



# education

Department:  
Education  
North West Provincial Government  
**REPUBLIC OF SOUTH AFRICA**

## PROVINCIAL ASSESSMENT *PROVINSIALE ASSESSERING*

**GRADE 11/GRAAD 11**

### TECHNICAL MATHEMATICS P1/*TEGNIESE WISKUNDE* MARKING GUIDELINES/*NASIENRIGLYNE* JUNE/*JUNIE* 2024

**MARKS/PUNTE: 100**

CODE	EXPLANATION
<b>A</b>	Accuracy/ <i>Akkuraatheid</i>
<b>AO</b>	Answer only/ <i>Slegs antwoord</i>
<b>CA</b>	Consistent Accuracy/ <i>Deurlopende akkuraatheid</i>
<b>I</b>	Identity/ <i>Identiteit</i>
<b>M</b>	Method/ <i>Metode</i>
<b>NPR</b>	No penalty for rounding/ <i>Geen penalisering vir afronding</i>
<b>NPU</b>	No penalty for units/ <i>Geen penalisering vir eenhede</i>
<b>R</b>	Rounding/ <i>Afronding</i>
<b>RE</b>	Reason/ <i>Rede</i>
<b>S</b>	Simplification/ <i>Vereenvoudiging</i>
<b>F</b>	Formula/ <i>Formule</i>
<b>SF</b>	Substitution in correct formula/ <i>Vervanging in korrekte formule</i>
<b>ST/RE</b>	Statement with reason/ <i>Stelling met rede</i>
<b>NPU</b>	No penalty for units/ <i>Geen penalisering vir eenhede</i>

**These Marking guidelines consist of 8 pages.**

***Hierdie nasienriglyne bestaan uit 8 bladsye***

**NOTE/LET WEL:**

- If a candidate answers a question TWICE, only mark the FIRST attempt.
- *Indien 'n kandidaat 'n vraag TWEE keer beantwoord het, sien slegs die EERSTE poging na.*
- If a candidate crossed out an answer and did not redo it, mark the crossed-out answer.
- *Indien 'n kandidaat 'n antwoord doodgekrap het, en nie oorgedoen het nie, merk die uitgekrapte antwoord.*
- Consistent accuracy applies to ALL aspects of the marking memorandum.
- *Konstante akkuraatheid is op ALLE aspekte van die nasienriglyne van toepassing.*
- Assuming values/answers in order to solve a problem is unacceptable.
- *Dit is onaanvaarbaar om waardes/antwoorde aan te neem om die probleme op te los.*

**QUESTION 1/VRAAG 1**

1.1.1	$x = 0$ or $x = 1$	✓✓ both values of $x$ / beide waardes van $x$ (2)
1.1.2	$3x^2 - 5x - 4 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(3)(-4)}}{2(3)}$ $x = \frac{5 \pm \sqrt{73}}{6}$ $x = 2.26$ or $x = -0.59$	✓ standard form standaardvorm  ✓ substitution / vervanging  ✓ simplifying vereenvoudiging  ✓ both values of $x$ / beide waardes van $x$ (4)
1.1.3	$x^2 + 5x + 6 = 0$ $x + 3 = 0$ or $x + 2 = 0$  $x = -3$ or $x = -2$  <b>NOTE:</b> Any other valid method. / <b>NOTA:</b> Enige ander aanvaarbare metode	✓ standard form standaardvorm  ✓ factors / faktore ✓ $x = -3$ ✓ $x = -2$ (4)
1.1.4	$2x(x+1) + 8 = 8(x+1)$ $2x^2 + 2x + 8 = 8x + 8$ $2x^2 + 2x - 8x + 8 - 8 = 0$ $2x^2 - 6x = 0$ $2x(x-3) = 0$ $2x = 0$ or $x = 3$ $x = 0$	✓ multiplying by $x+1$ vermenigvuldiging met $x + 1$ ✓ standard form standaardvorm ✓ factors / faktore  ✓ values of $x$ / beide waardes van $x$ (4)

1.2	$x(x+1) = 30$ $x^2 + x - 30 = 0$ $(x+6)(x-5) = 0$ $x = -6$ or $x = 5$  <b>NOTE:</b> Any other valid method. / <b>LET WEL:</b> <i>Enige ander aanvaarbare metode</i>	✓ mathematical / <i>wiskundig korrek</i>  ✓ standard form <i>standaardvorm</i>  ✓ values of x / <i>beide waardes van x</i>  (3)
		[17]

**QUESTION 2/VRAAG 2**

2.1	$x^2 + 3x - 28 \geq 0$ $(x+7)(x-4) \geq 0$ $x+7=0$ or $x-4=0$ $x = -7$ or $x = 4$ $x \leq -7$ or $x \geq 4$  <b>NOTE:</b> Any other valid method. / <b>LET WEL:</b> <i>Enige ander aanvaarbare metode</i>	✓ standard form / <i>standaardvorm</i>  ✓ factors / <i>faktore</i> ✓ critical values / <i>kritiese waardes</i> ✓ both solutions / <i>beide oplossings</i>  (4)
2.2	$y - x = -1$ .....(1) $y + 7 = x^2 + 2x$ .....(2) $y = -1 + x$ .....(3)  $-1 + x + 7 = x^2 + 2x$ $0 = x^2 + 2x - x - 7 + 1$ $0 = x^2 + x - 6$ $0 = (x+3)(x-2)$ $x = -3$ or $x = 2$  $y = -1 - 3 = -4$ $y = -1 + 2 = 1$  <b>NOTE:</b> Any other valid method. / <b>LET WEL:</b> <i>Enige ander aanvaarbare metode</i>	✓ equation 3 / <i>vergelyking 3</i>  ✓ substituting / <i>vervanging</i>  ✓ standard form <i>standaardvorm</i> ✓ factors / <i>faktore</i> ✓ both x values / <i>beide waardes van x</i>  ✓✓ values of y / <i>beide waardes van y</i> CA (7)
2.3.1	$v - v_o = xt$  $\frac{v - v_o}{t} = x$	✓✓ answer / <i>antwoord</i> A  (2)
2.3.2	$x = \frac{15-5}{2}$  $x = 5$	✓✓ answer / <i>antwoord</i>  CA  (2)
		[15]

**QUESTION 3/VRAAG 3**

3.1.1	$\Delta = b^2 - 4ac$ $= (-1)^2 - 4(2)(4)$ $= -31$	✓SF  ✓ answer / <i>antwoord</i> (2)
3.1.2	Non real root / <i>Nie-reële wortels</i>	✓ answer / <i>antwoord</i> (1)
3.2	$\Delta = b^2 - 4ac$ $0 = (t+1)^2 - 4(1)(t)$ $0 = t^2 + 2t + 1 - 4t$ $0 = t^2 - 2t + 1$ $0 = (t-1)(t-1)$ $t = 1$	✓ equating to zero <i>gelykstel aan nul</i> ✓ substitution / <i>vervanging</i>  ✓ factors / <i>faktore</i>  ✓ value of t / <i>waarde van t</i> (4)
		[7]

**QUESTION 4 / VRAAG 4**

4.1.1	$= (5^3)^{\frac{2}{3}}$ $= 5^{3 \times \frac{2}{3}}$ $= 5^2 = 25$ <p><b>NOTE:</b> Any other valid method. / <b>LET WEL:</b> <i>Enige ander aanvaarbare metode</i></p>	✓ prime base / <i>priem grondtal</i>  ✓ multiplying exponents <i>vermenigvuldig eksponente</i>  ✓ answer / <i>antwoord</i> (3)
4.1.2	$= \frac{\sqrt{16.3} + \sqrt{4.3}}{\sqrt{9.3}}$ $= \frac{4\sqrt{3} + 2\sqrt{3}}{3\sqrt{3}}$ $= \frac{\sqrt{3}(4+2)}{3\sqrt{3}}$ $= \frac{6}{3} = 2$ <p><b>NOTE:</b> Any other valid method. / <b>LET WEL:</b> <i>Enige ander aanvaarbare metode</i></p>	✓ factors of integers / <i>faktore van heelgetalle</i>  ✓ simplification / <i>vereenvoudiging</i>  ✓ common factor / <i>gemene faktor</i>  ✓ answer / <i>antwoord</i> (4)

4.1.3	$\begin{aligned} &= \frac{(3^2)^{2x+1} \cdot (2^2 \cdot 3)^{x-2}}{(2^2 \cdot 3^2)^x \cdot (2^3)^{1-x}} \\ &= \frac{3^{4x+2} \cdot 2^{2x-4} \cdot 3^{x-2}}{2^{2x} \cdot 3^{2x} \cdot 2^{3-3x}} \\ &= \frac{3^{5x} \cdot 2^{2x-4}}{3^{3x} \cdot 2^{-x+3}} \\ &= 3^{5x-2x} \cdot 2^{2x-4+x-3} \\ &= 3^{3x} \cdot 2^{3x-7} \end{aligned}$	<ul style="list-style-type: none"> <li>✓ prime base / <i>priem grondtal</i></li> <li>✓ Exponential properties <i>eksponensiële eienskappe</i></li> <li>✓ product of the same base <i>produk van dieselfde grondtal</i></li> <li>✓ answer / <i>antwoord</i></li> </ul> <p style="text-align: right;">(4)</p>
4.1.4	$\begin{aligned} &= \frac{2^x \cdot 2 - 2^x \cdot 2^{-2}}{2^x \cdot 2^{-1} + 2^x} \\ &= \frac{2^x(2 - 2^{-2})}{2^x(2^{-1} + 1)} \\ &= \frac{2 - \frac{1}{4}}{\frac{1}{2} + 1} \\ &= \frac{7}{4} \div \frac{3}{2} \\ &= \frac{7}{6} \end{aligned}$	<ul style="list-style-type: none"> <li>✓ exponential property <i>eksponensiële eienskap</i></li> <li>✓ common factor / <i>gemene faktor</i></li> <li>✓ simplifying / <i>vereenvoudiging</i></li> <li>✓ Positive exponents / <i>positiewe eksponente</i></li> <li>✓ answer / <i>antwoord</i></li> </ul> <p style="text-align: right;">(5)</p>
4.1.5	$\begin{aligned} &= \log 8 + \log 20^2 - \log 4 - \log 2^3 \\ &= \log 8 + \log 400 - \log 4 - \log 8 \\ &= \log 400 - \log 4 \\ &= \log \left( \frac{400}{4} \right) \\ &= \log(100) \\ &= \log 10^2 \\ &= 2 \log 10 \\ &= 2(1) = 2 \end{aligned}$ <p><b>OR/OF</b></p>	<ul style="list-style-type: none"> <li>✓ log rules / <i>log reëls</i></li> <li>✓ S</li> <li>✓ rule / <i>reël</i></li> <li>✓ answer / <i>antwoord</i></li> </ul> <p style="text-align: right;"><b>OR/OF</b> (4)</p>

	$= \log \frac{80 \times 20^2}{4 \times 2^3}$ $= \log \frac{3200}{32}$ $= \log 100$ $= \log 10^2$ $= 2 \log 10$ $= 2$	✓ rule / reël  $\checkmark = \log \frac{80 \times 20^2}{4 \times 2^3}$  ✓ S ✓ answer / antwoord (4)
4.2.1	$x^{\frac{3}{2}} = 125$ $x^{\frac{3}{2}} = 5^3$ $x^{2 \times \frac{3}{2}} = 5^{3 \times \frac{2}{2}}$ $x = 5^2 = 25$	✓ dividing by 3 / deel deur 3  ✓ multiplying exponent with its reciprocal / vermenigvuldig eksponent met resiprook  ✓ answer / antwoord (3)
4.2.2	$5 \cdot 3^{2x} \cdot 3 - 3^{2x} \cdot 3^2 = 18$ $3^{2x} (5 \cdot 3 - 3^2) = 18$ $3^{2x} (6) = 18$ $3^{2x} = 3$ $2x = 1$ $x = \frac{1}{2}$	✓ exponential properties eksponensiële eienskappe  ✓ common factor / gemene faktor  ✓ simplifying / vereenvoudiging  ✓ answer / antwoord (4)
4.2.3	$x \log 3 = \log 2$ $x = \frac{\log 2}{\log 3}$ $x = 0.63$	✓ introducing log / gebruik van log  ✓ answer / antwoord (2)
4.2.4	$\log(x+2)(x-1) = 1$ $\log(x^2 + x - 2) = 1$ $10^1 = x^2 + x - 2$ $0 = x^2 + x - 12$ $0 = (x-3)(x+4)$ $x = 3 \text{ or } x = -4$ <p><b>NOTE:</b> Any other valid method./ <b>LET WEL:</b> Enige ander aanvaarbare metode</p>	✓ multiplying rule vermenigvuldigings reël  ✓ exponential equation eksponensiële vergelyking  ✓ standard form / standaardvorm  ✓ factors / faktore ✓ both values of x / beide waardes van x (5)
		[34]

**QUESTION 5 / VRAAG 5**

5.1.1	Let $x=0$ $y = 2^0 - 4$ $y = -3$	✓ $x=0$ ✓ $y$ intercept / $y$ -afsnit (2)
5.1.2	$y = -4$	✓ answer / antwoord (1)
5.1.3	Let $x = 0$ $y = (0)^2 - 0 - 3$ $y = -3$ Let $y = 0$ $0 = (x-3)(x+1)$ $x = 3$ or $x = -1$	✓ letting $x$ and $y$ to be zero <i>stel <math>x</math> en <math>y</math> gelyk aan nul</i> ✓ $y$ intercept / $y$ -afsnit ✓ $x$ values / $x$ waardes (3)
5.1.4	$x = -\frac{b}{2a}$ $= -\frac{(-2)}{2(1)}$ $= 1$ $y = \frac{4(1)(-3) - (-2)^2}{4(1)}$ $= \frac{-16}{4} = -4$ t.p(1, -4) <p style="text-align: center;">OR/OF</p> $r(x) = x^2 - 2x - 3$ $r(1) = (1)^2 - 2(1) - 3$ $= -4$	✓ $x$ value / $x$ waarde ✓ $y$ value / $y$ waarde ✓ turning point / draaipunt (3)
5.1.5		$r(x)$ ✓ shape of / vorm ✓ $x$ -intercept / $x$ -afsnit ✓ $y$ - intercept / $y$ -afsnit ✓ turning point / draaipunt  $p(x)$ ✓ shape / vorm ✓ $x$ and $y$ -intercept / $x$ - en $y$ -afsnitte ✓ asymptote / asimptoot (7)

5.2	$k(x) = \frac{a}{x} - 4$ $2 = \frac{a}{-1} - 4$ $a = -6$	✓ asymptote / <i>asimptoot</i> ✓ substituting / <i>vervanging</i> ✓ value of a / <i>waarde van a</i> (3)
		<b>[19]</b>

**QUESTION 6 / VRAAG 6**

6.1	x-intercept let $y=0$ $0 = 2x - 10$ $10 = 2x$ $x = 5$ $\therefore C(5;0)$	✓ letting $x=0$ / <i>stel <math>x=0</math></i>  ✓ coordinate of C / <i>koördinate van C</i> (2)
6.2	$BD = 10 - 5$ $= 5$ units/ <i>eenhede</i>  <b>NOTE:</b> Any other valid method. / <b>LET WEL:</b> <i>Enige ander aanvaarbare metode</i>	✓ S ✓ answer / <i>antwoord</i> (2)
6.3	$f(x) = \sqrt{(5)^2 - x^2}$ $f(x) = \sqrt{25 - x^2}$	✓ radius / <i>radius</i> ✓ equation / <i>vergelyking</i> (2)
6.4	$g(x) > f(x)$ $3 < x < 5$	✓✓ answer / <i>antwoord</i> (2)
		<b>[8]</b>
		<b>TOTAL: 100</b>