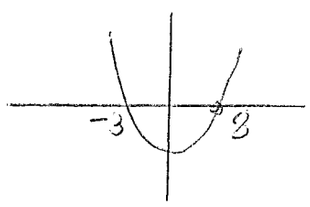
Gr 12 June 2016
Vraestel 1 - Memorandum

1.1.1 $x^2 - 5x - 24 = 0$
$(x-8)(x+3) = 0$ ✓
$x = 8$ of -3 ✓ (2)

faktore/formule ✓
wortels ✓

1.1.2 $x^2 - 5x \geq 24$
$x^2 - 5x - 24 \geq 0$ ✓
$x \leq -3$ of $x \geq 8$
$\therefore x \geq 8$ ✓ (2)



standaardvorm ✓
stegs $x \geq 8$ ✓

1.2.1 $2x^2 - 3x - 7 = 0$
$x = \dfrac{-(-3) \pm \sqrt{(-3)^2 - 4(2)(-7)}}{2(2)}$ ✓
$= 2{,}77$ ✓ of $-1{,}27$ ✓ (3)

Subst. ✓
✓✓ x-waardes

1.2.2 $2^0 + 2^{x-2} + 2^{x+1} + 2^x = 53$
✓ $1 + 2^{x-2} + 2^{x+1} + 2^x = 53$
$2^x(2^{-2} + 2^1 + 1)$ ✓ $= 52$
$2^x\ (3\frac{1}{4}) = 52$
$2^x = 16$ ✓
$2^x = 2^4$
$x = 4$ ✓ (4)

$2^0 = 1$ ✓
faktoriseer ✓
$2^x = 16$ ✓
$x = 4$ ✓

1.3 $4 = \sqrt{(x+1)^2 - 4}$
$16 = x^2 + 2x + 1 - 4$
$x^2 + 2x - 19 = 0$ ✓
$x = \dfrac{-2 \pm \sqrt{(2)^2 - 4(1)(-19)}}{2}$ ✓
$= -1 + 2\sqrt{5}$ of $-1 - 2\sqrt{5}$ ✓
toets → alfwee antwoorde geldig ✓ (4)

standaardvorm ✓
subst ✓
2 x-waardes ✓
✓ toets + gradering

13.2 $k = 0$ ✓ (1)

$k = 0$ ✓

13.4 $3 + x = 2y$

$x = 2y - 3$ ✓

x onderwerp

$x^2 + 4y^2 = 2xy + 7$

$(2y-3)^2 + 4y^2 = 2y(2y-3) + 7$ ✓

subst ✓

$4y^2 - 12y + 9 + 4y^2 = 4y^2 - 6y + 7$

$4y^2 - 6y + 2 = 0$ ✓

$2y^2 - 3y + 1 = 0$ ✓

Standaardvorm

$(y-1)(2y-1) = 0$ ✓

faktore

$y = 1$ of $y = \frac{1}{2}$ ✓

2y-waardes

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

$= -1$ $= -2$ ✓

✓ x-waardes

(6)

[22]

2.1 $\sum_{r=4}^{12} 3\left(\frac{1}{2}\right)^r$

$T_1 = \frac{3}{16}$; $T_2 = \frac{3}{32}$ $T_3 = \frac{3}{64}$ ✓ — T_1, T_2, T_3 ✓

$S_n = \frac{\frac{3}{16}\left(1-\left(\frac{1}{2}\right)^9\right)}{1-\frac{1}{2}}$ ✓ ✓ — $n=9$ ✓; a, r ✓

$= \frac{1533}{4096}$ ✓ (4) — antw ✓

2.2 $\frac{89}{100}; \left(\frac{89}{100}\right)^2 \left(\frac{89}{100}\right)^3$ ✓ — ry ✓

MK $a = \frac{89}{100}, r = \frac{89}{100}$

$T_n = ar^{n-1}$

$\frac{20}{100} > \frac{89}{100}\left(\frac{89}{100}\right)^{n-1}$ ✓ — Subst. ✓

$n-1 < \log_{\frac{89}{100}} \frac{20}{89}$ ✓ — Korrekte gebruik van logs ✓

$n-1 < 12,81$

$n < 13,81$

$\therefore$ kan 13 maak. ✓ (4) — antw ✓

2.3 $-1 < \frac{2(1-k)}{5} < 1$ ✓ — ✓ $r = \frac{2(1-k)}{5}$; ✓ $-1 < r < 1$

$-5 < 2-2k < 5$

$-7 < -2k < 3$

$\frac{7}{2} > k > -\frac{3}{2}$

$-\frac{3}{2} < k < \frac{7}{2}$ ✓ (3) — ✓ antw

2.4 $S_{80} = 3^{75} + 2$ ✓

$S_{79} = 3^{74} + 2$ ✓

$\therefore T_{80} = 3^{75} + 2 - 3^{74} - 2$

$= 3^{75} - 3^{74}$

$= 3^{74}(3-1)$

$= 2 \cdot 3^{74}$ ✓ (3) — S_{80} ✓; S_{79} ✓; ✓ antw

[14]

Vraag 3

3.1.1 $-3; 1; 5; \ldots 393$

RK $a = -3$, $d = 4$

$T_n = a + (n-1)d$

$= -3 + (n-1)(4)$

$= -3 + 4n - 4$

$= 4n - 7$ ✓ ✓ (2) $4n - 7$ ✓ ✓

3.1.2 $9; 13; 17; 21$ ✓ (1) termwaarde ✓

3.1.3 $0; 1; 2; 0; 1; 2; 0$. ✓ (1) reswaardes ✓

3.1.4 terme deelbaar deur 3:

$-3; 9; 21; \ldots \ldots 393$ ✓ ry ✓

RK $a = -3$, $d = 12$ $\ell = 393$

$T_n = a + (n-1)d$

$393 = -3 + (n-1)12$ $(12n - 15)$ ✓ ✓ subst T_n

$396 = 12n - 12$

$408 = 12n$

$34 = n$ ✓ $n = 34$ ✓

$S_n = \frac{34}{2}(-3 + 393)$ ✓ subst S_n ✓

$= 6630$. ✓ (5) S_n = ✓

3.2.1 $T_5 = 35$ ✓ (1) T_5

3.2.2 $2a = 3$

$a = \frac{3}{2}$ ✓ a ✓

$3a + b = 4$ b ✓

$b = -\frac{1}{2}$ ✓

$c = 0$ ✓ $T_n = \frac{3}{2}n^2 - \frac{1}{2}n$ ✓ c ✓

T_n ✓

$T_{55} = \frac{3}{2}(55)^2 - \frac{1}{2}(55)$

$= 4510$. ✓ (5) T_{55} ✓

[15]

4.1.1. $y = a(x+1)(x-3)$ ✓

$-6 = a(1)(-3)$ ✓

$a = 2$ ✓

$y = 2(x+1)(x-3)$

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

$= 2x^2-4x-6$ ✓

$\therefore a = 2,\ b = -4,\ c = -6$ (4)

✓$a(x+1)(x-3)$
✓subst $(0;-6)$
a ✓
vgl ✓

4.1.2. C: $x = 1$

$y = 2(1)^2 - 4(1) - 6$

$= -8$

$(1;-8)$ ✓ ✓ (2)

$(x;y)$ ✓ ✓

4.1.3 $y = -k^x + q$

$(0;-6)$ $-6 = -k^0 + q$ ✓

$-5 = q$ ✓

$y = -k^x - 5$

$(1;-8)$ $-8 = -k^1 - 5$ ✓

$-3 = -k$

$3 = k$ ✓ $\therefore y = -3^x - 5$ (4)

✓subst $(0;-6)$
✓$q = -5$
✓subst $(1;-8)$
✓$k = 3$

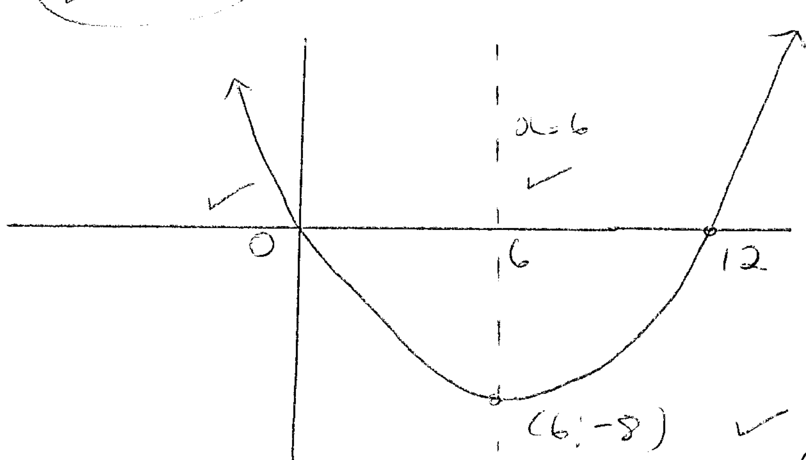
4.1.4 (a) $x = 0$ of $x = 1$ ✓ ✓ (2)

4.1.5 $(1;12)$ ✓ ✓ (2)

(b) $-1 < x < 3$; $x \in R$ ✓ ✓N (2)

✓$x = 0$ ✓$x = 1$
✓ krit waardes
✓ notasie
✓$(x;y)$ ✓

4.2.

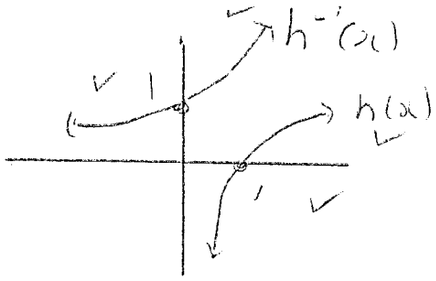


(4)

Sim-as ✓
x-afsnitte ✓ ✓
draaipunt ✓

[30]

5.1



vorm ✓✓
x^{-1}-asm
y-afsnit
(moet aandui
Watter grafiek
is watter een)

5.2 $h^{-1}(x) = 3^x$ ✓✓ (2) $h^{-1}(x)$ ✓

5.3 $x > 0$, $x \in R$ of $x \in (0;\infty)$ (1) $x > 0$ ✓

5.4 $\log_3 x = 2$
$3^2 = x = 9$
$0 < x \leq 9$ (2) $x > 0$ ✓
$x \leq 9$ ✓

5.5 $y = 3^{x+2}$ ✓✓ (2) $y = 3^{x+2}$

[11]

6.1 $y = \frac{a}{x+1} + 1$ ✓ Subs ✓ asimptote ✓

$(2;0)$ $0 = \frac{a}{3} + 1$
$\frac{a}{3} = -1$
$a = -3$ ✓ $a = -3$ ✓

$y = \frac{-3}{x+1} + 1$ ✓ (4) vgl ✓

6.2 $x = 0$: $y = \frac{-3}{1} + 1 = -2$
$\therefore A(0;-2)$ ✓✓ (2) $(x;y)$

6.3 $y = x + c$
$(-1,1)$ $1 = -1 + c$
$2 = c$
$y = x + 2$ ✓ (2) $y = x + 2$ ✓

6.4 $(-2;4)$ ✓✓ (2) $(x;y)$

[10]

7.1.1 $\frac{10}{4} = 2,5\%$ ✓ (1) | 2,5% ✓

7.1.2 $1 + i_e = \left(1 + \frac{i_m}{m}\right)^m$ ✓ formule ✓

$1 + i_e = \left(1 + \frac{10}{400}\right)^4$ ✓ subst ✓

$i_e = 10,38\%$ ✓ (3) antw ✓

7.2.1 $P = \frac{a\left[1 - (1+i)^{-n}\right]}{i}$

$900\,000 = \frac{12000\left[1 - \left(1 + \frac{0,13}{12}\right)^{-n}\right]}{\frac{0,13}{12}}$ ✓ ✓ ✓

P ✓ A ✓ ✓ ✓

$\frac{13}{16} = 1 - \left(\frac{1213}{1200}\right)^{-n}$

$\left(\frac{1213}{1200}\right)^{-n} = \frac{3}{16}$ (1,010833...)$^{-n}$ (1,8125) $\left(\frac{1213}{1200}\right)^{-n} = \frac{29}{16}$ ✓

$-n = \log_{\frac{1213}{1200}} \frac{3}{16}$ ✓

✓ regte gebruik van logs

$-n = -155,36$

$\therefore n = 155$ onttrekkings ✓ (5) ✓ 55

7.2.2 a) Balans $= A - F$

$= 900\,000\left(1 + \frac{0,13}{12}\right)^{48} - \frac{12000\left[\left(1 + \frac{0,13}{12}\right)^{48} - 1\right]}{\frac{0,13}{12}}$ ✓ ✓ ✓

subst ✓✓ (-1) fout

$= R\,75\,932,4$ ✓ (4) antw ✓

(b) $\frac{75932}{35} \times 100$

$= R\,216\,949,7$ ✓ (1) antw ✓ MF

[14]

8.1 $f(x) = 3x^2 - 4$

$f(x+h) = 3(x+h)^2 - 4$

$= 3x^2 + 6xh + 3h^2 - 4$ ✓

$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$ ✓

$= \lim_{h \to 0} \frac{3x^2 + 6xh + 3h^2 - 4 - 3x^2 + 4}{h}$ ✓

$= \lim_{h \to 0} \frac{h(6x + 3h)}{h}$ ✓

$= 6x$ ✓ (5)

$f(x+h)$ ✓

Formula ✓

subst ✓

faktorisering ✓

antwoord ✓

8.2 $23 = 3x^2 - 4$

$3x^2 = 27$

$x^2 = 9$

$x = \pm 3$

$\therefore x = 3$ ✓

$y = 3(-2)^2 - 4$

$= 12 - 4$

$= 8$ ✓

$m_{AB} = \frac{23 - 8}{3 + 2} = \frac{15}{5} = 3$ ✓ ✓

(4)

$x = 3$ ✓

$y = 8$ ✓

m subst. ✓

$m = 3$ ✓

8.3 $y = \frac{x+5}{\sqrt{x}}$

$= x^{\frac{1}{2}} + 5x^{-\frac{1}{2}}$ ✓

$\frac{dy}{dx} = \frac{1}{2}x^{-\frac{1}{2}} - \frac{5}{2}x^{-\frac{3}{2}}$ ✓ ✓

$= \frac{1}{2\sqrt{x}} - \frac{5}{2\sqrt{x^3}}$ (3)

$x^{\frac{1}{2}} + 5x^{-\frac{1}{2}}$ ✓

$\frac{1}{2}x^{-\frac{1}{2}}$ ✓ $-\frac{5}{2}x^{-\frac{3}{2}}$ ✓

8.3 $f(x) = -3x^3 - 4x + 5$

$f'(x) = -9x^2 - 4$ ✓ $f'(x)$ ✓

$m = -9(-1)^2 - 4$

$= -13$ ✓ $m = -13$ ✓

$f(-1) = -3(-1)^3 - 4(-1) + 5$

$= 12$ ✓ $y = 12$ ✓

$y = -13x + c$

$(-1; 12)$ $12 = -13(-1) + c$

$12 - 13 = c$

$-1 = c$ ✓ (4) $c = -1$ ✓

5.4) $T = \frac{t^2(45 - t)}{10} + 25$

$= 4,5t^2 - 0,1t^3 + 25$

$T' = 9t - 0,3t^2$ ✓ ✓ °C/minute (2) $9t$ ✓ $- 0,3t^2$ ✓

8.4.3 Maks $T' = 0$

$9t - 0,3t^2 = 0$ ✓ $T' = 0$ ✓

$t(9 - 0,3t) = 0$

$t \neq 0$ of $0,3t = 9$

$t = 30$ minute (2) $t = 30\text{min}$ ✓

8.4.1 $T = (45 - 0) \times 10^1 + 25$

$= 25^0 C$ ✓ (1)

[21]

9.1 $f(x) = ax^3 + cx$.

$(-1;-2)$ $-2 = a(-1)^3 + c(-1)$ ✓

$-2 = -a - c$

$2 = a + c$ ① ✓

$f'(x) = 0$

$3ax^2 + c = 0$ ✓

$x = -1$: $3a + c = 0$ ② ✓

① − ② $-2a = 2$

$a = -1$

$c = 3$ ✓ (5)

✓ Subst point

✓ vg/ ①

✓ $f'(x) = 0$

✓ vg/ ②

✓ $a = -1$, $c = 3$

9.2 $f(x) = -x^3 + 3x$

$f'(x) = -3x^2 + 3 = 0$ ✓

$x^2 = 1$

$x = \pm 1$

$y = -(1)^3 + 3(1) = 2$

$(1;2)$ ✓✓ (3)

✓ $f'(x) = 0$

✓ $x = 1$, ✓ $y = 2$

$(x; y)$

9.3 $x \leq -1$ of $x \geq 1$ ✓ (2)

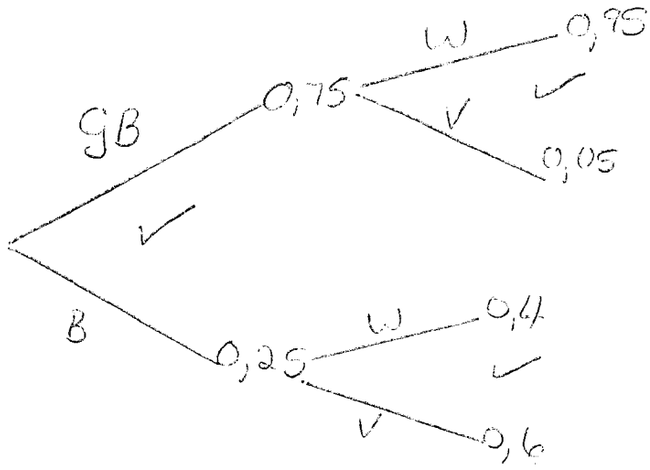
$x \leq -1$ ✓ of $x \geq 1$ ✓ (-1N)

9.4 $y > 2$ ✓✓ (2)

$y > 2$

[12]

10.1.1.



GBW ✓
GBV ✓ ✓ } elke tak met waardes

BW ✓ uitkomste

BV
(4)

10.1.2 $P(W) = 0,75 \times 0,95 + 0,25 \times 0,4$
$= 0,81$ ($13/16$)

$0,75 \times 0,95$
$0,25 \times 0,41$
antw
(3)

10.2) Onafhanklik: $P(A \text{ en } B) = P(B) \times P(A)$
$a^2 - b^2 = (a+b) \times P(A)$ } ✓ subst in formule

$P(A) = \dfrac{(a+b)(a-b)}{(a+b)}$ ✓ vereenvoudig

$= a - b.$ ✓ antw
(2)

10.2.2 $P(B \text{ of } C) = P(B) + P(C)$
$= a+b + 3(a+b)$ } ✓ subst in formule
$= a+b + 3a + 3b$
$= 4a + 4b$ ✓ antw
(2)

[11]