



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

MATHEMATICS N3

12 August 2026

This marking guideline consists of 9 pages.

QUESTION 1

1.1 1.1.1

$$\begin{aligned}
 & \frac{\sqrt{\sqrt{64}} - \sqrt{12}}{\sqrt{18} - \sqrt{27}} \\
 &= \frac{\sqrt{8} - \sqrt{12}}{\sqrt{18} - \sqrt{27}} \checkmark \\
 &= \frac{2\sqrt{2} - 2\sqrt{3}}{3\sqrt{2} - 3\sqrt{3}} \checkmark \\
 &= \frac{2(\sqrt{2} - \sqrt{3})}{3(\sqrt{2} - \sqrt{3})} \checkmark \\
 &= \frac{2}{3} \checkmark
 \end{aligned}
 \tag{4}$$

1.1.2

$$\begin{aligned}
 & \log_3 5 \times \log_5 27 \\
 &= \frac{\log 5}{\log 3} \times \frac{\log 27}{\log 5} \\
 &= \frac{\log 5}{\log 3} \times \frac{3\log 3}{\log 5} \checkmark \\
 &= 3 \checkmark
 \end{aligned}
 \tag{2}$$

1.1.3

$$\begin{aligned}
 & \left(\frac{z^{-2}y^0x^2}{(\sqrt[3]{zx^{-2}})^{-1}} \right)^{-2} \times e^{\ln(z^5)^0} \\
 &= \frac{z^4x^{-4}}{(\sqrt[3]{zx^{-2}})^2} \checkmark \times (z^5)^0 \checkmark \\
 &= \frac{z^4x^{-4}}{z^{\frac{2}{3}}x^{-4}} \checkmark \times z^0 \\
 &= z^{4-\frac{2}{3}}x^{-4+4} \times 1 \checkmark = z^{\frac{10}{3}} \checkmark
 \end{aligned}
 \tag{5}$$

1.2 1.2.1

$$\begin{aligned}
 & -3ab + 3a^2 + 4b - 4a \\
 &= (-3ab + 3a^2) + (4b - 4a) \checkmark \\
 &= -3a(b - a) + 4(b - a) \checkmark \\
 &= (b - a)(4 - 3a) \checkmark
 \end{aligned}$$

1.2.2

$$2(x-2)^2 + 9(x-2) - 5$$

$$\text{let } k = x - 2$$

$$= 2k^2 + 9k - 5$$

$$= (2k - 1)(k + 5)$$

$$= [2(x-2) - 1](x-2+5) \checkmark$$

$$= (2x - 4 - 1)(x + 3) \checkmark$$

$$= (2x - 5)(x + 3) \checkmark \quad (3)$$

1.2.3

$$\frac{x^4 - 1}{(x^2 + 1)(x^2 - 1)} \checkmark$$

$$= (x^2 + 1)(x + 1)(x - 1) \checkmark \quad (2)$$

1.3

$$f(x) = 3x^3 - 2x^2 - 4x + k.$$

$$3(1)^3 - 2(1)^2 - 4(1) + k = 0 \checkmark$$

$$3 - 2 - 4 + k = 0 \checkmark$$

$$k = 3 \checkmark \quad (3)$$

1.4

1.4.1

$$\frac{x^2 - 6x - 16}{x^2 + 4x - 12} \div \frac{x^2 + 9x + 14}{x^2 - 8x + 15}$$

$$= \frac{x^2 - 6x - 16}{x^2 + 4x - 12} \times \frac{x^2 - 8x + 15}{x^2 + 9x + 14} \checkmark$$

$$= \frac{(x+2)(x-8)}{(x-3)(x+7)} \times \frac{(x-3)(x-5)}{(x+2)(x+7)} \checkmark$$

$$= \frac{(x-8)(x-5)}{(x+7)^2} \checkmark \quad (3)$$

1.4.2

$$\frac{2}{x^2 - 1} + \frac{1}{x^2 - 3x - 4}$$

$$= \frac{2(x-4) + x-1}{(x-1)(x+1)(x-4)} \checkmark$$

$$= \frac{2x - 8 + x - 1}{(x-1)(x+1)(x-4)} \checkmark$$

$$= \frac{3x - 9}{(x-1)(x+1)(x-4)} \checkmark$$

QUESTION 2

2.1 2.1.1

$$\frac{2x-1}{x+1} = \frac{2x}{x-1} + \frac{5}{x}$$

$$\frac{2x-1}{x+1} \times x(x-1)(x+1) = \left(\frac{2x}{x-1} + \frac{5}{x} \right) \times x(x-1)(x+1)$$

$$x(2x-1)(x-1) = 2x \times x(x+1) + 5(x-1)(x+1) \checkmark$$

$$2x^3 - 3x^2 + x = 2x^3 + 2x^2 + 5x^2 - 5 \checkmark$$

$$10x^2 - x - 5 = 0 \checkmark$$

$$x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(10)(-5)}}{2(10)} \checkmark$$

$$x = -0,66 \checkmark \text{ or } x = 0,76 \checkmark \quad (6)$$

2.1.2

$$\left(\frac{1}{2} \right)^{2x+1} = 1$$

$$\left(\frac{1}{2} \right)^{2x+1} = \left(\frac{1}{2} \right)^0 \checkmark$$

$$2x+1 = 0 \checkmark$$

$$x = -\frac{1}{2} \checkmark \quad (3)$$

2.2

$$R = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}}$$

$$R \left(\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \right) = 1 \checkmark$$

$$\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} = \frac{1}{R} \checkmark$$

$$\frac{1}{R_1} = \frac{1}{R} - \frac{1}{R_2} - \frac{1}{R_3} \checkmark$$

$$R_1 \left(\frac{1}{R} - \frac{1}{R_2} - \frac{1}{R_3} \right) = 1 \checkmark$$

$$R_1 = \frac{1}{\frac{1}{R} - \frac{1}{R_2} - \frac{1}{R_3}} \checkmark$$

2.3

$$x - y = 7 \dots \dots (1) \checkmark$$

$$x = 3y \dots \dots (2) \checkmark$$

Substitute (2) into (1)

$$3y - y = 7 \checkmark$$

$$y = \frac{7}{2} \checkmark$$

$$x = \frac{21}{2} \checkmark$$

(5)
[19]

QUESTION 3

3.1

$$6x - 7y + 18 = 0$$

$$6x - 7(0) + 18 = 0 \checkmark$$

$$6x = -18$$

$$x = -3 \checkmark$$

Thus, coordinates of P are $(-3; 0) \checkmark$

(3)

3.2

$$m_{QR} = \frac{-2 - 6}{8 - 4} = -\frac{8}{4} = -2 \checkmark$$

$$m_{QR} \times m_{PT} = -1$$

$$-2 \times m_{PT} = -1 \checkmark$$

$$m_{PT} = \frac{1}{2} \checkmark$$

$$y = \frac{1}{2}x + c$$

$$0 = \frac{1}{2}(-3) + c$$

$$c = \frac{3}{2} \checkmark$$

$$\therefore y = \frac{1}{2}x + \frac{3}{2} \checkmark$$

(5)

$$3.3 \quad QR = \sqrt{(8-4)^2 + (-2-6)^2} \checkmark = \sqrt{16+64} = 4\sqrt{5} \text{ units} \checkmark \quad (2)$$

$$3.4 \quad \text{Midpoint}_S = \left(\frac{8-3}{2}; \frac{0-2}{2} \right) \checkmark = \left(\frac{5}{2}; -1 \right) \checkmark \quad (2)$$

$$3.5 \quad m_{PQ} = m_{line} = \frac{6}{7} \checkmark$$

$$y = \frac{6}{7}x + c \checkmark$$

$$-2 = \frac{6}{7} \times 8 + c$$

$$c = -\frac{62}{7} \checkmark$$

$$\therefore y = \frac{6}{7}x - \frac{62}{7} \checkmark \quad (4)$$

$$3.6 \quad m_{PT} = \frac{0-4}{-3-5} = \frac{4}{8} = \frac{1}{2} \checkmark$$

$$m_{QR} \times m_{PT}$$

$$= -2 \times \frac{1}{2} = -1 \checkmark$$

Thus, $QR \perp PT$ (2)

[18]

QUESTION 4

$$4.1 \quad f(x) = \sqrt{x} + 9\sqrt[3]{x^7} - \frac{2}{\sqrt[5]{x^2}}$$

$$= x^{\frac{1}{2}} + 9x^{\frac{7}{3}} - 2x^{-\frac{2}{5}} \checkmark$$

$$f'(x) = \frac{1}{2}x^{-\frac{1}{2}} \checkmark + 21x^{\frac{4}{3}} \checkmark + \frac{4}{5}x^{-\frac{7}{5}} \checkmark$$

$$= \frac{1}{2\sqrt{x}} + 21\sqrt[3]{x^4} + \frac{4}{5\sqrt[5]{x^7}} \checkmark \quad (5)$$

4.2

4.2.1

$$f(x) = x^3 - 2x^2 - 3x$$

$$f'(x) = 3x^2 - 4x - 3 \checkmark$$

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(3)(-3)}}{2(3)} \checkmark$$

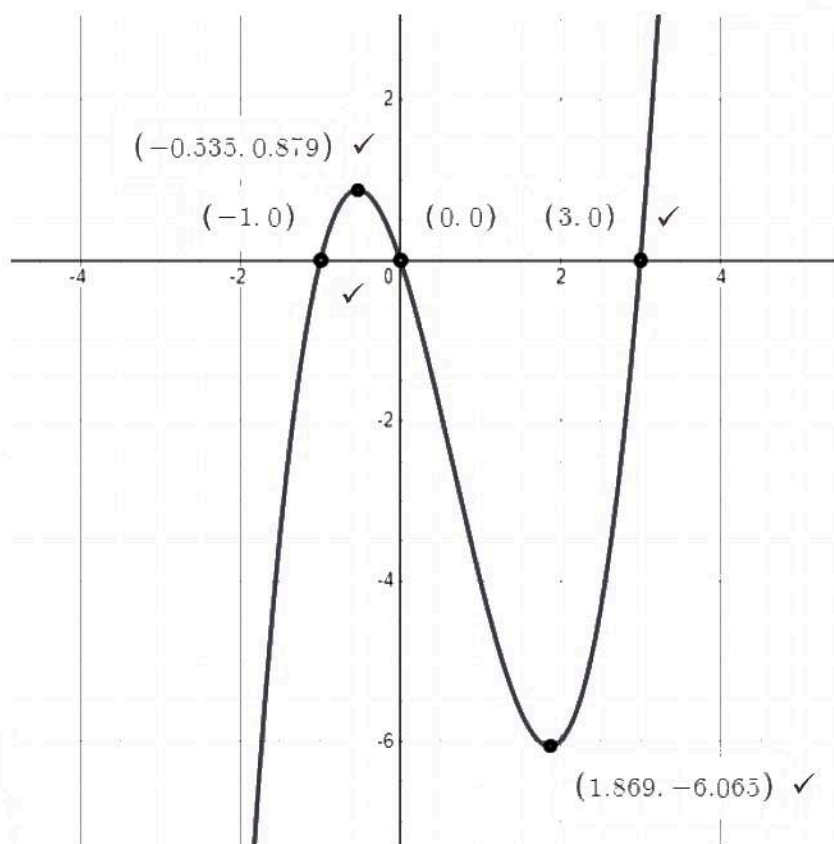
$$-0,535 \text{ or } 1,869 \checkmark$$

$$0,879 \text{ or } -6,065$$

Thus, coordinates of turning points are $(-0,535; 0,879) \checkmark$ and $(1,869; -6,065) \checkmark$

(5)

4.2.2



(4)

[14]

QUESTION 5

5.1

$$\frac{1 + \sin x}{\cos x} + \frac{\cos x}{1 + \sin x} = 2 \sec x$$

LHS

$$\begin{aligned} & \frac{1 + \sin x}{\cos x} + \frac{\cos x}{1 + \sin x} \checkmark \\ &= \frac{(1 + \sin x)^2 + \cos^2 x}{\cos x (1 + \sin x)} \checkmark \\ &= \frac{1 + 2\sin x + \sin^2 x + \cos^2 x}{\cos x (1 + \sin x)} \checkmark \\ &= \frac{2 + 2\sin x}{\cos x (1 + \sin x)} \checkmark \\ &= \frac{2(1 + \sin x)}{\cos x (1 + \sin x)} \checkmark \\ &= \frac{2}{\cos x} \checkmark \\ &= 2 \sec x \end{aligned}$$

(6)

5.2

$$\sqrt{3}\tan x + 2 = 3$$

$$\sqrt{3}\tan x = 1$$

$$\tan x = \frac{1}{\sqrt{3}} \checkmark$$

$$x = 30^\circ \checkmark$$

$$x = 180^\circ + 30^\circ \checkmark$$

$$x = 210^\circ \checkmark$$

(4)

5.3

$$\sin 30^\circ = \frac{CD}{5} \checkmark$$

$$CD = 2,5 \checkmark$$

$$\tan 45^\circ = \frac{2,5}{BC} \checkmark$$

$$BC = 2,5 \checkmark$$

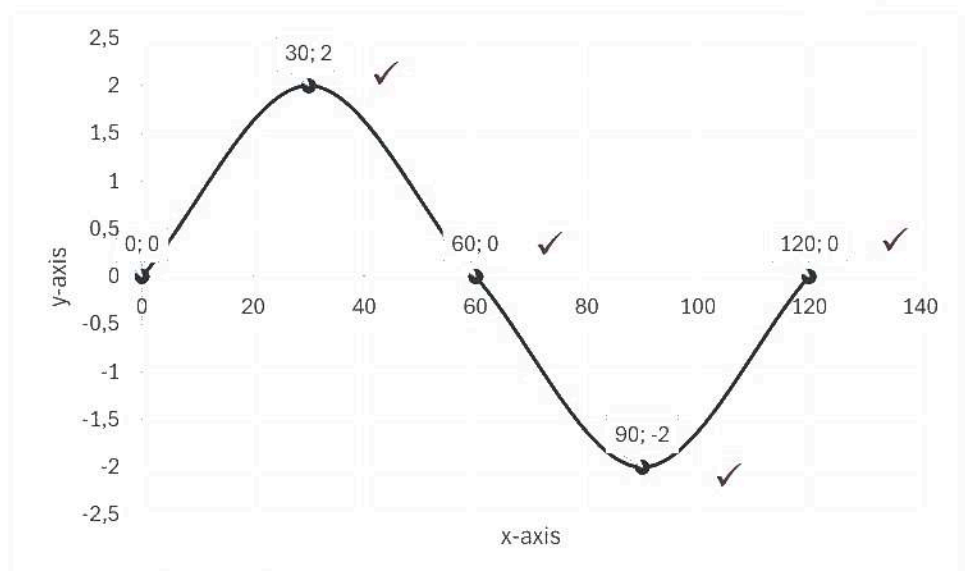
$$AC^2 + 2,5^2 = 5^2$$

$$AC = 4,33 \checkmark$$

$$AB = 4,33 - 2,5 = 1,83 \checkmark$$

(6)

5.4



(4)

[20]

TOTAL: 100