{280}{40} = 7$.
$\left.\begin{array}{l} y = 7x + b \\ \text{door } D(17, 155) \end{array}\right\} \Rightarrow 155 = 7 \cdot 17 + b$
$36 = b$. Dus $m$: $y = 7x + 36$.

```
155-7*17
             36
```

**23c** $p$: $y = ax$ met $a = \frac{\Delta y}{\Delta x} = \frac{-30 - -27}{12-18} = \frac{-3}{-6} = 0{,}5$.
Dus $p$: $y = 0{,}5x$.

**23d** $q$: $y = ax + b$ met $a = \frac{\Delta y}{\Delta x} = \frac{4-0}{-12-0} = \frac{4}{-12} = -\frac{1}{3}$.

$$\left.\begin{array}{l} y = -\frac{1}{3}x + b \\ \text{door } G(-8, 14) \end{array}\right\} \Rightarrow 14 = -\frac{1}{3} \cdot -8 + b$$

$11\frac{1}{3} = b$. Dus $q$: $y = -\frac{1}{3}x + 11\frac{1}{3}$.

**24a** $\text{rc}_{AB} = \frac{\Delta R}{\Delta q} = \frac{315-270}{500-350} = \frac{45}{150} = 0{,}3$.

**24b** Ze verdient per doos €0,30.

**24c**
$$\left.\begin{array}{l} R = 0{,}3q + b \\ \text{door } D(500, 315) \end{array}\right\} \Rightarrow 315 = 0{,}3 \cdot 500 + b$$

```
315-0.3*500
            165
```

Haar basisloon is dus $b = 165$ (€).

**25a** $A = as + b$ met $a = \frac{\Delta A}{\Delta s} = \frac{750-300}{21-15} = \frac{450}{6} = 75$.

$$\left.\begin{array}{l} A = 75s + b \\ \text{door } (15, 300) \end{array}\right\} \Rightarrow 300 = 75 \cdot 15 + b$$

$-825 = b$. Dus $A = 75s - 825$.

```
450/6
             75
300-75*15
           -825
```

**25b** $R = at + b$ met $a = \frac{\Delta R}{\Delta t} = \frac{35-10}{60-35} = \frac{25}{25} = 1$.

$$\left.\begin{array}{l} R = t + b \\ \text{door } (35, 10) \end{array}\right\} \Rightarrow 10 = 35 + b$$

$-25 = b$. Dus $R = t - 25$.

**26a** $p = aq + b$ met $a = \frac{\Delta p}{\Delta q} = \frac{2{,}25-7{,}75}{425-150} = \frac{-5{,}5}{275} = -0{,}02$.

$$\left.\begin{array}{l} p = -0{,}02q + b \\ \text{door } (150; 7{,}75) \end{array}\right\} \Rightarrow 7{,}75 = -0{,}02 \cdot 150 + b$$

$10{,}75 = b$. Dus $p = -0{,}02q + 10{,}75$.

```
(2.25-7.75)/(425
-150)
            -.02
7.75+0.02*150
           10.75
```

**26c** $q = 250 \Rightarrow$

```
-0.02*250+10.75
            5.75
```

$p = -0{,}02 \cdot 250 + 10{,}75 = 5{,}75$.

**26d** $p = 4{,}25 \Rightarrow$

```
-50*4.25+537.5
             325
```

$p = -50 \cdot 4{,}25 + 537{,}5 = 325$.

**26b** $q = ap + b$ met $a = \frac{\Delta q}{\Delta p} = \frac{425-150}{2{,}25-7{,}75} = \frac{275}{-5{,}5} = -50$.

$$\left.\begin{array}{l} q = -50p + b \\ \text{door } (7{,}75; 150) \end{array}\right\} \Rightarrow 150 = -50 \cdot 7{,}75 + b$$

$537{,}5 = b$. Dus $q = -50p + 537{,}5$.

```
(425-150)/(2.25-
7.75)
             -50
150+50*7.75
           537.5
```

of --------------------- $p = -0{,}02q + 10{,}75$
$0{,}02q = -p + 10{,}75$ terug $\boxed{\times 0{,}02}$
$q = -50p + 537{,}5$.

```
-1/0.02
             -50
10.75/0.02
           537.5
```

**27a** $q = ap + b$ met $a = \frac{\Delta q}{\Delta p} = \frac{315-380}{145-120} = \frac{-65}{25} = -2{,}6$.

$$\left.\begin{array}{l} q = -2{,}6p + b \\ \text{door } (120, 380) \end{array}\right\} \Rightarrow 380 = -2{,}6 \cdot 120 + b$$

$692 = b$. Dus $q = -2{,}6p + 692$.

```
-65/25
            -2.6
380+2.6*120
             692
-2.6*180+692
             224
```

**27b** $p = 180 \Rightarrow q = -2{,}6 \cdot 180 + 692 = 224$ (auto's).

**27c** $q = 445 \Rightarrow$
$445 = -2{,}6 \cdot p + 692$
$2{,}6p = 247$
$p = 95$
Vanaf 95 euro.

```
692-445
             247
Ans/2.6
              95
```

**28a** $k = aV + b$ met $a = \frac{\Delta k}{\Delta V} = \frac{49{,}6-56}{650-250} = \frac{-6{,}4}{400} = -0{,}016$.

$$\left.\begin{array}{l} k = -0{,}016V + b \\ \text{door } (250, 56) \end{array}\right\} \Rightarrow 56 = -0{,}016 \cdot 250 + b$$

$60 = b$. Dus $k = -0{,}016V + 60$.

```
(49.6-56)/400
           -.016
56+0.016*250
              60
```

**28b** $k = 5 \Rightarrow$
$5 = -0{,}016 \cdot V + 60$
$0{,}016 \cdot V = 55$
$V = 3\,437{,}5$ (km na de start).

```
60-5
              55
Ans/0.016
          3437.5
```

**29a** $L_{\text{m}} = at + b$ met $a = \frac{\Delta L_{\text{m}}}{\Delta t} = \frac{185-173}{100-40} = \frac{12}{60} = \frac{1}{5} = 0{,}2$.

$$\left.\begin{array}{l} L_{\text{m}} = 0{,}2t + b \\ \text{door } (40, 173) \end{array}\right\} \Rightarrow 173 = 0{,}2 \cdot 40 + b$$

$165 = b$. Dus $L_{\text{m}} = 0{,}2t + 165$.

```
12/60
              .2
173-0.2*40
             165
165-13
             152
```

**29b** $L_{\text{v}} = L_{\text{m}} - 13 \Rightarrow L_{\text{v}} = 0{,}2t + 165 - 13 = 0{,}2t + 152$.

**29c** In 2050 is $t = 150$.
Dus $L_{\text{v}} = 0{,}2 \cdot 150 + 152 = 182$ (cm).
Het is de vraag of je de formule mag gebruiken voor het jaar 2050.
(dat jaar ligt ver buiten de gegevens)

```
2050-1900
             150
0.2*150+152
             182
```

**29d** $L = al + b$ met $a = \frac{\Delta L}{\Delta l} = \frac{168-176}{80-20} = \frac{-8}{60} = -\frac{2}{15}$.

$$\left.\begin{array}{l} L = -\frac{2}{15}l + b \\ \text{door } (20, 176) \end{array}\right\} \Rightarrow 176 = -\frac{2}{15} \cdot 20 + b \Rightarrow 178{,}667 \approx b. \text{ Dus } L \approx -0{,}133l + 178{,}667.$$

```
(168-176)/(80-20
)▸Frac
           -2/15
176+2/15*20
     178.6666667
-2/15
    -.1333333333
```

**30a** $B = aw + b$ met $a = \frac{\Delta B}{\Delta w} = \frac{145{,}89-120{,}13}{112-89} = 1{,}12$.

$$\left.\begin{array}{l} B = 1{,}12w + b \\ \text{door } (89; 120{,}13) \end{array}\right\} \Rightarrow 120{,}13 = 1{,}12 \cdot 89 + b$$

$20{,}45 = b$. Dus $B = 1{,}12w + 20{,}45$.

```
(145.89-120.13)/
(112-89)
            1.12
120.13-1.12*89
           20.45
```

**30b** Het vastrecht is €20,45. De prijs per $m^3$ water is €1,12.

**30c** $w = 97 \Rightarrow B = 1{,}12 \cdot 97 + 20{,}45 = 129{,}09$ (€).

**30d** $B = 161{,}57 \Rightarrow$
$161{,}57 = 1{,}12 \cdot w + 20{,}45$
$-1{,}12 \cdot w = -141{,}12$
$w = 126$ ($m^3$ water).

```
20.45-161.57
         -141.12
Ans/-1.12
             126
```

**31a** $h = at + b$ met $a = \frac{\Delta h}{\Delta t} = \frac{245{,}6-235}{11-15} = \frac{10{,}6}{-4} = -2{,}65$.

$$\left.\begin{array}{l} h = -2{,}65t + b \\ \text{door } (15, 235) \end{array}\right\} \Rightarrow 235 = -2{,}65 \cdot 15 + b$$

$274{,}75 = b$. Dus $h = -2{,}65t + 274{,}75$.

```
(245.6-235)/(11-
15)
           -2.65
235+2.65*15
          274.75
-2.65*6+274.75
          258.85
```

**31b** $t = 6 \Rightarrow h = -2{,}65 \cdot 6 + 274{,}75 = 258{,}85$ (km).

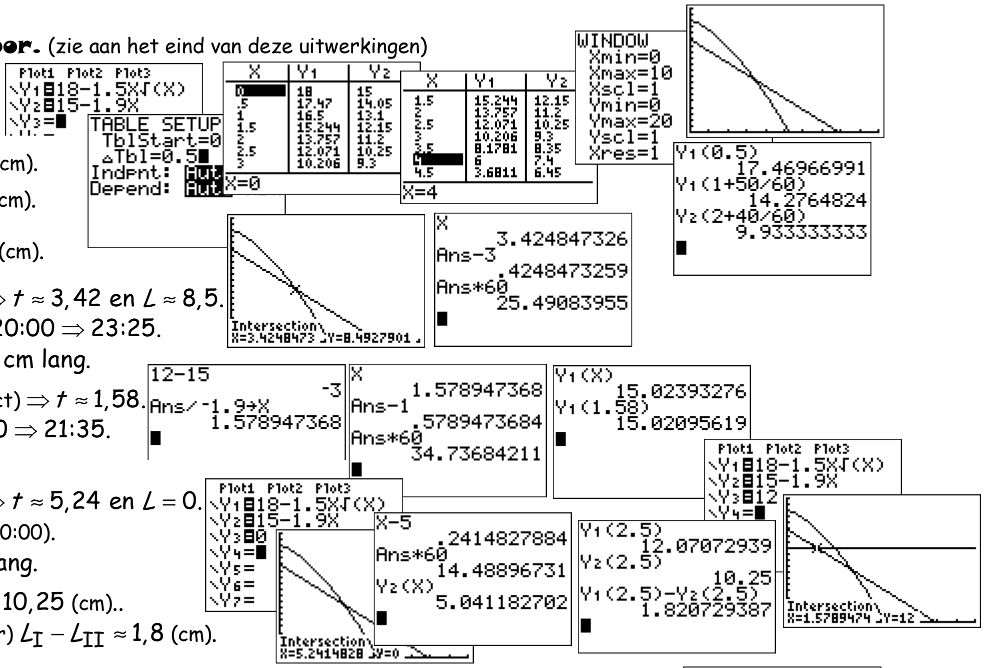
**31c** $t = 9{,}25 \Rightarrow h = -2{,}65 \cdot 9{,}25 + 274{,}75$
$= 250{,}2375$ (km).

```
-2.65*9.25+274.7
5
        250.2375
```

**31d** $220 = -2{,}65t + 274{,}75$
$2{,}65t = 54{,}75$
$t \approx 20{,}66$.
Dit is 22 maart.
(ongeveer 4 uur in de ochtend)

```
274.75-220
           54.75
Ans/2.65
     20.66037736
(Ans-20)*24
      15.8490566
```

✳✳✳ 🖩 **Neem GR - practicum 3 door.** (zie aan het eind van deze uitwerkingen)



32a Dat is voor $t = 4$. (zie de tabellen)

32b Zie de plot hiernaast.

32c Om 20:30 is $t = 0{,}5 \Rightarrow L_{\text{I}} \approx 17{,}5$ (cm).
Om 21:50 is $t = 1\frac{50}{60} \Rightarrow L_{\text{I}} \approx 14{,}3$ (cm).

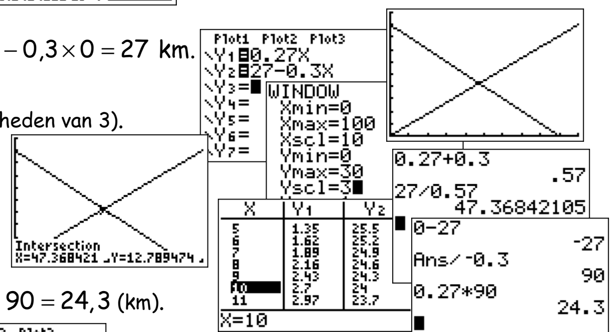
32d Om 22:40 is $t = 2\frac{40}{60} \Rightarrow L_{\text{II}} \approx 9{,}9$ (cm).

32e $18 - 1{,}5t\sqrt{t} = 15 - 1{,}9t$ (intersect) $\Rightarrow t \approx 3{,}42$ en $L \approx 8{,}5$.
$t \approx 3{,}42$ uur is (ongeveer) 3:25 na 20:00 $\Rightarrow$ 23:25.
De kaarsen zijn dan (ongeveer) 8,5 cm lang.

32f $15 - 1{,}9t = 12$ (algebraïsch of intersect) $\Rightarrow t \approx 1{,}58$.
1,58 uur is (ongeveer) 1:35 na 20:00 $\Rightarrow$ 21:35.
$t \approx 1{,}58 \Rightarrow L_{\text{I}} \approx 15{,}0$ (cm).

32g $18 - 1{,}5t\sqrt{t} = 0$ (intersect of zero) $\Rightarrow t \approx 5{,}24$ en $L = 0$.
$t \approx 5{,}24$ uur is (ongeveer) 5:14 (na 20:00).
Kaars II is dan (ongeveer) 5,0 cm lang.

32h $t = 2{,}5 \Rightarrow L_{\text{I}} \approx 12{,}07$ (cm) en $L_{\text{II}} = 10{,}25$ (cm)..
Het lengteverschil is dan (ongeveer) $L_{\text{I}} - L_{\text{II}} \approx 1{,}8$ (cm).



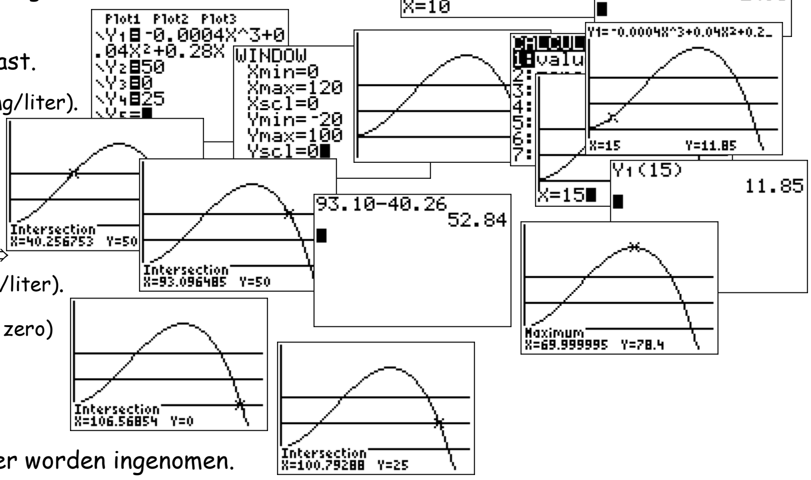
33a Op $t = 0$ is Martijn in $B$ en zijn afstand tot $A$ is dan $d = 27 - 0{,}3 \times 0 = 27$ km.

33b Zie de plot hiernaast.
Xmax = 100 (bij $t = 100$ is Sandra in $B$) en Ymax = 30 (27 is 9 eenheden van 3).

33c $0{,}27t = 27 - 0{,}3t$ (intersect of algebraïsch) $\Rightarrow t \approx 47$ (min).

33d $t = 10 \Rightarrow d = 0{,}27 \cdot 10 = 2{,}7$ (km) en $d = 27 - 0{,}3 \cdot 10 = 24$ (km).
Dus de onderlinge afstand is $24 - 2{,}7 = 21{,}3$ (km).

33e $27 - 0{,}3t = 0$ (intersect of zero of algebraïsch) $\Rightarrow t = 90$ (min).
$t = 90 \Rightarrow$ de afstand die Sandra heeft afgeledg is $d = 0{,}27 \cdot 90 = 24{,}3$ (km).



34a Zie de gevraagde plot (van de kromme) hiernaast.

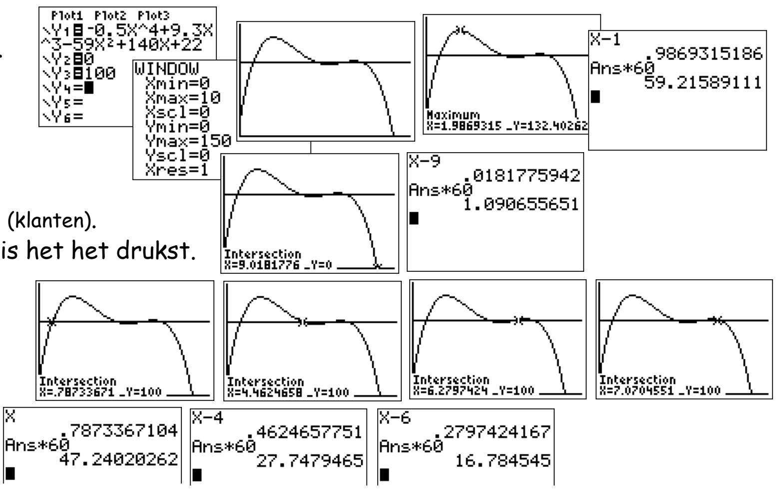
34b Na een kwartier is $t = 15 \Rightarrow C(15) = 11{,}85$ (mg/liter).

34c $-0{,}0004t^3 + 0{,}04t^2 + 0{,}28t = 50$ (intersect)
$t \approx 40{,}26$ en $t \approx 93{,}10$ (min).
Gedurende bijna 53 minuten is $C > 50$.

34d $C = -0{,}0004t^3 + 0{,}04t^2 + 0{,}28t$ (maximum) $\Rightarrow$
$t = 70$ (min na het innemen) en $C_{max} = 78{,}4$ (mg/liter).

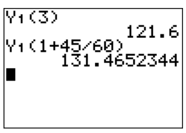
34e $-0{,}0004t^3 + 0{,}04t^2 + 0{,}28t = 0$ (intersect of zero)
$t \approx 107$ (min na het innemen).

34f $-0{,}0004t^3 + 0{,}04t^2 + 0{,}28t = 25$ (intersect)
$t \approx 101$ (min na het innemen).
Na bijna 101 minuten moet het medicijn weer worden ingenomen.



35a Maak een schets van de plot (kromme) hiernaast.

35b $N(3) \approx 122$ (klanten).

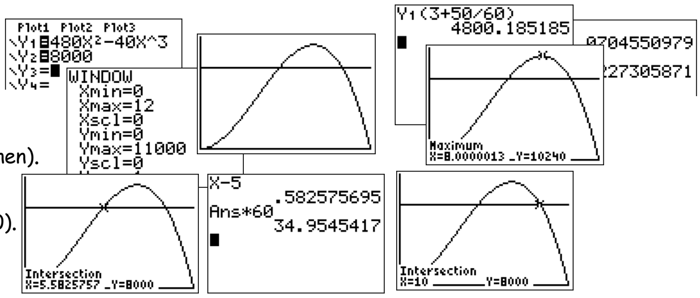


35c Om 10:45 is $t = 1 + \frac{45}{60}$.
$N(1\frac{45}{60}) \approx 131$ (klanten).

35d De optie maximum geeft $t \approx 1{,}9869$ en $N \approx 132$ (klanten).
$t \approx 1{,}9869$ is 1 uur en 59 minuten dus om 10:59 is het het drukst.

35e $N = 0$ (intersect of zero) $\Rightarrow t \approx 9{,}018$ (min).
$t \approx 9{,}018$ is 9 uur en 1 minuut dus om 18:01.

35f $N = 100$ (intersect) $\Rightarrow$
$t \approx 0{,}787 \vee t \approx 4{,}462 \vee t \approx 6{,}280 \vee t \approx 7{,}070$ (min).
9:47 of 13:28 of 15:17 of 16:04.

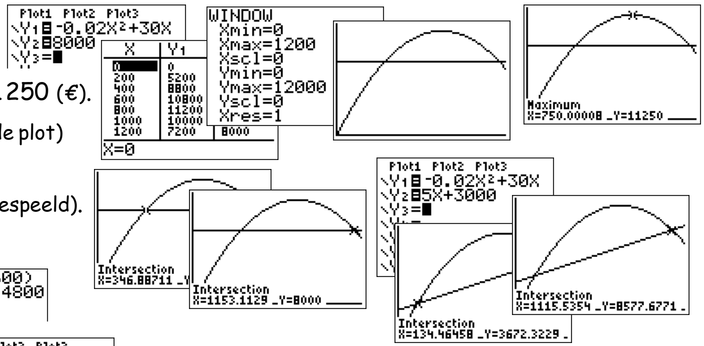



36a Maak een schets van de plot (kromme) hiernaast.

36b Om 12:50 is $t = 3 + \frac{50}{60} \Rightarrow N(3\frac{50}{60}) \approx 4\,800$ (personen).

36c De optie maximum geeft $t = 8$ en $N = 10\,240$ (personen).
Dus om 17:00 is het het drukst.

36d $N = 8\,000$ (intersect) $\Rightarrow t \approx 5{,}58$ en $t = 10$ (uur na 9:00).
Het kan dus 14:35 of 19:00 zijn.




37a Maak een schets van de plot (kromme) hiernaast.

37b Neem de tabel hiernaast over.

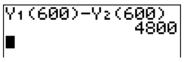
| X | Y1 |
|---|---|
| 0 | 0 |
| 200 | 5200 |
| 400 | 8800 |
| 600 | 10800 |
| 800 | 11200 |
| 1000 | 10000 |
| 1200 | 7200 |

37c De optie maximum geeft $q = 750$ (broodroosters) en $R = 11\,250$ (€).

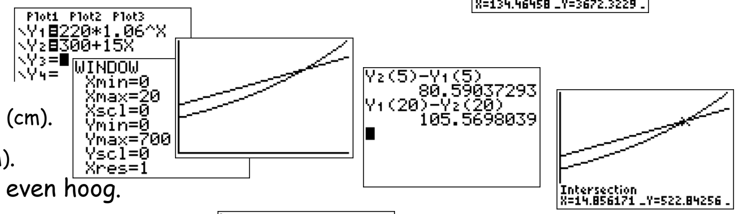
37d $R = 8\,000$ (intersect) $\Rightarrow q \approx 346{,}9$ en $q \approx 1153{,}1$. (bekijk nu de plot)
Bij een verkoop van 347 tot en met 1153 broodroosters.

37e $R = K \Rightarrow$ er is geen winst en geen verlies (er wordt quitte gespeeld).
$R = K$ (intersect) $\Rightarrow q \approx 134{,}46$ en $q \approx 1115{,}54$.
Hierbij horen 134 en 1116 broodroosters.

37f $q = 600 \Rightarrow W = R(600) - K(600) = 4\,800$ (€).

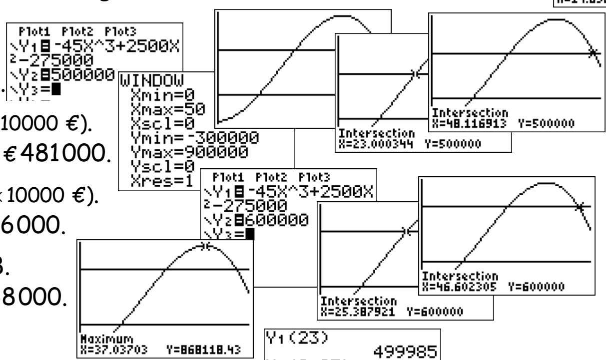



38a Maak een schets van de plot hiernaast.




38b $t = 5 \Rightarrow$ hoogteverschil is $h_{II}(5) - h_{I}(5) \approx 81$ (cm).
$t = 20 \Rightarrow$ hoogteverschil is $h_{I}(20) - h_{II}(20) \approx 106$ (cm).

38c $h_{I} = h_{II}$ (intersect) $\Rightarrow t \approx 14{,}9$ (jaar) en $h \approx 523$ (cm).
In de loop van $2002 + 14 = 2016$ zijn beide bomen even hoog.
De bomen zijn dan 523 cm hoog.



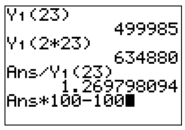

39a Maak een schets van de plot (de kromme) hiernaast.

39b $W = 500\,000$ (intersect) $\Rightarrow x \approx 23{,}0$ en $x \approx 48{,}1$ ($\times 10000$ €).
De reclamekosten zijn dus (ongeveer) € 230000 of € 481000.

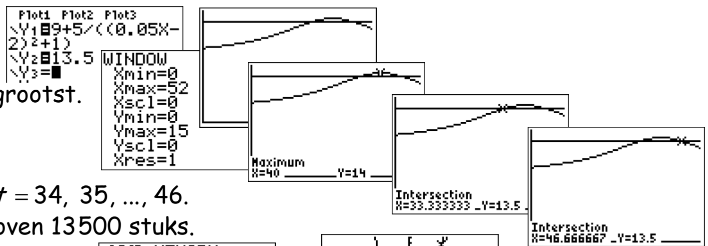
39c $W = 600\,000$ (intersect) $\Rightarrow x \approx 25{,}4$ en $x \approx 46{,}6$ ($\times 10000$ €).
De reclamekosten liggen tussen € 254000 en € 466000.

39d De optie maximum geeft $x \approx 37{,}0$ en $W \approx 868118$.
Dus de maximale jaarlijkse winst is ongeveer € 868000.

39e $x = 23$ ($\times 10000$ €) $\Rightarrow W(23) = 499\,985$ (€).
$x = 2 \cdot 23$ ($\times 10000$ €) $\Rightarrow W(46) = 634\,880$ (€).
$\frac{634880}{499985} \approx 1{,}269798 = 126{,}9798\%$. Dus een toename van (ongeveer) 27,0%.



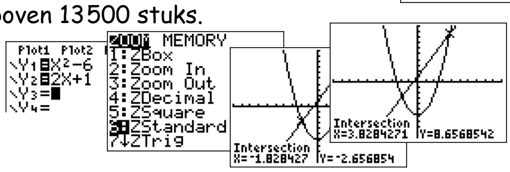

40a Maak een schets van de plot (kromme) hiernaast.




40b De optie maximum geeft $t = 40$ en $A = 14$.
Dus 40 weken na de start is de losse verkoop het grootst.
De verkoop is dan 14000 stuks.

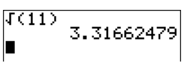
40c $A = 13{,}5$ (intersect) $\Rightarrow t \approx 33{,}33$ en $t \approx 46{,}67$.
Tussen $t \approx 33{,}33$ en $t \approx 46{,}67$ liggen de waarden $t = 34,\ 35,\ ...,\ 46$.
Dus gedurende $46 - 33 = 13$ weken is de verkoop boven 13500 stuks.

41 $x^2 - 6 = 2x + 1$ (intersect) $\Rightarrow x \approx -1{,}83$ en $x \approx 3{,}83$.




42a $x^2 + 6 = 5x$
$x^2 - 5x + 6 = 0$
$(x-2) \cdot (x-3) = 0$
$x = 2 \vee x = 3$.

42c $x^2 = 11$
$x = \pm\sqrt{11}$
$x = -3{,}32 \vee x = 3{,}32$.

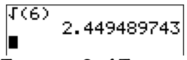



42e $3q^2 - 18q = 0$
$3q \cdot (q-6) = 0$
$q = 0 \vee q = 6$.

42b $x^2 = x$
$x^2 - x = 0$
$x \cdot (x-1) = 0$
$x = 0 \vee x = 1.$

42d $t^2 + 5t = 14$
$t^2 + 5t - 14 = 0$
$(t+7) \cdot (t-2) = 0$
$x = -7 \vee t = 2.$

42f $3a^2 = 18$
$a^2 = 6$
$a = \pm\sqrt{6}$
$a = -2{,}45 \vee a = 2{,}45.$



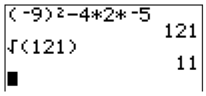

43a $5x^2 + 15x - 50 = 0$
$x^2 + 3x - 10 = 0$
$(x+5) \cdot (x-2) = 0$
$x = -5 \vee x = 2.$

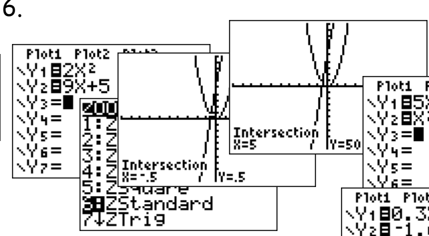
43b $0{,}5x^2 - 2x = 6$
$0{,}5x^2 - 2x - 6 = 0$
$x^2 - 4x - 12 = 0$
$(x+2) \cdot (x-6) = 0$
$x = -2 \vee x = 6.$

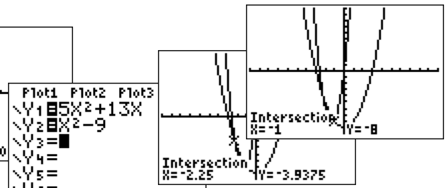
43c $0{,}02a^2 - 80a = 0$
$a^2 - 4\,000a = 0$
$a \cdot (a - 4\,000) = 0$
$a = 0 \vee a = 4\,000.$

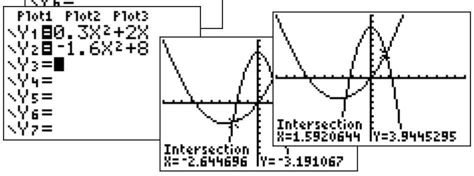
43d $2p^2 - 5p = 3{,}4p$
$2p^2 - 8{,}4p = 0$
$2p \cdot (p - 4{,}2) = 0$
$p = 0 \vee p = 4{,}2.$

44a $2x^2 = 9x + 5$
$2x^2 - 9x - 5 = 0$
$D = (-9)^2 - 4 \cdot 2 \cdot -5 = 121$
$x = \frac{9-11}{4} = -\frac{1}{2} \vee x = \frac{9+11}{4} = 5.$




44b $2x^2 = 9x + 5$ (intersect) $\Rightarrow x = -\frac{1}{2} \vee x = 5.$

44c Ieder zijn eigen voorkeur. (met de GR werk je rustiger)

44d $5x^2 + 13x = x^2 - 9$ (intersect) $\Rightarrow x = -2{,}25 \vee x = -1.$

44e $0{,}3x^2 + 2x = -1{,}6x^2 + 8$ (intersect) $\Rightarrow x \approx -2{,}64 \vee x \approx 1{,}59.$

45a $x^2 - 5x = 0$
$x \cdot (x-5) = 0$
$x = 0 \vee x = 5.$

45b $x^2 - 5x = 24$
$x^2 - 5x - 24 = 0$
$(x+3) \cdot (x-8) = 0$
$x = -3 \vee x = 8.$

45c $-0{,}004x^2 - 120x = 0$
$-0{,}004x \cdot (x + 30\,000) = 0$
$x = 0 \vee x = -30\,000.$

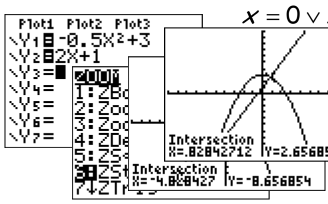
45d $(2x-1) \cdot (3x+12) = 0$
$2x - 1 = 0 \vee 3x + 12 = 0$
$2x = 1 \vee 3x = -12$
$x = \frac{1}{2} \vee x = -4.$

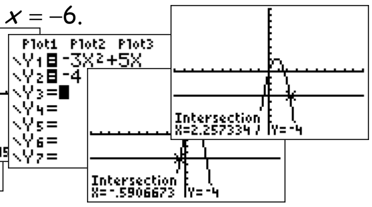
45e $(x+3)^2 - (x+1)^2 = 8$
$x^2 + 6x + 9 - (x^2 + 2x + 1) = 8$
$x^2 + 6x + 9 - x^2 - 2x - 1 = 8$
$4x = 0$
$x = 0.$

45f $(x+4)^2 = 2x + 16$
$x^2 + 8x + 16 = 2x + 16$
$x^2 + 6x = 0$
$x \cdot (x+6) = 0$
$x = 0 \vee x = -6.$

46 Winst als $R > K \Rightarrow 90 < q < 460$ ($q$ tussen 90 en 460).

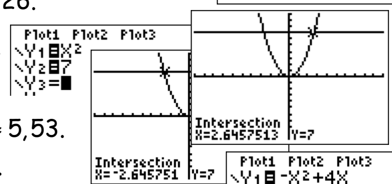
47a $-0{,}5x^2 + 3 = 2x + 1$ (intersect) $\Rightarrow x \approx -4{,}83 \vee x \approx 0{,}83.$
$-0{,}5x^2 + 3 < 2x + 1$ (zie plot) $\Rightarrow x < -4{,}83 \vee x > 0{,}83.$



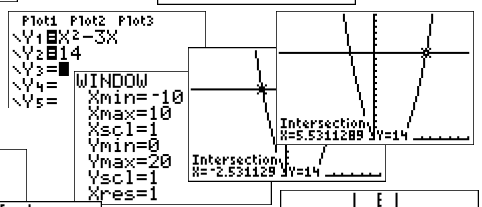




47b $-3x^2 + 5x = -4$ (intersect) $\Rightarrow x \approx -0{,}59 \vee x \approx 2{,}26.$
$-3x^2 + 5x > -4$ (zie plot) $\Rightarrow -0{,}59 < x < 2{,}26.$

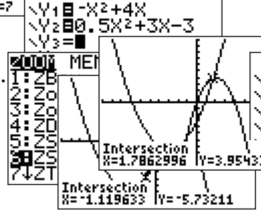
47c $x^2 = 7$ (intersect) $\Rightarrow x \approx -2{,}65 \vee x \approx 2{,}65.$
$x^2 \geq 7$ (zie plot) $\Rightarrow x \leq -2{,}65 \vee x \geq 2{,}65.$



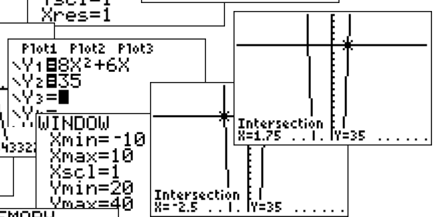

47d $x^2 - 3x = 14$ (intersect) $\Rightarrow x \approx -2{,}53 \vee x \approx 5{,}53.$
$x^2 - 3x \leq 14$ (zie plot) $\Rightarrow -2{,}53 \leq x \leq 5{,}53.$




48a $-x^2 + 4x = 0{,}5x^2 + 3x - 3$ (intersect) $\Rightarrow x \approx -1{,}12 \vee x \approx 1{,}79.$
$-x^2 + 4x < 0{,}5x^2 + 3x - 3$ (zie plot) $\Rightarrow x < -1{,}12 \vee x > 1{,}79.$




48b $8x^2 + 6x = 35$ (intersect) $\Rightarrow x = -2{,}5 \vee x = 1{,}75.$
$8x^2 + 6x \geq 35$ (zie plot) $\Rightarrow x \leq -2{,}5 \vee x \geq 1{,}75.$

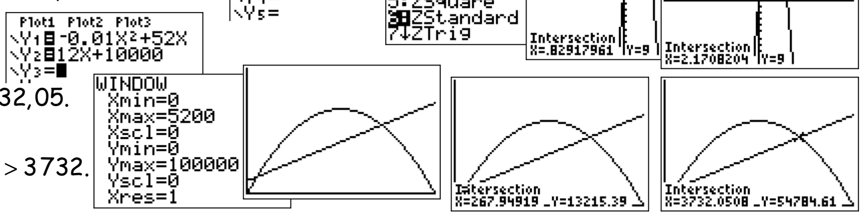



49 $-5t^2 + 15t = 9$ (intersect) $\Rightarrow t \approx 0{,}83 \vee t \approx 2{,}17.$
$-5t^2 + 15t > 9$ (zie plot) $\Rightarrow 0{,}83 < t < 2{,}17 \Rightarrow 1{,}3$ seconden.

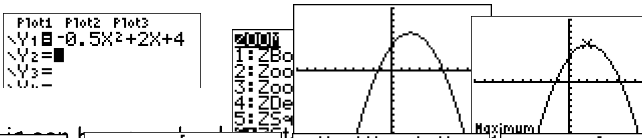

50a Maak een schets van de plot hiernaast.

50b $O = K$ (intersect) $\Rightarrow q \approx 267{,}95 \vee q \approx 3\,732{,}05.$
$O > K$ (zie plot) $\Rightarrow 268 \leq q \leq 3\,732.$

50c Verlies $\Rightarrow O < K$ (zie plot) $\Rightarrow q < 268 \vee q > 3\,732.$



51a Maak een schets van de plot hiernaast.
Optie maximum $\Rightarrow x = 2$ en $y = 6 \Rightarrow$ top(2,6).




51b De grootste functiewaarde is 6.

51c Het getal voor $x^2$ is negatief $\Rightarrow$ ☹ $\Rightarrow$ de grafiek is een b

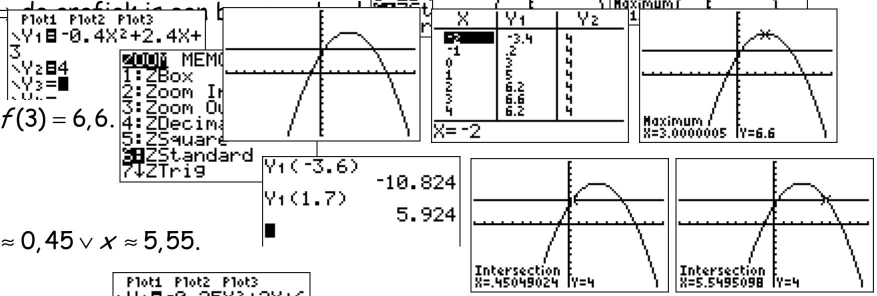
52a Teken zelf de grafiek van $f$.
(gebruik een plot en een tabel)

52b Optie maximum $\Rightarrow$ maximum van $f$ is $f(3) = 6,6$.

52c De symmetrieas is $x = 3$.

52d $f(3,6) = -10,824$ en $f(1,7) = 5,924$.

52e $-0,4x^2 + 2,4x + 3 = 4$ (intersect) $\Rightarrow x \approx 0,45 \vee x \approx 5,55$.

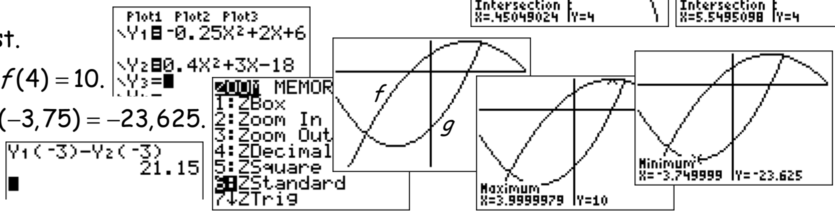



53a Maak een schets van de plot hiernaast.

53b Optie maximum $\Rightarrow$ maximum van $f$ is $f(4) = 10$.

53c Optie minimum $\Rightarrow$ minimum van $g$ is $g(-3,75) = -23,625$.

53d $AB = y_1(-3) - y_2(-3) = 21,15$.

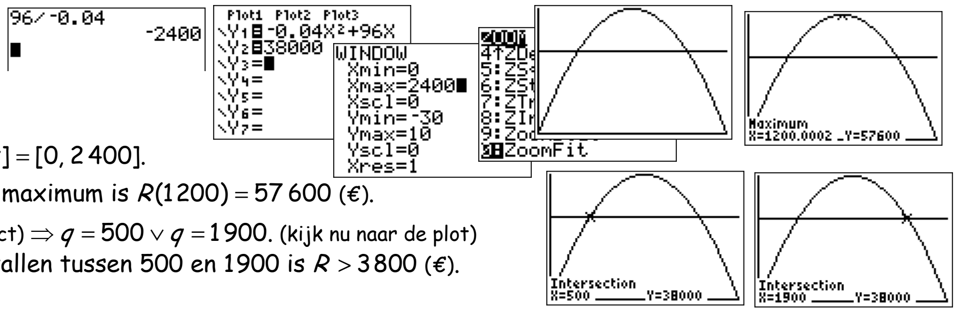



54a $-0,04q^2 + 96q = 0$
$q^2 - 2\,400q = 0$
$q \cdot (q - 2\,400) = 0$
$q = 0 \vee q = 2\,400$.

54b Neem [Xmin,Xmax] = [0, 2 400].

54c Optie maximum $\Rightarrow$ maximum is $R(1200) = 57\,600$ (€).

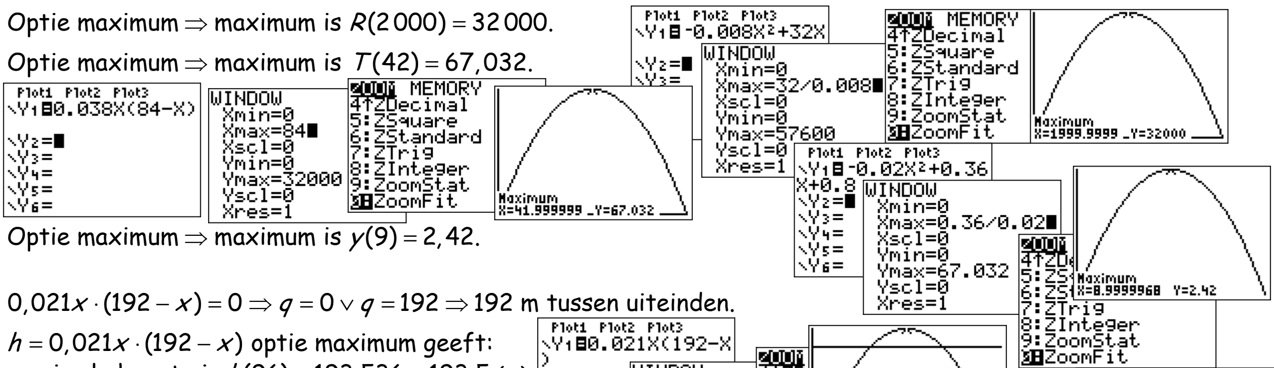
54d $R = 38\,000$ (intersect) $\Rightarrow q = 500 \vee q = 1900$. (kijk nu naar de plot)
Bij verkochte aantallen tussen 500 en 1900 is $R > 3800$ (€).




55a Optie maximum $\Rightarrow$ maximum is $R(2\,000) = 32\,000$.

55b Optie maximum $\Rightarrow$ maximum is $T(42) = 67,032$.

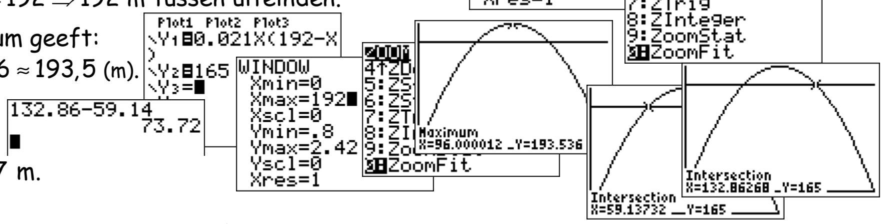
55c Optie maximum $\Rightarrow$ maximum is $y(9) = 2,42$.




56a $0,021x \cdot (192 - x) = 0 \Rightarrow q = 0 \vee q = 192 \Rightarrow 192$ m tussen uiteinden.

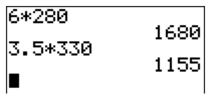
56b $h = 0,021x \cdot (192 - x)$ optie maximum geeft:
maximale hoogte is $h(96) = 193,536 \approx 193,5$ (m).

56c $0,021x \cdot (192 - x) = 165$ (intersect)
$q \approx 59,14 \vee q = 132,86$.
De afstand is $132,86 - 59,14 \approx 73,7$ m.



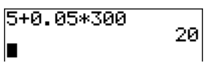

57a $€\,6,00 = €\,5,00 + 2 \times €\,0,50 \Rightarrow 300 - 2 \times 10 = 280$ verkochte kaartjes $\Rightarrow$ opbrengst is $€\,6,00 \times 280 = €\,1680$.

57b $€\,3,50 = €\,5,00 - 3 \times €\,0,50 \Rightarrow 300 + 3 \times 10 = 330$ verkochte kaartjes $\Rightarrow$ opbrengst is $€\,3,50 \times 330 = €\,1155$.




57cd $p = aq + b$ met $a = \frac{\Delta p}{\Delta q} = \frac{5,50 - 5}{290 - 300} = \frac{0,50}{-10} = -0,05$.

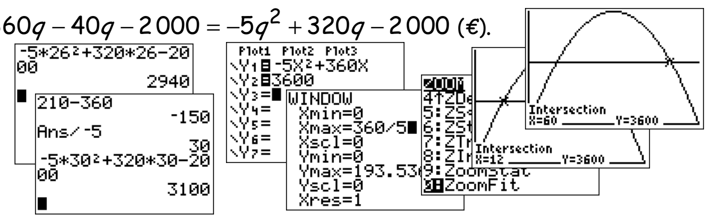
$$\left.\begin{array}{l} p = -0,05q + b \\ \text{door } (300, 5) \end{array}\right\} \Rightarrow \quad 5 = -0,05 \cdot 300 + b$$
$20 = b$. Dus $p = -0,05q + 20$ (€).



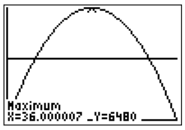

58a $R = p \cdot q = (-5q + 360) \cdot q = -5q^2 + 360q$ (€).
$W = R - K = -5q^2 + 360q - (40q + 2\,000) = -5q^2 + 360q - 40q - 2\,000 = -5q^2 + 320q - 2\,000$ (€).

58b $q = 26 \Rightarrow W = -5 \cdot 26^2 + 320 \cdot 26 - 2\,000 = 2\,940$ (€).

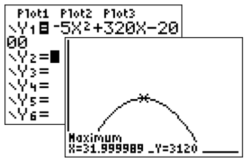
58c $p = -5q + 360 = 210 \Rightarrow -5q = -150 \Rightarrow q = 30$.
$q = 30 \Rightarrow W = -5 \cdot 30^2 + 320 \cdot 30 - 2\,000 = 3100$ (€).



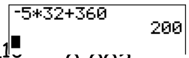
58d $R = -5q^2 + 360q = 3\,600$ (intersect) $\Rightarrow q = 12 \vee q = 60$.




58e $R = -5q^2 + 360q$ (optie maximum) $\Rightarrow q = 36$ en $R_{max} = 6\,480$ (€).

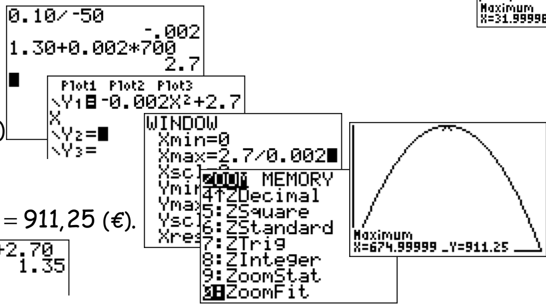



58f $W = -5q^2 + 320q - 2\,000$ (optie maximum) $\Rightarrow q = 32$ en $W_{max} = 3120$ (€).
$q = 32 \Rightarrow p = -5 \cdot 32 + 360 = 200$ (€).



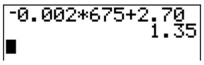

59a $p = aq + b$ met $a = \frac{\Delta p}{\Delta q} = \frac{1,40 - 1,30}{650 - 700} = \frac{0,10}{-50} = -0,002$.

$\left.\begin{array}{l} p = -0,002q + b \\ \text{door } (700; 1,30) \end{array}\right\} \Rightarrow 1,30 = -0,002 \cdot 700 + b$
$2,70 = b$. Dus $p = -0,002q + 2,70$ (€).



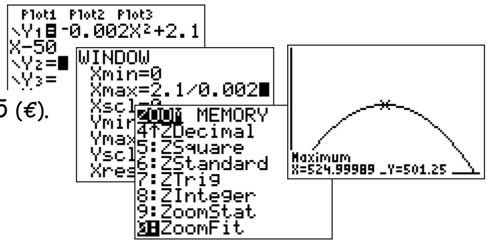

59b $R = p \cdot q = (-0,002q + 2,70) \cdot q = -0,002q^2 + 2,70q$ (€).

59c $R = -0,002q^2 + 2,70q$ (optie maximum) $\Rightarrow q = 675$ en $R_{max} = 911,25$ (€).
$q = 675 \Rightarrow p = -0,002 \cdot 675 + 2,70 = 1,35$ (€).

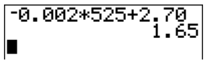



59d $K = 0,60q + 50$ (€).

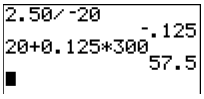
59e $W = R - K = -0,002q^2 + 2,70q - (0,60q + 50)$
$= -0,002q^2 + 2,70q - 0,60q - 50 = -0,002q^2 + 2,10q - 50$ (€).



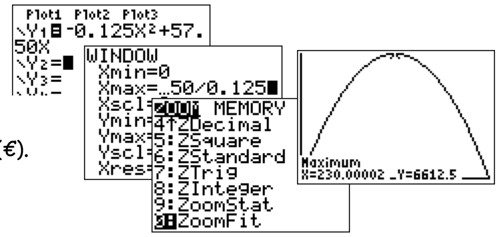

59f $W = -0,002q^2 + 2,10q - 50$ (optie maximum) $\Rightarrow q = 525$ en $W_{max} = 501,25$ (€).
$q = 525 \Rightarrow p = -0,002 \cdot 525 + 2,70 = 1,65$ (€).




60a $p = aq + b$ met $a = \frac{\Delta p}{\Delta q} = \frac{22,50 - 20}{280 - 300} = \frac{2,50}{-20} = -0,125$.

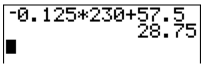



$\left.\begin{array}{l} p = -0,125q + b \\ \text{door } (300, 20) \end{array}\right\} \Rightarrow 20 = -0,125 \cdot 300 + b$
$57,50 = b$. Dus $p = -0,125q + 57,50$ (€).

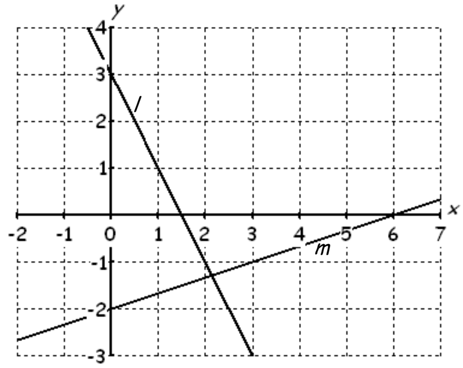



60b $R = p \cdot q = (-0,125q + 57,50) \cdot q = -0,125q^2 + 57,50q$ (€).

60c $R = -0,125q^2 + 57,50q$ (optie maximum) $\Rightarrow q = 230$ en $R_{max} = 6\,612,50$ (€).
$q = 230 \Rightarrow p = -0,125 \cdot 230 + 57,50 = 28,75$ (€).



**Diagnostische toets**




D1 De grafiek van $l$: $y = -2x + 3$ is een rechte lijn door (0, 3) met rc $= -2$.
De grafiek van $m$: $y = \frac{1}{3}x - 2$ is een rechte lijn door (0, $-2$) met rc $= \frac{1}{3}$.

D2a $k$: $y = ax + b$ met $a = \text{rc}_k = \text{rc}_l = -\frac{1}{2}$.

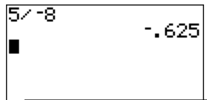
$\left.\begin{array}{l} k\text{: } y = -\frac{1}{2}x + b \\ \text{door } A(9, 3) \end{array}\right\} \Rightarrow 3 = -\frac{1}{2} \cdot 9 + b$

$3 = -4\frac{1}{2} + b$

$7\frac{1}{2} = b$. Dus $k$: $y = -\frac{1}{2}x + 7\frac{1}{2}$.

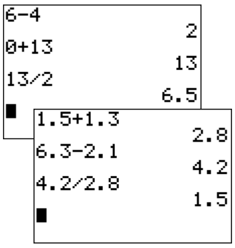
D2b $m$: $y = 6$.

D2c Snijpunt met de $x$-as $(y = 0) \Rightarrow 0 = 8x + 5 \Rightarrow -8x = 5 \Rightarrow x = -0{,}625 \Rightarrow A(-0{,}625;\ 0)$.
Snijpunt met de $y$-as $(x = 0) \Rightarrow y = 8 \cdot 0 + 5 = 5 \Rightarrow B(0, 5)$.

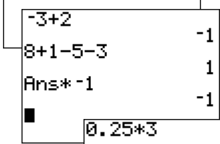



D3a $6x - 13 = 4x$
$2x = 13$
$x = \frac{13}{2} = 6{,}5$.

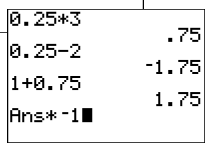
D3b $1{,}5x + 2{,}1 = 6{,}3 - 1{,}3x$
$2{,}8x = 4{,}2$
$x = \frac{4{,}2}{2{,}8} = 1{,}5$.




D3c $5 - 3(x - 1) = 8 - (2x - 1)$
$5 - 3x + 3 = 8 - 2x + 1$
$-x = 1 \Rightarrow x = -1$.



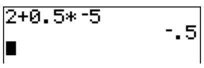

D3d $0{,}25(x - 3) = 2x + 1$
$0{,}25x - 0{,}75 = 2x + 1$
$-1{,}75x = 1{,}75 \Rightarrow x = \frac{1{,}75}{-1{,}75} = -1$.




D4a $k$: $y = ax + b$ met $a = \frac{\Delta y}{\Delta x} = \frac{-2-2}{3--5} = \frac{-4}{8} = -0{,}5$.

$\left.\begin{array}{l} y = -0{,}5x + b \\ \text{door } A(-5, 2) \end{array}\right\} \Rightarrow 2 = -0{,}5 \cdot -5 + b$

$-0{,}5 = b$. Dus $k$: $y = -0{,}5x - 0{,}5$.




D4b $l$: $y = ax + b$ met $a = \frac{\Delta y}{\Delta x} = \frac{135-60}{65-40} = \frac{75}{25} = 3$.

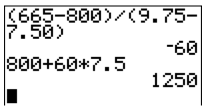
$\left.\begin{array}{l} y = 3x + b \\ \text{door } Q(40, 60) \end{array}\right\} \Rightarrow 60 = 3 \cdot 40 + b$

$-60 = b$. Dus $l$: $y = 3x - 60$.

D5a $t = ap + b$ met $a = \frac{\Delta t}{\Delta p} = \frac{665-800}{9{,}75-7{,}50} = \frac{-135}{2{,}25} = -60$.

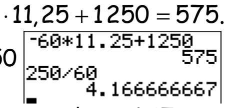
$\left.\begin{array}{l} t = -60p + b \\ \text{door } A(7{,}5;\ 800) \end{array}\right\} \Rightarrow 800 = -60 \cdot 7{,}5 + b$

$1250 = b$. Dus $t = -60p + 1250$.




D5b $p = 11{,}25 \Rightarrow t = -60 \cdot 11{,}25 + 1250 = 575$.

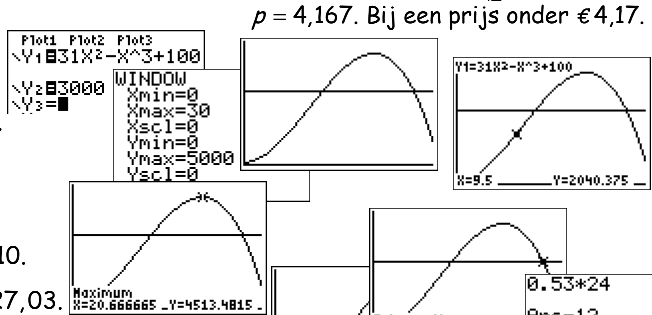
D5c $1000 = -60 \cdot p + 1250$
$60p = 250$
$p = 4{,}167$. Bij een prijs onder € 4,17.



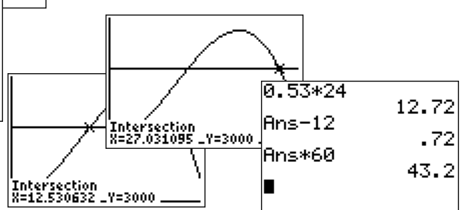

D6a Maak een schets van de plot (kromme) hiernaast.

D6b Op 10 juni om 12:00 is $t = 9{,}5 \Rightarrow N(9{,}5) \approx 2\,040{,}375$.
Dus er zijn 2 040 Coloradokevers.

D6c De optie maximum geeft $t \approx 20{,}67$ en $N \approx 4\,513{,}48$.
$t \approx 20{,}67$ hoort bij 21 juni.
Het maximale aantal Coloradokevers is ongeveer 4 510.




D6d $31t^2 - t^3 + 100 = 3\,000$ (intersect) $\Rightarrow t \approx 12{,}53$ en $t \approx 27{,}03$.
Op 13 juni (om 12:43) komt het aantal boven 3 000 en
op 28 juni (om 00:43) komt het aantal weer onder 3 000.
Dus van 13 juni tot 28 juni zijn er meer dan 3 000 Coloradokevers.

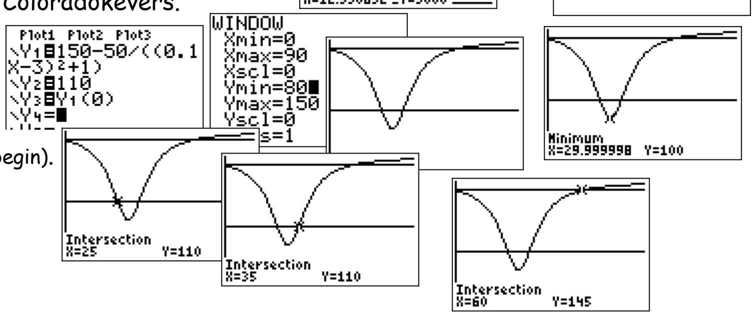



D7a Maak een schets van de plot (de kromme) hiernaast.

D7b De optie minimum geeft $t = 30$ (dagen na het begin).

D7c $N = 110$ (intersect) $\Rightarrow t = 25$ en $t = 35$ (dagen na het begin).
Dus gedurende $35 - 25 = 10$ dagen.

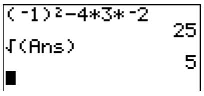
D7d $N = N(0)$ (intersect) $\Rightarrow t = 60$ (dagen na het begin).



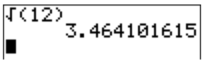
**D8a** $3x^2 - x = 0$
$x \cdot (3x - 1) = 0$
$x = 0 \vee 3x = 1$
$x = 0 \vee x = \frac{1}{3}$.

**D8b** $3x^2 - 9x = 12$
$3x^2 - 9x - 12 = 0$
$x^2 - 3x - 4 = 0$
$(x + 1) \cdot (x - 4) = 0$
$x = -1 \vee x = 4$.

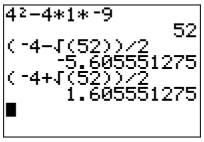
**D8c** $3x^2 - x = 2$
$3x^2 - x - 2 = 0$
$D = (-1)^2 - 4 \cdot 3 \cdot -2 = 25$
$x = \frac{1-5}{6} = -\frac{2}{3} \vee x = \frac{1+5}{6} = 1$.




**D8d** $x^2 + 4 = 16$
$x^2 = 12$
$x = -\sqrt{12} \approx -3{,}46 \vee x = \sqrt{12} \approx 3{,}46$.

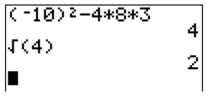



**D8e** $x^2 + 2 \cdot (2x - 6) = -3$
$x^2 + 4x - 12 = -3$
$x^2 + 4x - 9 = 0$
$D = 4^2 - 4 \cdot 1 \cdot -9 = 52$
$x = \frac{-4-\sqrt{52}}{2} \approx -5{,}61 \vee x = \frac{-4+\sqrt{52}}{2} \approx 1{,}61$.

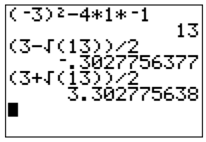



**D8f** $(3x - 5) \cdot (2x - 6) = 0$
$3x = 5 \vee 2x = 6$
$x = \frac{5}{3} \vee x = 3$.

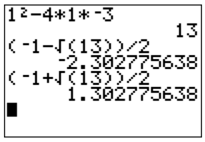
**D8g** $8x^2 + 3 = 10x$
$8x^2 - 10x + 3 = 0$
$D = (-10)^2 - 4 \cdot 8 \cdot 3 = 4$
$x = \frac{10-2}{16} = \frac{1}{2} \vee x = \frac{10+2}{16} = \frac{12}{16} = \frac{3}{4}$.




**D8h** $(3x + 2) \cdot (x - 1) = (x + 5) \cdot x$
$3x^2 - 3x + 2x - 2 = x^2 + 5x$
$2x^2 - 6x - 2 = 0$
$x^2 - 3x - 1 = 0$
$D = (-3)^2 - 4 \cdot 1 \cdot -1 = 13$
$x = \frac{3-\sqrt{13}}{2} \approx -0{,}30 \vee x = \frac{3+\sqrt{13}}{2} \approx 3{,}30$.

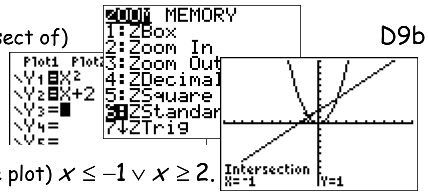



**D8i** $(x + 2)^2 = 3x + 7$
$x^2 + 4x + 4 = 3x + 7$
$x^2 + x - 3 = 0$
$D = 1^2 - 4 \cdot 1 \cdot -3 = 13$
$x = \frac{-1-\sqrt{13}}{2} \approx -2{,}30 \vee x = \frac{-1+\sqrt{13}}{2} \approx 1{,}30$.

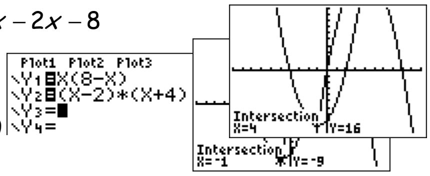



**D8j** $9 - (x - 1)^2 = (x - 4)^2$
$9 - (x^2 - 2x + 1) = x^2 - 8x + 16$
$9 - x^2 + 2x - 1 = x^2 - 8x + 16$
$-2x^2 + 10x - 8 = 0$
$x^2 - 5x + 4 = 0$
$(x - 1) \cdot (x - 4) = 0$
$x = 1 \vee x = 4$.

**D9a** $x^2 = x + 2$ (intersect of)
$x^2 - x - 2 = 0$
$(x + 1)(x - 2) = 0$
$x = -1 \vee x = 2$.
$x^2 \geq x + 2 \Rightarrow$ (zie plot) $x \leq -1 \vee x \geq 2$.




**D9b** $x \cdot (8 - x) = (x - 2) \cdot (x + 4)$ (algebraïsch of intersect)
$8x - x^2 = x^2 + 4x - 2x - 8$
$-2x^2 + 6x + 8 = 0$
$x^2 - 3x - 4 = 0$
$(x + 1) \cdot (x - 4) = 0$
$x = -1 \vee x = 4$.
$x \cdot (8 - x) > (x - 2) \cdot (x + 4) \Rightarrow$ (zie plot) $-1 < x < 4$.

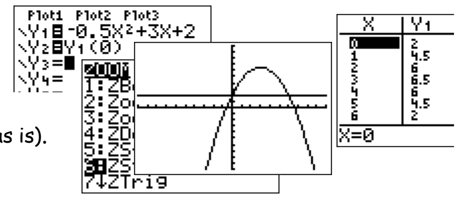


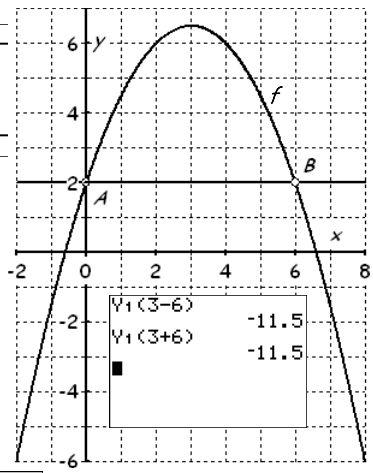

**D10a** Zie de grafiek van $f$ (parabool) hiernaast.
(gebruik een plot en een tabel voor de waarden)

**D10b** De optie maximum geeft $x = 3$ en $y = 6{,}5$.
Dus het maximum van $f$ is $f(3) = 6{,}5$.
(kan ook met de tabel omdat $x = 3$ de symmetrieas is).

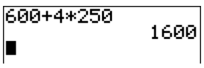
**D10c** $A(0, 2)$ en $B(6, 2)$ (zie de tabel) $\Rightarrow AB = 6$.

**D10d** De afstand van het punt $C$ (en het punt $D$) tot de symmetrieas $x = 3$ is gelijk aan 6.
Dus $CD = 2 \cdot 6 = 12 \Rightarrow x_C = 3 - 6 = -3$ en $x_D = 3 + 6 = 9 \Rightarrow c = f(-3) = f(9) = -11{,}5$.



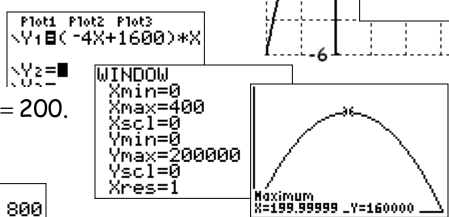




**D11a** $p = aq + b$ met $a = \frac{\Delta p}{\Delta q} = \frac{640-600}{240-250} = \frac{40}{-10} = -4$.
$\left.\begin{array}{l} p = -4q + b \\ \text{door } (250, 600) \end{array}\right\} \Rightarrow 600 = -4 \cdot 250 + b$
$1600 = b$. Dus $p = -4q + 1600$ (€).

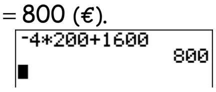



**D11b** $R = p \cdot q = (-4q + 1600) \cdot q = -4q^2 + 1600q$ (€).

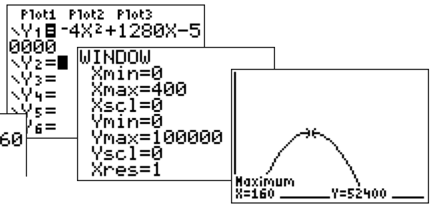
**D11c** $R = (-4q + 1600) \cdot q = 0 \Rightarrow q = 400 \vee q = 0 \Rightarrow$ symmetrieas $q = 200$.
(of met de optie maximum geeft $q = 200$ en $R = 160\,000$)
$q = 200 \Rightarrow p = -4 \cdot 200 + 1600 = -800 + 1600 = 800$ (€).




**D11d** $K = 320q + 50\,000$ (€).



D11e $W = R - K = -4q^2 + 1600q - (320q + 50\,000)$
$= -4q^2 + 1600q - 320q - 50\,000 = -4q^2 + 1280q - 50\,000$ (€).




D11f De optie maximum geeft $q = 160$ en $W = 52\,400$ (€).
$q = 160 \Rightarrow p = -4 \cdot 160 + 1600 = -640 + 1600 = 960$ (€).
De maximale winst is $52\,400$ (€).

```
-4*160+1600
                 960
```

**Gemengde opgaven 1. Functies en grafieken**

G14a $5x^2 - 6x = 0$
$x \cdot (5x - 6) = 0$
$x = 0 \vee 5x = 6$
$x = 0 \vee x = \frac{6}{5} = 1{,}2.$

G14b $5x^2 - 6x = 8$
$5x^2 - 6x - 8 = 0$
$D = (-6)^2 - 4 \cdot 5 \cdot -8 = 196$
$x = \frac{6-14}{10} = -0{,}8 \vee x = \frac{6+14}{10} = 2.$

```
(-6)²-4*5*-8
              196
√(196)
               14
```

G14c $5x^2 - 6x = 4x$
$5x^2 - 10x = 0$
$5x \cdot (x - 2) = 0$
$x = 0 \vee x = 2.$

G14d $3x^2 + 5 = 9$
$3x^2 = 4$
$x^2 = \frac{4}{3}$
$x = \pm\sqrt{\frac{4}{3}}$
$x \approx -1{,}15 \vee x \approx 1{,}15.$

```
√(4/3)
      1.154700538
```

G14e $x^2 + 3(x - 6) = 3x$
$x^2 + 3x - 18 = 3x$
$x^2 = 18$
$x = \pm\sqrt{18}$
$x \approx -4{,}24 \vee x \approx 4{,}24.$

```
√(18)
      4.242640687
```

G14f $(2x - 3)(5x - 9) = 0$
$2x = 3 \vee 5x = 9$
$x = \frac{3}{2} = 1{,}5 \vee x = \frac{9}{5} = 1{,}8.$

G14g $8x + 3 = 10(6x - 2)$
$8x + 3 = 60x - 20$
$-52x = -23$
$x = \frac{-23}{-52} = \frac{23}{52} \approx 0{,}44.$

```
23/52
      .4423076923
```

G14h $(3x + 2)(x - 1) = 2$
$3x^2 - 3x + 2x - 2 = 2$
$3x^2 - x - 4 = 0$
$D = (-1)^2 - 4 \cdot 3 \cdot -4 = 49$
$x = \frac{1-7}{6} = -1 \vee x = \frac{1+7}{6} = \frac{4}{3}.$

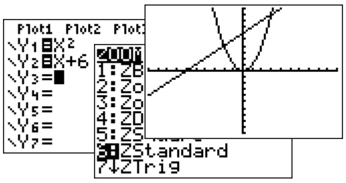
```
(-1)²-4*3*-4
               49
√(Ans)
                7
```

G14i $(x + 2)^2 = 25$
$x + 2 = 5 \vee x + 2 = -5$
$x = 3 \vee x = -7.$

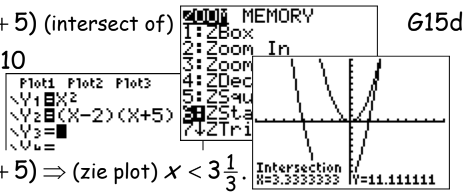
G14j $8 + (2x - 1)^2 = 11x$
$8 + 4x^2 - 2x - 2x + 1 = 11x$
$4x^2 - 15x + 9 = 0$
$D = (-15)^2 - 4 \cdot 4 \cdot 9 = 81$
$x = \frac{15-9}{8} = 0{,}75 \vee x = \frac{15+9}{8} = 3.$

```
(-15)²-4*4*9
               81
√(Ans)
                9
```

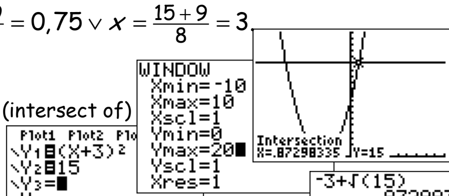
G15a $x^2 = x + 6$ (intersect of)
$x^2 - x - 6 = 0$
$(x + 2)(x - 3) = 0$
$x = -2 \vee x = 3.$
$x^2 \geq x + 6 \Rightarrow$ (zie plot) $x \leq -2 \vee x \geq 3.$




G15b $x^2 = (x - 2)(x + 5)$ (intersect of)
$x^2 = x^2 + 3x - 10$
$-3x = -10$
$x = \frac{-10}{-3} = 3\frac{1}{3}.$
$x^2 > (x - 2)(x + 5) \Rightarrow$ (zie plot) $x < 3\frac{1}{3}.$

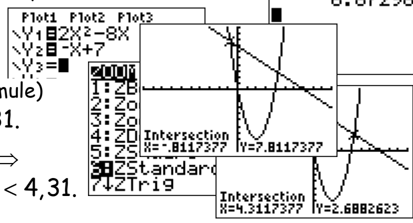



G15c $(x + 3)^2 = 15$ (intersect of)
$x + 3 = \pm\sqrt{15}$
$x = -3 \pm \sqrt{15}$
$(x + 3)^2 \leq 15 \Rightarrow$ (zie plot) $-6{,}87 \leq x \leq 0{,}87.$




```
-3+√(15)
      .8729833462
-3-√(15)
     -6.872983346
```

G15d $2x^2 - 8x = -x + 7$
(intersect of $abc$-formule)
$x \approx -0{,}81 \vee x \approx 4{,}31.$
$2x^2 - 8x < -x + 7 \Rightarrow$
(zie plot) $-0{,}81 < x < 4{,}31.$




G16a $m$: $y = ax + b$ met $a = \text{rc}_m = \text{rc}_k = -0{,}5.$
$\left.\begin{array}{l} y = -0{,}5x + b \\ \text{door } A(-4, 3) \end{array}\right\} \Rightarrow 3 = -0{,}5 \cdot -4 + b$
$1 = b.$ Dus $y = -0{,}5x + 1.$

```
3+0.5*-4
                1
```

G16b $k$ snijden met de $x$-as ($y = 0$)
$0 = -0{,}5x + 16 \Rightarrow 0{,}5x = 16 \Rightarrow x = 32 \Rightarrow B(32, 0).$
$n$: $y = ax + b$ met $a = \text{rc}_n = \text{rc}_l = 2.$
$\left.\begin{array}{l} y = 2x + b \\ \text{door } B(32, 0) \end{array}\right\} \Rightarrow 0 = 2 \cdot 32 + b$
$-64 = b.$ Dus $y = 2x - 64.$

```
16/0.5
               32
0-2*32
              -64
```

G16c $-0{,}5x + 16 = 2x - 9$
$-2{,}5x = -25$
$x = 10 \Rightarrow y = 2 \cdot 10 - 9 = 11 \Rightarrow C(10, 11).$

```
25/2.5
               10
2*10-9
               11
```

G16d $-24 = 2x - 9$
$-15 = 2x$
$x = -7{,}5 = x_D.$

```
-24+9
              -15
Ans/2
             -7.5
```

```
(890.22-735.94)/
(2906-2355)
              .28
735.94-0.28*2355
            76.54
```

G17a $B = ag + b$ met $a = \frac{\Delta B}{\Delta g} = \frac{890{,}22 - 735{,}94}{2906 - 2355} = 0{,}28.$

$\left.\begin{array}{l} B = 0{,}28g + b \\ \text{door } A(2355;\, 735{,}94) \end{array}\right\} \Rightarrow 735{,}94 = 0{,}28 \cdot 2355 + b$

$76{,}54 = b$. Dus $B = 0{,}28g + 76{,}54$.

G17b Het vastrecht is €76,54.
De prijs per $m^3$ gas is €0,28.

G17c $g = 2318 \Rightarrow B = 0{,}28 \cdot 2318 + 76{,}54$

```
0.28*2318+76.54
          725.58
```

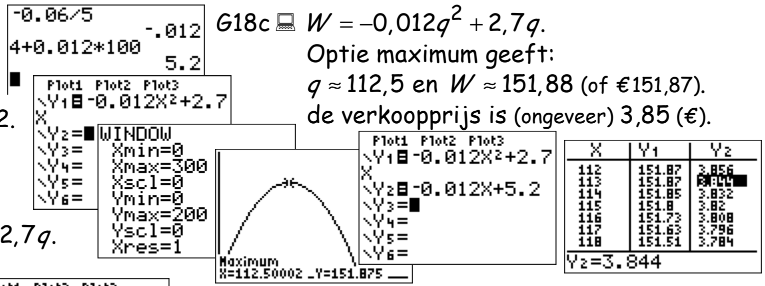
$= 725{,}58$ (€).

G18a $p = aq + b$ met $a = \frac{\Delta p}{\Delta q} = \frac{3{,}94 - 4}{105 - 100} = \frac{-0{,}06}{5} = -0{,}012.$

$\left.\begin{array}{l} p = -0{,}012q + b \\ \text{door } A(100,\, 4) \end{array}\right\} \Rightarrow 4 = -0{,}012 \cdot 100 + b$

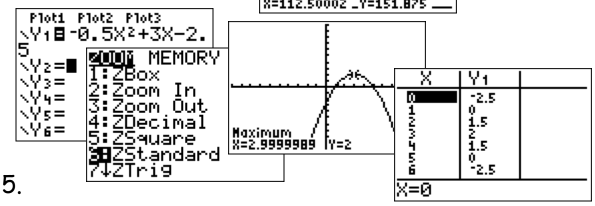
$5{,}2 = b$. Dus $p = -0{,}012q + 5{,}2$.

G18b $K = 2{,}50q$.
$R = p \cdot q = (-0{,}012q + 5{,}2) \cdot q = -0{,}012q^2 + 5{,}2q.$
$W = R - K = -0{,}012q^2 + 5{,}2q - 2{,}5q = -0{,}012q^2 + 2{,}7q.$




G18c $W = -0{,}012q^2 + 2{,}7q$.
Optie maximum geeft:
$q \approx 112{,}5$ en $W \approx 151{,}88$ (of €151,87).
de verkoopprijs is (ongeveer) 3,85 (€).

G19a Plot de grafiek van $f(x) = -0{,}5x^2 + 3x - 2{,}5$.
De optie maximum geeft $x = 3$ en $y = 2$.
Het maximum van $f$ is $f(3) = 2$.




G19b $T(3,\, 2)$ en $C(0;\, -2{,}5)$
$TC$: $y = ax + b$ met $a = \frac{\Delta y}{\Delta x} = \frac{-2{,}5 - 2}{0 - 3} = \frac{-4{,}5}{-3} = 1{,}5.$
$y = 1{,}5x + b$ door $C(0;\, -2{,}5) \Rightarrow TC$: $y = 1{,}5x - 2{,}5$.

G19c $-0{,}5x^2 + 3x - 2{,}5 = 0$ (keer $-2$)
$x^2 - 6x + 5 = 0.$
$(x-5)(x-1) = 0$
$x = 5 \vee x = 1 \Rightarrow B(5,\, 0)$

$rc_k = rc_{BC} = \frac{\Delta y}{\Delta x} = \frac{0 - -2{,}5}{5 - 0} = \frac{2{,}5}{5} = 0{,}5.$

$\left.\begin{array}{l} k\text{: } y = 0{,}5x + b \\ \text{door } T(3,\, 2) \end{array}\right\} \Rightarrow 2 = 0{,}5 \cdot 3 + b$

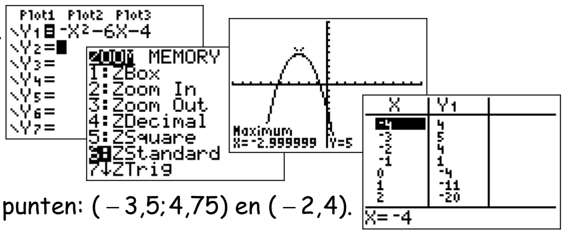
$0{,}5 = b \Rightarrow k$: $y = 0{,}5x + 0{,}5$

$k$ snijden met de $x$-as ($y = 0$):
$0 = 0{,}5x + 0{,}5$
$-0{,}5x = 0{,}5$
$x = -1 \Rightarrow D(-1,\, 0)$.

G20a Optie maximum $\Rightarrow x = -3$ en $y = 5 \Rightarrow$ maximum van $g$ is $g(-3) = 5$.

G20b $-0{,}5x + 3 = -x^2 - 6x - 4$
$x^2 + 5{,}5x + 7 = 0$ ($abc$-formule of)
$(x+2) \cdot (x+3{,}5) = 0$
$x = -2 \vee x = -3{,}5.$

```
5.5²-4*1*7
            2.25
√(2.25)
             1.5
(-5.5+1.5)/2
              -2
(-5.5-1.5)/2
```




$f(-2) = -0{,}5 \cdot -2 + 3 = 4$ en $f(-3{,}5) = -0{,}5 \cdot -3{,}5 + 3 = 4{,}75 \Rightarrow$ snijpunten: $(-3{,}5;\, 4{,}75)$ en $(-2,\, 4)$.

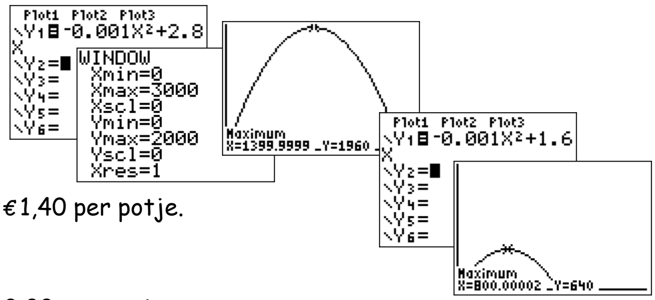
G20c $x_A = x_B = 2 \Rightarrow y_A = f(2) = -0{,}5 \cdot 2 + 3 = 2$ en $y_B = g(2) = -2^2 - 6 \cdot 2 - 4 = -20 \Rightarrow y_B - y_A = AB = 2 - -20 = 22.$

G21a $p = aq + b$ met $a = \frac{\Delta p}{\Delta q} = \frac{1{,}70 - 1{,}80}{1100 - 1000} = \frac{-0{,}10}{100} = -0{,}001.$

$\left.\begin{array}{l} p = -0{,}001q + b \\ \text{door } (1000;\, 1{,}80) \end{array}\right\} \Rightarrow 1{,}80 = -0{,}001 \cdot 1000 + b$

```
1.80+0.001*1000
             2.8
```

$2{,}80 = b$. Dus $p = -0{,}001q + 2{,}8$.
$R = p \cdot q = (-0{,}001q + 2{,}8) \cdot q = -0{,}001q^2 + 2{,}8q.$
$K = 1{,}2 \cdot q$
$W = R - K = -0{,}001q^2 + 2{,}8q - 1{,}2q = -0{,}001q^2 + 1{,}6q.$



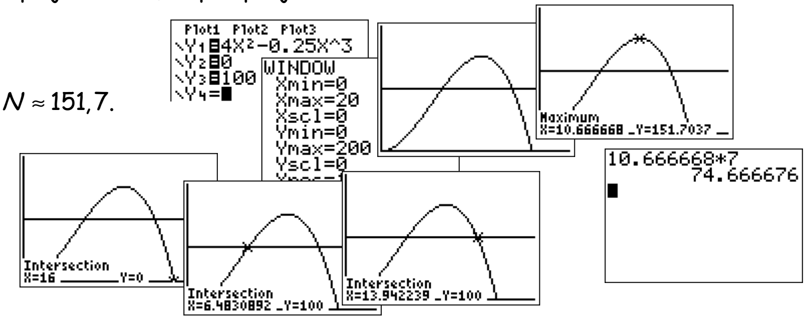

G21b Optie maximum $\Rightarrow q = 1400$ en $R_{max} = 1960$.
$q = 1400 \Rightarrow p = -0{,}001 \cdot 1400 + 2{,}8 = 1{,}4.$
De weekopbrengst is maximaal (€1960) bij een prijs van €1,40 per potje.

G21c Optie maximum $\Rightarrow q = 800$ en $W = 640$.
$q = 800 \Rightarrow p = -0{,}001 \cdot 800 + 2{,}8 = 2.$
De maximale winst per week is €640 bij een prijs van €2,00 per potje.

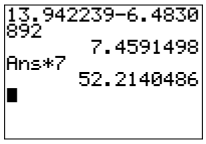
G22a Maak een schets van de plot (hiernaast).

G22b Optie maximum geeft: $t \approx 10{,}67$ (weken) en $N \approx 151{,}7$.
Dus (ongeveer) $10{,}67 \cdot 7 \approx 75$ dagen na 1 mei.
Er zijn dan ruim 150 koeien ziek.

G22c $N = 0$ (intersect) $\Rightarrow t = 16$ (weken na 1 mei).



G22d $N = 100$ (intersect) $\Rightarrow t \approx 6,48$ en $t \approx 13,94$.
Dus gedurende $13,94 - 6,48 \approx 7,46$ weken.
Er zijn gedurende 52 dagen meer dan 100 koeien ziek.



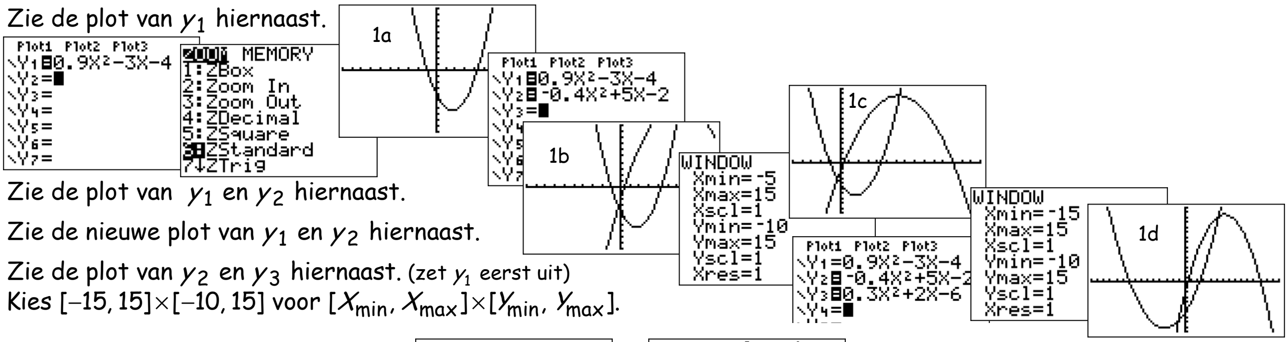

**TI-84** **3. Omgaan met formules**

1a Zie de plot van $y_1$ hiernaast.

1b Zie de plot van $y_1$ en $y_2$ hiernaast.

1c Zie de nieuwe plot van $y_1$ en $y_2$ hiernaast.

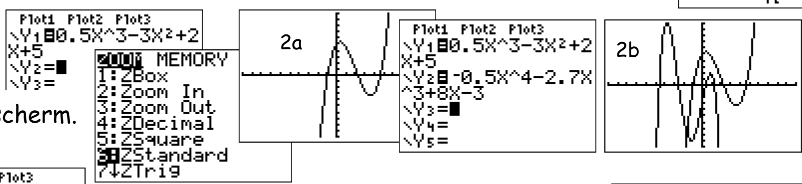
1d Zie de plot van $y_2$ en $y_3$ hiernaast. (zet $y_1$ eerst uit)
Kies $[-15, 15] \times [-10, 15]$ voor $[X_{min}, X_{max}] \times [Y_{min}, Y_{max}]$.



2a Zie scherm 2a hiernaast.

2b Zie scherm 2b hiernaast.

2c Er is één snijpunt op het standaardscherm.



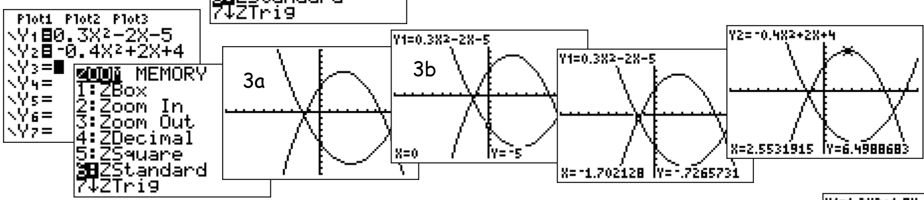
3a Zie scherm 3a hiernaast.

3b Zie scherm 3b hiernaast.

3c $(-1,702;\ -0,727)$.

3d Ga dit zelf na.

3e $(2,553;\ 6,499)$.

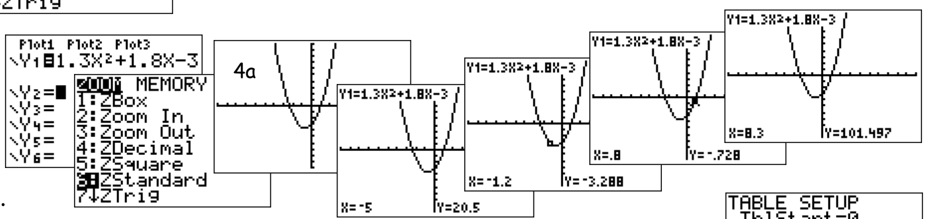


4a Zie scherm 4a hiernaast.

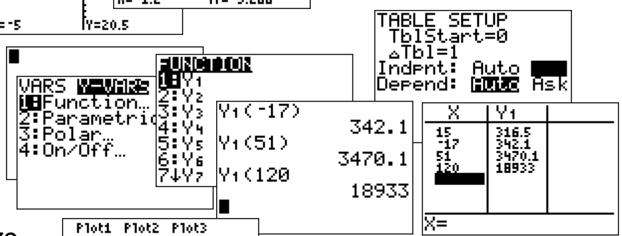
4b $f(-5) = 20,5$; $f(-1,2) = -3,288$;
$f(0,8) = -0,728$; $f(8,3) = 101,497$.

4c Ga dit zelf na.

4d Neem $[-20, 130]$ voor $[X_{min}, X_{max}]$.
Je vindt dan: $f(15) = 316,5$.



4e $f(-17) = 342,1$; $f(51) = 3\,470,1$ en $f(120) = 18\,933$. (ga dit zelf na)
Een andere manier op het basisscherm met VARS ▸ ENTER 1 zie je hiernaast.
(2nd ENTER geeft de laatste invoer waarna de getallen te overschrijven zijn)
Nog anders: met TABLE (zet Indpnt op Ask; zie verder ook opgave 6 en 7).

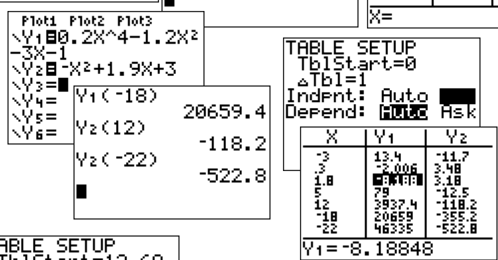


5a $y_1(-3) = 13,4$; $y_1(0,3) = -2,00638$; $y_1(1,8) = -8,18848$ en $y_1(5) = 79$.
(oefen voor jezelf met TRACE, VARS of 2nd GRAPH = [TABLE])

5b $y_2(-3) = -11,7$; $y_2(0,3) = 3,48$; $y_2(1,8) = 3,18$ en $y_2(5) = -12,5$.

5c $y_1(12) = 3\,937,4$ en $y_1(-18) = 20\,659,4$.

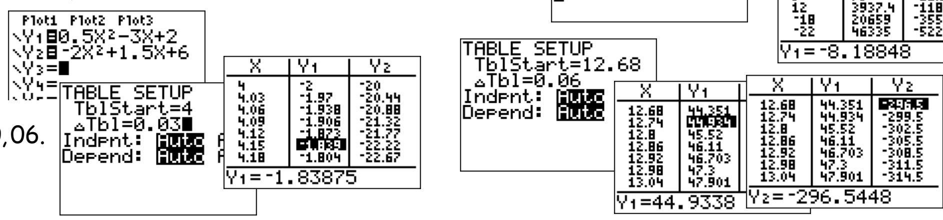
5d $y_2(12) = -118,2$ en $y_2(-22) = -522,8$.



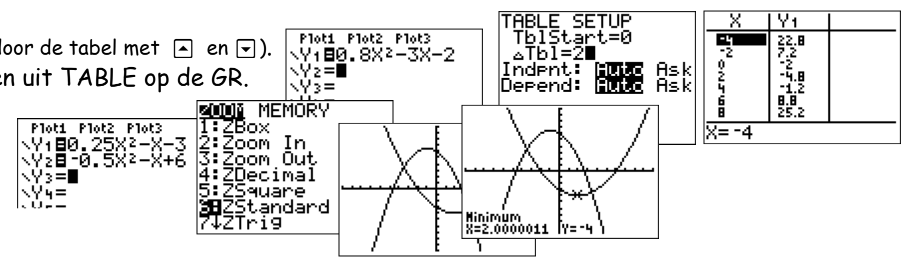
6a Zie de schermen hiernaast.

6b $y_1(4,15) = -1,83875$.

6c Tblstart $= 12,68$ en $\Delta$Tbl $= 0,06$.
$y_1(12,74) = 44,9338$ en
$y_2(12,68) = -296,5448$.

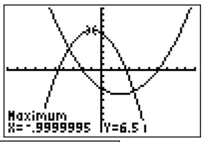


7 Tblstart $= 0$ en $\Delta$Tbl $= 2$ (blader door de tabel met ▴ en ▾).
Maak de tabel af met de waarden uit TABLE op de GR.



8a Zie de schermen hiernaast.

8b De top van $y_1$ is $(2, -4)$.
De top van $y_2$ is $(-1; 6,5)$.



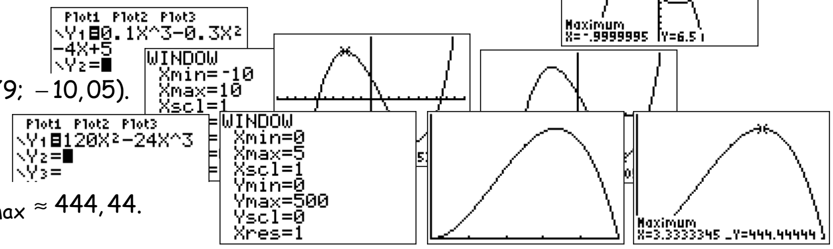
9a Zie de schermen hiernaast.

9b De toppen zijn $(-2,79; 11,65)$ en $(4,79; -10,05)$.

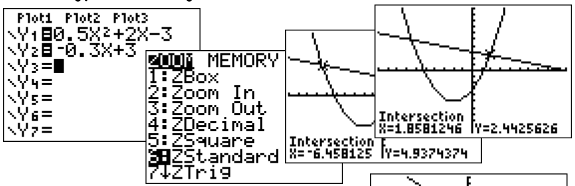
10a Zie de schermen hiernaast.

10b De top is $(3,33; 444,44)$.

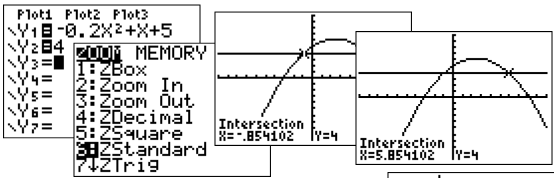
10c Voor $t \approx 3,33$ is $N$ maximaal met $N_{max} \approx 444,44$.



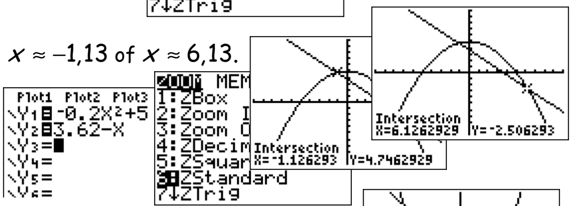
11 De snijpunten zijn $(-6,46; 4,94)$ en $(1,86; -2,44)$.



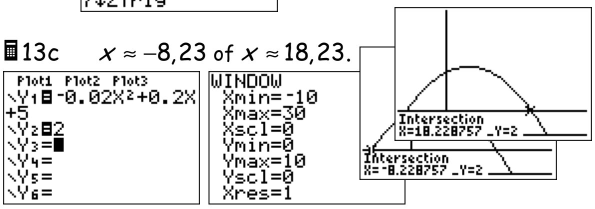
12 De oplossingen zijn $x \approx -0,85$ en $x \approx 5,85$.



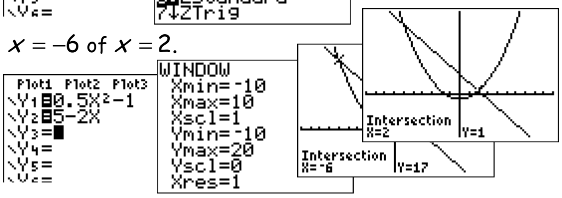
13a $x \approx -1,13$ of $x \approx 6,13$.



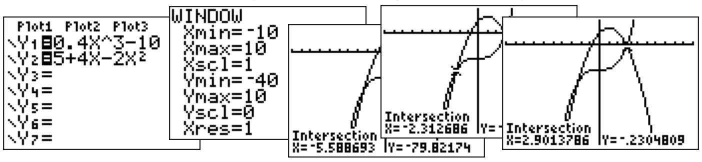
13c $x \approx -8,23$ of $x \approx 18,23$.



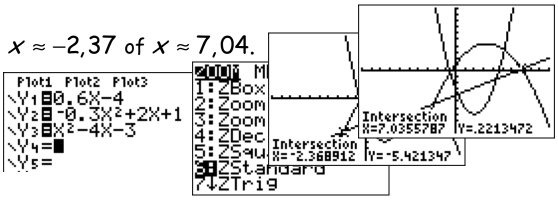
13b $x = -6$ of $x = 2$.



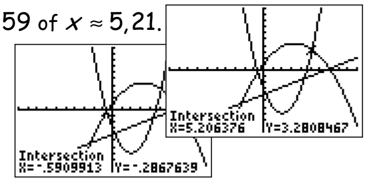
13d $x \approx -5,59$ of $x \approx -2,31$ of $x \approx 2,90$.



14ab $x \approx -2,37$ of $x \approx 7,04$.

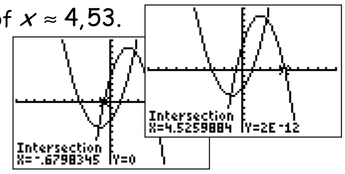


14c $x \approx -0,59$ of $x \approx 5,21$.

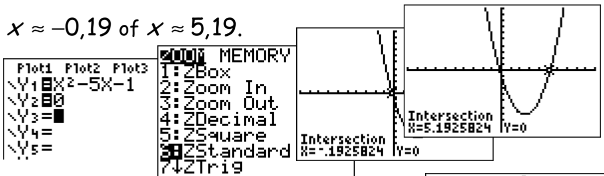


15abc $x \approx -3,25$ of $x \approx 1,03$. (ik kies liever voor snijden met $y = 0$ in plaats van de optie zero)

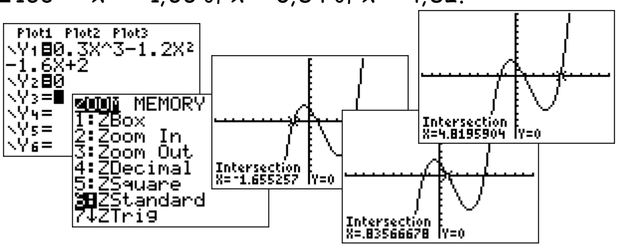
15d $x \approx -0,68$ of $x \approx 4,53$.



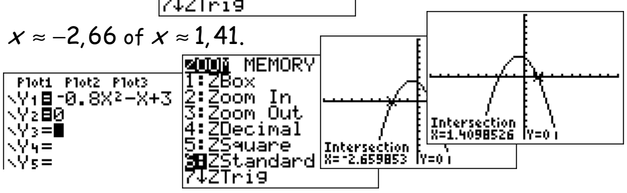
16a $x \approx -0,19$ of $x \approx 5,19$.



16c $x \approx -1,66$ of $x \approx 0,84$ of $x \approx 4,82$.

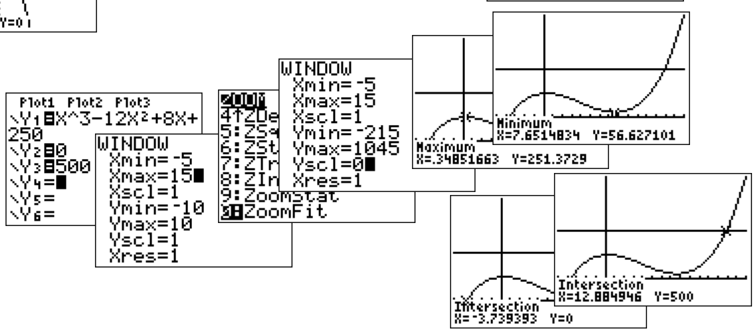


16b $x \approx -2,66$ of $x \approx 1,41$.



17a Zie de plot hiernaast.
WINDOW: $[-5, 15] \times [-215, 1045]$.

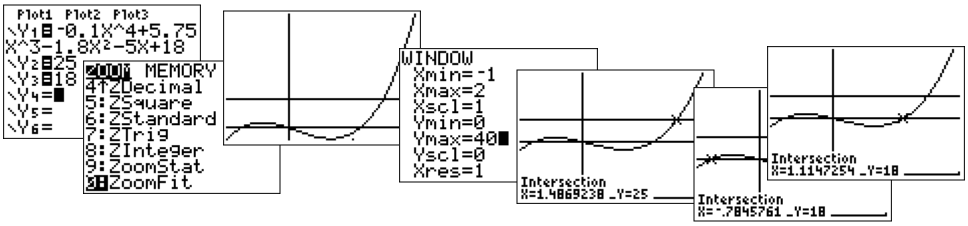
17b De toppen zijn $(0,35; 251,37)$ en $(7,65; 56,63)$.



17c $x \approx -3{,}74$.

17d $x \approx 12{,}88$.

18a Zie de plot hiernaast.
WINDOW: $[-1, 2] \times [0, 40]$.




18b $x \approx 1{,}49$.

18c $x \approx -0{,}78$ of $x \approx 1{,}11$.