



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

MATHEMATICS N2

19 November 2020

This marking guideline consists of 10 pages.

QUESTION 1

1.1	1.1.1	$-x^2 + 3x - 2 = 0$ $x^2 - 3x + 2 = 0$ $(x-1)(x-2) = 0 \checkmark$ $x = 1 \checkmark$ and $x = 2 \checkmark$	ALTERNATE $-x^2 + 3x - 2 = 0$ $(-x+1)(x-2) = 0$ $x = 1$ and $x = 2$	(3)
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1.1.2	$6(2-m) - 5(4-m) = 7$ $12 - 6m - 20 + 5m = 7 \checkmark$ $-m - 8 = 7 \checkmark$ $m = -15 \checkmark$	(3)
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1.2	1.2.1	$p = \sqrt[3]{r^2 - q^2}$ $p^3 = r^2 - q^2 \checkmark$ $r^2 = p^3 + q^2 \checkmark$ $r = \pm \sqrt{p^3 + q^2} \checkmark$	(Award full marks if $\pm$ is omitted)	(3)
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1.2.2	$r = \pm \sqrt{p^3 + q^2}$ $r = \pm \sqrt{4^3 + 6^2}$ $r = \pm 10 \checkmark$	(Award full marks if $\pm$ is omitted)	(1)
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1.3	Eq. 1: $5x = 6y + 3$ Eq. 2: $3y - 4x + 1 = 0$ $x = \frac{6y+3}{5}$ sub into Eq. 2 $3y - 4\left(\frac{6y+3}{5}\right) + 1 = 0 \checkmark$ $15y - 24y - 12 + 5 = 0$ $y = -\frac{7}{9} \checkmark$ $5x = 6\left(-\frac{7}{9}\right) + 3 \checkmark$ $x = \frac{1}{5}\left(-\frac{42}{9} + 3\right)$ $x = -\frac{1}{3} \checkmark$	ALTERNATE Eq. 1: $5x = 6y + 3$ Eq. 2: $3y - 4x + 1 = 0 \times 2$ $5x = 6y + 3$ $+ \left[\frac{-8x = -6y - 2}{-3x = 1} \right] \checkmark$ $x = -\frac{1}{3} \checkmark$ sub into Eq 1 $5\left(-\frac{1}{3}\right) = 6y + 3 \checkmark$ $\therefore y = \frac{1}{6}\left(-\frac{5}{3} - 3\right)$ $y = -\frac{7}{9} \checkmark$
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(4)
[14]

QUESTION 2

2.1 2.1.1
$$\frac{4y^2 - 4y + 1}{4y^2 + 8y + 4} \times \frac{2y^2 - 2}{8y^2 - 8} \div \frac{10}{5y + 5}$$

$\checkmark$ $\checkmark$

$$= \frac{(2y-1)^2}{4(y+1)^2} \times \frac{2(y^2-1)}{8(y^2-1)} \times \frac{5(y+1)}{10}$$

$\checkmark$ $\checkmark$

$$= \frac{(2y-1)^2}{32(y+1)} \checkmark$$

(5)

2.1.2
$$\frac{3}{2x+2y} - \frac{4}{x^2-y^2} + \frac{1}{7x-7y}$$

$\checkmark$ $\checkmark$ $\checkmark$

$$= \frac{3}{2(x+y)} - \frac{4}{(x+y)(x-y)} + \frac{1}{7(x-y)}$$

$$= \frac{21(x-y) - 4(14) + 2(x+y)}{14(x+y)(x-y)} \checkmark$$

$$= \frac{23x - 19y - 56}{14(x+y)(x-y)} \checkmark$$

(5)

2.2 2.2.1 $HCF = (ab - 4) \checkmark$

(1)

2.2.2 $LCM = 3ab(ab-4) \times 2(ab+4) \times (3x+y)$

$\checkmark$ $\checkmark$ $\checkmark$

(3)

2.3 2.3.1 $6x^2y - 17xy + 12y$

$$= y(6x^2 - 17x + 12) \checkmark$$

$\checkmark$ $\checkmark$

$$= y(3x-4)(2x-3)$$

(3)

2.3.2 $x^{16} - 81$

$$= (x^8 + 9)(x^8 - 9) \checkmark$$

$\checkmark$ $\checkmark$

$$= (x^8 + 9)(x^4 + 3)(x^4 - 3)$$

(3)

[20]

QUESTION 3

$$\begin{aligned}
 3.1 \quad 3.1.1 \quad & \log_q q - \log_x 1 \\
 & = 1 - 0 \quad \checkmark \\
 & = 1 \quad \checkmark
 \end{aligned}
 \tag{2}$$

$$\begin{aligned}
 3.1.2 \quad & \log_4 8 + \log_2 32 \\
 & \quad \checkmark \\
 & = \frac{\log_2 2^3}{\log_2 2^2} + \log_2 2^5 \\
 & = \frac{3}{2} + 5 \quad \checkmark \\
 & = \frac{13}{2} \quad \checkmark \text{ or } = 6,5
 \end{aligned}
 \tag{3}$$

$$\begin{aligned}
 3.2 \quad 3.2.1 \quad & \left(\frac{1}{8}\right)^{-\frac{2}{3}} \\
 & = \left(2^{-3}\right)^{-\frac{2}{3}} \quad \checkmark \\
 & = 2^2 \quad \checkmark
 \end{aligned}
 \tag{2}$$

$$\begin{aligned}
 3.2.2 \quad & \frac{m^5 n^7 m^{-2} n^{-4}}{\sqrt[3]{(m^2 n^2)^{\frac{9}{2}}}} \\
 & = \frac{m^{5-2} n^{7-4}}{(m^2 n^2)^{\frac{9}{2} \times \frac{1}{3}}} \quad \checkmark \\
 & = \frac{m^3 n^3}{m^3 n^3} \\
 & = 1 \quad \checkmark
 \end{aligned}
 \tag{2}$$

$$\begin{aligned}
 3.3 \quad 3.3.1 \quad & \log_y 2 = \log_2 y \\
 & \log_y 2 = \frac{1}{\log_y 2} \quad \checkmark \\
 & (\log_y 2)^2 = 1 \quad \checkmark \\
 & \log_y 2 = \pm 1 \\
 & 2 = y^{\pm 1} \\
 & y = 2 \quad \checkmark \text{ and } y = \frac{1}{2} \quad \checkmark
 \end{aligned}
 \tag{4}$$

$$\begin{aligned} 3.3.2 \quad & \frac{8^y}{4^{2y}} = 64^{-1} \\ & \frac{2^{3y}}{2^{4y}} = 2^{-6} \quad \checkmark \\ & 2^{-y} = 2^{-6} \\ & y = 6 \quad \checkmark \end{aligned}$$

(2)
[15]

QUESTION 4

4.1 4.1.1 $V = \pi r^2 h$
 $\frac{\pi}{2} = \pi r^2 (2) \checkmark$
 $\frac{1}{4} = r^2 \checkmark$
 $r = \frac{1}{2} \checkmark \text{m}$ (3)

4.1.2 $SA = 2\pi r^2 + 2\pi rh$
 $SA = 2\pi \left(\frac{1}{2}\right)^2 + 2\pi \left(\frac{1}{2}\right)(2) \checkmark$
 $SA = 7,854 \checkmark \text{ m}^2$ (2)

4.1.3 Volume in litres:
 $V = \frac{\pi}{2} \times 1000$
 $V = 500\pi \text{ litre or } V = 1570,80 \text{ litres } \checkmark$
Amount:
 $= 500\pi \times R1,00$
 $= R500\pi \text{ per container or } = R1570,80 \text{ per container } \checkmark$ (2)

4.2 4.2.1 $y = 6 \checkmark$ (1)

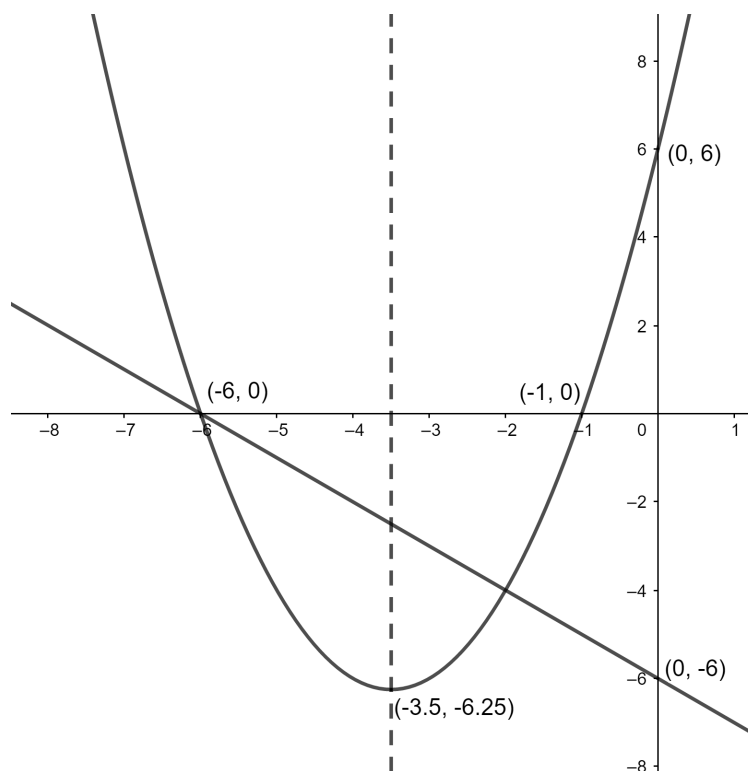
4.2.2 $0 = x^2 + 7x + 6$
 $0 = (x+6)(x+1)$
 $\checkmark \qquad \qquad \checkmark$
 $x = -6 \text{ and } x = -1$ (2)

4.2.3 $x = \frac{-b}{2a}$
 $x = \frac{-7}{2} \checkmark$ (1)

4.2.4 $y = \left(-\frac{7}{2}\right)^2 + 7\left(-\frac{7}{2}\right) + 6$
 $y = -\frac{25}{4} \checkmark$ (1)

- 4.2.5 x -intercepts ✓ ✓
 y -intercepts ✓
 Turning point ✓
 Axis of symmetry ✓

- 4.3 x -intercepts ✓
 y -intercepts ✓



- 4.4 $x = -6$ ✓ and $x = -2$ ✓

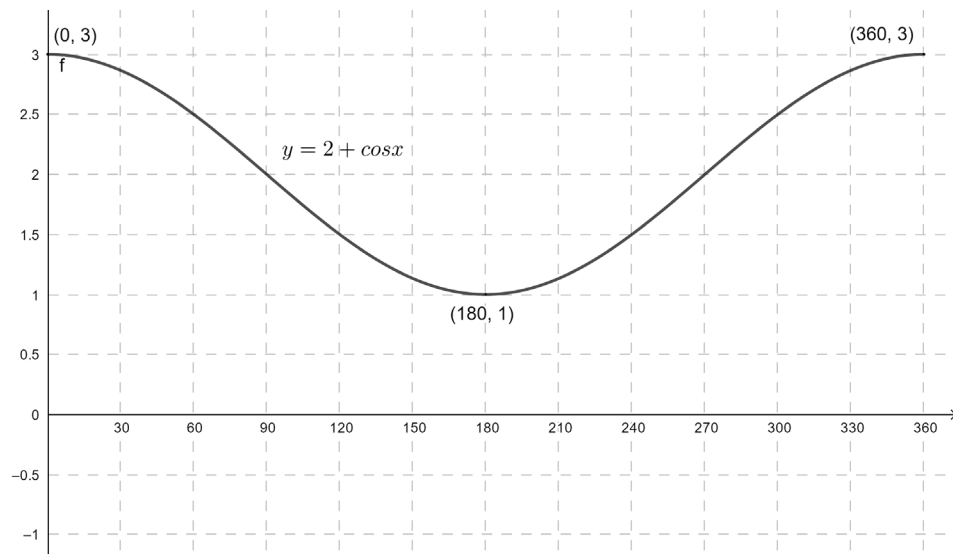
(5)

(2)

(2)
[21]

QUESTION 5

5.1 5.1.1



Turning Point: ✓

Start at $(0^\circ; 3)$ ✓End at $(360^\circ; 3)$ ✓

Shape ✓

(4)

5.1.2 $x = 180^\circ$ ✓

(1)

$$\begin{aligned}
 5.2 \quad & \cos(350^\circ 25' - 101^\circ 12') \\
 &= \cos(249^\circ 13') \quad \checkmark \\
 &= -0,355 \quad \checkmark
 \end{aligned}$$

(2)

$$\begin{aligned}
 5.3 \quad 5.3.1 \quad & \cos \hat{C} = \frac{BC}{AC} \\
 & \checkmark \\
 & BC = 69 \cos 31^\circ \quad \checkmark \\
 & BC = 59,145 \text{ cm} \quad \checkmark
 \end{aligned}$$

(2)

$$\begin{aligned}
 5.3.2 \quad & \sin \hat{C} = \frac{AB}{AC} \\
 & AB = 69 \sin 31^\circ \quad \checkmark \\
 & AB = 35,538 \text{ cm} \quad \checkmark
 \end{aligned}$$

$$\begin{aligned}
 & \text{ALTERNATE} \\
 & AB = \sqrt{AC^2 - BC^2} \\
 & AB = \sqrt{69^2 - 59,145^2} \quad \checkmark \\
 & AB = 35,538 \text{ cm} \quad \checkmark
 \end{aligned}$$

(2)

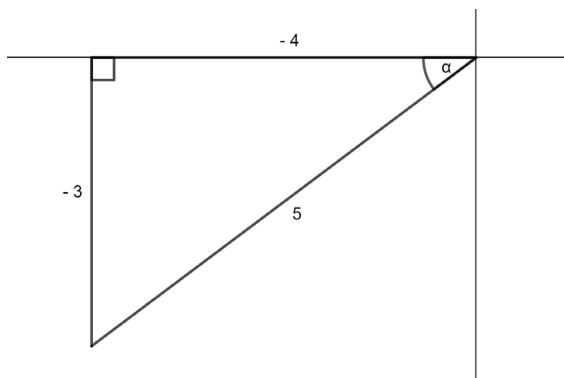
$$\begin{aligned}
 5.3.3 \quad & 2 \sin \hat{A} = 2 \sin(59^\circ) \quad \checkmark \\
 & 2 \sin \hat{A} = 1,273 \quad \checkmark
 \end{aligned}$$

(2)

$$5.4 \quad x = -4 \quad \checkmark \quad (y : x : r) \rightarrow (3 : 4 : 5)$$

$$\cos \alpha = \frac{y}{r}$$

$$\cos \alpha = \frac{-4}{5} \quad \checkmark$$



(2)
[15]

QUESTION 6

$$6.1 \quad 27^\circ 44' = 27^\circ + \frac{44}{60}$$

$$27^\circ 44' = 27,73^\circ \checkmark \quad (1)$$

$$6.2 \quad \text{Area} = \left[\frac{(1^{\text{st}} \text{ ordinate} + \text{Last ordinate})}{2} + \text{Sum of all other ordinates} \right] \times \text{Common distance}$$

$$A = \left[\frac{0,5 + 1,5}{2} + \frac{5}{2} + \frac{7}{2} + \frac{13}{2} + \frac{19}{2} + \frac{15}{2} + \frac{11}{2} \right] \times 4 \checkmark \checkmark$$

$$A = 144 \text{ units}^2 \checkmark \quad (3)$$

$$6.3 \quad 6.3.1 \quad \theta = \frac{\text{arc}}{\text{radius}}$$

$$l = 3,5(1,309)$$

$$l = 4,582 \text{ cm} \checkmark \quad (1)$$

$$6.3.2 \quad A = \frac{1}{2} r^2 \theta$$

$$A = \frac{1}{2} (3,5)^2 (1,309) \checkmark$$

$$A = 8,018 \text{ cm}^2 \checkmark \quad (2)$$

$$6.4 \quad 6.4.1 \quad n = \frac{R}{t}$$

$$n = \frac{1230}{60} \checkmark$$

$$n = 20,5 \text{ r/s} \checkmark \quad (2)$$

$$6.4.2 \quad \omega = 2\pi n$$

$$\omega = 2\pi(20,5) \checkmark$$

$$\omega = 12,566 \text{ rad/s} \checkmark \quad (2)$$

$$6.5 \quad D = h + \frac{x^2}{4h}$$

$$5,5 = h + \frac{(5)^2}{4h} \checkmark$$

$$4h^2 - 22h + 25 = 0 \checkmark$$

$$h_1 = 3,896 \text{ and } h_2 = 1,604$$

$$\text{Minor segment} = 3,896 \text{ cm} \checkmark \quad \text{Major segment} = 1,604 \text{ cm} \checkmark \quad (4)$$

[15]**TOTAL: 100**