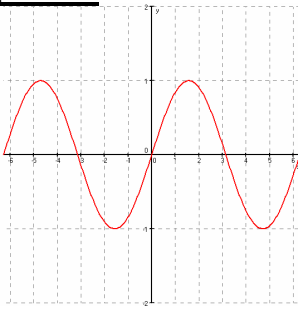


6.3 Transformaties bij sinusoiden

Opgave 32:

a.

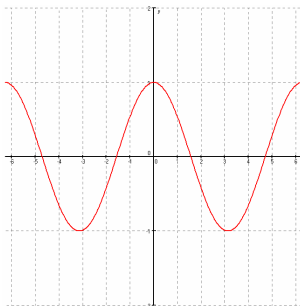


b. $(-1\frac{1}{2}\pi, 1)$ $(-\frac{1}{2}\pi, -1)$ $(\frac{1}{2}\pi, 1)$ $(1\frac{1}{2}\pi, -1)$

c. $(-2\pi, 0)$ $(-\pi, 0)$ $(0, 0)$ $(\pi, 0)$ $(2\pi, 0)$

Opgave 33:

a.



b. $(-2\pi, 1)$ $(-\pi, -1)$ $(0, 1)$ $(\pi, -1)$ $(2\pi, 1)$

c. $x = -1\frac{1}{2}\pi \vee x = -\frac{1}{2}\pi \vee x = \frac{1}{2}\pi \vee x = 1\frac{1}{2}\pi$

d. zie opgave a

Opgave 34:

a. $T(0, 2)$

evenwichtsas is 2

b. $T(\frac{1}{3}\pi, 0)$

$$\sin(x - \frac{1}{3}\pi) = 0$$

$$x - \frac{1}{3}\pi = 0 + k \cdot \pi$$

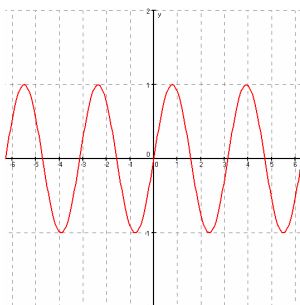
$$x = \frac{1}{3}\pi + k \cdot \pi$$

c. $V_{x-as, 4}$

amplitude is 4

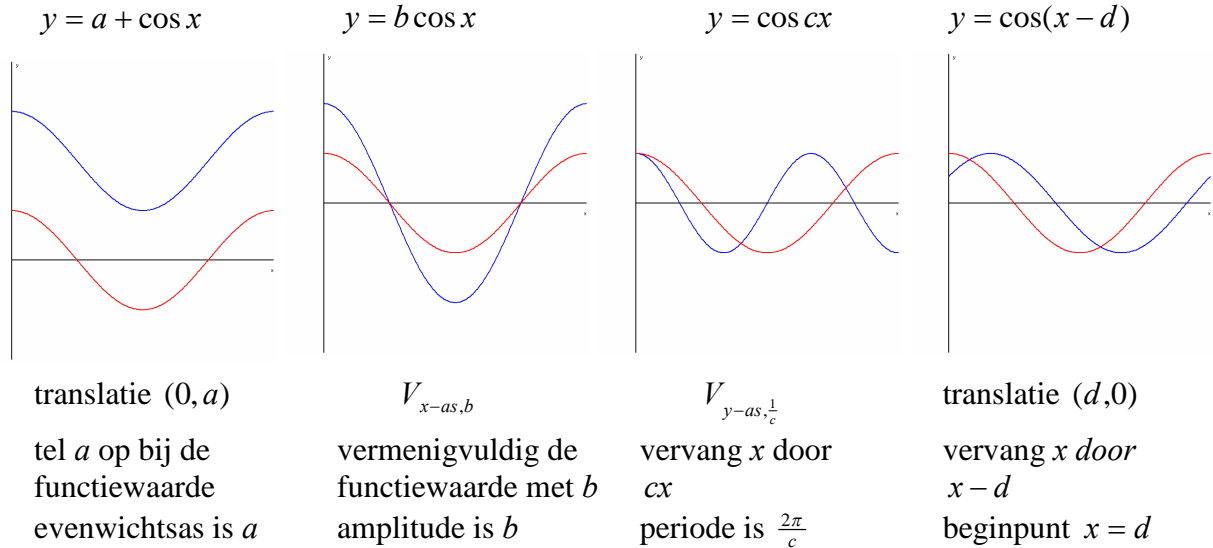
Opgave 35:

a.



- b. periode is π
 c. periode is 6π

Opgave 36:



Opgave 37:

- a. $V_{x-as, 2}$ daarna $T(-3, 0)$
 b. $V_{x-as, \frac{1}{3}}$ daarna $T(0, \frac{1}{5})$
 c. $h(x) = \cos 3(x - 4)$
 $V_{y-as, \frac{1}{3}}$ daarna $T(4, 0)$
 d. $V_{x-as, 1\frac{1}{2}}$ daarna $V_{y-as, 4}$

Opgave 38:

- a. $V_{x-as, 1, 2}$ daarna $T(\frac{1}{6}\pi, 5)$
 b. $V_{y-as, 5}$ daarna $T(-\frac{1}{3}\pi; 0, 4)$
 c. $h(x) = 0,29 \cos 3(x + 1, 4)$
 $V_{x-as, 0, 29}$ daarna $V_{y-as, \frac{1}{3}}$ daarna $T(-1, 4; 0)$
 d. $V_{x-as, 2}$ daarna $V_{y-as, \frac{1}{3}}$ daarna $T(\frac{1}{2}\pi; -0, 8)$

Opgave 39:

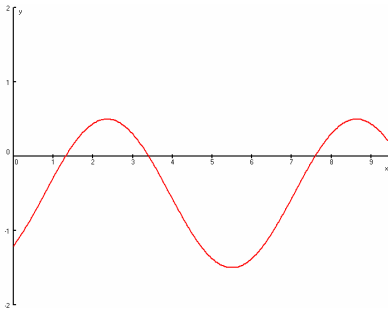
$$y = \sin x \xrightarrow{V_{x-as, 3}} y = \sin \frac{1}{3}x \xrightarrow{T(4; -1, 5)} y = -1,5 + \sin \frac{1}{3}(x - 4)$$

Opgave 40:

- a. $y = \cos x \xrightarrow{T(\frac{1}{4}\pi, 4)} y = 4 + \cos(x - \frac{1}{4}\pi) \xrightarrow{V_{x-as, 3}} y = 12 + 3 \cos(x - \frac{1}{4}\pi)$
 b. $y = \cos x \xrightarrow{V_{x-as, 3}} y = 3 \cos x \xrightarrow{T(\frac{1}{4}\pi; 4)} y = 4 + 3 \cos(x - \frac{1}{4}\pi)$

Opgave 41:

a.



b. $(\frac{1}{4}\pi, -\frac{1}{2})$ $(1\frac{1}{4}\pi, -\frac{1}{2})$ $(2\frac{1}{4}\pi, -\frac{1}{2})$

c. $(\frac{3}{4}\pi, \frac{1}{2})$ $(1\frac{3}{4}\pi, \frac{1}{2})$ $(2\frac{3}{4}\pi, \frac{1}{2})$

d. $-\frac{1}{2} + \sin(x - \frac{1}{4}\pi) = 0$

$$\sin(x - \frac{1}{4}\pi) = \frac{1}{2}$$

$$x - \frac{1}{4}\pi = \frac{1}{6}\pi + k \cdot 2\pi \quad \vee \quad x - \frac{1}{4}\pi = \frac{5}{6}\pi + k \cdot 2\pi$$

$$x = \frac{5}{12}\pi + k \cdot 2\pi \quad \vee \quad x = 1\frac{1}{12}\pi + k \cdot 2\pi$$

$$x_A = \frac{5}{12}\pi \quad x_B = 1\frac{1}{12}\pi$$

$$AB = \frac{8}{12}\pi = \frac{2}{3}\pi$$

e. $-\frac{1}{2} + \sin(x - \frac{1}{4}\pi) = -1$

$$\sin(x - \frac{1}{4}\pi) = -\frac{1}{2}$$

$$x - \frac{1}{4}\pi = -\frac{1}{6}\pi + k \cdot 2\pi \quad \vee \quad x - \frac{1}{4}\pi = 1\frac{1}{6}\pi + k \cdot 2\pi$$

$$x = \frac{1}{12}\pi + k \cdot 2\pi \quad \vee \quad x = 1\frac{5}{12}\pi + k \cdot 2\pi$$

$$\frac{1}{12}\pi \leq x \leq 1\frac{5}{12}\pi \quad \vee \quad 2\frac{1}{12}\pi \leq x \leq 3\pi$$

Opgave 42:

$$|1 + 2\sin x| = 2$$

$$1 + 2\sin x = 2 \quad \vee \quad 1 + 2\sin x = -2$$

$$2\sin x = 1 \quad \vee \quad 2\sin x = -3$$

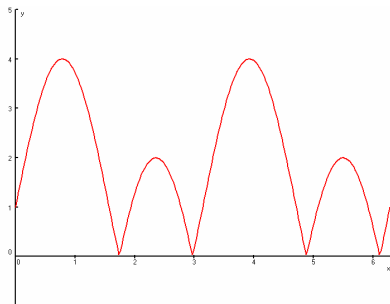
$$\sin x = \frac{1}{2} \quad \vee \quad \sin x = -1\frac{1}{2}$$

$$x = \frac{1}{6}\pi \quad \vee \quad x = \frac{5}{6}\pi$$

$$\frac{1}{6}\pi \leq x \leq \frac{5}{6}\pi$$

Opgave 43:

a.



b. dat zijn de toppen van $y = 1 + 3\sin 2x$

$$1 + 3\sin 2x = 4 \quad \vee \quad 1 + 3\sin 2x = -2$$

$$3 \sin 2x = 3 \quad \vee \quad 3 \sin 2x = -3$$

$$\sin 2x = 1 \quad \vee \quad \sin 2x = -1$$

$$2x = \frac{1}{2}\pi + k \cdot 2\pi \quad \vee \quad 2x = 1\frac{1}{2}\pi + k \cdot 2\pi$$

$$x = \frac{1}{4}\pi + k \cdot \pi \quad \vee \quad x = \frac{3}{4}\pi + k \cdot \pi$$

$$\left(\frac{1}{4}\pi, 4\right) \quad \left(\frac{3}{4}\pi, 2\right) \quad \left(1\frac{1}{4}\pi, 4\right) \quad \left(1\frac{3}{4}\pi, 2\right)$$

c. $f\left(\frac{1}{6}\pi\right) = \left|1 + 3 \sin \frac{1}{3}\pi\right| = \left|1 + 3 \cdot \frac{1}{2}\sqrt{3}\right| = 1 + 1\frac{1}{2}\sqrt{3}$

$$f\left(\frac{1}{3}\pi\right) = \left|1 + 3 \sin \frac{2}{3}\pi\right| = \left|1 + 3 \cdot \frac{1}{2}\sqrt{3}\right| = 1 + 1\frac{1}{2}\sqrt{3}$$

$$f\left(\frac{2}{3}\pi\right) = \left|1 + 3 \sin \frac{4}{3}\pi\right| = \left|1 + 3 \cdot -\frac{1}{2}\sqrt{3}\right| = 1\frac{1}{2}\sqrt{3} - 1$$

$$f\left(\frac{5}{6}\pi\right) = \left|1 + 3 \sin \frac{5}{3}\pi\right| = \left|1 + 3 \cdot -\frac{1}{2}\sqrt{3}\right| = 1\frac{1}{2}\sqrt{3} - 1$$