



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE/GRAAD 12

MATHEMATICS P1/WISKUNDE VI

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MEMORANDUM

MARKS: 150

PUNTE: 150

**This memorandum consists of 18 pages.
*Hierdie memorandum bestaan uit 18 bladsye.***

NOTE:

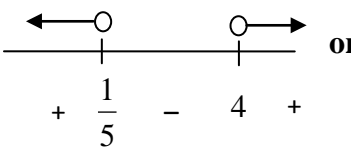
- If a candidate answers a question TWICE, only mark the FIRST attempt.
- Consistent accuracy applies in all aspects of the marking memorandum.

LET WEL:

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

QUESTION/VRAAG 1

1.1.1	$(x + 4)(x - 5) = 0$ $\therefore x = -4$ or $x = 5$	✓ factors/faktore ✓ answers/antwoorde (2)
1.1.2	$2x^2 - 11x + 7 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-(-11) \pm \sqrt{(-11)^2 - 4(2)(7)}}{2(2)}$ $= 4,77 \text{ or } 0,73$ <p>OR/OF</p> $2x^2 - 11x + 7 = 0$ $x^2 - \frac{11}{2}x + \frac{7}{2} = 0$ $x^2 - \frac{11}{2}x + \left(\frac{1}{2} \cdot \frac{11}{2}\right)^2 + \frac{7}{2} - \left(\frac{1}{2} \cdot \frac{11}{2}\right)^2 = 0$ $\left(x - \frac{11}{4}\right)^2 + \frac{7}{2} - \frac{121}{16} = 0$ $\left(x - \frac{11}{4}\right)^2 = \frac{121 - 56}{16}$ $x - \frac{11}{4} = \pm \sqrt{\frac{65}{16}}$ $\therefore x = \frac{11}{4} + \frac{\sqrt{65}}{4}$ or $x = \frac{11}{4} - \frac{\sqrt{65}}{4}$ $x = 4,77$ or $x = 0,73$	✓ substitution into correct formula/substitusie in korrekte formule ✓ 4,77 ✓ 0,73 (3) ✓ correct completion of the square/korrekte voltooiing van die vierkant ✓ 4,77 ✓ 0,73 (3)

<p>1.1.3</p>	$5x^2 - 21x + 4 > 0$ $(5x - 1)(x - 4) > 0$ $x < \frac{1}{5} \text{ or/of } x > 4$ 	<ul style="list-style-type: none"> ✓ standard form/ standaardvorm ✓ factors/faktore ✓ $x < \frac{1}{5}$ ✓ $x > 4$ ✓ of <p style="text-align: right;">(5)</p>
<p>1.1.4</p>	$2^{2x} - 6 \cdot 2^x = 16$ $2^{2x} - 6 \cdot 2^x - 16 = 0$ $(2^x - 8)(2^x + 2) = 0$ $2^x = 2^3 \text{ or/of } 2^x = -2$ $x = 3 \text{ or/of No Solution or } 2^x \neq -2$	<ul style="list-style-type: none"> ✓ factors/faktore ✓ no solution to/ geen oplossing $2^x = -2$ ✓ $2^x = 2^3$ ✓ answer/antw. <p style="text-align: right;">(4)</p>

<p>1.2</p>	$y = 2x - 1$ $x^2 - x(2x - 1) + (2x - 1)^2 = 7$ $x^2 - 2x^2 + x + 4x^2 - 4x + 1 = 7$ $3x^2 - 3x - 6 = 0$ $x^2 - x - 2 = 0$ $(x - 2)(x + 1) = 0$ $x = 2 \text{ or/of } x = -1$ $y = 3 \text{ or/of } y = -3$ <p>OR/OF</p> $x = \frac{y}{2} + \frac{1}{2}$ $\left(\frac{y}{2} + \frac{1}{2}\right)^2 - \left(\frac{y}{2} + \frac{1}{2}\right)y + y^2 = 7$ $\frac{y^2}{4} + \frac{y}{2} + \frac{1}{4} - \frac{y^2}{2} - \frac{y}{2} + y^2 = 7$ $\times 4: y^2 + 2y + 1 - 2y^2 - 2y + 4y^2 - 28 = 0$ $3y^2 - 27 = 0$ $y^2 - 9 = 0$ $(y - 3)(y + 3) = 0$ $\therefore y = 3 \quad \text{or} \quad y = -3$ $\therefore x = \frac{3}{2} + \frac{1}{2} \quad x = \frac{-3}{2} + \frac{1}{2}$ $x = 2 \quad x = -1$	<p>✓ y the subject/ die onderwerp</p> <p>✓ substitution/substitusie ✓ simplification/vereenv.</p> <p>✓ factors/faktore ✓ x-values/waardes ✓ y-values/waardes (6)</p> <p>✓ x the subject/ die onderwerp ✓ substitution/substitusie</p> <p>✓ simplification/vereenv.</p> <p>✓ factors/faktore ✓ y-values/waardes</p> <p>✓ x-values/waardes (6)</p>
<p>1.3.1</p>	$k = -2 \text{ or/of } k = 2$	<p>✓✓ answer/antw. (2)</p>
<p>1.3.2</p>	$k = -3$	<p>✓ -3 (1)</p>

1.4	$\sqrt{\frac{7^{2014} - 7^{2012}}{12}}$ $= \sqrt{\frac{7^{2012}(7^2 - 1)}{12}}$ $= \sqrt{\frac{7^{2012} \cdot 48}{12}}$ $= \sqrt{7^{2012} \cdot 4}$ $= 2 \cdot 7^{1006}$ <p>$a = 2; b = 1006$</p>	$\checkmark \frac{7^{2012}(7^2 - 1)}{12}$ $\checkmark \sqrt{7^{2012} \cdot 4}$ $\checkmark 2 \cdot 7^{1006} \checkmark$ <p>OR/OF</p> $\checkmark a = 2$ $\checkmark b = 1006$ <p style="text-align: right;">(4) [27]</p>
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QUESTION/VRAAG 2

2.1	$S_n = a + (a + d) + (a + 2d) + \dots + a + (n - 1)d$ $S_n = a + (n - 1)d + a + (n - 2)d + a + (n - 3)d + \dots + a$ $2S_n = n(2a + (n - 1)d)$ $S_n = \frac{n}{2}[2a + (n - 1)d]$	\checkmark first series/ <i>eerste reeks</i> \checkmark series reversed/ <i>reeks omgekeer</i> \checkmark sum/ <i>som</i> \checkmark division/ <i>deling</i> <p style="text-align: right;">(4)</p>
2.2	$\sum_{k=1}^{50} (100 - 3k) = 97 + 94 + 91 + \dots$ $T_1 = a = 97$ $d = -3$ $n = 50 - 1 + 1 = 50$ $S_n = \frac{n}{2}[2a + (n - 1)d]$ $= \frac{50}{2}[2(97) + 49(-3)]$ $= 1175$ <p>OR/OF</p> $T_1 = a = 97$ $l = 100 - 3(50) = -50$ $n = 50 - 1 + 1 = 50$ $S_n = \frac{n}{2}[a + l]$ $= \frac{50}{2}[97 - 50]$ $= 1175$	$\checkmark a = 97$ $\checkmark d = -3$ $\checkmark n = 50$ \checkmark answer/ <i>antwoord</i> <p style="text-align: right;">(4)</p> $\checkmark a = 97$ $\checkmark l = -50$ $\checkmark n = 50$ \checkmark answer/ <i>antwoord</i> <p style="text-align: right;">(4)</p>

2.3.1 (a)	$T_5 - T_4 = 25$	✓ answer/antwoord (1)
2.3.1 (b)	$T_{70} - T_{69} = 7 + (69 - 1)(6)$ $= 415$	✓ $n = 69$ ✓ $7 + (69 - 1)(6)$ ✓ answer/antw. (3)
2.3.2	$T_{89} - T_{69} = (T_{70} - T_{69}) + (T_{71} - T_{70}) + \dots + (T_{89} - T_{88})$ $= 415 + 421 + \dots \text{to 20 terms}$ $= \frac{20}{2} [2(415) + 19(6)]$ $= 9440$ <p>$T_{69} = T_{89} - (\text{sum of the differences from/som van die verskille van } T_{69} \text{ to } T_{89})$</p> $T_{69} = 23594 - 9440$ $= 14154$ <p>OR/OF</p> $ \begin{array}{ccc} 7 & 13 & 19 & 25 \\ \swarrow & \swarrow & \swarrow & \\ 6 & 6 & 6 & \end{array} $ <p>$\therefore 2a = 6$</p> $a = 3$ $3a + b = 7$ $b = -2$ $T_{89} = 3(89)^2 - 2(89) + c = 23594$ <p>$\therefore c = 9$</p> $\therefore T_n = 3n^2 - 2n + 9$ $\therefore T_{69} = 3(69)^2 - 2(69) + 9$ $\therefore T_{69} = 14154$	✓ expansion/uitbreiding ✓ $n = 20$ ✓ method/metode ✓ $a = 415$ ✓ answer/antwoord (5) ✓ a and/en b ✓ T_{89} (subst $n = 89$) ✓ T_n ✓ substitution/substitusie ✓ answer/antwoord (5)

	<p>OR/OF</p> $\begin{array}{ccc} 7 & 13 & 19 & 25 \\ & \swarrow \searrow & \swarrow \searrow & \swarrow \searrow \\ & 6 & 6 & 6 \end{array}$ <p> $\therefore 2a = 6$ $a = 3$ $7 - 6 = 1$ $T_1 - T_0 = 1$ $a + b + c - c = 1$ $3 + b = 1$ $b = -2$ $T_{89} = 3(89)^2 - 2(89) + c = 23594$ $\therefore c = 9$ $\therefore T_n = 3n^2 - 2n + 9$ $\therefore T_{69} = 3(69)^2 - 2(69) + 9$ $\therefore T_{69} = 14154$ </p>	<p> $\checkmark a$ and/en b $\checkmark T_{89}$ (subst $n = 89$) $\checkmark T_n$ \checkmark substitution/substitusie \checkmark answer/antwoord (5) [17] </p>
	<p>OR/OF</p> $T_{n+1} - T_n = 7 + 6(n-1)$ $\therefore T_{89} - T_1 = \sum_{n=1}^{88} (T_{n+1} - T_n)$ $= \frac{n}{2} [2a + (n-1)d]$ $= \frac{88}{2} [14 + 87 \times 6]$ $= 23584$ $\therefore T_1 = 23594 - 23584 = 10$ $\therefore T_{69} - 10 = \sum_{n=1}^{68} (T_{n+1} - T_n)$ $= 34(15 + 67 \times 6) = 14144$ $\therefore T_{69} = 14154$	<p> \checkmark formula/formule \checkmark value of/waarde van S_{88} \checkmark first term value/ eerste term waarde \checkmark substitution/substitusie \checkmark answer/antwoord (5) [17] </p>

QUESTION 3

3.1	$r = \frac{40,5}{45} = 0,9$ $T_{12} = 45(0,9)^{12-1}$ $= 14,12147682\dots$ $= 14,12$	<p>✓ $r = 0,9$</p> <p>✓ substitution into correct formula/<i>substitusie in korrekte formule</i></p> <p>✓ answer/<i>antwoord</i></p> <p style="text-align: right;">(3)</p>
3.2	$r = 0,9$ $-1 < 0,9 < 1$	<p>✓ answer/<i>antwoord</i></p> <p style="text-align: right;">(1)</p>
3.3	$S_{\infty} = \frac{45}{1-0,9}$ $S_{\infty} = 450$	<p>✓ substitution/<i>substitusie</i></p> <p>✓ 450</p> <p style="text-align: right;">(2)</p>
3.4	$S_{\infty} - S_n < 1$ $S_{\infty} - S_n = 450 - \frac{45(1 - (0,9)^n)}{1 - 0,9}$ $S_{\infty} - S_n = 450 - 450(1 - (0,9)^n)$ $450(0,9)^n < 1$ $(0,9)^n < \frac{1}{450}$ $\log(0,9)^n < \log \frac{1}{450}$ $n \cdot \log(0,9) < \log \frac{1}{450}$ $n > \frac{\log \frac{1}{450}}{\log(0,9)}$ $n > 57,98\dots$ <p>Smallest value/<i>Kleinste waarde</i>: $n = 58$</p>	<p>✓ $450 - \frac{45(1 - (0,9)^n)}{1 - 0,9}$</p> <p>✓ $(0,9)^n = \frac{1}{450}$</p> <p>✓ introducing/<i>gebruik logs</i></p> <p>✓ making n the subject/<i>maak n die onderwerp</i></p> <p>✓ $n = 58$</p> <p style="text-align: right;">(5)</p> <p style="text-align: right;">[11]</p>

QUESTION/VRAAG 4

4.1	$x = -2$ $y = -1$	✓ $x = -2$ ✓ $y = -1$ (2)
4.2.1	$g(0) = \frac{6}{0+2} - 1$ $= 2$ y-intercept/afsnit (0 ; 2)	✓ answer/antwoord (1)
4.2.2	$0 = \frac{6}{x+2} - 1$ $1 = \frac{6}{x+2}$ $x+2 = 6$ $x = 4$ x-intercept/afsnit (4 ; 0)	✓ equating to/stel gelyk aan 0 ✓ answer/antwoord (2)
4.3		✓ asymptotes/asimptote ✓ intercepts/afsnitte ✓ shape/vorm (3)
4.4	$y + 1 = -(x + 2)$ $y = -x - 3$ OR/OF Using general formula/Gebruik algemene formule: $y = -(x + p) + q$ $y = -(x + 2) - 1$ $y = -x - 3$	✓ $m = -1$ ✓ substitution of (-2 ; -1) ✓ answer (3) ✓ formula/formule ✓ substitution of p and q values/substitusie van p - en q -waardes ✓ answer/antwoord (3)
4.5	$x > -2$	✓✓ answer (2)

[13]

QUESTION/VRAAG 5

5.1	$9 = a^2$ $a = 3$ OR/OF $f^{-1}(x) = \log_a x$ $2 = \log_a 9$ $a^2 = 9 = 3^2$ $\therefore a = 3$	$\checkmark 9 = a^2$ $\checkmark a = 3$ (2) $\checkmark 9 = a^2$ $\checkmark a = 3$ (2)
5.2	$g(x) = 3^{-x}$ OR/OF $g(x) = \left(\frac{1}{3}\right)^x$	\checkmark answer/antwoord (1) \checkmark answer/antwoord (1)
5.3	$x \geq 9$ OR/OF $f^{-1}(x) = \log_3 x$ $\log_3 x = 2$ $x = 3^2 = 9$ $\therefore x \geq 9$ OR/OF $\log_3 x \geq 2$ $x \geq 3^2$ $\therefore x \geq 9$	$\checkmark\checkmark$ answer/antwoord (2) $\checkmark\checkmark$ answer/antwoord (2) $\checkmark\checkmark$ answer/antwoord (2)
5.4	Yes/Ja. For every y-value there is only one x such that/Vir elke y-waarde is daar slegs een x sodanig dat $y = f(x)$. OR/OF Yes/Ja. f is a one-to-one relation/is 'n een-tot-een-relasie.	\checkmark Yes/Ja \checkmark Reason/Rede (2) \checkmark Yes/Ja \checkmark Reason/Rede (2) [7]

QUESTION/VRAAG 6

6.1	$-3 \leq x \leq 2$	✓ critical values/ <i>kritiese waardes</i> ✓ notation/notasie (2)
6.2	$f: y = a(x - x_1)(x - x_2)$ $y = a(x + 3)(x - 2)$ $-8 = a(1 + 3)(1 - 2)$ $-8 = -4a$ $2 = a$ $y = 2(x + 3)(x - 2)$ $y = 2x^2 + 2x - 12$ $b = 2$ and/en $c = -12$ OR/OF $y = a\left(x + \frac{1}{2}\right)^2 + q$ $0 = a\left(2 + \frac{1}{2}\right)^2 + q \rightarrow 0 = \frac{25}{4}a + q \dots(1)$ $-8 = a\left(1 + \frac{1}{2}\right)^2 + q \rightarrow -8 = \frac{9}{4}a + q \dots(2)$ $(1) - (2): 8 = 4a$ $a = 2$ $q = 0 - \frac{25}{4}(2) = -\frac{25}{2} = -12,5$ $y = 2\left(x + \frac{1}{2}\right)^2 - 12\frac{1}{2}$ $y = 2\left(x^2 + x + \frac{1}{4}\right) - 12\frac{1}{2}$ $y = 2x^2 + 2x + \frac{1}{2} - 12\frac{1}{2}$ $y = 2x^2 + 2x - 12$ $\therefore b = 2$ and $c = -12$ OR/OF	✓ $y = a(x + 3)(x - 2)$ ✓ substitute/vervang (1 ; - 8) ✓ $a = 2$ ✓ $b = 2$ and/en ✓ $c = -12$ (5) ✓ equation/vergelyking 1 ✓ equation/vergelyking 2 ✓ $a = 2$ ✓ substitution/substitusie ✓ $b = 2$ and/en ✓ $c = -12$ (5)

	$y = 2[x^2 + x - 6]$ $y = 2\left[x^2 + x + \left(\frac{1}{2} \cdot 1\right)^2 - 6 - \left(\frac{1}{2} \cdot 1\right)^2\right]$ $= 2\left[\left(x + \frac{1}{2}\right)^2 - 6,25\right]$ $= 2\left(x + \frac{1}{2}\right)^2 - 12,5$ $\text{TP}\left(-\frac{1}{2}; -12,5\right)$ <p>OR/OF</p> $x = \frac{-3 + 2}{2} = -\frac{1}{2}$ $y = 2\left(-\frac{1}{2}\right) + 2\left(-\frac{1}{2}\right) - 12$ $y = -12\frac{1}{2}$ $\text{TP}\left(-\frac{1}{2}; -12,5\right)$ <p>OR/OF</p> $f(x) = y = 2x^2 + 2x - 12$ $f'(x) = 4x + 2$ $4x + 2 = 0$ $4x = -2$ $x = -\frac{1}{2}$ $\therefore y = 2\left(-\frac{1}{2}\right)^2 + 2\left(-\frac{1}{2}\right) - 12 = -\frac{25}{2}$ $\text{TP}\left(-\frac{1}{2}; -\frac{25}{2}\right)$	<p>✓ method/metode</p> <p>✓ x-value/waarde ✓ y-value/waarde (3)</p> <p>✓ method/metode ✓ x-value/waarde</p> <p>✓ y-value/waarde (3)</p> <p>✓ method/metode</p> <p>✓ x-value/waarde ✓ y-value/waarde (3)</p>
6.4	$x = \frac{13}{2}$	<p>✓✓ answer/i (2)</p>
6.5	$f'(x) = 4x + 2$ $m = f'(1) = 4(1) + 2$ $m = 6$	<p>✓ $y' = 4x + 2$ ✓ subst. $x = 1$ ✓ answer/antwoord (3)</p> <p>[15]</p>

QUESTION/VRAAG 7

7.1.1	$R400 \times (44 \times 12)$ $= R211200$	✓ $R400 \times (44 \times 12)$ ✓ $R211200$ (2)
7.1.2	$F = \frac{x[(1+i)^n - 1]}{i}$ $400 \left[\frac{\left(1 + \frac{0,08}{12}\right)^{528} - 1}{0,08} \right]$ $= \frac{400 \left[\left(1 + \frac{0,08}{12}\right)^{528} - 1 \right]}{0,08}$ $= R1\,943\,524,42$	✓ $x = 400$ ✓ $n = 528$ ✓ $i = \frac{0,08}{12}$ ✓ substitution into correct formula/substitusie in korrekte formule ✓ answer/antwoord (5)
7.1.3	$P = \frac{x[1 - (1+i)^{-n}]}{i}$ $2000000 = \frac{x \left[1 - \left(1 + \frac{0,1}{12}\right)^{-300} \right]}{\frac{0,1}{12}}$ $x = R18\,174,01$ <p>OR/OF</p> $2000000 \left(1 + \frac{0,1}{12}\right)^{300} = \frac{x \left[\left(1 + \frac{0,1}{12}\right)^{300} - 1 \right]}{\frac{0,1}{12}}$ $x = R18174,01$	✓ $P = 2000000$ ✓ $n = 300$ and/en $i = \frac{0,1}{12}$ ✓ substituting into correct formula/substitusie in korrekte formule ✓ answer/antwoord (4)
7.2	Let P_X and P_Y be the populations of the two towns at the beginning of 2010./Laat P_X en P_Y die bevolkings wees van die twee dorpe aan die begin van 2010. $A_X = A_Y$ $P_X (1 - 0,08)^3 = P_Y (1 + 0,12)^3$ $\frac{P_X}{P_Y} = \frac{(1 + 0,12)^3}{(1 - 0,08)^3}$ $= \frac{1,404\dots}{0,778\dots}$ $= 1,8:1$	✓ equating/stel gelyk ✓ $A_X = P_X (1 - 0,08)^3$ ✓ $A_Y = P_Y (1 + 0,12)^3$ ✓ answer/antwoord (4) [15]

QUESTION/VRAAG 8

8.1	$f(x+h) = 2(x+h)^2 + 4$ $= 2x^2 + 4xh + 2h^2 + 4$ $f(x+h) - f(x) = 2x^2 + 4xh + 2h^2 + 4 - 2x^2 - 4$ $= 4xh + 2h^2$ $f'(x) = \lim_{h \rightarrow 0} \frac{4xh + 2h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(4x + 2h)}{h}$ $= \lim_{h \rightarrow 0} (4x + 2h)$ $= 4x$	$\checkmark 2x^2 + 4xh + 2h^2 + 4$ $\checkmark 4xh + 2h^2$ $\checkmark \lim_{h \rightarrow 0} \frac{h(4x + 2h)}{h}$ $\checkmark 4x \quad (4)$
8.2.1	$f(x) = -3x^2 + 5\sqrt{x}$ $f(x) = -3x^2 + 5x^{\frac{1}{2}}$ $f'(x) = -6x + \frac{5}{2}x^{-\frac{1}{2}}$	$\checkmark 5x^{\frac{1}{2}}$ $\checkmark -6x$ $\checkmark \frac{5}{2}x^{-\frac{1}{2}}$ (3)
8.2.2	$p(x) = \left(\frac{1}{x^3} + 4x\right)^2$ $= \frac{1}{x^6} + \frac{8}{x^2} + 16x^2$ $= x^{-6} + 8x^{-2} + 16x^2$ $p'(x) = -6x^{-7} - 16x^{-3} + 32x$ <p>OR/OF</p> $p(x) = (x^{-3} + 4x)^2$ <p>by making use of the chain rule:</p> $p'(x) = 2(x^{-3} + 4x)(-3x^{-4} + 4)$ $p'(x) = -6x^{-7} - 16x^{-3} + 32x$	$\checkmark \frac{1}{x^6} + \frac{8}{x^2} + 16x^2$ $\checkmark x^{-6} + 8x^{-2} + 16x^2$ $\checkmark \checkmark \text{ answer/antwoord} \quad (4)$ $\checkmark \checkmark 2(x^{-3} + 4x)$ $\checkmark \checkmark (-3x^{-4} + 4)$ (4)
8.3.1	$h'(x) = 3x^2 - 14x + 14$	$\checkmark \text{ finding/kry } h'(x) \quad (1)$
8.3.2	<p>At/By B: $h'(x) = 0$</p> $3x^2 - 14x + 14 = 0$ $x = \frac{14 \pm \sqrt{(-14)^2 - 4(3)(14)}}{2(3)}$ $= 1,45 \text{ or } 3,22$ <p>n/a</p>	$\checkmark \text{ derivative equal to/afgeleide gelyk aan } 0$ $\checkmark \text{ substitution into correct formula/substitusie in korrekte formule}$ $\checkmark x\text{-value of/x-waarde van } 1,45 \quad (3)$

<p>8.3.3</p>	$x^3 - 7x^2 + 14x - 8 = (x-1)(x^2 - 6x + 8)$ $= (x-1)(x-2)(x-4)$ <p>C(4;0)</p> <p>OR/OF</p> $x_c > 3,22$ $h(4) = (4)^3 - 7(4)^2 + 14(4) - 8 = 0$ $\therefore x_c = 4$	$\checkmark (x-1)$ $\checkmark x^2 - 6x + 8$ $\checkmark (x-2)(x-4)$ \checkmark coordinates of/ <i>koördinate</i> <i>van C</i> (4) $\checkmark x_c > 3,22$ \checkmark substitution of/ <i>substitusie van 4</i> $\checkmark h(4) = 0$ $\checkmark x_c$ (4)
<p>8.3.4</p>	$h'(x) = 3x^2 - 14x + 14$ $h''(x) = 6x - 14$ $6x - 14 < 0$ $6x < 14$ $\therefore x < \frac{7}{3}$ $\therefore k = \frac{7}{3}$	$\checkmark h''(x) = 6x - 14$ $\checkmark 6x - 14 < 0$ $\checkmark k = \frac{7}{3}$ <p>(3) [22]</p>

QUESTION/VRAAG 9

9.1	$\pi r^2 h = 6$ $h = \frac{6}{\pi r^2}$	$\checkmark h = \frac{6}{\pi r^2} \quad (1)$
9.2	$S = 10(2\pi r^2 + 2\pi rh + 4\pi r^2)$ $= 10[2\pi rh + 6\pi r^2]$ $= 20\pi rh + 60\pi r^2$ $= 20\pi r\left(\frac{6}{\pi r^2}\right) + 60\pi r^2$ $= 60\pi r^2 + \frac{120}{r}$ <p>OR/OF</p> <p>Area of/van 10 spheres/sfere = $10 \times 4 \times \pi \times r^2 = 40\pi r^2$ Area of/van 10 cylinders/silinders = $10(2\pi r^2 + 2\pi rh)$</p> $= 10\left(2\pi r^2 + 2\pi r \frac{6}{\pi r^2}\right)$ $= 20\pi r^2 + \frac{120}{r}$ <p>Total area/Totale area = $40\pi r^2 + 20\pi r^2 + \frac{120}{r}$</p> $= 60\pi r^2 + \frac{120}{r}$	$\checkmark \checkmark 10(2\pi r^2 + 2\pi rh + 4\pi r^2)$ $\checkmark 20\pi rh + 60\pi r^2$ $\checkmark \text{ substitution/substitusie}$ <p style="text-align: right;">(4)</p> $\checkmark \text{ area of 10 spheres/}$ $\text{ area van 10 sfere}$ $\checkmark \text{ area of 10 cylinders/}$ $\text{ area van 10 silinders}$ $\checkmark \text{ substitution/substitusie}$ $\checkmark \text{ simplification/vereenvoudiging}$ <p style="text-align: right;">(4)</p>
9.3	$S' = 120\pi r - 120r^{-2} = 0$ $120\pi r - \frac{120}{r^2} = 0$ $120\pi r^3 - 120 = 0$ $r^3 = \frac{120}{120\pi}$ $\therefore r = \frac{1}{\pi^{\frac{1}{3}}} = 0,68 \text{ cm}$	$\checkmark 120\pi r - 120r^{-2}$ $\checkmark = 0$ $\checkmark r^3 = \frac{120}{120\pi}$ $\checkmark \text{ answer/antwoord}$ <p style="text-align: right;">(4) [9]</p>

QUESTION/VRAAG 10

10.1.1	$d = 5$ $e = 4$ $f = 7$ $g = 5$	$\checkmark d = 5$ $\checkmark e = 4$ $\checkmark f = 7$ $\checkmark g = 5$	(4)
10.1.2a	$P(\text{A and/en B and/en C}) = \frac{4}{54} = \frac{2}{27}$	$\checkmark \frac{4}{54} = \frac{2}{27}$	(1)
10.1.2b	$P(\text{A or/of B or/of C}) = \frac{48}{54} = \frac{8}{9}$	$\checkmark \frac{48}{54} = \frac{8}{9}$	(1)
10.1.2c	$P(\text{only/slegs C}) = \frac{7}{54}$	$\checkmark \frac{7}{54}$	(1)
10.1.2d	$P(\text{that a country uses exactly two methods/dat 'n land presies twee metodes gebruik}) = \frac{5 + 4 + 8}{54} = \frac{17}{54}$	$\checkmark \frac{17}{54}$	(1)
10.2.1	$P(\text{selects } \textit{Midnight} \text{ as drama/kies } \textit{Midnight} \text{ as drama}) = \frac{1}{5}$	$\checkmark \checkmark$ answer/antwoord	(2)
10.2.2	Number of different selections of drama, romance and comedy/Aantal verskillende keuses van drama, liefdesverhale en komedie = $5 \times 4 \times 3 = 60$	\checkmark product/produk \checkmark answer/antwoord	(2)
10.2.3	$P(\text{select } \textit{Last Hero} \text{ and } \textit{Laughing Dragon}/\text{kies } \textit{Last Hero} \text{ en } \textit{Laughing Dragon}) = \frac{1}{5} \times \frac{1}{3} = \frac{1}{15}$ OR/OF $P(\text{select } \textit{Last Hero} \text{ and } \textit{Laughing Dragon}/\text{kies } \textit{Last Hero} \text{ en } \textit{Laughing Dragon}) = \frac{1 \times 4 \times 1}{60} = \frac{1}{15}$	\checkmark product/produk \checkmark answer/antwoord \checkmark product/produk \checkmark answer/antwoord	(2) (2)
TOTAL/TOTAAL:			[14]
			150