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Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12/*GRAAD 12*

MATHEMATICS P1/*WISKUNDE V1*

FEBRUARY/MARCH/*FEBRUARIE/MAART* 2016

MEMORANDUM

MARKS: 150

PUNTE: 150

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

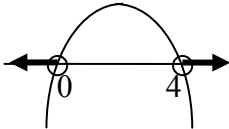
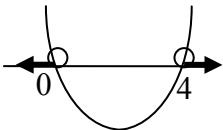
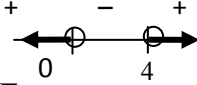
NOTE:

- 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, sien slegs die EERSTE poging na.
- Volgehoue akkuraatheid is op ALLE aspekte van die memorandum van toepassing.

QUESTION/VRAAG 1

1.1.1	$x^2 - x - 12 = 0$ $(x - 4)(x + 3) = 0$ $x = 4 \text{ or } x = -3$ OR/OF $x^2 - x - 12 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-(-1) \pm \sqrt{(-1)^2 - 4(1)(-12)}}{2(1)}$ $= 4 \text{ or } -3$	✓ factors ✓✓ answers (3) ✓ substitution into formula ✓✓ answers (3)
1.1.2	$x(x + 3) - 1 = 0$ $x^2 + 3x - 1 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-3 \pm \sqrt{3^2 - 4(1)(-1)}}{2(1)}$ $= \frac{-3 \pm \sqrt{13}}{2}$	✓ standard form ✓ substitution into correct formula ✓ answer (3)
1.1.3	$x(4 - x) < 0$ $x < 0 \text{ or } x > 4$ OR/OF $x(4 - x) < 0$ $x(x - 4) > 0$ $x < 0 \text{ or } x > 4$  OR/OF  	✓ $x < 0$ ✓ $x > 4$ ✓ or (3) ✓ $x < 0$ ✓ $x > 4$ ✓ or (3)

1.1.4	$x = \frac{a^2 + a - 2}{a - 1}$ $= \frac{(a+2)(a-1)}{a-1}$ $= a + 2$ $= 88888888888890$	✓ $(a+2)(a-1)$ ✓ answer (check ten eights written)/<i>tien agtstes geskryf</i> (2)
1.2	$y + 7 = 2x$ $y = 2x - 7 \dots\dots\dots(1)$ $x^2 - xy + 3y^2 = 15$ substitute (1) in (2) : $x^2 - x(2x - 7) + 3(2x - 7)^2 = 15$ $x^2 - 2x^2 + 7x + 3(4x^2 - 28x + 49) = 15$ $x^2 - 2x^2 + 7x + 12x^2 - 84x + 147 - 15 = 0$ $11x^2 - 77x + 132 = 0$ $x^2 - 7x + 12 = 0$ $(x - 3)(x - 4) = 0$ $x = 3 \quad \text{or} \quad x = 4$ $y = 2(3) - 7 \quad y = 2(4) - 7$ $y = -1 \quad y = 1$ OR/OF $y + 7 = 2x$ $x = \frac{y+7}{2} \dots\dots\dots(1)$ $x^2 - xy + 3y^2 = 15 \dots\dots\dots(2)$ substitute (1) in (2) : $\left(\frac{y+7}{2}\right)^2 - \left(\frac{y+7}{2}\right)y + 3y^2 = 15$ $\frac{y^2 + 14y + 49}{4} - \frac{y^2 + 7y}{2} + 3y^2 = 15$ $y^2 + 14y + 49 - 2y^2 - 14y + 12y^2 - 60 = 0$ $11y^2 - 11 = 0$ $y^2 - 1 = 0$ $(y - 1)(y + 1) = 0$ $y = -1 \quad y = 1$ $x = \frac{-1+7}{2} \quad x = \frac{1+7}{2}$ $x = 3 \quad x = 4$	✓ $y = 2x - 7$ ✓ substitution ✓ standard form ✓ factorisation ✓ x-values ✓ y-values (6) ✓ $x = \frac{y+7}{2}$ ✓ substitution ✓ standard form ✓ factorisation ✓ y-values ✓ x-values (6)

$2a = 1$ $a = \frac{1}{2}$ $T_n = an^2 + bn + c$ $-2 = \frac{1}{2} + b + c \dots\dots\dots T_1$ $b + c = -\frac{5}{2} \dots\dots\dots \text{line 1}$ $0 = 2 + 2b + c \dots\dots\dots T_2$ $2b + c = -2 \dots\dots\dots \text{line 2}$ $\text{line 2} - \text{line 1}:$ $b = \frac{1}{2}$ $\text{substitute in line 1} \quad \text{or} \quad \text{substitute in line 2}$ $\frac{1}{2} + c = -\frac{5}{2}$ $c = -3$ $\therefore T_n = \frac{1}{2}n^2 + \frac{1}{2}n - 3$ OR/OF $T_n = T_1 + (n-1)d_1 + \frac{(n-1)(n-2)}{2}d_2$ $= -2 + (n-1)(2) + \frac{(n-1)(n-2)}{2}(1)$ $= -2 + 2n - 2 + (n^2 - 3n + 2)(\frac{1}{2})$ $= -2 + 2n - 2 + \frac{1}{2}n^2 - \frac{3}{2}n + 1$ $= \frac{1}{2}n^2 + \frac{1}{2}n - 3$ OR/OF $2a = 1$ $a = \frac{1}{2}$ $3a + b = T_2 - T_1$ $3\left(\frac{1}{2}\right) + b = 2$ $b = \frac{1}{2}$ $T_0 = c = -3$ $\therefore T_n = \frac{1}{2}n^2 + \frac{1}{2}n - 3$ OR/OF	✓ value of a ✓ $-2 = \frac{1}{2} + b + c$ ✓ $0 = 2 + 2b + c$ ✓ value of b ✓ value of c (5) ✓ formula ✓ substitution ✓ value of a ✓ value of b ✓ value of c (5) ✓ value of a ✓ $3\left(\frac{1}{2}\right) + b = 2$ ✓ value of b ✓ $T_0 = c$ ✓ value of c (5)
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	Since $T_2 = 0$, $(n - 2)$ is a factor of T_n $T_n = an^2 + bn + c$ $= a(n - 2)(n - k)$ $T_1 = -2 = a(1 - 2)(1 - k)$ $-2 = -a(1 - k)$ $a = \frac{2}{1 - k}$ $T_3 = 3 = a(3 - 2)(3 - k)$ $3 = a(3 - k)$ $a = \frac{3}{3 - k}$ $\frac{2}{1 - k} = \frac{3}{3 - k}$ $2(3 - k) = 3(1 - k)$ $6 - 2k = 3 - 3k$ $k = -3$ $a = \frac{1}{2}$ $T_n = \frac{1}{2}(n - 2)(n + 3)$ $= \frac{1}{2}n^2 + \frac{1}{2}n - 3$	✓ $T_n = a(n - 2)(n - k)$ ✓ $-2 = a(1 - 2)(1 - k)$ ✓ $3 = a(3 - 2)(3 - k)$ ✓ value of k ✓ value of a (5)
2.1.3	$\frac{1}{2}n^2 + \frac{1}{2}n - 3 = 322$ $n^2 + n - 6 = 644$ $n^2 + n - 650 = 0$ $n = \frac{-1 \pm \sqrt{1^2 - 4(1)(-650)}}{2}$ $n = 25 \text{ or } n = -26$ The 25th term has a value of 322./Die 25^{ste} term se waarde is 322. OR/OF $\frac{1}{2}n^2 + \frac{1}{2}n - 3 = 322$ $n^2 + n - 6 = 644$ $n^2 + n - 650 = 0$ $(n - 25)(n + 26) = 0$ $n = 25 \text{ or } n = -26$ The 25th term has a value of 322./Die 25^{ste} term se waarde is 322. OR/OF	✓ $\frac{1}{2}n^2 + \frac{1}{2}n - 3 = 322$ ✓ standard form ✓ substitution into quadratic formula ✓ answer (4) ✓ $\frac{1}{2}n^2 + \frac{1}{2}n - 3 = 322$ ✓ standard form ✓ factors ✓ answer (4)

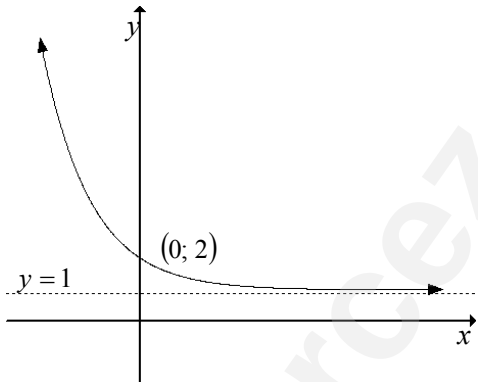
	$\frac{1}{2}n^2 + \frac{1}{2}n - 3 = 322$ $n^2 + n - 6 = 644$ $(n+3)(n-2) = 23 \times 28$ $n-2 = 23$ $n = 25$	$\checkmark \frac{1}{2}n^2 + \frac{1}{2}n - 3 = 322$ $\checkmark (n+3)(n-2)$ $\checkmark 23 \times 28$ $\checkmark \text{answer}$ (4)
2.2.1	$T_2 : a + d = 8$ $T_5 : a + 4d = 10$ $T_5 - T_2 : 3d = 2$ $d = \frac{2}{3}$	$\checkmark a + d = 8$ $\checkmark a + 4d = 10$ $\checkmark \text{answer}$ (3)
2.2.2	$T_1 = T_2 - d$ $= 8 - \frac{2}{3}$ $= \frac{22}{3}$ $T_n = a + (n-1)d$ $= \frac{22}{3} + (n-1)\frac{2}{3}$ $= \frac{2n+20}{3}$ $S_{50} = \sum_{n=1}^{50} \left(\frac{22}{3} + (n-1)\frac{2}{3} \right)$ OR/OF $S_{50} = \sum_{n=1}^{50} \left(\frac{2n+20}{3} \right)$	$\checkmark T_1 = \frac{22}{3}$ $\checkmark \text{answer}$ (2) (2)
2.2.3	$S_n = \frac{n}{2}[2a + (n-1)d]$ $S_{50} = \frac{50}{2} \left[2 \left(\frac{22}{3} \right) + (50-1) \left(\frac{2}{3} \right) \right]$ $= \frac{3550}{3}$	$\checkmark \text{correct substitution into correct formula}$ $\checkmark \checkmark \text{answer}$ (3) [18]

QUESTION/VRAAG 3

3.1	$r = \frac{70}{100}$ $= \frac{7}{10}$ $T_n = ar^{n-1}$ $11,76 = 100\left(\frac{7}{10}\right)^{n-1}$ $\left(\frac{7}{10}\right)^{n-1} = \frac{11,76}{100}$ $n-1 = \log_{\frac{7}{10}}\left(\frac{11,76}{100}\right)$ $n-1 = 6$ $n = 7$ During the 7th year/<i>In die 7^{de} jaar</i> OR/OF $r = \frac{70}{100}$ $= \frac{7}{10}$ $T_n = ar^{n-1}$ $11,76 = 100(0,7)^{n-1}$ $0,7^{n-1} = \frac{11,76}{100}$ $= 0,1176$ $(n-1)\log 0,7 = \log 0,1176$ $n-1 = \frac{\log 0,1176}{\log 0,7}$ $n-1 = 6$ $n = 7$ During the 7th year/<i>In die 7^{de} jaar</i>	✓ value of r ✓ substitution in formula for T_n ✓ use of logarithms ✓ answer (4) ✓ value of r ✓ substitution in formula for T_n ✓ use of logarithms ✓ answer (4)
3.2	$h(n) = 130 + (100 + 70 + 49 + \dots \text{to } n \text{ terms})$ $= 130 + \frac{100(1 - (0,7)^n)}{1 - 0,7}$ $= 130 + \frac{100(1 - (0,7)^n)}{0,3}$	✓ 130 ✓ 100 + 70 + 49 + ... to n terms ✓ answer (3)

3.3	Eventual height of the tree/<i>Uiteindelijke hoogte van die boom</i> $= 130 + \frac{100}{1 - 0,7}$ $= 463,33 \text{ mm} \quad \text{OR} \quad \frac{1390}{3} \text{ mm}$	✓✓ $130 + \frac{100}{1 - 0,7}$ ✓ answer (3) [10]
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QUESTION/VRAAG 4

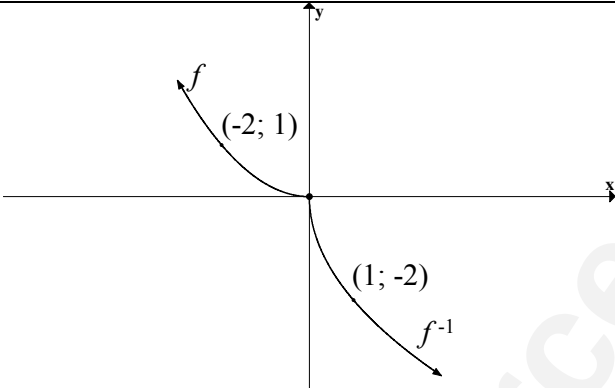
4.1	(0 ; 2)	✓ answer (1)
4.2		✓ shape ✓ (0; 2) ✓ asymptote (3)
4.3	$f(-2) = 5$ $f(1) = 2^{-1} + 1 = \frac{3}{2}$ Average gradient = $\frac{f(1) - f(-2)}{1 - (-2)}$ $\frac{\frac{3}{2} - 5}{3}$ $= -\frac{7}{6}$	✓ $f(-2) = 5$ ✓ $f(1) = \frac{3}{2}$ ✓ answer (3)
4.4	Since the asymptote of f is $y = 1$, the asymptote of $h(x) = 3f(x)$ will be $y = 3$. <i>Omdat die asimptoot van f $y = 1$ is, sal die asimptoot van $h(x) = 3f(x)$ $y = 3$ wees.</i>	✓ answer (1) [8]

QUESTION/VRAAG 5

5.1	$y = a(x + p)^2 + q$ Turning point $(1; -8)$: $y = a(x - 1)^2 - 8$ Substitute $(0; -4)$: $-4 = a(0 - 1)^2 - 8$ $-4 = a - 8$ $a = 4 \quad p = -1 \quad q = -8$ $y = 4(x - 1)^2 - 8$	✓ $y = a(x - 1)^2 - 8$ ✓ substitute $(0; -4)$ ✓ $a = 4$ ✓ p and q values (4)
5.2	Asymptote is $y = -2 \Rightarrow d = -2$ Substitute $(1; -8)$: $-8 = \frac{k}{1 + r} - 2$ $k = -6(1 + r)$ $k = -6 - 6r \dots \dots \dots \text{line 1}$ Substitute $(0; -4)$: $-4 = \frac{k}{r} - 2$ $\frac{k}{r} = -2$ $k = -2r \dots \dots \dots \text{line 2}$ Equating lines 1 and 2: $-6 - 6r = -2r$ $-4r = 6$ $r = -\frac{3}{2}$ Substituting into line 2 or line 1: $k = (-2)\left(-\frac{3}{2}\right) = 3 \qquad k = -6 - 6\left(-\frac{3}{2}\right) = 3$	✓ $d = -2$ ✓ $k = -6 - 6r$ ✓ $k = -2r$ ✓ $-6 - 6r = -2r$ ✓ value of r ✓ value of k (6)
5.3	$g(x) \geq f(x)$ $\therefore 0 \leq x \leq 1$	✓ $0 \leq x$ ✓ $x \leq 1$ (2)
5.4	The line $y = k$ must pass through f twice on the positive side of the x-axis./Die lyn $y = k$ moet twee keer deur f aan die positiewe kant van die x-as sny. $-8 < k < -4$	✓ $-8 < k$ ✓ $k < -4$ (2)

5.5	$y = -x + c$ Substitute the intersection point of the asymptotes, i.e. $\left(\frac{3}{2}; -2\right)$: <i>Vervang die snypunt van die asimptote, m.a.w. $\left(\frac{3}{2}; -2\right)$:</i> $-2 = -\frac{3}{2} + c$ $c = -\frac{1}{2}$ $y = -x - \frac{1}{2}$ OR/OF $y = -x$ is translated $\frac{3}{2}$ units right and 2 units down/ $y = -x$ <i>transleer $\frac{3}{2}$ eenhede na regs en 2 eenhede na onder $\Rightarrow$</i> $y = -\left(x - \frac{3}{2}\right) - 2$ $y = -x - \frac{1}{2}$	$\checkmark y = -x + c$ $\checkmark -2 = -\frac{3}{2} + c$ $\checkmark$ answer (3)
5.6	By symmetry, $Q = \left(\frac{3}{2} + 8 - 2; -2 + \frac{3}{2} - 1\right)$ $= \left(\frac{15}{2}; -\frac{3}{2}\right)$	$\checkmark x = \frac{15}{2}$ $\checkmark y = -\frac{3}{2}$ (2) [19]

QUESTION/VRAAG 6

6.1	$f: y = \frac{1}{4}x^2$ $f^{-1}: x = \frac{1}{4}y^2$ $y^2 = 4x$ $y = \pm\sqrt{4x}$ $f^{-1}(x) = -\sqrt{4x}$ OR/OF $f^{-1}(x) = -2\sqrt{x}$	✓interchanging x and y ✓ $y^2 = 4x$ ✓answer (3)
6.2		✓both graphs pass through (0 ; 0) ✓shape for both ✓one additional point on both graphs (3)
6.3	Yes. No value of x in the domain of f^{-1} maps onto more than one y -value. <i>Ja. Geen waarde van x in die definisieversameling van f^{-1} assosieer met meer as een y-waarde nie.</i> OR/OF Yes. One to one function./Ja. Een-tot-een-funksie. OR/OF Yes. Vertical line test holds./Ja. Die vertikale lyntoets werk.	✓yes ✓reason (2) ✓yes ✓reason (2) ✓yes ✓reason (2) [8]

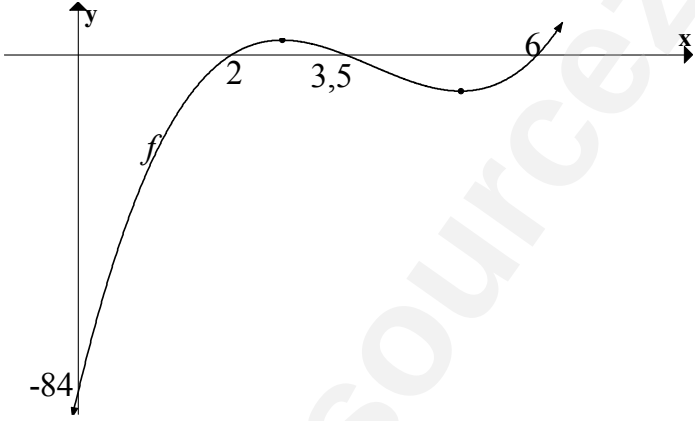
QUESTION/VRAAG 7

7.1.1	Quarterly interest rate/<i>Kwartaallikse rentekoers</i> $= \frac{10\%}{4}$ $= 2,5\%$	✓ answer (1)
7.1.2	$A = P(1+i)^n$ $= 5000 \left(1 + \frac{2,5}{100}\right)^{2 \times 4}$ $= R6\,092,01$	✓ $n = 8$ ✓ $5000 \left(1 + \frac{2,5}{100}\right)^{2 \times 4}$ ✓ answer (3)
7.2.1	$P_v = \frac{x[1 - (1+i)^{-n}]}{i}$ $800\,000 = \frac{10\,000 \left[1 - \left(1 + \frac{0,14}{12}\right)^{-n}\right]}{\frac{0,14}{12}}$ $\frac{800\,000}{10\,000} \times \frac{0,14}{12} = 1 - \left(1 + \frac{0,14}{12}\right)^{-n}$ $\left(1 + \frac{0,14}{12}\right)^{-n} = 1 - \frac{800\,000}{10\,000} \times \frac{0,14}{12}$ $-n = \frac{\log \left[1 - \frac{800\,000 \times \frac{0,14}{12}}{10\,000}\right]}{\log \left(1 + \frac{0,14}{12}\right)}$ $n = 233,4699962$ Motloi can make 233 withdrawals of R10 000./<i>Motloi kan 233 onttrekkings van R10 000 maak.</i>	✓ $i = \frac{0,14}{12}$ ✓ substitute into present value formula ✓ $\left(1 + \frac{0,14}{12}\right)^{-n} = 1 - \frac{800\,000}{10\,000} \times \frac{0,14}{12}$ ✓ use of logs ✓ 233 (5)
7.2.2 (a)	$A - F_v = 800\,000 \left(1 + \frac{0,14}{12}\right)^{48} - \frac{10\,000 \left[\left(1 + \frac{0,14}{12}\right)^{48} - 1\right]}{\frac{0,14}{12}}$ $= 1\,396\,005,54 - 638\,577,36$ $= R757\,428$ OR/OF	✓ $n = 48$ in both formulae ✓ $i = \frac{0,14}{12}$ in both formulae ✓ substitution into both formulae ✓ answer (4)

	$P_v = \frac{x[1-(1+i)^{-n}]}{i}$ $= \frac{10000 \left[1 - \left(1 + \frac{0,14}{12} \right)^{-185,4699962...} \right]}{\frac{0,14}{12}}$ $= R757\,428$	$\checkmark n = -185,46996...$ $\checkmark i = \frac{0,14}{12}$ $\checkmark$ $\frac{10000 \left[1 - \left(1 + \frac{0,14}{12} \right)^{-185,4699962...} \right]}{\frac{0,14}{12}}$ $\checkmark$ answer (4)
7.2.2 (b)	Let the purchase price of the house be y. / <i>Laat die koopprys van die huis y wees.</i> $\frac{757\,428}{y} = 30\%$ $757\,428 = 0,3y$ $y = \frac{757\,428}{0,3}$ $= R2\,524\,760$ OR/OF Let the purchase price of the house be y. / <i>Laat die koopprys van die huis y wees.</i> $y = \frac{757\,428}{30} \times 100$ $= R2\,524\,760$	$\checkmark$ answer (1) $\checkmark$ answer (1) [14]

QUESTION/VRAAG 8

8.1	$f(x+h) = -(x+h)^2 + 4 = -(x^2 + 2xh + h^2) + 4$ $= -x^2 - 2xh - h^2 + 4$ $f(x+h) - f(x) = -2xh - h^2$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{-2xh - h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(-2x - h)}{h}$ $= \lim_{h \rightarrow 0} (-2x - h)$ $= -2x$ OR/OF $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{-(x+h)^2 + 4 - (-x^2 + 4)}{h}$ $= \lim_{h \rightarrow 0} \frac{-x^2 - 2xh - h^2 + 4 + x^2 - 4}{h}$ $= \lim_{h \rightarrow 0} \frac{-2xh - h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(-2x - h)}{h}$ $= \lim_{h \rightarrow 0} (-2x - h)$ $= -2x$	✓ finding $f(x+h)$ ✓ $-2xh - h^2$ ✓ formula ✓ factorisation ✓ answer (5) ✓ formula ✓ finding $f(x+h)$ ✓ $-2xh - h^2$ ✓ factorisation ✓ answer (5)
8.2.1	$y = 3x^2 + 10x$ $\frac{dy}{dx} = 6x + 10$	✓ $6x$ ✓ 10 (2)
8.2.2	$f(x) = \left(x - \frac{3}{x}\right)^2$ $= x^2 - 6 + \frac{9}{x^2}$ $= x^2 - 6 + 9x^{-2}$ $f'(x) = 2x - 18x^{-3}$	✓ $x^2 - 6 + \frac{9}{x^2}$ ✓ $9x^{-2}$ ✓ $2x - 18x^{-3}$ (3)

8.3.1	$f(2) = 2(2)^3 - 23(2)^2 + 80(2) - 84$ $= 0$ $\therefore (x - 2)$ is a factor	✓ substitution of 2 into f ✓ value of 0 (2)
8.3.2	$f(x) = 2x^3 - 23x^2 + 80x - 84$ $= (x - 2)(2x^2 - 19x + 42)$ $= (x - 2)(2x - 7)(x - 6)$	✓ $2x^2 - 19x + 42$ ✓ $(x - 2)(2x - 7)(x - 6)$ (2)
8.3.3	$f'(x) = 6x^2 - 46x + 80$ $6x^2 - 46x + 80 = 0$ $3x^2 - 23x + 40 = 0$ $(3x - 8)(x - 5) = 0$ $x = \frac{8}{3}$ or $x = 5$	✓ $f'(x) = 6x^2 - 46x + 80$ ✓ $f'(x) = 0$ ✓ factors ✓ x -values (4)
8.3.4		✓ x -intercepts ✓ y -intercept ✓ shape (3)
8.3.5	$6x^2 - 46x + 80 = 40$ $6x^2 - 46x + 40 = 0$ $3x^2 - 23x + 20 = 0$ $(3x - 20)(x - 1) = 0$ $x = \frac{20}{3}$ or $x = 1$ But x must be an integer, so $x = 1$ at the point where tangent touches f/x moet heelgetal wees so $x = 1$ by punt waar die raaklyn f raak: $y = f(1) = 2(1)^3 - 23(1)^2 + 80(1) - 84 = -25$ $y = mx + c$ $-25 = 40(1) + c$ $-65 = c$ $(0; -65)$	✓ $6x^2 - 46x + 80 = 40$ ✓ factors ✓ $x = 1$ ✓ y -value ✓ $-25 = 40(1) + c$ ✓ answer (6) [27]

QUESTION/VRAAG 9

9.1	$340 = \pi r^2 h$ $\therefore h = \frac{340}{\pi r^2}$	✓ substitution into volume formula ✓ answer (2)
9.2	$A = 2\pi r^2 + 2\pi rh$ $= 2\pi r^2 + 2\pi r \left(\frac{340}{\pi r^2} \right)$ $= 2\pi r^2 + 680r^{-1}$	✓ formula ✓ substitution of h (2)
9.3	$A(r) = 2\pi r^2 + 680r^{-1}$ $A'(r) = 4\pi r - 680r^{-2}$ $4\pi r - 680r^{-2} = 0$ $4\pi r = \frac{680}{r^2}$ $r^3 = \frac{680}{4\pi}$ $r = \sqrt[3]{\frac{680}{4\pi}} \text{ cm or } 3,78 \text{ cm}$	✓ $4\pi r$ ✓ $-680r^{-2}$ ✓ $r^3 = \frac{680}{4\pi}$ ✓ answer (4) [8]

QUESTION/VRAAG 10

10.1.1	160	✓ answer (1)
10.1.2	$P(M) = \frac{60}{160}$ $= \frac{3}{8}$ $= 0,375$	✓ 60 ✓ answer (2)
10.1.3	$P(\text{Male}) \times P(\text{Coffee}) = P(\text{Male and Coffee})$ $P(\text{Manlik}) \times P(\text{Koffie}) = P(\text{Manlik en Koffie})$ $\frac{3}{8} \times \frac{80}{160} = \frac{b}{160}$ $\frac{3}{16} = \frac{b}{160}$ $16b = 480$ $b = 30$	✓ formula ✓ $\frac{80}{160}$ ✓ $\frac{b}{160}$ ✓ answer (4)

10.2.1	$6!$ $= 6 \times 5 \times 4 \times 3 \times 2 \times 1$ $= 720$	$\checkmark 6!$ $\checkmark$ answer (2)
10.2.2	number of ways Xoliswa sits next to Anees/ <i>getal maniere waarop Xoliswa langs Anees sit</i> $= 5! \times 2$ $= 240$ OR/OF Regard Xoliswa and Anees as a single entity/<i>Beskou Xoliswa en Anees as een</i> Number of ways in which 5 passengers can be arranged $= 5!$ <i>Getal maniere waarop 5 passasiers gerangskik kan word</i> $= 5!$ So $5!$ different arrangements for XA and $5!$ different arrangements for AX <i>So 5! verskillende rangskikkings vir XA en 5! verskillende rangskikkings vir AX</i> number of ways Xoliswa sits next to Anees <i>getal maniere waarop Xoliswa langs Anees sit</i> $= 5! \times 2$ $= 240$	$\checkmark 5! \times 2$ $\checkmark$ answer (2) $\checkmark 5! + 5!$ $\checkmark$ answer (2)
10.2.3	number of ways Mary is at an end of the row on the left $= 1 \times 5!$ number of ways Mary is at an end of the row on the right $= 5! \times 1$ total number of arrangements $= 6!$ $P(\text{Mary is at an end of the row}) = \frac{5! \times 1 + 1 \times 5!}{6!}$ $= \frac{1}{3}$ <i>getal maniere waarop Mary aan die einde van die ry links is</i> $= 1 \times 5!$ <i>getal maniere waarop Mary aan die einde van die ry regs is</i> $= 5! \times 1$ totale getal rangskikkings $= 6!$ $P(\text{Mary is aan einde van die ry}) = \frac{5! \times 1 + 1 \times 5!}{6!}$ $= \frac{1}{3}$	$\checkmark$ both LHS and RHS ways $\checkmark 6!$ $\checkmark$ setting up probability $\checkmark$ answer (4) [15]
	TOTAL/TOTAAL:	150