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

Approved
by Prof Rajendran Govender
Umalusi Moderator
8/11/2025

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

Approved
2025-11-08

Approved
8/11/2025

Standard-form is NB!

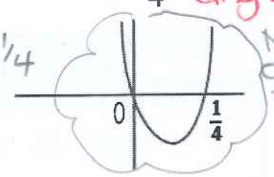
NOTE:
- If a candidate answers a question TWICE, only mark the FIRST attempt.
- Consistent Accuracy applies in all aspects of the marking guidelines.

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.*

IF ONLY USED PENCIL, MARK.

QUESTION 1/*VRAAG* 1

BD after 2 marks lost!

1.1.1	$(x+5)(x-2)=0$ $x=-5$ or $x=2$ ✓ ✓ If multiply and then incorrect factors, max (½) = 0 not NB!	✓ $x=-5$ ✓ $x=2$ order not (2) NB!
1.1.2	$5x^2+2=-9x$ $5x^2+9x+2=0$ ✓ NB! Must be seen $x=\frac{-9\pm\sqrt{(9^2)-4(5)(2)}}{2(5)}$ ✓ • careful wrong formula! $x=\frac{-9\pm\sqrt{41}}{10}$ (121) $x=-0,26$ or $x=-1,54$ ✓CA ✓CA (P)	• $5x^2+2+9x=0$ St.f. ✓ standard form ✓ substitution into the correct formula • BD if becomes linear. No Substitution ✓ answer ✓ answer (4/4) A/O with standard-form. 3/4 • no St.f. (4)
1.1.3	$8x^2>2x$ $8x^2-2x>0$ ✓ $2x(4x-1)>0$ CV: 0 ; $\frac{1}{4}$ ✓ anywhere  Not answer $x\leq 0$ or $x>\frac{1}{4}$ COMBO ✓✓	✓ standard form • ÷2x BD: Max: 1 ✓ critical values/factors • $4x-1>0$ $x>1/4$; BD (1/4) • St.f not shown (3/4) • $x>0$ OR $x>1/4$ (2/4) ✓✓ answer • Comma ; / (4/4) • "And" (3/4) (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 $2^x=4$ ✓ $2^x=2^{-1}$ $2^x=2^2$ $x=-1$ ✓ $x=2$ ✓	$x\leq 0$ OR $x\geq 1/4$ (3/4) ✓ factors $(2k-1)(k-4)=0$ $k=1/2$ $k=4$ ✓ both equations ✓ answer ✓ answer (4)

• If go to $x=-1$ (4/4)

• Incorrect factors CA

• A/O: (2/4)

	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 $\frac{1}{\sqrt{x}}=k$

$\sqrt{k+2}=k$ ✓

$k+2=k^2$ ✓ M

$k^2-k-2=0$ ✓

$(k-2)(k+1)=0$

$\therefore k=2$ or $k=-1$

NOT NB!

$\frac{1}{\sqrt{x}}=2$ ✓ 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

$5xy=6+\sqrt{x}$ → 5/6

$5xy=6+x$ → 5/6

$x=y+2$ .....(1) ✓ Accuracy

$5xy=x^2+6$ .....(2) ✓ Accuracy

$5(y+2)y=(y+2)^2+6$ ✓ CA

$5y^2+10y=y^2+4y+4+6$ • Swapping $x \neq y$. 5/6

$4y^2+6y-10=0$ } ✓

$2y^2+3y-5=0$ }

$(2y+5)(y-1)=0$

$y=-\frac{5}{2}$ or $y=1$ ✓

$x=-\frac{1}{2}$ or $x=3$ ✓

✓ $x=y+2$ • No BD if first 2 equations are wrong.
✓ $5xy=x^2+6$
✓ substitution
• If second equation does not lead to quadratic equation.
✓ standard form •
• If becomes linear now.

✓ y-values

✓ x-values NO CA if $\sqrt{}^4$ lin. indep. on condition that there are two answers

(6)

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 $y=1$ ✓

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	$n = 118 - k$ ✓ n Independent $n = 117 - k + 1$	✓ number of terms
	$T_{117} = 467$ ✓	✓ last term
	$S_{118-k} = \frac{118-k}{2}[4k - 1 + 467]$ ✓	✓ substitution
	$26\,675 = (118-k)[2k + 233]$ 4(117−1) = 467 → In relation T_{117}.	
	$26\,675 = 236k + 27494 - 2k^2 - 233k$	✓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
	$26\,675 = \frac{118-k}{2}[8k - 2 + 468 - 4k]$	
	$53\,350 = (118-k)[4k + 466]$ ✓ 4k+466.	✓simplification
	$53\,350 = 472k + 54\,988 - 4k^2 - 466k$	
	$4k^2 - 6k - 1638 = 0$ } ✓	✓ 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	
	$T_1 = 3 \quad T_2 = 7$	
	$S_{117} - S_{k-1} = 26\,675$	
	$S_{117} = \frac{n}{2}[2a + (n-1)d]$	
	$= \frac{117}{2}[2(3) + (116)4]$	
	$= 27\,495$ ✓ S_{117}.	✓ 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]

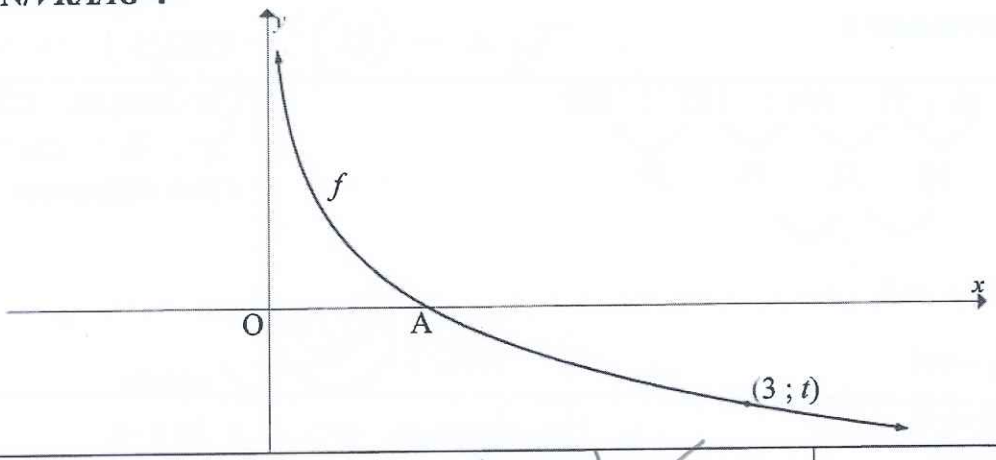
QUESTION/*VRAAG* 3

$T_5 = -(5)^2 + 38(5) - 1 = 164$. (0/2)

3.1	36 ; 71 ; 104 ; 135 ; 164 35 33 31 29 -2 $T_5 = 164$ ✓ A/O: 2/2	Unless done 3.2 in 3.1 and then T_5 (2/2). ✓ first differences ✓ answer (2)
3.2	$2a = -2$ ✓ $a = -1$ $3(-1) + b = 35$ ✓ $b = 38$ $-1 + 38 + c = 36$ ✓ $c = -1$ $T_n = -n^2 + 38n - 1$ • If done in 3.1. (3/3)	✓ $2a = -2$ ✓ $3(-1) + b = 35$ ✓ $-1 + 38 + c = 36$ (3)
3.3	$n = \frac{-38}{2(-1)} = 19$ ✓m ✓n $T_{19} = -(19)^2 + 38(19) - 1 = 360$ ✓ • or $T_n = 0$ ✓m, $n = 19$ ✓n, $T_{19} = 360$ ✓ **OR/*OF*** $T'_n = -2n + 38 = 0$ ✓m $\therefore n = 19$ ✓n $T_{19} = -(19)^2 + 38(19) - 1 = 360$ ✓ A/O: (3/3). Expansion:	✓ method ✓ n ✓ answer (3) **OR/*OF*** ✓ method ✓ n ✓ answer (3)
3.4	$\frac{n+3}{2} = 19$ ✓m $n + 3 = 38$ $n = 35$ ✓ **OR/*OF*** $-n^2 + 38n - 1 = 104$ ✓m $n^2 - 38n + 105 = 0$ $(n-35)(n-3) = 0$ $n = 35$ ✓ A/O: (2/2) If: $n = 35$ or $n = 3$ (1/2)	✓ method ✓ answer (2) ✓ method ✓ answer (2)
		[10]

36 ; 71 ; 104 ; 135 ; 164

QUESTION/*VRAAG* 4



4.1	$t = \log_{\frac{1}{3}} 3$ $t = -1$ ✓	• $y = -1$ Accept. ✓ • ONLY : -1 ✓ ✓ answer (1)
4.2	$A(1;0)$ ✓	• If $x=1$ Accept. ✓ answer (1)
4.3	$f(x) = \log_{\frac{1}{3}} x$ $y = \log_{\frac{1}{3}} x$ $x = \log_{\frac{1}{3}} y$ ✓ $y = \left(\frac{1}{3}\right)^x = 3^{-x}$ ✓ A/o: 2/2	✓ swopping ✓ answer (2)
4.4	$y = 0$ ✓ $q = 0$ ✗	✓ answer (1)

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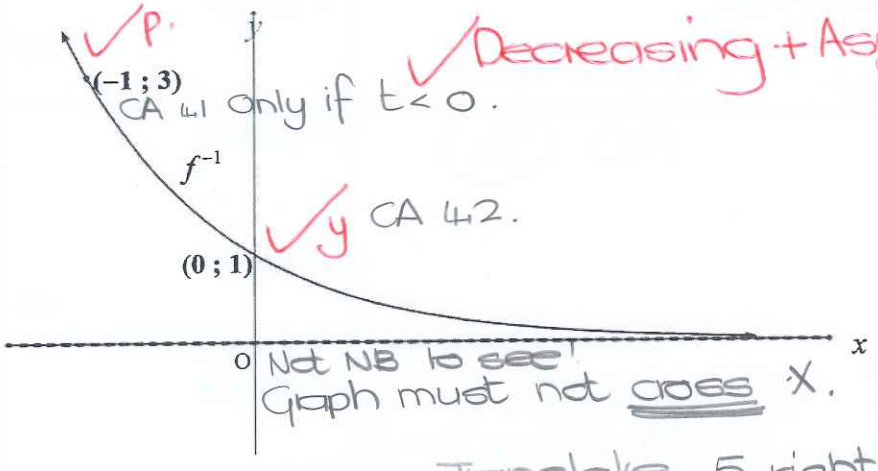
4.5



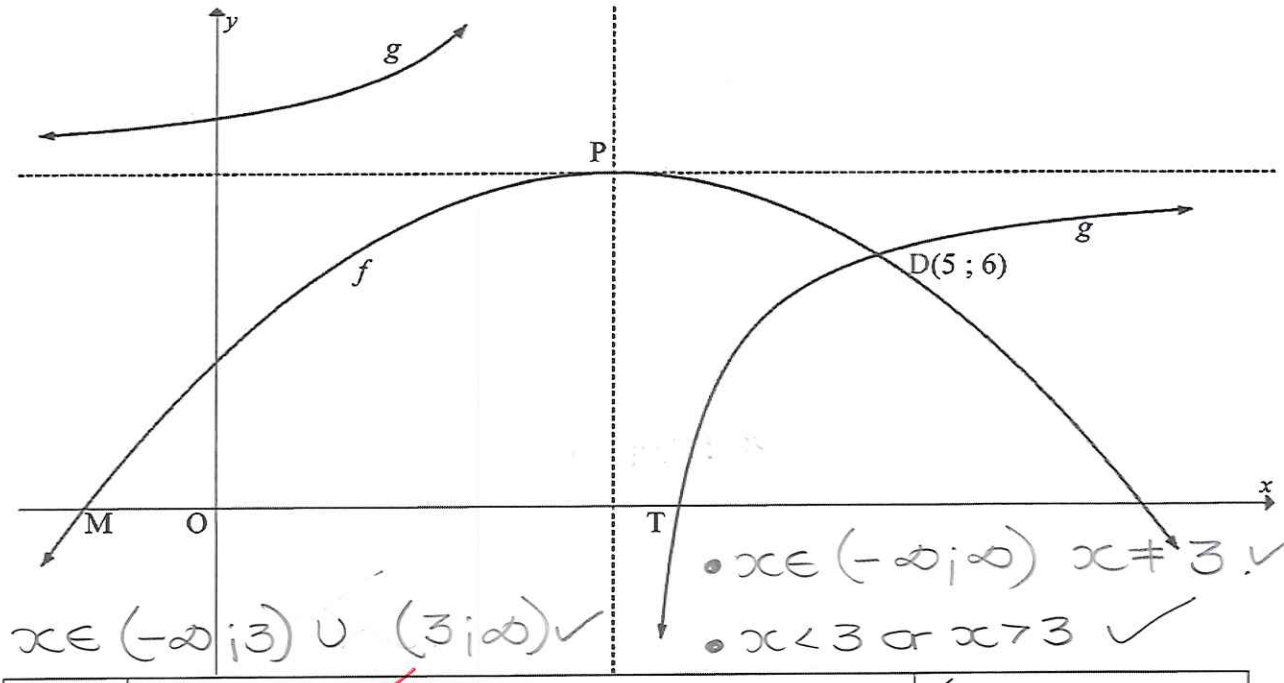
P. ✓ Decreasing + Asympt. ✓
CA 4.1 only if $t < 0$.
✓ y CA 4.2.
Not NB to see!
Graph must not cross X.
Translate 5 right. $x > 4$

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

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

• $y \in (0;3]$ ✗✗

QUESTION/*VRAAG* 5

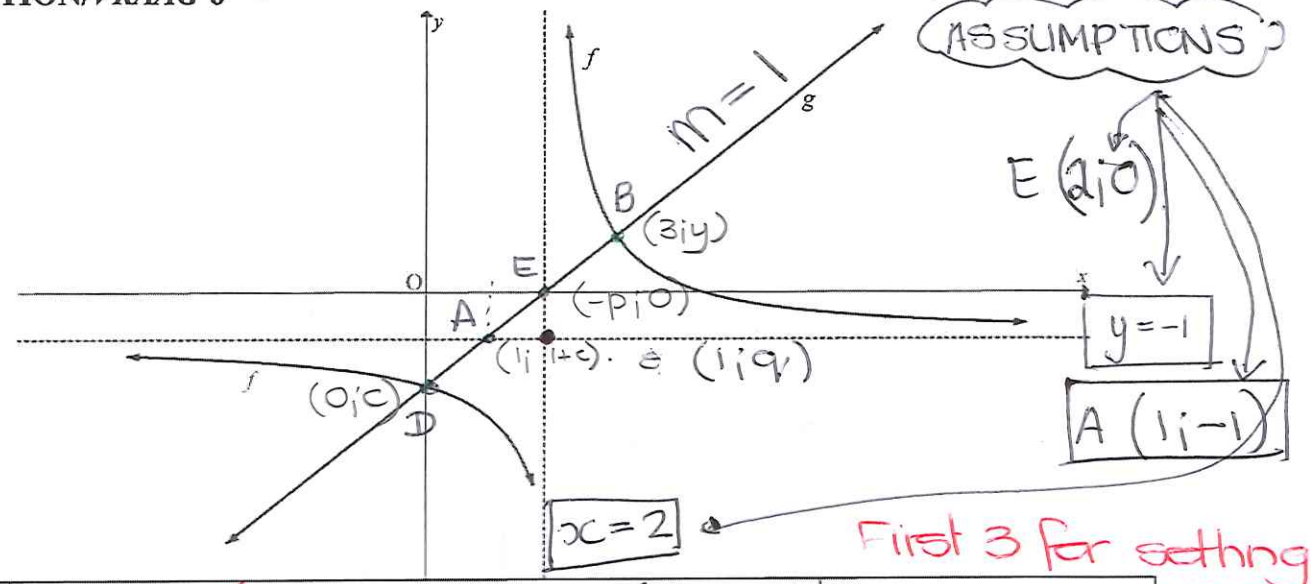


• $x \in (-\infty;3) \cup (3;\infty)$ ✓ • $x \in (-\infty;\infty)$ $x \neq 3$ ✓ • $x < 3$ or $x > 3$ ✓

5.1	$x \in R,\ x \neq 3$ ✓ • If $x \neq 3$ ✓	✓ answer (1)
5.2	$y \leq 8$ ✓ $y \in (-\infty;8]$ ✓	✓ answer • $y < 8$ ✗ (1)
5.3.1	$3 < x \leq 5$ **OR/*OF*** $x \in (3;5]$ ✓✓ combo • ✗✗	✓✓ answer • $x \in (3;5)$ (2) ½
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	$y = a(x-3)^2 + 8$ ✓p ✓q $6 = a(5-3)^2 + 8$ ✓ $-2 = 4a$ $\therefore a = -\frac{1}{2}$ $y = -\frac{1}{2}(x-3)^2 + 8$ $y = -\frac{1}{2}(x^2 - 6x + 9) + 8$ ✓ $y = -\frac{1}{2}x^2 + 3x + \frac{7}{2}$	✓ p and q values ✓ substitution (5 ; 6) $x^2 - 6x + 9$ ✓ simplification (3)

5.5	$y=-\frac{1}{2}x^2+3x+\frac{7}{2}$ $x^2-6x-7=0$ ✓ =0 Implied. $(x-7)(x+1)=0$ $x=7$ or $x=-1$ ✓ N/A • M$(-1;0)$ ✓ If leave out. $0=\frac{-4}{x-3}+8$ ✓ =0 $-8x+24=-4$ $x=\frac{7}{2}$ ✓ $T\left(\frac{7}{2};0\right)$ $MT=\frac{7}{2}+1=\frac{9}{2}=4,5$ ✓	✓ solve for x ✓ x-values ✓ coordinates of M ? Selecting $x=-1$ ✓ solve for x ✓ x-value ✓ MT (6)
5.6	$f(x)=-\frac{1}{2}x^2+3x+\frac{7}{2}$ ✓ Accuracy. $f'(x)=-x+3$ $m=f'(5)$ ✓ $x=5$ NB! (5;6). Else BD. $=-5+3$ $=-2$ $6=-2(5)+c$ $c=16$ $\therefore y=-2x+16$ ✓	✓ $f'(x)=-x+3$ ✓ $m=f'(5)$ ✓ answer (3)
		[18]

QUESTION/*VRAAG* 6



ASSUMPTIONS
E (2;0)

First 3 for setting up eq.

6.1	$(-p\,;0)$ ✓	$x=-p$ ✓Acc.	✓ $(-p\,;0)$ only $-p$. (1)
6.2			
(A)	$g(x)=x+c$ → $(1;q)$ $q=1+c$ ✓ $f(x)=\frac{a}{x+c}+1+c$ ✓ Subst. $q=1+c$. NB! $\therefore p=c$.	$f(x)=\frac{a}{x+p}+1+p$	✓ $q=1+c$ ✓ $f(x)=\frac{a}{x+c}+1+c$ subst.
(D)	Point $(0\,;c)$ $c=\frac{a}{0+c}+1+c$ $-1=\frac{a}{c}$ $a=-c$.	$f(0)=g(0)$	• Remember: $p=c$. → leads to many options.
(B)	Point $(3\,;3+c)$ $3+c=\frac{a}{3+c}+1+c$ ✓ $3+c=\frac{-c}{3+c}+1+c$ $9+6c+c^2=-c+3+4c+c^2$ $3c=-6$ $c=-2$ $a=2$ ✓ $q=-1$ ✓ $f(x)=\frac{2}{x-2}-1$	$f(3)=g(3)$	✓ $3+c=\frac{a}{3+c}+1+c$ Indepen. • Anything from a point of assumption BD ✓ $a=2$ ✓ $q=-1$ (5)
	OR/*OF*	A/O: ZERO.	**OR/*OF***

	$0 = x + c$ $\therefore \quad x = -c$ D $q = 1 + c$ ✓ (A) $f(x) = \frac{a}{x+c} + 1 + c$ ✓ subst (B) $3 + c = \frac{a}{3+c} + 1 + c$ ✓ $f(3) = g(3)$ $2 = \frac{a}{3+c}$ $a = 6 + 2c$ or $a = 6 + 2p$ — 3/5. D $y = \frac{6+2c}{x+c} + 1 + c$ $c = \frac{6+2c}{0+c} + 1 + c$ $f(0) = g(0)$. $-1 = \frac{6+2c}{c}$ $-c = 6 + 2c$ $\therefore \quad c = -2$ $a = 2$ ✓ $q = -1$ ✓ $\therefore \quad f(x) = \frac{2}{x-2} - 1$ CA	✓ $q = 1 + c$ ✓ $f(x) = \frac{a}{x+c} + 1 + c$ ✓ $3 + c = \frac{a}{3+c} + 1 + c$ ✓ $a = 2$ ✓ $q = -1$ CA (5)
6.3	Translation of 1 unit down ✓✓ combo. $-q$ down CA **OR/*OF*** Translation of 1 unit to the right ✓✓ $-p$ -1 right. CA	✓✓ answer (2) **OR/*OF*** ✓✓ answer (2)
		CA [8]

- ~~$+p$ down~~
- ~~$+p$ to right.~~

eg. $f(x) = \frac{2}{x-3} - 2$
(1; -2) Thinking
(3; -2)

QUESTION/*VRAAG* 7

7.1	$A = P(1+i)^n$ $A = 40\,000(1+7{,}8\%)^5$ $A = \text{R}58\,230{,}94$	✓ substitution into correct formula ✓ answer (2)
7.2	$F = \dfrac{x\left[(1+i)^n - 1\right]}{i}$ $F = \dfrac{2\,300\left[\left(1+\frac{0{,}058}{4}\right)^{24} - 1\right]}{\frac{0{,}058}{4}} \times \left(1+\frac{0{,}058}{4}\right)$ $F = \text{R}66\,411{,}60$ **OR/*OF*** $F = \dfrac{2\,300\left[\left(1+\frac{0{,}058}{4}\right)^{25} - 1\right]}{\frac{0{,}058}{4}} - 2300$ $F = \text{R}66\,411{,}60$	✓ i ✓ substitution into correct formula (F) ✓ future value $\times (1+i)^1$ ✓ answer (4) **OR/*OF*** ✓ i ✓ substitution into correct formula (F) ✓ -2300 ✓ answer (4)
7.3.1	$A = P(1+i)^n$ $A = 900\,000\left(1+\frac{0{,}068}{12}\right)^3$ $= \text{R}915\,386{,}86$ $P = \dfrac{x\left[1-(1+i)^{-n}\right]}{i}$ $915\,386{,}86 = \dfrac{10\,000\left[1-\left(1+\frac{0{,}068}{12}\right)^{-n}\right]}{\frac{0{,}068}{12}}$ $\left(1+\frac{0{,}068}{12}\right)^{-n} = 0{,}4812...$ $-n = \log_{1{,}005...} 0{,}4812...$ $n = 129{,}419...$ months $\therefore 132{,}419$ months since loan was granted $\therefore 133$ months since loan was granted	✓ substitution into correct formula ✓ correct use of logs ✓ answer of n ✓ final answer (5)

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Please turn over/*Blaai om asseblief*

CA from 7.3.1.

7.3.2	$P=\dfrac{10\,000\left[1-\left(1+\dfrac{0,068}{12}\right)^{-0,419\ldots}\right]}{\dfrac{0,068}{12}}$ ✓ NB $n=-0,42$ must be $0<n<1$	If $n>1$ BD. ✓ substitution correct formula. ✓ n Accept $n=-0,42$. If n wrong $(0<i)$ & subst ✓+
	$=$ R4 173,55… ✓	✓ balance
	Final payment $= 4173,55\ldots\left(1+\dfrac{0,068}{12}\right)^{1} = R4\,197,21$ ✓	✓ final payment (4)
	OR/*OF*	**OR/*OF***
	$A = 915\,386,86\left(1+\dfrac{0,068}{12}\right)^{129}$ ✓ subst. or $= R1\,897\,482,712$	✓ answer
	$F=\dfrac{10\,000\left[\left(1+\dfrac{0,068}{12}\right)^{129}-1\right]}{\dfrac{0,068}{12}}$ ✓ or subst.	
	$= R1\,893\,309,16$	✓ answer
	Balance after 129 months = R4 173,552 ✓	✓ balance
	Final payment $= 4173,552\left(1+\dfrac{0,068}{12}\right)^{1} = R4\,197,21$ ✓	✓ final payment (4)
		[15]

126. 2407,60 2421,31

$P = 10\,000\left[1-\left(1+\frac{0,068}{12}\right)^{-0,419\ldots}\right]\left(1+\frac{0,068}{12}\right) = 4197,21$ ✓

OR $900\,000\left(1+\frac{0,068}{12}\right)^{132}$

$\left[900\,000\left(1+\frac{0,068}{12}\right)^{132} - \;\heartsuit\;\right]\left(1+\frac{0,068}{12}\right) =$ ✓ ✓ ✓+

133 paym

$FP = \left[915\,386\left(1+i\right)^{129} - \frac{10\,000\left[(1+i)^{129}-1\right]}{i}\right]\left(1+\frac{0,068}{12}\right)$ ✓ ✓ ✓ ✓ Final paym.

answer balance

$FP = \left[900\,000\left(1+i\right)^{132} - \frac{10\,000\left[(1+i)^{129}-1\right]}{i}\right]\left(1+\frac{0,068}{12}\right)$ ✓ ✓ ✓ ✓ Final Paym.

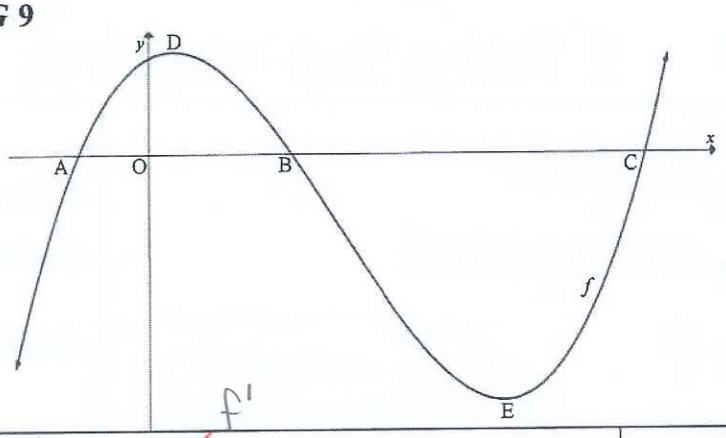
answer balance

QUESTION/*VRAAG* 8

2 Marks; Stop marking

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]

QUESTION/*VRAAG* 9



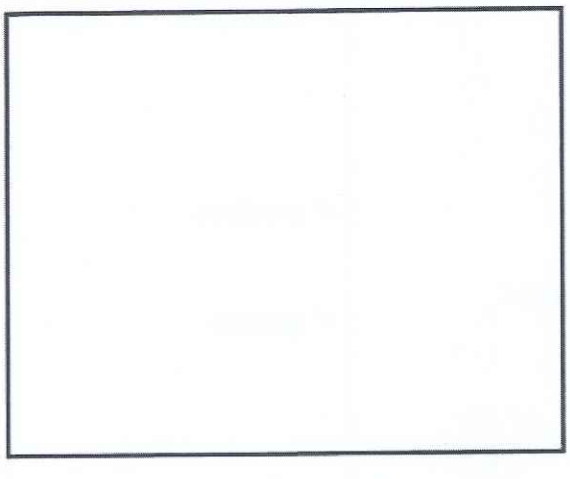
9.1	$f(x)=x^3-8x^2+5x+14$ ✓ f' $f'(x)=3x^2-16x+5=0$ ✓ =0 Must be seen. $(3x-1)(x-5)=0$ Not NB! $x=\frac{1}{3}$ or $x=5$ ✓ E(5 ; −36) ✓ y must be neg.	✓ $f'(x)$ Must be quadratic. ✓ $f'(x)=0$ ✓ x-value ✓ y-value (4)
9.2	$f''(x)=6x-16<0$ ✓ $x<\frac{8}{3}$ ✓ $x=\frac{-b}{3a}$ $x=8/3$ (3/3) **OR/*OF*** $x=\frac{\frac{1}{3}+5}{2}=\frac{8}{3}$ ✓ $x<\frac{8}{3}$ ✓✓ Acc. • $6x-16=0$ $x=8/3$ ✓✓ $x<8/3$ • only $x=8/3$ (1/3) • A/O: (3/3)	✓ $f''(x)$ • $6x-16=0$ $x=8/3$ (1/3) ✓ $f''(x)<0$ ✓ answer (3) **OR/*OF*** ✓ midpoint of TPs ✓ $f''(x)<0$ ✓ answer (3)
9.3	x-intercepts of f: (−1 ; 0) and (7 ; 0) ✓ Acc. $-1<x<2$ or $\frac{8}{3}<x<7$ ✓CA ✓CA If include C,V MAX 3/4	✓✓ x-intercepts A/O: 4/4 ✓ first interval ✓ second interval (4)
9.4	$3x^2-16x+5=-11$ ✓ $f'(x)=-11$ CA $3x^2-16x+16=0$ $(x-4)(3x-4)=0$ $x=4$ or $x=\frac{4}{3}$ ✓ At $x=4$: $(4)^3-8(4)^2+5(4)+14=-11(4)+t$ (−30) $t=14$ ✓ At $x=\frac{4}{3}$: $\left(\frac{4}{3}\right)^3-8\left(\frac{4}{3}\right)^2+5\left(\frac{4}{3}\right)+14=-11\left(\frac{4}{3}\right)+t$ (23 13/27 → 8 22/27) $t=\frac{634}{27}=23\frac{13}{27}=23,48$ ✓ $\therefore 14<t<\frac{634}{27}$ ✓✓ COMBO. Accuracy.	✓ equating ✓ x-values ✓ answer ✓ answer ✓✓ answer (7)

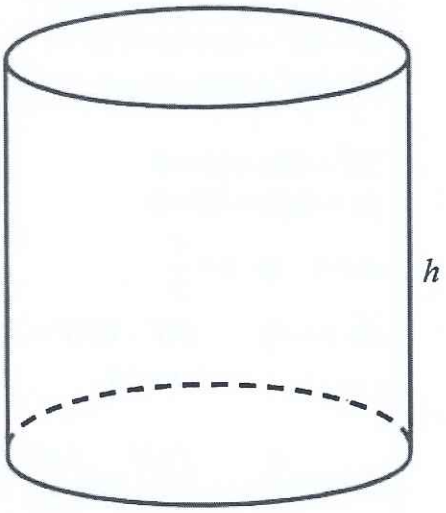
Please turn over/*Blaai om asseblief*

If include the C,V 5/6

	OR/*OF*	**OR/*OF***
	$x^3-8x^2+5x+14=-11x+t$ ✓	✓ equating
	$x^3-8x^2+5x+14+11x=t$	
	$x^3-8x^2+16x+14=t$	
	$3x^2-16x+16=0$	
	$(x-4)(3x-4)=0$	
	$x=4 \quad \text{or} \quad x=\frac{4}{3}$ ✓	✓ x-values
	At $x=4$: $(4)^3-8(4)^2+5(4)+14=-11(4)+t$ (−30)	
	$t=14$ ✓	✓ answer
	At $x=\frac{4}{3}$: $\left(\frac{4}{3}\right)^3-8\left(\frac{4}{3}\right)^2+5\left(\frac{4}{3}\right)+14=-11\left(\frac{4}{3}\right)+t$ ($8\frac{22}{27}$)	
	$t=\frac{634}{27}=23\frac{13}{27}=23,48$ ✓	✓ answer
	$\therefore 14<t<\frac{634}{27}$ ✓✓	✓✓ answer (6)
	If include c.v. 5/6	
		[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	$V'(x)=\frac{50x}{4\pi}-\frac{3x^2}{4\pi}$ $V'(x)=\frac{50x}{4\pi}-\frac{3x^2}{4\pi}=0$ $50x-3x^2=0$ $0=x(50-3x)$ $x\neq 0$ or $x=\frac{50}{3}$ $\therefore x=\frac{50}{3}=16,67$	✓ $\frac{50x}{4\pi}-\frac{3x^2}{4\pi}$ ✓ $V'(x)=0$ ✓ answer with selection (3)
		[6]

h&r $V=\frac{-x^3+25x^2}{4\pi}$ $V'=\frac{50x-3x^2}{4\pi}$

ACC.

$V'(\pi)=0$ ½

Indep. M

Can be implied in Solving.

If only state: $V'(x)=0$ ✓

$\frac{-50x}{4\pi^2}+\frac{x^3}{4\pi^2}=0$ ✓ ⅓

CA Indep.

$x = P(C \cap R')$.

11.2

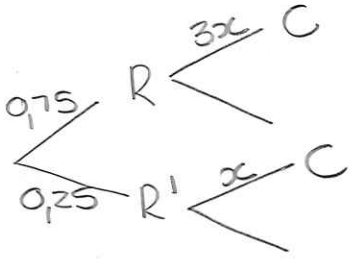
$\frac{3}{4}(3x)+\frac{1}{4}x=\frac{7}{12}$ ✓

$27x+3x=7$

$30x=7$

$x=\frac{7}{30}$

$\therefore$ 28 cups ✓



✓ $\frac{3}{4}(3x)$

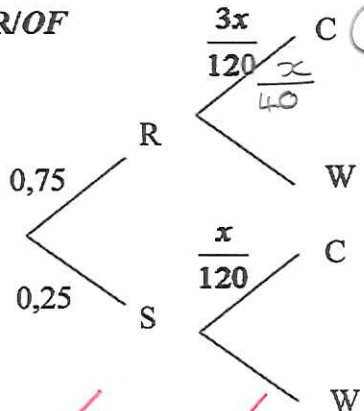
✓ $\frac{1}{4}x$ If X instead of +.

✓ $=\frac{7}{12}$ and adding.

✓answer

(4)

OR/*OF*



x = # Coffee

$\frac{75}{100}\times\left(\frac{3x}{120}\right)+\frac{25}{100}\left(\frac{x}{120}\right)=\frac{7}{12}$ ✓

$\frac{3}{160}x+\frac{1}{480}x=\frac{7}{12}$

$10x=280$

$x=28$ cups of coffee ✓

OR/*OF*

✓ $\frac{75}{100}\times\left(\frac{3x}{120}\right)$

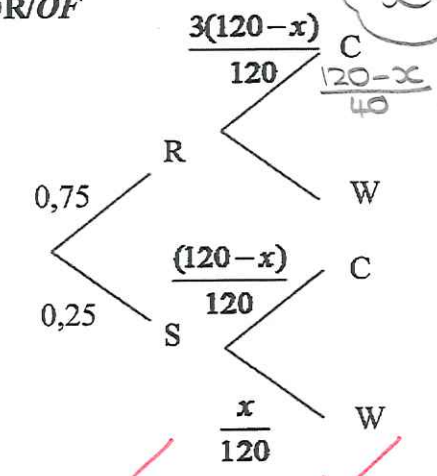
✓ $\frac{25}{100}\left(\frac{x}{120}\right)$

✓ $=\frac{7}{12}$ and adding. else (2/4)

✓answer

(4)

OR/*OF*



x = # bottles

$\frac{75}{100}\times\left(\frac{3(120-x)}{120}\right)+\frac{25}{100}\left(\frac{120-x}{120}\right)=\frac{7}{12}$ ✓

$270-\frac{9}{4}x+30-\frac{1}{4}x=70$

$-\frac{5}{2}x=-230$

$\therefore x=92$ (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)

✓'+✓² must make sense.

QUESTION/*VRAAG* 11

	JUICE	ENERGY DRINKS	TOTAL
Females	a 48	**72** B	**120**
Males	36	54	**90**
Total	**84** E	**126** D	210

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

A/O: 3/3

• ACCEPT: $\frac{72}{120}$ 3/3

11.3.1	$7.6! = 5\,040$ • ACCEPT: $7 \times 6!$ **OR/*OF*** $7! = 5\,040$ ✓✓ • ACCEPT: $7!$	✓✓ answer (2) **OR/*OF*** ✓✓ answer (2)
11.3.2	Possible outcomes: $A \times 6 \times 5 \times B \times 4 \times 3 \times 2 \times 1$ $A \times 6 \times 5 \times 4 \times B \times 3 \times 2 \times 1$ $A \times 6 \times 5 \times 4 \times 3 \times B \times 2 \times 1$ $A \times 6 \times 5 \times 4 \times 3 \times 2 \times B \times 1$ $A \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 \times B$ $5 \times 6! + 4 \times 6! + 3 \times 6! + 2 \times 6! + 1 \times 6!$ $= 6!(5+4+3+2+1)$ $= 6!(15)$ ✓✓ 10800 P(two or more runners finishing after Andrew) $= \frac{6!(15)}{8!}$ ✓ $= \frac{15}{56}$ ✓ Accept $\frac{6!15}{8!}$ $= 0,27$ **OR/*OF*** $\frac{8! - (7!.2 + 2.6.6!)}{8!.2}$ ✓ ✓ ✓ $= \frac{15}{56}$ ✓	✓✓ 6! (15) NB! must be in denominator. ✓ 8! in denominator ✓ $\frac{6!(15)}{8!}$ or $\frac{15}{56}$ (4) **OR/*OF*** See only 1. 8. ✓ 8! in numerator and denominator ✓✓ $(7!.2 + 2.6.6!)$ ✓ $\frac{15}{56}$ (4)
		[16]

TOTAL/*TOTAAL*: 150

$\frac{1}{2} - \frac{7! + 6.6!}{8!}$

$= \frac{15}{56}$.

A B _ _ _ _ _ _

A B _ _ _ _ _ _