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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 V1*

NOVEMBER 2025

MARKING GUIDELINES/*NASIENRIGLYNE*

MARKS/*PUNTE*: 150

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

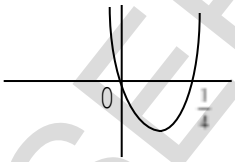
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NOTE:
- If a candidate answers a question TWICE, only mark the FIRST attempt.
- Consistent Accuracy applies in all aspects of the marking guidelines.

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	$(x+5)(x-2)=$ $x=-5$ or $x=$	✓ $x=-5$ ✓ $x=2$ (2)
1.1.2	$5x^2+2=-9x$ $5x^2+9x+2=$ $x=\frac{-9\pm\sqrt{(9^2)-4(5)(\ )}}{2(5)}$ $x=\frac{-9\pm\sqrt{41}}{10}$ $x=-0,26$ 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	$2.2^{2x}-9.2^x+4=0$ $(2.2^x-1)(2^x-4)=0$ $2^x=\frac{1}{2}$ or $2^x=4$ $2^x=2^{-1}$ $2^x=2^2$ $x=-1$ $x=2$	✓ factors ✓ both equations ✓ answer ✓ answer (4)

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	OR/*OF* $2.2^{2x} - 9.2^{x} + 4 = 0$ Let $k = 2^{x}$ $2k^{2} - 9k + 4 = 0$ $(2k - 1)(k - 4) = 0$ $k = \frac{1}{2}$ or $k = 4$ $\therefore 2^{x} = \frac{1}{2}$ or $2^{x} = 4$ $\therefore x = -1$ or $x = 2$	**OR/*OF*** ✓ factors ✓ both equations ✓ answer ✓ answer (4)
1.1.5	$\sqrt{\sqrt{\frac{1}{x}} + 2} = \frac{1}{\sqrt{x}}$ $\left(\sqrt{\sqrt{\frac{1}{x}} + 2}\right)^{2} = \left(\frac{1}{\sqrt{x}}\right)^{2}$ $\sqrt{\frac{1}{x}} + 2 = \frac{1}{x}$ $\frac{1}{\sqrt{x}} = \frac{1}{x} - 2$ $\left(\frac{1}{\sqrt{x}}\right)^{2} = \left(\frac{1}{x} - 2\right)^{2}$ $\frac{1}{x} = \frac{1}{x^{2}} - \frac{4}{x} + 4$ $\frac{1}{x^{2}} - \frac{5}{x} + 4 = 0$ $4x^{2} - 5x + 1 = 0$ $(4x - 1)(x - 1) = 0$ $x = \frac{1}{4}$ or $x \neq 1$ **OR/*OF***	✓ squaring both sides ✓ isolation of surd ✓ squaring both sides only after isolation of surd ✓ standard form ✓ answer with selection (5) **OR/*OF***

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1.1.5	$\sqrt{\sqrt{\frac{1}{x}}+2}=\frac{1}{\sqrt{x}}$ Let $\frac{1}{\sqrt{x}}=k$ $\sqrt{k+2}=k$ $k+2=k^2$ $k^2-k-2=0$ $(k-2)(k+1)=0$ $\therefore k=2$ or $k=-1$ $\frac{1}{\sqrt{x}}=2$ or $\frac{1}{\sqrt{x}}\neq -1$ $2\sqrt{x}=1$ $4x=1$ $\therefore x=\frac{1}{4}$	✓ equation ✓ squaring both sides ✓ standard form ✓ substitution ✓ answer with selection (5)
1.2	$x=y+2$ .....(1) $5xy=x^2+6$ .....(2) $5(y+2)y=(y+2)^2+6$ $5y^2+10y=y^2+4y+4+6$ $4y^2+6y-10=0$ $2y^2+3y-5=0$ $(2y+5)(y-1)=0$ $y=-\frac{5}{2}$ or $y=1$ $x=-\frac{1}{2}$ or $x=3$ **OR/*OF*** $y=x-2$ .....(1) $5xy-6=x^2$ .....(2) $5x(x-2)-6=x^2$ $5x^2-10x-6=x^2$ $4x^2-10x-6=0$ $2x^2-5x-3=0$ $(2x+1)(x-3)=0$ $x=-\frac{1}{2}$ or $x=3$ $y=-\frac{5}{2}$ or $y=1$	✓ $x=y+2$ ✓ $5xy=x^2+6$ ✓ substitution ✓ standard form ✓ y-values ✓ x-values (6) **OR/*OF*** ✓ $y=x-2$ ✓ $5xy-6=x^2$ ✓ substitution ✓ standard form ✓ x-values ✓ y-values (6) **[25]**

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QUESTION/*VRAAG* 2

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

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2.2.2	$n = 118 - k$ $T_{117} = 467$ $S_{118-k} = \frac{118-k}{2}[4k - 1 + 467]$ $26\,675 = (118-k)[2k + 23]$ $26\,675 = 236k + 27494 - 2k^2 - 233k$ $2k^2 - 3k - 819 = 0$ $(k - 21)(2k + 39) = 0$ $\therefore k = 21$ or $k \neq \frac{39}{2}$ **OR/*OF*** $n = 118 - k$ $S_{118-k} = \frac{118-k}{2}[2(4k + 1) + (118 - k - 1)(4)]$ $26\,675 = \frac{118-k}{2}[8k - 2 + 468 - 4k]$ $53\,350 = (118-k)[4k + 46]$ $53\,350 = 472k + 54\,988 - 4k^2 - 466k$ $4k^2 - 6k - 1638 = 0$ $2k^2 - 3k - 819 = 0$ $(k - 21)(2k + 39) = 0$ $\therefore k = 21$ or $k \neq \frac{39}{2}$ **OR/OF** $T_1 = 3 \quad T_2 = 7$ $S_{117} - S_{k-1} = 26\,675$ $S_{117} = \frac{n}{2}[2a + (n-1)d]$ $= \frac{117}{2}[2(3) + (116)4]$ $= 27\,495$ $\therefore S_{k-1} = 27\,495 - 26\,675 \quad 820$ $820 = \frac{n}{2}[2(3) + 4n - 4]$ $0 = 2n^2 + n - 820$ $(2n + 41)(n - 20) = 0$ $\therefore n = 20$ $\therefore k - 1 = 20$ $k = 21$	✓ number of terms ✓ last term ✓ substitution ✓ standard form ✓ answer with selection (5) **OR/*OF*** ✓ number of terms ✓ substitution ✓ simplification ✓ standard form ✓ answer with selection (5) ✓ 27 495 ✓ difference ✓ substitution ✓ standard form ✓ answer with selection (5)
		[15]

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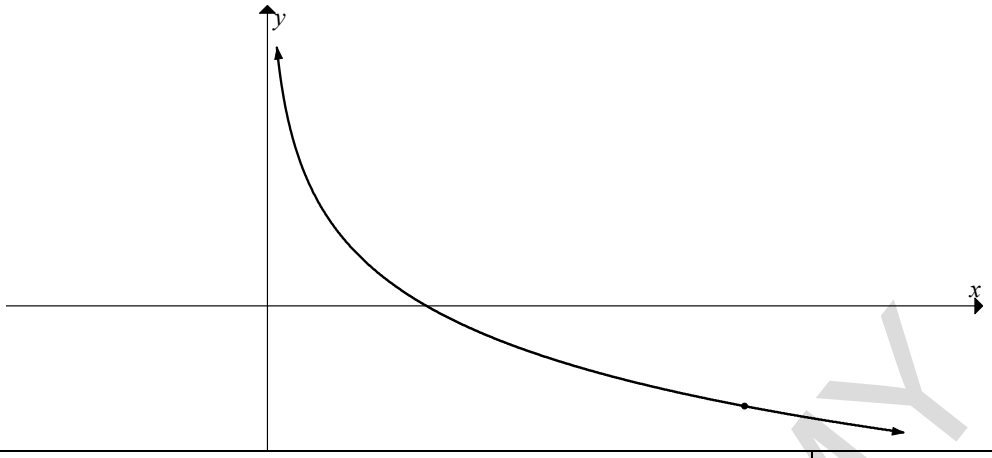
QUESTION/*VRAAG* 3

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

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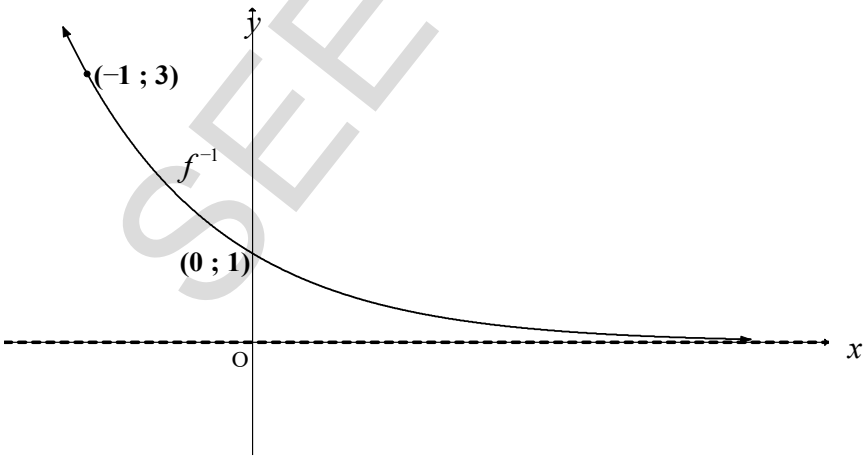
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QUESTION/*VRAAG* 4



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

4.5



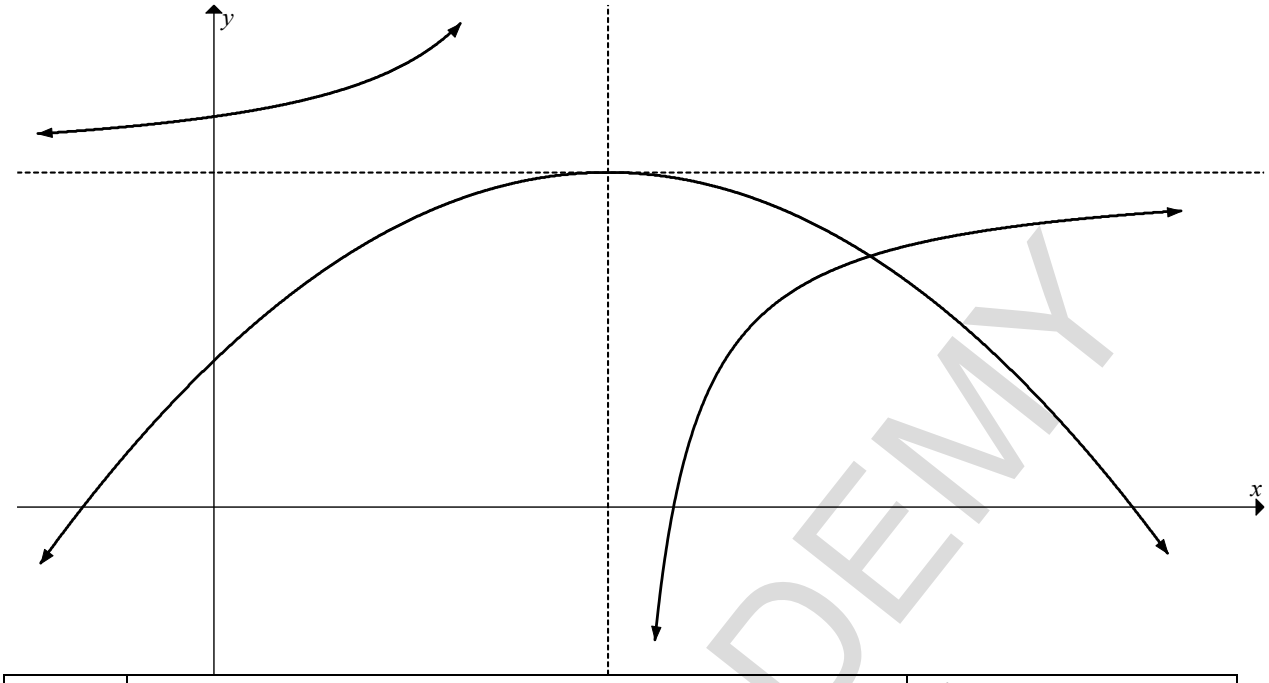
✓ decreasing exponential shape with asymptote $y = 0$
✓ y-intercept (0 ; 1)
✓ any point

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

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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*** $x \in (-\infty$ 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)

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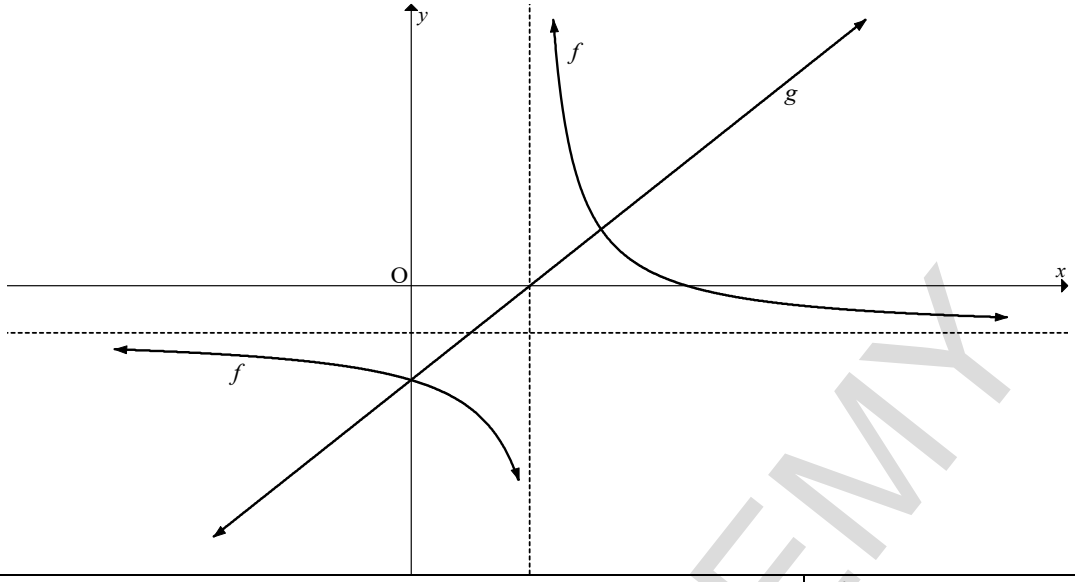
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5.5	$y = -\frac{1}{2}x^2 + 3\frac{7}{2}x +$ $x^2 - 6x - 7 = ($ $(x-7)(x+1) = 0$ $x = 7$ or $x = -$ M$(-1\ ;\ 0)$ $0 = \frac{-4}{x-3} + 8$ $-8x + 24 = -$ $x = \frac{7}{2}$ $\mathrm{T}\left(\frac{7}{2}\ ;\ 0\right)$ $\mathrm{MT} = \frac{7}{2} + 1 = \frac{9}{2}$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

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QUESTION/*VRAAG* 6



6.1	$(-p\ ;\ 0)$	✓ $(-p\ ;\ 0)$ (1)
6.2	$g(x) = x + c$ $q = 1 + c$ $f\left(x = \frac{a}{x+c} + 1 + c\right.$ Point $(0\ ;\ c)$ $c = \frac{a}{0+c} + 1 + c$ $-1 \quad \frac{a}{c} =$ $a = -c$ Point $(3\ ;\ 3 + c)$ $3 + c = \frac{q}{3+c} + 1 + c$ $3 + c = \frac{-c}{3+c} + 1 + c$ $9 + 6c + c^2 = -c + 3 + 4c + c^2$ $3c = -6$ $c = -2$ $a = 2$ $q = -1$ $f(x) = \frac{2}{x-2} \quad -1$ **OR/*OF***	✓ $q = 1 + c$ ✓ $f\left(x = \frac{a}{x+c} + 1 + c\right.$ ✓ $3 + c = \frac{q}{3+c} + 1 + c$ ✓ $a = 2$ ✓ $q = -1$ (5) **OR/*OF***

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	$0 = x + c$ $\therefore \quad x = -c$ $q = 1 + c$ $f(x = \frac{a}{x+c} + 1 + c$ $3 + c = \frac{a}{3+c} + 1 + c$ $2 = \frac{a}{3+c}$ $a = 6 + 2c$ $y = \frac{6+}{x+c}\ \frac{2c}{+1} + c$ $c = \frac{6+\ c\ 2}{0+c} + 1 + c$ $-1 \quad \frac{6+2c}{c}$ $-c = 6 + 2c$ $\therefore \quad c \neq -$ $a = 2$ $q = -1$ $\therefore \quad f(x) = \frac{2}{x-2} - 1$	✓ $q = 1 + c$ ✓ $f(x = \frac{a}{x+c} + 1 + c$ ✓ $3 + c = \frac{a}{3+c} + 1 + c$ ✓ $a = 2$ ✓ $q = -1$ (5)
6.3	Translation of 1 unit down **OR/*OF*** Translation of 1 unit to the right	✓ ✓ answer (2) **OR/*OF*** ✓ ✓ answer (2)
		[8]

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QUESTION/*VRAAG* 7

7.1	$A = P(1+i)$ $A = 40\,000(1+7{,}8\%)^5$ $A = R58\,230{,}94$	✓ substitution into correct formula ✓ answer (2)
7.2	$F = \frac{x\left[(1+i)^n - 1\right]}{i}$ $F = \frac{2\,300\left[\left(1+\frac{0{,}058}{4}\right)^{24} - 1\right]}{\frac{0{,}058}{4}} \times \left(1+\frac{0{,}058}{4}\right)$ $F = R66\ \ 4$ **OR/*OF*** $F = \frac{2\,300\left[\left(1+\frac{0{,}058}{4}\right)^{25} - 1\right]}{\frac{0{,}058}{4}} - 2300$ $F = R66\,411{,}60$	✓ ✓ substitution into correct formula ✓ future value $\times(1+i)$ ✓ answer (4) **OR/*OF*** ✓ ✓ substitution into correct formula ✓ -2300 ✓ answer (4)
7.3.1	$A = P(1+i)^n$ $A = 900\,000\left(\frac{0{,}068}{12}\right)^3$ $= R915\,386{,}86$ $P = \frac{x\left[1-(1+i)^{-n}\right]}{i}$ $915\,386{,}86 = \frac{10\,000\left[1-\left(1+\frac{0{,}068}{12}\right)^{-n}\right]}{\frac{0{,}068}{12}}$ $\left(1+\frac{0{,}068}{12}\right)^{-n} = 0{,}4812...$ $-n \quad \log_{1{,}005...} 0{,}4812...$ $n = 129{,}419...$ months $\therefore 132{,}419$ months since loan was granted $\therefore 133$ months since loan was granted	✓ answer ✓ substitution into correct formula ✓ correct use of logs ✓ answer of n ✓ final answer (5)

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7.3.2	$P = \dfrac{10\,000\left[1-\left(1+\frac{0,068}{12}\right)^{-0,419\ldots}\right]}{\frac{0,068}{12}}$ $= \text{R}4\,173,55\ldots$ Final payment $= 4173,55\ldots\left(1+\frac{0,068}{12}\right)^{1} = \text{R}4\,197,21$ **OR/*OF*** $A = 915\,386,86\left(1+\frac{0,068}{12}\right)^{129}$ $= \text{R}1\,897\,482,712$ $F = \dfrac{10\,000\left[\left(1+\frac{0,068}{12}\right)^{129}-1\right]}{\frac{0,068}{12}}$ $= \text{R}1\,893\,309,16$ Balance after 129 months = R4 173,552 Final payment $= 4\,173,552\left(1+\frac{0,068}{12}\right)^{1} = \text{R}4\,197,21$	✓ substitution ✓ *n* ✓ balance ✓ final payment (4) **OR/*OF*** ✓ answer ✓ answer ✓ balance ✓ final payment (4)
		[15]

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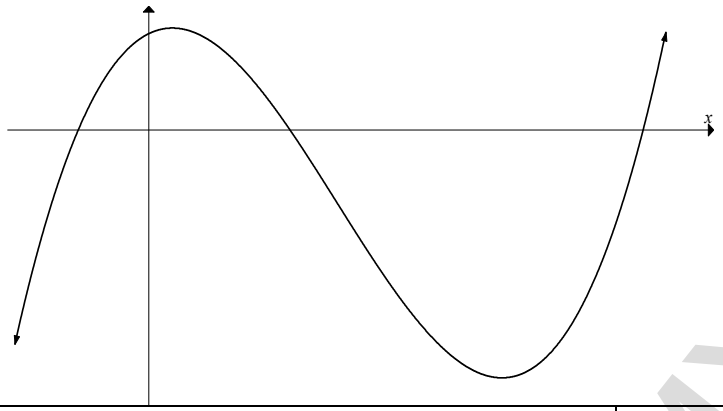
QUESTION/*VRAAG* 8

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

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QUESTION/*VRAAG* 9



9.1	$f(x) = x^3 - 8x^2 + 5x$ $f'(x) = 3x^2 - 16x + 5 = 0$ $(3x-1)(x-5) = 0$ $x = \frac{1}{3}$ or E(5 ; – 36)	✓ $f'(x)$ ✓ $f'(x) = 0$ ✓ x-value ✓ y-value (4)
9.2	$f''(x) = 6x - 16 < 0$ $x < \frac{8}{3}$ **OR/*OF*** $x = \frac{\frac{1}{3}+5}{2} = \frac{8}{3}$ $x < \frac{8}{3}$	✓ $f''(x)$ ✓ $f''(x) < 0$ ✓ answer (3) **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 $\frac{8}{3} < x < 7$	✓ ✓ 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 $x = \frac{4}{3}$: $\left(\frac{4}{3}\right)^3 - 8\left(\frac{4}{3}\right)^2 + 5\left(\frac{4}{3}\right) + 14 = -11\left(\frac{4}{3}\right) + t$ $t = \frac{634}{27} = 23\frac{13}{27} = 23,48$	✓ equating ✓ x-values ✓ answer ✓ answer

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$\therefore 14 < t < \frac{634}{27}$ ✓ ✓ answer (6)

OR/*OF*

$x^3 - 8x^2 + 5x + 14 = -11x -$
$x^3 - 8x^2 + 5x + 14 + 11x =$
$x^3 - 8x^2 + 16x + 14 =$

OR/*OF*
✓ equating

$3x^2 - 16x + 16 =$
$(x - 4)(3x - 4) = 0$

$x = 4$ or $\frac{4}{3}$ ✓ *x*-values

At $x = 4$: $(4)^3 - 8(4)^2 + 5(4) + 14 = -11(4) +$
$t = 14$ ✓ answer

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

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

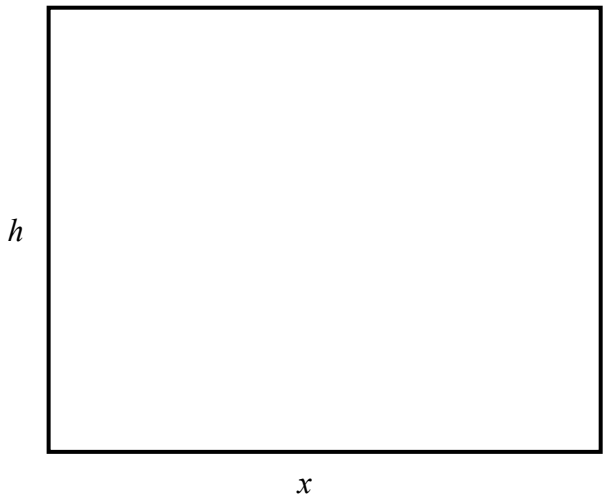
$\therefore 14 < t < \frac{634}{27}$ ✓ ✓ answer (6)

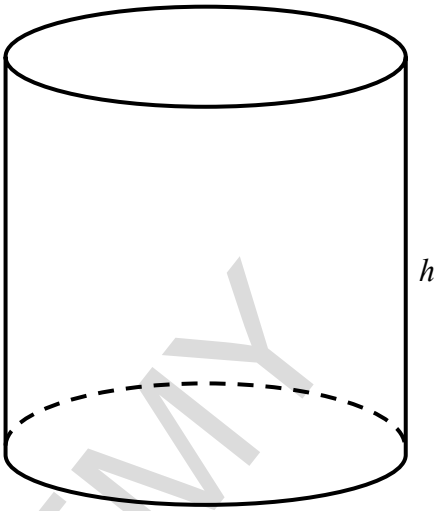
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QUESTION/*VRAAG* 10





10.1	$2x + 2h = 5$ $h = 25 - x$ $2\pi r = x$ $r = \frac{x}{2\pi}$ $V = \pi r^2 h$ $V = \pi\left(\frac{x}{2\pi}\right)^2(25 - x)$ $V = \frac{\pi x^2}{4\pi^2}(25 - x)$ $V = \frac{25x^2}{4\pi} - \frac{x^3}{4\pi}$	✓ $2x + 2h = 5$ ✓ $r = \frac{x}{2\pi}$ ✓ substitution (3)
10.2	$V'(x) = \frac{50x}{4\pi} - \frac{3x^2}{4\pi}$ $V'(x) = 0$ $\frac{50x}{4\pi} - \frac{3x^2}{4\pi} = 0$ $50x - 3x^2 = 0$ $0 = x(50 - 3x)$ $x \neq 0$ or $x = \frac{50}{3}$ $\therefore x = \frac{50}{3} \quad 16,67$	✓ $\frac{50x}{4\pi} - \frac{3x^2}{4\pi}$ ✓ $V'(x) = 0$ ✓ answer with selection (3)
		[6]

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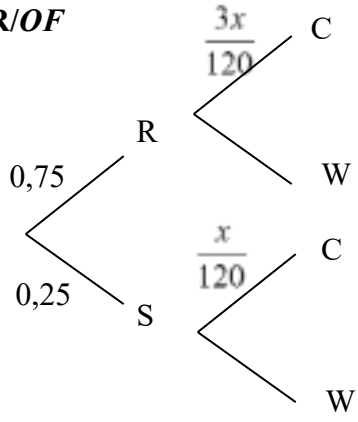
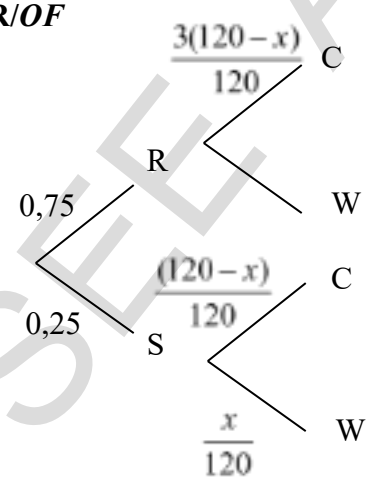
QUESTION/*VRAAG* 11

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

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

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11.2	$\frac{3}{4}(3x)+\frac{1}{4}x=$ $27x+3x=$ $30x=7$ $x=\frac{7}{30}$ $\therefore$ 28 cups	✓ $\frac{3}{4}(3x$ ✓ $\frac{1}{4}x$ ✓ $=\frac{7}{12}$ ✓ answer (4)
	OR/*OF*  $\frac{75}{100}\times\left(\frac{3x}{120}\right)+\frac{25}{100}\left(\frac{x}{120}\right)=\frac{7}{12}$ $\frac{3}{160}x+\frac{1}{480}x=\frac{7}{12}$ $10x=280$ $x=28$ cups of coffee	**OR/*OF*** ✓ $\frac{75}{100}\times\left(\frac{3x}{120}\right)$ ✓ $\frac{25}{100}\left(\frac{x}{120}\right)$ ✓ $=\frac{7}{12}$ ✓ answer (4)
	OR/*OF*  $\frac{75}{100}\times\left(\frac{3(120-x)}{120}\right)+\frac{25}{100}\left(\frac{120-x}{120}\right)=\frac{7}{12}$ $270-\frac{9}{4}x+30-\frac{1}{4}x=70$ $-\frac{5}{2}x=-230$ $\therefore x=92$ (bottles of water) $\therefore$ there are 28 cups of coffee	**OR/*OF*** ✓ $\frac{75}{100}\times\left(\frac{3(120-x)}{120}\right)$ ✓ $\frac{25}{100}\left(\frac{120-x}{120}\right)$ ✓ $=\frac{7}{12}$ ✓ answer (4)

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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 × 6 × 5 × B × 4 × 3 × 2 × 1 A × 6 × 5 × 4 × B × 3 × 2 × 1 A × 6 × 5× 4 × 3 × B × 2 × 1 A × 6 × 5 × 4 × 3 × 2 × B × 1 A × 6 × 5 × 4 × 3 × 2 × 1 × B $5\times6! + 4\times6! + 3\times6! + 2\times6! + 1\times6!$ $= 6!(5+4+3+2+1$ $= 6!(15)$ P(two or more runners finishing after Andrew) = $\frac{6!(15)}{8!}$ $= \frac{15}{56}$ $= 0,27$ **OR/*OF*** $\frac{8! - (7!.2 + 2.6.6)}{8!.2}$ $= \frac{15}{56}$	✓ ✓ (15) ✓ 8! in denominator ✓ $\frac{6!(15)}{8!}$ or $\frac{15}{56}$ (4) **OR/*OF*** ✓ 8! in numerator and denominator ✓ ✓ (7!.2 +) ✓ $\frac{15}{56}$ (4)
		[16]

TOTAL/*TOTAAL*: 150

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