HAVO WISKUNDE B 2017 TIJDVAK 1.

Opgave 1:

$x^2 + (-\frac{4}{3}x+5)^2 = 9$

$x^2 + \frac{16}{9}x^2 - 13\frac{1}{3}x + 25 = 9$

$2\frac{7}{9}x^2 - 13\frac{1}{3}x + 16 = 0$

$25x^2 - 120x + 144 = 0$

$D = 120^2 - 4 \cdot 25 \cdot 144 = 0$

dus lijn l raakt de cirkel c.

Opgave 2:

l: $-\frac{4}{3}x + 5 = 0$

$-\frac{4}{3}x = -5$

$x = 3\frac{3}{4}$

$B = (3\frac{3}{4}, 0)$

$y^2 = 9$

$y = 3 \quad \vee \quad y = -3$

$A = (0, -3)$

$rc_{AB} = \frac{-3-0}{0-3\frac{3}{4}} = \frac{4}{5}$

$rc_k \cdot rc_l = \frac{4}{5} \cdot -\frac{4}{3} = -\frac{16}{15} \neq -1$ dus k en l staan niet loodrecht op elkaar

Opgave 3:

bij $t = 0$ is $\log(N) = 1$ dus $N = 10$

bij $t = 8$ is $\log(N) = 7$ dus $N = 10^7$

8 uur is 480 minuten

$g^{480} = \frac{10^7}{10} = 10^6$

$g = \sqrt[480]{10^6} = 1{,}029$ dus de toename is 2,9%

Opgave 4:

$1{,}03^t = 2$

$y_1 = 1{,}03^x$ en $y_2 = 2$ intsect geeft $x = 23{,}4$

dus 23 minuten

Opgave 5:

$L = 84$

$100 \cdot 10^{-D} = 84$

$y_1 = 100 \cdot 10^{-x}$ en $y_2 = 84$ intsect geeft $x = 0{,}0757$

$D = 0{,}0757$ dus $N = 1{,}6 \cdot 10^7$

Opgave 6:

$\sqrt{x} + \frac{1}{x} = 3\sqrt{x} - \frac{3}{x}$

$\frac{4}{x} = 2\sqrt{x}$

$2x\sqrt{x} = 4$

$x\sqrt{x} = 2$

$x^3 = 4$

$x = \sqrt[3]{4}$ dus $x_S = \sqrt[3]{4}$

$f'(x) = \frac{1}{2\sqrt{x}} - \frac{1}{x^2} = 0$

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

$x^2 = 2\sqrt{x}$

$x^4 = 4x$

$x^4 - 4x = 0$

$x(x^3 - 4) = 0$

$x = 0 \quad \vee \quad x^3 = 4$

$x = \sqrt[3]{4} = x_S$

Opgave 7:

$b = 25$

$h = 0{,}707 \cdot 25 \cdot t - 4{,}9t^2 = 17{,}675t - 4{,}9t^2 = 0$

$t(17{,}675 - 4{,}9t) = 0$

$t = 0 \quad \vee \quad 4{,}9t = 17{,}675$

$t = 3{,}607$

$d = 0{,}707 \cdot 25 \cdot 3{,}607 = 63{,}76$

dus 74 m

Opgave 8:

$h = 0{,}707 \cdot b \cdot \frac{d}{0{,}707b} - 4{,}91 \cdot \left(\frac{d}{0{,}707b}\right)^2$

$= d - 4{,}91 \cdot \frac{d^2}{0{,}5b^2}$

$= d - \frac{9{,}8d^2}{b^2}$

Opgave 9:

$b = 31{,}1$

$h = d - \frac{9{,}8d^2}{31{,}1^2}$

$h' = 1 - \frac{19{,}6}{31{,}1^2} \cdot d = 0$

$\frac{19{,}6}{31{,}1^2} \cdot d = 1$
$d = 49{,}35$
$h = 24{,}67$ dus 25 m

Opgave 10:
$x^2 = 92{,}58^2 + 8^2 - 2 \cdot 92{,}58 \cdot 8 \cdot cos28{,}65° = 7335{,}1$
$x = 85{,}65$
$85{,}65 - 84{,}58 = 1{,}07$ m dus 107 cm

Opgave 11:
$A(0, \frac{1}{3})$
$f(x) = \frac{1}{2x+3} = (2x+3)^{-1}$
$f'(x) = -1 \cdot (2x+3)^{-2} \cdot 2 = \frac{-2}{(2x+3)^2}$
$f'(0) = -\frac{2}{9}$
l: $y = -\frac{2}{9}x + b$ door $\left(0, \frac{1}{3}\right)$
$y = -\frac{2}{9}x + \frac{1}{3}$

Opgave 12:
$rc_l = -\frac{2}{9}$
lijn k gaat door O en staat loodrecht op l
$rc_k = \frac{9}{2} = 4\frac{1}{2}$
k: $y = 4\frac{1}{2}x$
k en l snijden: $4\frac{1}{2}x = -\frac{2}{9}x + \frac{1}{3}$
$4\frac{13}{18}x = \frac{1}{3}$
$x = \frac{6}{85}$
$y = \frac{27}{85}$
$d(O, l) = \sqrt{\left(\frac{6}{85}\right)^2 + \left(\frac{27}{85}\right)^2} = \frac{3}{85}\sqrt{85}$

Opgave 13:
$\frac{1}{2\sin(x) + 3} = \frac{1}{4}$
$2\sin(x) + 3 = 4$
$2\sin(x) = 1$
$\sin(x) = \frac{1}{2}$
$x = \frac{1}{6}\pi + k \cdot 2\pi \quad \vee \quad x = \frac{5}{6}\pi + k \cdot 2\pi$

$x_B = -1\frac{5}{6}\pi$ en $x_E = \frac{5}{6}\pi$
$BE = \frac{5}{6}\pi - -1\frac{5}{6}\pi = 2\frac{2}{3}\pi$

Opgave 14:
$p = 0{,}31$
$\log(p) = \log(0{,}31) = -0{,}51$
$T = 69°C$

Opgave 15:
$$\log(p) = 5{,}68 - \frac{2120}{273 + 130} = 0{,}419$$
$p = 10^{0{,}419} = 2{,}6$ bar

Opgave 16:
$$\log(p) = 5{,}68 - \frac{2120}{273 + T}$$
$$\frac{2120}{273 + T} = 5{,}68 - \log(p)$$
$$273 + T = \frac{2120}{5{,}68 - \log(p)}$$
$$T = \frac{2102}{5{,}68 - \log(p)} - 273$$

Opgave 17:
$A(0, -3)$
$\sqrt[3]{9x - 27} = 0$
$9x - 27 = 0$
$9x = 27$
$x = 3$
$B(3{,}0)$
$$rc_k = \frac{0 - -3}{3 - 0} = 1$$

Opgave 18:
$f(x) = \sqrt[3]{9x - 27} = (9x - 27)^{\frac{1}{3}}$
$f'(x) = \frac{1}{3}(9x - 27)^{-\frac{2}{3}} \cdot 9 = 3 \cdot (9x - 27)^{-\frac{2}{3}} = 1$
$y_1 = 3 \cdot (9x - 27)^{-\frac{2}{3}}$ en $y_2 = 1$ intsect geeft $x_P = 2{,}42$ en $x_Q = 3{,}58$