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**

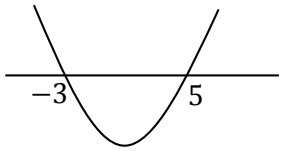
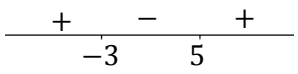
This marking guideline consists of 19 pages./
Hierdie nasienriglyn bestaan uit 19 bladsye.

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* $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-(-3) \pm \sqrt{(-3)^2 - 4(1)(-4)}}{2(1)}$ $= \frac{3 \pm \sqrt{25}}{2}$ $\therefore x = 4 \ \ or / of \ \ x = -1$	✓ factors/*faktore* ✓ $x = -1$ ✓ $x = 4$ ✓ correct substitution / *korrekte vervanging* ✓✓ answers / *antwoorde* (3)
1.1.2	$2x^2 - x - 7 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-(-1) \pm \sqrt{(-1)^2 - (4)(2)(-7)}}{2(2)}$ $= \frac{1 \pm \sqrt{57}}{4}$ 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	$5^{x+1} - 5^x = 2500$ $5^x.5^1 - 5^x = 2500$ $5^x(5-1) = 2500$ $5^x.4 = 2500$ $5^x = 625$ $5^x = 5^4$ $\therefore x = 4$	✓ factorisation/*faktorisering* ✓ $5^x = 625$ ✓ $x = 4$ (3)
1.1.4	$(x-3)(x+1) < 12$ $x^2 - 2x - 3 - 12 < 0$ $x^2 - 2x - 15 < 0$ $(x-5)(x+3) < 0$  **OR/*OF***  $-3 < x < 5$ OR / *OF* $x \in (-3;5)$	✓ standard form/*standaardvorm* ✓ factorisation/*faktorisering* ✓✓ $-3 < x < 5$ (accuracy) (*akkuraatheid*) (4)
1.2	$y = 2x - 1$ .....(1) $3x^2 - xy - y^2 = 1$ .....(2) (1) into (2) $3x^2 - x(2x-1) - (2x-1)^2 = 1$ $3x^2 - 2x^2 + x - (4x^2 - 4x + 1) = 1$ $3x^2 - 2x^2 + x - 4x^2 + 4x - 1 - 1 = 0$ $-3x^2 + 5x - 2 = 0$ $3x^2 - 5x + 2 = 0$ $(3x-2)(x-1) = 0$ $\therefore x = \frac{2}{3}$ or/of $x = 1$ $y = 2\left(\frac{2}{3}\right) - 1$ or/of $y = 2(1) - 1$ $y = \frac{1}{3}$ or/of $y = 1$	✓ $y = 2x - 1$ ✓ substitution/*vervanging* ✓ standard form/*standaardvorm* ✓ factorisation/*faktorisering* ✓ x-values/*waardes* ✓ y-values/*waardes* (6)

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

1.3	**OR/*OF***	✓ $b^2 - 4ac = 0$
		✓ 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* $p = -2$	✓ p values/*waardes*
	$\therefore$ Turning point of / *Draaipunt van f is* $(-2;0)$	✓ $(-2;0)$
	$\therefore$ Turning point of / *Draaipunt van h is* $(-2;-3)$	✓ $(-2;-3)$
		(5)
		[24]

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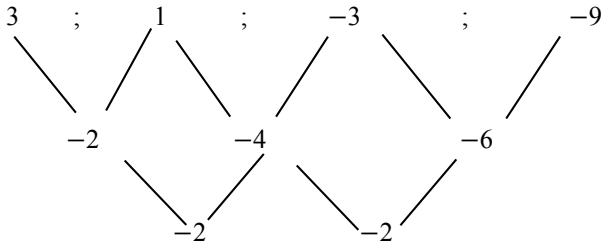
QUESTION 2/*VRAAG 2*

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

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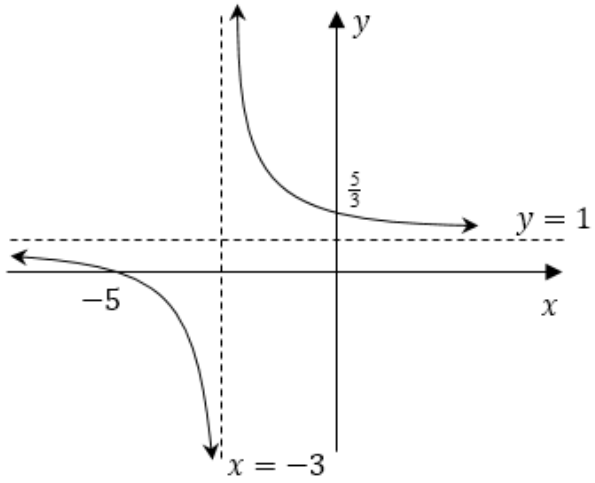
2.3	$T_4 = a + 3d$ and/*en* $T_{10} = a + 9d$ $\therefore T_{10} - T_4 = 6d$ $6d = (8x - 2y) - (2x + y)$ $= 6x - 3y$ $\therefore d = x - \frac{1}{2}y$ $T_4 = a + 3d$ $2x + y = a + 3(x - \frac{1}{2}y)$ $2x + y = a + 3x - \frac{3}{2}y$ $\therefore a = \frac{5}{2}y - x$	✓ $T_{10} - T_4 = 6d$ ✓ $6d = (8x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

QUESTION 3/*VRAAG 3*

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

QUESTION 4/*VRAAG 4*

4.1	$x=-3$ $y=1$	✓ $x=-3$ ✓ $y=1$ (2)
4.2	$1+\frac{2}{x+3}=0$ $\frac{2}{x+3}=-1$ $2=-x-3$ $x=-5$ $y=1+\frac{2}{0+3}$ $=\frac{5}{3}$	✓ 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	$h(x)=\frac{-2}{x+3}-1$ point of intersection of asymptotes/ *snypunt van asimptote* $(-3;-1)$ or / *of* $y=-(-x-p)+q$ $y=(x-(-3))-1$ *or / of* $y=-(-x-3)-1$ $y=x+2$	✓ $h(x)=\frac{-2}{x+3}-1$ ✓ substitute point of intersection of asymptotes / *vervang die snypunt van asimptote* ✓✓ answer/*antwoord* (4)

4.4	**OR/*OF*** $h(x)=\frac{-2}{x+3}-1$ point of intersection of asymptotes/ *snypunt van asimptote* $(-3;-1)$ $y=x+k$ $-1=-3+k$ $k=2$ $\therefore y=x+2$	✓ $h(x)=\frac{-2}{x+3}-1$ ✓ 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** $m_{TQ}=\frac{10-(-8)}{9-0}$ $m=2$ $\therefore y=2x-8$	✓ $c=-8$ ✓ 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	$y=x^2-7x-8$ $=x^2-7x+(-\frac{7}{2})^2-8-(-\frac{7}{2})^2$ $=(x-\frac{7}{2})^2-\frac{81}{4}$	 ✓ completing the square / *vierkantsvoltooiing* ✓ equation / *vergelyking* (2)
5.4	$(\frac{7}{2};-\frac{81}{4})$	✓ x- coordinate/*koördinaat* ✓ y- coordinate/*koördinaat* (2)

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

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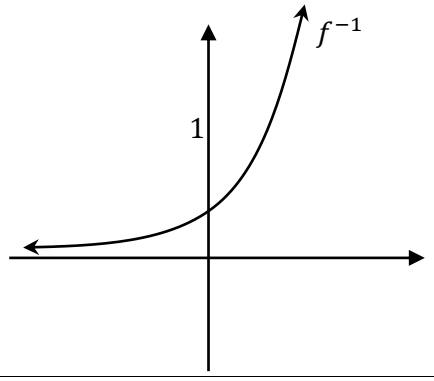
5.6	$x^2 - 7x - 8 = 0$ $(x-8)(x+1) = 0$ $\therefore \text{P}(-1;0) \text{ and / } en \text{ R}(8;0)$ $y = 2x - 8$ $0 = 2x - 8$ $\therefore \text{V}(4;0)$ $\therefore x < -1 \quad \text{or / } of \quad 4 < x < 8$ OR / *OF* $x \in (-\infty;-1) \cup (4;8)$	✓ x intercepts of f *x-afsnitte van f* ✓ x intercept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

QUESTION 6/*VRAAG 6*

6.1	$f(x) = \log_m x$ $3 = \log_m 64$ $m^3 = 64$ $m^3 = 4^3$ $\therefore m = 4$	✓ substitution/*vervanging* ✓ answer/*antwoord* (2)
6.2	$f(x) = \log_4 x$ $\therefore f^{-1} : x = \log_4 y$ $y = 4^x$	✓ interchanging x and y *omruiling van x en y* ✓ answer / *antwoord* (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	$A = P(1-i)^n$ $R26\,700 = R40\,000(1-i)^5$ $\sqrt[5]{\frac{26700}{40\,000}} - 1 = -i$ $-0{,}0777 \approx -i$ $\therefore r = 7{,}77\%$ p.a.	✓ substitution into correct formula *vervanging in korrekte formule* ✓ simplification / *vereenvoudiging* ✓ value for r / *waarde van r* (3)
7.2.1	$P = \frac{x[1-(1+i)^{-n}]}{i}$ $R1\,200\,000 = \frac{x[1-(1+\frac{0{,}115}{12})^{-180}]}{\frac{0{,}115}{12}}$ $\therefore x = \frac{1\,200\,000(\frac{0{,}115}{12})}{[1-(1+\frac{0{,}115}{12})^{-180}]}$ = 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)	Balance $= \frac{x\left[1-(1+i)^{-n}\right]}{i}(1+i)^n$ $(Balans)$ $= \frac{R14\,018{,}28\left[1-(1+\frac{0{,}115}{12})^{-105}\right]}{\frac{0{,}115}{12}}\left(1+\frac{0{,}115}{12}\right)^5$ $= R925\,435{,}98\left(1+\frac{0{,}115}{12}\right)^5$ $= R970\,637{,}89$	✓ $n = 105$ 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)

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	OR/OF Outstanding Balance after 75 months: $= A - F_v$ $= 1200000\left(1+\frac{11,5\%}{12}\right)^{75} - \frac{14018.28\left[\left(1+\frac{11,5\%}{12}\right)^{75}-1\right]}{\frac{11.5\%}{12}}$ $= 2453828,34 - 1528392,76$ $= R925435,58$ Outstanding Balance after 80 months : $=925435,58\left(1+\frac{11,5\%}{12}\right)^{5}$ $= R970637,48$	✓ $n = 75$ 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* ✓ $P(1+\frac{0,115}{12})^5$ ✓ answer/*antwoord* (5)
7.2.2 (b)	$P = \frac{x[1-(1+i)^{-n}]}{i}$ $R970637,89 = \frac{R14018,28[1-(1+\frac{0,115}{12})^{-n}]}{\frac{0,115}{12}}$ $\frac{970637,89(\frac{0,115}{12})}{14018,28} - 1 = -(1+\frac{0,115}{12})^{-n}$ $-0,3364416715 = -(\frac{2423}{2400})^{-n}$ $\therefore -n = \frac{\log 0,3364416715}{\log \frac{2423}{2400}}$ $= -114,2130673$ $\therefore n = 115$ 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	$f(x)=3-2x^2$ $f(x+h)=3-2(x+h)^2$ $=3-2(x^2+2hx+h^2)$ $=3-2x^2-4hx-2h^2$ $f'(x)=\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$ $=\lim_{h\to 0}\frac{3-2x^2-4hx-2h^2-(3-2x^2)}{h}$ $=\lim_{h\to 0}\frac{3-2x^2-4hx-2h^2-3+2x^2}{h}$ $=\lim_{h\to 0}\frac{h(-4x-2h)}{h}$ $=\lim_{h\to 0}-4x-2h$ $=-4x+2(0)$ $=-4x$	✓ $3-2x^2-4hx-2h^2$ ✓ substitution / *vervanging* ✓ simplification / *vereenvoudiging* ✓ factorisation / *faktorisering* ✓ answer / *antwoord* (5)
8.2.1	$D_x\left[x(x-2)^2\right]$ $=D_x\left[x(x^2-4x+4)\right]$ $=D_x\left[x^3-4x^2+4x\right]$ $=3x^2-8x+4$	✓ x^3-4x^2+4x ✓ $3x^2$ ✓ $-8x$ ✓ $+4$ (4)
8.2.2	$y=ax^{\frac{3}{7}}-\frac{2x}{\sqrt{x}}+3$ $y=ax^{\frac{3}{7}}-\frac{2x}{x^{\frac{1}{2}}}+3$ $=ax^{\frac{3}{7}}-2x^{\frac{1}{2}}+3$ $\frac{dy}{dx}=\frac{3}{7}ax^{-\frac{4}{7}}-x^{-\frac{1}{2}}$	✓ $-2x^{\frac{1}{2}}$ ✓ $\frac{3}{7}ax^{-\frac{4}{7}}$ ✓ $-x^{-\frac{1}{2}}$ (derivative of constant must be zero to get 3rd mark) (*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* $x = 1$	✓ $x = -\frac{1}{3}$ ✓ $x = 1$ (2)
9.2	$x = (1 + (-\frac{1}{3})) \div 2$ $= \frac{1}{3}$	✓✓ 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* $x \in \left(-\frac{1}{3}; 1\right)$	✓✓ answer (accuracy) *antwoord (akkuraatheid)* (2)
9.4	$y = a(x - x_1)(x - x_2)$ $= a(x + \frac{1}{3})(x - 1)$ $\therefore 1 = a(0 + \frac{1}{3})(0 - 1)$ $1 = -\frac{1}{3}a$ $\therefore a = -3$ $y = -3(x + \frac{1}{3})(x - 1)$ $= -3\left(x^2 - \frac{2}{3}x - \frac{1}{3}\right)$ $g'(x) = -3x^2 + 2x + 1$ **OR/*OF*** $y = a(x - x_1)(x - x_2)$ $= a(3x + 1)(x - 1)$ $\therefore 1 = a(3(0) + 1)(0 - 1)$ $1 = -a$ $a = -1$ $y = -1(3x + 1)(x - 1)$ $= -(3x^2 - 2x - 1)$ $g'(x) = -3x^2 + 2x + 1$	✓ substituting all intercepts *vervanging van alle afsnitte* ✓ $a = -3$ ✓ $y = -3(x + \frac{1}{3})(x - 1)$ ✓ $g'(x) = -3x^2 + 2x + 1$ ✓ substituting all intercepts *vervanging van alle afsnitte* ✓ $a = -1$ ✓ $y = -(3x + 1)(x - 1)$ ✓ $g'(x) = -3x^2 + 2x + 1$ (4)

9.5	$g(x) = ax^3 + bx^2 + cx + d$ $g'(x) = 3ax^2 + 2bx + c$ $= -3x^2 + 2x + 1$ $\therefore 3a = -3 \quad 2b = 2 \quad c = 1$ $\therefore a = -1 \quad b = 1$ $\therefore y = -x^3 + x^2 + x + d + 1$ $0 = -0^3 + 0^2 + 0 + d + 1$ $\therefore d = -1$	✓ $g'(x) = 3ax^2 + 2bx + c$ ✓ $3a = -3$ ✓ $2b = 2$ ✓ $a = -1\,; b = 1; c = 1$ ✓ substitute $(0;0)$ into $g(x)+1$ *vervanging van* $(0;0)$ *in* $g(x)+1$ (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* : $P(x) = yx^2$ $= (18 - x)x^2$ $= 18x^2 - x^3$ Product is maximum when: $P'(x) = 0$ *Produk is 'n maksimum wanneer* : $P'(x) = 0$ $P'(x) = 36x - 3x^2$ $36x - 3x^2 = 0$ $3x(12 - x) = 0$ $\therefore x = 0$ or $x = 12$ $\therefore y = 18 - 0 = 18$ or/of $y = 18 - 12 = 6$ P is maximum when $x = 12$ *P is 'n maksimum wanneer* $x = 12$ $\therefore$ the two numbers are :12 and 6 $\therefore$ *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*: $P(x) = xy^2$ $= x(18 - x)^2$ $= x(324 - 36x + x^2)$ $= 324x - 36x^2 + x^3$ Product is maximum when: $P'(x) = 0$ *Produk is 'n maksimum wanneer* : $P'(x) = 0$ $P'(x) = 324 - 72x + 3x^2$ $3x^2 - 72x + 324 = 0$ $x^2 - 24x + 108 = 0$ $(x - 18)(x - 6) = 0$ $\therefore x = 18$ *or* $x = 6$ $y = 18 - 18 = 0$ or/*of* $y = 18 - 6 = 12$ $\therefore$ The two numbers are 12 and 6 *Die twee getalle is* 12 *en* 6	✓ $x + y = 18$ ✓ yx^2 ✓ substitution and simplification *vervanging en vereenvoudiging* ✓ $P'(x)$ and equating to 0 $P'(x)$ *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 $P'(x)$ *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]**

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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*) $= \frac{108}{530}$ or / *of* $\frac{54}{265}$	✓ 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*) $= \frac{288}{530} + \frac{445}{530} - \frac{231}{530}$ $= \frac{502}{530}$ or / *of* $\frac{251}{265}$ or / *of* 94,72% **OR/*OF*** *P*(*Girl or not Tennis*) $= 1 - P(Boy\ and\ Tennis)$ $= 1 - \frac{28}{530}$ $= \frac{502}{530}$ or / *of* $\frac{251}{265}$ or / *of* 94,72%	✓ formula/*formule* ✓ substitution into correct formula *vervanging in korrekte formule* ✓ answer / *antwoord* ✓ method/*metode* ✓ substitution/*vervanging* ✓ answer/*antwoord* (3)

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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*: $6! \times 4!$ $\therefore$ 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* / *V*okale in onewe spasies $= \mathbf{4} \times 5 \times \mathbf{3} \times 4 \times \mathbf{2} \times 3 \times \mathbf{1} \times 2$ $= (\mathbf{4} \times \mathbf{3} \times \mathbf{2} \times \mathbf{1}) \times (5 \times 4 \times 3 \times 2)$ $= 4! \times 120$ $= 2880$ $\therefore$ *Probability* / *Waarskynlikheid* $= \dfrac{2880}{(9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2)}$ $= \dfrac{2880}{362\,880}$ $= \dfrac{1}{126}$	✓ $4!$ ✓ $\times 120$ ✓ $\frac{\text{Vowels in odd spaces}}{(9\times8\times7\times6\times5\times4\times3\times2)} / \frac{\textit{Vokale in onewe spasies}}{(9\times8\times7\times6\times5\times4\times3\times2)}$ ✓ answer/*antwoord* (4) **[15]**

TOTAL/*TOTAAL:* 150

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