



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**SENIOR CERTIFICATE EXAMINATIONS/
NATIONAL SENIOR CERTIFICATE EXAMINATIONS
*SENIORSERTIFIKAAT-EKSAMEN/
NASIONALE SENIORSERTIFIKAAT-EKSAMEN***

TECHNICAL MATHEMATICS P1/TEGNIJSE WISKUNDE VI

MAY/JUNE/MEI/JUNIE 2024

MARKING GUIDELINES/NASIENRIGLYNE

MARKS/PUNTE: 150

| Marking Codes/Nasienkode | |
|--------------------------|---|
| A | Accuracy/Akkuraatheid |
| CA | Consistent Accuracy/Volgehoue Akkuraatheid |
| M | Method/Metode |
| R | Rounding/Afronding |
| NPR | No Penalty for Rounding/Geen Penaliserings vir Afronding nie |
| NPU | No Penalty for Units omitted/Geen Penaliserings vir Eenhede Weggelaat nie |
| S | Simplification/Vereenvoudiging |
| SF | Substitution in Correct Formula/Vervanging in Korrekte Formule |

**These marking guidelines consist of 19 pages.
*Hierdie nasienriglyne bestaan uit 19 bladsye.***

NOTE:

- If a candidate answers a question TWICE, mark only the FIRST attempt.
- Consistent accuracy applies in all aspects of the marking guidelines where indicated.
- # Shows questions where a Tolerance Range will be applied:
Q 2.2 ; Q 5.2.1 ; Q 6.1 & Q 9.2

LET WEL:

- Indien 'n kandidaat 'n vraag TWEE keer beantwoord, sien slegs die EERSTE poging na.
- Volgehoue akkuraatheid is deurgaans op alle aspekte van die nasienriglyne soos aangedui.
- # Toon vrae waar Toleransie wydte (Verdraagsaamheids omvang) toegepas word:
V 2.2 ; V 5.2. ; V 6.1 & V 9.2

QUESTION/VRAAG 1

| | | | |
|-------|---|--|--|
| 1.1.1 | $x^2 - x - 12 = 0$ $(x - 4)(x + 3) = 0$ OR/OF $x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(1)(-12)}}{2(1)}$ $x = 4$ or/of $x = -3$ | ✓ factors/formula faktore/formule ✓ both values of x beide waardes van x AO: Full Marks/Volpunte | A CA (2) |
| 1.1.2 | $x^2 - x - 12 \leq 0$ $(x - 4)(x + 3) \leq 0$ $-3 \leq x \leq 4$ OR/OF $x \in [-3 ; 4]$ | ✓ correct notation korrekte notasie ADDENDUM | CA (1) |
| 1.1.3 | $x^2 - x - 12 = -5$ $x^2 - x - 7 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-(-1) \pm \sqrt{(-1)^2 - 4(1)(-7)}}{2(1)}$ $x \approx -2,19$ or/of $x \approx 3,19$ | ✓ standard form /standaardvorm ✓ SF ✓ positive x -value Positiewe x -waarde ✓ negative value of x negatiewe waarde v x NPR AO: Full Marks/Volpunte | A CA CA CA (4) |

| | | | |
|-------|---|--|---|
| 1.2.1 | $2y - x = 7$ $x = 2y - 7$ | ✓ x subject of formula <i>x onderwerp van formule</i> | A (1) |
| 1.2.2 | $x = 2y - 7$ $x^2 + xy = 21 - y^2$ $(2y - 7)^2 + (2y - 7)y = 21 - y^2$ $4y^2 - 28y + 49 + 2y^2 - 7y = 21 - y^2$ $7y^2 - 35y + 49 = 0$ OR/OF $y^2 - 5y + 4 = 0$ $(y - 4)(y - 1) = 0$ OR/OF $y = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(1)(4)}}{2(1)}$ $y = 4$ or / of $y = 1$ $x = 2(4) - 7 = 1$ or / of $x = 2(1) - 7 = -5$ OR/OF $2y - x = 7$ $y = \frac{x}{2} + \frac{7}{2}$ $x^2 + xy = 21 - y^2$ $x^2 + x\left(\frac{x}{2} + \frac{7}{2}\right) = 21 - \left(\frac{x}{2} + \frac{7}{2}\right)^2$ $x^2 + \frac{x^2}{2} + \frac{7x}{2} = 21 - \left(\frac{x^2}{4} + \frac{7x}{2} + \frac{49}{4}\right)$ $x^2 + \frac{x^2}{2} + \frac{7x}{2} = 21 - \frac{x^2}{4} - \frac{7x}{2} - \frac{49}{4}$ $4x^2 + 2x^2 + 14x = 84 - x^2 - 14x - 49$ $7x^2 + 28x - 35 = 0$ OR/OF $x^2 + 4x - 5 = 0$ $(x + 5)(x - 1) = 0$ OR/OF $x = \frac{-(4) \pm \sqrt{(4)^2 - 4(1)(-5)}}{2(1)}$ $x = -5$ or / of $x = 1$ $y = \frac{-5}{2} + \frac{7}{2} = 1$ or / of $y = \frac{1}{2} + \frac{7}{2} = 4$ | ✓ subst. /verv. ✓ standard form /vorm ✓ factors/formula <i>Faktor/formule</i> ✓ both y-values <i>beide y-waardes</i> ✓ both x-values <i>beide x-waardes</i> OR/OF ✓ subst./verv. ✓ standard form <i>/standaardvorm</i> ✓ factors/formula <i>faktore/formule</i> ✓ both x-values <i>/beide x-waardes</i> ✓ both y-values <i>beide y-waardes</i> | CA CA CA CA CA A CA CA CA (5) |

| | | | | | | | | | | | | | | | | | | | | | |
|----------------|---|----------------|----------------|----------------|----------------|----------------|----------------|---|---|---|---|---|---|----|----|---|---|---|---|---|---|
| 1.4 | <div>111110₂</div> <table><tr><td>2⁵</td><td>2⁴</td><td>2³</td><td>2²</td><td>2¹</td><td>2⁰</td></tr><tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td></tr><tr><td>32</td><td>16</td><td>8</td><td>4</td><td>2</td><td>0</td></tr></table> <div>32 + 16 + 8 + 4 + 2 = 62</div> <div>∴ 2 (111110₂ + 38)</div> <div>= 2 (62 + 38)</div> <div>= 200</div> | 2 ⁵ | 2 ⁴ | 2 ³ | 2 ² | 2 ¹ | 2 ⁰ | 1 | 1 | 1 | 1 | 1 | 0 | 32 | 16 | 8 | 4 | 2 | 0 | <div>✓ 62</div> <div>✓ 200</div> <div>AO: Full Marks/Volpunte</div> | <div>A</div> <div>CA</div> <div>(2)</div> <div>[20]</div> |
| 2 ⁵ | 2 ⁴ | 2 ³ | 2 ² | 2 ¹ | 2 ⁰ | | | | | | | | | | | | | | | | |
| 1 | 1 | 1 | 1 | 1 | 0 | | | | | | | | | | | | | | | | |
| 32 | 16 | 8 | 4 | 2 | 0 | | | | | | | | | | | | | | | | |

QUESTION/VRAAG 2

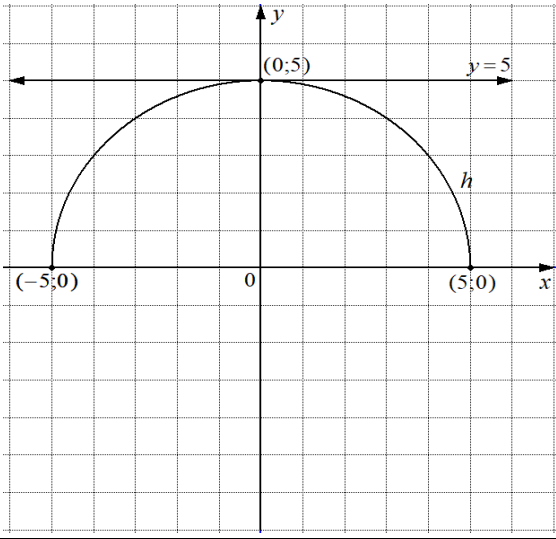
| | | | |
|----------|--|---|--|
| 2.1.1 | $b = 0$ | ✓ Value of/ waarde van b | A (1) |
| 2.1.2 | $b = \frac{2}{5}$ OR / OF 0,4 | ✓ Value of/ waarde van b | A (1) |
| 2.2 # | $kx^2 = 35 - 2x$ $kx^2 + 2x - 35 = 0$ $\Delta = b^2 - 4ac$ $= (2)^2 - 4(k)(-35)$ $= 4 + 140k$ For real roots / Vir reële wortels: $\Delta \geq 0$ $4 + 140k \geq 0$ $k \geq -\frac{1}{35}$ OR/OF $-0,03$ | ✓ standard form /standaardvorm ✓ SF ✓ S ✓ $\Delta \geq 0$ ✓ Values of /waardes van k ADDENDUM | A CA CA A CA (5) |
| | | | [7] |

QUESTION/VRAAG 3

| | | | |
|-------|---|---|---|
| 3.1.1 | $\sqrt[3]{8x^{27}} = 2x^9$ | ✓ $2x^9$ | A (1) |
| 3.1.2 | $9^{n+1} \times 4^n \times 6^{1-2n}$ $= (3^2)^{n+1} \times (2^2)^n \times (2 \times 3)^{1-2n}$ $= 3^{2n+2} \times 2^{2n} \times 2^{1-2n} \times 3^{1-2n}$ $= 3^{2n+2+1-2n} \times 2^{2n+1-2n}$ $= 3^3 \times 2^1$ $= 54$ | ✓ prime bases <i>/priem grondtalle</i> ✓ expansion/uitbreiding ✓ S | A CA CA (3) |
| 3.1.3 | $\sqrt{k} (2 - \sqrt{k}) - \sqrt{4k}$ $= 2\sqrt{k} - k - 2\sqrt{k}$ $= -k$ OR/OF $\sqrt{k} (2 - \sqrt{k}) - \sqrt{4k}$ $= k^{\frac{1}{2}} \left(2 - k^{\frac{1}{2}} \right) - 2k^{\frac{1}{2}}$ $= 2k^{\frac{1}{2}} - k - 2k^{\frac{1}{2}}$ $= -k$ | $\checkmark 2\sqrt{k} - k$ $\checkmark -2\sqrt{k}$ $\checkmark S$ OR/OF $\checkmark 2k^{\frac{1}{2}} - k$ $\checkmark -2k^{\frac{1}{2}}$ $\checkmark S$ | A A CA A A CA (3) |
| 3.2.1 | $\log 72 - \log 2$ OR/OF $\log 36 + \log 2 - \log 2 = \log 36$ $= \log \frac{72}{2}$ OR/OF $\log 36$ OR/OF $2 \log 6$ | ✓ log prop./eienskap | A (1) |
| 3.2.2 | $\frac{\log 72 - \log 2}{\log 6} = \frac{\log 36}{\log 6}$ $= \frac{\log 6^2}{\log 6}$ OR/OF $= \log_6 36$ $= \frac{2 \log 6}{\log 6}$ $= 2 \log_6 6$ $= 2$ | <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> AO: Full Marks if Q 3.2.1 is correct otherwise only 1mark <i>/Volpunte indien V3.2.1 korrek is anders Slegs 1 punt</i> </div> ✓ log prop./eienskap ✓ S ADDENDUM | CA CA (2) |

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|-------|--|---|---|
| 3.3 | $5^{x+2} - 5^x = 600$ $5^x \cdot 5^2 - 5^x = 600$ $5^x (25 - 1) = 600$ $5^x = 25$ $5^x = 5^2$ OR/OF $x = \log_5 25$ OR/OF $\log 5^x = \log 5^2$ $x \log 5 = 2 \log 5$ $\therefore x = 2$ | ✓ separating exp./skei eksp. ✓ factors / faktore ✓ S ✓ exp or log. prop./eksp. of log eienskap ✓ value of /waarde van x AO: Full Marks/Volpunte | A CA CA CA CA CA (5) |
| 3.4.1 | $-i$ OR/OF $0 - i$ | ✓ conjugate /gekojugeerde | A (1) |
| 3.4.2 | $\frac{2+3i}{i}$ $= \frac{2+3i}{i} \times \frac{-i}{-i}$ $= \frac{-2i-3i^2}{-i^2}$ OR / OF $-\frac{2i}{-i^2} + 3$ $= \frac{-2i-3(-1)}{-(-1)}$ OR / OF $-\frac{2i}{-(-1)} + 3$ $= -2i + 3$ | ✓ M ✓ S ✓ -1 ✓ S ADDENDUM | A CA A CA (4) |
| 3.5 | $a + bi = -i - 14$ $\therefore a = -14$ and / en $b = -1$ | ✓ a-value/waarde ✓ b-value/waarde | A A (2) |
| | | | [22] |

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|-----------|--|--|---|
| 4.1.4 (a) | $f(x) = -2(x-3)^2 + 18$ subst./verv. (5; t) $t = -2(5-3)^2 + 18$ $= 10$ OR/OF $f(x) = -2x^2 + 12x$ $t = -2(5)^2 + 12(5)$ $= 10$ | ✓ subst./verv ✓ value of /waarde van t OR/OF ✓ subst./verv ✓ value of /waarde van t AO: Full Marks/Volpunte | A CA CA CA (2) |
| 4.1.4 (b) | $h(x) = 2x + c$ subst./verv (5; 10) $10 = 2(5) + c$ $c = 0$ | ✓ subst./verv ✓ c -value of / c -waarde | CA CA (2) |
| 4.1.5 | REFER TO DIAGRAM IN Q 4.1.3 | | |
| 4.2.1 (a) | $x \in \square$; $x \neq 0$ OR/OF $x \in (-\infty ; 0) \cup (0 ; \infty)$ | ✓ $x \neq 0$ OR/OF $x \in (-\infty ; 0) \cup (0 ; \infty)$ | A (1) |
| 4.2.1 (b) | $y > -4$ OR/OF $y \in (-4 ; \infty)$ | ✓ Range/waarde versameling | A (1) |
| 4.2.1 (c) | $q = -4$ | ✓ $q = -4$ | A (1) |
| 4.2.1 (d) | $D(0 ; -3)$ | ✓ $x = 0$ ✓ $y = -3$ | A CA (2) |
| 4.2.2 | $0 = -\frac{8}{x} - 4$ $4 = -\frac{8}{x}$ $4x = -8$ $x = -2$ $C(-2 ; 0)$ | ✓ $y = 0$ ✓ S ✓ x -value / x -waarde AO: Full Marks/Volpunte | A CA CA (3) |
| 4.2.3 | $g(x) = a^x + q$ $g(x) = a^x - 4$ $0 = a^{-2} - 4$ subst./ver v. $(-2 ; 0)$ $4 = a^{-2}$ $a = \frac{1}{2}$ | ✓ subst./verv ✓ a -value / a -waarde | CA CA (2) |

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| 4.3 |  | <p><i>h:</i></p> <ul style="list-style-type: none"> ✓ shape/vorm ✓ <i>x</i>-intercepts / afsnitte ✓ line/lyn $y = 5$ | <p>A A CA</p> <p>(3)</p> |
| | | | [28] |

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| | <p style="text-align: center;">OR/OF</p> $A = P(1+i)^n$ $= R15000 \left(1 + \frac{8,5\%}{4}\right)^{3 \times 4} \times \left(1 + \frac{6\%}{2}\right)^{2 \times 2}$ $\approx R 21\,728,26$ $\therefore R 21\,728,26 < R 23\,000$ <p>He will NOT have enough money/Hy sal NIE genoeg geld hê NIE</p> | <p style="text-align: center;">OR/OF</p> <p>✓ M</p> <p>✓ values of <i>i</i> and <i>n</i>/ waarde van <i>i</i> en <i>n</i></p> <p>✓ values of <i>i</i> and <i>n</i>/ waarde van <i>i</i> en <i>n</i></p> <p>✓ R 21 728,26</p> <p>✓ conclusion/gevolgtrekking</p> <p style="text-align: center;">ADDENDUM</p> | <p>A</p> <p>A</p> <p>A</p> <p>CA</p> <p>CA</p> <p>(5)</p> |
| 5.2.2 | $R 21\,728,26 - R 15\,000$ $= R 6\,728,26$ | <p>✓ M subtracting / <i>af trek</i></p> <p>✓ interest earned <i>rente verdien</i></p> | <p>A</p> <p>CA</p> <p>(2)</p> |
| | | | [15] |

QUESTION/VRAAG 6

| | | | |
|----------|--|---|---|
| 6.1 # | $f(x) = 11 + 7x$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{11 + 7(x+h) - (11 + 7x)}{h}$ $= \lim_{h \rightarrow 0} \frac{11 + 7x + 7h - 11 - 7x}{h}$ $= \lim_{h \rightarrow 0} \frac{7h}{h}$ $= \lim_{h \rightarrow 0} (7)$ $\therefore f'(x) = 7$ | <p>✓ definition/definisie</p> <p>✓ SF</p> <p>✓ S (only if the given expression is used)/ (slegs as die gegewe uitdrukking gebruik is.)</p> <p>✓ S</p> <p>✓ 7</p> <p>Penalty: 1 mark for incorrect notation/ Penaliseer : 1 punt vir foutige notasie</p> <p>AO : 1 mark/ punt</p> <p>ADDENDUM</p> | <p>A</p> <p>A</p> <p>CA</p> <p>CA</p> <p>CA</p> <p>(5)</p> |
| 6.2.1 | $y = x^8$ $\therefore \frac{dy}{dx} = 8x^7$ | <p>✓ $8x^7$</p> | <p>A</p> <p>(1)</p> |
| 6.2.2 | $f(x) = \sqrt[3]{x^4}$ $= x^{\frac{4}{3}}$ $\therefore f'(x) = \frac{4}{3}x^{\frac{1}{3}} \text{ OR / OF } f'(x) = \frac{4}{3}\sqrt[3]{x}$ | <p>✓ $x^{\frac{4}{3}}$</p> <p>✓ $\frac{4}{3}x^{\frac{1}{3}} \text{ OR/ OF } \frac{4}{3}\sqrt[3]{x}$</p> | <p>A</p> <p>CA</p> <p>(2)</p> |
| 6.2.3 | $D_x \left[\frac{x^2 - 16}{4 - x} \right]$ $= D_x \left[\frac{(x+4)(x-4)}{-(x-4)} \right] \text{ OR/ OF } D_x \left[\frac{-(x+4)(4-x)}{(4-x)} \right]$ $= D_x [-x - 4]$ $= -1$ | <p>✓✓ factors /faktore</p> <p>✓ S</p> <p>✓ -1</p> | <p>A</p> <p>A</p> <p>CA</p> <p>CA</p> <p>(4)</p> |

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| 6.3 | $g(x) = -\frac{9}{x}$ $g(-3) = -\frac{9}{(-3)} = 3$ $g(-1) = -\frac{9}{(-1)} = 9$ $\text{Av./Gemid. Gradient} = \frac{g(x_2) - g(x_1)}{x_2 - x_1}$ $= \frac{3 - 9}{-3 - (-1)} \quad \text{OR/OF} \quad = \frac{9 - 3}{-1 - (-3)}$ $= 3$ | <p>✓ both $g(x)$-values beide $g(x)$-waardes</p> <p>✓ F</p> <p>✓ 3</p> | <p>A</p> <p>A</p> <p>CA (3)</p> |
| 6.4.1 | $f(x) = mx^3 + mx - 4$ $\therefore f'(x) = 3mx^2 + m + 0$ | <p>✓ $3mx^2$</p> <p>✓ $m + 0$ OR/OF $m - 0$</p> | <p>A</p> <p>A (2)</p> |
| 6.4.2 | $f'(2) = 3m(2)^2 + m = 13m$ | <p>✓ $13m$</p> | <p>CA (1)</p> |
| 6.4.3 | $f'(2) = 39$ $13m = 39$ $m = 3$ | <p>✓ Equating derivative to 39/ Stel afgeleide gelyk aan 39</p> <p>✓ Value of / waarde van m</p> | <p>CA</p> <p>CA (2)</p> |
| | | | [20] |

QUESTION/VRAAG 7

| | | | |
|-----|--|--|--|
| 7.1 | $F(0; -2)$ | ✓ 0 ✓ -2 | A A (2) |
| 7.2 | $2^3 + p(2)^2 + 9(2) - 2 = 0$ $8 + 4p + 18 - 2 = 0$ OR/OF $4p = -24$ $p = -6$ | ✓ Subst./verv. $(2; 0)$ ✓ S | A A (2) |
| 7.3 | <i>x</i> -intercepts /afsnitte; $y = 0$ $(x - 2)(x^2 - 4x + 1) = 0$ $\therefore x = 2$ or/of $x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(1)}}{2(1)}$ $\therefore x_B = 2$ and / en $x_A = 2 - \sqrt{3}$ and / en $x_C = 2 + \sqrt{3}$ $\therefore BC = \sqrt{3}$ | ✓ = 0 ✓ quadratic factor <i>kwadratiese faktor</i> ✓ SF ✓ values of/waardes van x ✓ length of / lengte van BC AO: Full Marks/Volpunte ADDENDUM | A A CA CA CA (5) |
| 7.4 | $h'(x) = 3x^2 - 12x + 9 = 0$ $3(x - 1)(x - 3) = 0$ OR/OF $x = \frac{-(-12) \pm \sqrt{(-12)^2 - 4(3)(9)}}{2(3)}$ $\therefore x = 1$ or/of $x = 3$ $h(1) = (1)^3 - 6(1)^2 + 9(1) - 2 = 2$ $h(3) = (3)^3 - 6(3)^2 + 9(3) - 2 = -2$ $\therefore D(1; 2)$ and / en $E(3; -2)$ | ✓ derivative/afgeleide ✓ derivative = 0 <i>afgeleide = 0</i> ✓ factors/formula <i>faktore/formule</i> ✓ both x -values <i>beide x-waardes</i> ✓ both y -values <i>beide y-waardes</i> AO: Full Marks/Volpunte ADDENDUM | A A CA CA CA (5) |

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|-----|---|---|--|
| 7.5 | $2 < x < 3$ or / of $x > 2 + \sqrt{3}$ <p style="text-align: center;">OR/OF</p> $x \in (2; 3)$ or / of $x \in (2 + \sqrt{3}; \infty)$ <p style="text-align: center;">OR/OF</p> $x > 2$ and /en $x < 3$ or / of $x > 2 + \sqrt{3}$ | ✓ critical values <i>kritiese waardes</i> ✓ correct notation <i>korrekte notasie</i> ✓ $x > 2 + \sqrt{3}$ <p style="text-align: center;">OR/OF</p> ✓ critical values <i>kritiese waardes</i> ✓ correct notation <i>korrekte notasie</i> ✓ $x \in (2 + \sqrt{3}; \infty)$ <p style="text-align: center;">OR/OF</p> ✓ critical values <i>kritiese waardes</i> ✓ correct notation <i>korrekte notasie</i> ✓ $x > 2 + \sqrt{3}$ | CA A CA CA CA CA (3) |
| | | | [17] |

QUESTION/VRAAG 8

| | | | |
|-----|--|---|---|
| 8.1 | $h(0) = -(0)^2 + 6(0) + 1,62$ $= 1,62 \text{ m}$ | ✓ 1,62 m | A NPU (1) |
| 8.2 | $h'(t) = -2t + 6$ | ✓ $-2t + 6$ | A (1) |
| 8.3 | $h'(t) = 0 \quad \textbf{OR/OF} \quad t = -\frac{b}{2a}$ $\therefore -2t + 6 = 0 \quad t = -\frac{(6)}{2(-1)}$ $t = 3 \text{ s}$ $h(3) = -(3)^2 + 6(3) + 1,62$ $= 10,62 \text{ m}$ <p style="text-align: center;">OR/OF</p> $h = \frac{4ac - b^2}{4a}$ $h = \frac{4(-1)(1,62) - (6)^2}{4(-1)}$ $= 10,62 \text{ m}$ | ✓ derivative/ <i>afgeleide</i> = 0 OR/OF using/ <i>gebruik</i> $-\frac{b}{2a}$ ✓ <i>t</i> -value / <i>waarde</i> ✓ Subst. <i>t</i> -value/ <i>waarde</i> ✓ Maximum height/ <i>maks hoogte</i> <p style="text-align: center;">OR/OF</p> ✓ F ✓✓ subst/ <i>verv. a, b</i> and/ <i>en c</i> <i>value/ waarde</i> ✓ Maximum height/ <i>maks hoogte</i> | A CA CA CA NPU A A CA NPU (4) |
| 8.4 | $-2t + 6 = 3$ $t = 1,5 \text{ s}$ $\therefore h(1,5) = -(1,5)^2 + 6(1,5) + 1,62$ $\approx 8,37 \text{ m}$ <p style="text-align: center;">OR/OF</p> $-2t + 6 = -3$ $t = 4,5 \text{ s}$ $\therefore h(4,5) = -(4,5)^2 + 6(4,5) + 1,62$ $\approx 8,37 \text{ m}$ | ✓ derivative / <i>afgeleide</i> = 3 ✓ <i>t</i> -value / <i>waarde</i> ✓ height / <i>hoogte</i> <p style="text-align: center;">OR/OF</p> ✓ derivative / <i>afgeleide</i> = -3 ✓ <i>t</i> -value / <i>waarde</i> ✓ height / <i>hoogte</i> | CA CA CA NPU CA CA CA NPU (3) |
| | | | [9] |

QUESTION/VRAAG 9

| | | | |
|----------|---|--|---|
| 9.1.1 | $\int x^4 dx$ $= \frac{x^5}{5} + C$ | $\checkmark \frac{x^5}{5}$ $\checkmark C$ | A A (2) |
| 9.1.2 | $\int \left(2\pi + \frac{4}{x} \right) dx$ $= 2\pi x + 4 \ln x + C$ | $\checkmark 2\pi x$ $\checkmark 4 \ln x + C$ No Penalty if C omitted/ Geen penalisering indien C weggelaat | A A (2) |
| 9.1.3 | $\int (2x^{-3})^3 dx$ $\int 8x^{-9} dx$ $= -x^{-8} + C \quad \text{OR/OF} \quad = -\frac{1}{x^8} + C$ | $\checkmark 8x^{-9}$ $\checkmark -x^{-8} + C$ No Penalty if C omitted/ Geen penalisering indien C weggelaat | A CA (2) |
| 9.2 # | $A = \int_{-1}^3 g(x) dx$ $= \int_{-1}^3 (2^x + 2) dx$ $= \left[\frac{2^x}{\ln 2} + 2x \right]_{-1}^3$ $= \left[\frac{(2)^3}{\ln 2} + 2(3) \right] - \left[\frac{(2)^{-1}}{\ln 2} + 2(-1) \right]$ $\approx 18,82 \text{ units}^2 / \text{eenhede}^2$ OR/OF $= 8 + \frac{15}{2 \ln 2} \text{ units}^2 / \text{eenhede}^2$ | \checkmark Area notation using integrals/ <i>Oppervlak-notasie</i> <i>met gebruik van integrale</i> $\checkmark \frac{2^x}{\ln 2}$ $\checkmark + 2x$ $\checkmark \checkmark \text{ SF}$ $\checkmark \text{ area /oppervl}$ AO: 1 mark/ 1 punt NPU No substitution or simplification marks to be allocated if there is no integration/ Geen vervangings- of vereenvoudigingspunte moet toegeken word as daar geen integrasie is nie. ADDENDUM | M A A CA CA (6) |
| | | | [12] |

TOTAL/TOTAAL: 150