



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

MATHEMATICS N2

21 November 2023

This marking guideline consists of 7 pages.

QUESTION 1

$$\begin{aligned}
 1.1 \quad & -10q^2 - 11q + 6 = 0 \\
 & \Rightarrow (3+2q)(2-5q) = 0 \\
 & \Rightarrow q = \frac{-3}{2} \vee p = \frac{2}{5}
 \end{aligned}$$

ALTERNATIVE

$$\begin{aligned}
 & 10q^2 + 11q - 6 = 0 \\
 & \Rightarrow (2q+3)(5q-2) = 0 \\
 & \Rightarrow q = \frac{-3}{2} \vee p = \frac{2}{5}
 \end{aligned}$$

(3)

$$\begin{aligned}
 1.2 \quad & \text{Eqn.1: } 2b + m = 50 \\
 & \text{Eqn.2: } 8m - 2b = 220 \\
 & \text{Eqn.1} \Rightarrow m = 50 - 2b \text{ ----- Eqn.3} \\
 & \text{Eqn.3} \in \text{Eqn.2} \Rightarrow 8(50 - 2b) - 2b = 220 \\
 & \Rightarrow b = \frac{180}{18} = 10 \text{ years} \\
 & \text{Eqn.3} \Rightarrow m = 50 - 2(10) = 30 \text{ years}
 \end{aligned}$$

ALTERNATIVE

$$\begin{aligned}
 & \text{Eqn.1: } 2b + m = 50 \\
 & \text{Eqn.2: } 8m - 2b = 220 \\
 & \text{Eqn.1} + \text{Eqn.2} \Rightarrow 9m = 270 \\
 & \Rightarrow m = \frac{270}{9} = 30 \text{ years} \\
 & \text{Eqn.1} \Rightarrow b = \frac{50 - 30}{2} = 10 \text{ years}
 \end{aligned}$$

(4)

$$\begin{aligned}
 1.3 \quad & k + (k+3) - 9(k+2) = 118 \\
 & \Rightarrow k + k + 3 - 9k - 18 = 118 \\
 & \Rightarrow k = -19
 \end{aligned}$$

(2)

$$\begin{aligned}
 1.4 \quad 1.4.1 \quad & F = \sqrt{\frac{7}{e} + h^2} \\
 & \Rightarrow F^2 = \frac{7}{e} + h^2 \\
 & \Rightarrow F^2 - h^2 = \frac{7}{e} \\
 & \Rightarrow e(F^2 - h^2) = 7 \\
 & \Rightarrow
 \end{aligned}$$

(4)

$$1.4.2 \quad e = \frac{7}{(13)^2 - (3)^2} = \frac{7}{160} = 0,04375$$

(1)

[14]

QUESTION 2

$$\begin{aligned}
 2.1 \quad 2.1.1 \quad & \frac{3a-1}{a+4} + \frac{8a}{a^2+3a-4} \\
 & \checkmark \frac{3a-1}{a+4} + \frac{8a}{(a+4)(a-1)} \\
 & \checkmark \frac{(3a-1)(a-1)+8a}{(a+4)(a-1)} \\
 & \checkmark \frac{3a^2-3a-a+1+8a}{(a+4)(a-1)} \\
 & \checkmark \frac{3a^2+4a+1}{(a-1)(a+4)} \\
 & \checkmark \frac{(3a+1)(a+1)}{(a+4)(a-1)} \quad (6)
 \end{aligned}$$

$$\begin{aligned}
 2.1.2 \quad & \frac{n^2-9}{n-2} \div \frac{n^2-n-6}{n^2-4} \\
 & \checkmark \frac{(n+3)(n-3)}{(n-2)} \times \frac{(n-2)(n+2)}{(n-3)(n+2)} \\
 & \checkmark n+3 \quad (4)
 \end{aligned}$$

$$\begin{aligned}
 2.2 \quad 2.2.1 \quad & 3p+3q-9-pq=(3-q)(p-3) \\
 & 45-5p^2=-5(p+3)(p-3) \\
 & p^2-9p+18=(p-3)(p-6) \quad (7)
 \end{aligned}$$

$$\begin{aligned}
 2.2.2 \quad & HCF=(p-3) \\
 & LCM=-5(p-3)(p+3)(p-6)(3-q) \quad (3) \\
 & [20]
 \end{aligned}$$

QUESTION 3

$$\begin{aligned}
 3.1 \quad 3.1.1 \quad & \log_3 \checkmark \checkmark \\
 & \checkmark \log_3 \checkmark \checkmark \\
 & \checkmark \log_3 3^2 + \left(\frac{4^3}{3^3}\right)^{\frac{1}{3}} \\
 & \checkmark 2 + \frac{4}{3} \\
 & \checkmark \frac{10}{3} \vee \checkmark \quad (3)
 \end{aligned}$$

$$3.1.2 \quad \log_{64} 8 = \frac{\log_2 8}{\log_2 64}$$

$$\downarrow \frac{\log_2 2^3}{\log_2 2^6}$$

$$\downarrow$$

ALTERNATE $\log_{64} 8 = \frac{\log_4 8}{\log_4 64}$ $\downarrow \frac{\log_4 4^{\frac{3}{2}}}{\log_4 4^3}$ $\downarrow \frac{\frac{3}{2}}{3}$ $\downarrow \frac{1}{2}$

$$3.1.3 \quad \frac{(8x^2y)(6xy^3)}{\sqrt[3]{4y^{36}x^{18}}} = \frac{48x^{(2+1)}y^{(3+1)}}{x^{18 \times \frac{1}{3} \times \frac{1}{4}} \times y^{36 \times \frac{1}{3} \times \frac{1}{4}}}$$

$$\downarrow \frac{48x^3y^4}{x^{\frac{3}{2}} \times y^3}$$

$$\downarrow 48x^{\frac{3}{2}}y \downarrow$$

(3)

$$3.2 \quad x^{\frac{-3}{4}} = 27$$

$$\Rightarrow x = (27)^{\frac{-4}{3}}$$

$$\downarrow (3^3)^{\frac{-4}{3}}$$

$$\downarrow \frac{1}{81}$$

(2)

$$3.3 \quad R = \frac{31,4}{(3,02)^5 \times \sqrt[3]{652}}$$

$$\Rightarrow \log R = \log 31,4 - \left[5 \log 3,02 + \frac{1}{3} \log 652 \right]$$

$$\Rightarrow \log R = 1,4969 - [2,4000 + 0,9381]$$

$$\downarrow -1,842$$

$$\Rightarrow R = 10^{-1,8412}$$

$$\downarrow 0,0144$$

(4)
[15]**QUESTION 4**

$$4.1 \quad 4.1.1 \quad \pi r^2 h_{cyl} = \frac{1}{3} \pi r^2 h_{cone} \text{ where } h_{cyl} = r \wedge h_{cone} = 9 \text{ cm}$$

$$\Rightarrow \pi r^3 = 3 \pi r^2 \text{ since } h_{cyl} = r \wedge h_{cone} = 9 \text{ cm}$$

$$\Rightarrow \pi r^3 - 3 \pi r^2 = 0$$

$$\Rightarrow \pi r^2 (r - 3) = 0$$

$$\Rightarrow r = 3 \text{ cm}$$

(3)

$$4.1.2 \quad S.A. \text{ of cylinder} = 2 \pi r^2 + 2 \pi r h$$

$$\downarrow 2 \pi (3)^2 + 2 \pi (3)(3)$$

$$= 133,097$$

(2)

4.1.3 $S.A. of cone = \pi r^2 + \pi r \sqrt{h^2 + r^2}$
 $\hookrightarrow \pi(3)^2 + \pi(3)\sqrt{9^2 + 3^2}$
 $\hookrightarrow 117,686 cm^2$ (2)

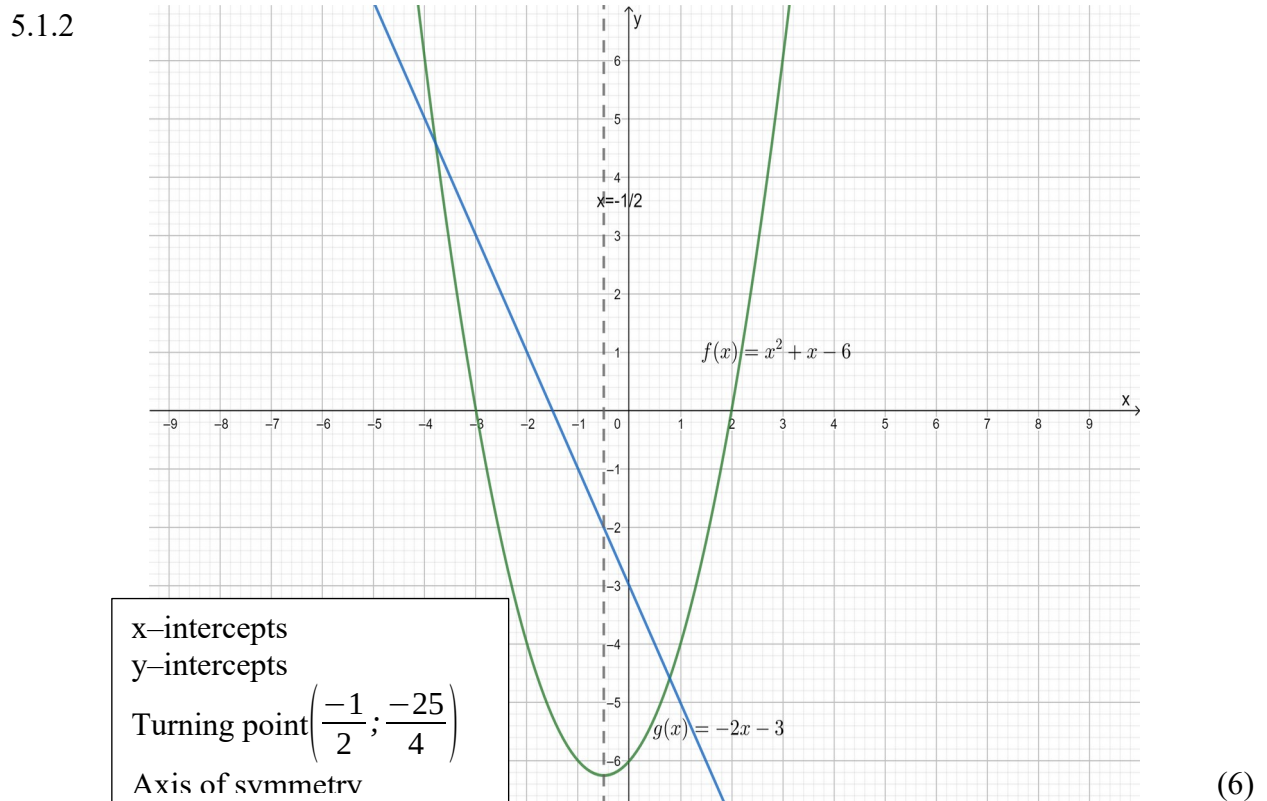
4.2 $21135 = \left[\frac{120+118}{2} + 125 + 135 + 140 + 145 + 160 + 155 + 150 + 145 + 135 \right] d$
 $\Rightarrow 21135 = 1409 d$
 $\Rightarrow d = 15$ (4)
[11]

QUESTION 5

5.1 5.1.1

x	-4	-3	-2	-1	0	1	2	3	4
$f(x)$	6	0	-4	-6	-6	-4	0	6	14
$g(x)$	5	3	1	-1	-3	-5	-7	-9	-11

(2)



5.1.3 $x \approx 0.8 \wedge x \approx -3.8$ [Accept accuracy of ± 0.1] (2)

5.1.4 $x = \frac{-1}{2(1)} = \frac{-1}{2}$ (1)

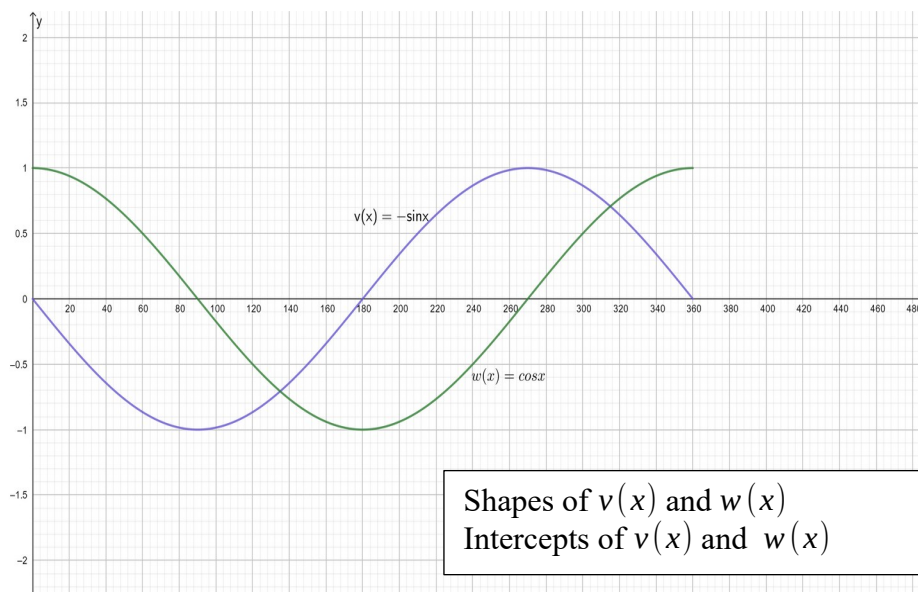
5.1.5 $y = \left(\frac{-1}{2}\right)^2 - \frac{1}{2} - 6 = -6,25 = \frac{-25}{4}$ (1)

5.2 5.2.1

x	0	30	60	90	120	150	180	210	240	270	300	330	360
$v(x)$	0	-0,5	-0,9	-1	-0,9	-0,5	0	0,5	0,9	1	0,9	0,5	0
$w(x)$	1	0,9	0,5	0	-0,5	-0,9	-1	-0,9	-0,5	0	0,5	0,9	1

(2)

5.2.2



(4)

5.2.3 $x = 135^\circ \wedge x = 315^\circ$ (2)
[20]

QUESTION 6

6.1 $13,4 = 13,4 \times 57,3^\circ$
 $\hookrightarrow 767,82^\circ$
 $\hookrightarrow 767 + 0,82 \times 60'$
 $\hookrightarrow 767^\circ, 49'$

ALTERNATIVE
 $13,4 = 13,4 \times \frac{180^\circ}{\pi}$
 $\hookrightarrow 767,76^\circ$
 $\hookrightarrow 767 + 0,76 \times 60'$
 $\hookrightarrow 767^\circ, 47'$

(2)

6.2 6.2.1 $r = \frac{l}{\theta} = \frac{12,5}{1,25} = 10 \text{ cm}$

(1)

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

$\hookrightarrow \frac{1}{2} \times (10)^2 (1,25)$
 $\hookrightarrow 62,5 \text{ cm}^2$
 $\hookrightarrow \frac{125}{2} \text{ cm}^2$

ALTERNATIVE
 $\text{Area} = \frac{l^2}{2\theta}$
 $\hookrightarrow \frac{(12,5)^2}{2(1,25)}$
 $\hookrightarrow 62,5$
 $\hookrightarrow \frac{125}{2} \text{ cm}^2$

(2)

$$\begin{aligned}
 6.3 \quad 6.3.1 \quad \omega &= 2\pi N \\
 &\Rightarrow 150 = 2\pi N \\
 &\Rightarrow N = \frac{150}{2\pi} = 23,873 \text{ rev. per second}
 \end{aligned}
 \tag{2}$$

$$6.3.2 \quad N = 23,873 \times 60 \approx 1432 \text{ rev. per minutes} \tag{1}$$

$$\begin{aligned}
 6.4 \quad D &= \frac{x^2}{4h} + h \\
 \Rightarrow 2x &= \frac{x^2}{4h} + h \\
 \Rightarrow 8xh &= x^2 + 4h^2 \\
 \Rightarrow x^2 - 8xh + 4h^2 &= 0 \\
 \Rightarrow \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\
 \Rightarrow \frac{8h \pm \sqrt{64h^2 - 16h^2}}{2} \\
 \Rightarrow x &= (4 + 2\sqrt{3})h \quad \text{OR} \quad x = (4 - 2\sqrt{3})h \\
 \Rightarrow x &= 7,73h \quad \text{OR} \quad 0,27h
 \end{aligned}
 \tag{4}$$

$$\begin{aligned}
 6.5 \quad adjacent &= \sqrt{17^2 - (-8)^2} = 15 \\
 \Rightarrow 1 + \tan^2 \theta &= 1 + \left(\frac{-8}{15}\right)^2 \\
 &= \frac{289}{225} \\
 &= 1.284
 \end{aligned}
 \tag{3}$$

$$\begin{aligned}
 6.6 \quad \tan 27^\circ &= \frac{DM}{20} \\
 \Rightarrow DM &= 20 \tan 27^\circ = 10,191 \text{ m} \\
 \tan 47^\circ &= \frac{BM}{20} \\
 \Rightarrow BM &= 20 \tan 47^\circ = 21,447 \text{ m} \\
 BD &= BM + DM = 10,191 + 21,447 \\
 \Rightarrow BD &= 31,638 \text{ m}
 \end{aligned}$$

ALTERNATIVE $ \begin{aligned} \tan 63^\circ &= \frac{20}{DM} \\ \Rightarrow DM &= \frac{20}{\tan 63^\circ} = 10,191 \text{ m} \\ \tan 43^\circ &= \frac{20}{BM} \\ \Rightarrow BM &= \frac{20}{\tan 43^\circ} = 21,447 \text{ m} \\ BD &= BM + DM = 10,191 + 21,447 \\ \Rightarrow BD &= 31,638 \text{ m} \end{aligned} $
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(5)
[20]**TOTAL: 100**