

Soek jy 'n fantastiese tutor?

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basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE/
NASIONALE SENIOR
SERTIFIKAAT**

GRADE 12/GRAAD 12

MATHEMATICS P1/WISKUNDE VI

NOVEMBER 2024

MARKING GUIDELINES/NASIENRIGLYNE

MARKS/PUNTE: 150

**These marking guidelines consist of 17 pages.
*Hierdie nasienriglyne bestaan uit 17 bladsye.***

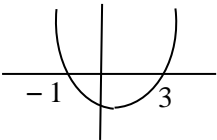
NOTE:

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

LET WEL:

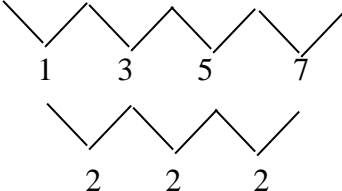
- Indien 'n kandidaat 'n vraag TWEE keer beantwoord, sien slegs die EERSTE poging na.
- Volgehoue akkuraatheid is DEURGAANS op ALLE aspekte van die nasienriglyne van toepassing.

QUESTION 1/VRAAG 1

1.1.1	$x(x - 3) = 0$ $x = 0$ or $x = 3$	✓ $x = 0$ ✓ $x = 3$ (2)
1.1.2	$2x^2 - 4x + 1 = 0$ $x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(2)(1)}}{2(2)}$ $x = 1,71$ or $x = 0,29$ <div style="border: 1px solid black; padding: 5px; display: inline-block;">Answer only: $\frac{4}{4}$</div>	✓ standard form ✓ correct substitution in correct formula ✓ answer ✓ answer (4)
1.1.3	$x^2 - 2x - 3 > 0$ $(x - 3)(x + 1) > 0$ CV: $x = 3$ or $x = -1$  <div style="border: 1px solid black; padding: 5px; display: inline-block;">Answer only: $\frac{3}{4}$</div>	✓ factors ✓ critical values ✓✓ answer (4)
1.1.4	$2^{2x} - 2^{x+2} - 32 = 0$ $2^{2x} - 2^2 \cdot 2^x - 32 = 0$ $(2^x - 8)(2^x + 4) = 0$ $2^x = 8$ or $2^x \neq -4$ $2^x = 2^3$ no solution $x = 3$ <div style="border: 1px solid black; padding: 5px; display: inline-block;">Answer only: $\frac{1}{5}$</div>	✓ use of exponential law ✓ factors ✓ $2^x = 8$ ✓ $2^x \neq -4$ ✓ answer (5)
1.1.5	$\sqrt{-2x + 4} - x = 2$ $\sqrt{-2x + 4} = 2 + x$ $(\sqrt{-2x + 4})^2 = (2 + x)^2$ $-2x + 4 = 4 + 4x + x^2$ $x^2 + 6x = 0$ $x(x + 6) = 0$ $x = 0$ or $x \neq -6$	✓ isolating the root ✓ squaring both sides ✓ standard form ✓ answers with selection (4)

1.2	$y = 3 - 2x \quad \dots (1)$ $y^2 + xy = 2 \quad \dots (2)$ Subs (1) into (2): $(3 - 2x)^2 + (3 - 2x)x = 2$ $4x^2 - 12x + 9 - 2x^2 + 3x - 2 = 0$ $2x^2 - 9x + 7 = 0$ $(2x - 7)(x - 1) = 0$ $x = \frac{7}{2} \quad \text{or} \quad x = 1$ $y = -4 \quad y = 1$ OR/OF $x = \frac{3 - y}{2} \quad \dots (1)$ $y^2 + xy = 2 \quad \dots (2)$ Subs (1) into (2): $y^2 + \left(\frac{3 - y}{2}\right)y = 2$ $2y^2 + 3y - y^2 - 4 = 0$ $y^2 + 3y - 4 = 0$ $(y + 4)(y - 1) = 0$ $y = -4 \quad \text{or} \quad y = 1$ $x = \frac{7}{2} \quad \text{or} \quad x = 1$	✓ eq 1 ✓ substitution ✓ standard form ✓ both x -values ✓ both y -values (5) OR/OF ✓ eq 1 ✓ substitution ✓ standard form ✓ both y -values ✓ both x -values (5)
1.3	$\text{Product} = \frac{3}{2} \times \frac{4}{3} \times \frac{5}{4} \times \dots \times \frac{n}{n-1} \times \frac{n+1}{n} = \frac{n+1}{2}$ The product will be an integer value when $n + 1$ is divisible by 2 i.e. $n \in \{3; 5; 7; \dots\}$ Therefore, n must be an odd number, greater than 2. OR/OF For $n = 2$ the product is $\frac{3}{2}$ For $n = 3$ the product is $\left(\frac{3}{2}\right)\left(\frac{4}{3}\right) = 2$ For $n = 4$ the product is $\left(\frac{3}{2}\right)\left(\frac{4}{3}\right)\left(\frac{5}{4}\right) = \frac{5}{2}$ For $n = 5$ the product is $\left(\frac{3}{2}\right)\left(\frac{4}{3}\right)\left(\frac{5}{4}\right)\left(\frac{6}{5}\right) = 3$ $n \in \{3; 5; 7; \dots\}$ Therefore, n must be an odd number, greater than 2.	✓ $\frac{3}{2} \times \frac{4}{3} \times \frac{5}{4} \times \dots \times \frac{n+1}{n}$ ✓ statement $\left(\frac{n+1}{2}\right)$ ✓ n is odd for $n > 2$ (3) OR/OF ✓ generation of the four products ✓ identifying the pattern when n is odd ✓ n is odd for $n > 2$ (3)
		[27]

QUESTION/VRAAG 2

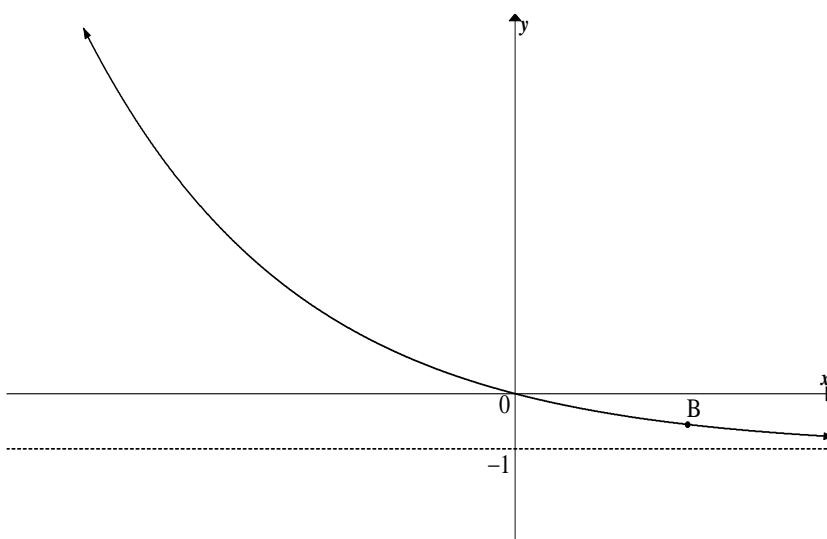
2.1.1	$S_n = \frac{n}{2}[2a + (n-1)d]$ $S_{20} = \frac{20}{2}[2(7) + (20-1)(5)]$ $S_{20} = 1\,090$	✓ substitution ✓ answer (2)
2.1.2	$T_n = 7 + (n-1)(5)$ $T_n = 5n + 2$ $S_{75} - S_{20} = 14\,400 - 1\,090 = 13\,310$ $\sum_{n=1}^{75} (5n+2) - \sum_{n=1}^{20} (5n+2) = 13\,310$ $\therefore \sum_{n=21}^{75} (5n+2) = 13\,310$ <p>OR/OF</p> $T_{21} + T_{22} + T_{23} + \dots + T_{75} = 14\,400 - 1\,090$ $107 + 112 + 117 + \dots = 13\,310$ $T_n = 102 + 5n$ $\therefore \sum_1^{55} (5n+102) = 13\,310$	✓ general term ✓ $S_{75} - S_{20}$ ✓ $\sum_{n=21}^{75} \checkmark = 13\,310$ (4) <p>OR/OF</p> ✓ $S_{75} - S_{20}$ ✓ general term ✓ $\sum_{n=1}^{55} \checkmark = 13\,310$ (4)
2.2.1	$T_n = 2n - 1$ $98^{\text{th}} \text{ first difference} = 2(98) - 1 = 195$ $\text{Quadratic: } T_{98} = 9\,632 - 195 = 9\,437$	✓ answer ✓ method ✓ answer (3)
2.2.2	$28 \quad ; \quad 29 \quad ; \quad 32$  $\begin{array}{ccc} 3a + b = 1 & 9a + 3b + c = 32 & \\ 2a = 2 & 3(1) + b = 1 & T_3 = 1(3)^2 - 2(3) + c = 32 \\ a = 1 & b = -2 & c = 29 \end{array}$ <p>OR/OF</p> $1 - 2 + c = 28$ $c = 29$ $\therefore T_n = n^2 - 2n + 29$	✓ second difference ✓ $a = 1$ ✓ $b = -2$ ✓ method to calculate c ✓ $c = 29$ (5)
		[14]

QUESTION/VRAAG 3

3.1	<p>2nd circle: $\frac{6}{2} = 3 \text{ cm}$</p> <p>3rd circle: $\frac{3}{2} = 1,5 \text{ cm}$</p> <p>OR/OF</p> <p>3rd circle = $6\left(\frac{1}{2}\right)^2 = 1,5$</p>	<p>✓✓ radius 3rd circle (2)</p> <p>OR/OF</p> <p>✓✓ radius 3rd circle (2)</p>
3.2	<p>$36\pi ; 9\pi ; \frac{9}{4}\pi ; \dots$</p> <p>$r = \frac{1}{4} ; a = 36\pi$</p> <p>$S_{10} = \frac{36\pi\left(\left(\frac{1}{4}\right)^{10} - 1\right)}{\frac{1}{4} - 1}$</p> <p>$S_{10} = 150,80$</p>	<p>✓ a</p> <p>✓ r</p> <p>✓ substitution</p> <p>✓ answer (4)</p>
3.3	<p>$6 ; 3 ; \frac{3}{2} \dots$</p> <p>radius = $\frac{1}{2}\left(\frac{3}{128}\right) = \frac{3}{256}$</p> <p>$\frac{3}{256} = 6\left(\frac{1}{2}\right)^{n-1}$</p> <p>$\frac{1}{512} = \left(\frac{1}{2}\right)^{n-1}$</p> <p>$\left(\frac{1}{2}\right)^9 = \left(\frac{1}{2}\right)^{n-1}$ or/of $n-1 = \log_{\left(\frac{1}{2}\right)}\left(\frac{1}{512}\right)$</p> <p>$\therefore n-1 = 9$ $\therefore n-1 = 9$</p> <p>$\therefore n = 10$ $\therefore n = 10$</p>	<p>✓ $\frac{3}{256}$</p> <p>✓ equating to radius general term</p> <p>✓ simplification</p> <p>✓ answer (4)</p>

	<p>OR/OF</p> <p>12 ; 6 ; 3 ; ...</p> <p>diameter = $\frac{3}{128}$</p> <p>$\frac{3}{128} = 12 \left(\frac{1}{2} \right)^{n-1}$</p> <p>$\frac{1}{512} = \left(\frac{1}{2} \right)^{n-1}$</p> <p>$\left(\frac{1}{2} \right)^9 = \left(\frac{1}{2} \right)^{n-1}$ or/of $n-1 = \log_{\left(\frac{1}{2} \right)} \left(\frac{1}{512} \right)$</p> <p>$\therefore n-1 = 9$ $\therefore n-1 = 9$</p> <p>$\therefore n = 10$ $\therefore n = 10$</p>	<p>OR/OF</p> <p>✓ $12 \left(\frac{1}{2} \right)^{n-1}$</p> <p>✓ equating general term of diameter to $\frac{3}{128}$</p> <p>✓ simplification</p> <p>✓ answer (4)</p>
		[10]

QUESTION/VRAAG 4

4.1	$f(x) = a^x - 1$ $-\frac{5}{9} = a^2 - 1$ $a^2 = \frac{4}{9}$ $a = \frac{2}{3}$	✓ substitution ✓ answer (2)
4.2	$y > -1$ OR/OF $y \in (-1; \infty)$	✓ answer (1) ✓ answer (1)
4.3		✓ (0 ; 0) ✓ asymptote ✓ decreasing shape (3)
4.4	$\frac{19}{8} = \left(\frac{2}{3}\right)^x - 1$ $\frac{27}{8} = \left(\frac{2}{3}\right)^x$ $\left(\frac{3}{2}\right)^3 = \left(\frac{3}{2}\right)^{-x}$ $\therefore x = -3$ $\therefore C\left(-3; \frac{19}{8}\right)$ $C'\left(\frac{19}{8}; -3\right)$	✓ substitution ✓ answer ✓ answer (3)
		[9]

QUESTION/VRAAG 5

5.1	$p = -1$	✓ $p = -1$ (1)
5.2	$y = x - 3$ $y = 1 - 3$ $y = -2$ <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-left: 20px;"> Answer only: $\frac{2}{2}$ </div>	✓ substitution ✓ answer (2)
5.3	$1 = \frac{a}{0-1} - 2$ $3 = \frac{a}{-1}$ $a = -3$	✓ substitute (0 ; 1) ✓ answer (2)
5.4	$\frac{-3}{x-1} - 2 = 0$ $-3 = 2x - 2$ $2x = -1$ $\therefore x = -\frac{1}{2}$ $x \in \left[-\frac{1}{2}; 1\right)$ OR/OF $-\frac{1}{2} \leq x < 1$	✓ x -intercept ✓✓ answer (3)
5.5	f is reflected in the y -axis, then translated 2 units to the right OR/OF f is reflected in the x -axis, then translated 4 units down OR/OF f is reflected about the line $x = 1$ OR/OF f is reflected about the line $y = -2$	✓ reflection in y -axis ✓ translation 2 units right (2) OR/OF ✓ reflection in x -axis ✓ translation 4 units down (2) OR/OF ✓✓ reflection about line $x = 1$ (2) OR/OF ✓✓ reflection about line $y = -2$ (2)
		[10]

QUESTION/VRAAG 6

6.1	$x = \frac{-4}{2(-1)} = 2$ OR/OF $f'(x) = -2x + 4 = 0$ $x = 2$ $y = -(2)^2 + 4(2) + 5$ $= 9$ $\therefore B(2; 9)$	✓ method for x ✓ value of x ✓ value for y (3)
6.2	$x^2 - 4x - 5 = 0$ $(x - 5)(x + 1) = 0$ $x = 5$ or $x = -1$ $\therefore A(-1; 0)$ Equation of AC: $\frac{8-0}{3+1} = \frac{y-0}{x+1}$ OR/OF $m = \frac{8-0}{3+1} = 2$ $8x + 8 = 4y$ $y - 0 = 2(x + 1)$ $2x + 2 = y$ $y = 2x + 2$	✓ $A(-1; 0)$ ✓ method for gradient ✓ substitute point A or C into equation of a straight line (3)
6.3	EH $= -x^2 + 4x + 5 - (2x + 2)$ EH $= -x^2 + 2x + 3$ Max EH at: $-2x + 2 = 0$ OR/OF $x = \frac{-b}{2a} = \frac{-(-2)}{2(-1)}$ $x = 1$ $x = 1$ Max length of EH $= -(1)^2 + 2(1) + 3$ $= 4$ <div style="border: 1px solid black; padding: 5px; display: inline-block;">Answer only: $\frac{1}{4}$</div>	✓ difference ✓ EH $= -x^2 + 2x + 3$ ✓ x - value ✓ length (4)
6.4	$k(x) = f(x + m)$ $= -x^2 - 2mx - m^2 + 4x + 4m + 5$ $k'(x) = -2x - 2m + 4$ $k'(x) = 2$ $-2x - 2m + 4 = 2$ $-2x = 2m - 2$ $x = 1 - m$ $k(1 - m) = g(1 - m)$ $-(1 - m)^2 - 2m(1 - m) - m^2 + 4(1 - m) + 4m + 5 = 2(1 - m) + 2$ $-1 + 2m - m^2 - 2m + 2m^2 - m^2 + 4 - 4m + 4m + 5 = 2 - 2m + 2$ $-2m - 4 = 0$ $\therefore m = -2$ <div style="border: 1px solid black; padding: 5px; display: inline-block;">Answer only: $\frac{0}{5}$</div>	✓ $k'(x)$ ✓ $k'(x) = 2$ ✓ $x = 1 - m$ ✓ substitution ✓ answer (5)

	<p>OR/OF</p> $k(x) = f(x + m) = g(x)$ $-x^2 - 2mx - m^2 + 4x + 4m + 5 = 2x + 2$ $0 = x^2 + (2m - 2)x + m^2 - 4m - 3$ $\Delta = (2m - 2)^2 - 4(1)(m^2 - 4m - 3)$ $\Delta = 4m^2 - 8m + 4 - 4m^2 + 16m + 12$ $\Delta = 8m + 16 = 0$ $\therefore m = -2$ <p>OR/OF</p> $f(x) = -x^2 + 4x + 5$ $f'(x) = -2x + 4 = 2$ $-2x = -2$ $x = 1$ $f(1) = -(1)^2 + 4(1) + 5$ $\therefore y = 8$ $\therefore \text{translate 2 units to the right}$ $\therefore m = -2$	<p>OR/OF</p> <p>✓ equating ✓ simplification</p> <p>✓ substitution into Δ</p> <p>✓ $\Delta = 0$ ✓ answer</p> <p>(5)</p> <p>OR/OF</p> <p>✓ $f'(x) = 2$</p> <p>✓ x-value</p> <p>✓ y-value ✓ 2 units to the right ✓ answer</p> <p>(5)</p>
		[15]

QUESTION/VRAAG 7

7.1	$A = P(1+i)^n$ $A = 5\,000 \left(1 + \frac{6,8}{400}\right)^{64}$ $= R\,14\,706,56$	✓ i, n ✓ substitution into correct formula ✓ answer (3)
7.2	$A = P(1-in)$ $\frac{1}{2}P = P(1-4i)$ $\frac{1}{2} = (1-4i)$ $i = \frac{1}{8}$ $\therefore r = 12,5\%$ OR/OF $r = \frac{50\%}{4}$ $r = 12,5\%$	✓ substitution into correct formula ✓ answer (2) OR/OF ✓ method ✓ answer (2)
7.3.1	Already paid: $2\,300,98 \times 60 = R\,138\,058,80$ Interest: $138\,058,80 - 100\,000 = R\,38\,058,80$	✓ amount already paid ✓ interest (2)

7.3.2	<p>Balance after 2 years:</p> $P = \frac{x[1 - (1+i)^{-n}]}{i}$ $P = \frac{2\,300,98 \left[1 - \left(1 + \frac{13,5}{1200} \right)^{-36} \right]}{\frac{13,5}{1200}}$ $= R\,67\,804,94$ $R\,67\,804,94 - R20\,000 = R\,47\,804,94$ $P = \frac{x[1 - (1+i)^{-n}]}{i}$ $47\,804,94 = \frac{2\,300,98 \left[1 - \left(1 + \frac{13,5}{1200} \right)^{-n} \right]}{\frac{13,5}{1200}}$ $0,766 = (1,01125)^{-n}$ $\log_{1,01125} 0,766 = -n$ $n = 23,83$ $\therefore 12 \text{ months earlier}$ <p>OR/OF</p> $A = 100\,000 \left(1 + \frac{13,5}{1200} \right)^{12 \times 2}$ $= R130\,799,12$ $F = \frac{2\,300,98 \left[\left(1 + \frac{13,5}{1200} \right)^{12 \times 2} - 1 \right]}{\frac{13,5}{1200}}$ $= R\,62\,993,92$ $\text{Balance outstanding} = A - F = 130\,799,12 - 62\,993,92$ $= R67\,805,20$ $R\,67\,805,20 - R20\,000 = R\,47\,805,20$ $P = \frac{x[1 - (1+i)^{-n}]}{i}$ $47\,805,20 = \frac{2\,300,98 \left[1 - \left(1 + \frac{13,5}{1200} \right)^{-n} \right]}{\frac{13,5}{1200}}$ $0,766... = (1,01125)^{-n}$ $\log_{1,01125} 0,766... = -n$ $n = 23,80$ $\therefore 12 \text{ months' earlier}$	<p>✓ $n = 36$ ✓ i ✓ substitution into correct formula</p> <p>✓ answer ✓ answer</p> <p>✓ substitution into correct formula</p> <p>✓ answer in months (7)</p> <p>OR/OF</p> <p>✓ $n = 24$ ✓ i</p> <p>✓ substitution into both correct formulae</p> <p>✓ answer</p> <p>✓ answer</p> <p>✓ substitution into correct formula</p> <p>✓ answer in months (7)</p>
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	<p>OR/OF</p> $100\,000 = \frac{2\,300,98 \left[1 - \left(1 + \frac{13,5}{1200} \right)^{-n} \right]}{\frac{13,5}{1200}} + 20\,000 \left(1 + \frac{13,5}{1200} \right)^{-24}$ $84\,709,38 = \frac{2\,300,98 \left[1 - \left(\frac{809}{800} \right)^{-n} \right]}{\frac{0,135}{12}}$ $0,4142 = 1 - \left(\frac{809}{800} \right)^{-n}$ $\left(\frac{809}{800} \right)^{-n} = 0,5858$ $-n = \log_{\left(\frac{809}{800} \right)} 0,5858$ $n = 47,80 \text{ months after starting payments}$ $\therefore 12 \text{ months earlier}$	<p>OR/OF</p> <ul style="list-style-type: none"> ✓ i ✓ $n = 24$ ✓ $= 100\,000$ ✓ substitution into correct P formula ✓ substitution into correct A formula ✓ simplification ✓ answer in months (7)
		[14]

QUESTION/VRAAG 8

8.1.1	$\frac{d}{dx}[3x - 5x^2]$ $= 3 - 10x$	$\checkmark 3$ $\checkmark -10x$ (2)
8.1.2	$g(x) = \frac{2}{x^2} - \sqrt[3]{x^7}$ $g(x) = 2x^{-2} - x^{\frac{7}{3}}$ $g'(x) = -4x^{-3} - \frac{7}{3}x^{\frac{4}{3}}$	$\checkmark 2x^{-2}$ $\checkmark -x^{\frac{7}{3}}$ $\checkmark -4x^{-3}$ $\checkmark -\frac{7}{3}x^{\frac{4}{3}}$ (4)
8.2	$f(x) = x^3 - 4x^2 + 2x + 3$ $f'(x) = 3x^2 - 8x + 2$ $m = f'(2) = 3(2)^2 - 8(2) + 2$ $m = -2$ $y = f(2) = (2)^3 - 4(2)^2 + 2(2) + 3$ $y = -1$ $y + 1 = -2(x - 2)$ $y = -2x + 3$	$\checkmark m = -2$ $\checkmark y = -1$ \checkmark answer (3)
8.3.1	$f(x) = -6x^2$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{-6(x+h)^2 + 6x^2}{h}$ $= \lim_{h \rightarrow 0} \frac{-6x^2 - 12xh - 6h^2 + 6x^2}{h}$ $= \lim_{h \rightarrow 0} \frac{-12xh - 6h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(-12x - 6h)}{h}$ $= \lim_{h \rightarrow 0} (-12x - 6h)$ $= -12x$	\checkmark substitution $\checkmark f(x+h) = -6x^2 - 12xh - 6h^2$ \checkmark simplification \checkmark common factor \checkmark answer (5)

	<p>OR/OF</p> $f(x) = -6x^2$ $f(x+h) = -6x^2 - 12xh - 6h^2$ $f(x+h) - f(x) = -6x^2 - 12xh - 6h^2 + 6x^2 = -12xh - 6h^2$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{-12xh - 6h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(-12x - 6h)}{h}$ $= \lim_{h \rightarrow 0} (-12x - 6h)$ $= -12x$	<p>OR/OF</p> $\checkmark f(x+h) = -6x^2 - 12xh - 6h^2$ $\checkmark \text{simplification}$ $\checkmark \text{substitution}$ $\checkmark \text{common factor}$ $\checkmark \text{answer}$ <p>(5)</p>
8.3.2	$x \geq 0$ <p>OR/OF</p> $x \leq 0$	$\checkmark \text{answer}$ <p>(1)</p> $\checkmark \text{answer}$ <p>(1)</p>
8.3.3	$y = -6x^2$ $x = -6y^2$ $y^2 = \frac{-1}{6}x$ $y = \pm \sqrt{-\frac{1}{6}x}$ $\therefore y = -\sqrt{-\frac{1}{6}x} \quad ; \quad x \leq 0$	$\checkmark \text{swopping } x \text{ and } y$ $\checkmark y = \pm \sqrt{-\frac{1}{6}x}$ $\checkmark \text{answer}$ <p>(3)</p>
		[18]

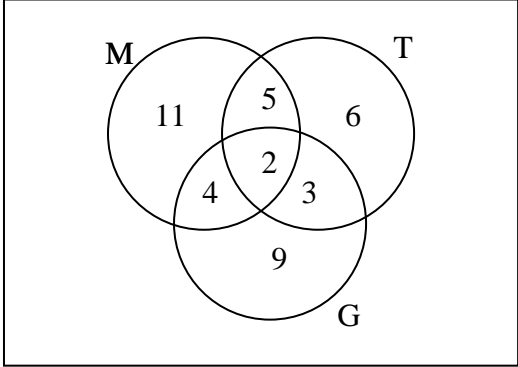
QUESTION/VRAAG 9

9.1	$1 < x < \frac{5}{2}$	✓✓ answer (2)
9.2	$(1; 0)$ and $\left(\frac{5}{2}; 0\right)$	✓ $x = 1$ ✓ $x = \frac{5}{2}$ (2)
9.3	$\frac{\frac{5}{2} + 1}{2}$ $= \frac{7}{4}$ Concave up for $x > \frac{7}{4}$	✓ method ✓ answer (2)
9.4	$-9 < k < -8$	✓✓ answer (2)
		[8]

QUESTION/VRAAG 10

10.1	$-6t + 18 = 0$ $18 = 6t$ $3 = t$ $s'(3) = -3(3)^2 + 18(3) = 27$	✓ $= 0$ ✓ value of t ✓ answer (3)
10.2	$-3t^2 + 18t = 0$ $-3t(t - 6) = 0$ $t = 0$ or $t = 6$ $s(t) = at^3 + bt^2$ $s'(t) = 3at^2 + 2bt$ $3a = -3$ and $2b = 18$ $a = -1$ $b = 9$ $s(t) = -1t^3 + 9t^2$ $s(6) = -(6)^3 + 9(6)^2$ $s(6) = 108$	✓ factors ✓ values ✓ a and b ✓ substitution ✓ answer (5)
		[8]

QUESTION/VRAAG 11

11.1		✓2 ✓3 ; 4 ; 5 ✓6 ; 9 ; 11 (3)
11.2	$P(\text{at least two subjects}) = \frac{4 + 2 + 5 + 3}{40} = \frac{14}{40} = \frac{7}{20} = 0,35$	✓ (4 + 2 + 5 + 3) or 14 in numerator ✓ 40 in denominator (2)
11.3	$P(M) \times P(T) = \frac{22}{40} \times \frac{16}{40} = \frac{11}{50} = 0,22$ $P(M \text{ and } T) = \frac{7}{40} = 0,175$ $P(M) \times P(T) \neq P(M \text{ and } T)$ Events M and T are not independent	✓ $\frac{22}{40} \times \frac{16}{40}$ ✓ $\frac{11}{50}$ ✓ $\frac{7}{40}$ ✓ answer (4)
		[9]

QUESTION/VRAAG 12

12.1	$26 \times 10 \times 26 \times 10 = 67\,600$	✓ for correct letters ✓ for correct digits (2)
12.2	$18 \times 9 \times 19 \times 5 = 15\,390$	Given that its multiplication ✓ 18 ✓ 19 ✓ 9 ✓ 5 (4)
12.3	$24 \times 9 \times 25 \times 5 = 27\,000$ $\frac{27\,000 - 15\,390}{15\,390} \times 100 = 75,44\%$	✓ $24 \times 9 \times 25 \times 5$ ✓ answer (2)
		[8]

TOTAL/TOTAAL: 150