

re tijd.

Examen no.:

Uitwerking wiskunde B 2017 HAVO

$$1. \begin{cases} x^2 + y^2 = 9 \\ y = -\frac{4}{3}x + 5 \end{cases}$$

snijpunt
 $y = \frac{3}{4}x$ en $y = -\frac{4}{3}x + 5$
 in o.a.

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

$$x^2 + \frac{16}{9}x^2 - \frac{40}{3}x + 25 = 9$$

$$\frac{25}{9}x^2 - \frac{40}{3}x + 16 = 0$$

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

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

Een oplossing, dus 1 raakt aan c.

$$2. A(0, -3) \text{ en } B\left(\frac{15}{4}, 0\right)$$

immers $y = -\frac{4}{3}x + 5 = 0$

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

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

$$4x = 15$$

$$x = \frac{15}{4}$$

$$r_{cl} = \frac{0 - (-3)}{\frac{15}{4} - 0} = \frac{4}{5}$$

$$r_{cl} = -\frac{4}{3}$$

$$r_{cl} \cdot r_{cl} = -\frac{4}{3} \cdot \frac{4}{5} = -\frac{16}{15}$$

+3) de en l staan met loodrecht.

3.

t	0	8
N	10	10^7

②

$$g_{\text{uur}} = \frac{10^7}{10} = 10^6 \quad | \quad g_{\text{uur}} = 480 \text{ min} \quad (1)$$

$$g_{\text{min}} = (10^6)^{\frac{1}{480}} \approx 1,0292 \dots \quad |$$

groeipercentage per minuut

is ongeveer 2,9%

4.

$$1,03^t = 2 \quad |$$

$$y_1 = 1,03$$

$$y_2 = 2$$

$$x: 0 \text{ tot } 60$$

$$y: \text{auto}$$

geeft $x \approx 23,44 \dots$ }

na 23 min is het aantal verdubbeld.
(24 min is over goed)

5.

$$L = 100 \cdot 10^{-D} \quad \text{en} \quad L = 84$$

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

oplossen! geeft $D \approx 0,07572 \dots$ |

aflezen uitwerkbijlage geeft

ongeveer $1,55 \times 10^7$

afgerond 16 miljoen bacteriën |

15 of 17 miljoen - |

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6. Snijpunt berekenen

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

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

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

$$16 = 4x^2 \cdot x$$

$$4x^3 = 16$$

$$x^3 = 4$$

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

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

$$f'(\sqrt[3]{4}) = \frac{1}{2\sqrt{\sqrt[3]{4}}} - \frac{1}{(\sqrt[3]{4})^2}$$

$$f(x) = \frac{1}{2 \cdot 4^{\frac{1}{6}}} - \frac{1}{4^{\frac{2}{3}}}$$

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

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

$$f'(x) = 0$$

In S geldt $f'(x) = 0$ dus S is een top!

of!

$$\frac{1}{2\sqrt{x}} - \frac{1}{x^2} = 0$$

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

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

$$x^4 = 4 \cdot x$$

$$x^4 - 4x = 0$$

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

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

$$x = 0 \vee x = \sqrt[3]{4}$$

↳ dus

7. $b = 25$

$0,707 \cdot 25 \cdot t - 4,91 \cdot t^2 = 0$

$y = 0,707 \cdot 25 \cdot x - 4,91 x^2$

graph $x = 0 \dots 10$
 $y = 0 \dots 20$

G-solve root

geeft $x \approx 3,5997 \dots$

$d = 0,707 \cdot 25 \cdot 3,5997 \dots \approx 63,624 \dots$

$d \approx 64$ meter.

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

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

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

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

plus nog 3 maxime

9. hoogte = $0,707 \cdot 31,1 \cdot t - 4,91 t^2$

$h' = 0,707 \cdot 31,1 - 9,82 \cdot t$

$h' = 0$

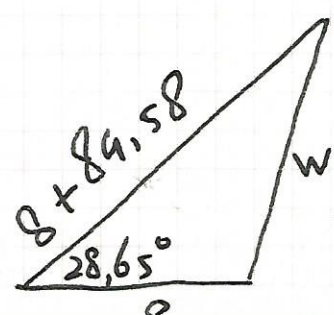
\Rightarrow

$t \approx 2,24$ sec.

$h = 0,707 \cdot 31,1 \cdot 2,24 - 4,91 \cdot (2,24)^2 \approx 23,616$

de maximale hoogte is ongeveer 25 meter

10.



$w^2 = 82,58^2 + 8^2 - 2 \cdot 82,58 \cdot 8 \cdot \cos(28,65^\circ)$

$w^2 \approx 7335,13 \dots$

$w \approx 85,645 \dots$

het verschil is ongeveer 107 cm

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

$f'(0) = \frac{-2}{9} = -\frac{2}{9}$ 1

$f(0) = \frac{1}{3}$ dus $l: y = -\frac{2}{9}x + \frac{1}{3}$ 1

12. k : loodrecht op l door O : $y = \frac{9}{2}x$ 1

k en l snijden: $-\frac{2}{9}x + \frac{1}{3} = \frac{9}{2}x$ 1

$-2x + 3 = 81x$

$83x = 3$

$x = \frac{3}{83}$ 1

$y = \frac{27}{83}$ 1

$d(l, O) = \sqrt{\left(\frac{6}{83}\right)^2 + \left(\frac{27}{83}\right)^2} = \sqrt{\frac{9}{83}} = \frac{3}{83}\sqrt{83}$ 1

13 Er geldt

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

$2\sin(x)+3 = 4$

$2\sin(x) = 1$

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

$x = \frac{1}{6}\pi + k \cdot 2\pi$ v $x = \frac{5}{6}\pi + k \cdot 2\pi$ 1

Bp $[-2\pi, 2\pi]$

$x = -1\frac{5}{6}\pi$ v $x = -1\frac{1}{6}\pi$ v $x = \frac{1}{6}\pi$ v $x = \frac{5}{6}\pi$ 1

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

$d(B, E) = \frac{5}{6}\pi - (-1\frac{5}{6}\pi) = 2\frac{2}{3}\pi$ 1

correctly
venster
max. 2 punt.

3 14 $p = 0,31 \Rightarrow \log(0,31) = -0,51$
aflezen (zie zijlage) geeft 69°

(6)

68° of 70° ook goed.

15 $T = 130^\circ\text{C}$ murke.

3 $\log(p) = 5,68 - \frac{2120}{273 + 130} \approx 0,4194 \dots$

$p = 10^{0,4194} \approx 2,6 \text{ bar!}$

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

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

3 $273 + T = \frac{2120}{5,68 - \log(p)}$

$T = \frac{2120}{5,68 - \log(p)} - 273$

$\frac{12}{3} = 4$

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17. $f(0) = \sqrt[3]{9 \cdot 0 - 27} = \sqrt[3]{-27} = -3$ |
 $A(0, -3)$

$\sqrt[3]{9x - 27} = 0$

$9x - 27 = 0$ |

$9x = 27$

$x = 3$

$B(3, 0)$ |

$rc_k = \frac{0 - (-3)}{3 - 0} = \frac{3}{3} = 1$ |

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18. $f'(x) = \frac{1}{3} \cdot (9x - 27)^{-\frac{2}{3}} \cdot 9 = 3(9x - 27)^{-\frac{2}{3}}$ 3

$3(9x - 27)^{-\frac{2}{3}} = 1$ | (evenueitdig aan k)

$(9x - 27)^{-\frac{2}{3}} = \frac{1}{3}$

$y_1 = (9x - 27)^{-\frac{2}{3}}$
 $y_2 = \frac{1}{3}$

window $x = 0 \dots 10$ |

graph $y = 0 \dots 6$ |

g-solve

intersect.

$x \approx 2,42264 \dots$ of $x \approx 3,57735 \dots$

$x_p \approx 2,42$ |

$x_q \approx 3,58$ |

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