LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

NATIONAL

SENIOR CERTIFICATE

GRADE/*GRAAD* 12

MATHEMATICS P1/*WISKUNDE V1*

SEPTEMBER 2023

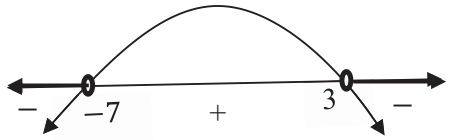
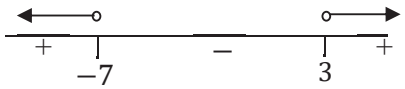
MARKING GUIDELINES/*NASIENRIGLYNE*

MARKS/*PUNTE*: 150

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

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QUESTION/*VRAAG* 1

1.1	1.1.1	$x(7-x)=0$ $x=0$ or/*of* $x=7$	✓ $x=0$ ✓ $x=7$	(2)
	1.1.2	$3x^2-2x-6=0$ $x=\dfrac{-(-2)\pm\sqrt{(-2)^2-4(3)(-6)}}{2(3)}$ $x=-1,12$ or/*of* $x=1,79$	✓ subst in correct formula/*vervang in korrekte formule* ✓ $x=-1,12$, ✓ $x=1,79$ N.B. (-1 mark for incorrect rounding/*-1 vir verkeerde afronding*)	(3)
	1.1.3	$(3-x)(x+7)<0$ CV : $x=3$ or/*of* $x=-7$  $\therefore x<-7$ or/*of* $x>3$ OR/*OF* $(-\infty;-7)$ or/*of* $(3;\infty)$ OR/*OF* $(3-x)(x+7)<0$ $-(x-3)(x+7)<0$ $(x-3)(x+7)>0$ CV: $x=-7$ or/*of* $x=3$  $\therefore x<-7$ or/*of* $x>3$ OR/*OF* $(-\infty;-7)$ or/*of* $(3;\infty)$	✓ critical values/ *kritieke waardes* ✓✓ answer/*antwoord* OR/*OF* ✓ critical values/ *kritieke waardes* ✓✓ answer/*antwoord*	(3) (3)

	1.1.4	$\sqrt[3]{32} = 8^{3x}.2^{6x}$ $32^{\frac{1}{3}} = 8^{3x}.4^{3x}$ $32^{\frac{1}{3}} = (8\times 4)^{3x}$ $32^{\frac{1}{3}} = 32^{3x}$ $3x = \frac{1}{3}$ $x = \frac{1}{9}$ OR / *OF* $\sqrt[3]{32} = 8^{3x}.2^{6x}$ $2^{\frac{5}{3}} = (2^3)^{3x}.2^{6x}$ $2^{\frac{5}{3}} = 2^{9x}.2^{6x}$ $2^{\frac{5}{3}} = 2^{15x}$ $15x = \frac{5}{3}$ $x = \frac{1}{9}$	✓ $32^{\frac{1}{3}} = 8^{3x}.4^{3x}$ ✓ $32^{\frac{1}{3}} = 32^{3x}$ ✓ $3x = \frac{1}{3}$ ✓ $x = \frac{1}{9}$ OR/*OF* ✓ $2^{\frac{5}{3}} = 2^{9x}.2^{6x}$ ✓ $2^{\frac{5}{3}} = 2^{15x}$ ✓ $15x = \frac{5}{3}$ ✓ $x = \frac{1}{9}$	(4) (4)
	1.1.5	$x-4-2\sqrt{x-1}=0$ $x-4=2\sqrt{x-1}$ $(x-4)^2 = (2\sqrt{x-1})^2$ $x^2-8x+16 = 4(x-1)$ $x^2-12x+20=0$ $(x-10)(x-2)=0$ $x=10$ or/*of* $x\neq 2$	✓ isolating the square root/*isoleer vierkants wortel* ✓ squaring both sides/ *kwadreer beide kante* ✓ standard form/*vorm* ✓ $x=10$ or/*of* $x\neq 2$	(4)

1.2		$x-2y=1$ $x=1+2y$.....(1) $x^2-xy+2y^2=2$.....(2) subst (1) into (2) $(1+2y)^2-y(1+2y)+2y^2=2$ $4y^2+4y+1-y-2y^2+2y^2-2=0$ $4y^2+3y-1=0$ $(4y-1)(y+1)=0$ $y=\frac{1}{4}$ or/*of* $y=-1$ $x=\frac{3}{2}$ or/*of* $x=-1$ OR/*OF* $y=\frac{x-1}{2}$.....(1) $x^2-xy+2y^2=2$.....(2) Subst. (1) into (2) $x^2-x\left(\frac{x-1}{2}\right)+2\left(\frac{x-1}{2}\right)^2=2$ $x^2-\frac{x^2-x}{2}+\frac{2x^2-4x+2}{4}=2$ $4x^2-2x^2+2x+2x^2-4x+2-8=0$ $4x^2-2x-6=0$ $2x^2-x-3=0$ $(2x-3)(x+1)=0$ $x=\frac{3}{2}$ or/*of* $x=-1$ $y=\frac{1}{4}$ or/*of* $y=-1$	✓ equation/*vgl* 1 ✓ substitution/*vervang* ✓simpl/*vereenv* ✓ standard form/*vorm* ✓ *y*-values/*waardes* ✓ *x*-values/*waardes* OR/*OF* ✓ equation/*vgl* 1 ✓ substitution/*vervang* ✓ simpl/*vereenv* ✓ standard form/*vorm* ✓ *x*-values/*waardes* ✓ *y*-values/*waardes*	(6) (6)

1.3	1.3.1	Then the amount that should be paid by each friend $=\frac{3500}{x}$ $\therefore$ The amount paid by each friend less four friends $=\frac{3500}{x-4}$ Extra amount paid $=43,75$ $\rightarrow \frac{3500}{x-4}-\frac{3500}{x}=43,75$ $43,75x^2-175x-14000=0$ $x^2-4x-320=0$ $(x-20)(x+16)=0$ $x=20$ or $x\neq -16$ $\rightarrow 20$ friends are going on the trip. OR/*OF* Let the cost per person be y $y=\frac{3\ 500}{x}$ $xy=3\ 500$ $(x-4)(y+43,75)=3\ 500$ $xy-4y+43,75x-175=3\ 500$ $3\ 500-4\left(\frac{3\ 500}{x}\right)+43,75x-175=3\ 500$ $43,75x^2-175x-14\ 000=0$ $x^2-4x-320=0$ $(x-20)(x+16)=0$ $\therefore x=20$ or $x\neq -16$	✓ $\frac{3500}{x}$ ✓ $\frac{3500}{x-4}$ ✓ equation/*vgl* ✓ standard form/*vorm* ✓ values with selection/ *waardes net seleksie* OR/*OF* ✓ $y=\frac{3\ 500}{x}$ ✓equation/*vgl* ✓simplification/ *vereenvoudig* ✓ standard form/*vorm* ✓values with selection/ *waardes met seleksie*	(5) (5)
	1.3.2	Each friend pays: $\frac{3500}{16}=\text{R}218,75$ OR/*OF* Cost $=175+43,75$ $=\text{R}218,75$	✓ answer/*antwoord* OR/*OF* ✓R218,75	(1) (1)
				[28]

QUESTION/*VRAAG* 2

2.1	2.1.1	$d = 7$ $T_n = a + (n-1)d$ $336 = 14 + (n-1)(7)$ $n - 1 = 46$ $n = 47$	✓ $d = 7$ ✓ subst in correct formula/*vervang in korrekte formule* ✓ $n = 47$	(3)
	2.1.2	$S_n = \frac{n}{2}(a + l)$ $S_{47} = \frac{47}{2}(14 + 336)$ $= 8\ 225$ OR/*OF* $S_n = \frac{n}{2}[2a + (n-1)d]$ $S_{47} = \frac{47}{2}[2(14) + (46)(7)]$ $= 8\ 225$	✓ subst in correct formula/*vervang in korrekte formule* ✓ answer/*antwoord* OR/*OF* ✓ subst in correct formula/*vervang in korrekte formule* ✓ answer/*antwoord*	(2) (2)
	2.1.3	$d = 14$ $\therefore T_n + (T_n + 14) = 308$ $2T_n = 294$ $T_n = 147,$ the first term $\therefore$ The next term $= 161$ OR/*OF* $d = 14$ $S_n = \frac{n}{2}[2a + (n-1)d]$ $308 = \frac{2}{2}[2a + (2-1)14]$ $2a = 294$ $a = 147$, the first term $\therefore$ The next term $= 161$	✓ $d = 14$ ✓ method/*metode* ✓ first/*eerste* term ✓ second/*tweede* term OR/*OF* ✓ $d = 14$ ✓ substitution/ *vervanging* ✓ first/*eerste* term ✓ second/*tweede* term	(4) (4)

		OR/*OF* $21+(n-2)(14)+21+(n-1)(14)=308$ $21+14n-28+21+14n-14=308$ $28n=308$ $n=11$ $T_{11}=21+10(14)=161$ $T_{10}=21+9(14)=147$	OR/*OF* ✓ $d=14$ ✓ method/*metode* ✓ $n=11$ ✓ $T_{10}=147$	(4)
2.2		$a+b+c$ $\quad 4a+2b+c$ $\quad 9a+3b+c$ $\quad 68$ $3a+b$ $\quad 21$ $\quad 29$ 8 $\quad 8$ $2a=8$ $a=4$ $5a+b=21$ $5(4)+b=21$ $b=1$ $16a+4b+c=68$ $16(4)+4(1)+c=68$ $c=0$ $\therefore T_n=4n^2+n$	✓ 2nd difference/ *2e verskil* ✓ $2a=8$ ✓ $5a+b=21$ ✓ $16a+4b+c=68$	(4)
				[13]

QUESTION/*VRAAG* 3

3.1	3.1.1	$T_1 = a^2$ $T_2 = (ar)^2$ OR / *OF* $T_2 = a^2r^2$	✓ answer/*antwoord*	(1)
	3.1.2	$\frac{a}{1-r} = 6$.....(1) $\frac{a^2}{1-r^2} = 6$.....(2) $\frac{a^2}{1-r^2} = \left(\frac{a}{1-r}\right)\left(\frac{a}{1+r}\right)$ $6 = 6\left(\frac{a}{1+r}\right)$ $a = 1+r$.....(3) subst. into (1) $\frac{1+r}{1-r} = 6$ $1+r = 6-6r$ $r = \frac{5}{7}$ $a = \frac{12}{7}$	✓ both equations/ *beide vergelykings* ✓ $6 = 6\left(\frac{a}{1+r}\right)$ ✓ equation/*vgl* (3) ✓ substitution/ *vervanging* ✓ value/*waarde* $r = \frac{5}{7}$ ✓ value/*waarde* $a = \frac{12}{7}$	(6)

		OR/*OF* $\frac{a}{1-r}=6$ $a=6(1-r)$.....(1) $\frac{a^2}{1-r^2}=6$ $a^2=6\left(1-r^2\right)$.....(2) From equation (1) $a^2=36(1-r)^2$ $\therefore 36(1-r)^2=6\left(1-r^2\right)$ $36-72r+36r^2=6-6r^2$ $42r^2-72r+30=0$ $7r^2-12r+5=0$ $(7r-5)(r-1)=0$ $r=\frac{5}{7}$ or $r\neq 1$ $a=6\left(1-\frac{5}{7}\right)$ $=\frac{12}{7}$	OR/*OF* ✓ $a=6(1-r)$ ✓ $a^2=6\left(1-r^2\right)$ ✓ $36(1-r)^2=6\left(1-r^2\right)$ ✓ $42r^2-72r+30=0$ ✓ $r=\frac{5}{7}$ or / *of* $r\neq 1$ ✓ $a=\frac{12}{7}$	(6)
	3.1.3	$T_6=a^2r^{10}$ $=\left(\frac{12}{7}\right)^2\left(\frac{5}{7}\right)^{10}$ $=0,10$ OR/*OF* $T_6=\left(ar^5\right)^2$ $=\left[\frac{12}{7}\left(\frac{5}{7}\right)^5\right]^2$ $=\left(\frac{12}{7}\right)^2\left(\frac{5}{7}\right)^{10}$ $=0,10$	✓ $\left(\frac{12}{7}\right)^2\left(\frac{5}{7}\right)^{10}$ ✓ answer/*antwoord* OR/*OF* ✓ $\left(\frac{12}{7}\right)^2\left(\frac{5}{7}\right)^{10}$ OR/*OF* $\left[\frac{12}{7}\left(\frac{5}{7}\right)^5\right]^2$ ✓ answer/*antwoord*	(2) (2)

3.2		water left after 1 hour $= \frac{99}{100} \times 50$ $\therefore a = 50(0,99), \quad r = 0,99$ $T_n = ar^{n-1}$ $T_8 = 50(0,99)(0,99)^7$ $= 50(0,99)^8$ $= 46,14$ 46,14 litres of water will be left after eight hours OR/*OF* water evaporated after an hour $= 1\%$ of $50 = 0,5$ water evaporated after 2 hours $= 1\%$ of $49,5 = 0,495$ water evaporated after 3 hours $= 1\%$ of $49,005 = 0,49005$ $a = 0,5 \quad r = 0,99$ $S_n = \frac{a(r^n - 1)}{r - 1}$ $S_8 = \frac{0,5(0,99^8 - 1)}{0,99 - 1}$ $= 3,86$ $\therefore$ water that will be left after eight hours $= 50 - 3,86$ $= 46,14$ liters OR/*OF* $T_0 = 50$ $T_1 = 50(0,99)$ $T_2 = 50(0,99)(0,99)$ $T_8 = 50(0,99)(0,99)^7$ $= 50(0,99)^8$ $= 46,14$ litres	✓ $a = 50(0,99)$ ✓ subst in correct formula/*vervang in korrekte formule* ✓ 46,14 litres OR/*OF* ✓ $a = 0,5$ ✓ subst in correct formula/*vervang in korrekte formule* ✓ 46,14 litres OR/*OF* ✓ $T_1 = 50(0,99)$ ✓ substitution/ *vervanging* ✓ answer/*antwoord*	(3) (3) (3)
				[12]

QUESTION/*VRAAG* 4

4.1	4.1.1	$p=-1$ $q=-3$	✓ value/*waarde p* ✓ value/*waarde q*	(2)
	4.1.2	$f(x)=\frac{a}{x-1}-3$ subs $(0\ ;\ -5)$ $-5=\frac{a}{0-1}-3$ $-5=-a-3$ $a=2$	✓subst. *p* and *q*/ *verv. p en q* ✓ subst/*verv* $(0\ ;\ -5)$ ✓ value/*waarde a*	(3)
	4.1.3	f is translated 6 units up and 2 units to the right to form g.	✓ 6 units up/ *eenhede op* ✓ 2 units to the right/ *eenhede na regs*	(2)
	4.1.4	$y=3$	✓ answer/*antwoord*	(1)
4.2	4.2.1	$x>0$	✓ answer/*antwoord*	(1)
	4.2.2	$y=\log_b x$ $b^y=x$ $b^{-2}=25$ $b=\frac{1}{5}$ $f(x)=\log_{\frac{1}{5}} x$	✓ subst/*verv* $(25\ ;\ -2)$ ✓ answer/*antwoord*	(2)
	4.2.3	$y=\log_{\frac{1}{5}} x$ $x=\log_{\frac{1}{5}} y$ $y=\left(\frac{1}{5}\right)^x$	✓ swop *x* and *y*/ *ruil x en y* ✓ answer/*antwoord*	(2)
	4.2.4	$x>-5$	✓✓ answer/*antwoord*	(2)
				[15]

QUESTION/*VRAAG* 5

5.1		$y = a(x+1)(x+5)$ $5 = a(1)(5)$ $a = 1$ $y = (x+1)(x+5)$ $y = x^2 + 6x + 5$	✓ subst/*verv* $(-5\ ;\ 0)$ & $(-1\ ;\ 0)$ ✓ subst/*verv* $(0\ ;\ 5)$ ✓ value/*waarde a*	(3)
5.2		$x^2 + 6x + 5 = 2x + 10$ $x^2 + 4x - 5 = 0$ $(x+5)(x-1) = 0$ $x \neq -5$ or $x = 1$ $\therefore y = 2(1) + 10 = 12$ OR $y = (1)^2 + 6 + 5 = 12$ Q(1 ; 12)	✓ equating/*gelykstel* ✓ standard form/*vorm* ✓ x-values with selection/*x-waardes met seleksie* ✓ y-value/*waarde*	(4)
5.3		For turning point: $f'(x) = 2x + 6 = 0$ $x = -3$ Then $f(-3) = (-3)^2 + 6(-3) + 5 = -4$ -4 is minimum value. Therefore, $f(x) \neq -5$ for all value of x OR/*OF* Axis of symmetry: $x = -\frac{b}{2a} = -\frac{6}{2} = -3$ $y = (-3)^2 + 6(-3) + 5 = -4$ $f(x) = -4$ is minimum at $x = -3$ $-5 < -4$, therefore, $(x) \neq -5$ for all x	✓ $x = -3$ ✓ value/*waarde y* ✓ conclusion/ *gevolgtrekking* OR/*OF* ✓ x-value//*waardes* ✓ value/*waarde y* ✓ conclusion/ *gevolgtrekking*	(3) (3)
5.4	5.4.1	$SR = 2x + 10 - (x^2 + 6x + 5)$ $= -x^2 - 4x + 5$ $\frac{dSR}{dx} = -2x - 4 = 0$ $x = -2$ $f'(x) = 2x + 6$ $\therefore f'(-2) = 2$	✓ SR ✓ value/*waarde x* ✓ $f'(x)$ ✓ $f'(-2)$	(4)

		OR / *OF* $\text{SR} = 2x+10-(x^2+6x+5)$ $= -x^2-4x+5$ max SR at $x = \dfrac{-(-4)}{2(-1)}$ $= -2$ $f'(x) = 2x+6$ $\therefore f'(-2) = 2$	OR/*OF* ✓ $-x^2-4x+5$ ✓ $x=-2$ ✓ $f'(x)=2x+6$ ✓ $f'(-2)=2$	(4)
	5.4.2	When $x=-2$ $y = x^2+6x+5$ $y = (-2)^2+6(-2)+5 = -3$ $\text{R}(-2;-3)$ and $m=2$ $y = mx+c$ $-3 = 2(-2)+c$ $c = 1$ $y = 2x+1$ OR / *OF* When $x=-2$ $y = x^2+6x+5$ $y = (-2)^2+6(-2)+5 = -3$ $\text{R}(-2;-3)$ and $m=2$ $y-(-3) = 2[x-(-2)]$ $y+3 = 2x+4$ $y = 2x+1$	✓ y-value/*waarde* ✓ substitution/ *vervanging* ✓ answer/*antwoord* OR/*OF* ✓ y-value//*waarde* ✓ substitution/ *vervanging* ✓ answer/*antwoord*	(3) (3)
5.5		$g(x) = 2x+10$ $g^{-1}(x) = \dfrac{x}{2}-\dfrac{10}{2}$ $g(x)-g^{-1}(x) = 15$ for $x=15$ $\therefore g(x)-g^{-1}(x) > 15$ for $x>0$	✓ $g^{-1}(x)$ ✓✓ $x>0$	(3)
				[20]

QUESTION/*VRAAG* 6

6.1		$1+i_{eff}=l+i_{nom}$ $1+i_{eff}=\left(1+\frac{0,05}{12}\right)^{12}$ $i_{eff}=0,05116...$ $=5,12\%$	✓ substitution/ *vervanging* ✓ answer/*antwoord*	(2)
6.2	6.2.1	$P=\frac{x\left[1-(1+i)^{-n}\right]}{i}$ $800\ 000=\frac{x\left[1-\left(1+\frac{0,1075}{12}\right)^{-300}\right]}{\frac{0,1075}{12}}$ $x=\ 7\ 696,74$ Matome's monthly payments = R7 696,74	✓ value/*waarde n* ✓ value/*waardes i* ✓ subst in correct formula/*vervang in korrekte formule* ✓ answer/*antwoord*	(4)
	6.2.2	Balance after 240th payment: $\text{Balance}\ =\ x(1+i)^n-\frac{x\left[(1+i)^n-1\right]}{i}$ $=800\ 000\left(1+\frac{0,1075}{12}\right)^{240}-\frac{7\ 696,74\left[\left(1+\frac{0,1075}{12}\right)^{240}-1\right]}{\frac{0,1075}{12}}$ $=356\ 036,20$ OR/*OF* $P=\frac{x\left[1-(1+n)^{-n}\right]}{i}$ $=\frac{7696,74\left[1-\left(1+\frac{0,1075}{12}\right)^{-60}\right]}{\frac{0,1075}{12}}$ $=356\ 034,62$ Balance was R356 034, 62	✓✓ Tick for each term/ *merk elke term* ✓ answer/*antwoord* OR/*OF* ✓ $n=-60$ ✓ subst in correct formula/*vervang in korrekte formule* ✓ answer/*antwoord*	(3) (3)

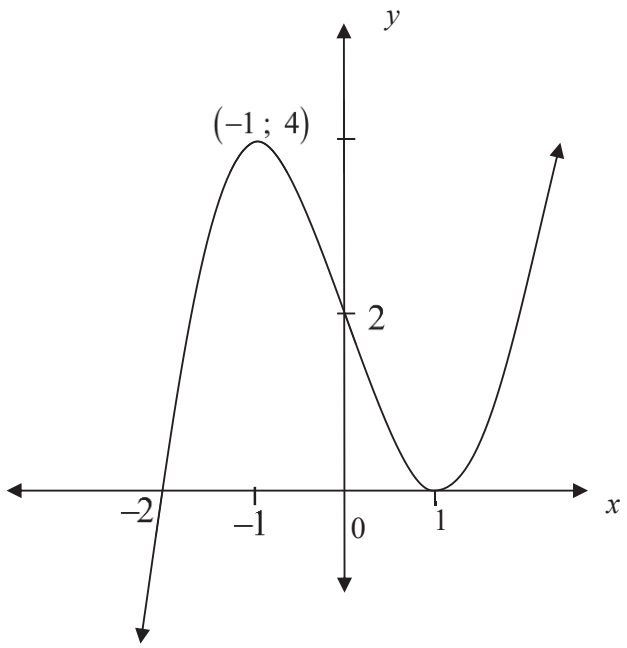
	6.2.3	The balance after missing 6 instalments: $A = P(1+i)^n$ $= 356\ 034,62\left(1+\frac{0,1075}{12}\right)^6$ $= 375\ 605,22$	✓ subst in correct formula/*vervang in korrekte formule* ✓ answer/*antwoord*	
		The number of payments: $375\ 605,22 = \frac{9\ 000\left[1-\left(1+\frac{0,1075}{12}\right)^{-n}\right]}{\frac{0,1075}{12}}$ $-n = \log_{\left(1+\frac{0,1075}{12}\right)}\left[1-\frac{375\ 605,22\left(\frac{0,1075}{12}\right)}{9\ 000}\right]$ $n = 52,5$ Yes, Matome was able to settle the loan in time. He settled the loan in 53 months instead of 54 months.	✓ subst in correct formula/*vervang in korrekte formule* ✓ value/*waarde n* ✓ conclusion/	(5)
		OR/*OR* $A = P(1+i)^n$ $= 356\ 034,62\left(1+\frac{0,1075}{12}\right)^6$ $= 375\ 605,2205$ $P = \frac{x\left[1-(1+i)^{-n}\right]}{i}$ $375\ 605,2205 = \frac{x\left[1-\left(1+\frac{0,1075}{12}\right)^{-54}\right]}{\frac{0,1075}{12}}$ $x = 8\ 803,68$ Yes, Matome paid more than the required amount.	OR/*OF* ✓ subst in correct formula/*vervang in korrekte formule* ✓ answer/*antwoord* ✓ subst in correct formula/*vervang in korrekte formule* ✓ answer/*antwoord* ✓ conclusion/ *gevolgtrekking gevolgtrekking*	(5)
				[14]

QUESTION/*VRAAG* 7

7.1		$f(x)=4x^2-x$ $f(x+h)=4(x+h)^2-(x+h)$ $=4x^2+8xh+4h^2-x-h$ $f'(x)=\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$ $=\lim_{h\to 0}\frac{4x^2+8xh+4h^2-x-h-(4x^2-x)}{h}$ $=\lim_{h\to 0}\frac{8xh+4h^2-h}{h}$ $=\lim_{h\to 0}\frac{h(8x+4h-1)}{h}$ $=\lim_{h\to 0}(8x+4h-1)$ $=8x-1$ OR/*OF* $f'(x)=\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$ $=\lim_{h\to 0}\frac{4(x+h)^2-(x+h)-(4x^2-x)}{h}$ $=\lim_{h\to 0}\frac{4x^2+8xh+4h^2-x-h-4x^2+x}{h}$ $=\lim_{h\to 0}\frac{8xh+4h^2-h}{h}$ $=\lim_{h\to 0}\frac{h(8x+4h-1)}{h}$ $=\lim_{h\to 0}(8x+4h-1)$ $=8x-1$	✓ expansion/*uitbrei* ✓ correct substitution/ *korrekte vervanging* ✓ simplification/ *vereenvoudig* ✓ common factor/ *gemeensk faktor* ✓ answer/*antwoord* OR/*OF* ✓ correct substitution ✓ expansion ✓ simplification/ *vereenvoudig* ✓ common factor ✓ answer/*antwoord*	(5) (5)
7.2	7.2.1	$y=-x^3-16x^2+6x$ $\frac{dy}{dx}=-3x^2-32x+6$	✓ $-3x^2$ ✓ $-32x$ ✓ 6	(3)

	7.2.2	$f(x)=\frac{4}{5x^{-3}}-\frac{3}{\sqrt[3]{x^2}}$ $=\frac{4}{5}x^3-3x^{-\frac{2}{3}}$ $f'(x)=\frac{12}{5}x^2+2x^{-\frac{5}{3}}$	✓ $\frac{4}{5}x^3$ ✓ $-3x^{-\frac{2}{3}}$ ✓ $\frac{12}{5}x^2$ ✓ $2x^{-\frac{5}{3}}$	(4)
				[12]

QUESTION/*VRAAG* 8

8.1			✓ *x*-intercepts/*afsnitte* ✓ y- intercept/*afsnit* ✓ turning points/*DP* ✓ shape/*vorm*	(4)
8.2		$y=a(x-1)^2(x+2)$ $2=a(-1)^2(2)$ $2=2a$ $a=1$ $f(x)=(x^2+x-2)(x-1)$ $=x^3-3x+2$	✓ subst in correct formula/*vervang in korrekte formule* ✓ subst/*verv* (0 ; 2) ✓ $a=1$ ✓ $b=0$ ✓ $c=-3$ & $d=2$	(5)

8.3		(1 ; 0) and/*en* (4 ; 0)	✓ (1 ; 0) ✓ (4 ; 0)	(2)
8.4		$p > 4$ or/*of* $p < 0$	✓✓ answer/*antwoord*	(2)
				[13]

QUESTION/*VRAAG* 9

9.1		The area of the square $= x^2$ and the area of the circle $= \pi r^2$ Total area (A) $= x^2 + \pi r^2$.....(1) Perimeter of the square + circumference of the circle $= 12$ $4x + 2\pi r = 12$ $r = \frac{6-2x}{\pi}$.....(2) subst. (2) into (1) $A = x^2 + \pi\left(\frac{6-2x}{\pi}\right)^2$ $A = x^2 + \frac{4x^2 - 24x + 36}{\pi}$ $A = \frac{4x^2 + \pi x^2 - 24x + 36}{\pi}$ $A = \frac{(4+\pi)x^2 - 24x + 36}{\pi}$	✓ $A = x^2 + \pi r^2$ ✓ $4x + 2\pi r$ ✓ equating to 12 ✓ $r = \frac{6-2x}{\pi}$ ✓ substitution/ *vervanging* ✓ simplification/ *vereenvoudig*	(6)

		OR/*OF*	OR/*OF*	
		The area of the square $= x^2$	✓ x^2	
		remaining wire $= 12 - 4x$	✓ $12 - 4x$	
		$2\pi r = 12 - 4x$		
		$r = \dfrac{12-4x}{2\pi}$	✓ $r = \dfrac{12-4x}{2\pi}$	
		area of the circle $= \pi\left(\dfrac{12-4x}{2\pi}\right)^2$		
		$= \pi\left(\dfrac{6-2x}{\pi}\right)^2$		
		$= \dfrac{36-24x+4x^2}{\pi}$	✓ $\dfrac{36-24x+4x^2}{\pi}$	
		Total area = area of a square + area of a circle	✓	
		Total area (A) $= x^2 + \dfrac{36-24x+4x^2}{\pi}$	$x^2 + \dfrac{36-24x+4x^2}{\pi}$	
		$= \dfrac{\pi x^2 + 36 - 24x + 4x^2}{\pi}$	✓	
		$= \dfrac{(\pi+4)x^2 - 24x + 36}{\pi}$	$\dfrac{\pi x^2 + 36 - 24x + 4x^2}{\pi}$	(6)

9.2		Area is minimum when: $x = \dfrac{\dfrac{24}{\pi}}{2\left(\dfrac{\pi+4}{\pi}\right)}$ $x = 1,68$ OR/*OF* For minimum area: $\mathrm{A}(x) = \dfrac{(4+\pi)}{\pi}x^2 - \dfrac{24}{\pi}x + \dfrac{36}{\pi}$ $\mathrm{A}'(x) = 2\left(\dfrac{4+\pi}{\pi}\right)x - \dfrac{24}{\pi} = 0$ $2\left(\dfrac{4+\pi}{\pi}\right)x = \dfrac{24}{\pi}$ $x = 1,68$ m For minimum area, the side of the square should be 1, 68 m	✓ method/*metode* ✓ answer/*antwoord* OR/*OF* ✓ method/*metode* ✓ answer/*antwoord*	(2) (2)
				[8]

QUESTION/*VRAAG* 10

10.1	10.1.1	$P(G) = \frac{50}{100} = \frac{1}{2} = 0,5$	✓ answer/*antwoord*	(1)
	10.1.2	$P(S) = \frac{35}{100} = \frac{7}{20} = 0,35$	✓ answer/*antwoord*	(1)
	10.1.3	$P(G \text{ and } S) = \frac{15}{100} = 0,15$ $P(S) \times P(G) = \frac{1}{2} \times \frac{7}{20} = \frac{7}{40} = 0,175$ $P(G \text{ and } S) \neq P(G) \times P(S)$ Events G and S are not independent	✓ 0, 15 ✓ 0, 175 ✓ Conclusion/ *gevolgtrekking*	(3)
10.2		$4 \times 7 \times 7 \times 3$ $= 588$	✓ $4 \times 7 \times 7 \times 3$ ✓ answer/*antwoord*	(2)
10.3	10.3.1	$7! = 5\,040$	✓$7!$ or/*of* $5\,040$	(1)
	10.3.2	$3 \times 5! \times 4 = 1\,440$	✓4 ✓$3 \times 5!$ ✓answer/*antwoord*	(3)
	10.3.3	The number of ways of arranging all the letters with all the three vowels following each other : $3! \times 5! = 720$ $\therefore$ P(all vowels will not follow each other) $= 1 - \frac{720}{5\,040} = \frac{6}{7}$	✓$3!$ ✓$3! \times 5!$ ✓$1 - \frac{720}{5\,040}$ ✓ $\frac{6}{7}$	(4)
				[15]

TOTAL/*TOTAAL* : 150