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.

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QUESTION 1

1.1 1.1.1

$-x^2+3x-2=0$
$x^2-3x+2=0$
$(x-1)(x-2)=0$ ✓
$x=1$ ✓ and $x=2$ ✓

ALTERNATE
$-x^2+3x-2=0$
$(-x+1)(x-2)=0$
$x=1$ and $x=2$ (3)

1.1.2

$6(2-m)-5(4-m)=7$
$12-6m-20+5m=7$ ✓
$-m-8=7$ ✓
$m=-15$ ✓ (3)

1.2 1.2.1

$p=\sqrt[3]{r^2-q^2}$
$p^3=r^2-q^2$ ✓
$r^2=p^3+q^2$ ✓
$r=\pm\sqrt{p^3+q^2}$ ✓ (Award full marks if ± is omitted) (3)

1.2.2

$r=\pm\sqrt{p^3+q^2}$
$r=\pm\sqrt{4^3+6^2}$
$r=\pm 10$ ✓ (Award full marks if ± is omitted) (1)

1.3

Eq. 1: $5x=6y+3$
Eq. 2: $3y-4x+1=0$

$x=\dfrac{6y+3}{5}$ sub into Eq. 2
$3y-4\left(\dfrac{6y+3}{5}\right)+1=0$ ✓
$15y-24y-12+5=0$
$y=-\dfrac{7}{9}$ ✓
$5x=6\left(-\dfrac{7}{9}\right)+3$ ✓
$x=\dfrac{1}{5}\left(-\dfrac{42}{9}+3\right)$
$x=-\dfrac{1}{3}$ ✓

ALTERNATE
Eq. 1: $5x=6y+3$
Eq. 2: $3y-4x+1=0$ ×2

$5x=6y+3$
$+\left[-8x=-6y-2\right]$ ✓
$-3x=1$
$x=-\dfrac{1}{3}$ ✓ sub into Eq 1
$5\left(-\dfrac{1}{3}\right)=6y+3$ ✓
$\therefore y=\dfrac{1}{6}\left(-\dfrac{5}{3}-3\right)$
$y=-\dfrac{7}{9}$ ✓

(4)
[14]

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QUESTION 2

2.1 2.1.1

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

✓ ✓

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

✓ ✓

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

(5)

2.1.2

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

✓ ✓ ✓

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

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

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

(5)

2.2 2.2.1

$$\text{HCF}=(ab-4)\ \checkmark$$

(1)

2.2.2

$$\text{LCM}=3ab(ab-4)\times2(ab+4)\times(3x+y)$$

✓ ✓ ✓

(3)

2.3 2.3.1

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

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

✓ ✓

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

(3)

2.3.2

$$x^{16}-81$$

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

✓ ✓

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

(3)

[20]

QUESTION 3

3.1 3.1.1

$\log_q q - \log_x 1$

$= 1 - 0$ ✓

$= 1$ ✓ (2)

3.1.2

$\log_4 8 + \log_2 32$

✓

$= \dfrac{\log_2 2^3}{\log_2 2^2} + \log_2 2^5$

$= \dfrac{3}{2} + 5$ ✓

$= \dfrac{13}{2}$ ✓ or $= 6,5$ (3)

3.2 3.2.1

$\left(\dfrac{1}{8}\right)^{-\frac{2}{3}}$

$= \left(2^{-3}\right)^{-\frac{2}{3}}$ ✓

$= 2^2$ ✓ (2)

3.2.2

$\dfrac{m^5 n^7 m^{-2} n^{-4}}{\sqrt[3]{\left(m^2 n^2\right)^{\frac{9}{2}}}}$

$= \dfrac{m^{5-2} n^{7-4}}{\left(m^2 n^2\right)^{\frac{9}{2} \times \frac{1}{3}}}$ ✓

$= \dfrac{m^3 n^3}{m^3 n^3}$

$= 1$ ✓ (2)

3.3 3.3.1

$\log_y 2 = \log_2 y$

$\log_y 2 = \dfrac{1}{\log_y 2}$ ✓

$\left(\log_y 2\right)^2 = 1$ ✓

$\log_y 2 = \pm 1$

$2 = y^{\pm 1}$

$y = 2$ ✓ and $y = \dfrac{1}{2}$ ✓ (4)

3.3.2 $\dfrac{8^{y}}{4^{2y}} = 64^{-1}$

$\dfrac{2^{3y}}{2^{4y}} = 2^{-6}$ ✓

$2^{-y} = 2^{-6}$

$y = 6$ ✓ (2)

[15]

QUESTION 4

4.1 4.1.1

$V = \pi r^2 h$

$\frac{\pi}{2} = \pi r^2 (2)$ ✓

$\frac{1}{4} = r^2$ ✓

$r = \frac{1}{2}$ ✓m (3)

4.1.2

$SA = 2\pi r^2 + 2\pi rh$

$SA = 2\pi\left(\frac{1}{2}\right)^2 + 2\pi\left(\frac{1}{2}\right)(2)$ ✓

$SA = 7,854$ ✓ m^2 (2)

4.1.3 Volume in litres:

$V = \frac{\pi}{2} \times 1000$

$V = 500\pi$ litre or $V = 1570,80$ litres ✓

Amount:

$= 500\pi \times R1,00$

$= R500\pi$ per container or $= R1570,80$ per container ✓ (2)

4.2 4.2.1

$y = 6$ ✓ (1)

4.2.2

$0 = x^2 + 7x + 6$

$0 = (x+6)(x+1)$

✓ ✓

$x = -6$ and $x = -1$ (2)

4.2.3

$x = \frac{-b}{2a}$

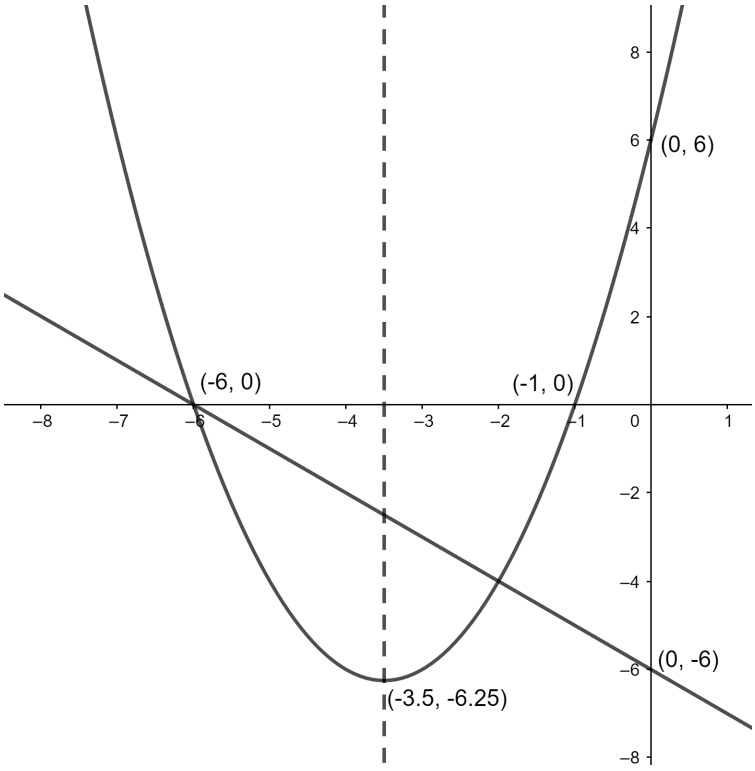
$x = \frac{-7}{2}$ ✓ (1)

4.2.4

$y = \left(-\frac{7}{2}\right)^2 + 7\left(-\frac{7}{2}\right) + 6$

$y = -\frac{25}{4}$ ✓ (1)

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



(5)

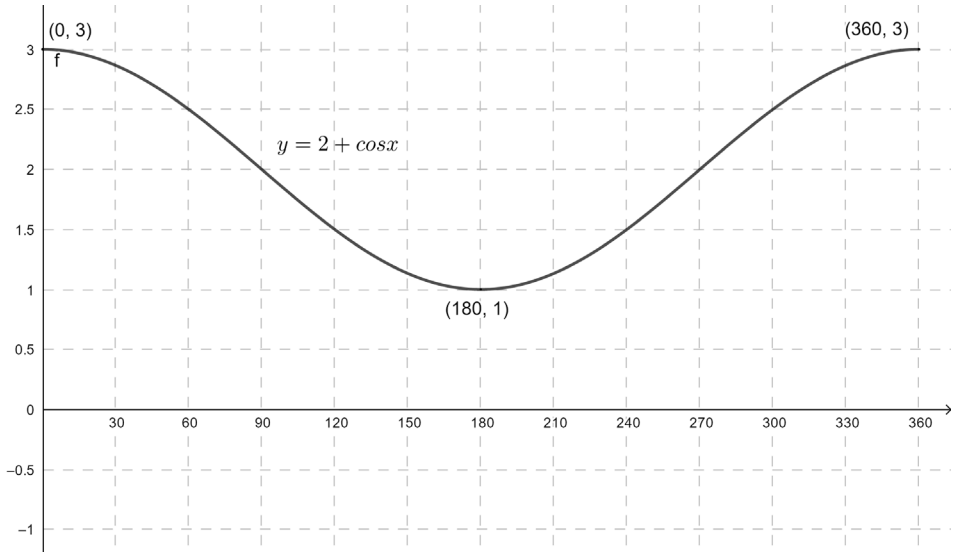
4.3 *x*-intercepts ✓
y-intercepts ✓ (2)

4.4 $x = -6$ ✓ and $x = -2$ ✓ (2)

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QUESTION 5

5.1 5.1.1



Turning Point: ✓
Start at $(0°;3)$ ✓
End at $(360°;3)$ ✓
Shape ✓ (4)

5.1.2 $x = 180°$ ✓ (1)

5.2 $\cos(350°25' - 101°12')$
$= \cos(249°13')$ ✓
$= -0,355$ ✓ (2)

5.3 5.3.1

$\cos \hat{C} = \frac{BC}{AC}$
$BC = 69\cos 31°$ ✓
$BC = 59,145$ cm ✓ (2)

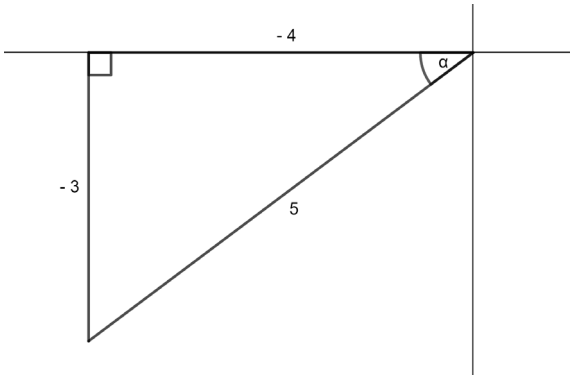
5.3.2

$\sin \hat{C} = \frac{AB}{AC}$
$AB = 69\sin 31°$ ✓
$AB = 35,538$ cm ✓

ALTERNATE
$AB = \sqrt{AC^2 - BC^2}$
$AB = \sqrt{69^2 - 59,145^2}$ ✓
$AB = 35,538$ cm ✓ (2)

5.3.3 $2\sin \hat{A} = 2\sin(59°)$ ✓
$2\sin \hat{A} = 1,273$ ✓ (2)

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



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

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

(2)
[15]

QUESTION 6

6.1
$$27°44' = 27° + \frac{44}{60}$$
$$27°44' = 27,73° \checkmark$$ (1)

6.2
$$\text{Area} = \left[\frac{\left(1^{st}\ \text{ordinate} + \text{Last ordinate}\right)}{2} + \text{Sum of all other ordinates}\right] \times \text{Common distance}$$
$$A = \left[\frac{0,5+1,5}{2} + \frac{5}{2} + \frac{7}{2} + \frac{13}{2} + \frac{19}{2} + \frac{15}{2} + \frac{11}{2}\right] \times 4 \checkmark\checkmark$$
$$A = 144 \text{ units}^2 \checkmark$$ (3)

6.3 6.3.1
$$\theta = \frac{arc}{radius}$$
$$l = 3,5(1,309)$$
$$l = 4,582 \text{ cm} \checkmark$$ (1)

6.3.2
$$A = \frac{1}{2} r^2 \theta$$
$$A = \frac{1}{2}(3,5)^2 (1,309) \checkmark$$
$$A = 8,018 \text{ cm}^2 \checkmark$$ (2)

6..4 6.4.1
$$n = \frac{R}{t}$$
$$n = \frac{1230}{60} \checkmark$$
$$n = 20,5 \text{ r/s} \checkmark$$ (2)

6.4.2
$$\omega = 2\pi n$$
$$\omega = 2\pi(20,5) \checkmark$$
$$\omega = 12,566 \text{ rad/s} \checkmark$$ (2)

6.5
$$D = h + \frac{x^2}{4h}$$
$$5,5 = h + \frac{(5)^2}{4h} \checkmark$$
$$4h^2 - 22h + 25 = 0 \checkmark$$
$$h_1 = 3,896 \text{ and } h_2 = 1,604$$
Minor segment = 3,896 cm ✓ Major segment = 1,604 cm ✓ (4)

[15]

TOTAL: 100

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