



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

MATHEMATICS N2

15 November 2022

This marking guideline consists of 9 pages.

QUESTION 1

$$\begin{aligned}
 1.1 \quad 1.1.1 \quad & \frac{\sqrt[4]{(a^2b^2)^6}}{a^5b^7 \times a^{-2}b^{-4}} \\
 &= \frac{(a^2b^2)^{\frac{3}{2}}}{a^{5-2}b^{7-4}} \checkmark \checkmark \\
 &= a^{3-3}b^{3-3} \\
 &= a^0b^0 \\
 &= 1 \checkmark
 \end{aligned} \tag{3}$$

$$\begin{aligned}
 1.1.2 \quad & \left[(\log_3 27)^2 + \left(\log_8 \frac{1}{64} \right)^3 \right]^{-1} \\
 &= [(3\log_3 3)^2 + (-2\log_8 8)^3]^{-1} \checkmark \\
 &= [(3)^2 + (-2)^3]^{-1} \\
 &= [9 - 8]^{-1} \checkmark \\
 &= 1 \checkmark
 \end{aligned} \tag{3}$$

$$\begin{aligned}
 1.2 \quad & \log_x 9 + \log_3 1 - \log_4 \frac{1}{16} = 3 \\
 & \log_x 9 + 0 + 2\log_4 4 = 3 \checkmark \\
 & \log_x 9 = 3 - 2 \checkmark \\
 & \log_x 9 = 1 \checkmark \\
 & x = 9 \checkmark
 \end{aligned} \tag{4}$$

$$\begin{aligned}
 1.3 \quad & \frac{64^{2x+1}}{16^{x-2}} = 256 \\
 & \frac{4^{3(2x+1)}}{4^{2(x-2)}} = 4^4 \\
 & 4^{6x+3-2x+4} = 4^4 \checkmark \\
 & 4^{4x+7} = 4^4 \\
 & \therefore 4x + 7 = 4 \checkmark \\
 & \therefore 4x = -3 \\
 & \therefore x = \frac{-3}{4} \checkmark
 \end{aligned} \tag{3}$$

$$\begin{aligned}
 1.4 \quad 1.4.1 \quad & s = \pi r(4r + 2h) \\
 & \frac{s}{\pi r} = 4r + 2h \checkmark \\
 & \frac{s}{\pi r} - 4r = 2h \checkmark \\
 & \frac{s}{2\pi r} - 2r = h \checkmark
 \end{aligned} \tag{3}$$

$$\begin{aligned}
 1.4.2 \quad & \frac{149,7}{2\pi(2,45)} - 2(2,25) = h \checkmark \\
 & h = 5,225 \checkmark
 \end{aligned} \tag{2}$$

$$\begin{aligned}
 1.5 \quad & 20x^2 + 9x = 18 \\
 & 20x^2 + 9x - 18 = 0 \\
 & (5x + 6)(4x - 3) = 0 \\
 & x = -\frac{6}{5} \text{ and } x = \frac{3}{4}
 \end{aligned}$$

(3)

[21]

QUESTION 2

$$\begin{aligned}
 2.1 \quad 2.1.1 \quad & 6b^2 - 27b - 15 \\
 & = 3(2b^2 - 9b - 5) \checkmark \\
 & = 3(2b + 1)(b - 5) \checkmark \checkmark \\
 & \text{If student divides by 3, penalise by 1 mark (max 2 marks)}
 \end{aligned}$$

(3)

$$\begin{aligned}
 2.1.2 \quad & 1 - 16x^{20} \\
 & = (1 + 4x^{10})(1 - 4x^{10}) \checkmark \\
 & = (1 + 4x^{10})(1 + 2x^5)(1 - 2x^5) \checkmark \checkmark
 \end{aligned}$$

(3)

$$\begin{aligned}
 2.1.3 \quad & 5x - 3a^2 - 5a + 3ax \\
 & = 5x + 3ax - 5a - 3a^2 \\
 & = x(5 + 3a) - a(5 + 3a) \checkmark \\
 & = (5 + 3a)(x - a) \checkmark \checkmark
 \end{aligned}$$

(3)

$$2.2 \quad 2.2.1 \quad \begin{array}{cccc} \checkmark & \checkmark & \checkmark & \checkmark \\ LCM = (a + 1)(a + 1)(a + 2)(a - 7) \end{array}$$

(4)

$$2.2.2 \quad LCM = (a + 1) \checkmark$$

(1)

$$\begin{aligned}
 2.3 \quad 2.3.1 \quad & \frac{6}{a+3} + \frac{a-2}{6-a-a^2} \\
 & = \frac{6}{a+3} + \frac{a-2}{(3+a)(2-a)} \\
 & = \frac{6}{a+3} - \frac{a-2}{(3+a)(a-2)} \checkmark \\
 & = \frac{6}{a+3} - \frac{1}{(a+3)} \checkmark \\
 & = \frac{5}{a+3} \checkmark
 \end{aligned}$$

(3)

$$\begin{aligned}
 2.3.2 \quad & \frac{a^2 - 4a + 4}{a^2 - 1} \div \frac{a^2 - 2a}{a^2 - a} \\
 & = \frac{(a-2)(a-2)}{(a-1)(a+1)} \times \frac{a(a-1)}{a(a-2)} \\
 & = \frac{(a-2)}{(a+1)} \checkmark
 \end{aligned}$$

(4)

[21]

QUESTION 3

$$\begin{aligned}
 3.1 \quad & 3y + 6 = 6x \text{ and } x = 2y - 2 \\
 & 3y + 6 = 6(2y - 2) \checkmark \\
 & 3y + 6 = 12y - 12 \\
 & 18 = 9y \\
 & y = 2 \checkmark \\
 & x = 2(2) - 2 \checkmark \\
 & x = 2 \checkmark
 \end{aligned}
 \tag{4}$$

$$\begin{aligned}
 3.2 \quad & 3.2.1 \quad \omega = 2\pi n \qquad n = 0,25 \times 60 \\
 & \omega = 2\pi(15) \qquad n = 15 \text{revs/s} \checkmark \\
 & \omega = 94,248 \text{rad/s} \checkmark
 \end{aligned}
 \tag{2}$$

$$\begin{aligned}
 3.2.2 \quad & v = \pi D n \qquad D = \frac{80}{1000} \\
 & v = \pi(0,08)(15) \checkmark \qquad D = 0,08 \text{m} \checkmark \\
 & v = 3,77 \text{ m/s} \checkmark
 \end{aligned}
 \tag{3}$$

$$\begin{aligned}
 3.3 \quad & c = 2\pi r \\
 & \frac{25}{2\pi} = r \\
 & r = 3,979 \checkmark \\
 & A = \frac{1}{2} r^2 \theta \qquad \theta = 55 \times \frac{\pi}{180} \\
 & A = \frac{1}{2} (3,979)^2 (0,960) \checkmark \checkmark \qquad \theta = 0,960 \text{radians} \checkmark \\
 & A = 7,600 \text{ cm}^2 \checkmark
 \end{aligned}
 \tag{5}$$

$$\begin{aligned}
 3.4 \quad & \text{Surface area} = \pi r l \\
 & 0,6 = \pi(1,3)l \checkmark \\
 & l = 0,147 \checkmark \\
 & l^2 = r^2 + h^2 \\
 & h = \sqrt{(1,3)^2 - (0,147)^2} \checkmark \\
 & h = 1,292 \text{cm} \checkmark
 \end{aligned}
 \tag{4}$$

$$\begin{aligned}
 3.5 \quad & \text{Volume} = \pi r^2 h \\
 & 506,6 = \pi r^2 (30) \checkmark \\
 & r = \sqrt{\frac{506,6}{30\pi}} \\
 & r = 2,318 \text{ cm} \checkmark \\
 & \text{Surface area} = 2\pi r^2 + 2\pi r h \\
 & \text{Surface area} = 2\pi(2,318)^2 + 2\pi(2,318)(30) \checkmark \\
 & \text{Surface area} = 470,693 \text{ cm}^2 \checkmark
 \end{aligned}
 \tag{4}$$

$$3.6 \quad A = \left[\frac{\text{First ordinate} + \text{Last ordinate}}{2} + \text{Sum of all other ordinates} \right] \times \text{distance}$$

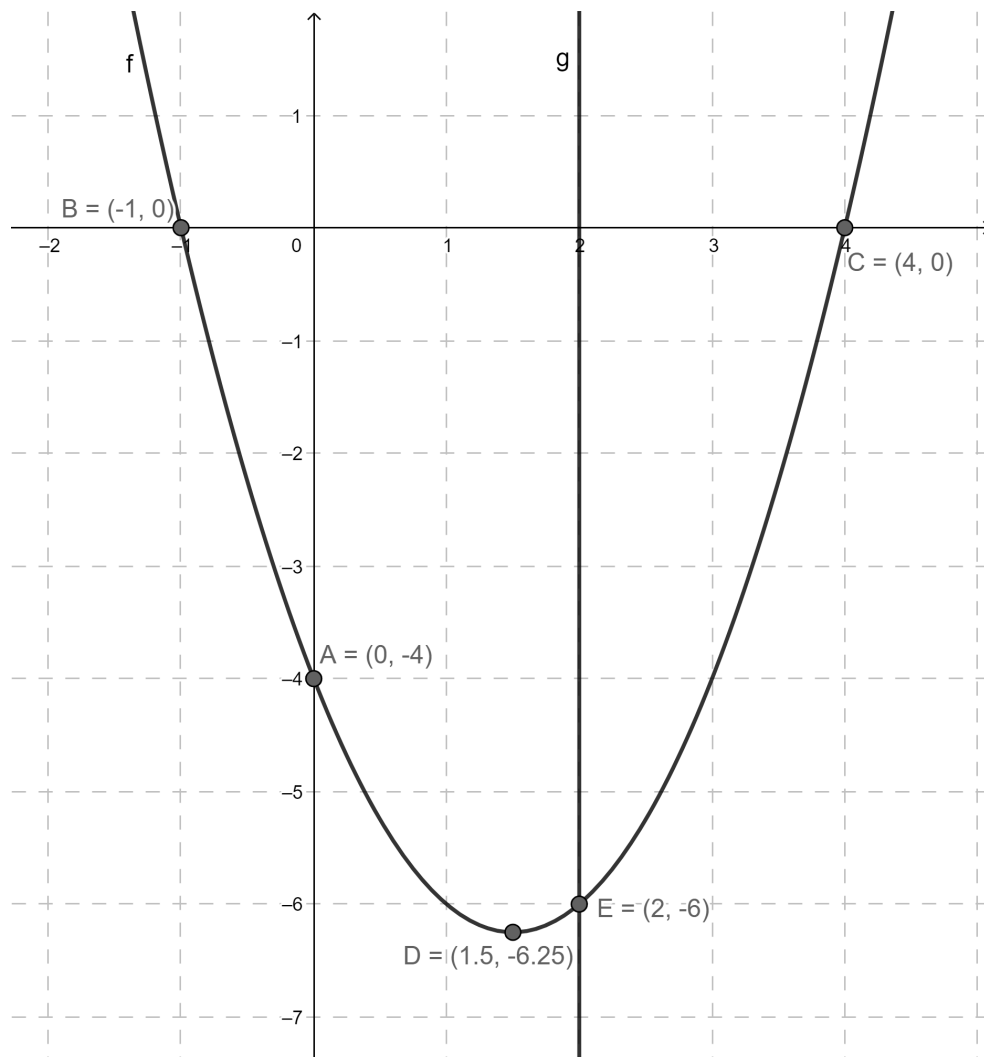
$$A = 0,5 \left[\frac{0,25 + 0,3}{2} + 1,3 + 3,1 + 3,7 + 2,9 + 2,7 + 2,8 + 1,6 \right]$$

$$A = 9,188 \text{ km}^2$$

(4)
[26]**QUESTION 4**

- 4.1 4.1.1 $A(-6; 0)$ ✓ and $D(0; 12)$ ✓ (2)
- 4.1.2 $B(-2; 0)$ ✓ and $C(6; 0)$ ✓ (2)
- 4.1.3 $E(2; 16)$ ✓✓ (2)

4.2.1



$$f: y = x^2 - 3x - 4$$

x - intercept ✓

y - intercept ✓

TP ✓

Shape ✓

$$g: x = 2$$

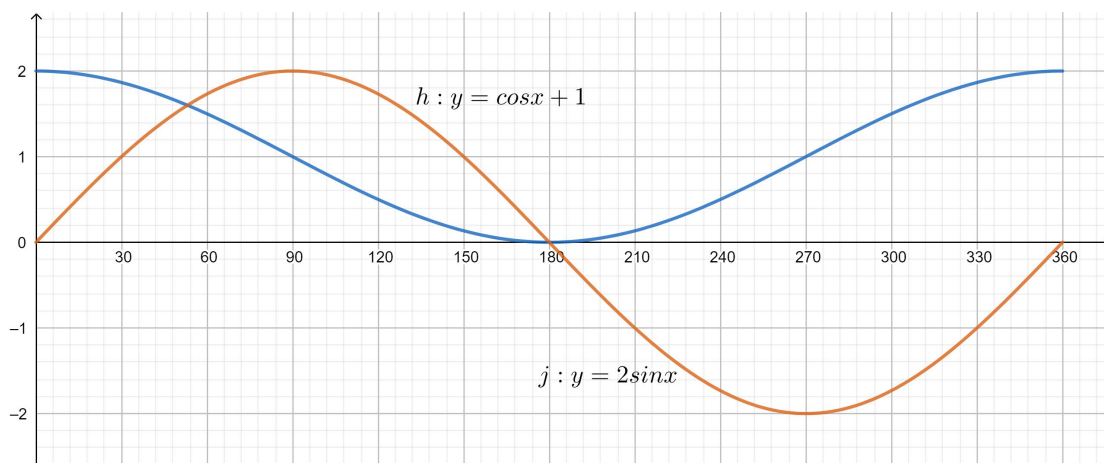
x - intercept ✓

(5)

4.2.2 (2; -6) ✓✓

(2)

4.3.1



$$h: y = \cos x + 1$$

starting point ✓

correct shift ✓

shape ✓

$$j: y = \sin x$$

starting point ✓

correct amplitude ✓

shape ✓

4.3.2 (53; 1,6) ✓ and (180; 0) ✓

(2)

[21]**QUESTION 5**

5.1 $\tan \theta = -1$

$$\theta = \tan^{-1}(1)$$

$$\theta = 45^\circ$$

$$\theta = 135^\circ \text{ and } 315^\circ$$

(3)

5.2 5.2.1 $33^\circ 15' = 33,25^\circ$

$$\tan B = \frac{AC}{AB}$$

$$\tan 33,25^\circ = \frac{AC}{96}$$

$$AC = 96 \tan 33,25^\circ$$

$$AC = 62,940 \text{ m}$$

(3)

5.2.2 $BC^2 = AB^2 + AC^2$

$$BC = \sqrt{96^2 + 62,940^2}$$

$$BC = 114,793$$

(2)

5.3
$$D = h + \frac{x^2}{4h}$$

$$42 = 10 + \frac{x^2}{4(10)}$$

$$x = \sqrt{1280}$$

$$x = 35,778 \text{ mm}$$

(3)

[11]**TOTAL:****100**