



**NATIONAL
SENIOR CERTIFICATE/
NASIONALE
SENIOR SERTIFIKAAT**

GRADE/GRAAD 11

NOVEMBER 2025

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

MARKS/ PUNTE: 150

MARKING CODES/NASIENKODES	
A	Accuracy/ <i>Akkuraatheid</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 nie</i>
NPU	No penalty for units omitted / <i>Geen penalisering vir eenhede weggelaat nie</i>
S	Simplification/ <i>Vereenvoudiging</i>
SF	Substitution in correct formula/ <i>Vervanging in korrekte formule</i>

This marking guideline consists of 15 pages/
Hierdie nasienriglyn bestaan uit 15 bladsye

1.1.5	$\frac{3(x^4y^{-4})^2}{2xy^2} \div \frac{(xy)^{-3}}{(3x^{-3}y^4)^2}$ $= \frac{3x^8y^{-8}}{2xy^2} \times \frac{9x^{-6}y^8}{x^{-3}y^{-3}}$ $= \frac{27}{2}x^4y$	$\checkmark 3x^8y^{-8}$ A $\checkmark \mathbf{M}$ A $\checkmark 3x^{-6}y^8$ A $\checkmark x^{-3}y^{-3}$ A $\checkmark \frac{27}{2}x^4y$ CA (5)
1.2.1	$\frac{\sqrt{1000}}{\sqrt{2}(\sqrt{80} - \sqrt{45})} = 10$ $\text{L.H.S} = \frac{\sqrt{10 \times 100}}{\sqrt{2}(\sqrt{16 \times 5} - \sqrt{9 \times 5})}$ $= \frac{10\sqrt{10}}{\sqrt{2}(4\sqrt{5} - 3\sqrt{5})}$ $= \frac{10\sqrt{2}\sqrt{5}}{\sqrt{2}\sqrt{5}} \text{ or } \frac{10\sqrt{10}}{\sqrt{10}}$ $= 10$ $\text{L.H.S} = \text{R.H.S}$	$\checkmark \sqrt{10 \times 100}$ A $\checkmark \sqrt{16 \times 5}$ A $\checkmark \sqrt{9 \times 5}$ A $\checkmark \frac{10\sqrt{2}\sqrt{5}}{\sqrt{2}\sqrt{5}} \text{ or } \frac{10\sqrt{10}}{\sqrt{10}}$ A (4)

1.2.2	$\log_5 125 - \frac{\log 32 - \log 8}{\log 16} = \frac{5}{2}$ <p>L.H.S</p> $= \log_5 5^3 - \frac{\log 2^5 - \log 2^3}{\log 2^4}$ $= 3\log_5 5 - \frac{5\log 2 - 3\log 2}{4\log 2}$ $= 3(1) - \frac{2\log 2}{4\log 2}$ $= 3 - \frac{1}{2}$ $= \frac{5}{2}$ <p>L.H.S = R.H.S</p> <p style="text-align: center;">OR/OF</p> $= \log_5 5^3 - \frac{\log \frac{32}{8}}{\log 16}$ $= 3\log_5 5 - \frac{\log 4}{2\log 4} \text{ or } 3\log_5 5 - \frac{2\log 2}{4\log 2}$ $= 3(1) - \frac{1}{2}$ $= \frac{5}{2}$	<p>✓ rewrite with prime bases / <i>skryf as priembasisse</i> M A</p> <p>✓ power property / <i>magseienskap</i> A</p> <p>✓ S CA</p> <p>✓ 3 A</p> <p>✓ $\frac{1}{2}$ A</p> <p style="text-align: center;">OR/OF</p> <p>✓ quotient law / <i>kwosiëntwet</i> A</p> <p>✓ power property / <i>magseienskap</i> A</p> <p>✓ S CA</p> <p>✓ 3 A</p> <p>✓ $\frac{1}{2}$ A</p> <p style="text-align: right;">(5)</p>														
1.3.1	$A + B$ $= 75 + 15$ $= 90$	<p>✓ Substitution / <i>vervanging</i> A</p> <p>✓ 90 A</p> <p>AO: Full marks / volpunte</p> <p style="text-align: right;">(2)</p>														
1.3.2	<table border="1" style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td>64</td><td>32</td><td>16</td><td>8</td><td>4</td><td>2</td><td>1</td> </tr> <tr> <td>1</td><td>0</td><td>1</td><td>1</td><td>0</td><td>1</td><td>0</td> </tr> </tbody> </table>	64	32	16	8	4	2	1	1	0	1	1	0	1	0	<p>✓ M A</p> <p>✓ 1011010₂ A</p> <p>AO: Full marks / volpunte</p> <p style="text-align: right;">(2)</p>
64	32	16	8	4	2	1										
1	0	1	1	0	1	0										
1.4.1	$V = l \times b \times h$ $V = 60 \times 30 \times 25$ $V = 45\,000 \text{ cm}^3$	<p>✓ SF A</p> <p>✓ 45 000 CA</p> <p style="text-align: right;">(2)</p>														

1.4.2	$4,5 \times 10^4$	$\surd 4,5 \times 10^4$	A (1)
			[36]

QUESTION / VRAAG 2		
2.1.1	$0,5x^3 = 0,0625$ $x^3 = \frac{1}{8}$ $x = \left(\frac{1}{2^3}\right)^{\frac{1}{3}}$ $x = \frac{1}{2}$	$\checkmark x^3 = \frac{1}{8}$ A $\checkmark \left(\frac{1}{2^3}\right)^{\frac{1}{3}}$ CA $\checkmark x = \frac{1}{2}$ CA (3)
2.1.2	$3^x + 3^{x+1} = 36$ $3^x + 3^x \cdot 3^1 = 36$ $3^x(1+3) = 36$ $3^x = 9$ $3^x = 3^2$ $x = 2$	$\checkmark 3^x \cdot 3^1$ A \checkmark Factorization / <i>faktoriseer</i> A $\checkmark 3^x = 3^2$ CA $\checkmark x = 2$ CA (4)
2.1.3	$(-2\sqrt{3+x})^2 = 12$ $4(3+x) = 12$ $12 + 4x = 12$ $4x = 0$ $x = 0$	$\checkmark 4(3+x)$ A \checkmark Simplification / <i>vereenvoudiging</i> CA $\checkmark x = 0$ CA (3)
2.1.4	$\log_3(x+4) + \log_3(x-4) = \log 100$ $\log_3(x+4)(x-4) = \log 10^2$ $\log_3(x^2 - 16) = 2$ $x^2 - 16 = 3^2$ $x^2 - 25 = 0$ $(x-5)(x+5) = 0$ $x = 5$ or $x = -5$ $\therefore x = 5$	\checkmark log property of addition / <i>log optellingswet</i> A $\checkmark 2\log 10$ A $\checkmark \log_3(x^2 - 16) = 2$ CA \checkmark log property / <i>log eienskap</i> CA \checkmark Factors / <i>faktore</i> CA $\checkmark x$ value / <i>waarde</i> CA (6)
2.2.1	$P = \frac{V^2}{R}$ $V^2 = RP$ $V = \sqrt{RP}$	$\checkmark V^2$ subject / <i>onderwerp</i> A $\checkmark V = \sqrt{RP}$ CA (2)

2.2.2	$V = \sqrt{25 \times 100}$ $V = 50$ volts	✓ SF ✓ $V = 50$ volts	A CA (2)
			[20]

QUESTION / VRAAG 3			
3.1.1	$x(x-1) = 0$ $x = 0$ or $x = 1$	✓ 1 ✓ 0	A A (2)
3.1.2	$x^2 - x = 1$ $x^2 - x - 1 = 0$ $x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(1)(-1)}}{2(1)}$ $x = \frac{1 \pm \sqrt{5}}{2}$ $x = 1,62$ or $x = -0,62$	✓ Standard form / <i>standaardvorm</i> ✓ Substitution / <i>vervanging</i> ✓✓ Values of/ <i>waardes van x</i>	A CA CA (4)
3.1.3	$(x-3)(x-4) \geq 0$ Critical values / <i>Kritiese waardes</i> $x = 3$ or $x = 4$ $x \leq 3$ or $x \geq 4$ OR $x \in (-\infty; 3] \cup [4; \infty)$	✓ Both critical values / <i>beide kritiese waardes</i> ✓ $x \leq 3$ ✓ $x \geq 4$	A CA CA (3)
3.2	$2y + x = 5$ and $2y^2 - xy - 4x^2 = 8$ $x = 5 - 2y$(3) $2y^2 - y(5 - 2y) - 4(5 - 2y)^2 = 8$ $2y^2 - 5y + 2y^2 - 4(25 - 20y + 4y^2) = 8$ $2y^2 - 5y + 2y^2 - 100 + 80y - 16y^2 - 8 = 0$ $-12y^2 + 75y - 108 = 0$ $y = \frac{-(75) \pm \sqrt{(75)^2 - 4(-12)(-108)}}{2(-12)}$ $y = \frac{9}{4}$ or $y = 4$ $x = 5 - 2\left(\frac{9}{4}\right)$ or $x = 5 - 2(4)$ $x = \frac{1}{2}$ or $x = -3$	✓ Equation/ <i>vergelyking</i> 3 ✓ Substitution/ <i>vervanging</i> ✓ Standard form/ <i>standaardvorm</i> ✓ Factors / <i>faktore</i> ✓ Both values of <i>y/beide waarde van y</i> ✓ Both values of <i>x/beide waardes van x</i>	A A CA CA CA CA (6)

3.3.1	$r = 1.5$ or $\frac{3}{2}$ $V = \frac{4}{3}\pi\left(\frac{3}{2}\right)^3$ $V = 14,14$ or $\frac{9}{2}\pi$	✓ Value of /waarde van r ✓ SF ✓ $V = 14,14$ or $\frac{9}{2}\pi$	A A CA (3)
3.3.2	$14,14 \times 1000$ $= 45000\pi$ or $14137,17 \text{ l}$	✓ Method / metode ✓ $14137,17 \text{ l}$	A CA (2)
3.3.3	$\frac{14137,17}{250}$ $= 56,55$ $\approx 56 \text{ days/dae}$	✓ Method / metode ✓ 56 days / dae Accept / aanvaar 56 or/to /of/tot 57	A A (2)
			[22]

QUESTION/VRAAG 4			
4.1.1	$\frac{2-\sqrt{k-1}}{k} = 0$ $\therefore 2-\sqrt{k-1} = 0$ $\therefore k = 5$	$\checkmark 2-\sqrt{k-1} = 0$ $\checkmark k = 5$	<p>A</p> <p>A</p> <p>(2)</p>
4.1.2	$k-1 < 0$ $k < 1$	$\checkmark \Delta < 0$ $\checkmark k < 1$	<p>A</p> <p>A</p> <p>(2)</p>
4.2	$3x^2 - 13x + 12 = 0$ $\Delta = b^2 - 4ac$ $\Delta = (-13)^2 - 4(3)(12)$ $\Delta = 25$ <p>Roots are Real, Rational and Unequal. / <i>Wortels is Reëel, Rasionaal en Ongelyk</i></p>	\checkmark Substitution / <i>vervanging</i> $\checkmark \Delta = 25$ \checkmark Nature of roots / <i>aard van wortels</i>	<p>A</p> <p>CA</p> <p>CA</p> <p>(3)</p>
4.3	$ax^2 - 4x + 5 = 0$ $\Delta \geq 0$ $(-4)^2 - 4(a)(5) \geq 0$ $16 - 20a \geq 0$ $a \leq \frac{4}{5}$	$\checkmark \Delta \geq 0$ \checkmark Substitution / <i>vervanging</i> \checkmark Values of a / <i>waarde van a</i>	<p>A</p> <p>CA</p> <p>CA</p> <p>(3)</p>
			[10]

QUESTION / VRAAG 5		
5.1	$y \geq -4$	✓ Critical value / <i>Kritieke waarde</i> A ✓ Notation / <i>Notasie</i> A (2)
5.2	By inspection / deur inspeksie: B(2 ; 0) & C(0; -6)	✓ $x_B = 2$ A ✓ $y_B = 0$ A ✓ $x_C = 0$ A ✓ $y_C = -6$ A (4)
5.3	$y = ax^2 - 4$ $0 = a(2)^2 - 4$ $4 = 4a$ $a = 1$	✓ Substitution / <i>vervanging</i> A ✓ Simplification / <i>vereenvoudiging</i> A ✓ Value of a / <i>waarde van a</i> CA (3)
5.4	$y = x^2 - 4$ $y = 3x - 6$ $x^2 - 4 = 3x - 6$ $x^2 - 3x + 2 = 0$ $(x - 1)(x - 2) = 0$ $x = 1$ or $x = 2$ $\therefore x = 1$ $y = 3(1) - 6$ $y = -3$ D(1; -3)	✓ Equating / <i>gelykstelling</i> A ✓ Standard form / <i>standaardvorm</i> CA ✓ Factors / <i>faktore</i> CA ✓ x value / <i>waarde</i> CA ✓ $y = -3$ CA (5)
5.5	$x = 0$	✓ $x = 0$ A (1)
5.6	$x \in [1; 2]$ or $1 \leq x \leq 2$	✓ Critical values / <i>kritiese waardes</i> A ✓ Notation / <i>notasie</i> A (2)
5.7	$h(x) = -(x^2 - 4) + 1$ $h(x) = -x^2 + 4 + 1$ $h(x) = -x^2 + 5$	✓ Expanding / <i>uitbreiding</i> A ✓ Equation / <i>vergelyking</i> CA (2)
		[19]

QUESTION / VRAAG 6			
6.1	$0 = \frac{2}{x} - 8$ $8x = 2$ $x = \frac{1}{4}$	$\checkmark y = 0$ $\checkmark x = \frac{1}{4}$	A CA (2)
6.2	$y = 2^0 - 8 = -7$ $0 = 2^x - 8$ $2^3 = 2^x$ $x = 3$	$\checkmark y = -7$ $\checkmark x = 0$ $\checkmark x = 3$	A A CA (3)
6.3	$x \in \mathbb{R}; x \neq 0$	$\checkmark x \in \mathbb{R}$ $\checkmark x \neq 0$	A A (2)
6.4		\checkmark Asymptote / <i>asimptoot</i> For/vir $k(x)$ \checkmark Both intercepts / <i>beide afsnitte</i> \checkmark Shape / <i>vorm</i> For / vir $p(x)$ \checkmark x -intercept/ <i>afsnit</i> \checkmark Shape / <i>vorm</i>	A CA A CA A (5)
6.5	$y = -x - 8$	$\checkmark\checkmark y = -x - 8$	A (2)
6.6	$x \geq 3$ or $x \in [3; \infty)$	\checkmark Critical values / <i>kritiese waardes</i> \checkmark Notation / <i>notasie</i>	A A (2)
6.7	$y > -8$	\checkmark Critical values / <i>kritiese waardes</i> \checkmark Notation / <i>notasie</i>	A A (2)
			[18]

QUESTION / VRAAG 7			
7.1	$x^2 + y^2 = r^2$ $(3)^2 + (1)^2 = r^2$ $10 = r^2$ $r = \sqrt{10}$	✓ Substitution / <i>vervanging</i> ✓ $r = \sqrt{10}$	A CA (2)
7.2	$y = -\sqrt{10 - x^2}$	✓ $y = -\sqrt{10 - x^2}$	A (1)
7.3	$-\sqrt{10} \leq y \leq 0$	✓ Critical values / <i>kritiese waardes</i> ✓ Notation / <i>notasie</i>	A A (2)
7.4	$(0; \sqrt{10})$	✓✓ Coordinates / <i>koördinate</i>	A (2)
			[7]

QUESTION / VRAAG 8			
8.1.1	$A = P(1+i)^n$ $A = R10000 \left(1 + \frac{0,0432}{4}\right)^{4 \times 12}$ $A = R16\,746,76$	✓ Formula / <i>formule</i> ✓ Substitution / <i>vervanging</i> ✓ $A = R16\,746,76$	A A CA (3)
8.1.2	$i_{eff} = \left(1 + \frac{i}{m}\right)^m - 1$ $i_{eff} = \left(1 + \frac{0,0432}{4}\right)^4 - 1$ $i_{eff} = 4,39\%$	✓ Formula / <i>formule</i> ✓ Substitute / <i>vervanging</i> ✓ $i_{eff} = 4,39\%$	A A CA (3)
8.2.1	R 200 000	✓ R 200 000	A (1)
8.2.2	$A = P(1-in)$ $80\,000 = 200\,000(1-6i)$ $\frac{2}{5} = 1-6i$ $6i = 1 - \frac{2}{5}$ $i = 10\%$	✓ Formula / <i>formule</i> ✓ Substitution / <i>vervanging</i> ✓ $i = 10\%$	A A CA (3)
8.3	$A = P(1+i)^n$ $81 = 34(1+0,22)^n$ $(1+0,22)^n = \frac{81}{34}$ $n = \log_{(1+0,22)} \frac{81}{34}$ $n = 4,37$ hours /ure $n = 4$ hour: /ure	✓ Substitution / <i>vervanging</i> ✓ n Subject / <i>onderwerp</i> ✓ $n = 4$ hours / ure	A CA CA (3)
8.4	$A = P(1+i)^n$ $A = R50\,000 \left(1 + \frac{0,12}{2}\right)^{2 \times 3} \left(1 + \frac{0,18}{12}\right)^{12 \times 4}$ $A = R144\,935,65$	✓ $\left(1 + \frac{0,12}{2}\right)$ ✓ $n = 2 \times 3$ ✓ $\left(1 + \frac{0,18}{12}\right)$ ✓ $n = 12 \times 4$ ✓ $A = R144\,935,65$	A A A A CA
OR / OF		OR / OF	

	$A_1 = R50\,000 \left(1 + \frac{0,12}{2}\right)^{2 \times 3}$ $A_1 = R70\,925,95561$ $A_2 = R70\,925,95561 \left(1 + \frac{0,18}{12}\right)^{12 \times 4}$ $A = R144\,935,65$	✓ Substitution / <i>vervanging</i> ✓ R70 925,95561 ✓ $\left(1 + \frac{0,18}{12}\right)^{12 \times 4}$ ✓ $70\,925,95561 \left(1 + \frac{0,18}{12}\right)^{12 \times 4}$ ✓ R 144 935,65	A CA A CA CA (5)
			[18]
TOTAL/TOTAAL: 150			