



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

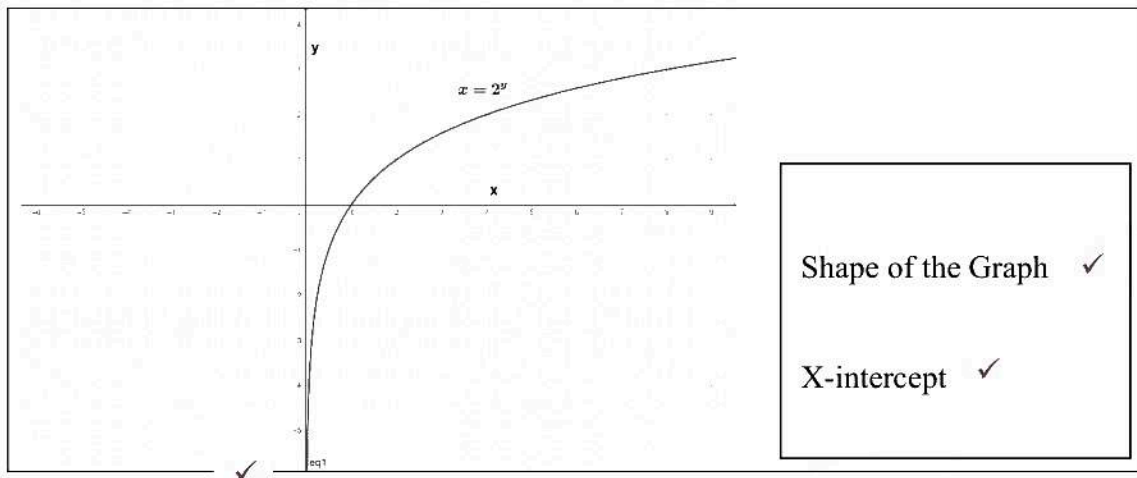
MATHEMATICS N4

30 July 2025

This marking guideline consists of 8 pages.

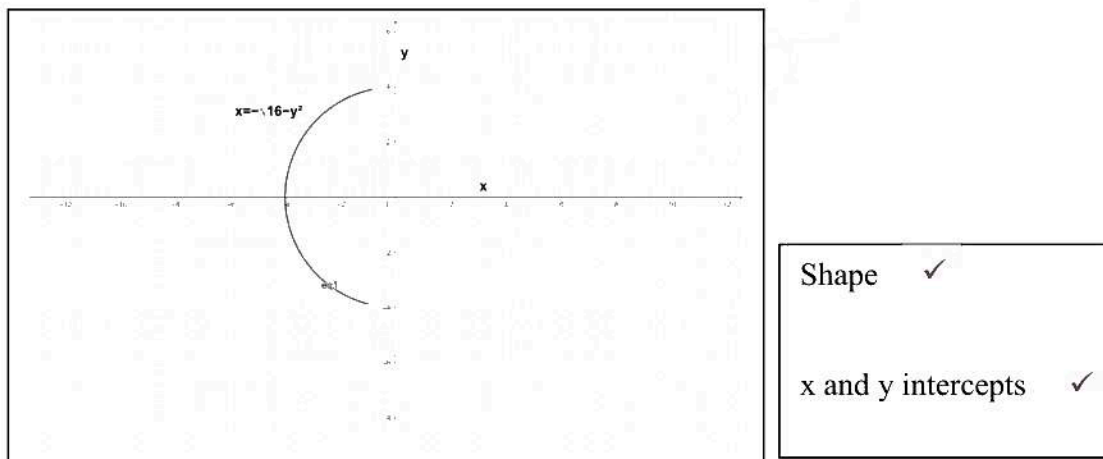
QUESTION 1

1.1



(2)

1.2



(2)

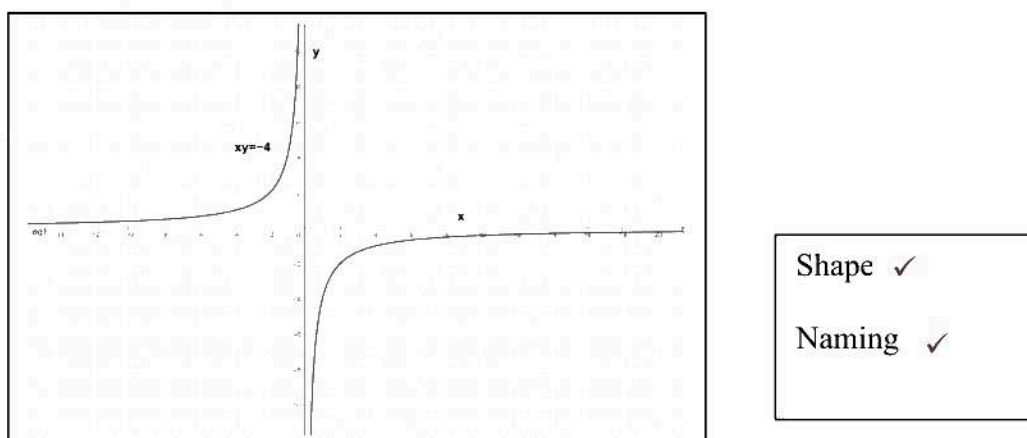
1.2.1 Relation

(1)

1.2.2 Continuous

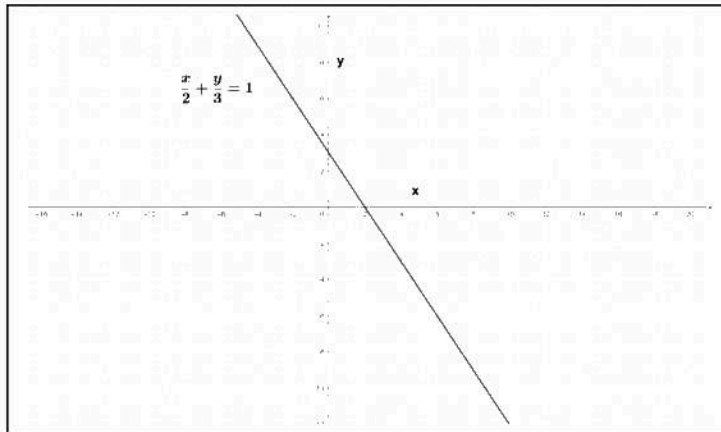
(1)

1.3



(2)

1.4



X and Y intercept ✓

Shape of the Graph ✓

(2)
[10]

QUESTION 2

2.1 FIRST ROW

$$\begin{aligned}\Delta_0 &= 2 \begin{vmatrix} 1 & 5 \\ 1 & 2 \end{vmatrix} - 4 \begin{vmatrix} 3 & 5 \\ 6 & 2 \end{vmatrix} + 6 \begin{vmatrix} 3 & 1 \\ 6 & 1 \end{vmatrix} \quad \checkmark \\ &= 2(-3) - 4(-24) + 6(-3) \quad \checkmark \\ &= -6 + 96 - 18 \quad \checkmark \\ &= 72 \quad \checkmark\end{aligned}$$

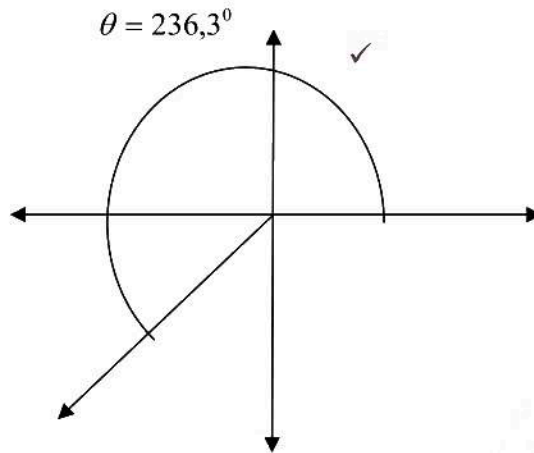
FIRST COLUMN

$$\begin{aligned}&= 2 \begin{vmatrix} 1 & 5 \\ 1 & 2 \end{vmatrix} - 3 \begin{vmatrix} 4 & 6 \\ 1 & 2 \end{vmatrix} + 6 \begin{vmatrix} 4 & 6 \\ 1 & 5 \end{vmatrix} \quad \checkmark \\ &= 2(-3) - 3(2) + 6(14) \quad \checkmark \\ &= -6 - 6 + 84 \quad \checkmark \\ &= 72 \quad \checkmark\end{aligned}$$

(8)

2.2

$$\begin{aligned}|r| &= \sqrt{(-2)^2 + (-3)^2} \\ r &= \sqrt{13} \quad \checkmark \\ \tan \theta &= \frac{y}{x} \\ &= \frac{3}{2} \\ \theta &= \tan^{-1}\left(\frac{3}{2}\right) \\ \therefore \theta &= 236,3^\circ \quad \checkmark \\ &= \sqrt{13} \operatorname{cis} 236,3^\circ \quad \checkmark\end{aligned}$$



(4)

$$\begin{aligned}
 2.3 \quad & \frac{3+2i}{4-3i} \times \frac{4-3i}{4-3i} \quad \checkmark \\
 & = \frac{12+9i+8i+6i^2}{16+12i-12i-9i^2} \quad \checkmark \\
 & = \frac{6+17i}{25} \quad \checkmark \\
 & = \frac{6}{25} + \frac{17i}{25} \quad \checkmark
 \end{aligned}$$

(4)

$$\begin{aligned}
 2.4 \quad & 4x + jx = 2y - 2j - yj + j^2 \\
 & 4x = 2y - 1 \dots\dots\dots(1) \quad \checkmark \\
 & x = -2 - y \dots\dots\dots(2) \quad \checkmark \\
 & \text{Substitute (2) in (1)} \\
 & 4(-2 - y) = 2y - 1 \\
 & -8 - 4y = 2y - 1 \\
 & -6y = 7 \\
 & \therefore y = -\frac{7}{6} \quad \checkmark \\
 & \therefore x = -2 - \left(-\frac{7}{6}\right) \\
 & = -\frac{5}{6} \quad \checkmark
 \end{aligned}$$

(4)

[20]

QUESTION 3

$$\begin{aligned}
 3.1 \quad & 3 \sin^2 x + 2 \sin x \cdot \cos x = 4 \cos x + 6 \sin x \\
 & 3 \sin^2 x + 2 \sin x \cdot \cos x - (4 \cos x + 6 \sin x) = 0 \quad \checkmark \\
 & \sin x (3 \sin x + 2 \cos x) - 2(2 \cos x + 3 \sin x) = 0 \quad \checkmark \\
 & (3 \sin x + 2 \cos x)(\sin x - 2) = 0 \quad \checkmark \\
 & 3 \sin x = -2 \cos x \text{ or } \sin x = 2 \\
 & \therefore \tan x = -\frac{2}{3} \text{ or } \sin x = 2 \text{ (NO SOLUTION)} \quad \checkmark \\
 & \therefore x = -33,69^\circ + n \cdot 180^\circ \\
 & G.S : \{146,31^\circ; 326,31^\circ\} \quad \checkmark
 \end{aligned}
 \tag{5}$$

$$\begin{aligned}
 3.2 \quad & \cos 2x = \cos x \cdot \cos x - \sin x \cdot \sin x \\
 & = \cos^2 x - \sin^2 x \quad \checkmark \quad \checkmark \\
 & = \left(\frac{12}{13}\right)^2 - \left(\frac{5}{13}\right)^2 \quad \checkmark \\
 & = \frac{144}{169} - \frac{25}{169} \quad \checkmark \\
 & = \frac{119}{169} \quad \checkmark
 \end{aligned}
 \tag{5}$$

$$\begin{aligned}
 3.3 \quad & \text{LHS} = \frac{\cos^2 \theta - \cos \theta - (1 - \cos^2 \theta)}{2 \sin \theta \cdot \cos \theta + \sin \theta} \\
 & = \frac{2 \cos^2 \theta - \cos \theta - 1}{2 \sin \theta \cdot \cos \theta + \sin \theta} \\
 & = \frac{(2 \cos \theta + 1)(\cos \theta - 1)}{\sin \theta (2 \cos \theta + 1)} \quad \checkmark \\
 & = \frac{\cos \theta - 1}{\sin \theta} \quad \checkmark \\
 & \text{RHS} = \frac{\cos \theta}{\sin \theta} - \frac{1}{\sin \theta} \quad \checkmark \\
 & = \frac{\cos \theta - 1}{\sin \theta} \quad \checkmark \\
 & = \text{LHS} \quad \checkmark
 \end{aligned}
 \tag{5}$$

3.4

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

(5)
[20]

QUESTION 4

4.1 For TP let $f'(x) = 0$

$$\begin{aligned}
 \therefore 12x^2 - 16 &= 0 \quad \checkmark \\
 x &= \pm \frac{2}{\sqrt{3}} \quad \checkmark \checkmark
 \end{aligned}$$

For corresponding y -values : if $x = \frac{2}{\sqrt{3}}$

$$\begin{aligned}
 y &= 4\left(\frac{2}{\sqrt{3}}\right)^3 - 16\left(\frac{2}{\sqrt{3}}\right) \\
 &= -12,316 \quad \checkmark
 \end{aligned}$$

$$\text{if } x = -\frac{2}{\sqrt{3}}$$

$$\begin{aligned}
 \therefore y &= 4\left(-\frac{2}{\sqrt{3}}\right)^3 - 16\left(-\frac{2}{\sqrt{3}}\right) \\
 &= 12,316 \quad \checkmark
 \end{aligned}$$

Points of inflection : (8)

$$\begin{aligned}
 \frac{d^2y}{dx^2} &= 0 \\
 24x &= 0 \quad \checkmark \\
 \therefore x &= 0 \quad \checkmark \\
 \therefore y &= 0 \quad \checkmark
 \end{aligned}$$

Points of inflection : (0;0) $\checkmark$

(8)

4.2

$$= \sqrt{2x} + \frac{2}{\sqrt{2x}} - \frac{2}{\sqrt{(2x)^3}} + \frac{4}{\sqrt{(2x)^5}}$$

(5)

4.3 . $y = 5 \sec 2x$

$u = 2x$

$y = \sec u$

$\frac{du}{dx} = 2 \quad \checkmark$

$\frac{dy}{du} = 5 \sec u \cdot \tan u \quad \checkmark$

$\therefore \frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$

$= 5 \sec u \cdot \tan u \times 2 \quad \checkmark$

$= 10 \sec 2x \tan 2x \quad \checkmark \checkmark$

(5)

4.4

$\frac{dx}{dy} = \pi x^2 - 12pe^{4x} + 4 \cos 4x - \frac{8}{\pi x} + 6 \cdot 10^{6x} \cdot \ln 10 + 0 + 9t \quad \checkmark$

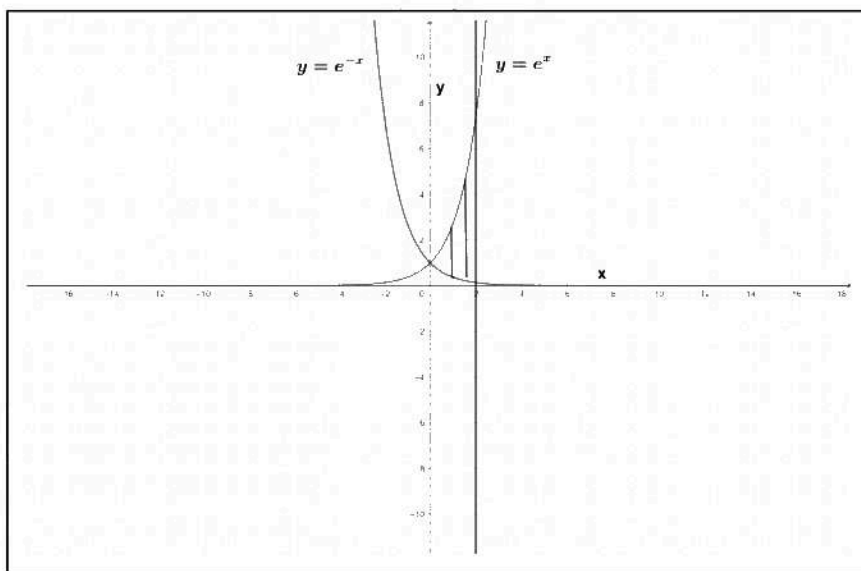
(7)

[25]

QUESTION 5

5.1

5.1.1



Each graph $\checkmark \checkmark$

Area $\checkmark$

Strip $\checkmark$

(4)

$$\begin{aligned}
 5.1.2 \quad A &= \int_{x_1}^{x_2} (y_2 - y_1) dx \quad \checkmark \\
 &= \int_0^2 (e^x - e^{-x}) dx \quad \checkmark \\
 &= [e^x + e^{-x}]_0^2 \quad \checkmark \\
 &= e^2 + e^{-2} - (e^0 - e^0) \quad \checkmark \\
 &= 5,524u^2 \quad \checkmark
 \end{aligned} \tag{5}$$

$$\begin{aligned}
 5.2 \quad &\int_0^2 5^{2x} dx \quad \checkmark \\
 &= \left[\frac{5^{2x}}{2 \cdot \ln 5} \right]_0^2 \\
 &= \frac{5^{2(2)}}{2 \cdot \ln 5} - \frac{5^{2(0)}}{2 \ln 5} \quad \checkmark \checkmark \\
 &= \frac{5^4}{2 \cdot \ln 5} - \frac{1}{2 \cdot \ln 5} \quad \checkmark \\
 &= 193,86 \quad \checkmark
 \end{aligned} \tag{5}$$

$$\begin{aligned}
 5.3 \quad &\int \left(\frac{25 \sec^2 x - 4}{5 \sec x - 2} \right) dx \quad \checkmark \checkmark \\
 &= \int \frac{(5 \sec x - 2)(5 \sec x + 2)}{(5 \sec x - 2)} dx \\
 &= \int (5 \sec x - 2) dx \quad \checkmark \\
 &= 5 \ln |\sec x + \tan x| + 2x + c \quad \checkmark
 \end{aligned} \tag{4}$$

$$\begin{aligned}
 5.4 \quad &\checkmark \\
 5.4. \quad &= -\cos x - \frac{7}{3 \ln 2} + \pi e^{2x} - \frac{\checkmark}{2 \ln 10} + \frac{3\pi x}{6p} + \cos ecx + c \quad \checkmark
 \end{aligned} \tag{7}$$

[25]

TOTAL: 100