Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE/**
*NASIONALE
SENIOR SERTIFIKAAT*

GRADE 12/*GRAAD 12*

SEPTEMBER 2019

**MATHEMATICS P1/*WISKUNDE V1*
MARKING GUIDELINE/*NASIENRIGLYN***

MARKS/*PUNTE*: **150**

This marking guideline consists of 19 pages./
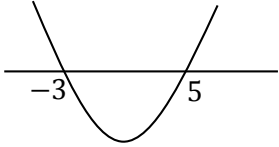*Hierdie nasienriglyn bestaan uit 19 bladsye.*

NOTE/*LET WEL*:

- If a candidate answers a question TWICE, mark the FIRST attempt ONLY.
  Indien 'n kandidaat 'n vraag TWEE keer beantwoord, merk SLEGS die EERSTE poging.
- Consistent accuracy applies in ALL aspects of the marking guideline.
  Volgehoue akkuraatheid geld deurgaans in ALLE aspekte van die nasienriglyn.
- If a candidate crossed out an attempt of a question and did not redo the question, mark the crossed-out attempt.
  Indien 'n kandidaat 'n poging vir 'n vraag deurgetrek het en nie die vraag weer beantwoord het nie, merk die poging wat deurgetrek is.
- The mark for substitution is awarded for substitution into the correct formula.
  Die punt vir substitusie word vir substitusie in die korrekte formule toegeken.

QUESTION 1/*VRAAG 1*

1.1.1	$x^2 - 3x - 4 = 0$ $(x + 1)(x - 4) = 0$ $x = -1$ or/*of* 4 Answers only: *Antwoorde alleen* (2/3) **OR/OF** Can use quadratic formula / *Kan kwadratiese formule gebruik* $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \dfrac{-(-3) \pm \sqrt{(-3)^2 - 4(1)(-4)}}{2(1)}$ $= \dfrac{3 \pm \sqrt{25}}{2}$ $\therefore x = 4$ *or / of* $x = -1$	✓ factors/*faktore* ✓ $x = -1$ ✓ $x = 4$ ✓ correct substitution / *korrekte vervanging* ✓✓ answers / *antwoorde* (3)
1.1.2	$2x^2 - x - 7 = 0$ $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \dfrac{-(-1) \pm \sqrt{(-1)^2 - (4)(2)(-7)}}{2(2)}$ $= \dfrac{1 \pm \sqrt{57}}{4}$ Penalise 1 mark for incorrect rounding off *Penaliseer 1 punt vir verkeerde afronding* $x = 2,14$ or/*of* $-1,64$	✓ substitution/*vervanging* ✓ $x = 2,14$ ✓ $x = -1,64$ (3)

1.1.3	$5^{x+1} - 5^x = 2500$	
	$5^x.5^1 - 5^x = 2500$	
	$5^x(5-1) = 2500$	✓ factorisation/*faktorisering*
	$5^x.4 = 2500$	
	$5^x = 625$	✓ $5^x = 625$
	$5^x = 5^4$	
	$\therefore x = 4$	✓ $x = 4$
		(3)
1.1.4	$(x-3)(x+1) < 12$	
	$x^2 - 2x - 3 - 12 < 0$	
	$x^2 - 2x - 15 < 0$	✓ standard form/*standaardvorm*
	$(x-5)(x+3) < 0$	✓ factorisation/*faktorisering*
	OR/*OF*	
		✓✓ $-3 < x < 5$ (accuracy) (*akkuraatheid*)
	$-3 < x < 5$ OR / *OF* $x \in (-3;5)$	(4)
1.2	$y = 2x - 1$ .....(1)	✓ $y = 2x - 1$
	$3x^2 - xy - y^2 = 1$ .....(2)	
	(1) into (2)	
	$3x^2 - x(2x-1) - (2x-1)^2 = 1$	✓ substitution/*vervanging*
	$3x^2 - 2x^2 + x - (4x^2 - 4x + 1) = 1$	
	$3x^2 - 2x^2 + x - 4x^2 + 4x - 1 - 1 = 0$	
	$-3x^2 + 5x - 2 = 0$	✓ standard form/*standaardvorm*
	$3x^2 - 5x + 2 = 0$	
	$(3x-2)(x-1) = 0$	✓ factorisation/*faktorisering*
	$\therefore x = \dfrac{2}{3}$ or/of $x = 1$	✓ x-values/*waardes*
	$y = 2\left(\dfrac{2}{3}\right) - 1$ or/of $y = 2(1) - 1$	
	$y = \dfrac{1}{3}$ or/of $y = 1$	✓ y-values/*waardes*
		(6)

OR/*OF*	$\checkmark\ x = \dfrac{y+1}{2}$
$x = \dfrac{y+1}{2}$ ...(1)	
$3x^2 - xy - y^2 = 1$ ...(2)	$\checkmark$ substitution/*vervanging*
(1) into (2),	
$3\left(\dfrac{y+1}{2}\right)^2 - y\left(\dfrac{y+1}{2}\right) - y^2 = 1$	
$3\left(\dfrac{y^2+2y+1}{4}\right) - \dfrac{y^2+y}{2} - y^2 = 1$	
$3y^2 + 6y + 3 - 2y^2 - 2y - 4y^2 - 4 = 0$	
$-3y^2 + 4y - 1 = 0$	$\checkmark$ standard form/*standaardvorm*
$3y^2 - 4y + 1 = 0$	
$(3y-1)(y-1) = 0$	$\checkmark$ factorisation/*faktorisering*
$\therefore y = \dfrac{1}{3}$ or $y = 1$ /*of*	$\checkmark$ y-values/*waardes*
$x = \left(\dfrac{\frac{1}{3}+1}{2}\right)$ or/*of* $x = \left(\dfrac{1+1}{2}\right)$	
$x = \dfrac{2}{3}$ or/*of* $x = 1$	$\checkmark$ x-values/*waardes* (6)
1.3 $f(x) = x^2 - 2px + 8 + 2p$	
For equal roots:*Vir gelyke wortels* :	
$b^2 - 4ac = 0$	$\checkmark$ $b^2 - 4ac = 0$
$(-2p)^2 - 4(1)(2p+8) = 0$	$\checkmark$ substitution/*vervanging*
$4p^2 - 8p - 32 = 0$	
$p^2 - 2p - 8 = 0$	
$(p+2)(p-4) = 0$	
$\therefore p = -2$ or /*of* $p = 4$	$\checkmark$ $p - values$ / *waardes*
but / *maar* : $p < 0 \Rightarrow p = -2$	
So, $f(x) = x^2 + 4x + 4$	
$\therefore h(x) = x^2 + 4x + 1$	$\checkmark$ $h(x) = x^2 + 4x + 1$
$= x^2 + 4x + 4 - 4 + 1$	
$= (x+2)^2 - 3$	$\checkmark$ answer in coordinate form/
$\therefore TP : (-2;-3)$	*antwoord in koördinaatvorm* (5)

1.3	**OR/*OF***	$\checkmark b^2 - 4ac = 0$
		$\checkmark$ substitution/*vervanging*
	$b^2 - 4ac = 0$	
	$(-2p)^2 - 4(1)(8 + 2p) = 0$	
	$4p^2 - 8p - 32 = 0$	
	$p^2 - 2p - 8 = 0$	
	$(p - 4)(p + 2) = 0$	
	$\therefore p \neq 4$ or/*of* $p = -2$	$\checkmark$ *p* values/*waardes*
	$\therefore$ Turning point of / *Draaipunt van f is* $(-2 ; 0)$	$\checkmark (-2 ; 0)$
	$\therefore$ Turning point of / *Draaipunt van h is* $(-2 ; -3)$	$\checkmark (-2 ; -3)$
		(5)
		[24]

QUESTION 2/VRAAG 2
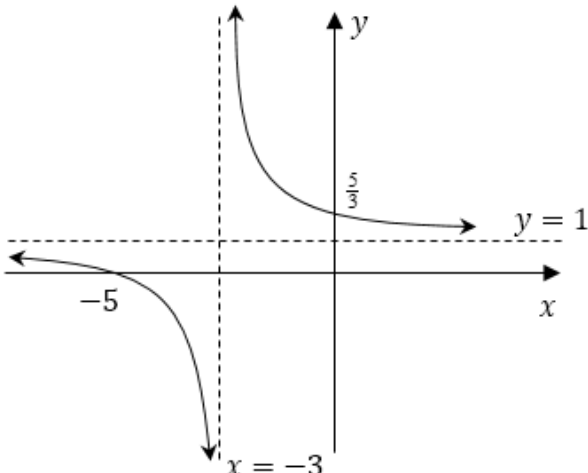
2.1.1	$-17;-27$	✓ both terms/*beide terme* (1)
2.1.2	$2a = -2$ $\quad$ $3a + b = -2$ $\quad$ $a + b + c = 3$ $\therefore a = -1$ $\quad$ $3(-1) + b = -2$ $\quad$ $-1 + 1 + c = 3$ $\qquad\qquad\qquad\qquad \therefore b = 1$ $\qquad\qquad \therefore c = 3$ $T_n = -n^2 + n + 3$	✓ $a = -1$ ✓ $b = 1$ ✓ $c = 3$ ✓ $T_n = -n^2 + n + 3$ (4)
2.1.3	$-n^2 + n + 3 = -809$ $n^2 - n - 812 = 0$ $(n - 29)(n + 28) = 0$ $\therefore n = 29$	✓ equating T_n to -809 $\quad$ *stel* T_n *gelyk aan* -809 ✓ factors/*faktore* ✓ choosing/*kies* $n = 29$ (3)
2.2.1	$T_n = 2n - 3$ $T_{53} = 2(53) - 3$ $\quad = 103$ **OR/OF** $T_{53} = a + 52d$ $\quad = -1 + 52(2)$ $\quad = 103$	✓ substituting into T_{53} / $\quad$ *vervanging in* T_{53} ✓ answer/*antwoord* ✓ substituting into T_{53} $\quad$ *vervanging in* T_{53} ✓ 103 (2)
2.2.2	$S_n = \frac{n}{2}[2a + (n-1)d]$ $S_{29} = \frac{29}{2}[2(-1) + 28(2)]$ $\quad = 783$	✓ substitution into correct formula $\quad$ *vervanging in korrekte formule* ✓ 783 (2)
2.2.3	$\displaystyle\sum_{n=1}^{29}(2n - 3) = 783$	✓ $\displaystyle\sum_{n=1}^{29}$ ✓ $2n - 3$ (2)

2.3	$T_4 = a + 3d$ and/*en* $T_{10} = a + 9d$	✓ $T_{10} - T_4 = 6d$
	$\therefore T_{10} - T_4 = 6d$	✓ $6d = (8x - 2y) - (2x + y)$
	$\quad 6d = (8x - 2y) - (2x + y)$	✓ $d = x - \frac{1}{2}y$
	$\qquad = 6x - 3y$	✓ substitution/*vervanging*
	$\therefore d = x - \frac{1}{2}y$	
	$\quad T_4 = a + 3d$	✓ value of a / *waarde van a*
	$\quad 2x + y = a + 3(x - \frac{1}{2}y)$	
	$\quad 2x + y = a + 3x - \frac{3}{2}y$	(5)
	$\therefore a = \frac{5}{2}y - x$	**[19]**

QUESTION 3/*VRAAG 3*

3.1	$T_1 = (x - 1)$	
	$T_2 = (x - 1)^2$	
	$\therefore r = x - 1$	
	for convergence : / *vir konvergensie*	
	$-1 < r < 1,$	✓ $-1 < r < 1$
	$\therefore -1 < x - 1 < 1$	
	$0 < x < 2$	✓ answer/*antwoord*
		(2)
3.2	When / *Wanneer* : $x = \frac{2}{3}$,	
	$p = (\frac{2}{3} - 1) + (\frac{2}{3} - 1)^2 + (\frac{2}{3} - 1)^3 + ...$	✓ substituting for x *vervanging vir x*
	$p = (-\frac{1}{3}) + (\frac{1}{9}) + (-\frac{1}{27}) + ...$	✓ values for a and r *waardes vir a en r*
	$\therefore a = -\frac{1}{3}$ and / *en* $r = -\frac{1}{3}$	
	$\therefore S\infty = \dfrac{a}{1 - r}$	✓ substituting into S_∞ formula *vervanging in S_∞ formule*
	$\qquad = \dfrac{-\frac{1}{3}}{1 - (-\frac{1}{3})}$	✓ answer/*antwoord*
		(4)
	$\qquad = -\frac{1}{4}$	**[6]**

QUESTION 4/*VRAAG 4*

4.1	$x = -3$ $y = 1$	✓ $x = -3$ ✓ $y = 1$ (2)
4.2	$1 + \dfrac{2}{x+3} = 0$ $\dfrac{2}{x+3} = -1$ $2 = -x - 3$ $x = -5$ $y = 1 + \dfrac{2}{0+3}$ $= \dfrac{5}{3}$	✓ substitution/*vervanging* ✓ *x*-intercept/*x-afsnit* ✓ *y*-intercept/*y-afsnit* (3)
4.3		✓ asymptotes / *asimptote* ✓ *x*-intercept / *x-afsnit* ✓ *y*-intercept / *y-afsnit* ✓ shape / *vorm* (4)
4.4	$h(x) = \dfrac{-2}{x+3} - 1$ point of intersection of asymptotes/ *snypunt van asimptote* $(-3; -1)$ or/*of* $y = -(-x - p) + q$ $y = \left(x - (-3)\right) - 1$ *or/of* $y = -(-x-3) - 1$ $y = x + 2$	✓ $h(x) = \dfrac{-2}{x+3} - 1$ ✓ substitute point of intersection of asymptotes / *vervang die snypunt van asimptote* ✓✓ answer/*antwoord* (4)

4.4	**OR/OF** $h(x) = \dfrac{-2}{x+3} - 1$ point of intersection of asymptotes/ *snypunt van asimptote* $(-3; -1)$ $y = x + k$ $-1 = -3 + k$ $k = 2$ $\therefore y = x + 2$	✓ $h(x) = \dfrac{-2}{x+3} - 1$ ✓ substitute point of intersection of asymptotes / *vervang die snypunt van asimptote* ✓✓ answer/*antwoord* (4) **[13]**

QUESTION 5/*VRAAG 5*
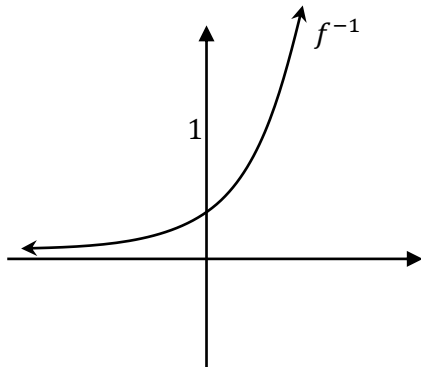
5.1	$(0; -8)$	✓ answer / *antwoord* (1)
5.2	$y = mx + c$ $y = mx - 8$ $10 = 9m - 8$ $m = 2$ $\therefore y = 2x - 8$ **OR/OF** $m_{TQ} = \dfrac{10 - (-8)}{9 - 0}$ $m = 2$ $\therefore y = 2x - 8$	✓ $c = -8$ ✓ substituting T(9;10) into equation of line / *vervanging van* T(9;10) *in vergelyking van lyn* ✓ equation / *vergelyking* ✓ substituting T and Q into m_{TQ} *vervanging van* T *en* Q *in* m_{TQ} ✓ $m=2$ ✓ equation (3)
5.3	$y = x^2 - 7x - 8$ $= x^2 - 7x + (-\tfrac{7}{2})^2 - 8 - (-\tfrac{7}{2})^2$ $= (x - \tfrac{7}{2})^2 - \tfrac{81}{4}$	✓ completing the square / *vierkantsvoltooiing* ✓ equation / *vergelyking* (2)
5.4	$\left(\tfrac{7}{2}; -\tfrac{81}{4}\right)$	✓ x- coordinate/*koördinaat* ✓ y- coordinate/*koördinaat* (2)

5.5	Ave gradient/Gem. gradiënt	
	$$\frac{y-10}{x-9}=1$$	✓ method/*metode*
	$y-10=x-9$	
	$y=x+1$	✓ making y the subject *maak y die onderwerp*
	$f(x)=x^2-7x-8$	✓ equating 2 equations
	$x+1=x^2-7x-8$	*gelykstel van 2 vergelykings*
	$0=x^2-8x-9$	✓ factors/*faktore*
	$0=(x-9)(x+1)$	
	$\therefore x=9 \text{ or}/\text{of } -1$	✓ specifying coordinates for W /
	$y=10 \text{ or}/\text{of } 0$	*spesifiseer W se koördinate*
	$\therefore W(-1\,;0)$	
	OR/*OF*	
	$$\frac{x^2-7x-8-(10)}{x-(9)}=1$$	✓ $\dfrac{x^2-7x-8-(10)}{x-(9)}$
		✓ equating to 1 / *gelykstel aan* 1
	$x^2-7x-18=x-9$	✓ standard form/*standaardvorm*
	$x^2-8x-9=0$	✓ factors/*faktore*
	$(x-9)(x+1)=0$	
	$x=9 \text{ or}/\text{of } x=-1$	✓ specifying coordinates for W.
	$y=10 \text{ or}/\text{of } y=0$	*spesifiseer W se koördinate*
	$\therefore W(-1\,;0)$	
	OR/*OF*	
	$f'(x)=2x-7$	✓ $f'(x)=2x-7$
	$f'(9)=2(9)-7$	
	$\quad =11$	✓ $f'(9)=11$
	$$\frac{f'(9)+f'(x)}{2}=1$$	✓ average gradient = 1 *gemiddelde gradiënt = 1*
	$$\frac{11+2x-7}{2}=1$$	✓ substitution/*vervanging*
	$$\frac{2x+4}{2}=1$$	
	$x+1=1$	
	$x=-1$	
	$y=0$	✓ coordinates of W /
	$\therefore W(-1;0)$	*koördinate van W*
		(5)

5.6	$x^2 - 7x - 8 = 0$	
	$(x - 8)(x + 1) = 0$	
	$\therefore \text{P}(-1;0) \text{ and} / en \text{ R}(8;0)$	✓ x intercepts of f x-afsnitte van f
	$y = 2x - 8$	
	$0 = 2x - 8$	✓ x intercept of g x-afsnit van g
	$\therefore \text{V}(4;0)$	
		✓ $x < -1$ accuracy/*akkuraatheid*
	$\therefore x < -1$ or / *of* $4 < x < 8$	✓ $4 < x < 8$ accuracy/
	OR / OF	*akkuraatheid*
	$x \in (-\infty; -1) \cup (4;8)$	(4) **[17]**

QUESTION 6/*VRAAG 6*

6.1	$f(x) = \log_m x$	✓ substitution/*vervanging*
	$\quad 3 = \log_m 64$	
	$\quad m^3 = 64$	✓ answer/*antwoord*
	$\quad m^3 = 4^3$	(2)
	$\therefore m = 4$	
6.2	$f(x) = \log_4 x$	✓ interchanging x and y *omruiling van x en y*
	$\therefore f^{-1} : x = \log_4 y$	
		✓ answer / *antwoord*
	$y = 4^x$	(2)
6.3		✓ y-intercept/*y-afsnit* ✓ shape and asymptote *vorm en asimptoot* (2)
6.4	$y > -2$ **OR/*OF*** $y \in (-2; \infty)$	✓ answer/*antwoord* **OR/*OF*** ✓ answer/*antwoord* (1) **[7]**

QUESTION 7/VRAAG 7

No penalty for rounding off in this question.
Geen penalisering vir afronding in hierdie vraag nie.

7.1	$A = P(1-i)^n$ $R26\,700 = R40\,000(1-i)^5$ $\sqrt[5]{\dfrac{26700}{40000}} - 1 = -i$ $-0,0777 \approx -i$ $\therefore r = 7,77\% \text{ p.a.}$	✓ substitution into correct formula *vervanging in korrekte formule* ✓ simplification / *vereenvoudiging* ✓ value for r / *waarde van r* (3)
7.2.1	$P = \dfrac{x[1-(1+i)^{-n}]}{i}$ $R1\,200\,000 = \dfrac{x[1-(1+\frac{0,115}{12})^{-180}]}{\frac{0,115}{12}}$ $\therefore x = \dfrac{1200\,000(\frac{0,115}{12})}{[1-(1+\frac{0,115}{12})^{-180}]}$ $= R14\,018,28$	✓ $i = \frac{0,115}{12}$ and/*en* $n = 180$ ✓ substituting into correct formula *vervanging in korrekte formule* ✓ answer/*antwoord* (3)
7.2.2 (a)	$\text{Balance} = \dfrac{x\left[1-(1+i)^{-n}\right]}{i}(1+i)^n \quad (Balans)$ $= \dfrac{R14\,018,28\left[1-(1+\frac{0,115}{12})^{-105}\right]}{\frac{0,115}{12}}\left(1+\frac{0,115}{12}\right)^5$ $= R925\,435,98\left(1+\frac{0,115}{12}\right)^5$ $= R970\,637,89$	✓ $n = 105$ for / *vir P* and/*en* $n = 5$ for / *vir A* ✓ substituting into correct P formula *vervanging in korrekte P formule* ✓ substituting into correct A formula *vervanging in korrekte A formule* ✓ $P(1+\frac{0,115}{12})^5$ ✓ answer/*antwoord* (5)

	OR/OF	

	Outstanding Balance after 75 months:
	
	$= A - F_v$
	
	$= 1\,200\,000\left(1+\dfrac{11,5\%}{12}\right)^{75} - \dfrac{14018.28\left[\left(1+\dfrac{11,5\%}{12}\right)^{75}-1\right]}{\dfrac{11.5\%}{12}}$
	
	$= 2\,453\,828,34 \ - \ 1\,528\,392,76$
	$= R\,925\,435,58$
	
	Outstanding Balance after 80 months :
	
	$= 925\,435,58\left(1+\dfrac{11,5\%}{12}\right)^{5}$
	
	$= R\,970\,637,48$
		✓ $n = 75$ for both formulae /
		  vir albei formules
		✓ substituting into correct F formula
		  vervanging in korrekte F formule
		✓ substituting into correct A formula
		  vervanging in korrekte A formule
		
		✓ $P\left(1+\frac{0,115}{12}\right)^{5}$
		
		✓ answer/*antwoord*
		                                              (5)

7.2.2
(b)
	$P = \dfrac{x[1-(1+i)^{-n}]}{i}$
	
	$R\,970\,637,89 = \dfrac{R14\,018,28[1-(1+\frac{0,115}{12})^{-n}]}{\frac{0,115}{12}}$
	
	$\dfrac{970\,637,89(\frac{0,115}{12})}{14\,018,28} - 1 = -(1+\frac{0,115}{12})^{-n}$
	
	$-0,3364416715 = -\left(\frac{2423}{2400}\right)^{-n}$
	
	$\therefore -n = \dfrac{\log 0,3364416715}{\log \frac{2423}{2400}}$
	
	$\qquad = -114,2130673$
	$\therefore n = 115\text{ months}/maande$
		✓ P = R970 637,89
		✓ substituting into correct formula
		  vervanging in korrekte formule
		
		✓ correct use of logs /
		  korrekte gebruik van logs
		
		✓ final answer/*finale antwoord*
		                                              (4)
		                                              [15]

QUESTION 8/VRAAG 8

Penalise once for notation in this question
Penaliseer een keer vir notasie in hierdie vraag

8.1	$f(x) = 3 - 2x^2$	
	$f(x+h) = 3 - 2(x+h)^2$	
	$\qquad = 3 - 2(x^2 + 2hx + h^2)$	
	$\qquad = 3 - 2x^2 - 4hx - 2h^2$	✓ $3 - 2x^2 - 4hx - 2h^2$
	$f'(x) = \lim\limits_{h \to 0} \dfrac{f(x+h)-f(x)}{h}$	
	$\qquad = \lim\limits_{h \to 0} \dfrac{3-2x^2-4hx-2h^2-(3-2x^2)}{h}$	✓ substitution / *vervanging*
	$\qquad = \lim\limits_{h \to 0} \dfrac{3-2x^2-4hx-2h^2-3+2x^2}{h}$	✓ simplification / *vereenvoudiging* ✓ factorisation / *faktorisering*
	$\qquad = \lim\limits_{h \to 0} \dfrac{h(-4x-2h)}{h}$	✓ answer / *antwoord*
	$\qquad = \lim\limits_{h \to 0} -4x - 2h$	
	$\qquad = -4x + 2(0)$	
	$\qquad = -4x$	(5)
8.2.1	$D_x\left[x(x-2)^2 \right]$	
	$= D_x\left[x(x^2 - 4x + 4) \right]$	
	$= D_x\left[x^3 - 4x^2 + 4x \right]$	✓ $x^3 - 4x^2 + 4x$
	$= 3x^2 - 8x + 4$	✓ $3x^2$ ✓ $-8x$ ✓ $+4$
		(4)
8.2.2	$y = ax^{\frac{3}{7}} - \dfrac{2x}{\sqrt{x}} + 3$	
	$y = ax^{\frac{3}{7}} - \dfrac{2x}{x^{\frac{1}{2}}} + 3$	✓ $-2x^{\frac{1}{2}}$
	$\quad = ax^{\frac{3}{7}} - 2x^{\frac{1}{2}} + 3$	✓ $\frac{3}{7}ax^{-\frac{4}{7}}$ ✓ $-x^{-\frac{1}{2}}$
		(derivative of constant must be zero to get 3rd mark)
	$\dfrac{dy}{dx} = \dfrac{3}{7}ax^{-\frac{4}{7}} - x^{-\frac{1}{2}}$	(*afgeleide van die konstante moet nul wees om 3de punt te kry*)
		(3) **[12]**

QUESTION 9/*VRAAG 9*

9.1	$x = -\frac{1}{3}$ and/*en* $x = 1$	$\checkmark$ $x = -\frac{1}{3}$ $\quad \checkmark$ $x = 1$ (2)
9.2	$x = (1 + (-\frac{1}{3})) \div 2$ $\quad = \frac{1}{3}$	$\checkmark\checkmark$ answer/*antwoord* (2)
9.3	$g(x)$ is increasing when $g'(x) > 0$ $g(x)$ *is stygend wanneer* $g'(x) > 0$ $-\frac{1}{3} < x < 1$ OR/OF $x \in \left(-\frac{1}{3}; 1\right)$	$\checkmark\checkmark$ answer (accuracy) *antwoord (akkuraatheid)* (2)
9.4	$y = a(x - x_1)(x - x_2)$ $\quad = a(x + \frac{1}{3})(x - 1)$ $\therefore 1 = a(0 + \frac{1}{3})(0 - 1)$ $\quad 1 = -\frac{1}{3}a$ $\therefore a = -3$ $\quad y = -3(x + \frac{1}{3})(x - 1)$ $\qquad = -3\left(x^2 - \frac{2}{3}x - \frac{1}{3}\right)$ $g'(x) = -3x^2 + 2x + 1$ **OR/*OF*** $y = a(x - x_1)(x - x_2)$ $\quad = a(3x + 1)(x - 1)$ $\therefore 1 = a(3(0) + 1)(0 - 1)$ $\quad 1 = -a$ $\quad a = -1$ $\quad y = -1(3x + 1)(x - 1)$ $\qquad = -\left(3x^2 - 2x - 1\right)$ $g'(x) = -3x^2 + 2x + 1$	$\checkmark$ substituting all intercepts *vervanging van alle afsnitte* $\checkmark$ $a = -3$ $\checkmark$ $y = -3(x + \frac{1}{3})(x - 1)$ $\checkmark$ $g'(x) = -3x^2 + 2x + 1$ $\checkmark$ substituting all intercepts *vervanging van alle afsnitte* $\checkmark$ $a = -1$ $\checkmark$ $y = -(3x + 1)(x - 1)$ $\checkmark$ $g'(x) = -3x^2 + 2x + 1$ (4)

9.5	$g(x) = ax^3 + bx^2 + cx + d$	
	$g'(x) = 3ax^2 + 2bx + c$	$\checkmark$ $g'(x) = 3ax^2 + 2bx + c$
	$\qquad = -3x^2 + 2x + 1$	$\checkmark$ $3a = -3$
	$\therefore 3a = -3 \quad 2b = 2 \quad c = 1$	$\checkmark$ $2b = 2$
	$\therefore a = -1 \qquad b = 1$	$\checkmark$ $a = -1 ; b = 1 ; c = 1$
	$\therefore y = -x^3 + x^2 + x + d + 1$	$\checkmark$ substitute $(0;0)$ into $g(x)+1$
	$\quad 0 = -0^3 + 0^2 + 0 + d + 1$	*vervanging van* $(0;0)$ *in*
	$\therefore d = -1$	$g(x)+1$
		(5)
		[15]

QUESTION 10/VRAAG 10

| 10.1 | Let the two numbers be x and y
 Laat die twee getalle x en y wees :

 $x + y = 18$

 $\therefore y = 18 - x$

 Product/*Produk* : $P(x) = yx^2$
 $\qquad = (18 - x)x^2$
 $\qquad = 18x^2 - x^3$
 Product is maximum when: $P'(x) = 0$
 Produk is 'n maksimum wanneer : $P'(x) = 0$

 $\qquad P'(x) = 36x - 3x^2$
 $\qquad 36x - 3x^2 = 0$
 $\qquad 3x(12 - x) = 0$
 $\qquad \therefore x = 0 \text{ or } x = 12$
 $\qquad \therefore y = 18 - 0 = 18$
 $\qquad$ or/*of* $y = 18 - 12 = 6$
 P is maximum when $x = 12$
 P is 'n maksimum wanneer $x = 12$

 $\qquad \therefore$ the two numbers are : 12 and 6
 $\qquad \therefore$ *die twee getalle is* : 12 *en* 6

 OR / OF
 Let the two numbers be x and y
 Laat die twee getalle x en y wees

 $x + y = 18$

 $\therefore y = 18 - x$

 Product/*Produk*: $P(x) = xy^2$
 $\qquad = x(18 - x)^2$
 $\qquad = x(324 - 36x + x^2)$
 $\qquad = 324x - 36x^2 + x^3$
 Product is maximum when: $P'(x) = 0$
 Produk is 'n maksimum wanneer : $P'(x) = 0$

 $\qquad P'(x) = 324 - 72x + 3x^2$
 $\qquad 3x^2 - 72x + 324 = 0$
 $\qquad x^2 - 24x + 108 = 0$
 $\qquad (x - 18)(x - 6) = 0$
 $\qquad \therefore x = 18 \text{ or } x = 6$
 $\qquad y = 18 - 18 = 0$
 or/*of* $\qquad y = 18 - 6 = 12$
 $\therefore$ The two numbers are 12 and 6
 $\quad$ *Die twee getalle is* 12 *en* 6 | ✓ $x + y = 18$
 ✓ yx^2
 ✓ substitution and simplification
 vervanging en vereenvoudiging

 ✓ $P'(x)$ and equating to 0
 $\quad P'(x)$ *en gelykstel aan 0*

 ✓ x-values/*waardes*
 ✓ y-values/*waardes*

 ✓ selection of the 2 numbers
 keuse van die 2 getalle
 (if/*as* $x = 0$, Product/*Produk* = 0)

 ✓ $x + y = 18$
 ✓ xy^2
 ✓ substitution and simplification
 vervanging en vereenvoudiging

 ✓ $P'(x)$ and equating to 0
 $\quad P'(x)$ *en gelykstel aan 0*

 ✓ x-values/*waardes*

 ✓ y-values/*waardes*
 ✓ selection of the two numbers
 keuse van die 2 getalle
 (P = 0 when/*wanneer* $x = 18$) |
| | | **[7]** |

QUESTION 11 /VRAAG 11

11.1.1	$a = 111$ $b = 106$	✓ answer/*antwoord* ✓ answer/*antwoord* (2)
11.1.2 (a)	P(a boy who plays cricket) / P(*'n seun wat krieket speel*) $= \dfrac{108}{530}$ or / *of* $\dfrac{54}{265}$	✓ numerator/*teller* ✓ denominator/*noemer* (2)
11.1.2 (b)	P(A or / *of* B) $= $ P(A) $+$P(B)$-$P(A and/*en* B) P(girl *or* not a tennis player) / *P(meisie of nie 'n tennisspeler nie)* $= \dfrac{288}{530} + \dfrac{445}{530} - \dfrac{231}{530}$ $= \dfrac{502}{530}$ or / *of* $\dfrac{251}{265}$ or / *of* 94,72% **OR/*OF*** *P(Girl or not Tennis)* $= 1 - P(Boy \ and \ Tennis)$ $= 1 - \dfrac{28}{530}$ $= \dfrac{502}{530}$ or / *of* $\dfrac{251}{265}$ or / *of* 94,72%	✓ formula/*formule* ✓ substitution into correct formula *vervanging in korrekte formule* ✓ answer / *antwoord* ✓ method/*metode* ✓ substitution/*vervanging* ✓ answer/*antwoord* (3)

11.2.1	9^9 or / of $387\,420\,489$	✓ 9^9	(1)

11.2.2	If vowels are together/*As die vokale saam is*:
	    $6! \times 4!$
	 ∴ If vowels are not all together:
	    As die vokale nie almal saam is nie :
	    $9! - (6! \times 4!)$
	
	 $= 345\,600$
		✓ $6! \times 4!$
		
		 ✓ subtracting from 9!
		    aftrekking vanaf 9!
		 ✓ answer/*antwoord*
			(3)

11.2.3	*Vowels in odd spaces* / *Vokale in onewe spasies* $= \mathbf{4} \times 5 \times \mathbf{3} \times 4 \times \mathbf{2} \times 3 \times \mathbf{1} \times 2$ $= (\mathbf{4} \times \mathbf{3} \times \mathbf{2} \times \mathbf{1}) \times (5 \times 4 \times 3 \times 2)$ $= 4! \times 120$ $= 2880$ ∴ *Probability / Waarskynlikheid* $= \dfrac{2880}{(9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2)}$ $= \dfrac{2880}{362880}$ $= \dfrac{1}{126}$	✓ 4! ✓ $\times 120$ ✓ $\dfrac{\text{Vowels in odd spaces}}{(9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2)}$ / $\dfrac{\text{Vokale in onewe spasies}}{(9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2)}$ ✓ answer/*antwoord*	(4) **[15]**

TOTAL/*TOTAAL:*   **150**