



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

MATHEMATICS N2

01 February 2022

This marking guideline consists of 9 pages.

QUESTION 1

1.1 1.1.1 $(\sqrt{x})^3 = 27$ (1)

1.1.2 $x^{\frac{3}{2}} = 3^3$
 $x = 3^{3 \times \frac{2}{3}}$
 $x = 3^2$ [No mark for answer only] (3)

1.2 1.2.1 $\log 60 = \log(2 \times 3 \times 10)$
 $\log 60 = \log 2 + \log 3 + \log 10$
 $\log 60 = 0.301 + 0.477 + 1$ [No mark for answer only] (3)

1.2.2 $\log_2 3 = \frac{\log 3}{\log 2}$
 $\log_2 3 = \frac{0.477}{0.301}$ (2)

1.3 1.3.1 $\frac{a^{3x+z+2y} \times a^{5x+4y}}{a^{x+z+3y}}$
 $\hat{=} a^{3x+z+2y+5x+4y-x-z-3y}$
 $\hat{=} a^{7x+3y}$ (2)

1.3.2 $\log_5 \sqrt{125} + \hat{=} \log_2 \sqrt{32} \hat{=}$
 $\hat{=} \log_5 (5)^{\frac{3}{2}} + \hat{=} \log_2 (2)^{\frac{5}{2}} \hat{=}$
 $\hat{=} \frac{3}{2} + \frac{5}{2}$
 $\hat{=} 4$ (4)
[15]

QUESTION 2

$$\begin{aligned}
 2.1 \quad 2.1.1 \quad & \frac{2x^2+4x}{x^2+4x+4} \div \frac{x^2-4}{x^2-4x+4} \times \frac{x^2+2x}{x^2-2x} \\
 & \frac{2x(x+2)}{(x+2)^2} \times \frac{(x-2)^2}{(x-2)(x+2)} \times \frac{x(x+2)}{x(x-2)} \\
 & \frac{2x}{x+2}
 \end{aligned} \quad (5)$$

$$\begin{aligned}
 2.1.2 \quad & \frac{x-5}{x^2-7x+12} - \frac{x+2}{x^2-9} \\
 & \frac{x-5}{(x-3)(x-4)} - \frac{x+2}{(x-3)(x+3)} \\
 & \frac{(x-5)(x+3) - (x+2)(x-4)}{(x-3)(x-4)(x+3)} \\
 & \frac{x^2+3x-5x-15 - (x^2-4x+2x-8)}{(x-3)(x-4)(x+3)} \\
 & \frac{-7}{(x-3)(x-4)(x+3)}
 \end{aligned} \quad (5)$$

$$\begin{aligned}
 2.2 \quad 2.2.1 \quad & ax+bx+ay+by = x(b+a) + y(b+a) \\
 & (x+y)(b+a) \\
 & b^2+ab-2b-2a = (b+a)(b-2) \\
 & a^2b^2-a^4 = a^2(b^2-a^2) \\
 & a^2(a+b)(b-a)
 \end{aligned} \quad (7)$$

$$\begin{aligned}
 2.2.2 \quad & LCM = a^2(b+a)(b-a)(b-2)(x+y)
 \end{aligned} \quad (3)$$

[20]

QUESTION 3

3.1 $x + y = 127$ ----- (1)

$x - y = 17$ ----- (2)

$(1) + (2) \Rightarrow 2x = 144$

$\Rightarrow x = 72 \text{ km}$

$(1) \Rightarrow y = 127 - x$

$\Rightarrow y = 55 \text{ km}$

(4)

3.2 3.2.1 $2y + 41 = 8y - 19$
 $-6y = -60$
 $y = 10$

(2)

3.2.2 $20y^2 + 9y - 18 = 0$
 $(5y + 6)(4y - 3) = 0$
 $y = -\frac{6}{5} \vee y = \frac{3}{4}$

(3)

If alternate method is used, award no marks

3.3 3.3.1 $V = \frac{W}{\sqrt{X^3 + YZ^3}}$
 $V(\sqrt{X^3 + YZ^3}) = W$
 $V^2(X^3 + YZ^3) = W^2$
 $X^3 + YZ^3 = \frac{W^2}{V^2}$
 $Z^3 = \frac{\frac{W^2}{V^2} - X^3}{Y}$
 $Z = \sqrt[3]{\frac{\frac{W^2}{V^2} - X^3}{Y}}$

(4)

3.3.2 $Z = \sqrt[3]{\frac{\frac{W^2}{V^2} - X^3}{Y}}$
 $Z = \sqrt[3]{\frac{(20.5)^2}{(1.25)^2} - 2^3}$
 $Z = 4.431$

(1)

ALTERNATIVE

$x + y = 127$ ----- (1)

$x - y = 17$ ----- (2)

$(1) - (2) \Rightarrow 2y = 110$

$\Rightarrow y = 55 \text{ km}$

$(2) \Rightarrow x = 17 + y$

$\Rightarrow x = 72 \text{ km}$

ALTERNATIVE

$V = \frac{W}{\sqrt{X^3 + YZ^3}}$

$V(\sqrt{X^3 + YZ^3}) = W$

$V^2(X^3 + YZ^3) = W^2$

$V^2X^3 + V^2YZ^3 = W^2$

$Z^3 = \frac{W^2 - V^2X^3}{V^2Y}$

$Z = \sqrt[3]{\frac{W^2 - V^2X^3}{V^2Y}}$

ALTERNATIVE

$Z = \sqrt[3]{\frac{(20.5)^2 - (1.25)^2 \times 2^3}{3(1.25)^2}}$

$Z = 4.431$

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QUESTION 4

4.1 4.1.1 $SA = 4\pi r^2$
 $625\pi = 4\pi r^2$
 $r^2 = 156.25$
 $r = 12.5 \text{ cm}$ (3)

4.1.2 $V = \frac{4}{3}\pi r^3$
 $V = \frac{4}{3}\pi (12.5)^3$
 $V = 8181.231 \text{ cm}^3$
 $V = \frac{15625\pi}{6} \text{ cm}^3$ (2)

4.1.3 $Cost = \frac{1}{2} \times \frac{15625\pi}{6}$
 $\text{R } 4090.62$ (2)

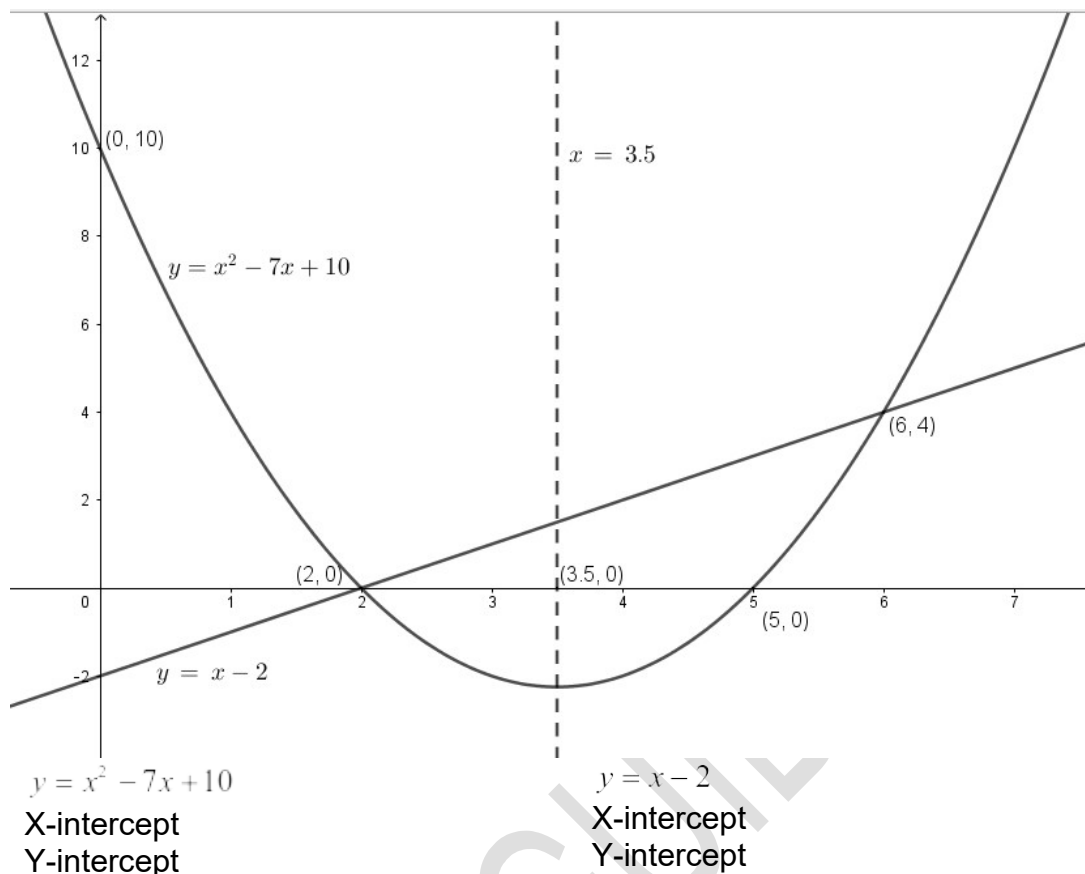
4.2 4.2.1 $y = 10$ (1)

4.2.2 $x = 2 \text{ or } x = 5$ (2)

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

4.2.4 $y = \left(\frac{7}{2}\right)^2 - 7\left(\frac{7}{2}\right) + 10$
 -2.25
 $-\frac{9}{4}$ (1)

4.2.5
+
4.3



Turning points $\left(\frac{7}{2}; -\frac{9}{4}\right)$
Axis of symmetry

4.4

$(2; 0)$ and $(6; 4)$

(7)

(2)

[21]

QUESTION 5

$$5.1 \quad 75^{\circ}24' = \frac{75^{\circ}24'}{57.3}$$

$$\hat{=} \frac{75^{\circ} + \frac{24}{60}}{57.3}$$

$$\hat{=} 1.316$$

ALTERNATIVELY

$$75^{\circ}24' = \frac{75^{\circ}24' \times \pi}{180}$$

$$\hat{=} \frac{\left(75^{\circ} + \frac{24}{60}\right) \times \pi}{57.3}$$

(2)

$$5.2 \quad 5.2.1 \quad A = \frac{360}{8}$$

$$A = 45 \text{ cm}^2$$

(1)

$$5.2.2 \quad A = \frac{1}{2} r^2 \theta$$

$$45 = \frac{1}{2} \hat{=}$$

$$\theta = \frac{45}{8} \text{ rads}$$

$$\theta = 5.625 \text{ rads}$$

(2)

$$5.3 \quad 5.3.1 \quad v = \frac{72 \text{ km}}{h}$$

$$v = \frac{72 \times 1000}{60 \times 60}$$

$$v = 20 \text{ m/s}$$

(1)

$$5.3.2 \quad r = \frac{D}{2} = \frac{4.5}{2} = \frac{9}{4} = 2.25$$

$$\Rightarrow \omega = \frac{v}{r}$$

$$\omega = \frac{20}{2.25}$$

$$\omega = \frac{80}{9}$$

$$\omega = 8.889 \text{ rads/secs.}$$

(2)

$$5.4 \quad D = \frac{x^2}{4h} + h$$

$$350 = \frac{x^2}{4(80)} + 80$$

$$270(320) = x^2$$

$$x = \sqrt{86400}$$

$$x = 293,939 \text{ mm}$$

$$D = 2r$$

$$D = 175 \times 2$$

$$D = 350 \text{ mm}$$

(4)

$$5.5 \quad \text{Area} = \left[\frac{3+41}{2} + 6+57+219+13+79+47+36+51 \right] \times 91$$

$$\hat{=} 48230 \text{ mm}^2$$

(3)

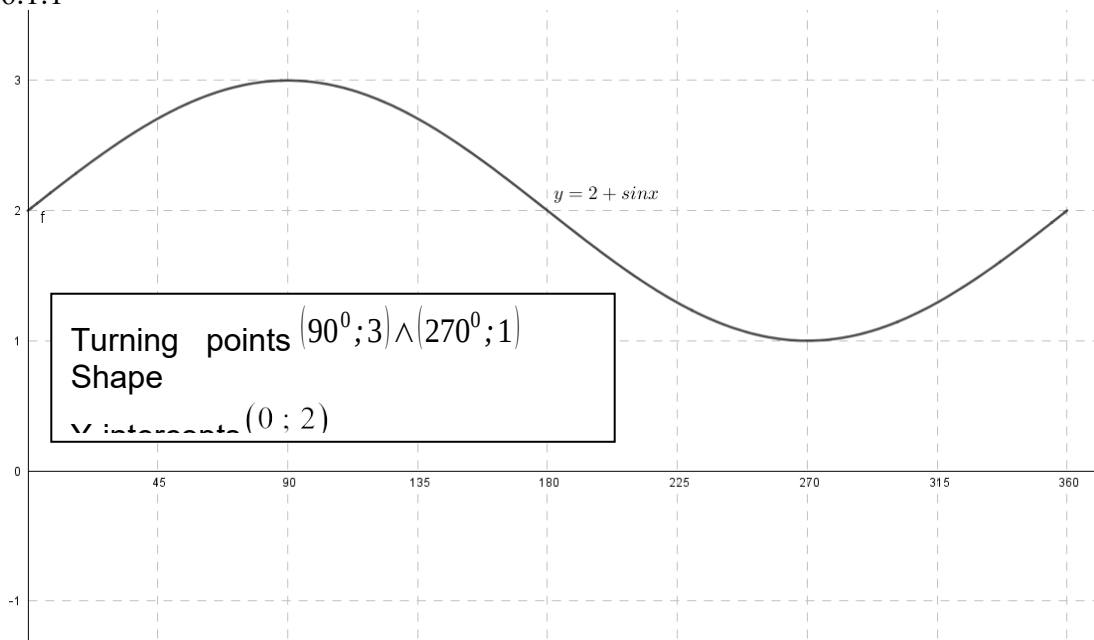
[15]

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QUESTION 6

6.1

6.1.1



(3)

6.1.2 $x = 30^\circ \wedge x = 150^\circ$

(2)

6.2

$$\frac{-3}{2} \sec 355^\circ 9' = \frac{-3}{2 \cos 355^\circ 9'}$$

$$\frac{-3}{2 \cos \left(355^\circ + \frac{9}{60} \right)}$$

$$\frac{-3}{2 \cos 355.15^\circ}$$

$$-1.505$$

ANSWER ONLY: FULL MARKS

(2)

6.3

6.3.1 $\tan 51^\circ = \frac{21}{BC}$

$$BC = \frac{21}{\tan 51^\circ}$$

$$BC = 17.005 \text{ cm}$$

6.3.2 $\sin 51^\circ = \frac{21}{AC}$

$$AC = \frac{21}{\sin 51^\circ}$$

$$AC = 27.022 \text{ cm}$$

ALTERNATIVELY

$$AC = \sqrt{(21)^2 - (17.005)^2}$$

$$AC = 27.022 \text{ cm}$$

6.3.3 $\hat{A} = 180^\circ - 51^\circ - 90^\circ = 39^\circ$

$$1 + \tan^2 \hat{A}$$

$$1 + \tan^2 39^\circ$$

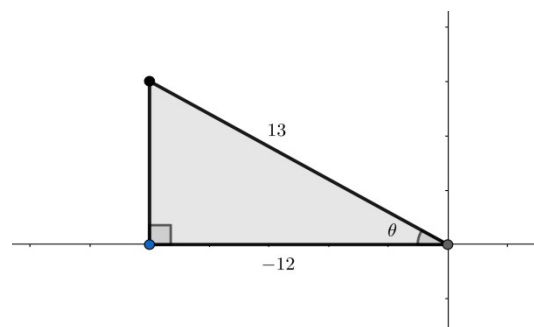
$$1.656$$

(3×2)

(6)

6.4 $y = \sqrt{13^2 - (-12)^2} = 5$

$$\therefore \tan \theta = \frac{-5}{12}$$



(2)

[15]

TOTAL: 100