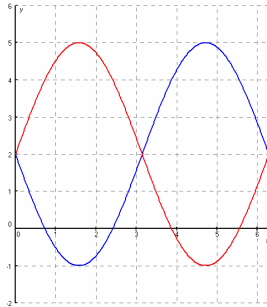


6.4 Sinusoïden tekenen.

Opgave 44:

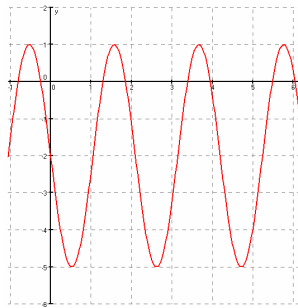
a.



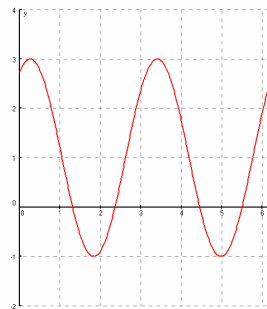
- b. amplitude van f is 3
amplitude van g is 3

Opgave 45:

- a. $f(x) = -2 + 3 \sin 3(x + \frac{1}{3}\pi)$
evenwichtsstand: -2
amplitude: 3
periode: $\frac{2\pi}{3} = \frac{2}{3}\pi$
beginpunt: $(-\frac{1}{3}\pi, 2)$

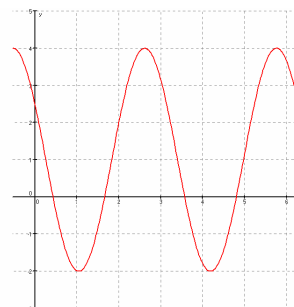


- b. $g(x) = 1 - 2 \sin 2(x - \frac{1}{3}\pi)$
evenwichtsstand: 1
amplitude: 2
periode: $\frac{2\pi}{2} = \pi$
beginpunt: $(\frac{1}{3}\pi, 1)$ dalend

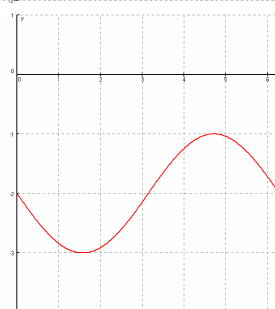


Opgave 46:

- a. $f(x) = 1 + 3 \cos 2(x + \frac{1}{6}\pi)$
evenwichtsstand: 1
amplitude: 3
periode: $\frac{2\pi}{2} = \pi$
beginpunt: $(-\frac{1}{6}\pi, 4)$



- b. $g(x) = -2 - \cos(x - \frac{1}{2}\pi)$
evenwichtsstand: -2
amplitude: 1
periode: 2π
beginpunt: $(\frac{1}{2}\pi, -3)$ laagste punt



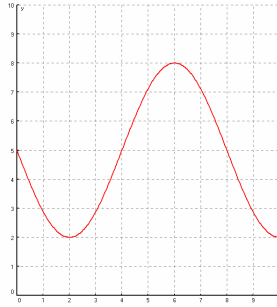
Opgave 47:

evenwichtsstand: 5

amplitude: 3

periode: $\frac{2\pi}{\frac{1}{4}\pi} = 8$

beginpunt: (0,5) dalend

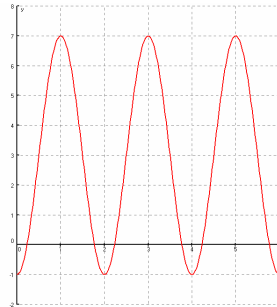
**Opgave 48:**

evenwichtsstand: 3

amplitude: 4

periode: $\frac{2\pi}{\pi} = 2$

beginpunt: (0,-1) laagste punt

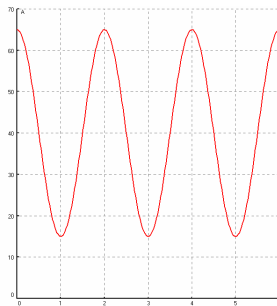
**Opgave 49:**

a. evenwichtsstand: 40

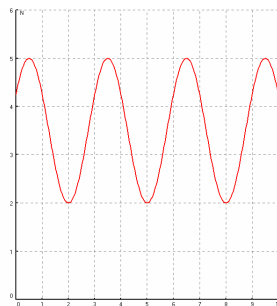
amplitude: 25

periode: $\frac{2\pi}{\pi} = 2$ beginpunt: $(\frac{1}{2}\pi, 40)$ b. $y_1 = 40 + 25 \sin(\pi(t - 1\frac{1}{2}))$ $y_2 = 30$

intersect geeft:

 $t = 0,63 \vee t = 1,37 \vee t = 2,63 \vee t = 3,37 \vee t = 4,63 \vee t = 5,37$ dus $0,63 < t < 1,37 \vee 2,63 < t < 3,37 \vee 4,63 < t < 5,37$ c. de grafiek snijdt de evenwichtsstand voor $t = 1\frac{1}{2}$ $\left[\frac{dy}{dx}\right]_{t=1\frac{1}{2}} = 78,5$ **Opgave 50:**a. evenwichtsstand: $3\frac{1}{2}$ amplitude: $1\frac{1}{2}$ periode: $\frac{2\pi}{\frac{2}{3}\pi} = 3$ beginpunt: $(\frac{1}{2}, 5)$ b. $y_1 = 3,5 + 1,5 \cos(\frac{2}{3}\pi(t - \frac{1}{2}))$ $y_2 = 4$

intersect geeft:

 $t = 1,09 \vee t = 2,91 \vee t = 4,09 \vee t = 5,91 \vee t = 7,09 \vee t = 8,91$ dus: $0 \leq t < 1,09 \vee 2,91 < t < 4,09 \vee 5,91 < t < 7,09 \vee 8,91 < t \leq 10$ c. $\left[\frac{dy}{dx}\right]_{t=0} = 2,72$ 

- d. de grafiek snijdt de evenwichtsstand in het punt met $t = \frac{1}{2} + \frac{3}{4} \cdot 3 = 2,75$

$$\left[\frac{dy}{dx} \right]_{t=2,75} = 3,1$$

Opgave 51:

bij a hoort j

bij b hoort f

bij c hoort g

bij d hoort h

Opgave 52:

evenwichtsstand: 20

amplitude: 30

periode: 50 dus $c = \frac{2\pi}{50} = \frac{\pi}{25}$

- $y = 20 + 30 \sin \frac{\pi}{25} x$
- $y = 20 - 30 \sin(\frac{\pi}{25}(x - 25))$
- $y = 20 + 30 \cos(\frac{\pi}{25}(x - 12,5))$
- $y = 20 - 30 \cos(\frac{\pi}{25}(x - 37,5))$

Opgave 53:

evenwichtsstand: -60

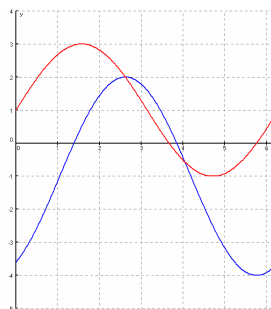
amplitude: 160

periode: 6,8 dus $c = \frac{2\pi}{6,8} = \frac{5\pi}{17}$

- $N = -60 + 160 \sin(\frac{5\pi}{17}(t - 4))$
- $N = -60 + 160 \cos(\frac{5\pi}{17}(t - 5,7))$

Opgave 54:

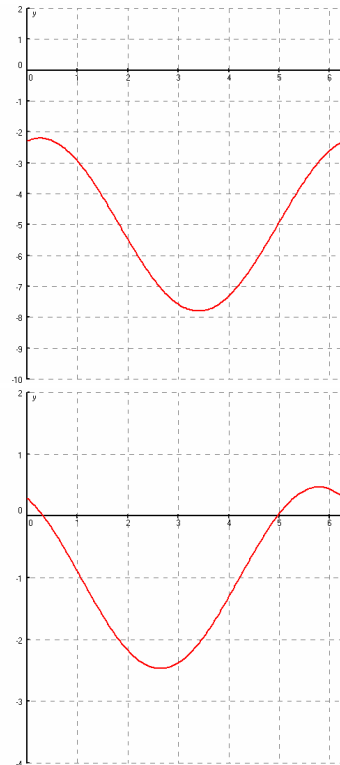
- f evenwichtsstand: 1
 amplitude: 2
 periode: 2π
 beginpunt: (0,1)
 g evenwichtsstand: -1
 amplitude: 3
 periode: 2π
 beginpunt: $(\frac{1}{3}\pi, -1)$



- $y_1 = 1 + 2 \sin x$ en $y_2 = -1 + 3 \sin(x - \frac{1}{3}\pi)$
 intersect geeft: $x = 2,62 \vee x = 4,05$
 $0 \leq x < 2,62 \vee 4,05 < x \leq 2\pi$
- de evenwichtsstand van f is 1 en die van g is -1 dus is de evenwichtsstand van $f + g$ gelijk aan 0
- teken de grafiek van $y_3 = y_1 + y_2$
 evenwichtsstand: 0
 amplitude: 4,36
 periode: 2π
 beginpunt: 0,64
 $s(x) = 4,36 \sin(x - 0,64)$

Opgave 55:

- a. $y_1 = -3 + \cos x$ en $y_2 = \cos(x - \frac{1}{4}\pi) - 2$
neem $y_3 = y_1 + y_2$
maximum = $-2,202$ en minimum = $-7,798$
evenwichtsstand: -5
amplitude: $2,80$
periode: 2π
beginpunt: $(0,26; -2,20)$
 $s(x) = -5 + 2,80 \cos(x - 0,26)$
- b. neem $y_3 = y_1 - y_2$
maximum = $0,474$ en minimum = $-2,474$
evenwichtsstand: -1
amplitude: $1,47$
periode: 2π
beginpunt: $(4,21; -1)$
 $v(x) = -1 + 1,47 \sin(x - 4,21)$



Opgave 56:

- a. evenwichtsstand: $21,5$
amplitude: $6,5$
periode: $\frac{2\pi}{\frac{1}{6}\pi} = 12$
beginpunt: $(4,21\frac{1}{2})$
- b. $y_1 = 21,5 + 6,5 \sin(\frac{\pi}{6}(x - 4))$ en $y_2 = 25$
intersect geeft: $t = 5,086$ ∨ $t = 8,914$
 $t = 5,086$ is 3 juni, $t = 8,914$ is 28 september, dus 118 dagen
of $\Delta t = 8,914 - 5,086 = 3,828$ maanden = $\frac{3,828}{12} \cdot 365 = 116$ dagen
- c. $[\frac{dT}{dt}]_{t=4} = 3,403$ °/maand = $0,1$ °/dag
- d. evenwichtsstand: $17,5$ dus $a = 17,5$
amplitude: $2,5$ dus $b = 2,5$
periode: 12 dus $c = \frac{2\pi}{12} = \frac{\pi}{6}$
beginpunt: $t = 2 + \frac{1}{4} \cdot 12 = 5$ dus $d = 5$
 $W = 17,5 + 2,5 \sin(\frac{\pi}{6}(t - 5))$

