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GRADE 12/*GRAAD 12*

SEPTEMBER 2019

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

MARKS/*PUNTE*: 150

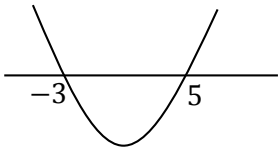
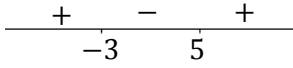
This marking guideline consists of 19 pages./
Hierdie nasienriglyn bestaan uit 19 bladsye.

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: <i>Antwoorde alleen (2/3)</i> OR/OF Can use quadratic formula / <i>Kan kwadratiese formule gebruik</i> $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-(-3) \pm \sqrt{(-3)^2 - 4(1)(-4)}}{2(1)}$ $= \frac{3 \pm \sqrt{25}}{2}$ $\therefore x = 4$ or / of $x = -1$	$\checkmark$ factors/faktore $\checkmark x = -1 \quad \checkmark x = 4$ $\checkmark$ correct substitution / <i>korrekte vervanging</i> $\checkmark\checkmark$ answers / <i>antwoorde</i> (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 <i>Penaliseer 1 punt vir verkeerde afronding</i> $x = 2,14$ or/of $-1,64$	$\checkmark$ substitution/ <i>vervanging</i> $\checkmark x = 2,14 \quad \checkmark x = -1,64$ (3)

1.1.3	$5^{x+1} - 5^x = 2500$ $5^x \cdot 5^1 - 5^x = 2500$ $5^x(5-1) = 2500$ $5^x \cdot 4 = 2500$ $5^x = 625$ $5^x = 5^4$ $\therefore x = 4$	✓ factorisation/ <i>faktorisering</i> ✓ $5^x = 625$ ✓ $x = 4$
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/ <i>standaardvorm</i> ✓ factorisation/ <i>faktorisering</i> ✓ ✓ $-3 < x < 5$ (accuracy) (akkuraatheid)
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/ <i>vervang</i> ✓ standard form/ <i>standaardvorm</i> ✓ factorisation/ <i>faktorisering</i> ✓ x-values/ <i>waardes</i> ✓ y-values/ <i>waardes</i>

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

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

2.1.1	$-17; -27$	✓ both terms/<i>beide terme</i> (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 <i>stel T_n gelyk aan -809</i> ✓ factors/<i>faktore</i> ✓ choosing/<i>kies $n = 29$</i> (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} / <i>vervang in T_{53}</i> ✓ answer/<i>antwoord</i> ✓ substituting into T_{53} <i>vervang in T_{53}</i> ✓ 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 <i>vervang in korrekte formule</i> ✓ 783 (2)
2.2.3	$\sum_{n=1}^{29} (2n - 3) = 783$	✓ $\sum_{n=1}^{29}$ ✓ $2n - 3$ (2)

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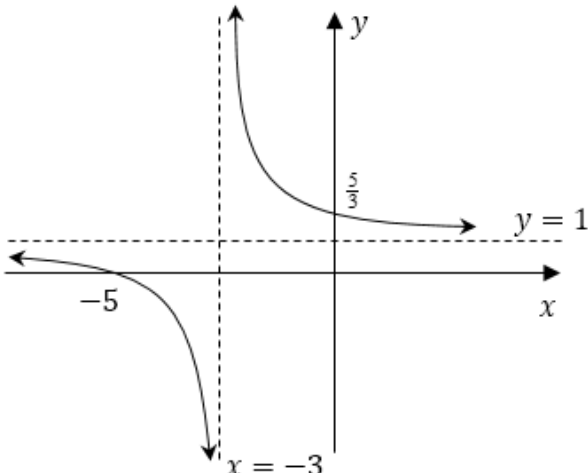
(5)
[19]

QUESTION 3/VRAAG 3

3.1	$T_1 = (x - 1)$ $T_2 = (x - 1)^2$ $\therefore r = x - 1$ for convergence : / vir konvergensie $-1 < r < 1$, $\therefore -1 < x - 1 < 1$ $0 < x < 2$	$\checkmark -1 < r < 1$ $\checkmark$ answer/antwoord
3.2	When / Wanneer : $x = \frac{2}{3}$, $p = (\frac{2}{3} - 1) + (\frac{2}{3} - 1)^2 + (\frac{2}{3} - 1)^3 + \dots$ $p = (-\frac{1}{3}) + (\frac{1}{9}) + (-\frac{1}{27}) + \dots$ $\therefore a = -\frac{1}{3}$ and / en $r = -\frac{1}{3}$ $\therefore S_{\infty} = \frac{a}{1 - r}$ $= \frac{-\frac{1}{3}}{1 - (-\frac{1}{3})}$ $= -\frac{1}{4}$	$\checkmark$ substituting for x vervangings vir x $\checkmark$ values for a and r waardes vir a en r $\checkmark$ substituting into S_{∞} formula vervangings in S_{∞} formule $\checkmark$ 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/ <i>vervang</i> ✓ x -intercept/ <i>x-afsnit</i> ✓ y -intercept/ <i>y-afsnit</i> (3)
4.3		✓ asymptotes / <i>asimptote</i> ✓ x -intercept / <i>x-afsnit</i> ✓ y -intercept / <i>y-afsnit</i> ✓ shape / <i>vorm</i> (4)
4.4	$h(x) = \frac{-2}{x+3} - 1$ point of intersection of asymptotes <i>snypunt van asimptote</i> $(-3; -1)$ 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 / <i>vervang die snypunt van asimptote</i> ✓✓ answer/ <i>antwoord</i> (4)

4.4	OR/OF $h(x) = \frac{-2}{x+3} - 1$ point of intersection of asymptotes <i>snypunt van asimptote</i> $(-3; -1)$ $y = x + k$ $-1 = -3 + k$ $k = 2$ $\therefore y = x + 2$	$\checkmark h(x) = \frac{-2}{x+3} - 1$ $\checkmark \text{ substitute point of intersection of asymptotes /}$ $\text{vervang die snypunt van asimptote}$ $\checkmark \checkmark \text{ answer/antwoord}$ (4) [13]
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QUESTION 5/VRAAG 5

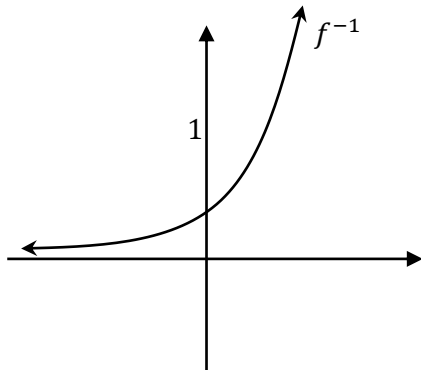
5.1	$(0; -8)$	$\checkmark \text{ answer / antwoord}$ (1)
5.2	$y = mx + c$ $y = mx - 8$ $10 = 9m - 8$ $m = 2$ $\therefore y = 2x - 8$ OR/OF $m_{TQ} = \frac{10 - (-8)}{9 - 0}$ $m = 2$ $\therefore y = 2x - 8$	$\checkmark c = -8$ $\checkmark \text{ substituting T(9;10) into equation of line /}$ $\text{vervanging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

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

(5)

5.6	$x^2 - 7x - 8 = 0$ $(x - 8)(x + 1) = 0$ $\therefore P(-1; 0)$ and / <i>en</i> $R(8; 0)$ $y = 2x - 8$ $0 = 2x - 8$ $\therefore V(4; 0)$ $\therefore x < -1$ or / <i>of</i> $4 < x < 8$ OR / OF $x \in (-\infty; -1) \cup (4; 8)$	✓ x intercepts of f <i>x-afsnitte van f</i> ✓ x intercept of g <i>x-afsnit van g</i> ✓ $x < -1$ accuracy/ <i>akkuraatheid</i> ✓ $4 < x < 8$ accuracy/ <i>akkuraatheid</i> (4) [17]
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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/ <i>vervanging</i> ✓ answer/ <i>antwoord</i> (2)
6.2	$f(x) = \log_4 x$ $\therefore f^{-1}: x = \log_4 y$ $y = 4^x$	✓ interchanging x and y <i>omruiling van x en y</i> ✓ answer / <i>antwoord</i> (2)
6.3		✓ y -intercept/ <i>y-afsnit</i> ✓ shape and asymptote <i>vorm en asimptoot</i> (2)
6.4	$y > -2$ OR / OF $y \in (-2; \infty)$	✓ answer/ <i>antwoord</i> OR / OF ✓ answer/ <i>antwoord</i> (1) [7]

QUESTION 7/VRAAG 7

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

7.1	$A = P(1 - i)^n$ $R26\,700 = R40\,000(1 - i)^5$ $\sqrt[5]{\frac{26\,700}{40\,000}} - 1 = -i$ $-0,0777 \approx -i$ $\therefore r = 7,77\% \text{ p.a.}$	✓ substitution into correct formula <i>vervanging in korrekte formule</i> ✓ simplification / <i>vereenvoudiging</i> ✓ value for r / <i>waarde van r</i> (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 <i>vervanging in korrekte formule</i> ✓ answer/antwoord (3)
7.2.2 (a)	$\text{Balance} = \frac{x[1 - (1 + i)^{-n}]}{i} (1 + i)^n \quad (\text{Balans})$ $= \frac{R14\,018,28[1 - (1 + \frac{0,115}{12})^{-105}]}{\frac{0,115}{12}} (1 + \frac{0,115}{12})^5$ $= R925\,435,98(1 + \frac{0,115}{12})^5$ $= R970\,637,89$	✓ $n = 105$ for / <i>vir P</i> and/en $n = 5$ for / <i>vir A</i> ✓ substituting into correct P formula <i>vervanging in korrekte P formule</i> ✓ substituting into correct A formula <i>vervanging in korrekte A formule</i> ✓ $P(1 + \frac{0,115}{12})^5$ ✓ answer/antwoord (5)

QUESTION 8/VRAAG 8

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

8.1	$f(x) = 3 - 2x^2$ $f(x+h) = 3 - 2(x+h)^2$ $= 3 - 2(x^2 + 2hx + h^2)$ $= 3 - 2x^2 - 4hx - 2h^2$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{3 - 2x^2 - 4hx - 2h^2 - (3 - 2x^2)}{h}$ $= \lim_{h \rightarrow 0} \frac{3 - 2x^2 - 4hx - 2h^2 - 3 + 2x^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(-4x - 2h)}{h}$ $= \lim_{h \rightarrow 0} -4x - 2h$ $= -4x + 2(0)$ $= -4x$	$\checkmark 3 - 2x^2 - 4hx - 2h^2$ $\checkmark$ substitution / <i>vervanging</i> $\checkmark$ simplification / <i>vereenvoudiging</i> $\checkmark$ factorisation / <i>faktorisering</i> $\checkmark$ answer / <i>antwoord</i>
8.2.1	$D_x [x(x-2)^2]$ $= D_x [x(x^2 - 4x + 4)]$ $= D_x [x^3 - 4x^2 + 4x]$ $= 3x^2 - 8x + 4$	$\checkmark x^3 - 4x^2 + 4x$ $\checkmark 3x^2 \checkmark -8x \checkmark + 4$
8.2.2	$y = ax^{\frac{3}{7}} - \frac{2x}{\sqrt{x}} + 3$ $y = ax^{\frac{3}{7}} - \frac{2x}{x^{\frac{1}{2}}} + 3$ $= ax^{\frac{3}{7}} - 2x^{\frac{1}{2}} + 3$ $\frac{dy}{dx} = \frac{3}{7}ax^{-\frac{4}{7}} - x^{-\frac{1}{2}}$	$\checkmark -2x^{\frac{1}{2}}$ $\checkmark \frac{3}{7}ax^{-\frac{4}{7}} \checkmark -x^{-\frac{1}{2}}$ (derivative of constant must be zero to get 3 rd mark) (afgeleide van die konstante moet nul wees om 3 ^{de} punt te kry)

(3)
 [12]

9.5	$g(x) = ax^3 + bx^2 + cx + d$ $g'(x) = 3ax^2 + 2bx + c$ $= -3x^2 + 2x + 1$ $\therefore 3a = -3 \quad 2b = 2 \quad c = 1$ $\therefore a = -1 \quad b = 1$ $\therefore y = -x^3 + x^2 + x + d + 1$ $0 = -0^3 + 0^2 + 0 + d + 1$ $\therefore d = -1$	$\checkmark g'(x) = 3ax^2 + 2bx + c$ $\checkmark 3a = -3$ $\checkmark 2b = 2$ $\checkmark a = -1 ; b = 1 ; c = 1$ $\checkmark$ substitute (0;0) into $g(x)+1$ <i>vervanging van (0;0) in</i> $g(x)+1$ (5) [15]
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QUESTION 10/VRAAG 10

10.1	Let the two numbers be x and y <i>Laat die twee getalle x en y wees :</i> $x + y = 18$ $\therefore y = 18 - x$ Product/<i>Produk</i> : $P(x) = yx^2$ $= (18 - x)x^2$ $= 18x^2 - x^3$ Product is maximum when: $P'(x) = 0$ <i>Produk is 'n maksimum wanneer : $P'(x) = 0$</i> $P'(x) = 36x - 3x^2$ $36x - 3x^2 = 0$ $3x(12 - x) = 0$ $\therefore x = 0 \text{ or } x = 12$ $\therefore y = 18 - 0 = 18$ or/of $y = 18 - 12 = 6$ <i>P is maximum when $x = 12$</i> <i>P is 'n maksimum wanneer $x = 12$</i> $\therefore \text{the two numbers are : } 12 \text{ and } 6$ $\therefore \text{die twee getalle is : } 12 \text{ en } 6$ OR / OF Let the two numbers be x and y <i>Laat die twee getalle x en y wees</i> $x + y = 18$ $\therefore y = 18 - x$ Product/<i>Produk</i>: $P(x) = xy^2$ $= x(18 - x)^2$ $= x(324 - 36x + x^2)$ $= 324x - 36x^2 + x^3$ Product is maximum when: $P'(x) = 0$ <i>Produk is 'n maksimum wanneer : $P'(x) = 0$</i> $P'(x) = 324 - 72x + 3x^2$ $3x^2 - 72x + 324 = 0$ $x^2 - 24x + 108 = 0$ $(x - 18)(x - 6) = 0$ $\therefore x = 18 \text{ or } x = 6$ $y = 18 - 18 = 0$ or/of $y = 18 - 6 = 12$ $\therefore$ The two numbers are 12 and 6 <i>Die twee getalle is 12 en 6</i>	✓ $x + y = 18$ ✓ yx^2 ✓ substitution and simplification <i>vervanging en vereenvoudiging</i> ✓ $P'(x)$ and equating to 0 <i>$P'(x)$ en gelykstel aan 0</i> ✓ x-values/<i>waardes</i> ✓ y-values/<i>waardes</i> ✓ selection of the 2 numbers <i>keuse van die 2 getalle</i> <i>(if/as $x = 0$, Product/<i>Produk</i> = 0)</i> ✓ $x + y = 18$ ✓ xy^2 ✓ substitution and simplification <i>vervanging en vereenvoudiging</i> ✓ $P'(x)$ and equating to 0 <i>$P'(x)$ en gelykstel aan 0</i> ✓ x-values/<i>waardes</i> ✓ y-values/<i>waardes</i> ✓ selection of the two numbers <i>keuse van die 2 getalle</i> <i>($P = 0$ when/<i>wanneer</i> $x = 18$)</i>
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[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) $= \frac{108}{530}$ or / of $\frac{54}{265}$	✓ numerator/teller ✓ denominator/noemer (2)
11.1.2 (b)	$P(A \text{ or / of } B) = P(A) + P(B) - P(A \text{ and/en } B)$ P(girl or not a tennis player) / <i>P(meisie of nie'n tennisspeler nie)</i> $= \frac{288}{530} + \frac{445}{530} - \frac{231}{530}$ $= \frac{502}{530}$ or / of $\frac{251}{265}$ or / of 94,72% OR/OF <i>P(Girl or not Tennis)</i> $= 1 - P(\text{Boy and Tennis})$ $= 1 - \frac{28}{530}$ $= \frac{502}{530}$ or / of $\frac{251}{265}$ or / of 94,72%	✓ formula/formule ✓ substitution into correct formula <i>vervanging in korrekte formule</i> ✓ answer / antwoord ✓ method/metode ✓ substitution/ <i>vervanging</i> ✓ answer/antwoord (3)

11.2.1	9^9 or / of 387 420 489	✓ 9^9 (1)
11.2.2	If vowels are together/<i>As die vokale saam is:</i> $6! \times 4!$ $\therefore$ If vowels are not all together: <i>As die vokale nie almal saam is nie :</i> $9! - (6! \times 4!)$ $= 345\,600$	✓ $6! \times 4!$ ✓ subtracting from 9! <i>afrekening vanaf 9!</i> ✓ answer/antwoord (3)
11.2.3	<i>Vowels in odd spaces / Vokale in onewe spasies</i> $= 4 \times 5 \times 3 \times 4 \times 2 \times 3 \times 1 \times 2$ $= (4 \times 3 \times 2 \times 1) \times (5 \times 4 \times 3 \times 2)$ $= 4! \times 120$ $= 2880$ $\therefore \text{Probability / Waarskynlikheid} = \frac{2880}{(9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2)}$ $= \frac{2880}{362880}$ $= \frac{1}{126}$	✓ $4!$ ✓ $\times 120$ ✓ $\frac{\text{Vowels in odd spaces}}{(9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2)} / \frac{\text{Vokale in onewe spasies}}{(9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2)}$ ✓ answer/antwoord (4) [15]

TOTAL/TOTAAL: 150