



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE/
NASIONALE
SENIOR SERTIFIKAAT**

GRADE/GRAAD 12

SEPTEMBER 2020

**TECHNICAL MATHEMATICS P1 MARKING GUIDELINE/
TEGNIESE WISKUNDE VI NASIENRIGLYN**

MARKS/PUNTE: 150

| MARKING CODES / NASIENKODES | |
|------------------------------------|---|
| A | Accuracy/ <i>Akkuraatheid</i> |
| AO | Answer only / <i>Slegs antwoord</i> |
| CA | Consistent accuracy / <i>Volgehoue akkuraatheid</i> |
| M | Method / <i>Metode</i> |
| R | Rounding / <i>Afronding</i> |
| NPR | No penalty for rounding / <i>Geen penalisering vir afronding</i> |
| NPU | No penalty for units omitted / <i>Geen penalisering vir weglating van eenhede nie</i> |
| S | Simplification / <i>Vereenvoudiging</i> |
| F | Correct formula / <i>Korrekte formule</i> |
| SF | Substitution in the correct formula / <i>Vervanging in die korrekte formule</i> |

This marking guideline consists of 20 pages./
Hierdie nasienriglyn bestaan uit 20 bladsye.


NOTE:

- If a candidate answers a question TWICE, only mark the FIRST attempt.
- If a candidate has crossed out an attempt of a question and not redone the question, mark the crossed-out version.
- Consistent accuracy (CA) to be applied as indicated on the marking guideline.
- Assuming answers/values to solve a problem is NOT ACCEPTABLE.

LET WEL:

- Indien 'n kandidaat 'n vraag TWEE keer beantwoord, sien slegs die EERSTE poging na.
- Indien 'n kandidaat 'n poging kanselleer, maar nie die vraag herdoen nie, merk die gekanselleerde poging.
- Volgehoue akkuraatheid (CA) sal toegepas word soos op die nasienriglyne aangedui.
- Aanvaarding van antwoorde / waardes om 'n probleem op te los is ONAANVAARBAAR.


| QUESTION/VRAAG 1 | | | | | |
|------------------|-------|---|--|-------------------------|-----|
| 1.1 | 1.1.1 | $0 = (3x - 2)(x + 1)$ $x = \frac{2}{3}$ or / of $x = -1$ | $\checkmark x = \frac{2}{3}$ $\checkmark x = -1$ | A A | (2) |
| | 1.1.2 | $7x^2 + 9x - 4 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-(9) \pm \sqrt{(9)^2 - 4(7)(-4)}}{2(7)}$ $x = -1,64$ or / of $x = 0,35$ <div style="border: 1px solid black; padding: 2px; width: fit-content; margin-top: 5px;"> -1 MARK for incorrect rounding / -1 PUNT vir verkeerde afronding </div> | \checkmark Formula /Formule \checkmark Substitution/Vervanging $\checkmark x = -1,64$ $\checkmark x = 0,35$ | A CA R CA | (4) |


| | | | | | |
|--------------|-------|---|---|--|-----|
| | 1.1.3 | $-6x^2 < 5x$ $-6x^2 - 5x < 0$ $x(6x+5) > 0$ Critical Values / Kritiese waardes : 0 and / en $-\frac{5}{6} = -0,83$ $x < -\frac{5}{6}$ or / of $0 < x$ | \checkmark Factors/Substitution <i>Faktore/vervanging</i> M \checkmark Both critical Values <i>Beide kritiese waardes</i> NPR $\checkmark\checkmark$ Correct Notation for each interval <i>Korrekte notasie vir elke interval</i> | A CA CA CA | (4) |
| 1.2 | | $x+3y=1$(1) $2x^2+2y^2=-5xy$(2) $x=1-3y$(3) $2(1-3y)^2+2y^2=-5(1-3y)y$ $2(1-6y+9y^2)+2y^2=-5y+15y^2$ $2-12y+18y^2+2y^2+5y-15y^2=0$ $5y^2-7y+2=0$  $y = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(5)(2)}}{2(5)}$ $y = 0,4$ or / of $y = 1$ $x = 1 - 3y$ $x = 1 - 3(0,4)$ or / of $x = 1 - 3(1)$ $x = -0,2$ or / of $x = -2$ | \checkmark Equation/vergelyking 3 M \checkmark Substitution/vervanging \checkmark Simplification/ <i>Vereenvoudiging</i> \checkmark Standard form/ <i>Standaardvorm</i> \checkmark Substitution/vervanging \checkmark Both y values / <i>Beide y-waardes</i> \checkmark Both x values <i>Beide x-waardes</i> NPR | A CA S S SF CA CA | |
| OR/OF | | | | | |


| | | | | | |
|-----|--|---|--|------------|-------------|
| | $x + 3y = 1 \dots\dots\dots(1)$ $2x^2 + 2y^2 = -5xy \dots\dots(2)$ $y = \frac{1-x}{3} \dots\dots\dots(3)$ $2x^2 + 2\left(\frac{1-x}{3}\right)^2 = -5x\left(\frac{1-x}{3}\right)$ $2x^2 + 2\left(\frac{1-2x+x^2}{9}\right) = \frac{-5x+5x^2}{3}$ $18x^2 + 2 - 4x + 2x^2 = -15x + 15x^2$ $18x^2 - 15x^2 + 2x^2 - 4x + 15x + 2 = 0$ $5x^2 + 11x + 2 = 0$ $y = \frac{-(11) \pm \sqrt{(11)^2 - 4(5)(2)}}{2(5)}$ $x = -2 \text{ or / of } x = -0,2$ $y = \frac{1-x}{3}$ $y = \frac{1-(-2)}{3} \text{ or / of } y = \frac{1-(0,2)}{3}$ $y = 1 \text{ or / of } y = 0,4$ | | | | (7) |
| 1.3 | 1.3.1 | $5,425 \text{ rev / min} = \frac{5,425 \text{ rev}}{60 \text{ sec}}$ $5,425 \text{ rev / min} = 0,09 \text{ rev / sec}$ | ✓ 0,09 rev/sec | A | (1) |
| | 1.3.2 | $5,425 \text{ rev / min} = 9 \times 10^{-2} \text{ rev / sec}$ | ✓ $9 \times 10^{-2} \text{ rev / sec}$ NPU | CA | (1) |
| 1.4 | 101111_2 $= 1 \times 2^5 + 0 \times 2^4 + 1 \times 2^3 + 1 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$ $= 32 + 8 + 4 + 2 + 1 = 47$ | <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> AO: Full Marks/ Volpunte </div> | ✓ Method/Metode ✓ 47 | A A | (2) |
| | | | | | [21] |

| QUESTION/VRAAG 2 | | | | |
|------------------|--|---|-----------------------------|------------|
| 2.1 | $-x^2 + 9x - 2 = 0$ $b^2 - 4ac = 9^2 - 4(-1)(-2)$ $b^2 - 4ac = 73$ Roots are real, irrational and unequal <i>Wortels is reël, irrasionaal en ongelyk</i> | ✓ Substitution/ <i>Vervanging</i> ✓ $\Delta = 73$ ✓ Nature of roots/ <i>Aard van die wortels</i> | SF CA CA | (3) |
| 2.2 | $-x^2 + 9x - c = 0$ $b^2 - 4ac < 0$ $9^2 - 4(-1)(c) < 0$ $4c < -81$ $c < \frac{-81}{4}$ | ✓ $\Delta < 0$ ✓ Substitution/ <i>Vervanging</i> ✓ $\frac{-81}{4}$ ✓ Correct notation / <i>Korrekte notasie</i> | A CA CA CA | (4) |
| | | | | [7] |



| QUESTION/VRAAG 3 | | | | | |
|------------------|-------|--|---|--|-----|
| 3.1 | 3.1.1 | $\frac{2.8^{n-2} + 3.8^{n+1}}{2^{3n-5}}$ $= \frac{2.2^{3(n-2)} + 3.2^{3(n+1)}}{2^{3n-5}}$ $= \frac{2.2^{3n-6} + 3.2^{3n+3}}{2^{3n-5}}$ $= \frac{2^{3n}(2.2^{-6} + 3.2^3)}{2^{3n}.2^{-5}}$ $= \frac{1}{32} + 24$ $= \frac{1}{32}$ $= \left(\frac{1}{32} + 24\right) 32$ $= 1 + 768$ $= 769$ | <p>✓ Prime bases/<i>Priemgrondtalle</i></p> <p>✓ Factorisation / <i>Faktorisering</i></p> <p>✓ Simplification/<i>Vereenvoudiging</i></p> <p>✓ Simplification/<i>Vereenvoudiging</i></p> | <p>A</p> <p>CA</p> <p>CA</p> <p>CA</p> | (4) |
| | 3.1.2 | $\sqrt[3]{(-27)x^6} + \sqrt{25x^4}$ $= \sqrt[3]{(-3)^3 x^6} + \sqrt{5^2 x^4}$ $= -3x^2 + 5x^2$ $= 2x^2$ |  <p>✓ Prime bases/<i>Priemgrondtalle</i></p> <p>✓ Simplification/<i>Vereenvoudiging</i></p> <p>✓ Simplification/<i>Vereenvoudiging</i></p> | <p>A</p> <p>CA</p> <p>CA</p> | (3) |
| | 3.1.3 | $\log_2 32 \div 2 \log_5 25$ $= \frac{\log_2 2^5}{2 \log_5 5^2}$ $= \frac{5 \log_2 2}{2 \times 2 \log_5 5}$ $= \frac{5}{4}$ | <p>✓ Prime bases/<i>Priemgrondtalle</i></p> <p>✓ Log property/<i>wet</i></p> <p>✓ Simplification/<i>Vereenvoudiging</i></p> | <p>A</p> <p>CA</p> <p>CA</p> | (3) |

| | | | | |
|-----|--|--|--|-----|
| 3.2 | $\log_2(8x^3 - 1) - \log 100 = \log_2(4x^2 + 2x + 1)$ $\log_2(8x^3 - 1) - \log_2(4x^2 + 2x + 1) = \log 100$ $\log_2\left(\frac{8x^3 - 1}{4x^2 + 2x + 1}\right) = \log 100$ $\log_2\left(\frac{(2x - 1)(4x^2 + 2x + 1)}{4x^2 + 2x + 1}\right) = \log 10^2$ $\log_2(2x - 1) = 2 \log 10$ $\log_2(2x - 1) = 2$ $2^2 = 2x - 1$ $x = \frac{5}{2}$ <p style="text-align: center;">OR/OF</p> $\log_2(8x^3 - 1) - \log 100 = \log_2(4x^2 + 2x + 1)$ $\log_2(8x^3 - 1) - \log 10^2 = \log_2(4x^2 + 2x + 1)$ $\log_2(8x^3 - 1) - 2 = \log_2(4x^2 + 2x + 1)$ $\log_2(8x^3 - 1) - \log_2 4 = \log_2(4x^2 + 2x + 1)$  $\log_2\left(\frac{8x^3 - 1}{4}\right) = \log_2(4x^2 + 2x + 1)$ $\frac{8x^3 - 1}{4} = 4x^2 + 2x + 1$ $\frac{(2x - 1)(4x^2 + 2x + 1)}{4x^2 + 2x + 1} = 4$ $2x - 1 = 4$ $x = \frac{5}{2}$ | <p>✓ Log property/Wet</p> <p>✓ Factors/Faktore</p> <p>✓ Log property / wet</p> <p>✓ Exponential form / Eksponensiale vorm</p> <p>✓ Simplification/ Vereenvoudiging</p> | <p>A</p> <p>A</p> <p>A</p> <p>CA</p> <p>CA</p> | (5) |
|-----|--|--|--|-----|

| | | | | |
|--------------|---|--|--|-----|
| 3.3 | $z = -3 + i\sqrt{3}$ $ z = \sqrt{(-3)^2 + (\sqrt{3})^2}$ $ z = \sqrt{12}$ $ z = 2\sqrt{3}$ $\tan \theta = \frac{\sqrt{3}}{3}$ $\theta = \tan^{-1}\left(\frac{\sqrt{3}}{3}\right)$ $\theta = 30^\circ \text{ (Reference Angle / Verw}\angle\text{)}$ $\theta = 180^\circ - 30^\circ = 150^\circ$ $z = 2\sqrt{3}(\cos 150^\circ + i \sin 150^\circ)$ | ✓ Substitution/Vervanging ✓ Modulus ✓ tan ratio/verhouding ✓ Reference angle/ Verwysingshoek ✓ Polar form/Polêre vorm | A CA A CA CA | (5) |
| 3.4 | $\frac{y-i}{2-i} = 3xi$ $y-i = (3xi)(2-i)$ $y-i = 6xi - 3xi^2$ $y-i = 6xi - 3x(-1)$ $y-i = 3x + 6xi$ $y = 3x \text{ and / en } -1 = 6x$ $y = 3x \text{ and / en } x = -\frac{1}{6}$ $y = 3\left(-\frac{1}{6}\right) \text{ and / en } x = -\frac{1}{6}$ $y = -\frac{1}{2} \text{ and / en } x = -\frac{1}{6}$ |  ✓ Simplification / Vereenvoudiging ✓ $i^2 = -1$ ✓ $x = -\frac{1}{6}$ ✓ $y = -\frac{1}{2}$ | A CA CA CA | |
| OR/OF | | | | |

| | | | | |
|-------------|--|---|----|-----|
| | $\frac{y-i}{2-i} \times \frac{2+i}{2+i} = 3xi$ | ✓ Conjugate product / Toegevoegde produk ✓ $i^2 = -1$ | A | |
| | $\frac{2y + yi - 2i - i^2}{2^2 - i^2} = 3xi$ | | | |
| | $\frac{2y + yi - 2i - (-1)}{4 - (-1)} = 3xi$ | | | |
| | $\frac{2y + 1 + (y - 2)i}{5} = 3xi$ | | | |
| | $2y + 1 + (y - 2)i = 15xi$ | | CA | |
| | $2y + 1 = 0$ and / en $y - 2 = 15x$ | | | |
| | $y = -\frac{1}{2}$ and / en $-\frac{1}{2} - 2 = 15x$ | | | |
| | $y = -\frac{1}{2}$ and / en $-\frac{5}{2} \div 15 = x$ | ✓ $x = -\frac{1}{6}$ | CA | |
| | $y = -\frac{1}{2}$ and / en $-\frac{1}{6} = x$ | ✓ $y = -\frac{1}{2}$ | CA | (4) |
| [24] | | | | |

QUESTION/VRAAG 4

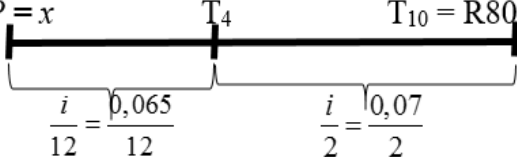
| | | | | | |
|-----|-------|---|--|-----------------------------|-----|
| 4.1 | 4.1.1 | $0 = -\frac{6}{x} + 2$ $\frac{6}{x} = 2$ $x = 3$ | ✓ Equating to 0 / Gelykstel aan 0 ✓ $x = 3$ | A A S | (2) |
| | 4.1.2 | $0 = x^2 - x - 6$ $0 = (x - 3)(x + 2)$ $x = 3$ or/of $x = -2$ | ✓ Factors/faktore ✓ $x = 3$ or/of ✓ $x = -2$ | SF A CA CA | (3) |
| | 4.1.3 | $y = -6$ | ✓ $y = -6$ | A | (1) |
| | 4.1.4 | $x = 0$ and/en $y = 2$ | ✓ $x = 0$ ✓ $y = 2$ | A A | (2) |

| | | | | | |
|--|-------|---|--|----------------------------------|-----|
| | 4.1.5 | Axis of symmetry / <i>simmetriese</i> - as : $x = \frac{-2+3}{2} = \frac{1}{2}$ $g\left(\frac{1}{2}\right) = \left(\frac{1}{2}\right)^2 - \frac{1}{2} - 6$ $g\left(\frac{1}{2}\right) = \frac{-25}{4}$ Turning point / <i>draaipunt</i> $\left(\frac{1}{2}; \frac{-25}{4}\right)$ | ✓M $\checkmark x = \frac{1}{2}$ \checkmark y-coordinate/ <i>koördinaat</i> | A CA CA | |
| | | OR/OF | | | |
| | | $g'(x) = 2x - 1$ $0 = 2x - 1$ $x = \frac{1}{2}$ $g\left(\frac{1}{2}\right) = \left(\frac{1}{2}\right)^2 - \frac{1}{2} - 6$ $g\left(\frac{1}{2}\right) = \frac{-25}{4}$ Turning point / <i>draaipunt</i> $\left(\frac{1}{2}; \frac{-25}{4}\right)$ | $\checkmark g'(x) = 0$ $\checkmark x = \frac{1}{2}$ \checkmark y-coordinate/ <i>koördinaat</i> | A CA CA | (3) |
| | 4.1.6 | <p style="text-align: right;"> ✓ Shape of / <i>vorm van g</i> ✓ Shape of / <i>vorm van f</i> ✓ Asymptotes/ <i>asimptote</i> ✓ x-intercepts / <i>afsnitte</i> ✓ y-intercept / <i>afsnit</i> ✓ turning point / <i>draaipunt</i> </p> | | CA CA CA CA CA CA | (6) |
| | 4.1.7 | $x \neq 0$ OR/OF $x < 0 \cup x > 0$ | $\checkmark x \neq 0$ | CA | (1) |
| | 4.1.8 | $x \geq 3$ OR/OF $x \in [3; \infty)$ | $\checkmark x \geq 3$ | CA | (1) |


| | | | | | |
|-------------|-------|--|---|------------------------------------|-----|
| 4.2 | 4.2.1 | $r^2 = (0)^2 + (-2)^2 = 4$ $y = -\sqrt{4-x^2}$ | $\checkmark r^2 = 4$ \checkmark Equation / vergelyking | A CA | (2) |
| | 4.2.2 | $y = 2^x + q$ $-2 = 2^0 + q$ $-2 = 1 + q$ $\square q = -3$ | \checkmark SF $\checkmark q = -3$ | A CA | (2) |
| | 4.2.3 | $y = 2^x - 3$ $0 = 2^x - 3$ $3 = 2^x$ $x = \log_2 3$ $x = 1,58$ $A(1,58;0)$ | \checkmark Substitution / vervanging SF \checkmark Logarithm Property/wet $\checkmark 1,58$ | A CA CA | (3) |
| | 4.2.4 | $y > -3$ | $\checkmark y > -3$ | A | (1) |
| [27] | | | | | |



| QUESTION/VRAAG 5 | | | | | | |
|------------------|--|---|--|--|----------------------------|-----|
| 5.1 | Depreciation value Verminderde waarde | | $= \frac{8,8}{100} \times 800\,000 = R70\,400$ | ✓ R729 600 | A | (1) |
| | Current Asset value Waarde van bate | | $= R800\,000 - R70\,400 = R729\,600$ | | | |
| | OR / OF | | | | | |
| | Current Asset value Waarde van bate | | $= 91,2\% \times R800\,000 = R729\,600$ | ✓ R729 600 | A | |
| 5.2 | 5.2.1 | Infected people / besmette mense = 9 | | ✓ 9 | A | (1) |
| | 5.2.2 | $A = P(1+i)^n$ $13 = 9(1+i)^7$ $\left(\frac{13}{9}\right)^{\frac{1}{7}} = 1+i$ $i = \left(\frac{13}{9}\right)^{\frac{1}{7}} - 1$ $i = 0,0539$ ∴ Daily infection rate ∴ Daaglikse besmettingskoers | | ✓ Substitution/Vervanging ✓ i ✓ 5,39% | SF CA CA | (3) |
| | 5.2.3 | $2P = P(1+0,0339)^n$ $2 = (1,0339)^n$ $n = \log_{1,0339} 2$ ∴ $n = 21$ days / dae | | ✓ Substitution/Vervanging ✓ Log law/wet ✓ $n = 21$ | A CA | (3) |

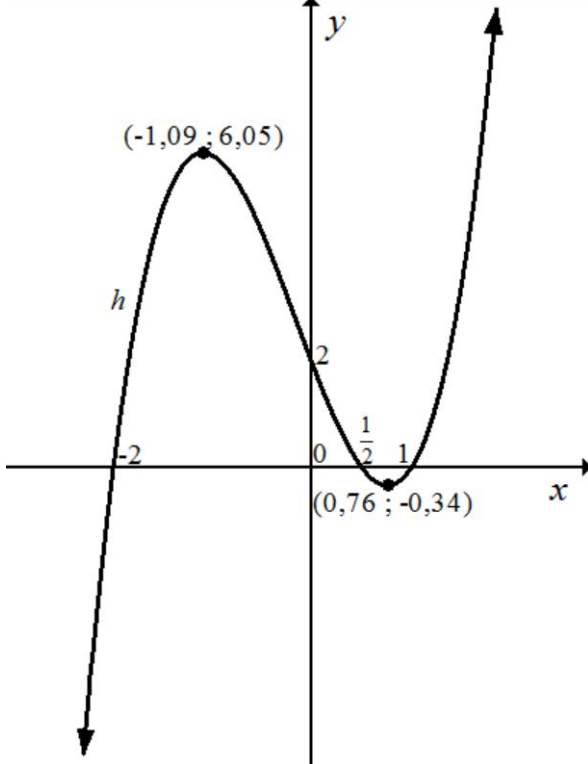

| | | | | |
|------------|---|--|--|-------------------------------|
| <p>5.3</p> | <p> $P = x$ T_4 $T_{10} = R800\ 000$  $\frac{i}{12} = \frac{0,065}{12}$ $\frac{i}{2} = \frac{0,07}{2}$ $A_4 = P(1+i)^n$ $A_4 = P\left(1 + \frac{i}{12}\right)^{12n}$ $A_4 = x\left(1 + \frac{0,065}{12}\right)^{12 \times 4}$ $A = A_4\left(1 + \frac{i}{2}\right)^{2n}$ $800\ 000 = x\left(1 + \frac{0,065}{12}\right)^{12 \times 4} \left(1 + \frac{0,07}{2}\right)^{2 \times 6}$ $x = \frac{800\ 000}{\left(1 + \frac{0,065}{12}\right)^{12 \times 4} \left(1 + \frac{0,07}{2}\right)^{2 \times 6}}$ $\therefore x = R408\ 501,77$ </p> | <p>✓ Substitute/Vervang x SF</p> <p>✓ Substitute i and n Vervang i en n SF</p> <p>✓ Substitution/ Vervanging SF</p> <p>✓ Simplification / Vereenvoudiging S</p> <p>✓ R 408 501,77</p> | <p>A</p> <p>A</p> <p>CA</p> <p>CA</p> <p>CA</p> | <p>(5)</p> <p>[13]</p> |
|------------|---|--|--|-------------------------------|



| QUESTION/VRAAG 6 | | | | | |
|---|---|---|---|--|-----|
| 6.1 | $f(x) = -\frac{1}{2}x + \pi$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{-\frac{1}{2}(x+h) + \pi - \left(-\frac{1}{2}x + \pi\right)}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{-\frac{1}{2}x - \frac{1}{2}h + \pi + \frac{1}{2}x - \pi}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{-\frac{1}{2}h}{h}$ $f'(x) = \lim_{h \rightarrow 0} -\frac{1}{2}$ $\therefore f'(x) = -\frac{1}{2}$ | | <p>✓ Definition/<i>Definisie</i></p> <p>✓ Substitution / <i>Vervanging</i> SF</p> <p>✓ Simplification/ <i>Vereenvoudiging</i> S</p> <p>✓ Simplification / <i>Vereenvoudiging</i> S</p> <p>✓ $f'(x) = -\frac{1}{2}$</p> | <p>A</p> <p>A</p> <p>CA</p> <p>CA</p> <p>CA</p> | |
|  | | | | | |
| 6.2 | 6.2.1 | $D_x \left(9\pi - \frac{14}{\sqrt{x}} \right)$ $D_x \left(9\pi - \frac{14}{x^{\frac{1}{2}}} \right)$ $D_x \left(9\pi - 14x^{-\frac{1}{2}} \right)$ $= 0 + \frac{14}{2} x^{-\frac{1}{2}-1}$ $= 7x^{-\frac{3}{2}}$ | <p>✓ Simplification/ <i>Vereenvoudiging</i> S</p> <p>✓ Simplification / <i>Vereenvoudiging</i> S</p> <p>✓ Derivative/<i>Afgeleide</i></p> | <p>A</p> <p>A</p> <p>CA</p> | (3) |

| | | | | |
|------------|---|--|--|-------------|
| | <p>6.2.2</p> $2xy + x = x^{-9}$ $y = \frac{x^{-9} - x}{2x}$ $y = \frac{x^{-10}}{2} - \frac{1}{2}$ $\frac{dy}{dx} = \frac{-10x^{-11}}{2}$ $\therefore \frac{dy}{dx} = -5x^{-11}$ | <p>✓ y Subject/Onderwerp</p> <p>✓✓ Simplification/ Vereenvoudiging S</p> <p>✓ $-5x^{-11}$</p> | <p>A</p> <p>CA</p> <p>CA</p> <p>CA</p> | <p>(4)</p> |
| <p>6.3</p> | <p>Average gradient = $\frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$</p> <p>Gemiddelde gradiënt = $\frac{-3}{-2 - x_1} = 1$</p> $-3 = -2 - x_1$ $\therefore x_1 = 1$ <p>or / of</p> <p>Average gradient = $\frac{-3}{x_1 + 2} = 1$</p> $-3 = x_1 + 2$ $\therefore x_1 = -5$ | <p>✓ Definition / definisie</p> <p>✓ Substitution/ Vervanging</p> <p>✓ 1</p> <p>✓ -5</p> | <p>A</p> <p>A</p> <p>CA</p> <p>CA</p> | <p>(4)</p> |
| | | | | <p>[16]</p> |

| QUESTION/VRAAG 7 | | | | |
|------------------|--|--|---|-----|
| 7.1 | $y = 2$ | $\checkmark 2$ | A | (1) |
| 7.2 | $h\left(\frac{1}{2}\right) = 2\left(\frac{1}{2}\right)^3 + \left(\frac{1}{2}\right)^2 - 5\left(\frac{1}{2}\right) + 2 = 0$ <p>Since/omdat $h\left(\frac{1}{2}\right) = 0$, then/dan $x = \frac{1}{2}$ is the x-intercept/ is die x-afsnit</p> | $\checkmark h\left(\frac{1}{2}\right) = 0$ $\checkmark x = \frac{1}{2}$ | A A | (2) |
| 7.3 | $\begin{array}{r rrrr} \frac{1}{2} & 2 & 1 & -5 & +2 \\ \hline & 0 & 1 & 1 & -2 \\ \hline & 2 & 2 & -4 & 0 \end{array}$ $(2x^2 + 2x - 4)\left(x - \frac{1}{2}\right) = 0$ $(2x - 2)(x + 2)\left(x - \frac{1}{2}\right) = 0$ <p>$x = -2$ or / of $x = 1$</p> | $\checkmark 2x^2 + 2x - 4$ $\checkmark (x + 2)(2x - 2)$ $\checkmark x = -2$ or / of $x = 1$ | A CA CA | (3) |
| 7.4 | $h'(x) = 6x^2 + 2x - 5 = 0$ $x = \frac{-2 \pm \sqrt{4 - 4(6)(-5)}}{12}$ <p>$x = -1,09$ or / of $x = 0,76$</p> $y = 2(-1,09)^3 + (-1,09)^2 - 5(-1,09) + 2 = 6,05$ <p>or / of</p> $y = 2(0,76)^3 + (0,76)^2 - 5(0,76) + 2 = -0,34$ <p>$(-1,09; 6,05)$ and/en $(0,76; -0,34)$</p> | $\checkmark h'(x) = 6x^2 + 2x - 5$ $\checkmark h'(x) = 0$ \checkmark Substitution/Vervanging \checkmark Both x values / Beide x -waardes \checkmark Both y -values / Beide y -waardes | A A CA CA CA | (5) |

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| 7.5 |  | <ul style="list-style-type: none"> ✓ Shape/Vorm ✓ x-intercepts/afsnitte ✓ y- intercept/afsnit ✓✓ Turning Points/ Draaipunte | <p style="text-align: center;">A CA CA CA</p> | (5) |
| 7.6 | $h'(x) = 6x^2 + 2x - 5 = m_{\text{tangent/raaklyn}}$ $m_{\text{tangent/raaklyn}} = -5$ $y - y_1 = m(x - x_1)$ $y - 2 = -5(x - 0)$ $y = -5x + 2$ | <p style="text-align: center;"></p> <ul style="list-style-type: none"> ✓ $m_{\text{tangent/raaklyn}} = 6x^2 + 2x - 5$ ✓ $m_{\text{tangent/raaklyn}} = -5$ at/by $x = 0$ ✓ Substitution/Vervanging SF ✓ $y = -5x + 2$ | <p style="text-align: center;">A A CA CA</p> | (4) |
| | | | | [20] |

| QUESTION/VRAAG 8 | | | | |
|------------------|--|---|--|-----|
| 8.1 | $S(t) = 3 + 6t - \frac{3}{4}t^2$ <div style="border: 1px solid black; padding: 5px; display: inline-block;"> AO: FULL MARKS AO: VOLPUNTE </div> Truck Height = $S(0) = 3 + 6(0) - \frac{3}{4}(0)^2$ <i>Trok hoogte = 3m</i> | \checkmark 3m | A | (1) |
| 8.2 | $S(t) = 3 + 6t - \frac{3}{4}t^2$ <div style="border: 1px solid black; padding: 5px; display: inline-block;"> AO: FULL MARKS AO: VOLPUNTE </div> $S(2) = 3 + 6(2) - \frac{3}{4}(2)^2$ $S(2) = 12m$ | \checkmark Substitution/Vervanging \checkmark 12 m | A CA | (2) |
| 8.3 | $S(t) = 3 + 6t - \frac{3}{4}t^2$ $S'(t) = 6 - \frac{3}{2}t$ $6 - \frac{3}{2}t = 0$ $t = 4s$ | \checkmark $S'(t)$ \checkmark $S'(t) = 0$ \checkmark 4s | A A CA | (3) |
| 8.4 | Maximum Height = $S(4) = 3 + 6(4) - \frac{3}{4}(4)$ <i>Maksimum hoogte = 15m</i> No, maximum height that can be reached is 15m. <i>Nee, die maksimum hoogte behaalbaar is 15m</i> | \checkmark Substitution/Vervanging \checkmark 15 m \checkmark Conclusion/Gevolgtrekking \checkmark Reason / Rede | A A CA CA | |
| OR/OF | | | | |

| | | | | |
|--|--|---|------------------------|------|
| | $3 + 6t - \frac{3}{4}t^2 = 16$ $-13 + 6t - \frac{3}{4}t^2 = 0$ $t = \frac{-6 \pm \sqrt{(6)^2 - 4\left(-\frac{3}{4}\right)(-13)}}{2\left(-\frac{3}{4}\right)}$ $t = \text{Non-real / nie-reël}$ <p>This indicates that it is not possible for the height of water ejected by the fire truck to reach 16 m, and so this truck is not suitable. <i>Dit dui aan dat dit nie moontlik is vir water om 16 m te bereik nie en dus is die brandblussertrok nie geskik daarvoor nie.</i></p> | ✓ Equating to 16/ <i>Gelykgestel aan 16</i> ✓ Non-real/nie-reël ✓ Conclusion/gevolgtrekking ✓ Reason/rede | A A CA CA | (4) |
| | | | | [11] |

QUESTION/VRAAG 9

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|-----|-------|--|--|----------------------|-----|
| 9.1 | 9.1.1 | $\int (y \sqrt[5]{x}) dx$ $= \int (y x^{\frac{1}{5}}) dx$ $= \frac{x^{\frac{1}{5}+1}}{\frac{1}{5}+1} y + c$ $= \frac{x^{\frac{6}{5}} y}{\frac{6}{5}} + c$ $= \frac{5x^{\frac{6}{5}} y}{6} + c$ | ✓ Exponential form / <i>Eksponensiële vorm</i> S ✓ c ✓ $\frac{5x^{\frac{6}{5}} y}{6}$ | A A CA | (3) |
| | 9.1.2 | $\int \left(\frac{1}{x} - \frac{5}{x^2} \right) dx$ $\int \left(\frac{1}{x} - 5x^{-2} \right) dx$ $\ln x + 5x^{-1} + c$ | ✓ Fraction/Breuk S ✓ $\ln x$ ✓ $5x^{-1} + c$ | A CA | (3) |

| | | | | |
|----------------------|--|---|--|---|
| 9.2 | $\int_{-2}^0 (x^2 - 4) dx$ $= \left[\frac{x^3}{3} - 4x + c \right]_{-2}^0$ $= 0 - \left(\frac{(-2)^3}{3} - 4(-2) \right)$ $= - \left(-\frac{8}{3} + 8 \right)$ $\therefore \text{Area} = \frac{16}{3} \approx 5,33$ | ✓ Area notation/notasie ✓ Integral/Integraal ✓ Substitution/Vervanging ✓ Substitution/Vervanging ✓ Simplification/ <i>Vereenvoudiging</i> ✓ Correct value of the bounded area/ <i>Korrekte waarde van die begrensde area</i> | A A CA CA CA CA | (6) |
| | | | | [12] |
| | | | | |
| TOTAL/TOTAAL: | | | | 150 |

