



Education and Sport Development

Department of Education and Sport Development
Departement van Onderwys en Sportontwikkeling
Lefapha la Thuto le Tlhabololo ya Metshameko

NORTH WEST PROVINCE

NASIONALE SENIOR SERTIFIKAAT

GRAAD 12

WISKUNDE V1

SEPTEMBER 2019

NASIENRIGLYNE

PUNTE: 150

Hierdie nasienriglyne bestaan uit 16 bladsye.

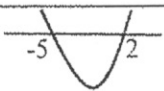
Kopiereg voorbehou

Blaai om asseblief

LET WEL:

- Indien 'n kandidaat 'n vraag TWEE keer beantwoord, merk slegs die EERSTE poging.
- Volgehoue akkuraatheid is op ALLE aspekte van die memorandum van toepassing.

VRAAG 1

1.1.1	$3x^2 - 18x = 0$ $3x(x - 6) = 0$ $3x = 0$ of $x - 6 = 0$ $x = 0$ $x = 6$	✓ faktore ✓ $x = 0$ ✓ $x = 6$ (3)
1.1.2	$7x^2 - 4x - 5 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{4 \pm \sqrt{(-4)^2 - 4(7)(-5)}}{2(7)}$ $= \frac{4 \pm \sqrt{156}}{14}$ $x = 1,18$ of $x = -0,61$	✓ standaardvorm ✓ substitusie in die korrekte formule ✓ $x = 1,18$ ✓ $x = -0,61$ (4)
1.1.3	$(x + 5)(x - 2) > 0$ $\therefore x < -5$ of $x > 2$ 	✓ ✓ $x < -5$ of $x > 2$ (2)
1.1.4	$26 - 5^{2x} = (5^x - 6)^2$ $26 - 5^{2x} = 5^{2x} - 12 \cdot 5^x + 36$ $0 = 2 \cdot 5^{2x} - 12 \cdot 5^x + 10$ $0 = 5^{2x} - 6 \cdot 5^x + 5$ $0 = (5^x - 5)(5^x - 1)$ $5^x = 5$ of $5^x = 1$ $x = 1$ $5^x = 5^0$ n.v.t. $x = 0$ n.v.t. $\therefore$ Geen reële oplossing	✓ vereenvoudiging ✓ standaardvorm ✓ faktore/formule ✓ $5^x = 5$ of $5^x = 1$ ✓ $x = 1$ n.v.t. of $x = 0$ n.v.t. ✓ Geen reële oplossing (6)

1.2 $x - 4y = 5$ $x = 4y + 5$ $3x^2 - 5xy + 2y^2 = 25$ $3(4y + 5)^2 - 5(4y + 5)y + 2y^2 = 25$ $3(16y^2 + 40y + 25) - 20y^2 - 25y + 2y^2 = 25$ $48y^2 + 120y + 75 - 20y^2 - 25y + 2y^2 - 25 = 0$ $30y^2 + 95y + 50 = 0$ $6y^2 + 19y + 10 = 0$ $(3y + 2)(2y + 5) = 0 \quad \text{OF} \quad y = \frac{-19 \pm \sqrt{(19)^2 - 4(6)(10)}}{2(6)}$ $3y = -2 \quad \text{of} \quad 2y = -5$ $y = -\frac{2}{3} \quad y = -\frac{5}{2}$ $x = \frac{7}{3} \quad x = -5$ OF $x - 4y = 5$ $4y = x - 5$ $y = \frac{x - 5}{4}$ $3x^2 - 5xy + 2y^2 = 25$ $3x^2 - 5x\left(\frac{x - 5}{4}\right) + 2\left(\frac{x - 5}{4}\right)^2 = 25$ $3x^2 - \left(\frac{5x^2 - 25x}{4}\right) + 2\left(\frac{x^2 - 10x + 25}{16}\right) - 25 = 0$ $3x^2 - \left(\frac{5x^2 - 25x}{4}\right) + \left(\frac{x^2 - 10x + 25}{8}\right) - 25 = 0$ $24x^2 - 10x^2 + 50x + x^2 - 10x + 25 - 200 = 0$ $15x^2 + 40x - 175 = 0$ $3x^2 + 8x - 35 = 0$ $(3x - 7)(x + 5) = 0 \quad \text{OF} \quad x = \frac{-8 \pm \sqrt{8^2 - 4(3)(-35)}}{2(3)}$ $x = \frac{7}{3} \quad \text{of} \quad x = -5$ $y = -\frac{2}{3} \quad y = -\frac{5}{2}$	✓ $x = 4y + 5$ ✓ substitusie ✓ standaardvorm ✓ faktore/formule ✓ beide y-waardes ✓ beide x-waardes (6) ✓ $y = \frac{x - 5}{4}$ ✓ substitusie ✓ standaardvorm ✓ faktore/formule ✓ beide x-waardes ✓ beide y-waardes (6)
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1.3	$x = \sqrt{12 + \sqrt{12 + \sqrt{12 + \sqrt{12 + \dots}}}}$ $(x)^2 = \left(\sqrt{12 + \sqrt{12 + \sqrt{12 + \sqrt{12 + \dots}}}} \right)^2$ $x^2 = 12 + \sqrt{12 + \sqrt{12 + \sqrt{12 + \dots}}}$ $x^2 = 12 + x$ $x^2 - x - 12 = 0$ $(x - 4)(x + 3) = 0$ $x = 4 \text{ of } x = -3$ n.v.t.	✓ substitusie ✓ standaardvorm ✓ $x = 4$ ✓ $x = -3$ n.v.t. (4) [25]
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VRAAG 2

2.1.1	$T_n = a + (n - 1)d$ $= -11 + (n - 1)(7)$ $= -11 + 7n - 7$ $= 7n - 18$	✓ vervang a en d in T_n: $-11 + (n - 1)(7)$ ✓ antwoord Slegs antwoord: volpunte (2)
2.1.2	$T_n = 7n - 18$ $T_{60} = 7(60) - 18$ $= 402$	✓ vervang $n=60$ in T_n ✓ antwoord (2)
2.1.3	$S_n = \frac{n}{2} [2a + (n - 1)d]$ $S_{60} = \frac{60}{2} [2(-11) + (60 - 1)(7)]$ $= 11\,730$	✓ substitusie ✓ antwoord (2)
2.2	$-4 + 3 + 10 + \dots + 486$ $T_n = 7n - 18$ $486 = 7n - 18$ $504 = 7n$ $72 = n$ $\therefore \sum_{n=2}^{72} (7n - 18)$ OF	✓ $486 = 7n - 18$ ✓ $n = 72$ ✓✓ $\sum_{n=2}^{72} (7n - 18)$ (4)

	$-4 + 3 + 10 + \dots + 486$ $T_n = a + (n-1)d$ $= -4 + (n-1)(7)$ $= -4 + 7n - 7$ $= 7n - 11$ $486 = 7n - 11$ $497 = 7n$ $71 = n$ $\therefore \sum_{n=1}^{71} (7n - 11)$	$\checkmark T_n = 7n - 11$ $\checkmark 486 = 7n - 11$ $\checkmark n = 71$ $\checkmark \sum_{n=1}^{71} (7n - 11)$	(4)															
2.3	$2a = 7$ $a = \frac{7}{2} = 3,5$ $T_2 - T_1 = 3a + b$ $-11 = 3(3,5) + b$ $-\frac{43}{2} = b$ $-21,5 = b$ $n = -\frac{b}{2a} = -\frac{(-21,5)}{2(3,5)} = \frac{43}{14} = 3,07$ Die 3^{de} term is die kleinste OF <table style="margin-left: auto; margin-right: auto;"> <tr> <td>T_1</td><td>T_2</td><td>T_3</td><td>T_4</td><td>T_5</td></tr> <tr> <td>$\backslash$</td><td>$/$</td><td>$\backslash$</td><td>$/$</td><td>$\backslash$</td></tr> <tr> <td>-11</td><td>-4</td><td>3</td><td>10</td><td></td></tr> </table> $T_1 - 11 = T_2 \quad T_1 > T_2$ $T_2 - 4 = T_3 \quad T_2 > T_3$ $T_3 + 3 = T_4 \quad T_4 > T_3$ $T_4 + 10 = T_5 \quad T_5 > T_4$ $T_1 > T_2 > T_3 \quad \& \quad T_5 > T_4 > T_3$ $\therefore T_3$ is die kleinste term.	T_1	T_2	T_3	T_4	T_5	$\backslash$	$/$	$\backslash$	$/$	$\backslash$	-11	-4	3	10		$\checkmark a = \frac{7}{2} = 3,5$ $\checkmark b = -21,5$ $\checkmark n = 3,07$ $\checkmark T_3 < T_4$ $\checkmark$ antwoord $\checkmark$ bewys $T_1 > T_2$ $\checkmark$ bewys $T_2 > T_3$ $\checkmark$ bewys $T_4 > T_3$ $\checkmark$ bewys $T_5 > T_4$ $\checkmark$ antwoord	(5)
T_1	T_2	T_3	T_4	T_5														
$\backslash$	$/$	$\backslash$	$/$	$\backslash$														
-11	-4	3	10															

[15]

VRAAG 3

3.1	$r = \frac{T_2}{T_1} = \frac{5(3x+1)^2}{5(3x+1)} = 3x+1$ $-1 < r < 1$ $-1 < 3x+1 < 1$ $-2 < 3x < 0$ $-\frac{2}{3} < x < 0$	$\checkmark r = 3x+1$ $\checkmark -1 < 3x+1 < 1$ $\checkmark$ antwoord (3)
3.2	$x = -\frac{1}{6}$ $r = 3\left(-\frac{1}{6}\right) + 1 \quad a = 5\left(3\left(-\frac{1}{6}\right) + 1\right)$ $= \frac{1}{2} \quad = \frac{5}{2}$ $S_\infty = \frac{a}{1-r}$ $= \frac{\frac{5}{2}}{1-\frac{1}{2}}$ $= 5$	$\checkmark r = \frac{1}{2}$ $\checkmark a = \frac{5}{2}$ $\checkmark$ substitusie $\checkmark$ antwoord (4) [7]

VRAAG 4

4.1	$C(2; -9)$	$\checkmark \checkmark C(2; -9)$ (2)
4.2	$y = \frac{1}{2}(x-2)^2 - 9$ $= \frac{1}{2}(0-2)^2 - 9$ $= -7$ $\therefore B(0; -7)$	$\checkmark x = 0$ $\checkmark y = -7$ (2)
4.3	$f(x) = x - 7$	$\checkmark \checkmark x - 7$ (2)

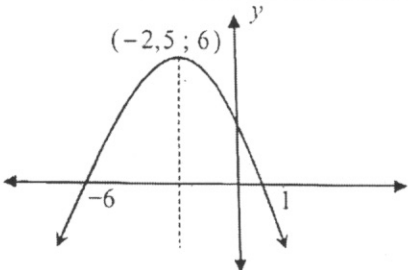
4.4	By die snypunt van die asimptote, $x = 2$ $\therefore y = 2 - 7 = -5$ $\therefore (2; -5)$ $h(x) = \frac{a}{x-2} - 5$ $-7 = \frac{a}{0-2} - 5$ $-2 = \frac{a}{-2}$ $4 = a$ $\therefore h(x) = \frac{4}{x-2} - 5$	✓ $y = -5$ ✓ $p = -2$ ✓ $q = -5$ ✓ substitusie van $B(0; -7)$ ✓ $a = 4$ (5)
4.5	$3h(x) - 2 = 3\left(\frac{4}{x-2} - 5\right) - 2$ $= \frac{12}{x-2} - 15 - 2$ $x = 2$ $y = -17$	✓ $x = 2$ ✓ $y = -17$ (2)
4.6	$h(x) = \frac{4}{x-2} - 5$ $0 = \frac{4}{x-2} - 5$ $5 = \frac{4}{x-2}$ $5(x-2) = 4$ $5x - 10 = 4$ $5x = 14$ $x = \frac{14}{5} = 2,8$	✓ $y = 0$ ✓ vereenvoudig ✓ antwoord (3)
4.7.1	$x \in (-\infty; 2)$ of $(2; 2,8)$ OF $x \in (-\infty; 2,8); x \neq 2$ OF $x < 2,8; x \neq 2$	✓ $(-\infty; 2)$ ✓✓ $(2; 2,8)$ ✓✓ $(-\infty; 2,8)$ ✓ $x \neq 2$ ✓✓ $x < 2,8$ ✓ $x \neq 2$ (3)

4.7.2	$f^{-1}(x-1): x-1 = y-7$ $\therefore y = x+6$ $f^{-1}(x-1) < 2: x+6 < 2$ $\therefore x < -4$ OF $(2, -5)$ lê op f $(-5; 2)$ lê op f^{-1} $(-4; 2)$ lê op $f^{-1}(x-1)$ Omdat $m_f = 1$, $m_{f^{-1}} = 1$ $\therefore f^{-1}$ is 'n stygende funksie $\therefore x < -4$	$\checkmark f^{-1}(x-1)$ $\checkmark y = x+6$ $\checkmark x+6 < 2$ $\checkmark$ antwoord $\checkmark (-5; 2)$ lê op f^{-1} $\checkmark (-4; 2)$ lê op $f^{-1}(x-1)$ $\checkmark$ stygende funksie $\checkmark$ antwoord (4)
4.8	$\frac{1}{2}(x-2)^2 - 9 = x-7+k$ $\frac{1}{2}x^2 - 2x - 7 = x-7+k$ $\frac{1}{2}x^2 - 3x - k = 0$ Vir gelyke wortels: $b^2 - 4ac = 0$ $(-3)^2 - 4\left(\frac{1}{2}\right)(-k) = 0$ $2k = -9$ $k = -\frac{9}{2}$ $\therefore$ Vir twee ongelyke positiewe wortels: $-4,5 < k < 0$ OF	$\checkmark$ substitusie van $g(x)$ en $f(x)$ $\checkmark$ standaard vorm $\checkmark$ substitusie in $b^2 - 4ac = 0$ $\checkmark$ waarde van k vir gelyke wortels $\checkmark\checkmark$ antwoord

$\frac{1}{2}(x-2)^2 - 9 = x - 7 + k$ $\frac{1}{2}x^2 - 2x - 7 = x - 7 + k$ $\frac{1}{2}x^2 - 3x - k = 0$ Vir gelyke wortels: $b^2 - 4ac = 0$ $(-3)^2 - 4\left(\frac{1}{2}\right)(-k) = 0$ $2k = -9$ $k = -\frac{9}{2}$ y-afsnit van $y = x - 7 + k$: $y = 0 - 7 - \frac{9}{2}$ $y = -11,5$ ∴ Vir twee ongelyke positiewe wortels: $-11,5 < -7 + k < -7$ $-4,5 < k < 0$ OF $g(x) = \frac{1}{2}(x-2)^2 - 9$ $= \frac{1}{2}(x^2 - 4x + 4) - 9$ $= \frac{1}{2}x^2 - 2x - 7$ $g'(x) = x - 2$ $1 = x - 2$ $3 = x$ $g(3) = \frac{1}{2}(3-2)^2 - 9 \text{ of } g(3) = \frac{1}{2}(3)^2 - 2(3) - 7$ $g(3) = -8\frac{1}{2}$ $y = x + c$ $-8\frac{1}{2} = 3 + c$ $c = -11,5$ Vir twee positiewe wortels: $-11,5 < c < -7$ $-11,5 < k - 7 < -7$ $-4,5 < k < 0$	✓ substitusie van $g(x)$ en $f(x)$ ✓ standaard vorm ✓ substitusie in $b^2 - 4ac = 0$ ✓ waarde van k vir gelyke wortels ✓ $-11,5 < -7 + k < -7$ ✓ antwoord ✓ $\frac{1}{2}x^2 - 2x - 7$ ✓ $g'(x) =$ gradiënt van $f(x) = 1$ ✓ $g(3) = -8\frac{1}{2}$ ✓ $c = -11,5$ ✓ $-11,5 < c < -7$ ✓ antwoord (6)
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[29]

VRAAG 5

5.1.1	$h(x) = \left(\frac{5}{6}\right)^{-x}$ $= \left(\frac{6}{5}\right)^x$	✓ enige antwoord (1)
5.1.2	$f(x) = \left(\frac{5}{6}\right)^x$ $f^{-1}: x = \left(\frac{5}{6}\right)^y$ $y = \log_{\frac{5}{6}} x \quad x > 0$	✓ $x = \left(\frac{5}{6}\right)^y$ ✓ $y = \log_{\frac{5}{6}} x$ (2)
5.1.3	$x \in (0;1]$ OF $0 < x \leq 1$	✓ kritieke punte ✓ notasie (slegs as waardes korrek) ✓ kritieke punte ✓ notasie (slegs as waardes korrek) (2)
5.2		✓ draaipunt ✓ elke x-afsnit ✓ vorm (4) [9]

VRAAG 6

6.1	$\text{Lening} = \frac{75}{100} \times 2\,000\,000$ $= R\,1\,500\,000$ OF $\frac{25}{100} \times 2\,000\,000$ $= R\,500\,000$ $\text{Lening} = R\,2\,000\,000 - 500\,000$ $= R\,1\,500\,000$	✓ $\frac{75}{100} \times 2\,000\,000$ ✓ antwoord ✓ R 500 000 ✓ antwoord (2)
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6.2	$A = P(1+i)^n$ $= 1\,500\,000 \left(1 + \frac{0,095}{4}\right)^1$ $= R1\,535\,625$ $P = \frac{x[1 - (1+i)^{-n}]}{i}$ $1\,500\,000 \left(1 + \frac{0,095}{4}\right)^1 = \frac{58\,000 \left[1 - \left(1 + \frac{0,095}{4}\right)^{-n}\right]}{\frac{0,095}{4}}$ $0,6288119612 = 1 - \left(1 + \frac{0,095}{4}\right)^{-n}$ $\left(1 + \frac{0,095}{4}\right)^{-n} = 0,3711880386$ $\log_{\left(1 + \frac{0,095}{4}\right)}(0,3711880386) = -n$ OF $\frac{\log(0,3711880386)}{\log\left(1 + \frac{0,095}{4}\right)} = -n$ $n = 42,22185853$ ∴ 43 kwartaallikse paaiemente	$\checkmark 1\,500\,000 \left(1 + \frac{0,095}{4}\right)^1$ $\checkmark i = \frac{0,095}{4}$ $\checkmark \text{ substitusie in die regte formule}$ $\checkmark \text{ korrekte gebruik van logs}$ $\checkmark n = 42,22$ $\checkmark \text{ antwoord}$ (6)
6.3	Uitstaande balans $= P(1+i)^n - \frac{x[(1+i)^n - 1]}{i}$ $= 1\,535\,625 \left(1 + \frac{0,095}{4}\right)^{23} - \frac{58\,000 \left[\left(1 + \frac{0,095}{4}\right)^{23} - 1\right]}{\frac{0,095}{4}}$ $= R\,886\,790,15$ OF	$\checkmark n = 23$ $\checkmark 1\,535\,625 \left(1 + \frac{0,095}{4}\right)^{23}$ OF $1\,500\,000 \left(1 + \frac{0,095}{4}\right)^{24}$ $\checkmark$ $\frac{58\,000 \left[\left(1 + \frac{0,095}{4}\right)^{23} - 1\right]}{\frac{0,095}{4}}$ $\checkmark \text{ antwoord}$ (4)

	Uitstaande tyd = $42,22185853 - 23$ $= 19,22185853$ Uitstaande balans: $P = \frac{x[1 - (1+i)^{-n}]}{i}$ $= \frac{58\,000 \left[1 - \left(1 + \frac{0,095}{4} \right)^{-19,22185853} \right]}{\frac{0,095}{4}}$ $= R\,886\,790,15$	✓ 23 ✓ $n = 19,22185853$ ✓ substitusie ✓ antwoord (4)
6.4	Rente gehef $= (58\,000 \times 23) - (1\,500\,000 - 886\,790,1491)$ $= R\,720\,790,15$	✓ $58\,000 \times 23$ ✓ ✓ $1\,500\,000 - 886\,790,1491$ ✓ antwoord (4) [16]

VRAAG 7

7.1	$f(x) = -x^2 + 3x - 7$ $f(x+h) = -(x+h)^2 + 3(x+h) - 7$ $= -(x^2 + 2xh + h^2) + 3x + 3h - 7$ $= -x^2 - 2xh - h^2 + 3x + 3h - 7$ $f(x+h) - f(x) = (-x^2 - 2xh - h^2 + 3x + 3h - 7) - (-x^2 + 3x - 7)$ $= -2xh - h^2 + 3h$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{-2xh - h^2 + 3h}{h}$ $= \lim_{h \rightarrow 0} \frac{h(-2x - h + 3)}{h}$ $= \lim_{h \rightarrow 0} (-2x - h + 3)$ $= -2x + 3$ OF	✓ $-(x+h)^2 + 3(x+h) - 7$ ✓ $-x^2 - 2xh - h^2 + 3x + 3h - 7$ ✓ vereenvoudiging ✓ substitusie in formule ✓ faktore ✓ antwoord (6)
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	$f(x) = -x^2 + 3x - 7$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{-(x+h)^2 + 3(x+h) - 7 - (-x^2 + 3x - 7)}{h}$ $= \lim_{h \rightarrow 0} \frac{-(x^2 + 2xh + h^2) + 3x + 3h - 7 + x^2 - 3x + 7}{h}$ $= \lim_{h \rightarrow 0} \frac{-x^2 - 2xh - h^2 + 3x + 3h - 7 + x^2 - 3x + 7}{h}$ $= \lim_{h \rightarrow 0} \frac{-2xh - h^2 + 3h}{h}$ $= \lim_{h \rightarrow 0} \frac{h(-2x - h + 3)}{h}$ $= \lim_{h \rightarrow 0} (-2x - h + 3)$ $= -2x + 3$	$\checkmark -(x+h)^2 + 3(x+h) - 7$ $\checkmark$ substitusie in formule $\checkmark$ $-x^2 - 2xh - h^2 + 3x + 3h - 7$ $\checkmark$ vereenvoudiging $\checkmark$ faktore $\checkmark$ antwoord (6)
7.2	$D_x \left[15\sqrt{x^4} - \frac{3x^7 + x}{4x^3} \right]$ $= D_x \left[15x^{\frac{4}{2}} - \frac{3x^4}{4} - \frac{x^{-2}}{4} \right]$ $= 12x^{-\frac{1}{2}} - 3x^3 + \frac{1}{2}x^{-3}$	$\checkmark 15x^{\frac{4}{2}} \quad \checkmark -\frac{3x^4}{4}$ $\checkmark -\frac{x^{-2}}{4}$ $\checkmark 12x^{-\frac{1}{2}}$ $\checkmark -3x^3 \quad \checkmark +\frac{1}{2}x^{-3}$ (6) [12]

VRAAG 8

8.1	$x \leq -3$ of $x \geq 2$ Nota: Aanvaar $x < -3$ of $x > 2$. By die stasionêre punte is die grafiek beide stygend en dalend.	$\checkmark x \leq -3$ $\checkmark x \geq 2$ (2)
8.2	$x = -3$	$\checkmark x = -3$ (1)
8.3	$f'(x) = 1(x+3)(x-2)$ $= x^2 + x - 6$	$\checkmark (x+3)(x-2)$ $\checkmark$ antwoord (2)

8.4	$f(x) = px^3 + qx^2 + rx + 10$ $f'(x) = 3px^2 + 2qx + r$ $f'(x) = x^2 + x - 6$ $\therefore 3p = 1 \quad 2q = 1 \quad r = -6$ $p = \frac{1}{3} \quad q = \frac{1}{2}$	$\checkmark f'(x) = 3px^2 + 2qx + r$ $\checkmark 3p = 1$ $\checkmark 2q = 1$ $\checkmark r = -6$ (4)
8.5	$f(x) = \frac{1}{3}x^3 + \frac{1}{2}x^2 - 6x + 10$ $f'(x) = x^2 + x - 6$ $f''(x) = 2x + 1$ Konkaaf af as $f''(x) < 0$ $2x + 1 < 0$ $x < -\frac{1}{2}$ OF $f(x) = \frac{1}{3}x^3 + \frac{1}{2}x^2 - 6x + 10$ $f'(x) = x^2 + x - 6$ $x = \frac{-3+2}{2}$ $x = -\frac{1}{2}$ $f'(x)$ is dalend as $x < -\frac{1}{2}$ $\therefore f''(x) < 0$ as $x < -\frac{1}{2}$ $\therefore$ Konkaaf af: $x < -\frac{1}{2}$	$\checkmark f''(x) = 2x + 1$ $\checkmark f''(x) < 0$ $\checkmark x < -\frac{1}{2}$ (3) $\checkmark x = \frac{-3+2}{2}$ $\checkmark f''(x) < 0$ $\checkmark$ antwoord (3) [12]

VRAAG 9

9.1	$AH = 4t$ $HB = 1\,200 - 4t$ $BD = 5t$ $HD^2 = (1\,200 - 4t)^2 + (5t)^2$ Pyth $= 1\,440\,000 - 9\,600t + 16t^2 + 25t^2$ $= 41t^2 - 9\,600t + 1\,440\,000$ $HD(t) = \sqrt{41t^2 - 9\,600t + 1\,440\,000}$	$\checkmark HB = 1\,200 - 4t$ $\checkmark BD = 5t$ $\checkmark HD^2 = (1\,200 - 4t)^2 + (5t)^2$ $\checkmark 1\,440\,000 - 9\,600t + 16t^2 + 25t^2$ (4)
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9.2	$(HD^2)'(t) = 82t - 9600$ $0 = 82t - 9600$ $82t = 9600$ $t = 117,07$ sekondes $\therefore$ na 117,07 sekondes OF Die minimum van HD vind plaas wanneer HD^2 'n minimum is. $\min t = \frac{-(-9600)}{2(41)}$ $= 117,07$ sekondes	$\checkmark (HD^2)'(t) = 82t - 9600$ $\checkmark (HD^2)'(t) = 0$ $\checkmark$ antwoord $\checkmark$ min van HD = min HD^2 $\checkmark$ vervang in vergelyking van simmetrie-as $\checkmark$ antwoord (3)
9.3	$HD = \sqrt{41(117,07)^2 - 9600(117,07) + 1440000}$ $= \sqrt{878048,7805}$ $= 937,04$ m Nee, die jagter is buite trefafstand.	$\checkmark$ substitusie $\checkmark$ antwoord $\checkmark$ Nee (3) [10]

VRAAG 10

10.1		$\checkmark$ eerste uitkoms $\checkmark$ tweede uitkoms (2)
10.2	$P(\text{wen}) = P(RW) + P(BW) + P(SW)$ $= (0,45)(0,18) + (0,32)(0,39) + (0,23)(0,63)$ $= 0,3507$ $= 35,07\%$	$\checkmark P(RW) = (0,45)(0,18)$ $\checkmark P(BW) = (0,32)(0,39)$ $\checkmark P(SW) = (0,23)(0,63)$ $\checkmark$ antwoord (4) [6]

VRAAG 11

11.1	$9! = 362\,880$	✓ $9!$ OF $362\,880$ (1)
11.2	$8! \times 2! = 80\,640$	✓✓ $8! \times 2!$ OF $80\,640$ (2)
11.3	$\frac{5 \times 7! \times 4}{9!}$ $= \frac{5}{18} \text{ or } 0,28$	✓ $5 \times 7! \times 4$ ✓ $9!$ in noemer ✓ antwoord (3)
11.4	Totale aantal maniere wat 9 perde in 4 stalle geplaas kan word $= 9 \times 8 \times 7 \times 6 = 3024$ Totale aantal maniere sonder 'n merrie in die plasing $= 4! = 24$ Totale aantal maniere met ten minste 1 merrie in die plasing $= 3\,024 - 24$ $= 3\,000$ maniere OF Die totale aantal maniere waar daar ten minste 1 merrie in die plasing is: $= [(5 \times 4 \times 3 \times 2) \times 4] + \left[(5 \times 4 \times 4 \times 3) \times \frac{12}{2} \right] +$ $[(5 \times 4 \times 3 \times 4) \times 4] + [5 \times 4 \times 3 \times 2]$ $= 3\,000$ maniere	✓ $3\,024$ ✓ 24 ✓ $3\,000$ ✓ $[(5 \times 4 \times 3 \times 2) \times 4] +$ $\left[(5 \times 4 \times 4 \times 3) \times \frac{12}{2} \right]$ ✓ $[(5 \times 4 \times 3 \times 4) \times 4] +$ $[5 \times 4 \times 3 \times 2]$ ✓ antwoord (3) [9]
		TOTAAL: 150