



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

MATHEMATICS N2

28 June 2022

This marking guideline consists of 8 pages.

QUESTION 1

1.1 1.1.1 $e^{\ln e^x} = e^{x \ln e} = e^x$ (1)

1.1.2 $-2 \log_4 \frac{1}{5} + 7 \log_3 9 - \log_5 125^{-3}$
 $-2(-1) \log_5 5 + 7 \log_3 3^2 - (-9 \log_5 5)$
 $2 + 14 + 9$
 25 (4)

1.2 1.2.1 $(32)^{2a+1} \times \left(\frac{1}{2}\right)^{a-6} = (16)^{-4}$
 $\Rightarrow 2^{5(2a+1)} \times 2^{-1(a-6)} = (2)^{4(-4)}$
 $\Rightarrow 2^{10a+5-a+6} = 2^{-16}$
 $\Rightarrow 10a+5-a+6 = -16$
 $\Rightarrow a = -3$

ALTERNATIVE
 $(32)^{2a} \times 32 \times \left(\frac{1}{2}\right)^a \times \left(\frac{1}{2}\right)^{-6} = (2^4)^{-4}$
 $\Rightarrow (2^5)^{2a} \times 2^5 \times 2^{-a} \times 2^6 = 2^{-16}$
 $\Rightarrow 2^{10a+5-a+6} = 2^{-16}$
 $\Rightarrow 10a+5-a+6 = -16$
 $\Rightarrow a = -3$
 4

1.2.2 $\log(a-1) = \pm 1$
 $\Rightarrow a-1 = 10^{\pm 1}$
 $\Rightarrow a-1 = 10 \vee a-1 = \frac{1}{10}$
 $\Rightarrow a = 11 \vee a = \frac{11}{10}$ (4)

1.2.3 $a = \log_{64} 8$
 $a = \frac{1}{\log_8 64}$
 $a = \frac{1}{2 \log_8 8}$
 $a = \frac{1}{2}$
 $a = \log_{64} 8$
 $64^a = 8$
 $8^{2a} = 8$
 $2a = 1$
 $a = \frac{1}{2}$ (3)

[16]

QUESTION 2

$$\begin{aligned}
 2.1 \quad 2.1.1 \quad & \frac{a}{2a^2-3ab+b^2} + \frac{b}{2a^2+ab-b^2} + \frac{1}{a+b} \\
 & \frac{a}{(2a-b)(a-b)} + \frac{b}{(2a-b)(a+b)} + \frac{1}{a+b} \\
 & \frac{a(a+b)+b(a-b)+(2a-b)(a-b)}{(2a-b)(a-b)(a+b)} \\
 & \frac{a^2+ab+ab-b^2+2a^2-2ab-ab+b^2}{(2a-b)(a-b)(a+b)} \\
 & \frac{3a^2-ab}{(2a-b)(a-b)(a+b)} \\
 & \frac{a(3a-b)}{(2a-b)(a-b)(a+b)} \quad (6)
 \end{aligned}$$

$$\begin{aligned}
 2.1.2 \quad & \frac{4p^2+8pq+4q^2}{3p^2-3q^2} \times \frac{9p^2-6pq-3q^2}{4p+4q} \\
 & \frac{4(p+q)^2}{3(p+q)(p-q)} \times \frac{3(3p+q)(p-q)}{4(p+q)} \\
 & 3p+q \quad (4)
 \end{aligned}$$

$$\begin{aligned}
 2.2 \quad 2.2.1 \quad & -2n-2l-2n^2+2l^2 = -2[(n+l)(1+n-l)] \\
 & -2n^2-4nl-2l^2 = -2(n+l)^2 \\
 & -2n-2l = -2(n+l) \quad (7)
 \end{aligned}$$

$$\begin{aligned}
 2.2.2 \quad & HCF = -2(n+l) \\
 & LCM = -2(n+l)^2(1+n-l) \quad (3) \\
 & [20]
 \end{aligned}$$

QUESTION 3

$$\begin{aligned}
 3.1 \quad & -3p^2 + p + 2 = 0 \\
 & \Rightarrow (2+3p)(1-p) = 0 \\
 & \Rightarrow p = \frac{-2}{3} \vee p = 1
 \end{aligned}$$

ALTERNATIVE

$$\begin{aligned}
 & 3p^2 - p - 2 = 0 \\
 & \Rightarrow (3p+2)(p-1) = 0 \\
 & \Rightarrow p = \frac{-2}{3} \vee p = 1
 \end{aligned}$$

(3)

$$\begin{aligned}
 3.2 \quad & 5v - 2w - 6 = 0 \text{-----} (1) \\
 & 6w - 3v - 30 = 0 \text{-----} (2) \\
 & (1) \Rightarrow v = \frac{2w+6}{5} \text{-----} (3) \\
 & (3) \text{ into } (2) \Rightarrow 6w - 3\left(\frac{2w+6}{5}\right) = 30 \\
 & \Rightarrow w = \frac{168}{24} = 7 \\
 & (3) \Rightarrow v = \frac{2(7)+6}{5} = \frac{20}{5} = 4
 \end{aligned}$$

ALTERNATIVE

$$\begin{aligned}
 & 5v - 2w = 6 \text{-----} (1) \\
 & -3v + 6w = 30 \text{-----} (2) \\
 & (1) \times 3 \Rightarrow 15v - 6w = 18 \text{---} (3) \\
 & (3) + (2) \Rightarrow 12v = 48 \\
 & v = 4 \\
 & \textcolor{red}{\hookrightarrow} v = 4 \text{ into } (1) \\
 & 5(4) - 2w = 6 \\
 & w = 7
 \end{aligned}$$

(4)

$$\begin{aligned}
 3.3 \quad & \text{Let } p = \text{price of a plum and } g = R2,5 = \text{price of a guava} \\
 & \Rightarrow 4p + 2g - 2 = 30 \\
 & \Rightarrow 4p + 5 - 2 = 30 \\
 & \Rightarrow p = R6,75
 \end{aligned}$$

(2)

$$\begin{aligned}
 3.4 \quad 3.4.1 \quad & mn = \frac{\sqrt[5]{t^3 - p^3}}{mq} \\
 & \Rightarrow m^2 nq = \sqrt[5]{t^3 - p^3} \\
 & \Rightarrow (m^2 nq)^5 = t^3 - p^3 \\
 & \Rightarrow p^3 = t^3 - (m^2 nq)^5 \\
 & \Rightarrow p = \sqrt[3]{t^3 - (m^2 nq)^5}
 \end{aligned}$$

(4)

$$\begin{aligned}
 3.4.2 \quad & p = \sqrt[3]{(5,2)^3 - [(1,35)^2 \times 0,25 \times 2,75]^5} \textcolor{red}{\hookrightarrow \hookrightarrow} \\
 & p = 5,162
 \end{aligned}$$

(1)

[14]

QUESTION 4

4.1 4.1.1 $\frac{4}{3}\pi r^3 = \frac{1}{3}\pi r^2 h$ where $h=12$
 $\Rightarrow \frac{4}{3}\pi r^3 = 4\pi r^2$ since $h=12$
 $\Rightarrow \frac{4}{3}\pi r^3 - 4\pi r^2 = 0$
 $\Rightarrow 4\pi r^2 \left(\frac{r}{3} - 1\right) = 0$
 $\Rightarrow r = 3 \text{ cm}$ (3)

4.1.2 $S.A. \text{ of cone} = \pi r^2 + \pi r \sqrt{h^2 + r^2}$
 $\hookrightarrow \pi(3)^2 + \pi(3)\sqrt{12^2 + 3^2}$
 $\hookrightarrow 144,85 \text{ cm}^2$ (2)

4.1.3 $S.A. \text{ of sphere} = 4\pi r^2$
 $\hookrightarrow 4\pi \hookrightarrow$
 $\hookrightarrow 113,097 \text{ cm}^2$ (2)

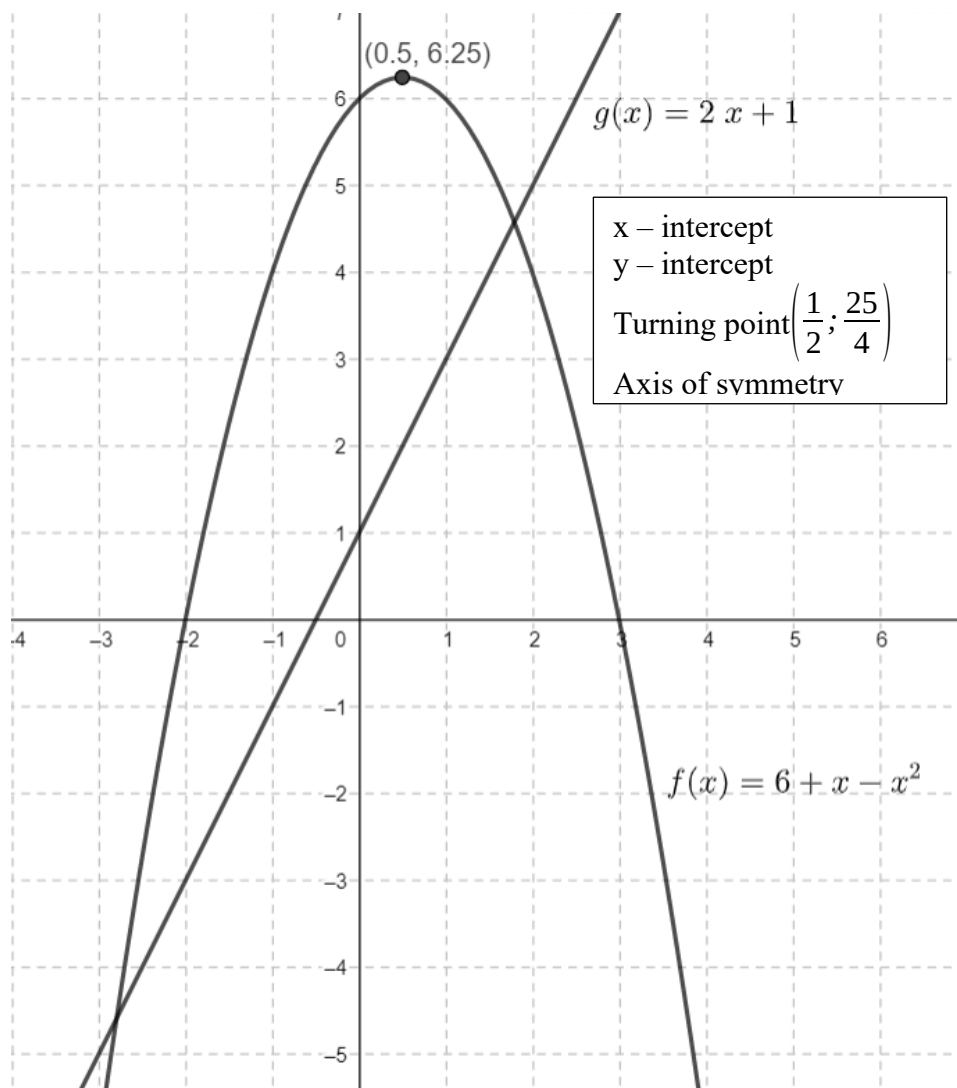
4.2 $A = \left[\frac{3+8}{2} + 5+7+10+16+11+9 \right] \times 2$
 $A = 127$ (3)
[10]

QUESTION 5

5.1 5.1.1 $x = \frac{-1}{2(-1)}$
 $x = \frac{1}{2}$ (1)

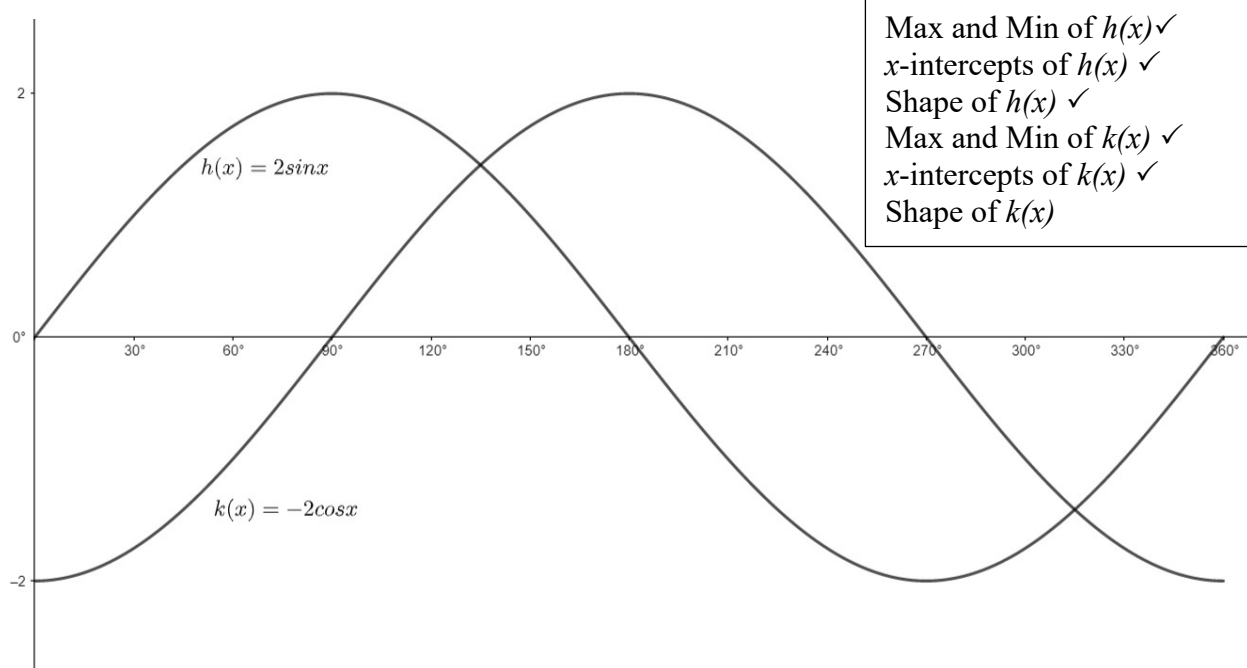
5.1.2 $y = 6 + \frac{1}{2} - \left(\frac{1}{2}\right)^2$
 $y = 6,25$ (1)

5.1.3



5.1.4 $x \approx 1,8 \wedge x \approx -2,8$ [Accept accuracy of ± 0.1] (2)

5.1.5 $x = -1 \wedge x = 2$ (2)

5. 5.2.1
2(6
)5.2.2 $x = 135^\circ \wedge x = 315^\circ$ (2)
[20]

QUESTION 6

$$6.1 \quad 102^\circ 42' = 102^\circ + \frac{42^\circ}{60}$$

$$\quad \quad \quad \hookrightarrow 102,7^\circ$$

$$\quad \quad \quad \hookrightarrow \frac{102,7^\circ}{57,3}$$

$$\quad \quad \quad \hookrightarrow 1,792 \text{ rads}$$

ALTERNATIVE $102^\circ 42' = 102^\circ + \frac{42^\circ}{60}$ $\quad \quad \quad \hookrightarrow 102,7^\circ$ $\hookrightarrow \frac{102,7^\circ \times \pi}{180}$ $\quad \quad \quad \hookrightarrow 1,792 \text{ rads}$	(2)
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$$6.2 \quad 6.2.1 \quad A = \frac{240}{5}$$

$$\quad \quad \quad A = 48 \text{ cm}^2 \quad (1)$$

$$6.2.2 \quad \text{Area} = \frac{1}{2} \times r^2 \theta$$

$$\Rightarrow 48 = \frac{1}{2} \times r^2 (0.96)$$

$$\Rightarrow 100 = r^2$$

$$\Rightarrow 10 \text{ cm} = r \quad (2)$$

$$6.3 \quad 6.3.1 \quad \omega = \frac{v}{r}$$

$$\quad \quad \quad \omega = \frac{275}{1,25}$$

$$\quad \quad \quad \omega = 220 \text{ rads per second} \quad (2)$$

$$6.3.2 \quad \theta = \omega t$$

$$\quad \quad \quad \theta = 220 \times 60$$

$$\quad \quad \quad \theta = 13200 \text{ rads} \quad (1)$$

$$6.4 \quad D = \frac{x^2}{4h} + h$$

$$\quad \quad \quad \hookrightarrow \frac{(4)^2}{4(16)} + 16$$

$$\quad \quad \quad \hookrightarrow 16,25 \text{ cm}$$

$$\quad \quad \quad r = \frac{D}{2}$$

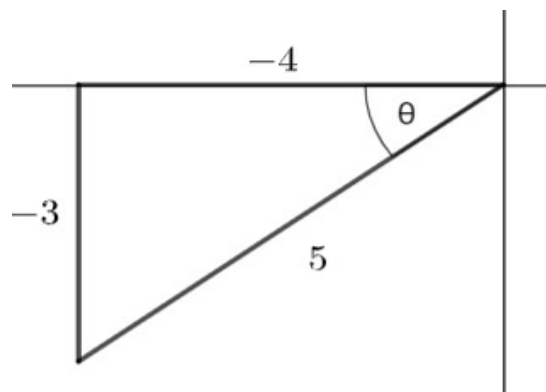
$$\quad \quad \quad r = \frac{16,25}{2}$$

$$\quad \quad \quad r = 8,125 \text{ cm} \quad (4)$$

6.5 If $\sec \theta = -\frac{5}{4}$ and $180^\circ \leq \theta \leq 270^\circ$

$$\begin{aligned} & \tan \theta \cdot \cos \theta \\ & \left(\frac{-3}{-4} \right) \left(\frac{-4}{5} \right) \\ & -\frac{3}{5} \end{aligned}$$

✓



(3)

6.6 $AB = AC - BC$
 $\tan C \hat{D} B = \frac{BC}{DC}$
 $DC = 150 \tan 35^\circ$
 $DC = 214,222$

$$\begin{aligned} \tan C \hat{D} A &= \frac{AC}{DC} \\ AC &= 214,222 \tan 40^\circ \\ AC &= 179,754 \end{aligned}$$

$$\begin{aligned} AB &= AC - BC \\ AB &= 179,754 - 150 \\ AB &= 29,754 \text{ m} \end{aligned}$$

(5)
[20]**TOTAL: 100**