



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

MATHEMATICS N2

29 July 2025

This marking guideline consists of 9 pages.

QUESTION 1

1.1 $6x^2 + 50x + 6 = 0$

$$\Rightarrow x = \frac{-50 \pm \sqrt{(50)^2 - 4(6)(6)}}{2(6)} \quad \checkmark$$

$$\Rightarrow x = -0,122 \quad \checkmark$$

ALTERNATIVE

Eq. 1: $5x - y = 31$
 Eq. 2: $x + y = 53 \checkmark$ (for both equations)
 Eq. 1 + Eq. 2 $\Rightarrow 6x = 84 \quad \checkmark$
 $\Rightarrow x = 14 \quad \checkmark$
 Eq. 1 $\Rightarrow y = 5(14) - 31 = 39 \quad \checkmark$

(3)

1.2 Eq. 1: $5x - 31 = y$
 Eq. 2: $x + y = 53 \checkmark$ (for both equations)
 Eq. 1 into Eq. 2 $\Rightarrow x + (5x - 31) = 53 \checkmark$
 $\Rightarrow x = 14 \quad \checkmark$
 Eq. 1 $\Rightarrow y = 5(14) - 31 = 39 \quad \checkmark$

(4)

1.3 1.3.1 $F = \frac{Gmn}{r^2}$
 $\Rightarrow Fr^2 = Gmn \quad \checkmark$
 $\Rightarrow r^2 = \frac{Gmn}{F} \quad \checkmark$
 $\Rightarrow \sqrt{\frac{Gmn}{F}} = r \quad \checkmark$

(3)

1.3.2 $r = \sqrt{\frac{10 \times 40 \times 50}{100}}$
 $= 14,142 \text{ OR } 10\sqrt{2} \quad \checkmark$

(1)

1.4 Let p = cost of a pen
 $\Rightarrow 15p + 20(p - 2) = 135 \checkmark$
 $\Rightarrow 15p + 20p - 40 = 135 \checkmark \text{ OR}$
 $\Rightarrow 35p = 175$
 $\Rightarrow p = \frac{175}{35} = R5 \quad \checkmark$

Let p = cost of a pencil
 $\Rightarrow 15(p + 2) + 20p = 135 \checkmark$
 $\Rightarrow 15p + 30 + 20p = 135$
 $\Rightarrow p = \frac{105}{35} = R3 \quad \checkmark$
 $\Rightarrow p + 2 = R5 \quad \checkmark$

(3)

[14]

QUESTION 2

$$\begin{aligned}
 2.1 \quad 2.1.1 \quad & 2p^3 + 2p^2 + p + 1 = (2p^2 + 1)(p + 1) \checkmark \checkmark \\
 & 2pq^2 + 2q^2 + p + 1 = (2q^2 + 1)(p + 1) \checkmark \checkmark \\
 & p^2 - 1 = (p - 1)(p + 1) \checkmark \checkmark
 \end{aligned} \tag{6}$$

$$2.1.2 \quad \text{HCF} = (p + 1) \checkmark \quad \text{and} \quad \text{LCM} = (p + 1)(p - 1)(2p^2 + 1)(2q^2 + 1) \checkmark \checkmark \tag{3}$$

$$\begin{aligned}
 2.2 \quad 2.2.1 \quad & \text{LHS} = \frac{6x^2 + 5x + 1}{4x^2 - 1} \div \frac{3x^2 - 8x - 3}{4x^2 - 11x - 3} = \frac{4x + 1}{2x - 1} \\
 & = \frac{(3x + 1)(2x + 1) \checkmark}{(2x - 1)(2x + 1) \checkmark} \div \frac{(3x + 1)(x - 3) \checkmark}{(4x + 1)(x - 3) \checkmark} \\
 & = \frac{(3x + 1)}{(2x - 1)} \times \frac{(4x + 1)}{(3x + 1)} \checkmark \\
 & = \frac{(4x + 1)}{(2x - 1)}
 \end{aligned} \tag{5}$$

$$\begin{aligned}
 2.2.2 \quad & \text{LHS} = \frac{12x + 9}{4x^2 + 3x} - \frac{x^2 - 3x}{x^2 - 5x + 6} \\
 & = \frac{3(4x + 3) \checkmark}{x(4x + 3) \checkmark} - \frac{x(x - 3) \checkmark}{(x - 2)(x - 3) \checkmark} \\
 & = \frac{3}{x} - \frac{x}{x - 2} \\
 & = \frac{3(x - 2) - x^2 \checkmark}{x(x - 2) \checkmark} \\
 & = \frac{-x^2 + 3x - 6}{x(x - 2)}
 \end{aligned} \tag{6}$$

[20]

QUESTION 3

$$3.1 \quad 3.1.1 \quad \frac{3(\sqrt{a})^2}{21\log_{\sqrt{a}}\sqrt{a}} = \frac{3a}{21} \checkmark = \frac{a}{7} \checkmark$$

$$3.1.2 \quad (\log_2 2^p)^3 = [p \log_2 2]^3 \checkmark \\ = p^3 \checkmark$$

(2 × 2) (4)

$$3.2 \quad 3.2.1 \quad \log_4 2 = x$$

$$\Rightarrow 2 = 4^x \quad \checkmark$$

$$\Rightarrow 2^1 = 2^{2x} \quad \checkmark \quad \text{OR}$$

$$\Rightarrow x = \frac{1}{2} \quad \checkmark$$

$$\log_4 2 = x$$

$$\Rightarrow 2 = 4^x \quad \checkmark$$

$$\Rightarrow (4)^{\frac{1}{2}} = 4^x \quad \checkmark$$

$$\Rightarrow x = \frac{1}{2} \quad \checkmark$$

(3)

$$3.2.2 \quad 8^x = 32 \times 2^x$$

$$\Rightarrow 2^{3x} = 2^5 \times 2^x \quad \checkmark$$

$$\Rightarrow 3x = 5 + x \quad \checkmark$$

$$\Rightarrow 2x = 5 \quad \checkmark$$

$$\Rightarrow x = \frac{5}{2} \quad \checkmark$$

(4)

$$3.3 \quad \log x = 4 \log(93,8) - \left(\log 12 + \frac{1}{6} \log 73,5 \right) \checkmark \\ = 7,8888 - 1,3902 \quad \checkmark \\ = 6,4986 \quad \checkmark \\ \Rightarrow x = 10^{6,4986} = 3152100,095 \checkmark$$

(4)

[15]

QUESTION 4

4.1 4.1.1 $r = \frac{6}{2} \text{ mm} = 3 \text{ mm} \checkmark$ (1)

4.1.2 $h = 20 \text{ mm} - 3 \text{ mm} - 3 \text{ mm} = 14 \text{ mm} \checkmark$ (1)

4.1.3

$$\begin{aligned} \text{Volume} &= \frac{4}{3}\pi r^3 + \pi r^2 h \checkmark \\ &= \frac{4}{3}\pi(3)^3 + \pi(3)^2 \times 14 \checkmark \\ &= 162\pi \text{ mm}^3 \checkmark \\ &= 509,938 \text{ mm}^3 \end{aligned}$$

$$\begin{aligned} \text{Volume} &= \frac{2}{3}\pi r^3 + \pi r^2 h + \frac{2}{3}\pi r^3 \checkmark \\ &= \frac{2}{3}\pi(3)^3 + \pi(3)^2(14) + \frac{2}{3}\pi(3)^3 \checkmark \\ &= 162\pi \text{ mm}^3 \checkmark \\ &= 509,938 \text{ mm}^3 \end{aligned}$$

(3)

4.1.4

$$\begin{aligned} \text{Surface Area} &= 4\pi r^2 + 2\pi r h \checkmark \\ &= 4\pi \times (3)^2 + 2\pi \times 3 \times 14 \checkmark \\ &= 120\pi \text{ mm}^2 \checkmark \\ &= 376,991 \text{ mm}^2 \end{aligned}$$

$$\begin{aligned} \text{SA} &= 2\pi r^2 + 2\pi r h + 2\pi r^2 \checkmark \\ &= 2\pi(3)^2 + 2\pi(3)(14) + 2\pi(3)^2 \checkmark \\ &= 120\pi \text{ mm}^2 \checkmark \\ &= 376.991 \text{ mm}^2 \end{aligned}$$

(3)

4.2

$$\begin{aligned} \text{Area} &= \left[\frac{\text{First ordinate} + \text{Last ordinate}}{2} + \text{sum of all other ordinates} \right] \times \text{distance} \\ 90 &= \left[\frac{7+y}{2} + 8 + 6 + 8 \right] 3 \checkmark \\ \Rightarrow 90 &= \left[\frac{7+y}{2} + 22 \right] 3 \\ \Rightarrow 30 &= \frac{7+y}{2} + 22 \checkmark \\ \Rightarrow 8 &= \frac{7+y}{2} \checkmark \\ \Rightarrow 16 &= 7+y \\ \Rightarrow y &= 9 \checkmark \end{aligned}$$

(4)
[12]

QUESTION 5

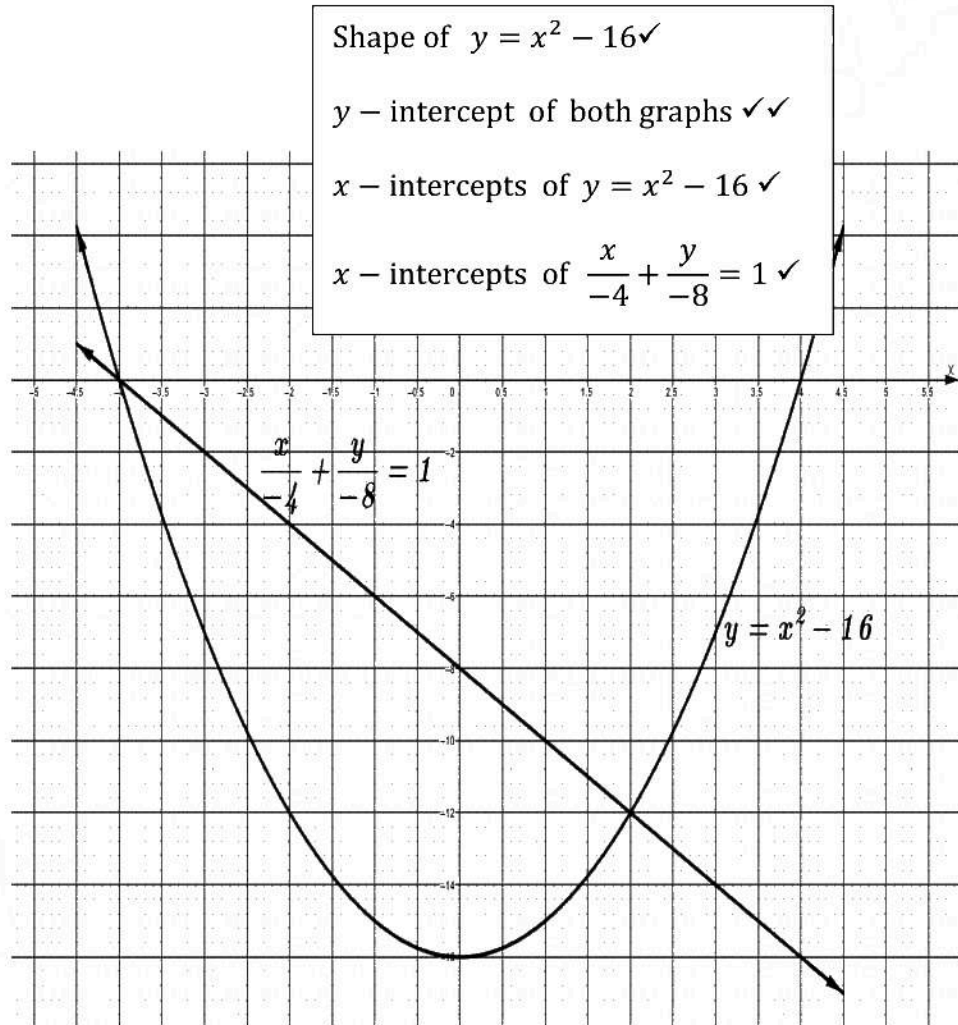
5.1 5.1.1 $x^2 - 16 = 0 \Rightarrow x = 4 \checkmark$ or $x = -4 \checkmark$ (2)

5.1.2 $x = 0 \checkmark$ (1)

5.1.3 $y = -16 \checkmark$ (1)

5.1.4 $(0; -16) \checkmark$ (1)

5.2 5.2.1



(3)

5.2.2 See QUESTION 5.2.1 above. (2)

5.3 $(-4; 0) \checkmark$ and $(2; -12) \checkmark$
NOTE: Accept accuracy of ± 1 for x values and ± 1 for y values. (2)

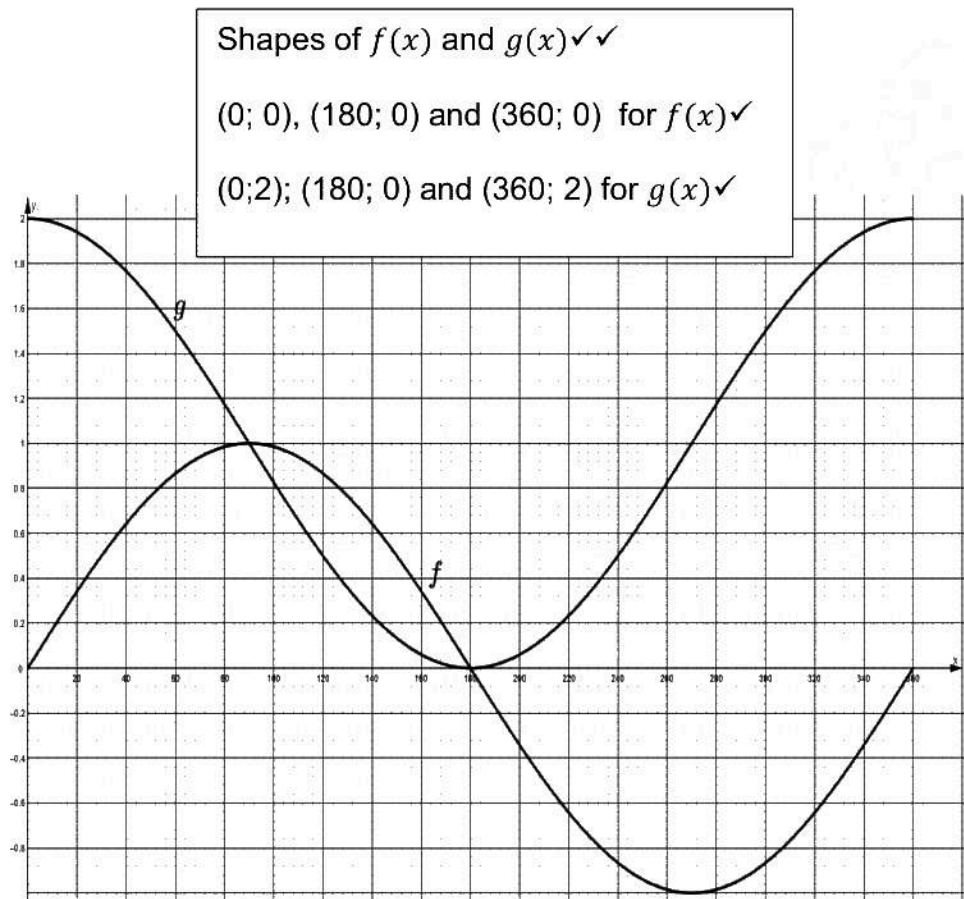
5.4

5.4.1

x	0	30	60	90	120	150	180	210	240	270	300	330	360
f(x)	0	0,5	0,9	1	0,9	0,5	0	-0,5	-0,9	-1	-0,9	-0,5	0
g(x)	2	1,9	1,5	1	0,5	0,1	0	0,1	0,5	1	1,5	1,9	2

(2)

5.4.2



(4)

5.4.3

$x = 90^\circ$ and $x = 180^\circ$ ✓✓

NOTE: Accept accuracy of ± 1 for x values.

(2)

[20]

QUESTION 6

6.1 6.1.1 $17^{\circ}45' = 17^{\circ} + \frac{45}{60} = 17,75^{\circ} \checkmark$

6.1.2 $89^{\circ} = 89 \times \frac{\pi}{180} = 1,553 \text{ rads} \checkmark \text{ OR}$

$$89^{\circ} = \frac{89}{57,3^{\circ}} = 1,553 \text{ rads} \checkmark$$

(2 × 1) (2)

6.2 $D = \frac{x^2}{4h} + h$
 $\Rightarrow \frac{35}{2} = \frac{(16)^2}{4h} + h \checkmark$
 $\Rightarrow 2h^2 - 35h + 128 = 0 \checkmark$
 $\Rightarrow h_{\text{major}} = 12,294 \text{ cm} \checkmark \text{ and } h_{\text{minor}} = 5,206 \text{ cm} \checkmark$ (4)

6.3 6.3.1 $\text{Area} = \frac{1}{2}r^2\theta$
 $\Rightarrow 368,64 = \frac{1}{2}r^2(0,32) \checkmark$
 $\Rightarrow r^2 = 2304 \checkmark$
 $\Rightarrow r = 48 \text{ cm} \checkmark$ (3)

6.3.2 $l = r\theta = 48 \times 0,32 = 15,36 \text{ cm} = \frac{384}{25} \text{ cm} \checkmark$ (1)

6.4 6.4.1 $N = \frac{\omega}{2\pi} = \frac{189}{2\pi} \checkmark$
 $= 30,080 \text{ revs per sec} \checkmark$

6.4.2 $V = \pi DN$
 $= \pi \times \frac{2100}{1000} \times 30,080 \checkmark \text{ OR}$
 $= 198,448 \text{ m/s} \checkmark$

$$\begin{aligned} V &= \omega R \\ &= 189 \times \frac{1}{2} \times \frac{2100}{1000} \checkmark \\ &= 198,45 \text{ m/s} \checkmark \\ &= \frac{3969}{20} \text{ m/s} \end{aligned}$$

(2 × 2) (4)

6.5 6.5.1 $\hat{D} = 70^\circ \checkmark$

$$\Rightarrow \tan 70^\circ = \frac{PF}{50} \checkmark$$

$$\Rightarrow PF = 50 \tan 70^\circ = 137,374 \text{ m} \checkmark$$

OR

$$\widehat{FPD} = 90^\circ - 70^\circ = 20^\circ \checkmark$$

$$\Rightarrow \tan 20^\circ = \frac{50}{PB} \checkmark$$

$$\Rightarrow PF = \frac{50}{\tan 20^\circ} = 137,374 \text{ m} \checkmark$$

(3)

6.5.2 $FW = 3FD$

$$= 3 \times 50$$

$$= 150 \text{ m} \checkmark$$

$$\therefore WD = FW + FD$$

$$= 150 + 50$$

$$= 200 \text{ m} \checkmark$$

OR

$$WD = 4FD \checkmark$$

$$= 4 \times 50$$

$$= 200 \text{ m} \checkmark$$

(2)

[19]

TOTAL: 100