



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE/
NASIONALE SENIOR
SERTIFIKAAT**

GRADE 12/GRAAD 12

MATHEMATICS P1/WISKUNDE V1

NOVEMBER 2025

MARKING GUIDELINES/NASIENRIGLYNE

MARKS/PUNTE: 150

**These marking guidelines consist of 21 pages.
Hierdie nasienriglyne bestaan uit 21 bladsye.**



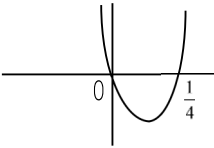
NOTE:

- 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	$(x+5)(x-2) = 0$ $x = -5$ or $x = 2$	✓ $x = -5$ ✓ $x = 2$ (2)
1.1.2	$5x^2 + 2 = -9x$ $5x^2 + 9x + 2 = 0$ $x = \frac{-9 \pm \sqrt{(9^2) - 4(5)(2)}}{2(5)}$ $x = \frac{-9 \pm \sqrt{41}}{10}$ $x = -0,26$ or $x = -1,54$	✓ standard form ✓ substitution into the correct formula ✓ answer ✓ answer (4)
1.1.3	$8x^2 > 2x$ $8x^2 - 2x > 0$ $2x(4x-1) > 0$ CV: 0 ; $\frac{1}{4}$  $x < 0$ or $x > \frac{1}{4}$	✓ standard form ✓ critical values/factors ✓✓ answer (4)
1.1.4	$2 \cdot 2^{2x} - 9 \cdot 2^x + 4 = 0$ $(2 \cdot 2^x - 1)(2^x - 4) = 0$ $2^x = \frac{1}{2}$ or $2^x = 4$ $2^x = 2^{-1}$ or $2^x = 2^2$ $x = -1$ or $x = 2$	✓ factors ✓ both equations ✓ answer ✓ answer (4)



	<p>OR/OF</p> $2 \cdot 2^{2x} - 9 \cdot 2^x + 4 = 0$ <p>Let $k = 2^x$</p> $2k^2 - 9k + 4 = 0$ $(2k - 1)(k - 4) = 0$ $k = \frac{1}{2} \text{ or } k = 4$ $\therefore 2^x = \frac{1}{2} \text{ or } 2^x = 4$ $\therefore x = -1 \text{ or } x = 2$	<p>OR/OF</p> <p>✓ factors</p> <p>✓ both equations</p> <p>✓ answer</p> <p>✓ answer</p> <p>(4)</p>
1.1.5	$\sqrt{\sqrt{\frac{1}{x} + 2}} = \frac{1}{\sqrt{x}}$ $\left(\sqrt{\sqrt{\frac{1}{x} + 2}}\right)^2 = \left(\frac{1}{\sqrt{x}}\right)^2$ $\sqrt{\frac{1}{x} + 2} = \frac{1}{x}$ $\frac{1}{\sqrt{x}} = \frac{1}{x} - 2$ $\left(\frac{1}{\sqrt{x}}\right)^2 = \left(\frac{1}{x} - 2\right)^2$ $\frac{1}{x} = \frac{1}{x^2} - \frac{4}{x} + 4$ $\frac{1}{x^2} - \frac{5}{x} + 4 = 0$ $4x^2 - 5x + 1 = 0$ $(4x - 1)(x - 1) = 0$ $x = \frac{1}{4} \text{ or } x \neq 1$ <p>OR/OF</p>	<p>✓ squaring both sides</p> <p>✓ isolation of surd</p> <p>✓ squaring both sides only after isolation of surd</p> <p>✓ standard form</p> <p>✓ answer with selection</p> <p>(5)</p> <p>OR/OF</p>



1.1.5	$\sqrt{\sqrt{\frac{1}{x} + 2}} = \frac{1}{\sqrt{x}}$ <p>Let $\frac{1}{\sqrt{x}} = k$</p> $\sqrt{k+2} = k$ $k+2 = k^2$ $k^2 - k - 2 = 0$ $(k-2)(k+1) = 0$ $\therefore k = 2 \quad \text{or} \quad k = -1$ $\frac{1}{\sqrt{x}} = 2 \quad \text{or} \quad \frac{1}{\sqrt{x}} \neq -1$ $2\sqrt{x} = 1$ $4x = 1$ $\therefore x = \frac{1}{4}$	<ul style="list-style-type: none"> ✓ equation ✓ squaring both sides ✓ standard form ✓ substitution ✓ answer with selection <p style="text-align: right;">(5)</p>
1.2	$x = y + 2 \quad \dots(1)$ $5xy = x^2 + 6 \quad \dots(2)$ $5(y+2)y = (y+2)^2 + 6$ $5y^2 + 10y = y^2 + 4y + 4 + 6$ $4y^2 + 6y - 10 = 0$ $2y^2 + 3y - 5 = 0$ $(2y+5)(y-1) = 0$ $y = -\frac{5}{2} \quad \text{or} \quad y = 1$ $x = -\frac{1}{2} \quad \text{or} \quad x = 3$ <p>OR/OF</p> $y = x - 2 \quad \dots(1)$ $5xy - 6 = x^2 \quad \dots(2)$ $5x(x-2) - 6 = x^2$ $5x^2 - 10x - 6 = x^2$ $4x^2 - 10x - 6 = 0$ $2x^2 - 5x - 3 = 0$ $(2x+1)(x-3) = 0$ $x = -\frac{1}{2} \quad \text{or} \quad x = 3$ $y = -\frac{5}{2} \quad \text{or} \quad y = 1$	<ul style="list-style-type: none"> ✓ $x = y + 2$ ✓ $5xy = x^2 + 6$ ✓ substitution ✓ standard form ✓ y-values ✓ x-values <p style="text-align: right;">(6)</p> <p>OR/OF</p> <ul style="list-style-type: none"> ✓ $y = x - 2$ ✓ $5xy - 6 = x^2$ ✓ substitution ✓ standard form ✓ x-values ✓ y-values <p style="text-align: right;">(6)</p>

QUESTION/VRAAG 2

2.1.1	$(10+t) + (t-2) + (t+4)$ $\frac{t-2}{t+10} = \frac{t+4}{t-2}$ $(t-2)^2 = (t+4)(t+10)$ $t^2 - 4t + 4 = t^2 + 14t + 40$ $-18t = 36$ $\therefore t = -2$	✓ equating the ratios ✓ cross multiplication ✓ expansion (3)
2.1.2	$8; -4; \dots$ $r = \frac{-4}{8} = -\frac{1}{2}$ $T_{25} = 8 \left(-\frac{1}{2}\right)^{24}$ $T_{25} = \left(\frac{1}{2}\right)^{21} \text{ or } T_{25} = (2)^{-21} \text{ or } T_{25} = (8)^{-7} \text{ or}$ $T_{25} = (128)^{-3} \text{ or } T_{25} = (2\ 097\ 152)^{-1}$	✓ 8 and -4 ✓ r ✓ answer in exponential form (3)
2.1.3	$S_{\infty} = \frac{a}{1-r}$ $S_{\infty} = \frac{8}{1 - \left(-\frac{1}{2}\right)}$ $S_{\infty} = \frac{16}{3} = 5,33$	✓ substitution ✓ answer (2)
2.2.1	$T_{14} - T_6$ $= 4 \times 8$ $= 32$ <p>OR/OF</p> $T_{14} - T_6$ $= (4(14) - 1) - (4(6) - 1)$ $= 55 - 23$ $= 32$ <p>OR/OF</p> $T_{14} - T_6$ $= (4(k+13) - 1) - (4(k+5) - 1)$ $= 4k + 51 - (4k + 19)$ $= 32$	✓✓ answer (2) OR/OF ✓ subs ✓ answer (2) OR/OF ✓ subs ✓ answer (2)



<p>2.2.2</p>	$n = 118 - k$ $T_{117} = 467$ $S_{118-k} = \frac{118-k}{2} [4k - 1 + 467]$ $26\ 675 = (118 - k)[2k + 233]$ $26\ 675 = 236k + 27494 - 2k^2 - 233k$ $2k^2 - 3k - 819 = 0$ $(k - 21)(2k + 39) = 0$ $\therefore k = 21 \text{ or } k \neq -\frac{39}{2}$ <p>OR/OF</p> $n = 118 - k$ $S_{118-k} = \frac{118-k}{2} [2(4k - 1) + (118 - k - 1)(4)]$ $26\ 675 = \frac{118-k}{2} [8k - 2 + 468 - 4k]$ $53\ 350 = (118 - k)[4k + 466]$ $53\ 350 = 472k + 54\ 988 - 4k^2 - 466k$ $4k^2 - 6k - 1638 = 0$ $2k^2 - 3k - 819 = 0$ $(k - 21)(2k + 39) = 0$ $\therefore k = 21 \text{ or } k \neq -\frac{39}{2}$ <p>OR/OF</p> $T_1 = 3 \quad T_2 = 7$ $S_{117} - S_{k-1} = 26\ 675$ $S_{117} = \frac{n}{2} [2a + (n-1)d]$ $= \frac{117}{2} [2(3) + (116)4]$ $= 27\ 495$ $\therefore S_{k-1} = 27\ 495 - 26\ 675 = 820$ $820 = \frac{n}{2} [2(3) + 4n - 4]$ $0 = 2n^2 + n - 820$ $(2n + 41)(n - 20) = 0$ $\therefore n = 20$ $\therefore k - 1 = 20$ $k = 21$	<p>✓ number of terms</p> <p>✓ last term</p> <p>✓ substitution</p> <p>✓ standard form</p> <p>✓ answer with selection (5)</p> <p>OR/OF</p> <p>✓ number of terms</p> <p>✓ substitution</p> <p>✓ simplification</p> <p>✓ standard form</p> <p>✓ answer with selection (5)</p> <p>✓ 27 495</p> <p>✓ difference</p> <p>✓ substitution</p> <p>✓ standard form</p> <p>✓ answer with selection (5)</p> <p>[15]</p>
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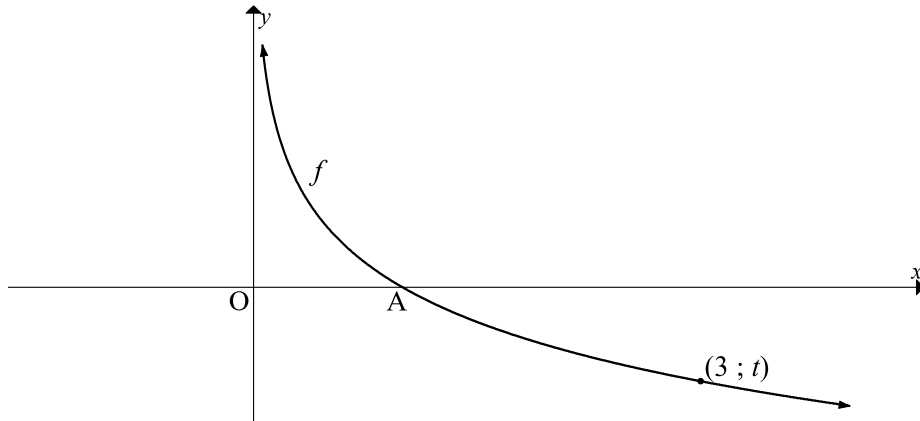


QUESTION/VRAAG 3

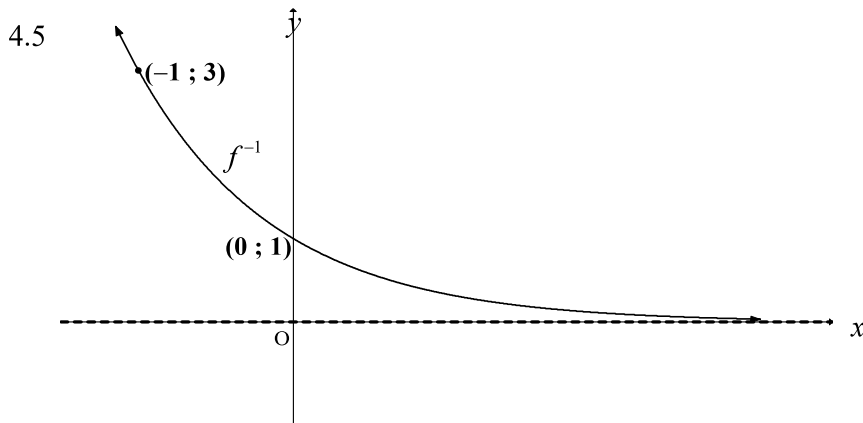
3.1	$ \begin{array}{cccc} 36 & ; & 71 & ; & 104 & ; & 135 & ; & 164 \\ & \swarrow & \searrow & & \swarrow & \searrow & & \swarrow & \searrow \\ & 35 & & 33 & & 31 & & 29 & \\ & & \swarrow & \searrow & & \swarrow & \searrow & & \\ & & & -2 & & & & & \end{array} $ $T_5 = 164$	<p>✓ first differences</p> <p>✓ answer (2)</p>
3.2	$2a = -2$ $a = -1$ $3(-1) + b = 35$ $b = 38$ $-1 + 38 + c = 36$ $c = -1$ $T_n = -n^2 + 38n - 1$	<p>✓ $2a = -2$</p> <p>✓ $3(-1) + b = 35$</p> <p>✓ $-1 + 38 + c = 36$</p> <p>(3)</p>
3.3	$n = \frac{-38}{2(-1)} = 19$ $T_{19} = -(19)^2 + 38(19) - 1 = 360$ OR/OF $T'_n = -2n + 38 = 0$ $\therefore n = 19$ $T_{19} = -(19)^2 + 38(19) - 1 = 360$	<p>✓ method</p> <p>✓ n</p> <p>✓ answer (3)</p> <p>OR/OF</p> <p>✓ method</p> <p>✓ n</p> <p>✓ answer (3)</p>
3.4	$\frac{n+3}{2} = 19$ $n+3 = 38$ $n = 35$ OR/OF $-n^2 + 38n - 1 = 104$ $n^2 - 38n + 105 = 0$ $(n-35)(n-3) = 0$ $n = 35$	<p>✓ method</p> <p>✓ answer (2)</p> <p>✓ method</p> <p>✓ answer (2)</p>
		[10]



QUESTION/VRAAG 4



4.1	$t = \log_{\frac{1}{3}} 3$ $t = -1$	✓ answer (1)
4.2	A(1; 0)	✓ answer (1)
4.3	$f(x) = \log_{\frac{1}{3}} x$ $y = \log_{\frac{1}{3}} x$ $x = \log_{\frac{1}{3}} y$ $y = \left(\frac{1}{3}\right)^x = 3^{-x}$	✓ swopping ✓ answer (2)
4.4	$y = 0$	✓ answer (1)

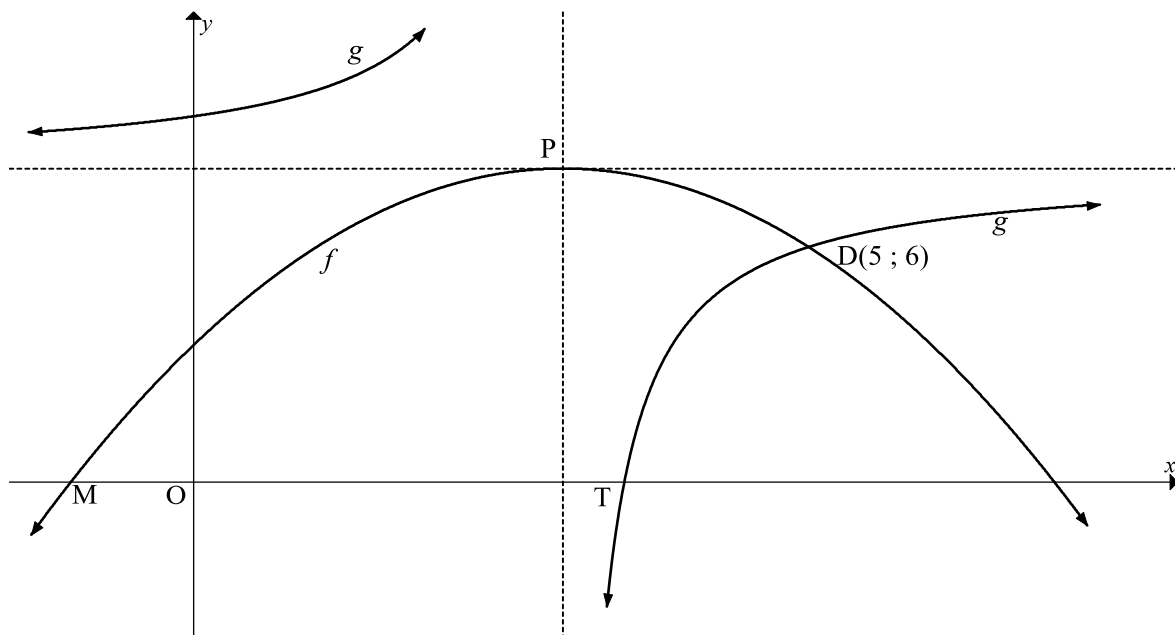


- ✓ decreasing exponential shape with asymptote $y = 0$
- ✓ y-intercept (0 ; 1)
- ✓ any point

4.6	$(4 ; 3)$ is a point on h $0 < y < 3$ or $y \in (0 ; 3)$	✓✓ answer (2)
SA EXAM PAPERS		[10]



QUESTION/VRAAG 5



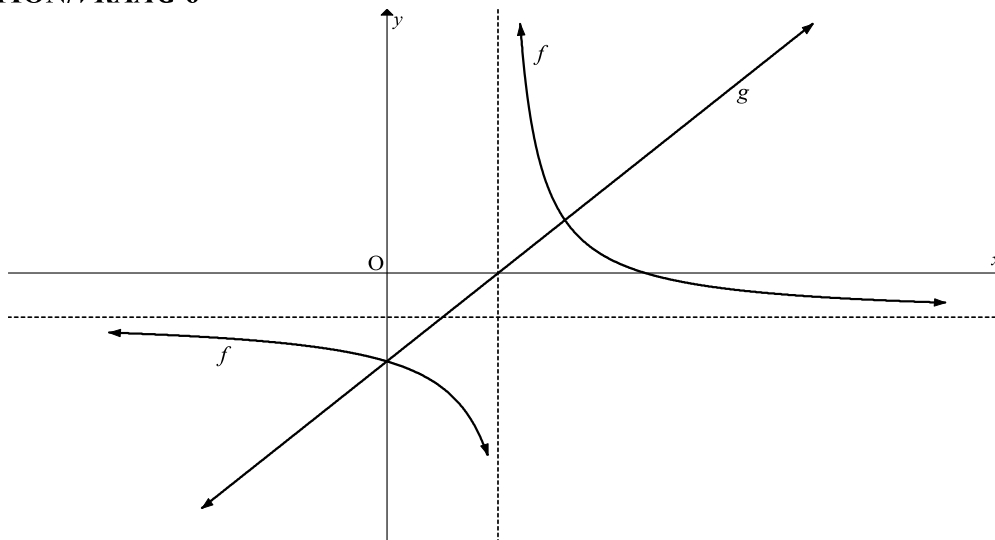
5.1	$x \in R, x \neq 3$	✓ answer (1)
5.2	$y \leq 8$	✓ answer (1)
5.3.1	$3 < x \leq 5$ OR/OF $x \in (3; 5]$	✓✓ answer (2)
5.3.2	$x < 1$ or $x > 5$ OR/OF $x \in (-\infty; 1)$ or $x \in (5; \infty)$	✓ $x < 1$ ✓ $x > 5$ (2)
5.4	$y = a(x-3)^2 + 8$ $6 = a(5-3)^2 + 8$ $-2 = 4a$ $\therefore a = -\frac{1}{2}$ $y = -\frac{1}{2}(x-3)^2 + 8$ $y = -\frac{1}{2}(x^2 - 6x + 9) + 8$ $y = -\frac{1}{2}x^2 + 3x + \frac{7}{2}$	✓ p and q values ✓ substitution (5 ; 6) ✓ simplification (3)



5.5	$y = -\frac{1}{2}x^2 + 3x + \frac{7}{2}$ $x^2 - 6x - 7 = 0$ $(x - 7)(x + 1) = 0$ $x = 7 \quad \text{or} \quad x = -1$ $M(-1; 0)$ $0 = \frac{-4}{x-3} + 8$ $-8x + 24 = -4$ $x = \frac{7}{2}$ $T\left(\frac{7}{2}; 0\right)$ $MT = \frac{7}{2} + 1 = \frac{9}{2} = 4,5$	<p>✓ solve for x</p> <p>✓ x-values</p> <p>✓ coordinates of M</p> <p>✓ solve for x</p> <p>✓ x-value</p> <p>✓ MT</p> <p style="text-align: right;">(6)</p>
5.6	$f(x) = -\frac{1}{2}x^2 + 3x + \frac{7}{2}$ $f'(x) = -x + 3$ $m = f'(5)$ $= -5 + 3$ $= -2$ $6 = -2(5) + c$ $c = 16$ $\therefore y = -2x + 16$	<p>✓ $f'(x) = -x + 3$</p> <p>✓ $m = f'(5)$</p> <p>✓ answer</p> <p style="text-align: right;">(3)</p>
[18]		



QUESTION/VRAAG 6



6.1	$(-p ; 0)$	$\checkmark (-p ; 0)$	(1)
6.2	$g(x) = x + c$ $q = 1 + c$ $f(x) = \frac{a}{x+c} + 1 + c$	$\checkmark q = 1 + c$ $\checkmark f(x) = \frac{a}{x+c} + 1 + c$	
	Point $(0 ; c)$ $c = \frac{a}{0+c} + 1 + c$ $-1 = \frac{a}{c}$ $a = -c$		
	Point $(3 ; 3 + c)$ $3 + c = \frac{a}{3+c} + 1 + c$	$\checkmark 3 + c = \frac{a}{3+c} + 1 + c$	
	$3 + c = \frac{-c}{3+c} + 1 + c$ $9 + 6c + c^2 = -c + 3 + 4c + c^2$ $3c = -6$ $c = -2$ $a = 2$ $q = -1$	$\checkmark a = 2$ $\checkmark q = -1$	
	$f(x) = \frac{2}{x-2} - 1$		(5)

OR/OF

OR/OF



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Proudly South African

QUESTION/VRAAG 7

7.1	$A = P(1+i)^n$ $A = 40\,000(1+7,8\%)^5$ $A = R58\,230,94$	<ul style="list-style-type: none"> ✓ substitution into correct formula ✓ answer <p style="text-align: right;">(2)</p>
7.2	$F = \frac{x[(1+i)^n - 1]}{i}$ $F = \frac{2\,300 \left[\left(1 + \frac{0,058}{4}\right)^{24} - 1 \right]}{\frac{0,058}{4}} \times \left(1 + \frac{0,058}{4}\right)$ $F = R66\,411,60$ <p>OR/OF</p> $F = \frac{2\,300 \left[\left(1 + \frac{0,058}{4}\right)^{25} - 1 \right]}{\frac{0,058}{4}} - 2300$ $F = R66\,411,60$	<ul style="list-style-type: none"> ✓ i ✓ substitution into correct formula ✓ future value $\times (1+i)^1$ ✓ answer <p style="text-align: right;">(4)</p> <p>OR/OF</p> <ul style="list-style-type: none"> ✓ i ✓ substitution into correct formula ✓ -2300 ✓ answer <p style="text-align: right;">(4)</p>
7.3.1	$A = P(1+i)^n$ $A = 900\,000 \left(1 + \frac{0,068}{12}\right)^3$ $= R915\,386,86$ $P = \frac{x[1 - (1+i)^{-n}]}{i}$ $915\,386,86 = \frac{10\,000 \left[1 - \left(1 + \frac{0,068}{12}\right)^{-n} \right]}{\frac{0,068}{12}}$ $\left(1 + \frac{0,068}{12}\right)^{-n} = 0,4812\dots$ $-n = \log_{1,005\dots} 0,4812\dots$ $n = 129,419\dots \text{ months}$ $\therefore 132,419 \text{ months since loan was granted}$ $\therefore 133 \text{ months since loan was granted}$	<ul style="list-style-type: none"> ✓ answer ✓ substitution into correct formula ✓ correct use of logs ✓ answer of n ✓ final answer <p style="text-align: right;">(5)</p>



7.3.2	$P = \frac{10\,000 \left[1 - \left(1 + \frac{0,068}{12} \right)^{-0,419\dots} \right]}{\frac{0,068}{12}}$ $= R4\,173,55\dots$ $\text{Final payment} = 4\,173,55\dots \left(1 + \frac{0,068}{12} \right)^1 = R4\,197,21$ <p>OR/OF</p> $A = 915\,386,86 \left(1 + \frac{0,068}{12} \right)^{129}$ $= R1\,897\,482,712$ $F = \frac{10\,000 \left[\left(1 + \frac{0,068}{12} \right)^{129} - 1 \right]}{\frac{0,068}{12}}$ $= R1\,893\,309,16$ $\text{Balance after 129 months} = R4\,173,552$ $\text{Final payment} = 4\,173,552 \left(1 + \frac{0,068}{12} \right)^1 = R4\,197,21$	✓ substitution ✓ n ✓ balance ✓ final payment (4) OR/OF ✓ answer ✓ answer ✓ balance ✓ final payment (4)
		[15]

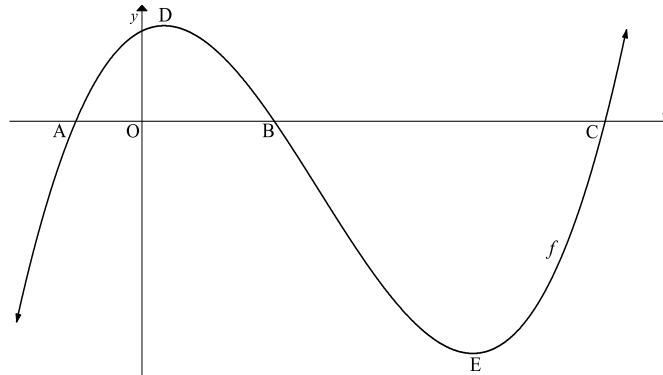


QUESTION/VRAAG 8

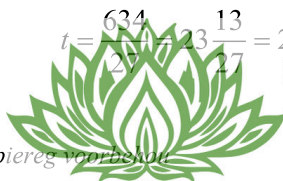
8.1	$f(x) = -2x + 3$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{-2(x+h) + 3 - (-2x + 3)}{h}$ $= \lim_{h \rightarrow 0} \frac{-2h}{h}$ $= \lim_{h \rightarrow 0} (-2)$ $= -2$ <p>OR/OF</p> $f(x) = -2x + 3$ $f(x+h) = -2(x+h) + 3$ $f(x+h) - f(x) = -2x - 2h + 3 + 2x - 3 = -2h$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{-2h}{h}$ $= \lim_{h \rightarrow 0} (-2)$ $= -2$	<p>✓ $f(x+h)$</p> <p>✓ substitution</p> <p>✓ simplification</p> <p>✓ answer</p> <p>(4)</p> <p>OR/OF</p> <p>✓ $f(x+h)$</p> <p>✓ simplification</p> <p>✓ substitution</p> <p>✓ answer</p> <p>(4)</p>
8.2.1	$g(x) = -3x^4 + 2x$ $g'(x) = -12x^3 + 2$	<p>✓ $-12x^3$</p> <p>✓ 2</p> <p>(2)</p>
8.2.2	$y = \frac{2x^4 + 1}{x^2}$ $y = 2x^2 + x^{-2}$ $\frac{dy}{dx} = 4x - 2x^{-3}$	<p>✓ $2x^2$</p> <p>✓ x^{-2}</p> <p>✓ derivative first term</p> <p>✓ derivative second term</p> <p>(4)</p>
[10]		



QUESTION/VRAAG 9



9.1	$f(x) = x^3 - 8x^2 + 5x + 14$ $f'(x) = 3x^2 - 16x + 5 = 0$ $(3x - 1)(x - 5) = 0$ $x = \frac{1}{3}$ or $x = 5$ $E(5; -36)$	<ul style="list-style-type: none"> ✓ $f'(x)$ ✓ $f'(x) = 0$ ✓ x-value ✓ y-value 	(4)
9.2	$f''(x) = 6x - 16 < 0$ $x < \frac{8}{3}$ OR/OF $x = \frac{\frac{1}{3} + 5}{2} = \frac{8}{3}$ $x < \frac{8}{3}$	<ul style="list-style-type: none"> ✓ $f''(x)$ ✓ $f''(x) < 0$ ✓ answer OR/OF ✓ midpoint of TPs ✓ $f''(x) < 0$ ✓ answer 	(3)
9.3	x -intercepts of f : $(-1; 0)$ and $(7; 0)$ $-1 < x < 2$ or $\frac{8}{3} < x < 7$	<ul style="list-style-type: none"> ✓✓ x-intercepts ✓ first interval ✓ second interval 	(4)
9.4	$3x^2 - 16x + 5 = -11$ $3x^2 - 16x + 16 = 0$ $(x - 4)(3x - 4) = 0$ $x = 4$ or $x = \frac{4}{3}$ At $x = 4$: $(4)^3 - 8(4)^2 + 5(4) + 14 = -11(4) + t$ $t = 14$ At $x = \frac{4}{3}$: $\left(\frac{4}{3}\right)^3 - 8\left(\frac{4}{3}\right)^2 + 5\left(\frac{4}{3}\right) + 14 = -11\left(\frac{4}{3}\right) + t$ $t = \frac{634}{27} = 23\frac{13}{27} = 23,48$	<ul style="list-style-type: none"> ✓ equating ✓ x-values ✓ answer ✓ answer 	



$$\therefore 14 < t < \frac{634}{27}$$

✓✓ answer

(6)

OR/OF

$$x^3 - 8x^2 + 5x + 14 = -11x + t$$

$$x^3 - 8x^2 + 5x + 14 + 11x = t$$

$$x^3 - 8x^2 + 16x + 14 = t$$

$$3x^2 - 16x + 16 = 0$$

$$(x - 4)(3x - 4) = 0$$

$$x = 4 \quad \text{or} \quad x = \frac{4}{3}$$

✓ x-values

$$\text{At } x = 4: \quad (4)^3 - 8(4)^2 + 5(4) + 14 = -11(4) + t$$

$$t = 14$$

✓ answer

$$\text{At } x = \frac{4}{3}: \quad \left(\frac{4}{3}\right)^3 - 8\left(\frac{4}{3}\right)^2 + 5\left(\frac{4}{3}\right) + 14 = -11\left(\frac{4}{3}\right) + t$$

$$t = \frac{634}{27} = 23\frac{13}{27} = 23,48$$

✓ answer

$$\therefore 14 < t < \frac{634}{27}$$

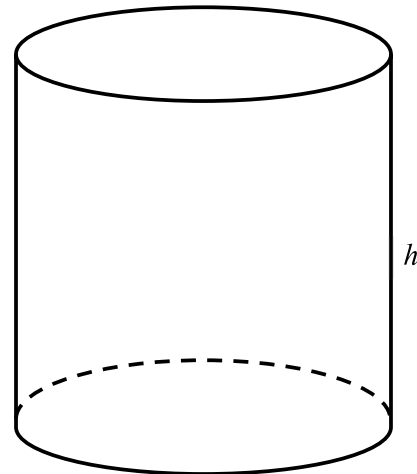
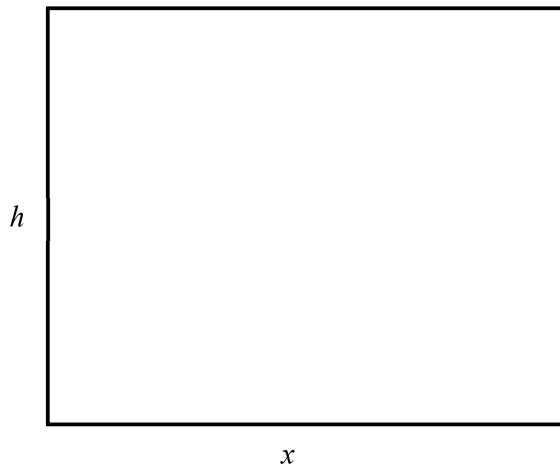
✓✓ answer

(6)

[17]



QUESTION/VRAAG 10



10.1	$2x + 2h = 50$ $h = 25 - x$ $2\pi r = x$ $r = \frac{x}{2\pi}$ $V = \pi r^2 h$ $V = \pi \left(\frac{x}{2\pi} \right)^2 (25 - x)$ $V = \frac{\pi x^2}{4\pi^2} (25 - x)$ $V = \frac{25x^2}{4\pi} - \frac{x^3}{4\pi}$	$\checkmark 2x + 2h = 50$ $\checkmark r = \frac{x}{2\pi}$ $\checkmark \text{substitution}$ <p style="text-align: right;">(3)</p>
10.2	$V'(x) = \frac{50x}{4\pi} - \frac{3x^2}{4\pi}$ $V'(x) = \frac{50x}{4\pi} - \frac{3x^2}{4\pi} = 0$ $50x - 3x^2 = 0$ $0 = x(50 - 3x)$ $x \neq 0 \text{ or } x = \frac{50}{3}$ $\therefore x = \frac{50}{3} = 16,67$	$\checkmark \frac{50x}{4\pi} - \frac{3x^2}{4\pi}$ $\checkmark V'(x) = 0$ $\checkmark \text{answer with selection}$ <p style="text-align: right;">(3)</p>
		[6]

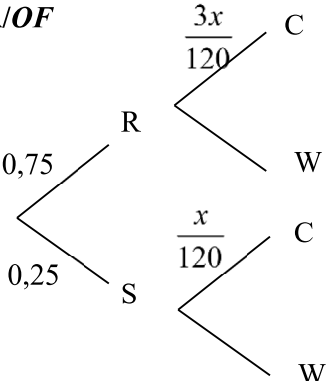
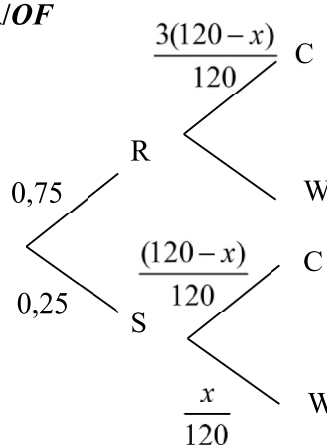


QUESTION/VRAAG 11

	JUICE	ENERGY DRINKS	TOTAL
Females	a	72	120
Males	36	54	90
Total	84	126	210

11.1.1	$P(\text{Male and Prefer juice}) = P(\text{Male}) \times P(\text{Prefer juice})$ $\frac{36}{210} = \frac{90}{210} \times \frac{e}{210}$ $e = 84$	✓ $P(\text{M and J}) = P(\text{M}) \times P(\text{J})$ ✓ $\frac{36}{210}$ ✓ $P(\text{Male}) = \frac{90}{210}$	(3)
11.1.2	$P(\text{Female and like energy drink}) = \frac{b}{210}$ $d = 210 - 84 = 126$ $b = 126 - 54 = 72$ $P(\text{Female and like energy drink}) = \frac{72}{210} = \frac{12}{35} = 0,34$ <p>OR/OF</p> $c = 120$ $b = 72$ $P(\text{Female and like energy drink}) = \frac{72}{210} = \frac{12}{35} = 0,34$	✓ d - value ✓ b -value ✓ answer <p>OR/OF</p> ✓ c - value ✓ b -value ✓ answer	(3)
			(3)



<p>11.2</p>	$\frac{3}{4}(3x) + \frac{1}{4}x = \frac{7}{12}$ $27x + 3x = 7$ $30x = 7$ $x = \frac{7}{30}$ <p>∴ 28 cups</p> <p>OR/OF</p>  $\frac{75}{100} \times \left(\frac{3x}{120} \right) + \frac{25}{100} \left(\frac{x}{120} \right) = \frac{7}{12}$ $\frac{3}{160}x + \frac{1}{480}x = \frac{7}{12}$ $10x = 280$ <p>x = 28 cups of coffee</p> <p>OR/OF</p>  $\frac{75}{100} \times \left(\frac{3(120-x)}{120} \right) + \frac{25}{100} \left(\frac{120-x}{120} \right) = \frac{7}{12}$ $270 - \frac{9}{4}x + 30 - \frac{1}{4}x = 70$ $-\frac{5}{2}x = -230$ <p>∴ x = 92 (bottles of water)</p> <p>∴ there are 28 cups of coffee</p>	<p>✓ $\frac{3}{4}(3x)$</p> <p>✓ $\frac{1}{4}x$</p> <p>✓ $= \frac{7}{12}$</p> <p>✓ answer (4)</p> <p>OR/OF</p> <p>✓ $\frac{75}{100} \times \left(\frac{3x}{120} \right)$</p> <p>✓ $\frac{25}{100} \left(\frac{x}{120} \right)$</p> <p>✓ $= \frac{7}{12}$</p> <p>✓ answer (4)</p> <p>OR/OF</p> <p>✓ $\frac{75}{100} \times \left(\frac{3(120-x)}{120} \right)$</p> <p>✓ $\frac{25}{100} \left(\frac{120-x}{120} \right)$</p> <p>✓ $= \frac{7}{12}$</p> <p>✓ answer (4)</p>
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11.3.1	$7.6! = 5\ 040$ OR/OF $7! = 5\ 040$	✓✓ answer (2) OR/OF ✓✓ answer (2)
11.3.2	Possible outcomes: $A \times 6 \times 5 \times B \times 4 \times 3 \times 2 \times 1$ $A \times 6 \times 5 \times 4 \times B \times 3 \times 2 \times 1$ $A \times 6 \times 5 \times 4 \times 3 \times B \times 2 \times 1$ $A \times 6 \times 5 \times 4 \times 3 \times 2 \times B \times 1$ $A \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 \times B$ $5 \times 6! + 4 \times 6! + 3 \times 6! + 2 \times 6! + 1 \times 6!$ $= 6!(5 + 4 + 3 + 2 + 1)$ $= 6!(15)$ $P(\text{two or more runners finishing after Andrew}) = \frac{6!(15)}{8!}$ $= \frac{15}{56}$ $= 0,27$ OR/OF $\frac{8! - (7!.2 + 2.6.6!)}{8!.2}$ $= \frac{15}{56}$	✓✓ 6! (15) ✓ 8! in denominator ✓ $\frac{6!(15)}{8!}$ or $\frac{15}{56}$ (4) OR/OF ✓ 8! in numerator and denominator ✓✓ $(7!.2 + 2.6.6!)$ ✓ $\frac{15}{56}$ (4)
		[16]

TOTAL/TOTAAL: 150