



**LIMPOPO**

**PROVINCIAL GOVERNMENT**  
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF  
**EDUCATION**

NATIONAL  
SENIOR CERTIFICATE

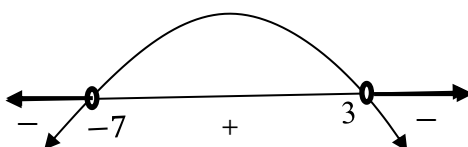
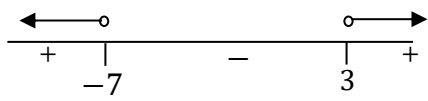
GRADE/GRAAD 12

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.***

**QUESTION/VRAAG 1**

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

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

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                         |     |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 1.2 | $x - 2y = 1$<br>$x = 1 + 2y \dots\dots\dots(1)$<br>$x^2 - xy + 2y^2 = 2 \dots\dots\dots(2)$<br>subst (1) into (2)<br>$(1 + 2y)^2 - y(1 + 2y) + 2y^2 = 2$<br>$4y^2 + 4y + 1 - y - 2y^2 + 2y^2 - 2 = 0$<br>$4y^2 + 3y - 1 = 0$<br>$(4y - 1)(y + 1) = 0$<br>$y = \frac{1}{4}$ or/of $y = -1$<br>$x = \frac{3}{2}$ or/of $x = -1$<br><br>OR/OF<br>$y = \frac{x-1}{2} \dots\dots\dots(1)$<br>$x^2 - xy + 2y^2 = 2 \dots\dots\dots(2)$<br>Subst. (1) into (2)<br>$x^2 - x\left(\frac{x-1}{2}\right) + 2\left(\frac{x-1}{2}\right)^2 = 2$<br>$x^2 - \frac{x^2 - x}{2} + \frac{2x^2 - 4x + 2}{4} = 2$<br>$4x^2 - 2x^2 + 2x + 2x^2 - 4x + 2 - 8 = 0$<br>$4x^2 - 2x - 6 = 0$<br>$2x^2 - x - 3 = 0$<br>$(2x - 3)(x + 1) = 0$<br>$x = \frac{3}{2}$ or/of $x = -1$<br>$y = \frac{1}{4}$ or/of $y = -1$ | ✓ equation/vgl 1<br><br>✓ substitution/vervang<br>✓ simpl/vereenv<br>✓ standard form/vorm<br><br>✓ y-values/waardes<br>✓ x-values/waardes<br><br>OR/OF<br>✓ equation/vgl 1<br><br>✓ substitution/vervang<br>✓ simpl/vereenv<br><br>✓ standard form/vorm<br><br>✓ x-values/waardes<br>✓ y-values/waardes | (6) |
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|     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |      |
|-----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1.3 | 1.3.1 | <p>Then the amount that should be paid by each friend <math>= \frac{3500}{x}</math></p> <p><math>\therefore</math> The amount paid by each friend less four friends <math>= \frac{3500}{x-4}</math></p> <p>Extra amount paid = 43,75</p> <p><math>\rightarrow \frac{3500}{x-4} - \frac{3500}{x} = 43,75</math></p> <p><math>43,75x^2 - 175x - 14000 = 0</math></p> <p><math>x^2 - 4x - 320 = 0</math></p> <p><math>(x-20)(x+16) = 0</math></p> <p><math>x = 20</math> or <math>x \neq -16</math></p> <p><math>\rightarrow 20</math> friends are going on the trip.</p> <p>OR/OF</p> <p>Let the cost per person be <math>y</math></p> <p><math>y = \frac{3\ 500}{x}</math></p> <p><math>xy = 3\ 500</math></p> <p><math>(x-4)(y+43,75) = 3\ 500</math></p> <p><math>xy - 4y + 43,75x - 175 = 3\ 500</math></p> <p><math>3\ 500 - 4\left(\frac{3\ 500}{x}\right) + 43,75x - 175 = 3\ 500</math></p> <p><math>43,75x^2 - 175x - 14\ 000 = 0</math></p> <p><math>x^2 - 4x - 320 = 0</math></p> <p><math>(x-20)(x+16) = 0</math></p> <p><math>\therefore x = 20</math> or <math>x \neq -16</math></p> | <p><math>\checkmark \frac{3500}{x}</math></p> <p><math>\checkmark \frac{3500}{x-4}</math></p> <p><math>\checkmark</math> equation/vgl</p> <p><math>\checkmark</math> standard form/vorm</p> <p><math>\checkmark</math> values with selection/ waardes net seleksie</p> <p>OR/OF</p> <p><math>\checkmark y = \frac{3\ 500}{x}</math></p> <p><math>\checkmark</math> equation/vgl</p> <p><math>\checkmark</math> simplification/ vereenvoudig</p> <p><math>\checkmark</math> standard form/vorm</p> <p><math>\checkmark</math> values with selection/ waardes met seleksie</p> | (5)  |
|     | 1.3.2 | <p>Each friend pays:</p> <p><math>\frac{3500}{16} = R218,75</math></p> <p>OR/OF</p> <p>Cost = <math>175 + 43,75</math></p> <p><math>= R218,75</math></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <p><math>\checkmark</math> answer/antwoord</p> <p>OR/OF</p> <p><math>\checkmark R218,75</math></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | (1)  |
|     |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | [28] |



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

**QUESTION/VRAAG 3**

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



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

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

**QUESTION/VRAAG 4**

|     |       |                                                                                                     |                                                                                                  |      |
|-----|-------|-----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|------|
| 4.1 | 4.1.1 | $p = -1$<br>$q = -3$                                                                                | ✓ value/waarde $p$<br>✓ value/waarde $q$                                                         | (2)  |
|     | 4.1.2 | $f(x) = \frac{a}{x-1} - 3$<br>subs (0 ; -5)<br>$-5 = \frac{a}{0-1} - 3$<br>$-5 = -a - 3$<br>$a = 2$ | ✓ subst. $p$ and $q$ /<br>verv. $p$ en $q$<br>✓ subst/verv<br>(0 ; -5)<br><br>✓ 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<br>✓ 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 | $y = \log_b x$<br>$b^y = x$<br>$b^{-2} = 25$<br>$b = \frac{1}{5}$<br>$f(x) = \log_{\frac{1}{5}} x$  | ✓ subst/verv<br>(25 ; -2)<br><br>✓ answer/antwoord                                               | (2)  |
|     | 4.2.3 | $y = \log_{\frac{1}{5}} x$<br>$x = \log_{\frac{1}{5}} y$<br>$y = \left(\frac{1}{5}\right)^x$        | ✓ swop $x$ and $y$ / ruil $x$ en $y$<br>✓ answer/antwoord                                        | (2)  |
|     | 4.2.4 | $x > -5$                                                                                            | ✓✓ answer/antwoord                                                                               | (2)  |
|     |       |                                                                                                     |                                                                                                  | [15] |

**QUESTION/VRAAG 5**

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

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



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

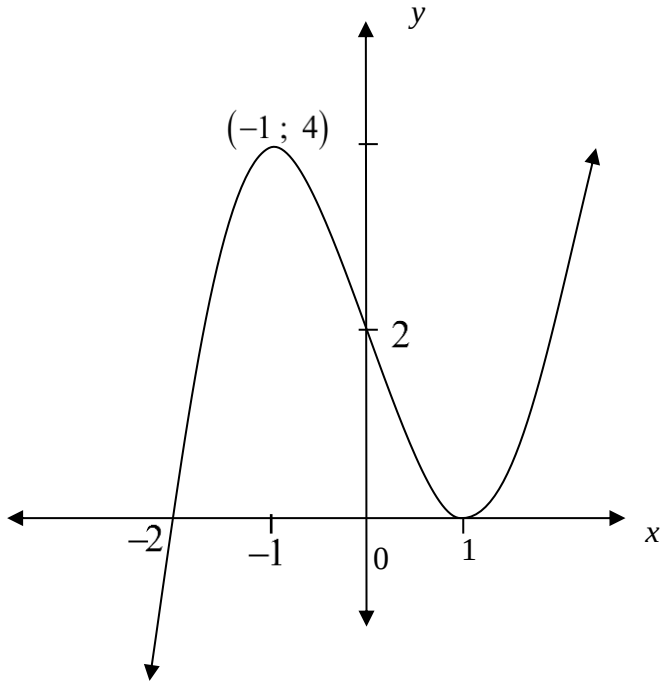
**QUESTION/VRAAG 7**

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



|       |                                                                                                                                           |                                                                                                                                  |      |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|------|
| 7.2.2 | $f(x) = \frac{4}{5x^{-3}} - \frac{3}{\sqrt[3]{x^2}}$ $= \frac{4}{5}x^3 - 3x^{-\frac{2}{3}}$ $f'(x) = \frac{12}{5}x^2 + 2x^{-\frac{5}{3}}$ | $\checkmark \frac{4}{5}x^3$<br>$\checkmark -3x^{-\frac{2}{3}}$<br>$\checkmark \frac{12}{5}x^2$<br>$\checkmark 2x^{-\frac{5}{3}}$ | (4)  |
|       |                                                                                                                                           |                                                                                                                                  | [12] |

**QUESTION/VRAAG 8**

|     |                                                                                                      |                                                                                                                                                                                           |     |
|-----|------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 8.1 |                   | $\checkmark$ x-intercepts/afsnitte<br>$\checkmark$ y- intercept/afsnit<br>$\checkmark$ turning points/DP<br>$\checkmark$ shape/vorm                                                       | (4) |
| 8.2 | $y = a(x-1)^2(x+2)$ $2 = a(-1)^2(2)$ $2 = 2a$ $a = 1$ $f(x) = (x^2 + x - 2)(x - 1)$ $= x^3 - 3x + 2$ | $\checkmark$ subst in correct formula/vervang in korrekte formule<br>$\checkmark$ subst/verv (0 ; 2)<br>$\checkmark a = 1$<br>$\checkmark b = 0$<br>$\checkmark c = -3 \text{ \& } d = 2$ | (5) |



|  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                             |     |
|--|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
|  |  | <p>OR/OF</p> <p>The area of the square = <math>x^2</math><br/> remaining wire = <math>12 - 4x</math><br/> <math>2\pi r = 12 - 4x</math><br/> <math>r = \frac{12 - 4x}{2\pi}</math><br/> area of the circle = <math>\pi \left( \frac{12 - 4x}{2\pi} \right)^2</math><br/> <math>= \pi \left( \frac{6 - 2x}{\pi} \right)^2</math><br/> <math>= \frac{36 - 24x + 4x^2}{\pi}</math><br/> Total area = area of a square + area of a circle<br/> Total area (A) = <math>x^2 + \frac{36 - 24x + 4x^2}{\pi}</math><br/> <math>= \frac{\pi x^2 + 36 - 24x + 4x^2}{\pi}</math><br/> <math>= \frac{(\pi + 4)x^2 - 24x + 36}{\pi}</math></p> | <p>OR/OF</p> <p>✓ <math>x^2</math><br/> ✓ <math>12 - 4x</math><br/> <br/> ✓ <math>r = \frac{12 - 4x}{2\pi}</math><br/> <br/> ✓ <math>\frac{36 - 24x + 4x^2}{\pi}</math><br/> <br/> ✓<br/> <math>x^2 + \frac{36 - 24x + 4x^2}{\pi}</math><br/> ✓<br/> <math>\frac{\pi x^2 + 36 - 24x + 4x^2}{\pi}</math></p> | (6) |
|--|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|

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

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

**TOTAL/TOTAAL : 150**