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*

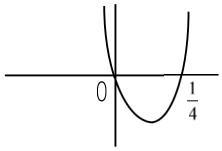
MARKS/*PUNTE*: 150

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	$2.2^{2x}-9.2^x+4=0$ $(2.2^x-1)(2^x-4)=0$ $2^x=\frac{1}{2}$ or $2^x=4$ $2^x=2^{-1}$ $2^x=2^2$ $x=-1$ $x=2$	✓factors ✓ both equations ✓ answer ✓ answer (4)

	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***

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

QUESTION/*VRAAG* 2

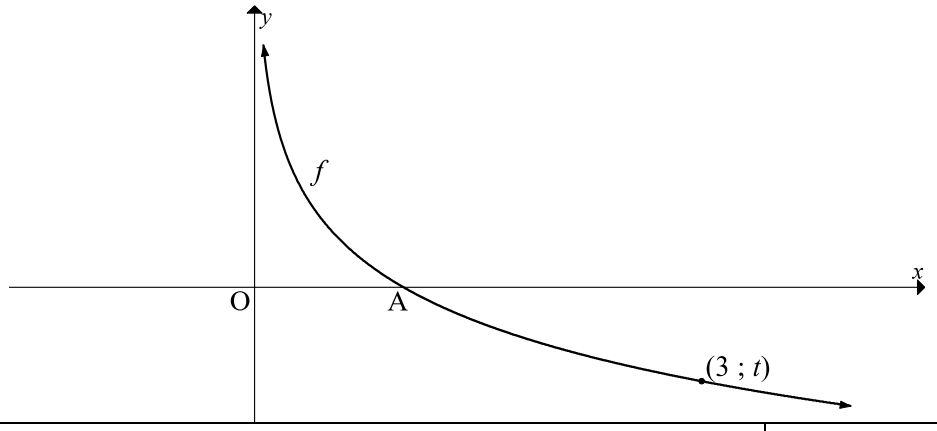
2.1.1	$(10+t)+(t-2)+(t+4)$ $\frac{t-2}{t+10}=\frac{t+4}{t-2}$ $(t-2)^2=(t+4)(t+10)$ $t^2-4t+4=t^2+14t+40$ $-18t=36$ $\therefore t=-2$	✓ equating the ratios ✓ cross multiplication ✓ expansion (3)
2.1.2	$8;-4;\ldots$ $r=\frac{-4}{8}=-\frac{1}{2}$ $T_{25}=8\left(-\frac{1}{2}\right)^{24}$ $T_{25}=\left(\frac{1}{2}\right)^{21}$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

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

QUESTION/*VRAAG* 3

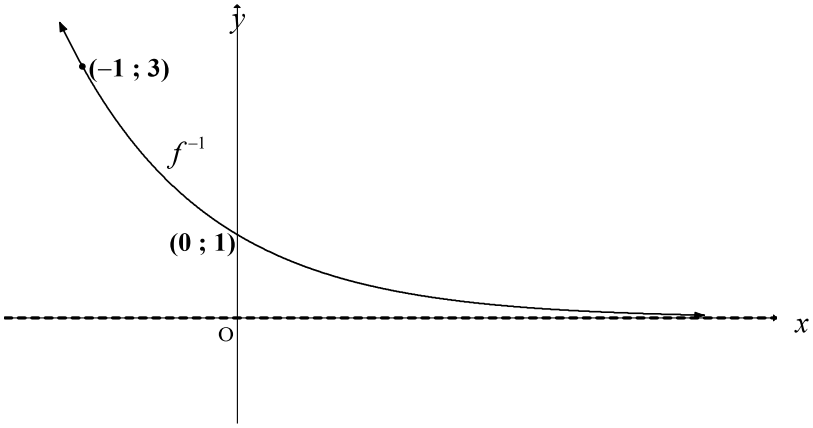
3.1	$36 \;;\; 71 \;;\; 104 \;;\; 135 \;;\; 164$ $35 \quad 33 \quad 31 \quad 29$ -2 $T_5 = 164$	✓first differences ✓ answer (2)
3.2	$2a = -2$ $a = -1$ $3(-1) + b = 35$ $b = 38$ $-1 + 38 + c = 36$ $c = -1$ $T_n = -n^2 + 38n - 1$	✓ $2a = -2$ ✓ $3(-1) + b = 35$ ✓ $-1 + 38 + c = 36$ (3)
3.3	$n = \dfrac{-38}{2(-1)}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

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)

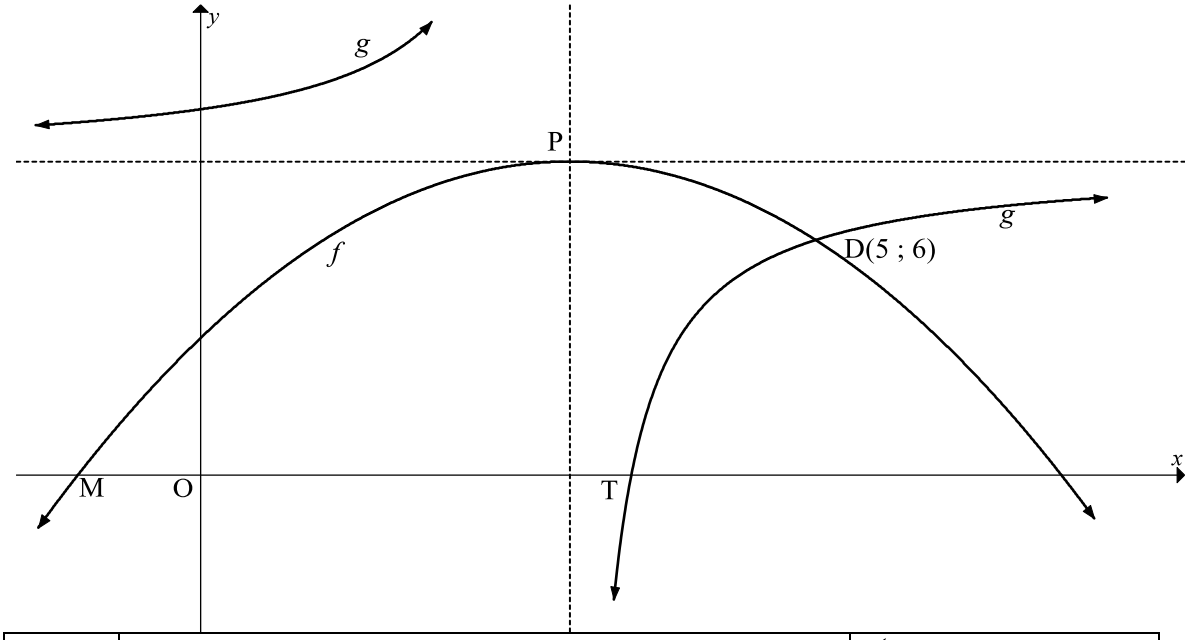
4.5



✓ 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]

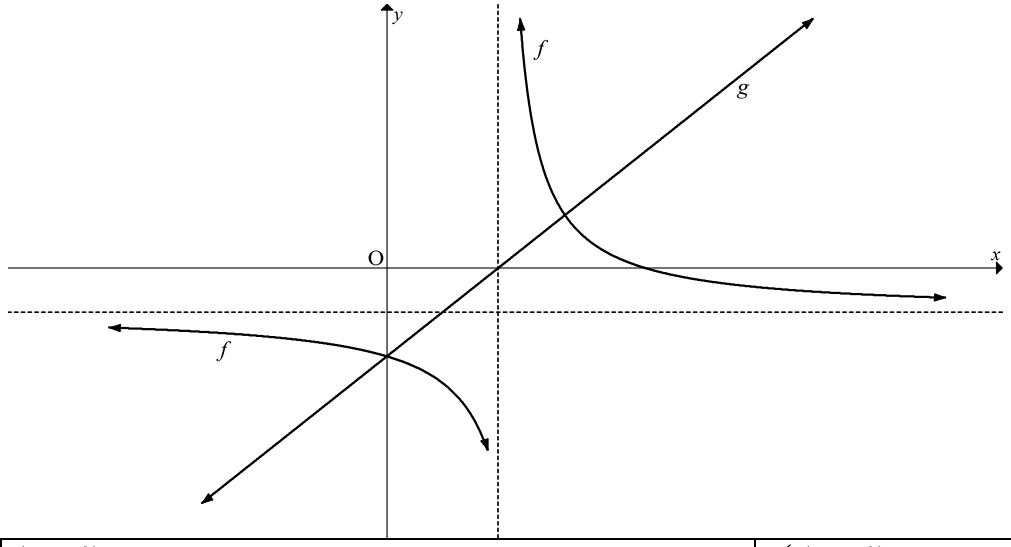
QUESTION/*VRAAG* 5



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

QUESTION/*VRAAG* 6



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

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

QUESTION/*VRAAG* 7

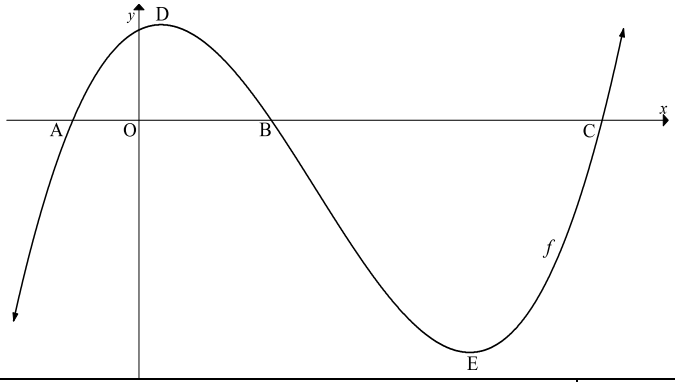
7.1	$A = P(1+i)^n$ $A = 40\,000(1+7,8\%)^5$ $A = R58\,230,94$	✓ substitution into correct formula ✓ answer (2)
7.2	$F = \dfrac{x\left[(1+i)^n - 1\right]}{i}$ $F = \dfrac{2\,300\left[\left(1+\dfrac{0,058}{4}\right)^{24} - 1\right]}{\dfrac{0,058}{4}} \times \left(1+\dfrac{0,058}{4}\right)$ $F = R66\ 411,60$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

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

QUESTION/*VRAAG* 8

8.1	$f(x)=-2x+3$ $f'(x)=\lim\limits_{h\to 0}\dfrac{f(x+h)-f(x)}{h}$ $=\lim\limits_{h\to 0}\dfrac{-2(x+h)+3-(-2x+3)}{h}$ $=\lim\limits_{h\to 0}\dfrac{-2h}{h}$ $=\lim\limits_{h\to 0}(-2)$ $=-2$ **OR/*OF*** $f(x)=-2x+3$ $f(x+h)=-2(x+h)+3$ $f(x+h)-f(x)=-2x-2h+3+2x-3=-2h$ $f'(x)=\lim\limits_{h\to 0}\dfrac{f(x+h)-f(x)}{h}$ $=\lim\limits_{h\to 0}\dfrac{-2h}{h}$ $=\lim\limits_{h\to 0}(-2)$ $=-2$	✓ $f(x+h)$ ✓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	$y=\dfrac{2x^4+1}{x^2}$ $y=2x^2+x^{-2}$ $\dfrac{dy}{dx}=4x-2x^{-3}$	✓ $2x^2$ ✓ x^{-2} ✓ derivative first term ✓ derivative second term (4)
		[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$(5\ ;\ -36)$	✓ $f'(x)$ ✓ $f'(x)=0$ ✓ 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

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

OR/*OF*

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

OR/*OF*
✓ equating

$3x^2 - 16x + 16 = 0$
$(x-4)(3x-4) = 0$
$x = 4 \quad \text{or} \quad x = \frac{4}{3}$ ✓ *x*-values

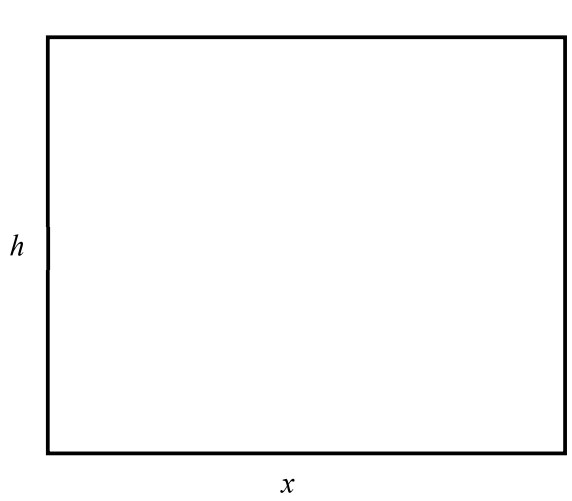
At $x = 4$: $(4)^3 - 8(4)^2 + 5(4) + 14 = -11(4) + t$
$t = 14$ ✓ answer

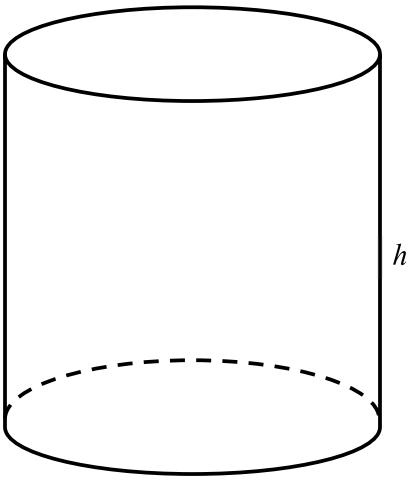
At $x = \frac{4}{3}$: $\left(\frac{4}{3}\right)^3 - 8\left(\frac{4}{3}\right)^2 + 5\left(\frac{4}{3}\right) + 14 = -11\left(\frac{4}{3}\right) + t$
$t = \frac{634}{27} = 23\frac{13}{27} = 23,48$ ✓ answer

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

[17]

QUESTION/*VRAAG* 10



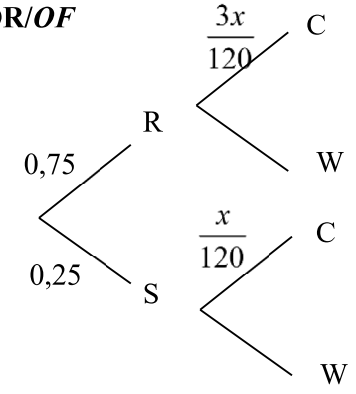
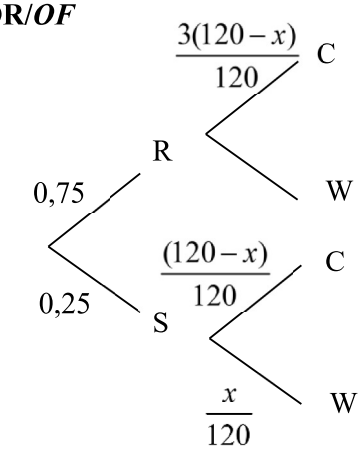


10.1	$2x+2h=50$ $h=25-x$ $2\pi r=x$ $r=\frac{x}{2\pi}$ $V=\pi r^2 h$ $V=\pi\left(\frac{x}{2\pi}\right)^2(25-x)$ $V=\frac{\pi x^2}{4\pi^2}(25-x)$ $V=\frac{25x^2}{4\pi}-\frac{x^3}{4\pi}$	✓ $2x+2h=50$ ✓ $r=\frac{x}{2\pi}$ ✓ substitution (3)
10.2	$V'(x)=\frac{50x}{4\pi}-\frac{3x^2}{4\pi}$ $V'(x)=\frac{50x}{4\pi}-\frac{3x^2}{4\pi}=0$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

QUESTION/*VRAAG* 11

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

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

11.2	$\frac{3}{4}(3x)+\frac{1}{4}x=\frac{7}{12}$ $27x+3x=7$ $30x=7$ $x=\frac{7}{30}$ $\therefore$ 28 cups	✓ $\frac{3}{4}(3x)$ ✓ $\frac{1}{4}x$ ✓ $=\frac{7}{12}$ ✓answer (4)
	OR/*OF*	**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	✓ $\frac{75}{100}\times\left(\frac{3x}{120}\right)$ ✓ $\frac{25}{100}\left(\frac{x}{120}\right)$ ✓ $=\frac{7}{12}$ ✓answer (4)
	OR/*OF*	**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	✓ $\frac{75}{100}\times\left(\frac{3(120-x)}{120}\right)$ ✓ $\frac{25}{100}\left(\frac{120-x}{120}\right)$ ✓ $=\frac{7}{12}$ ✓answer (4)

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*** $\frac{8!-(7!.2+2.6.6!)}{8!.2}$ $= \frac{15}{56}$	✓✓ 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