

HAVO WISKUNDE B 2018 TIJDVAK 1

Opgave 1:

$$4 - 2^{0,3x-2} = 2$$

$$2^{0,3x-2} = 2$$

$$0,3x - 2 = 1$$

$$0,3x = 3$$

$$x = 10$$

Opgave 2:

$$4 - 2^{0,3x-2} = 0$$

$$2^{0,3x-2} = 4 = 2^2$$

$$0,3x - 2 = 2$$

$$0,3x = 4$$

$$x = 13\frac{1}{3}$$

$$Q(13\frac{1}{3}, 0)$$

$$\text{lijn } l: rc = \frac{-5}{13\frac{1}{3}} = -\frac{15}{40} = -\frac{3}{8}$$

$$l: y = -\frac{3}{8}x + 5$$

$$-\frac{3}{8}x + 5 = 4 - 2^{0,3x-2}$$

$$y_1 = -\frac{3}{8}x + 5 \text{ en } y_2 = 4 - 2^{0,3x-2} \text{ intsect geeft: } x = 4,30 \text{ en } y = 3,39$$

Opgave 3:

$$y = 4 - 2^{0,3x-2} \xrightarrow{T(-20,10)} y = 4 - 2^{0,3(x+20)-2} + 10$$
$$y = 14 - 2^{0,3x+4}$$
$$y = 14 - 2^4 \cdot 2^{0,3x}$$
$$y = 14 - 16 \cdot 2^{0,3x}$$

$$\text{dus } a = 14 \text{ en } b = -16$$

Opgave 4:

$$m \text{ staat loodrecht op } l \text{ dus } rc_m = -\frac{4}{3}$$

$$m: y = -\frac{4}{3}x + b \text{ door } (6,1)$$

$$1 = -8 + b$$

$$b = 9$$

$$y = -\frac{4}{3}x + 9$$

$$l \text{ en } m \text{ snijden: } \frac{3}{4}x + \frac{11}{4} = -\frac{4}{3}x + 9$$

$$9x + 33 = -16x + 108$$

$$25x = 75$$

$$x = 3 \text{ en } y = 5$$

$$P(6,1) \text{ en } Q(3,5) \text{ dus } PQ = \sqrt{(6-3)^2 + (1-5)^2} = \sqrt{9+16} = 5$$

Opgave 5:

$$x^2 + y^2 - 28x - 32y = -308$$

$$(x-14)^2 - 196 + (y-16)^2 - 256 = -308$$

$$(x-14)^2 + (y-16)^2 = 144$$

$$M(14,16) \text{ en } r = 12$$

$$P(6,1) \text{ dus } PM = \sqrt{(14-6)^2 + (16-1)^2} = \sqrt{64+225} = 17$$

$$d(M, x-as) = 16$$

dus het verschil is 1

Opgave 6:

$$s_2 = 2 \cdot s_1$$

$$v_2 = v_1 \cdot \left(\frac{s_1}{2s_2}\right)^{0,06} = v_1 \cdot \left(\frac{1}{2}\right)^{0,06} = 0,96v_1$$

dus de afname van de snelheid is 4% dus het klopt niet

Opgave 7:

2 uur 2 min 57 sec is 7377 sec

$$\frac{7377}{42,195} = 175 \text{ sec dus } 2 \text{ min en } 55 \text{ sec}$$

Opgave 8:

$$\log(s) = \log(50) = 1,70$$

Als je de rechte lijn doortrekt is $\log(t) = 0,39$

$$t = 2,45 \text{ dus } 2 \text{ min } 27 \text{ sec}$$

Opgave 9:

$$f(x) = \frac{2}{3}(x-1)^3 - \frac{1}{2}x$$

$$f'(x) = 2(x-1)^2 - \frac{1}{2} > 3\frac{1}{2}$$

$$2(x-1)^2 > 4$$

$$(x-1)^2 > 2$$

$$(x-1)^2 = 2$$

$$x-1 = \sqrt{2} \quad \vee \quad x-1 = -\sqrt{2}$$

$$x = 1 + \sqrt{2} \quad \vee \quad x = 1 - \sqrt{2}$$

$$x > 1 + \sqrt{2} \quad \vee \quad x < 1 - \sqrt{2}$$

Opgave 10:

$$a = 40000 \text{ m}$$

$$\sqrt{h} = 10,7$$

$$h = 114 \text{ m}$$

Opgave 11:

$$k = 0,001 \cdot a = 3,741\sqrt{h} = \sqrt{14h}$$

Opgave 12:

30 zeemijl = 55,56 km

$$3,74(\sqrt{H} + \sqrt{2}) = 55,56$$

$y_1 = 3,74(\sqrt{x} + \sqrt{2})$ en $y_2 = 55,56$ intsect geeft $x = 180,7$ dus $H = 180,7$

$$\frac{180,7}{57} = 3,2 \text{ dus } 3,2x \text{ zo hoog}$$

Opgave 13:

$$f(x) = \frac{1}{2x-3} - x - 1$$

$$y = \frac{1}{2x-3} = (2x-3)^{-1}$$

$$y' = -(2x-3)^{-2} \cdot 2 = -2(2x-3)^{-2} = \frac{-2}{(2x-3)^2}$$

$$f'(x) = \frac{-2}{(2x-3)^2} - 1$$

$$f'(1) = -3$$

$$k: y = -3x + b \text{ door } (1, -3)$$

$$-3 = -3 + b$$

$$b = 0$$

$k: y = -3x$ dus k gaat door de oorsprong

Opgave 14:

$$\frac{1}{2x-3} - x - 1 = -\frac{11}{9}x$$

$$\frac{1}{2x-3} = -\frac{2}{9}x + 1$$

$$\frac{1}{2x-3} = -2x + 9$$

$$(2x-3)(-2x+9) = 0$$

$$-4x^2 + 24x - 27 = 9$$

$$-4x^2 + 24x - 36 = 0$$

$$x^2 - 6x + 9 = 0$$

$$(x-3)^2 = 0$$

$x = 3$ dit geeft punt B

Dus de lijn snijdt de linker tak van de grafiek niet

Opgave 15:

Teken vanuit A lijnstuk AE loodrecht op BC

$$\cos 50^\circ = \frac{BE}{250}$$

$$BE = 161$$

$$AD = CE = 300 - 161 = 139$$

Opgave 16:

$$AC = \sqrt{292^2 + 139^2} = \sqrt{104585} = 323,4$$

$$323,4^2 = 300^2 + 250^2 - 2 \cdot 300 \cdot 250 \cdot \cos \angle B$$

$$104585 = 90000 + 62500 - 150000 \cdot \cos \angle B$$

$$150000 \cdot \cos \angle B = 47915$$

$$\cos \angle B = 0,319$$

$$\angle B = 71,4^\circ$$

Dus de toename is 21°

Opgave 17:

$$2 + 3 \sin \left(\pi \left(x + \frac{1}{4} \right) \right) = \frac{7}{2}$$

$$3 \sin \left(\pi \left(x + \frac{1}{4} \right) \right) = 1 \frac{1}{2}$$

$$\sin \left(\pi \left(x + \frac{1}{4} \right) \right) = \frac{1}{2}$$

$$\pi \left(x + \frac{1}{4} \right) = \frac{1}{6} \pi + k \cdot 2\pi \quad \vee \quad \pi \left(x + \frac{1}{4} \right) = \frac{5}{6} \pi + k \cdot 2\pi$$

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

$$x = -\frac{1}{12} + k \cdot 2 \quad \vee \quad x = \frac{7}{12} + k \cdot 2$$

$$x = 1 \frac{11}{12} \quad \vee \quad x = \frac{7}{12}$$

Opgave 18:

hoogste punt van f is $y = 5$

amplitude van f is 3 dus de amplitude van g is 6

dus $q = 6$

$$p = y_{max} - amp = 5 - 6 = -1$$

$$r = \frac{2\pi}{per} = \frac{2\pi}{4} = \frac{1}{2} \pi$$

periode van f is $\frac{2\pi}{\pi} = 2$

$$\text{hoogste punt van } f \text{ is } x_{top} = x_{begin} + \frac{1}{4} \cdot \text{periode} = -\frac{1}{4} + \frac{1}{4} \cdot 2 = \frac{1}{4}$$

beginpunt van g is $x = \frac{1}{4}$ dus $s = \frac{1}{4}$