Uitwerkingen H14
Algebraïsche vaardigheden

1a. $\Delta x = 6 - 2 = 4$ en $\Delta y = 9{,}60 - 5 = 4{,}60$

b. Voor 4 km een bedrag van 4,60 euro $\Rightarrow$ Per km dus een bedrag van 1 ,15 euro.
Dat is het quotiënt van Δy en Δx.

c. Bij 2 km zijn de kosten 5 euro dus bij 0 km zijn de kosten 5 euro - 2 . 1,15 euro = 2,70 euro.

d. $y = 1{,}15x + 2{,}70$

2. $q = 13$ dan $P = 57$; $q = 17$ dan $P = 125$

a.

$$a = \frac{\Delta P}{\Delta q} = \frac{125-57}{17-13} = \frac{68}{4} = 17 \Rightarrow$$

$$\left.\begin{array}{l} P = 17q + b \\ P = 57 \ en \ q = 13 \end{array}\right\} \Rightarrow 57 = 17 \cdot 13 + b \Leftrightarrow b = -164 \Rightarrow P = 17q - 164$$

b.

$$t = 55 \text{ dan A=360; } t = 61 \text{ dan } A = 300 \Rightarrow$$

$$\frac{\Delta A}{\Delta t} = \frac{300-360}{61-55} = -10 \Rightarrow A = -10t + b$$

$$t = 55 \text{ dan A=360} \Rightarrow 360 = -10 \cdot 55 + b \Leftrightarrow b = 910 \Rightarrow A = -10t + 910$$

3. Vaste kosten 864 euro per dag en 1,40 euro per vaas. Verkoop 2,60 euro per vaas.

a. Uit het gegeven volgt meteen : $K = 1{,}40q + 864$

b. Opbrengst is : $R = 2{,}60q$

c. Nu moet gelden : $K = R \Rightarrow$ $2{,}60q = 1{,}40q + 864 \Leftrightarrow 1{,}20q = 864 \Leftrightarrow q = 720 \Rightarrow$
Bij een dagproductie van 720 zijn de kosten gelijk aan de opbrengst.

d. Dagwinst is 900 $\Rightarrow$ $R - K = 900 \Leftrightarrow$ $2{,}60q - (1{,}40q + 864) = 900 \Leftrightarrow$
$1{,}20q = 1764 \Leftrightarrow q = 1470 \Rightarrow$ Bij een dagproductie van 1470 stuks is de winst 900 euro.

4. Bij 24° C 32 sjirpen per 15 seconden en bij 19° C 24 sjirpen per 15 seconden.

a. $\frac{\Delta n}{\Delta T} = \frac{32-24}{24-19} = \frac{8}{5} = 1{,}6 \Rightarrow n = 1{,}6T + b$

Bij $T = 19$ dan n = 24 $\Rightarrow 24 = 1{,}6 \cdot 19 + b \Leftrightarrow b = -6{,}4 \Rightarrow$
De gevraagde formule is : $n = 1{,}6T - 6{,}4$

b.

$$n = 1{,}6T - 6{,}4 \Leftrightarrow 1{,}6T = n + 6{,}4 \Leftrightarrow T = \frac{n + 6{,}4}{1{,}6} \Leftrightarrow T = \tfrac{5}{8}n + 4$$

c. 88 sjirpen per minuut ⇔ 22 sjirpen per 15 seconden.
Nu dit invullen in de formule van b. ⇒ $T = \tfrac{5}{8} \cdot 22 + 4 = 17{,}75 \Rightarrow$
De temperatuur is dan 17,75° C.

5.

a. Kijk naar de grafiek van de vrachtauto. Aflezen geeft bij a = 150 km kosten van 200 euro per TEU. ⇒ De totale kosten zijn dan : 10 . 200 = 2000 euro.

b. **Foutje in boek**. Het moet zijn 69.000 bij 300 TEU ⇒ $\dfrac{69.000}{300} = 230$ euro per TEU.
Nu aflezen in de grafiek van de trein. ⇒ De transportafstand is dan 365 km.

c.

Vrachtauto : a = 100 dan K = 150 en a = 0 dan K = 50 ⇒

$$\frac{\Delta K}{\Delta a} = \frac{150 - 50}{100 - 0} = 1 \text{ en } b = 50 \Rightarrow K = a + 50$$

Trein: Punten

$$(0{,}150) \text{ en } (250{,}200) \Rightarrow r.c. = \frac{\Delta K}{\Delta a} = \frac{200 - 150}{250} = 0{,}2 \Rightarrow K = 0{,}2a + 150$$

$$(250{,}200) \text{ en } (450{,}250) \Rightarrow \text{ r.c.} = \frac{\Delta K}{\Delta a} = \frac{250 - 200}{450 - 250} = 0{,}25 \Rightarrow$$

Schip : Punten $K = 0{,}25a + b$ door (250,200) $\Rightarrow 200 = 62{,}5 + b \Rightarrow b = 137{,}5 \Rightarrow$

$$K = 0{,}25a + 137{,}5$$

d.

We moeten dan de snijpunten van de treinfunctie met de 2 andere functies berekenen. ⇒

$$0{,}25a + 137{,}5 = a + 50 \Leftrightarrow 0{,}75a = 87{,}5 \Leftrightarrow a = \frac{87{,}5}{0{,}75} \approx 117$$

$$0{,}2a + 150 = 0{,}25a + 137{,}5 \Leftrightarrow 0{,}05a = 12{,}5 \Leftrightarrow a = 250$$

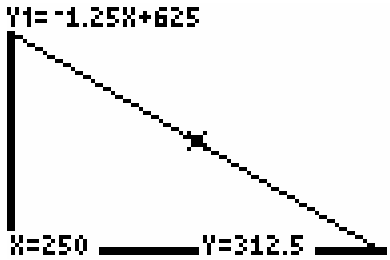
⇒ Met de trein is het voordeligst bij de afstanden tussen 117 km en 250 km.

6.a. Totaal x kaartjes van 30 euro ⇒ $30x$ en y kaartjes van 24 euro ⇒ 24y
Totale opbrengst is 15000 ⇒ $30x$ + 24y = 15000 ⇒

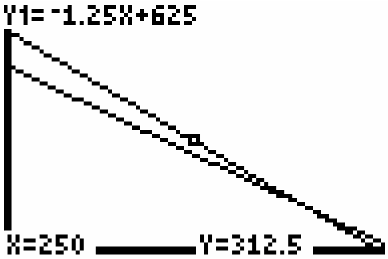
$$24y = 15000 - 30x \Leftrightarrow y = \frac{15000 - 30x}{24} \Leftrightarrow y = -\frac{30}{24}x + \frac{15000}{24} \Leftrightarrow$$

$$y = -1{,}25 + 625$$

Voer in $y_1 = -1{,}25x + 625$ en neem b.v. het window [0,500] X [0,700]



b. Het totaal aantal betalende bezoekers is 525 $\Rightarrow$ $x + y = 525$

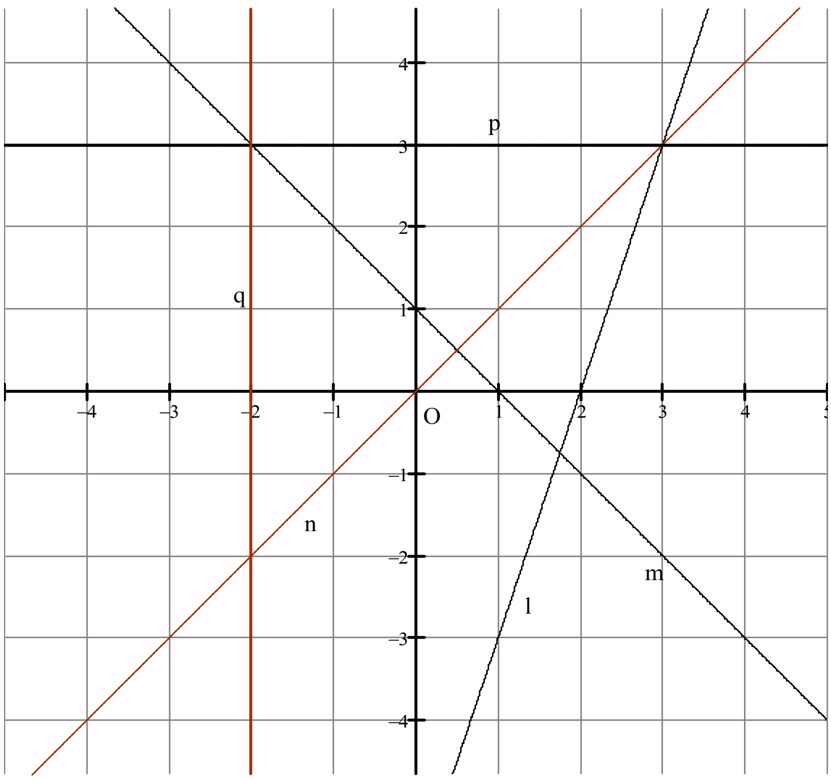


c. Met de optie intersect vinden we $x = 400$ en $y = 125$ $\Rightarrow$
Er waren 125 pashouders aanwezig.

7.

a. l : $3x - y = 6$ punten (2 , 0) en (0 ,-6)
m: $x + y = 1$ punten (1 , 0) en (0 , 1)
n: $x - y = 0$ punten (0 , 0) en (2 , 2)
p: $y = 3$ horizontale lijn op hoogte 3.
q: $x = -2$ verticale lijn op breedte -2.

l: $3x - y = 6 \Leftrightarrow y = 3x - 6 \Rightarrow$ r.c. = 3
m: $x + y = 1 \Leftrightarrow y = -x + 1 \Rightarrow$ r.c. = -1
n : $x - y = 0 \Leftrightarrow y = x \Rightarrow$ r.c. = 1
p : $y = 3 \Rightarrow$ r .c. = 0
q : $x = -2$ Deze lijn heeft geen r.c.



8.

a. $3x-4y=12 \Leftrightarrow -4y=12-3x \Leftrightarrow y=-3+\frac{3}{4}x$

b. $2x+6=3y-12 \Leftrightarrow -3y=-2x-18 \Leftrightarrow y=\frac{2}{3}x+6$

c. $2x+3y=y-20 \Leftrightarrow 2y=-2x-20 \Leftrightarrow y=-x-10$

d. $2{,}5x-3=-6y+30 \Leftrightarrow 6y=-2{,}5x+33 \Leftrightarrow y=-\frac{2{,}5}{6}x+5\frac{1}{2} \Leftrightarrow y=-\frac{5}{12}x+5\frac{1}{2}$

9

a. Stel het aantal stoelen is x en het aantal tafels is y.
Dan krijgen we : $350x+850y=22000 \Leftrightarrow 7x+17y=440$

b. Stel de prijs van 100 gram cashewnoten is x en van 100 gram studentenhaver is y.
Dan krijgen we: $4x+7y=8{,}40$

c. Stel het aantal ha groenten is x en het aantal ha granen is y.
Dan : $10000x+5000y=250000 \Leftrightarrow 2x+y=50$

10.

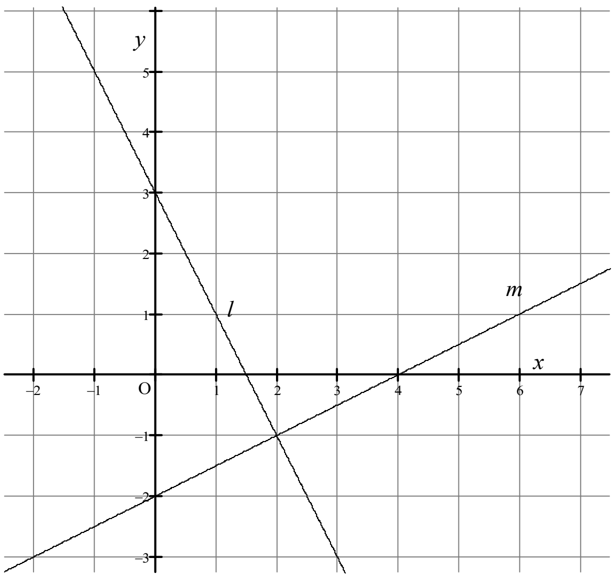
a. Stel het aantal abrikozenvlaaien is x en het aantal rijstevlaaien is y.
Dan krijgen we : $12x+15y=645 \Leftrightarrow 4x+5y=215$

b. Je b.v. kunnen hebben : x = 0 dan y = 45 of x = 10 dan y = 35 of x = 50 dan y = 3.

11. Gegeven : l: $2x+y=3$ en m: $x-2y=4$

a. l : punten (0 , 3) en (1 , 1)
en m : punten (4 , 0) en (6 , 1)

b. De coördinaten van het snijpunt zijn
x = 2 en y = -1.



12.

a. $\begin{cases}-2x+y=7\\3x+y=29\end{cases} \Leftrightarrow \begin{cases}y=2x+7\\3x+(2x+7)=29\end{cases} \Leftrightarrow \begin{cases}y=2x+7\\5x+7=29\end{cases} \Leftrightarrow \begin{cases}y=2x+7\\5x=22\end{cases} \Leftrightarrow \begin{cases}x=4{,}4\\y=15{,}8\end{cases}$

b.

$$\begin{cases} x-5y=-15 \\ x+y=27 \end{cases} \Leftrightarrow \begin{cases} (27-y)-5y=-15 \\ x=27-y \end{cases} \Leftrightarrow \begin{cases} x=27-y \\ -6y=-42 \end{cases} \Leftrightarrow \begin{cases} x=20 \\ y=7 \end{cases}$$

c.

$$\begin{cases} 2x-y=3 \\ -3x+5y=13 \end{cases} \Leftrightarrow \begin{cases} 2x-3=y \\ -3x+5(2x-3)=13 \end{cases} \Leftrightarrow \begin{cases} -3x+10x-15=13 \\ y=2x-3 \end{cases} \Leftrightarrow$$

$$\begin{cases} 7x=28 \\ y=2x-3 \end{cases} \Leftrightarrow \begin{cases} x=4 \\ y=5 \end{cases}$$

13a.

$$\begin{cases} a-b=720 \\ a-0{,}18b=1130 \end{cases} \Leftrightarrow \begin{cases} a=b+720 \\ (b+720)-0{,}18b=1130 \end{cases} \Leftrightarrow \begin{cases} a=b+720 \\ 0{,}82b=410 \end{cases} \Leftrightarrow \begin{cases} a=1220 \\ b=500 \end{cases}$$

b.

$$\begin{cases} 3p+q=18 \\ 2p-3q=19 \end{cases} \Leftrightarrow \begin{cases} q=18-3p \\ 2p-3(18-3p)=19 \end{cases} \Leftrightarrow \begin{cases} q=18-3p \\ 11p=73 \end{cases} \Leftrightarrow$$

$$\begin{cases} p=\dfrac{73}{11} \\ q=18-\dfrac{219}{11} \end{cases} \Leftrightarrow \begin{cases} p=6\dfrac{7}{11} \\ q=-1\dfrac{10}{11} \end{cases}$$

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$$\begin{cases} 3x-2y=-12 \\ x+4y=38 \end{cases} \Leftrightarrow \begin{cases} 3(38-4y)-2y=-12 \\ x=38-4y \end{cases} \Leftrightarrow \begin{cases} 114-12y-2y=-12 \\ x=38-4y \end{cases} \Leftrightarrow$$

$$\begin{cases} -14y=-126 \\ x=38-4y \end{cases} \Leftrightarrow \begin{cases} x=2 \\ y=9 \end{cases}$$

15.

a. $x + y = 5000$

b. $12x + 16y = 5000 \cdot 12{,}80 \Leftrightarrow 12x + 16y = 64000$ hetgeen gevraagd is.

c.

$$\begin{cases} x+y=5000 \\ 12x+16y=64000 \end{cases} \Leftrightarrow \begin{cases} x=5000-y \\ 12(5000-y)+16y=64000 \end{cases} \Leftrightarrow \begin{cases} x=5000-y \\ 60000-12y+16y=64000 \end{cases} \Leftrightarrow$$

$$\begin{cases} x=5000-y \\ 4y=4000 \end{cases} \Leftrightarrow \begin{cases} x=4000 \\ y=1000 \end{cases}$$

$\Rightarrow$ Het mengsel bestaat uit 4000 kg Colombiaanse koffie en 1000 kg Jamaicaanse koffie.

16.

Stel x is het aantal aandelen van fonds A en y is het aantal aandelen van fonds B.
Uit het gegeven volgt dan : $0{,}06x + 0{,}08y = 11000$
Verder geldt ook : $x + y = 150000$ $\Rightarrow$

$$\begin{cases} x + y = 150000 \\ 0{,}06x + 0{,}08y = 11000 \end{cases} \Leftrightarrow \begin{cases} x = 150000 - y \\ 0{,}06(150000 - y) + 0{,}08y = 11000 \end{cases} \Leftrightarrow$$

$$\begin{cases} x = 150000 - y \\ 9000 - 0{,}06y + 0{,}08y = 11000 \end{cases} \Leftrightarrow \begin{cases} x = 150000 - y \\ 0{,}02y = 2000 \end{cases} \Leftrightarrow \begin{cases} x = 50000 \\ y = 100000 \end{cases}$$

$\Rightarrow$ In fonds A wordt dus 50000 euro belegd.

17. $L = 207 - 0{,}85S - 1{,}02W$

a. $L = 207 - 0{,}85 \cdot 170 - 1{,}02 \cdot 18 = 44{,}14 \Rightarrow$ L $\approx$ 44

b.

$$99 = 207 - 0{,}85 \cdot 120 - 1{,}02W \Leftrightarrow 1{,}02W = 207 - 102 - 99 \Leftrightarrow 1{,}02W = 6 \Leftrightarrow$$

$$W \approx 5{,}88$$

$\Rightarrow$ Het gemiddeld aantal woorden per zin is ongeveer 5,88.

c.

Moeilijk boek $\Rightarrow$ het gemiddeld aantal woorden per zin is groot. b.v. 30 en het gemiddeld aantal lettergrepen per 100 woorden is ook groot b.v. 200.
Nu dit gaan invullen $\Rightarrow$
$L = 207 - 0{,}85 \cdot 200 - 1{,}02 \cdot 30 \approx 6{,}4$ De waarde wordt dus steeds kleiner.
$\Rightarrow$ Hoe moeilijker het boek des te lager de inde*x* L.

18a.

$$\begin{cases} K = 14\frac{1}{4}b + 518\frac{1}{4} \\ a = 5b + 8 \end{cases} \Leftrightarrow \begin{cases} K = 14\frac{1}{4}b + 518\frac{1}{4} \\ 5b = a - 8 \end{cases} \Leftrightarrow \begin{cases} K = 14\frac{1}{4}b + 518\frac{1}{4} \\ b = \frac{1}{5}a - \frac{8}{5} \end{cases} \Rightarrow$$

$$K = 14\tfrac{1}{4}\left(\tfrac{1}{5}a - \tfrac{8}{5}\right) + 518\tfrac{1}{4} = 2{,}85a - 22{,}8 + 518{,}25 \Leftrightarrow K = 2{,}85a + 495{,}45$$

b.

$$\begin{cases} K = 14\frac{1}{4}b + 518\frac{1}{4} \\ c = \frac{3}{4} - \frac{1}{4}b \end{cases} \Leftrightarrow \begin{cases} K = 14\frac{1}{4}b + 518\frac{1}{4} \\ \frac{1}{4}b = \frac{3}{4} - c \end{cases} \Leftrightarrow \begin{cases} K = 14\frac{1}{4}b + 518\frac{1}{4} \\ b = 3 - 4c \end{cases} \Rightarrow$$

$$K = 14\tfrac{1}{4}(3 - 4c) + 518\tfrac{1}{4} \Leftrightarrow K = 42{,}75 - 57c + 518{,}25 \Leftrightarrow K = 561 - 57c$$

19a.

$$\begin{cases} A = 2t + 5p + 9 \\ t = -\frac{1}{2}p + 6 \end{cases} \Leftrightarrow \begin{cases} A = 2t + 5p + 9 \\ \frac{1}{2}p = 6 - t \end{cases} \Leftrightarrow \begin{cases} A = 2t + 5p + 9 \\ p = 12 - 2t \end{cases} \Rightarrow$$

$$A = 2t + 5(12 - 2t) + 9 \Leftrightarrow A = 2t + 60 - 10t + 9 \Leftrightarrow A = -8t + 69$$

b.

$$\begin{cases} A = 6xy + 20 \\ y = 2x + 6 \end{cases} \Leftrightarrow \begin{cases} A = 6xy + 20 \\ 2x = y - 6 \end{cases} \Leftrightarrow \begin{cases} A = 6xy + 20 \\ x = \frac{1}{2}y - 3 \end{cases} \Rightarrow$$

$$A = 6y \cdot (\tfrac{1}{2}y - 3) + 20 \Leftrightarrow A = 3y^2 - 18y + 20$$

c.

$$\begin{cases} K = 5p + 3q + 5r + 100 \\ p = -3q + 6 \\ 2q = -r + 8 \end{cases} \Leftrightarrow \begin{cases} K = 5p + 3q + 5r + 100 \\ p = -3q + 6 \\ r = 8 - 2q \end{cases} \Rightarrow$$

$$K = 5(-3q + 6) + 3q + 5(8 - 2q) + 100 \Leftrightarrow$$

$$K = -15q + 30 + 3q + 40 - 10q + 100 \Leftrightarrow K = -22q + 170$$

d.

$$\begin{cases} W = 18 - 0{,}02x - 0{,}6y - 0{,}5z \\ x + y + z = 50 \end{cases} \Leftrightarrow \begin{cases} W = 18 - 0{,}02x - 0{,}6y - 0{,}5z \\ z = 50 - x - y \end{cases} \Rightarrow$$

$$W = 18 - 0{,}02x - 0{,}6y - 0{,}5(50 - x - y) \Leftrightarrow W = 18 - 0{,}02x - 0{,}6y - 25 + 0{,}5x + 0{,}5y$$

$$\Leftrightarrow W = -7 + 0{,}48x - 0{,}1y$$

20a.

$$\begin{cases} q = -10p + 0{,}3A + 150 \\ A = 10p \end{cases} \Rightarrow q = -10p + 0{,}3 \cdot 10p + 150 \Leftrightarrow q = -7p + 150$$

b.

$$\begin{cases} q = -10p + 0{,}3A + 150 \\ A = 30 + 5p \end{cases} \Rightarrow q = -10p + 0{,}3 \cdot (30 + 5p) + 150 \Leftrightarrow$$

$$q = -10p + 9 + 1{,}5p + 150 \Leftrightarrow q = -8{,}5p + 159$$

c.

$$\begin{cases} q = -10p + 0{,}3A + 150 \\ q = 119 \text{ en } p = 8{,}50 \end{cases} \Rightarrow 119 = -10 \cdot 8{,}50 + 0{,}3A + 150 \Leftrightarrow$$

$$119 = -85 + 0{,}3A + 150 \Leftrightarrow 0{,}3A = 54 \Leftrightarrow A = 180$$

$\Rightarrow$ In die week is 180 euro gegeven aan reclame.

21a.

$$\left.\begin{aligned} &BMR = 66 + 13{,}7g + 5h - 6{,}8l \\ &l = 50 \end{aligned}\right\} \Rightarrow BMR = 66 + 13{,}7g + 5h - 6{,}8 \cdot 50 \Leftrightarrow$$

$$BMR = 13{,}7g + 5h - 274$$

b.

$$1700 = 66 + 13{,}7 \cdot 68 + 5h - 6{,}8 \cdot 28 \Leftrightarrow 1700 = 807{,}2 + 5h \Leftrightarrow$$

$$5h = 892{,}8 \Leftrightarrow h = 178{,}56$$

$\Rightarrow$ De lengte van hem is ongeveer 179 cm.

c.

$$\left.\begin{array}{l} BMR = 66 + 13{,}7g + 5h - 6{,}8l \\ l = 40 \\ g = h - 100 \end{array}\right\} \Rightarrow BMR = 66 + 13{,}7(h-100) + 5h - 6{,}8 \cdot 40 \Leftrightarrow$$

$$BMR = 66 + 13{,}7h - 1370 + 5h - 272 \Leftrightarrow BMR = 18{,}7h - 1576$$

22

$$\begin{cases} P = \dfrac{xy}{10}\left(2 - \dfrac{z}{5}\right) \\ y = 80 \\ 10x = z + 20 \end{cases} \Leftrightarrow \begin{cases} P = \dfrac{xy}{10}\left(2 - \dfrac{z}{5}\right) \\ y = 80 \\ z = 10x - 20 \end{cases} \Rightarrow P = \frac{80x}{10}\left(2 - \frac{10x - 20}{5}\right) \Leftrightarrow$$

$$P = 8x(2 - 2x + 4) \Leftrightarrow P = 8x(-2x + 6) \Leftrightarrow P = -16x^2 + 48x$$

23. $p = -0{,}002q + 4$

a. $R = p \cdot q = (-0{,}002q + 4)q = -0{,}002q^2 + 4q$

b. $R = -0{,}002q^2 + 4q \Rightarrow R' = -0{,}004q + 4 = 0 \Leftrightarrow 0{,}004q = 4 \Leftrightarrow q = 1000$
Het is een bergparabool $\Rightarrow$ maximale opbrengst bij q = 1000 van 2000 euro.

c. $W = R - K = -0{,}002q^2 + 4q - \left(200 + 0{,}60q\right) = -0{,}002q^2 + 3{,}4q - 200$

d. $W = -0{,}002q^2 + 3{,}4q - 200 \Rightarrow W' = -0{,}004q + 3{,}4 = 0 \Leftrightarrow q = 850 \Rightarrow$
Er is een maximale winst (bergparabool) bij een verkoop van 850 broodjes.
De prijs per broodje is dan : -0,002.850 + 4 = 2,30 euro

24a.

$$20x^2 - 160x + 300 = 0 \Leftrightarrow x^2 - 8x + 15 = 0 \Leftrightarrow (x-5)(x-3) = 0 \Leftrightarrow x = 5 \vee x = 3$$

b.

$$0{,}02x^2 - 8x = 0 \Leftrightarrow x(0{,}02x - 8) = 0 \Leftrightarrow x = 0 \vee 0{,}02x = 8 \Leftrightarrow x = 0 \vee x = 400$$

c.

$$q(4 - 0{,}2q) = 15 \Leftrightarrow 4q - 0{,}2q^2 - 15 = 0 \Leftrightarrow q^2 - 20q + 75 = 0 \Leftrightarrow$$

$$(q-15)(q-5) = 0 \Leftrightarrow q = 15 \vee q = 5$$

d.

$$q(-0{,}01q + 40) = 0 \Leftrightarrow q = 0 \vee -0{,}01q + 40 = 0 \Leftrightarrow q = 0 \vee 0{,}01q = 40 \Leftrightarrow q = 0 \vee q = 4000$$

25. $R = -0,002q^2 + 24q$

a. Horizontale as snijden $\Rightarrow$ R = 0 $\Leftrightarrow$

$-0,002q^2 + 24q = 0 \Leftrightarrow q(-0,002q + 24) = 0 \Leftrightarrow q = 0 \vee -0,002q + 24 = 0 \Leftrightarrow$

$q = 0 \vee 0,002q = 24 \Leftrightarrow q = 0 \vee q = 12000$

b.

Het is een bergparabool. $\Rightarrow$ Het maximum heb je op de as van symmetrie. $\Rightarrow$
Bij $q = 6000$. Het maximum is dan $R(6000) = 72000$ euro

c.

$R = 64000 \Rightarrow$ $-0,002q^2 + 24q = 64000 \Leftrightarrow q^2 + 12000q - 32.000.000 = 0 \Leftrightarrow$

$(q-4000)(q-8000) = 0 \Leftrightarrow q = 4000 \vee q = 8000 \Rightarrow$

De opbrengst is 64000 euro bij $q = 4000 \vee q = 8000$.

d.

Het is een bergparabool. $\Rightarrow$ Aflezen $\Rightarrow$ De opbrengst is meer dan 64000 euro voor $4000 < q < 8000$.

26.

a. Stel $p = aq + b$ punten (400 , 28) en (1200 , 20) $a = \dfrac{\Delta p}{\Delta q} = \dfrac{28-20}{400-1200} = -0,01 \Rightarrow$

$p = -0,01q + b$ door (400 , 28) $\Rightarrow 28 = -0,01 \,.\, 400 + b \Leftrightarrow b = 32 \Rightarrow p = -0,01q + 32$
$\Rightarrow$ de opbrengst R is dus : $R = p.q = -0,01q^2 + 32q$

b. $R = 2400 \Leftrightarrow -0,01q^2 + 32q = 24000 \Leftrightarrow -0,01q^2 + 32q - 24000 = 0 \Leftrightarrow$

$q^2 - 3200q + 2400000 = 0 \Leftrightarrow$ (q-1200)(q-2000)=0 $\Leftrightarrow$ q=1200 $\vee$ q=2000
Bij $q = 1200$ dan $p = -0,01.1200 + 32 = 20$
Bij $q = 2000$ dan $p = -0,01 \,.\, 2000 + 32 = 12$
$\Rightarrow$ dus bij prijzen van 12 en 20 euro

c. $K = 1500 + 16q \Rightarrow W = R - K = -0,01q^2 + 32q - (1500 + 16q) = -0,01q^2 + 16q - 1500$

Het is een bergparabool. $\Rightarrow$ $W_{\max}$ is bij $x = \dfrac{-b}{2a} \Rightarrow$ bij $x = \dfrac{-16}{-0,02} = 800$

$\Rightarrow$ maximum is : $W(800) = 4900$ euro.

De prijs is dan : $-0,01 \cdot 800 + 32 = 24$ euro

d. $W = -0,01q^2 + 16q - 1500$ geeft

$W_{\max}$ $bij\ q = -\dfrac{b}{2a} = \dfrac{-16}{-0,02} = 800 \Rightarrow$

$W_{\max}(800) = 4900$ euro De vaste kosten zijn 1100 euro minder geworden $\Rightarrow$ Nu zijn dus de vaste kosten 400 euro

27. $h = -0,18x^2 + 0,96$ met h en x in honderden feet en 1 foot = 0,314 meter

a. Snijpunten x-as $\Rightarrow$ $-0{,}18x^2 + 0{,}96 = 0 \Leftrightarrow 0{,}18x^2 = 0{,}96 \Leftrightarrow x^2 \approx 5.333\ldots \Leftrightarrow x \approx 2{,}31 \vee$
$x = -2{,}31 \Rightarrow AB = 2.2{,}31 = 4{,}62$ keer 100 feet = 462 feet = 462 . 0,314 meter $\approx$ 145 meter

b. PQ = 380 feet = 3,8 keer 100 feet $\Rightarrow x_Q = 1{,}9 \Rightarrow h_q = -0{,}18 \,.\, 1{,}9^2 + 0{,}96 = 0{,}3102$
Verder weten we dat OT = 0,96 $\Rightarrow$ het hoogteverschil tussen T en Q is dus 0,6498 $\Rightarrow$
het water staat 0,6498 keer 100 $\approx$ 65 feet onder T

c. 70 feet onder T $\Rightarrow$ 0,7 keer 100 feet onder T $\Rightarrow$ het wateroppervlak heeft dan een hoogte van
$0{,}96 - 0{,}7 = 0{,}26 \Rightarrow h = 0{,}26 \Leftrightarrow -0{,}18x^2 + 0{,}96 = 0{,}26 \Leftrightarrow 0{,}18x^2 = 0{,}70 \Leftrightarrow x^2 \approx 3{,}88\ldots \Leftrightarrow$
$x \approx -1{,}97 \vee x \approx 1{,}97 \Rightarrow$ de breedte van het wateroppervlak is dan:
2 . 1,97 keer 100 feet = 394 feet = 394 . 0,314 meter $\approx$ 123,7 meter = 1237 dm

28a.

$$x^2 = 16 \Leftrightarrow x = 4 \vee x = -4 \Rightarrow$$

$$(2x-1)^2 = 16 \Leftrightarrow 2x-1 = 4 \vee 2x-1 = -4 \Leftrightarrow 2x = 5 \vee 2x = -3 \Leftrightarrow x = 2{,}5 \vee x = -1{,}5$$

b. Bij onderdeel a al gedaan.

c.

Een kwadraat is nooit negatief $\Rightarrow$ $(2x - 1)^2 = -16$ heeft dus geen oplossingen.

29.

a.

$$(x-3)(2x+1) = (x-3)(x+5) \Leftrightarrow 2x^2 + x - 6x - 3 = x^2 + 5x - 3x - 15 \Leftrightarrow$$

$$x^2 - 7x + 12 = 0 \Leftrightarrow (x-3)(x-4) = 0 \Leftrightarrow x = 3 \vee x = 4$$

b.

Hij krijgt $2x + 1 = x + 5 \Leftrightarrow x = 4$ Hij mist dus de oplossing $x = 3$

c.

Dat is niet toegestaan. Zo verduister je de oplossing $x = 3$.

30a.

$$(3x-2)^2 = 40 \Leftrightarrow 3x-2 = 7 \vee 3x-2 = -7 \Leftrightarrow 3x = 9 \vee 3x = -5 \Leftrightarrow x = 3 \vee x = -1\tfrac{2}{3}$$

b.

$$(3x-1)(5x-3) = (3x-1)(6x+5) \Leftrightarrow 3x-1 = 0 \vee 5x-3 = 6x+5 \Leftrightarrow$$

$$3x = 1 \vee -x = 8 \Leftrightarrow x = \tfrac{1}{3} \vee x = -8$$

c.

$$(x-3)^2 = (2x-7)^2 \Leftrightarrow x-3 = 2x-7 \vee x-3 = -2x+7 \Leftrightarrow$$

$$-x = -4 \vee 3x = 10 \Leftrightarrow x = 4 \vee x = 3\tfrac{1}{3}$$

d.

$$(x^2-1)(4x-3) - 5(x^2-1) = 0 \Leftrightarrow (x^2-1)(4x-3) = 5(x^2-1) \Leftrightarrow$$

$$x^2 - 1 = 0 \vee 4x-3 = 5 \Leftrightarrow x = 1 \vee x = -1 \vee x = 2$$

31a.

$(x+2)(x^2+2x+1)=x+2 \Leftrightarrow x+2=0 \vee x^2+2x+1=1 \Leftrightarrow$

$x=-2 \vee x^2+2x=0 \Leftrightarrow x=-2 \vee x(x+2)=0 \Leftrightarrow x=-2 \vee x=0 \vee x=-2$

b.

$5\sqrt{x^2-3}=(2x-1)\sqrt{x^2-3} \Leftrightarrow \sqrt{x^2-3}=0 \vee 5=2x-1 \Leftrightarrow$

$x^2=3 \vee 2x=6 \Leftrightarrow x=-\sqrt{3} \vee x=\sqrt{3} \vee x=3$

c.

$(x-1)(x+3)=(x-1)(x^2+6x+3) \Leftrightarrow x-1=0 \vee x+3=x^2+6x+3 \Leftrightarrow$

$x=1 \vee x^2+5x=0 \Leftrightarrow x=1 \vee x(x+5)=0 \Leftrightarrow x=1 \vee x=0 \vee x=-5$

d.

$5(3x-5)=(x-1)(3x-5) \Leftrightarrow 3x-5=0 \vee 5=x-1 \Leftrightarrow 3x=5 \vee x=6 \Leftrightarrow$

$x=1\frac{2}{3} \vee x=6$

e.

$7(x-3)^2=(x+1)(x-3)^2 \Leftrightarrow (x-3)^2=0 \vee 7=x+1 \Leftrightarrow x=3 \vee x=6$

f.

$(2x-1)^2 \cdot \sqrt{2x-1}=25 \cdot \sqrt{2x-1} \Leftrightarrow \sqrt{2x-1}=0 \vee (2x-1)^2=25 \Leftrightarrow$

$2x-1=0 \vee 2x-1=5 \vee 2x-1=-5 \Leftrightarrow x=\frac{1}{2} \vee x=3 \vee x=-2$

g.

$(x^2-5)^3=9(x^2-5) \Leftrightarrow (x^2-5)(x^2-5)^2=9(x^2-5) \Leftrightarrow (x^2-5)=0 \vee (x^2-5)^2=9$

$\Leftrightarrow x=-\sqrt{5} \vee x=\sqrt{5} \vee x^2-5=3 \vee x^2-5=-3 \Leftrightarrow$

$x=-\sqrt{5} \vee x=\sqrt{5} \vee x^2=8 \vee x^2=2 \Leftrightarrow$

$x=-\sqrt{5} \vee x=\sqrt{5} \vee x=-\sqrt{2} \vee x=\sqrt{2} \vee x=-\sqrt{8} \vee x=\sqrt{8} \Leftrightarrow$

$x \approx -2{,}24 \vee x \approx 2{,}24 \vee x \approx -1{,}41 \vee x \approx 1{,}41 \vee x \approx -2{,}83 \vee x \approx 2{,}83$

h.

$(2x-1)(x^2-36)=(x^2-36)(x+7) \Leftrightarrow x^2-36=0 \vee 2x-1=x+7 \Leftrightarrow$

$x=6 \vee x=-6 \vee x=8$

32a.

$(5x^2-30)(3x+1)=0 \Leftrightarrow 5x^2=30 \vee 3x=-1 \Leftrightarrow x^2=6 \vee x=-\frac{1}{3} \Leftrightarrow$

$x=-\sqrt{6} \vee x=\sqrt{6} \vee x=-\frac{1}{3} \Leftrightarrow x \approx -2{,}45 \vee x \approx 2{,}45 \vee x \approx -0{,}33$

b.

$(5x^2-125)(3x+1)=(5x^2-125)(x^2+1) \Leftrightarrow 5x^2-125=0 \vee 3x+1=x^2+1 \Leftrightarrow$

$x^2=25 \vee 3x-x^2=0 \Leftrightarrow x=-5 \vee x=5 \vee x(3-x)=0 \Leftrightarrow$

$x=-5 \vee x=5 \vee x=0 \vee x=3$

c.

$$3x\cdot\sqrt{x^2-4}=(x+3)\cdot\sqrt{x^2-4}\Leftrightarrow\sqrt{x^2-4}=0\vee 3x=x+3\Leftrightarrow$$
$$x^2=4\vee 2x=3\Leftrightarrow x=-2\vee x=2\vee x=1\tfrac{1}{2}$$

d.

$$5\sqrt{x^2-4}-x\sqrt{x^2-4}=0\Leftrightarrow\sqrt{x^2-4}\cdot(5-x)=0\Leftrightarrow\sqrt{x^2-4}=0\vee 5-x=0$$
$$\Leftrightarrow x^2=4\vee x=5\Leftrightarrow x=-2\vee x=2\vee x=5$$

e.

$$6(5x-3)-(2x-3)(x+6)=0\Leftrightarrow 30x-18-(2x^2+12x-3x-18)=0\Leftrightarrow$$
$$30x-18-2x^2-9x+18=0\Leftrightarrow -2x^2+21x=0\Leftrightarrow x(-2x+21)=0\Leftrightarrow x=0\vee x=10\tfrac{1}{2}$$

f.

$$(x+2)(x+3)=(x+4)(x+5)\Leftrightarrow x^2+5x+6=x^2+9x+20\Leftrightarrow$$
$$-4x=14\Leftrightarrow x=-3\tfrac{1}{2}$$

33.

$$\left.\begin{array}{l}K=0,2q+25\\ q=0,6(a-3)^2\end{array}\right\}\Rightarrow K=0,2\cdot\left(0,6(a-3)^2\right)+25\Leftrightarrow K=0,12(a-3)^2+25$$

b.

$$K=37\Rightarrow 37=0,12(a-3)^2+25\Leftrightarrow 0,12(a-3)^2=12\Leftrightarrow(a-3)^2=100$$
$$\Leftrightarrow a-3=10\vee a-3=-10\Leftrightarrow a=13\vee a=-7$$

34.

$y=ax^2+bx+8$ door $(3,5)\Rightarrow x=3$ en y = 5 $\Rightarrow$ $a\cdot 9+b\cdot 3+8=5$

35.

$$\left.\begin{array}{l}y=ax^2+bx \text{ door (-2,-24) } \Rightarrow 4a-2b=-24\\ y=ax^2+bx \text{ door (1,3) } \Rightarrow a+b=3\end{array}\right\}\Rightarrow$$

$$\begin{cases}2a-b=-12\\ a=3-b\end{cases}\Leftrightarrow\begin{cases}2(3-b)-b=-12\\ a=3-b\end{cases}\Leftrightarrow\begin{cases}6-2b-b=-12\\ a=3-b\end{cases}\Leftrightarrow$$

$$\begin{cases}-3b=-18\\ a=3-b\end{cases}\Leftrightarrow\begin{cases}b=6\\ a=-3\end{cases}$$

36.

$$\left.\begin{array}{l} y = ax^2 + bx + c \text{ door } (0,0) \Rightarrow c = 0 \\ y = ax^2 + bx + c \text{ door } (1,300) \Rightarrow 300 = a + b + 0 \\ y = ax^2 + bx + c \text{ door } (2,500) \Rightarrow 500 = 4a + 2b + 0 \end{array}\right\} \Rightarrow$$

$$\begin{cases} a + b = 300 \\ 2a + b = 250 \end{cases} \Leftrightarrow \begin{cases} a = 300 - b \\ 2(300 - b) + b = 250 \end{cases} \Leftrightarrow \begin{cases} a = 300 - b \\ 600 - 2b + b = 250 \end{cases} \Leftrightarrow$$

$$\begin{cases} a = 300 - b \\ -b = -350 \end{cases} \Leftrightarrow \begin{cases} a = -50 \\ b = 350 \end{cases}$$

Totaal a = -50 ; b = 350 en c = 0

37.

$$A = aT^2 + bT + 60000$$

a.

$$\left.\begin{array}{l} A = aT^2 + bT + 60000 \text{ door } (2{,}50;40000) \Rightarrow 40000 = 6{,}25a + 2{,}50b + 60000 \\ A = aT^2 + bT + 60000 \text{ door } (5{,}25000) \Rightarrow 25000 = 25a + 5b + 60000 \end{array}\right\}$$

$$\Rightarrow \begin{cases} 6{,}25a + 2{,}50b = -20000 \\ 25a + 5b = -35000 \end{cases} \Leftrightarrow \begin{cases} 6{,}25a + 2{,}50b = -20000 \\ 5b = -25a - 35000 \end{cases} \Leftrightarrow$$

$$\begin{cases} 6{,}25a + 2{,}50(-5a - 7000) = -20000 \\ b = -5a - 7000 \end{cases} \Leftrightarrow \begin{cases} 6{,}25a - 12{,}50a - 17500 = -20000 \\ b = -5a - 7000 \end{cases} \Leftrightarrow$$

$$\begin{cases} -6{,}25a = -2500 \\ b = -5a - 7000 \end{cases} \Leftrightarrow \begin{cases} a = 400 \\ b = -9000 \end{cases}$$

b. Uit onderdeel a volgt :

$$A = 400T^2 - 9000T + 60000 \text{ en } R = A \cdot T \Rightarrow$$

$$R = 400T^3 - 9000T^2 + 60000T$$

c.

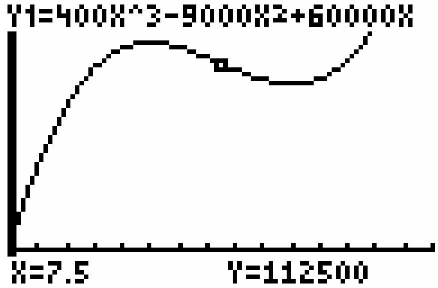
Maximum berekenen $\Rightarrow$ differentiëren $\Rightarrow$

$$R'(T) = 1200T^2 - 18000T + 60000 \Rightarrow R'(T) = 0 \Leftrightarrow$$

$$1200T^2 - 18000T + 60000 = 0 \Leftrightarrow T^2 - 15T + 50 = 0 \Leftrightarrow$$

$$(T - 10)(T - 5) = 0 \Leftrightarrow T = 10 \vee T = 5$$

Nu de schets van R $\Rightarrow$ `
Neem b.v. het window [0,15] X [-20000,150000]



Uit de schets zien we dat er een maximum is bij x = T = 5 en dus niet bij T = 10.
Bij een toltarief van 5 euro is de dagopbrengst maximaal.

38

a. Als D = 1 dan krijgen we : $\frac{A}{B}=C \Rightarrow A=B\cdot C$

b. Als C = 0 en D = 1 dan : $\frac{A}{B}=0 \Rightarrow A=0$

39a.

$$\frac{20}{x-3}=2 \Rightarrow 20=2(x-3) \Leftrightarrow 20=2x-6 \Leftrightarrow 2x=26 \Leftrightarrow x=13$$

b.

$$\frac{800}{x-3}-300=100 \Leftrightarrow \frac{800}{x-3}=400 \Rightarrow x-3=2 \Leftrightarrow x=5$$

c.

$$\frac{5}{x^2}-\frac{20}{x^3}=0 \Leftrightarrow \frac{5}{x^2}\cdot\frac{x}{x}-\frac{20}{x^3}=0 \Leftrightarrow \frac{5x-20}{x^3}=0 \Rightarrow 5x-20=0 \Leftrightarrow x=4$$

d.

$$\frac{-0,03x^2+18x}{x+7}=0 \Rightarrow -0,03x^2+18x=0 \Leftrightarrow x(-0,03x+18)=0 \Leftrightarrow$$

$$x=0 \vee -0,03x+18=0 \Leftrightarrow x=0 \vee -0,03x=-18 \Leftrightarrow x=0 \vee x=600$$

e.

$$\frac{3(2x-5)-(x+3)(x-5)}{2x-1}=0 \Rightarrow 3(2x-5)-(x+3)(x-5)=0 \Leftrightarrow$$

$$6x-15-(x^2-5x+3x-15)=0 \Leftrightarrow -x^2+8x=0 \Leftrightarrow x(-x+8)=0 \Leftrightarrow$$

$$x=0 \vee -x+8=0 \Leftrightarrow x=0 \vee x=8$$

f.

$$\frac{x}{x-10}=\frac{5}{x} \Rightarrow x^2=5(x-10) \Leftrightarrow x^2=5x-50 \Leftrightarrow x^2-5x+50=0$$

$$D=25-4\cdot 1\cdot 50=-175<0 \Rightarrow \text{geen oplossingen.}$$

40a.

$$\frac{500}{a}-70=\frac{500}{a}-70\cdot\frac{a}{a}=\frac{500-70a}{a}$$

b.

$$\frac{100}{a}+\frac{200}{b}=\frac{100}{a}\cdot\frac{b}{b}+\frac{200}{b}\cdot\frac{a}{a}=\frac{100b+200a}{ab}$$

c.

$$5+\frac{3}{x-2}=5\cdot\frac{x-2}{x-2}+\frac{3}{x-2}=\frac{5x-10}{x-2}+\frac{3}{x-2}=\frac{5x-7}{x-2}$$

d.

$$\frac{0,5}{x+3}-0,2x=\frac{0,5}{x+3}-0,2x\cdot\frac{x+3}{x+3}=\frac{0,5}{x+3}-\frac{0,2x^2+0,6x}{x+3}=\frac{-0,2x^2-0,6x+0,5}{x+3}$$

e.

$$80+\frac{50}{3x-10}=80\cdot\frac{3x-10}{3x-10}+\frac{50}{3x-10}=\frac{240x-800}{3x-10}+\frac{50}{3x-10}=\frac{240x-750}{3x-10}$$

f.

$$\frac{380}{x^2}-\frac{40}{x}=\frac{380}{x^2}-\frac{40}{x}\cdot\frac{x}{x}=\frac{380-40x}{x^3}$$

41a.

$$\frac{3}{x}\cdot\frac{5}{y}=\frac{15}{xy}$$

b.

$$\frac{3}{2x}\cdot\frac{x^3}{5y}=\frac{3x^3}{10xy}=\frac{3x^2}{10y}$$

c.

$$\frac{6000}{\left(\frac{2}{x-4}\right)}=6000\cdot\frac{x-4}{2}=3000(x-4)=3000x-12000$$

d.

$$\frac{350}{x}\left(1-\frac{2}{x}\right)=\frac{350}{x}-\frac{350}{x}\cdot\frac{2}{x}=\frac{350}{x}-\frac{700}{x^2}=\frac{350}{x}\cdot\frac{x}{x}-\frac{700}{x^2}=\frac{350x-700}{x^2}$$

e.

$$\frac{150}{x}:\frac{x-4}{x}=\frac{150}{x}\cdot\frac{x}{x-4}=\frac{150x}{x(x-4)}=\frac{150}{x-4}$$

f.

$$8x\left(3+\frac{5}{x^2}\right)=24x+8x\cdot\frac{5}{x^2}=24x+\frac{40x}{x^2}=24x+\frac{40}{x}=24x\cdot\frac{x}{x}+\frac{40}{x}=\frac{24x^2+40}{x}$$

42.

$$\frac{15}{\left(\frac{5}{3}\right)}=15\cdot\frac{3}{5}=\frac{15\cdot 3}{5}=3\cdot 3=9$$

$$\frac{\left(\frac{15}{5}\right)}{3}=\frac{3}{3}=1$$

43a.

$$\frac{15+\frac{3}{x}}{x}=\frac{15+\frac{3}{x}}{x}\cdot\frac{x}{x}=\frac{\left(15+\frac{3}{x}\right)\cdot x}{x}=\frac{15x+3}{x}$$

b.

$$\frac{20a}{b+\frac{a^2}{2b}}=\frac{20a}{b+\frac{a^2}{2b}}\cdot\frac{2b}{2b}=\frac{20a\cdot 2b}{\left(b+\frac{a^2}{2b}\right)\cdot 2b}=\frac{40ab}{2b^2+a^2}$$

c.

$$\frac{\left(\frac{50}{x}\right)}{10}\cdot\frac{x}{x}=\frac{\frac{50}{x}\cdot x}{10x}=\frac{50}{10x}=\frac{5}{x}$$

d.

$$\frac{50}{\left(\frac{10}{x}\right)}=\frac{50}{\left(\frac{10}{x}\right)}\cdot\frac{x}{x}=\frac{50x}{10}=5x$$

e.

$$x+25\cdot\frac{\left(\frac{100}{x}\right)}{5}=x+25\cdot\frac{\left(\frac{100}{x}\right)}{5}\cdot\frac{x}{x}=x+25\cdot\frac{100}{5x}=x+\frac{2500}{5x}=x+\frac{500}{x}$$

f.

$$\frac{3+\frac{2}{x}}{7-\frac{1}{x}}=\frac{3+\frac{2}{x}}{7-\frac{1}{x}}\cdot\frac{x}{x}=\frac{3x+2}{7x-1}$$

44a.

$$A=18\cdot\frac{\left(\frac{500}{x}\right)}{10}+25x=18\cdot\frac{\left(\frac{500}{x}\right)}{10}\cdot\frac{x}{x}+25x=\frac{18\cdot 500}{10x}+25x=\frac{900}{x}+25x$$

b. $$T=\frac{50a}{\frac{a^2}{5b}+2b}\cdot\frac{5b}{5b}=\frac{250ab}{\frac{a^2}{5b}\cdot 5b+10b^2}=\frac{250ab}{a^2+10b^2}$$

c.

$$L=\left(21+\frac{180}{\frac{a}{b}\cdot 20}\right)a=\left(21+\frac{180}{\frac{a}{b}\cdot 20}\cdot\frac{b}{b}\right)a=\left(21+\frac{180b}{\frac{20ab}{b}}\right)a=\left(21+\frac{180b}{20a}\right)a=$$

$$21a+\frac{180ab}{20a}=21a+9b$$

45. $$A=\frac{x^2+3x+8}{x}=\frac{x^2}{x}+\frac{3x}{x}+\frac{8}{x}=x+3+\frac{8}{x}$$

a. $A = \dfrac{5x^2+4x+3}{x} = \dfrac{5x^2}{x} + \dfrac{4x}{x} + \dfrac{3}{x} = 5x + 4 + \dfrac{3}{x}$

b. $T = \dfrac{3x^2+6x+180}{3x} = \dfrac{3x^2}{3x} + \dfrac{6x}{3x} + \dfrac{180}{3x} = x + 2 + \dfrac{60}{x}$

c. $y = \dfrac{5a^2+10a}{2a^2} = \dfrac{5a^2}{2a^2} + \dfrac{10a}{2a^2} = \dfrac{5}{2} + \dfrac{5}{a} = 2\tfrac{1}{2} + \dfrac{5}{a}$

d. $K = \dfrac{q^2+3q+18}{q} = \dfrac{q^2}{q} + \dfrac{3q}{q} + \dfrac{18}{q} = q + 3 + \dfrac{18}{q}$

46.

a. $C = \dfrac{A}{B+3} \Leftrightarrow B+3 = \dfrac{A}{C} \Leftrightarrow B = \dfrac{A}{C} - 3$

b. $C = 5 + \dfrac{A}{B} \Leftrightarrow C - 5 = \dfrac{A}{B} \Leftrightarrow B = \dfrac{A}{C-5}$

47.

a. $K = 5 + \dfrac{8}{q} \Leftrightarrow \dfrac{8}{q} = K - 5 \Leftrightarrow q = \dfrac{8}{K-5}$

b. $K = \dfrac{8}{q-1} \Leftrightarrow q - 1 = \dfrac{8}{K} \Leftrightarrow q = \dfrac{8}{K} + 1$

c.

$$K = \frac{q+3}{2q-1} \Leftrightarrow K(2q-1) = q+3 \Leftrightarrow 2Kq - K = q + 3 \Leftrightarrow 2Kq - q = K + 3 \Leftrightarrow$$

$$q(2K-1) = K + 3 \Leftrightarrow q = \frac{K+3}{2K-1}$$

d. $P = 18 - \dfrac{5}{q-2} \Leftrightarrow \dfrac{5}{q-2} = 18 - P \Rightarrow q - 2 = \dfrac{5}{18-P} \Leftrightarrow q = 2 + \dfrac{5}{18-P}$

e. $P = \dfrac{7}{3q-2} \Leftrightarrow 3q - 2 = \dfrac{7}{P} \Leftrightarrow 3q = 2 + \dfrac{7}{P} \Leftrightarrow q = \dfrac{2}{3} + \dfrac{7}{3P}$

f.

$$A = \frac{q}{q+4} \Rightarrow A(q+4) = q \Leftrightarrow Aq + 4A = q \Leftrightarrow Aq - q = -4A \Leftrightarrow$$

$$q(A-1) = -4A \Leftrightarrow q = \frac{-4A}{A-1}$$

48a.

$$T=\frac{a}{a-6}\Rightarrow T(a-6)=a\Leftrightarrow Ta-6T=a\Leftrightarrow Ta-a=6T\Leftrightarrow$$

$$a(T-1)=6T\Leftrightarrow a=\frac{6T}{T-1}$$

b.

$$L=320-\frac{18}{q-1}\Leftrightarrow\frac{18}{q-1}=320-L\Leftrightarrow q-1=\frac{18}{320-L}\Leftrightarrow q=1+\frac{18}{320-L}$$

c.

$$\frac{3x}{x+y}=5-x\Leftrightarrow x+y=\frac{3x}{5-x}\Leftrightarrow y=\frac{3x}{5-x}-x$$

49.

a.

$$\frac{1}{T}=5+\frac{3}{A}\Leftrightarrow\frac{3}{A}=\frac{1}{T}-5\Leftrightarrow\frac{3}{A}=\frac{1}{T}-\frac{5T}{T}\Leftrightarrow\frac{3}{A}=\frac{1-5T}{T}\Rightarrow$$

$$\frac{A}{3}=\frac{T}{1-5T}\Leftrightarrow A=\frac{3T}{1-5T}$$

b.

$$\frac{1}{T}=5+\frac{3}{A}\Leftrightarrow\frac{1}{T}=\frac{5A}{A}+\frac{3}{A}\Leftrightarrow\frac{1}{T}=\frac{5A+3}{A}\Rightarrow T=\frac{A}{5A+3}$$

50.

a.

$$K=\frac{xy}{120}\left(4-\frac{z}{4}\right)\quad y=15\quad z=\tfrac{1}{2}x+4\ \text{ invullen geeft:}$$

$$K=\frac{15x}{120}\left(4-\frac{\frac{1}{2}x+4}{4}\right)=\frac{15x}{120}\left(4-(\tfrac{1}{8}x+1)\right)=\frac{x}{8}\left(3-\tfrac{1}{8}x\right)=\tfrac{3}{8}x-\tfrac{1}{64}x^2\Rightarrow$$

$a=-\frac{1}{64}$ en $b=\frac{3}{8}$

b.

$xy=120$ en $K=\dfrac{50}{x}+8x+\dfrac{6}{y}+\frac{1}{15}y$

We gaan uit het eerste gegeven y uitdrukken in x en dit vervolgens invullen. $\Rightarrow$

$y=\dfrac{120}{x}$ Invullen geeft : $K=\dfrac{50}{x}+8x+\dfrac{6}{\left(\frac{120}{x}\right)}+\frac{1}{15}\cdot\dfrac{120}{x}=$

$$\frac{50}{x}+8x+6\cdot\frac{x}{120}+\frac{120}{15x}=\frac{50}{x}+8x+\frac{x}{20}+\frac{8}{x}=\frac{58}{x}+8\tfrac{1}{20}x\Rightarrow$$

$a=58$ en $b=8\frac{1}{20}$

51.

$5\sqrt{x} = y \Rightarrow 25x = y \Leftrightarrow x = \frac{1}{25}y$

$\sqrt{x-5} = y \Rightarrow x - 5 = y^2 \Leftrightarrow x = 5 + y^2$

$5\sqrt{x-5} = y \Rightarrow 25(x-5) = y^2 \Leftrightarrow 25x - 125 = y^2 \Leftrightarrow 25x = 125 + y^2 \Leftrightarrow x = 5 + \frac{1}{25}y^2$

52a. $y = \sqrt{16x} = \sqrt{16} \cdot \sqrt{x} = 4\sqrt{x}$

b. $y = \sqrt{20x} = \sqrt{20} \cdot \sqrt{x} \approx 4{,}47\sqrt{x}$

c. $y = 3\sqrt{7x} = 3\sqrt{7} \cdot \sqrt{x} \approx 7{,}94\sqrt{x}$

53.

a. $A = \sqrt{t-3} \Rightarrow A^2 = t - 3 \Leftrightarrow t = A^2 + 3$

b. $S = 2\sqrt{\frac{1}{2}t + 4} \Rightarrow S^2 = 4\left(\frac{1}{2}t + 4\right) \Leftrightarrow S^2 = 2t + 16 \Leftrightarrow 2t = S^2 - 16 \Leftrightarrow t = \frac{1}{2}S^2 - 8$

c. $y = 3 - \dfrac{2}{\sqrt{t}} \Leftrightarrow \dfrac{2}{\sqrt{t}} = 3 - y \Leftrightarrow \sqrt{t} = \dfrac{2}{3-y} \Rightarrow t = \dfrac{4}{(3-y)^2}$

54.

a. $z = 6\sqrt{8 - \frac{1}{2}y} \Leftrightarrow \dfrac{z}{6} = \sqrt{8 - \frac{1}{2}y} \Rightarrow 8 - \frac{1}{2}y = \dfrac{z^2}{36} \Leftrightarrow \frac{1}{2}y = 8 - \frac{1}{36}z^2 \Leftrightarrow y = 16 - \frac{1}{18}z^2$

$\Rightarrow a = -\frac{1}{18}$ en $b = 16$

b. $A = 8 - \dfrac{20}{\sqrt{s}} \Leftrightarrow \dfrac{20}{\sqrt{s}} = 8 - A \Rightarrow \sqrt{s} = \dfrac{20}{8-A} \Rightarrow s = \dfrac{400}{(8-A)^2}$

c. $\sqrt{At} = A + 2 \Rightarrow At = A^2 + 4A + 4 \Rightarrow t = \dfrac{A^2 + 4A + 4}{A} \Leftrightarrow t = A + 4 + \dfrac{4}{A}$

55.a

Uit het gegeven volgt: $\dfrac{\Delta N}{\Delta t} = \dfrac{90-50}{12-8} = 10 \Rightarrow N$ neemt met 10 toe per tijdseenheid.

b.

Uit het gegeven volgt : $g^4 = \dfrac{90}{50} \Rightarrow g = \sqrt[4]{\dfrac{90}{50}} \approx 1{,}16$

56

a. Uit het gegeven volgt :

$\dfrac{\Delta N_1}{\Delta t} = \dfrac{942 - 750}{20 - 12} = \dfrac{192}{8} = 24 \Rightarrow N_1 = 24t + b$ door het punt (12,750) $\Rightarrow$

$750 = 24 \cdot 12 + b \Leftrightarrow b = 462 \Rightarrow N_1 = 24t + 462$

Uit het gegeven volgt : $g^8 = \dfrac{942}{750} \Rightarrow g = \sqrt[8]{\dfrac{942}{750}} \approx 1{,}029 \Rightarrow$

$N_2 = b \cdot 1{,}029^t$ door (12,750) $\Rightarrow 750 = b \cdot 1{,}029^{12} \Rightarrow b = \dfrac{750}{1{,}029^{12}} \approx 532 \Rightarrow$

$N_2 = 532 \cdot 1{,}029^t$

b. $N_2 = 2N_1 \Leftrightarrow 532 \cdot 1{,}029^t = 2(24t + 462)$

Voer in $y_1 = 2(24x + 462)$ en $y_2 = 532 \cdot 1{,}029^x$

Met de solver vinden we $x = t \approx 74{,}8$

57.

a.

Uit het gegeven volgt :

$\dfrac{\Delta N_1}{\Delta t} = \dfrac{1820 - 2180}{10 - 6} = -90 \Rightarrow N_1 = -90t + b$ door het punt (6, 2180) $\Rightarrow$

$2180 = -90 \cdot 6 + b \Leftrightarrow b = 2720 \Rightarrow N_1 = -90t + 2720$

Uit het gegeven volgt : $g^4 = \dfrac{1820}{2180} \Rightarrow g = \sqrt[4]{\dfrac{1820}{2180}} \approx 0{,}956 \Rightarrow$

$N_2 = b \cdot 0{,}956^t$ door (6,2180) $\Rightarrow 2180 = b \cdot 0{,}956^6 \Rightarrow b = \dfrac{2180}{0{,}956^6} \approx 2856 \Rightarrow$

$N_2 = 2856 \cdot 0{,}956^t$

b.

$N_2 = 2N_1 \Leftrightarrow 2856 \cdot 0{,}956^t = 2(-90t + 2720)$

Voer in $y_1 = 2 \cdot (-90x + 2720)$ en $y_2 = 2856 \cdot 0{,}956^x$

Met de solver vinden we $x = t \approx 25{,}1$

58.

a. $\dfrac{1}{x^3} = x^{-3}$

b. $\sqrt[4]{x^3} = x^{\frac{3}{4}}$

c. $\sqrt{x} = x^{\frac{1}{2}}$

d. $x^3 \cdot x^5 = x^8$

e. $x^6 : x^2 = x^4$

f. $x^3 \cdot \sqrt{x} = x^3 \cdot x^{\frac{1}{2}} = x^{3\frac{1}{2}}$

59.

a. $y = 5x^4 \cdot \sqrt{x} = 5x^4 \cdot x^{\frac{1}{2}} = 5x^{4\frac{1}{2}}$

b. $y = \dfrac{5}{x} \cdot x^{1,3} = 5 \cdot x^{-1} \cdot x^{1,3} = 5x^{0,3}$

c. $y = (3x^{-1,8})^4 \cdot 2x^{3,6} = 3^4 \cdot x^{-7,2} \cdot 2x^{3,6} = 162x^{-3,6}$

60

a. $N(0) = 25 \cdot 1,4^{-2} \approx 12,76$ en $N(1) = 25 \cdot 1,4^1 = 35 \Rightarrow g = \dfrac{35}{12,76} \approx 2,74 \Rightarrow$

$N = 12,76 \cdot 2,74^t$

b.

$N = 180 \cdot 0,8^{5-t} = 180 \cdot 0,8^5 \cdot 0,8^{-t} = 180 \cdot 0,8^5 \cdot \left(0,8^{-1}\right)^t = 58,98 \cdot 1,25^t$

c.

$N = 92,6 \cdot 1,7^{-1,2t+0,5} \Rightarrow N(0) = 120,74$ en $N(1) = 63,87 \Rightarrow g = \dfrac{63,87}{120,74} \approx 0,53 \Rightarrow$

$N = 120,74 \cdot 0,53^t$

61.

a.

$y = 18 \cdot \left(2x^2\right)^{0,3} \cdot \left(5z\right)^{0,6} = 18 \cdot 2^{0,3} \cdot x^{0,6} \cdot 5^{0,6} \cdot z^{0,6} = 18 \cdot 2^{0,3} \cdot 5^{0,6} \cdot x^{0,6} \cdot z^{0,6} \approx 58,21 \cdot x^{0,6} \cdot z^{0,6}$

b. $18 - 5\left(6 - 1,5^{4t}\right) = 18 - 30 + 5 \cdot 1,5^{4t} = -12 + 5 \cdot \left(1,5^4\right)^t \approx -12 + 5 \cdot 5,06^t$

c.

$T = 27 \cdot 0,4^t \left(3 - 0,4^{2t}\right) = 81 \cdot 0,4^t - 27 \cdot 0,4^{3t} = 81 \cdot 0,4^t - 27 \cdot \left(0,4^3\right)^t \approx$

$81 \cdot 0,4^t - 27 \cdot 0,06^t$

62.

a.

$L = 0,006 \cdot \left(5t\right)^{0,35} \cdot (5s)^{0,18}$ en $s = \frac{1}{3}t^3 \Rightarrow L = 0,006 \cdot \left(5t\right)^{0,35} \cdot (5 \cdot \frac{1}{3}t^3)^{0,18} =$

$0,006 \cdot 5^{0,35} \cdot t^{0,35} \cdot 5^{0,18} \cdot \left(\frac{1}{3}\right)^{0,18} \cdot t^{0,54} = 0,006 \cdot 5^{0,35} \cdot 5^{0,18} \cdot \left(\frac{1}{3}\right)^{0,18} \cdot t^{0,35} \cdot t^{0,54} \approx$

$0,01 \cdot t^{0,89}$

b.

$y = 0,12 \cdot (3t)^{1,6} \cdot \left(\frac{1}{5}z\right)^{2,3}$ en $t = \frac{1}{2}z^{-0,4} \Rightarrow y = 0,12 \cdot (3 \cdot \frac{1}{2}z^{-0,4})^{1,6} \cdot \left(\frac{1}{5}z\right)^{2,3} =$

$0,12 \cdot 1,5^{1,6} \cdot z^{-0,64} \cdot \left(\frac{1}{5}\right)^{2,3} \cdot z^{2,3} = 0,12 \cdot 1,5^{1,6} \cdot \left(\frac{1}{5}\right)^{2,3} \cdot z^{-0,64} \cdot z^{2,3} \approx 0,01 \cdot z^{1,66}$

c.

$$y=\frac{500}{x^4} \text{ en } x=4\cdot\sqrt{20+a^2} \Rightarrow y=500\cdot x^{-4} \text{ en } x=4\cdot\sqrt{20+a^2} \Rightarrow$$

$$y=500\cdot\left(4\cdot\left(20+a^2\right)^{\frac{1}{2}}\right)^{-4}=500\cdot4^{-4}\cdot\left(20+a^2\right)^{-2}\approx1{,}95\cdot\left(20+a^2\right)^{-2}$$

63

a. $x^5=18\Rightarrow x=\sqrt[5]{18}=18^{\frac{1}{5}}$

b. $\sqrt[3]{x}=4\Leftrightarrow x^{\frac{1}{3}}=4\Rightarrow x=4^3\Leftrightarrow x=64$

64.

a. $5x^{-1,2}=20\Leftrightarrow x^{-1,2}=4\Rightarrow x=4^{-\frac{1}{1,2}}\Leftrightarrow x\approx0{,}31$

b. $3+0{,}18x^{1,7}=25\Leftrightarrow0{,}18x^{1,7}=22\Leftrightarrow x^{1,7}=\frac{22}{0{,}18}\Leftrightarrow x=\left(\frac{22}{0{,}18}\right)^{\frac{1}{1,7}}\Leftrightarrow x\approx16{,}89$

c. $5\cdot\sqrt[4]{x}-7=43\Leftrightarrow5\cdot\sqrt[4]{x}=50\Leftrightarrow\sqrt[4]{x}=10\Rightarrow x=10^4\Leftrightarrow x=10000$

d. $3x^6=57\Leftrightarrow x^6=19\Leftrightarrow x=\sqrt[6]{19}\vee x=-\sqrt[6]{19}\Rightarrow x\approx1{,}63\vee x=-1{,}63$

65.

a.

$$y=3x^{2,6}\Leftrightarrow\frac{y}{3}=x^{2,6}\Rightarrow x=\left(\frac{y}{3}\right)^{\frac{1}{2,6}}\Leftrightarrow x=\left(\tfrac{1}{3}\cdot y\right)^{\frac{1}{2,6}}\Leftrightarrow y=\left(\frac{1}{3}\right)^{\frac{1}{2,6}}\cdot y^{\frac{1}{2,6}}\Leftrightarrow$$

$$x=0{,}66\cdot y^{0,38}$$

b.

$$y=0{,}18\cdot(3x)^{-1,4}\Leftrightarrow\frac{y}{0{,}18}=\left(3x\right)^{-1,4}\Rightarrow3x=\left(\frac{y}{0{,}18}\right)^{\frac{1}{-1,4}}\Leftrightarrow3x=\left(\frac{1}{0{,}18}\cdot y\right)^{\frac{1}{-1,4}}\Leftrightarrow$$

$$3x=\left(\frac{1}{0{,}18}\right)^{\frac{1}{-1,4}}\cdot y^{\frac{1}{-1,4}}\Leftrightarrow x=\tfrac{1}{3}\cdot\left(\frac{1}{0{,}18}\right)^{\frac{1}{-1,4}}\cdot y^{\frac{1}{-1,4}}\Leftrightarrow x\approx0{,}10\cdot y^{-0,71}$$

c.

$$y=7\cdot\sqrt[5]{3x}\Leftrightarrow\frac{y}{7}=\sqrt[5]{3x}\Rightarrow3x=\left(\frac{y}{7}\right)^5\Leftrightarrow x=\frac{1}{3}\cdot\left(\frac{1}{7}\cdot y\right)^5\Leftrightarrow x=\frac{1}{3}\cdot\left(\frac{1}{7}\right)^5\cdot y^5\Leftrightarrow$$

$$x\approx0{,}00\cdot y^5$$

d.

$$y=1{,}9\cdot(2x)^{3{,}6}\cdot(3x)^{-1{,}7}\Leftrightarrow y=1{,}9\cdot 2^{3{,}6}\cdot x^{3{,}6}\cdot 3^{-1{,}7}\cdot x^{-1{,}7}\Leftrightarrow y=1{,}9\cdot 2^{3{,}6}\cdot 3^{-1{,}7}\cdot x^{1{,}9}\Rightarrow$$

$$x^{1{,}9}=\frac{y}{1{,}9\cdot 2^{3{,}6}\cdot 3^{-1{,}7}}\Rightarrow x=\left(\frac{1}{1{,}9\cdot 2^{3{,}6}\cdot 3^{-1{,}7}}\cdot y\right)^{\frac{1}{1{,}9}}\Leftrightarrow x=\left(\frac{1}{1{,}9\cdot 2^{3{,}6}\cdot 3^{-1{,}7}}\right)^{\frac{1}{1{,}9}}\cdot y^{\frac{1}{1{,}9}}\Leftrightarrow$$

$$x\approx 0{,}51\cdot y^{0{,}53}$$

66. a.

$$P=2{,}5q^{3.6}\Leftrightarrow \frac{P}{2{,}5}=q^{3{,}6}\Rightarrow q=\left(\frac{P}{2{,}5}\right)^{\frac{1}{3{,}6}}\Leftrightarrow q=\left(\frac{1}{2{,}5}\right)^{\frac{1}{3{,}6}}\cdot P^{\frac{1}{3{,}6}}\Leftrightarrow q\approx 0{,}78\cdot P^{0{,}28}$$

b.

$$L=\tfrac{1}{6}\cdot\sqrt[3]{A}-7\Leftrightarrow L+7=\tfrac{1}{6}\cdot\sqrt[3]{A}\Leftrightarrow \sqrt[3]{A}=6L+42\Rightarrow A=(6L+42)^3$$

c.

$$K=4a^3 \text{ en } O=8a^2\Rightarrow a^2=\tfrac{1}{8}O\Rightarrow a=\pm\left(\tfrac{1}{8}O\right)^{\frac{1}{2}}\Rightarrow K=\pm 4\cdot\left(\tfrac{1}{8}O\right)^{\frac{3}{2}}\Leftrightarrow$$

$$K=\pm 4\cdot\left(\tfrac{1}{8}\right)^{\frac{3}{2}}\cdot O^{\frac{3}{2}}\Leftrightarrow K=\pm 0{,}18\cdot O^{\frac{3}{2}}$$

$$K=0{,}18\cdot O^{\frac{3}{2}}\Leftrightarrow \frac{K}{0{,}18}=O^{\frac{3}{2}}\Rightarrow O=\left(\frac{K}{0{,}18}\right)^{\frac{2}{3}}\Leftrightarrow O=\left(\frac{1}{0{,}18}\right)^{\frac{2}{3}}\cdot K^{\frac{2}{3}}\Leftrightarrow$$

$$O=3{,}14\cdot K^{\frac{2}{3}}$$

67.

a. ${}^{3}\log(81)=4$

b. ${}^{5}\log(5)=1$

c. ${}^{2}\log\left(\tfrac{1}{2}\right)=-1$

d. ${}^{10}\log(1000)=3$

e. ${}^{6}\log(1)=0$

f. ${}^{3}\log\left(3^{1{,}9}\right)=1{,}9$

68a.

$$\log(N)=1{,}17+0{,}3t\Leftrightarrow N=10^{1{,}17+0{,}3t}\Leftrightarrow N=10^{1{,}17}\cdot\left(10^{0{,}3}\right)^t\Leftrightarrow N\approx 15\cdot 2{,}00^t$$

b.

$$\log(a)=2{,}16+1{,}3\log(b)\Leftrightarrow a=10^{2{,}16+1{,}3\log(b)}\Leftrightarrow a=10^{2{,}16}\cdot 10^{1{,}3\log(b)}\Leftrightarrow$$

$$a\approx 145\cdot\left(10^{\log(b)}\right)^{1{,}3}\Leftrightarrow a\approx 145\cdot b^{1{,}3}$$

c.

$$^2\log(p)=1{,}18-0{,}8\cdot{}^2\log(q)\Leftrightarrow p=2^{1{,}18-0{,}8\cdot{}^2\log(q)}\Leftrightarrow p=2^{1{,}18}\cdot 2^{-0{,}8\cdot{}^2\log(q)}\Leftrightarrow$$

$$p=2^{1{,}18}\cdot\left(2^{{}^2\log(q)}\right)^{-0{,}8}\Leftrightarrow p\approx 2{,}27\cdot q^{-0{,}8}$$

d.

$$N=\log(3L+6)\Leftrightarrow 3L+6=10^N\Leftrightarrow 3L=10^N-6\Leftrightarrow L=\frac{1}{3}\cdot 10^N-2$$

69a.

$$0{,}5k=\log(2T+5)-1{,}8\Leftrightarrow\log(2T+5)=1{,}8+0{,}5k\Leftrightarrow 2T+5=10^{1{,}8+0{,}5k}\Leftrightarrow$$

$$2T=-5+10^{1{,}8}\cdot 10^{0{,}5k}\Leftrightarrow T=-2{,}5+31{,}55\cdot 3{,}16^k$$

b.

$$3\log(M)=1{,}6+\log(4S-1)\Leftrightarrow\log(4S-1)=3\cdot\log(M)-1{,}6\Leftrightarrow$$

$$4S-1=10^{3\log(M)-1{,}6}\Leftrightarrow 4S=1+\left(10^{\log M}\right)^3\cdot 10^{-1{,}6}\Leftrightarrow S\approx\tfrac{1}{4}+M^3\cdot 0{,}01$$

70. $S=290\log(g+100)-550$

a. $S=290\log(185+100)-550\approx 161{,}9\Rightarrow$ De schouderhoogte is dus ongeveer 162 cm.

b.

$$210=290\log(g+100)-550\Leftrightarrow 290\log(g+100)=760\Leftrightarrow\log(g+100)=\frac{760}{290}\Leftrightarrow$$

$$g+100=10^{\frac{760}{290}}\Leftrightarrow g=10^{\frac{760}{290}}-100\approx 318\text{ cm}$$

c.

$$S=290\log(g+100)-550\Leftrightarrow 290\log(g+100)=S+550\Leftrightarrow\log(g+100)=\frac{S}{290}+\frac{100}{290}$$

$$\Leftrightarrow g+100=10^{\frac{S}{290}+\frac{100}{290}}\Leftrightarrow g=10^{\frac{S}{290}}\cdot 10^{\frac{100}{290}}-100\Leftrightarrow g=78{,}8\cdot 1{,}008^S-100$$

71. $\log(N)=5{,}3-1{,}7\log(D)$

a.

$$\log(N)=5{,}3-1{,}7\log(50)\approx 2{,}4117...\Rightarrow N\approx 10^{2{,}4117...}\approx 258\Rightarrow$$

Het aantal bomen per ha is dan ongeveer 258.

b.

2000 bomen op 8ha $\Leftrightarrow$ 250 bomen per ha. $\Rightarrow$

$$\log(250)=5{,}3-1{,}7\log(D)\Leftrightarrow 1{,}7\log(D)=5{,}3-\log(250)\approx 2{,}90....\Rightarrow$$

$$\log(D)\approx\frac{2{,}90......}{1{,}7}\Leftrightarrow D\approx 10^{1{,}70...}\approx 50{,}9$$

$\Rightarrow$ De diameter is dus ongeveer 51 cm.

c.

$$\log(N) = 5,3 - 1,7\log(D) \Leftrightarrow 1,7\log(D) = 5,3 - \log(N) \Leftrightarrow \log(D) = \frac{5,3}{1,7} - \frac{\log(N)}{1,7}$$

$$\Leftrightarrow D = 10^{\frac{5,3}{1,7} - \frac{\log(N)}{1,7}} \Leftrightarrow D = 10^{\frac{5,3}{1,7}} \cdot \left(10^{\log(N)}\right)^{-\frac{1}{1,7}} \Leftrightarrow D \approx 1311 \cdot N^{-0,59}$$

72. $v = 0,86 \cdot \log(p) + 0,04$ met $1\,\text{feet} = 0,314$ meter.

a.

$v = 0,86 \cdot \log(350000) + 0,04 \approx 4,8079$ feet/sec$=4,8079 \cdot 0,314 \cdot 10^{-3} \cdot 3600 km/uur$

$\approx$ 5,43 km/uur.

b.

$6 km/uur = \dfrac{6 \cdot 1000}{3600}$ m/sec$=\dfrac{6000}{3600 \cdot 0,314}$ feet/sec=5,31 feet/sec

Nu krijgen we dus :

$$5,31 = 0,86 \cdot \log(p) + 0,04 \Leftrightarrow 0,86 \cdot \log(p) = 5,268 \Rightarrow \log(p) = \frac{5,268}{0,86} \Rightarrow$$

$$p = 10^{\frac{5,268}{0,86}} \approx 1335000$$

$\Rightarrow$ Het percentage is dan : $\dfrac{1,335 - 1,2}{1,2} \cdot 100\% = 11,25\%$

c.

$$v = 0,86 \cdot \log(p) + 0,04 \Leftrightarrow 0,86 \cdot \log(p) = v - 0,04 \Leftrightarrow \log(p) = \frac{v}{0,86} - \frac{0,04}{0,86} \Leftrightarrow$$

$$p = 10^{\frac{v}{0,86} - \frac{0,04}{0,86}} \Leftrightarrow p = 10^{-\frac{0,04}{0,86}} \cdot \left(10^{\frac{1}{0,86}}\right)^{v} \approx 0,9 \cdot 14,5^{v}$$

73.

a. $3^x = 200 \Leftrightarrow x = {}^3\log(200) = \dfrac{\log(200)}{\log(3)} \approx 4,82$

b.

$$3^x = 200 \Rightarrow \log\left(3^x\right) = \log(200) \Leftrightarrow x \cdot \log(3) = \log(200) \Leftrightarrow x = \frac{\log(200)}{\log(3)} \approx 4,82$$

74.

a. $1,2^x = 13 \Leftrightarrow \log(1,2^x) = \log(13) \Leftrightarrow x \cdot \log(1,2) = \log(13) \Leftrightarrow x = \dfrac{\log(13)}{\log(1,2)} \approx 14,07$

b. $x^{1,2} = 13 \Leftrightarrow x = 13^{\frac{1}{1,2}} \Leftrightarrow x \approx 8,48$

c.

$$3 \cdot 1{,}5^x + 1 = 19 \Leftrightarrow 3 \cdot 1{,}5^x = 18 \Leftrightarrow 1{,}5^x = 6 \Leftrightarrow \log(1{,}5^x) = \log(6) \Leftrightarrow$$

$$x \cdot \log(1{,}5) = \log(6) \Leftrightarrow x = \frac{\log(6)}{\log(1{,}5)} \approx 4{,}42$$

d.

$$5x^{1{,}74} + 8 = 29 \Leftrightarrow 5x^{1{,}74} = 21 \Leftrightarrow x^{1{,}74} = 4{,}2 \Leftrightarrow x = 4{,}2^{\frac{1}{1{,}74}} \Leftrightarrow x \approx 2{,}28$$

e.

$$^3\log(4x) = 1{,}7 \Leftrightarrow 4x = 3^{1{,}7} \Leftrightarrow x = \frac{3^{1{,}7}}{4} \Leftrightarrow x \approx 1{,}62$$

f.

$$2 \cdot 1{,}7^{3x-1} = 46 \Leftrightarrow 1{,}7^{3x-1} = 23 \Leftrightarrow \log\left(1{,}7^{3x-1}\right) = \log(23) \Leftrightarrow (3x-1)\log(1{,}7) = \log(23)$$

$$3x - 1 = \frac{\log(23)}{\log(1{,}7)} \Leftrightarrow 3x = 5{,}909... + 1 \Leftrightarrow x = \frac{5{,}909...}{3} + \frac{1}{3} \Leftrightarrow x \approx 2{,}30$$

75.

a.

$$y = 3 \cdot 5^x \Leftrightarrow 5^x = \frac{y}{3} \Leftrightarrow \log(5^x) = \log\left(\frac{y}{3}\right) \Leftrightarrow x \cdot \log(5) = \log(y) - \log(3) \Leftrightarrow$$

$$x = \frac{\log(y)}{\log(5)} - \frac{\log(3)}{\log(5)} = \frac{1}{\log(5)} \cdot \log(y) - \frac{\log(3)}{\log(5)} \Leftrightarrow x \approx 1{,}43\log(y) - 0{,}68$$

b.

$$y = 7 \cdot 1{,}6^x \Leftrightarrow 1{,}6^x = \frac{y}{7} \Leftrightarrow \log(1{,}6^x) = \log\left(\frac{y}{7}\right) \Leftrightarrow x \cdot \log(1{,}6) = \log(y) - \log(7) \Leftrightarrow$$

$$x = \frac{\log(y)}{\log(1{,}6)} - \frac{\log(7)}{\log(1{,}6)} = \frac{1}{\log(1{,}6)} \cdot \log(y) - \frac{\log(7)}{\log(1{,}6)} \Leftrightarrow x \approx 4{,}90\log(y) - 4{,}14$$

c.

$$y = 1{,}8 \cdot 1{,}3^{2x-5} \Leftrightarrow 1{,}3^{2x-5} = \frac{y}{1{,}8} \Leftrightarrow \log(1{,}3^{2x-5}) = \log\left(\frac{y}{1{,}8}\right) \Leftrightarrow$$

$$(2x-5) \cdot \log(1{,}3) = \log(y) - \log(1{,}8) \Leftrightarrow$$

$$2x - 5 = \frac{\log(y)}{\log(1{,}3)} - \frac{\log(1{,}8)}{\log(1{,}3)} = \frac{1}{\log(1{,}3)} \cdot \log(y) - \frac{\log(1{,}8)}{\log(1{,}3)} \Leftrightarrow$$

$$2x \approx 8{,}776... \cdot \log(y) - 2{,}240... + 5 \Leftrightarrow x \approx 4{,}39 \cdot \log(y) - 1{,}38$$

76a.

$$P = 25 \cdot 3^{2q+4} \Leftrightarrow \frac{P}{25} = 3^{2q+4} \Leftrightarrow \log(3^{2q+4}) = \log\left(\frac{P}{25}\right) \Leftrightarrow$$

$$(2q+4)\log(3) = \log(P) - \log(25) \Leftrightarrow 2q+4 = \frac{\log(P)}{\log(3)} - \frac{\log(25)}{\log(3)} \Leftrightarrow$$

$$2q = \frac{\log(P)}{\log(3)} - \frac{\log(25)}{\log(3)} - 4 \Leftrightarrow q = \frac{\log(P)}{2\cdot\log(3)} - \frac{\log(25)}{2\cdot\log(3)} - 2 \Leftrightarrow q = 1{,}05\log(P) - 3{,}46$$

b.

$$P \cdot 1{,}5^{q+2} = 18 \Leftrightarrow 1{,}5^{q+2} = \frac{18}{P} \Leftrightarrow \log\left(1{,}5^{q+2}\right) = \log\left(\frac{18}{P}\right) \Leftrightarrow$$

$$(q+2)\cdot\log(1{,}5) = \log(18) - \log(P) \Leftrightarrow q+2 = \frac{\log(18)}{\log(1{,}5)} - \frac{\log(P)}{\log(1{,}5)} \Leftrightarrow$$

$$q = -2 + \frac{\log(18)}{\log(1{,}5)} - \frac{\log(P)}{\log(1{,}5)} \Leftrightarrow q \approx 5{,}13 - 5{,}68\cdot\log(P)$$

c.

$$P = 27q^{1{,}8} \Leftrightarrow q^{1{,}8} = \frac{P}{27} \Leftrightarrow q = \left(\frac{P}{27}\right)^{\frac{1}{1{,}8}} \Leftrightarrow q = \frac{P^{\frac{1}{1{,}8}}}{28^{\frac{1}{1{,}8}}} \Leftrightarrow q \approx 0{,}16\cdot P^{0{,}56}$$

d.

$$P = 3{,}5 + 4{,}2\log(q) \Leftrightarrow 4{,}2\log(q) = P - 3{,}5 \Leftrightarrow \log(q) = \frac{P}{4{,}2} - \frac{3{,}5}{4{,}2} \Leftrightarrow$$

$$q = 10^{\frac{P}{4{,}2} - \frac{3{,}5}{4{,}2}} \Leftrightarrow q = 10^{\frac{P}{4{,}2}} \cdot 10^{-\frac{3{,}5}{4{,}2}} \Leftrightarrow q \approx \left(10^{\frac{1}{4{,}2}}\right)^{P} \cdot 0{,}15 \Leftrightarrow q \approx 1{,}73^{P} \cdot 0{,}15$$