



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

MATHEMATICS

(Second paper)

NQF LEVEL 3

17 February 2025

This marking guideline consists of 8 pages.

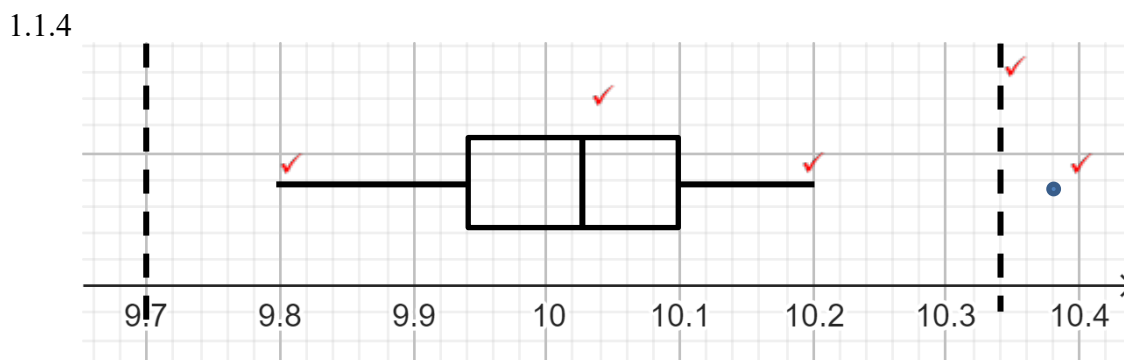
QUESTION 1

1.1 1.1.1 Position of median=9
Median=10,03✓ (1)

1.1.2 Position of $Q_1=4,5$
Lower Quartile $Q_1 = \frac{9,93 + 9,95}{2}$
 $= 9,94$ ✓

Position of $Q_3=13,5$
Lower Quartile $Q_3 = \frac{10,10 + 10,10}{2}$
 $= 10,10$ ✓ (2)

1.1.3 Lower fence = $Q_1 - 1,5(Q_3 - Q_1)$
 $= 9,94 - 1,5(10,10 - 9,94)$ ✓
 $= 9,7$ ✓
Upper fence = $Q_3 + 1,5(Q_3 - Q_1)$
 $= 10,10 + 1,5(10,10 - 9,94)$ ✓
 $= 10,34$ ✓ (4)



1-mark Outlier at 10,38
1-mark Fences at 9,7 and 10,34
1 mark New maximum at 10,2
1 mark minimum at 9,8
1-mark Box (Q_1 , Q_2 and Q_3) (5)

1.1.5 10,38✓
Athlete was tired or injured.
Any other reasonable explanation an athlete may be slower during practice.✓ (2)

1.2 1.2.1

Time (minutes) (x)	Frequency f_i	Midpoint x_i	$f_i x_i$	< Cumulative Frequency
$0 \leq x < 20$	a = 12 ✓	10	b = 120 ✓	c = 12 ✓
$20 \leq x < 40$	22	30	660	34
$40 \leq x < 60$	45	50	2 250	d = 78 ✓
$60 \leq x < 80$	33	70	2 310	112
$80 \leq x < 100$	8	90	720	120
TOTAL	$\sum f_i = 120$		$\sum f_i x_i$ (e) = 6 060 ✓	

(5)

1.2.2

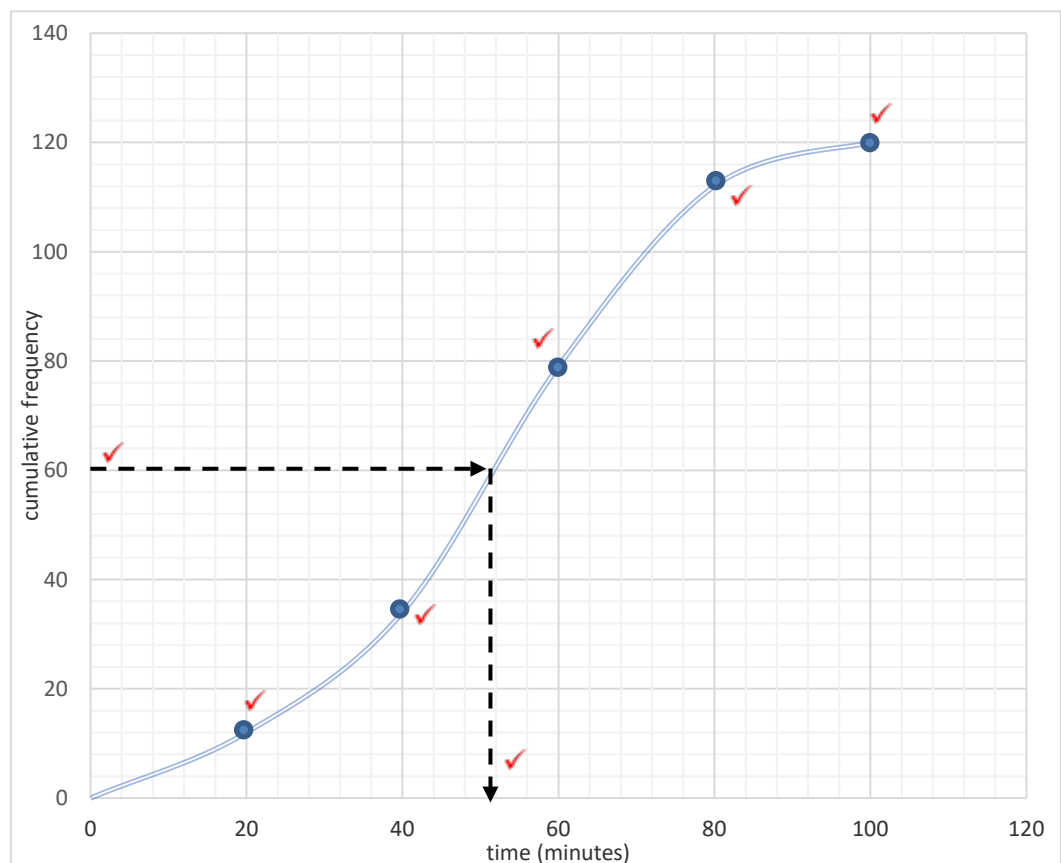
$$\bar{X} = \frac{\sum f_i x_i}{\sum f_i}$$

$$= \frac{6\,060}{120} \quad \checkmark$$

$$= 50,5 \quad \checkmark$$

(2)

1.2.3



1 mark for 2 correctly plotted points.

1 mark for joining points.

1 mark, overall impression, smooth curve.

(5)

- 1.2.4 2 marks on graph
Median= 51
Accept 49 to 53, as shown on candidate's graph✓
(3)
[29]

QUESTION 2

- 2.1 2.1.1 $V_{\text{hemisphere}} = \frac{1}{2} \left(\frac{4}{3} \pi r^3 \right)$
 $= \frac{1}{2} \left(\frac{4}{3} \pi \times 27^3 \right)$
 $= 41\,223,979 \text{ cm}^3$ ✓ (3)
- 2.1.2 $V_{\text{cone}} = \frac{1}{3} \pi r^2 h$
 $= \frac{1}{3} \pi \times (25)^2 \times 24$ ✓ ✓
 $= 15\,707,963 \text{ cm}^3$ ✓ (3)
- 2.1.3 $V_{\text{Lead}} = V_{\text{hemisphere}} - V_{\text{cone}}$
 $= 41\,223,979 - 15\,707,963$ ✓
 $= 25\,516,106 \text{ cm}^3$ ✓ (2)
- 2.1.4 $TA_{\text{cone}} = \pi r l$
 $= \pi \times 25 \times \sqrt{25^2 + 24^2}$ ✓
 $= 2\,721,832 \text{ cm}^2$ ✓ (2)
- 2.1.5 Total surface area= $Area_{\text{curved part}} + Area_{\text{circle}}$
 $= \frac{1}{2} (4\pi \times 27^2) + \pi \times 27^2$
 $= 6\,870,663 \text{ cm}^2$ ✓ (3)
- 2.2 2.2.1 $m_{AB} = \frac{8 - (-6)}{4 - (-6)}$
 $= \frac{7}{5}$ ✓
 $8 = \frac{7}{5}(4) + c$ ✓
 $c = \frac{12}{5}$
 $y = \frac{7}{5}x + \frac{12}{5}$ ✓
 $y - 8 = \frac{7}{5}(x - 4)$ ✓
 $y = \frac{7}{5}x + \frac{12}{5}$ ✓ (3)

$$\begin{aligned}
 2.2.2 \quad m_{DE} &= -\frac{5}{7} \quad \checkmark \\
 m_{AB} \times m_{DE} &= \frac{7}{5} \times -\frac{5}{7} \quad \checkmark \\
 &= -1 \quad \checkmark \quad \text{Therefore, they are perpendicular.} \quad (3)
 \end{aligned}$$

$$\begin{aligned}
 2.2.3 \quad y &= -\frac{5}{7}x + c \quad \checkmark \\
 8 &= -\frac{5}{7}(4) + c \quad \checkmark \\
 c &= \frac{76}{7} \\
 y &= -\frac{5}{7}x + \frac{76}{7} \quad \checkmark \quad (3)
 \end{aligned}$$

$$\begin{aligned}
 2.2.4 \quad \theta &= \tan^{-1}(m) \\
 \text{Ref angle} &= \tan^{-1}\left(\frac{5}{7}\right) \quad \checkmark \\
 &= 35,538^\circ \\
 \theta &= 180^\circ - 35,538^\circ \quad \checkmark \\
 &= 144,462^\circ \quad \checkmark \quad (3)
 \end{aligned}$$

[25]

QUESTION 3

$$\begin{aligned}
 3.1 \quad \frac{\sin 110^\circ \cdot \cos 330^\circ \cdot \tan 210^\circ}{\cos 20^\circ \cdot \sin 225^\circ \cdot \cos 135^\circ} &= \frac{\sin(90^\circ + 20^\circ) \cdot \cos(360^\circ - 30^\circ) \cdot \tan(180^\circ + 30^\circ)}{\cos 20^\circ \cdot \sin(180^\circ + 45^\circ) \cdot \cos(180^\circ - 45^\circ)} \quad \checkmark \\
 &= \frac{\cos 20^\circ \cdot \cos 30^\circ \cdot \tan 30^\circ}{\cos 20^\circ \cdot -\sin 45^\circ \cdot -\cos 45^\circ} \quad \checkmark \\
 &= \frac{\cos 30^\circ \cdot \tan 30^\circ}{\sin 45^\circ \cdot \cos 45^\circ} \\
 &= \frac{\frac{\sqrt{3}}{2} \cdot \frac{\sqrt{3}}{3}}{\frac{\sqrt{2}}{2} \cdot \frac{\sqrt{2}}{2}} \quad \checkmark \\
 &= \frac{3}{6} \div \frac{1}{2} \quad \checkmark \\
 &= 1 \quad \checkmark \quad (6)
 \end{aligned}$$

$$\begin{aligned}
 3.2 \quad \frac{\sin^2 k \cdot \sin(90^\circ - k)}{\cos(180^\circ - k) \cdot \sin(360^\circ - k) \cdot \tan(180^\circ + k)} &= \frac{\sin^2 k \cdot \cos k}{-\cos k \cdot -\sin k \cdot \tan k} \quad \checkmark \\
 &= \frac{\sin k}{\tan k} \\
 &= \sin k \div \frac{\sin k}{\cos k} \quad \checkmark \\
 &= \cos k \quad \checkmark \quad (4)
 \end{aligned}$$

3.3 3.3.1 $5 \tan(x + 30^\circ) = -9$

$$\tan(x + 30^\circ) = -\frac{9}{5}$$

$$\text{ref angle} = \tan^{-1}\left(\frac{9}{5}\right)$$

$$= 60,945^\circ$$

$$x + 30^\circ = 180^\circ - 60,945^\circ \checkmark \text{ or } x + 30^\circ = 360^\circ - 60,945^\circ$$

$$x = 89,055^\circ \checkmark \text{ or } x = 269,055^\circ \checkmark \quad (3)$$

3.3.2 $3\sin^2 x - 2 = 0$

$$\sin x = \pm \frac{\sqrt{6}}{3}$$

$$\text{ref angle} = \sin^{-1}\left(\frac{\sqrt{6}}{3}\right)$$

$$= 54,736^\circ \checkmark$$

$$\sin x = \frac{\sqrt{6}}{3} \quad \sin x = -\frac{\sqrt{6}}{3}$$

$$x = 54,736^\circ; 125,264^\circ \checkmark \quad x = 234,736; 305,264 \checkmark \quad (5)$$

3.4 3.4.1 $q^2 = p^2 + r^2 - 2pr\cos Q$

$$q^2 = 14^2 + 12,5^2 - 2(14)(12,5)\cos 50^\circ \checkmark \checkmark$$

$$= 127,274335 \dots$$

$$PR = 11,282 \text{ km} \checkmark \quad (3)$$

3.4.2 $\frac{p}{\sin P} = \frac{s}{\sin S}$

$$\frac{p}{\sin 85^\circ} = \frac{11,282}{\sin 55^\circ} \checkmark \quad \text{C.A from 3.4.1}$$

$$p = \frac{11,282}{\sin 55^\circ} \cdot \sin 85^\circ \checkmark$$

$$= 13,720 \text{ km} \checkmark \quad (3)$$

3.4.3 $\text{Area} = \frac{1}{2}rp \cdot \sin Q$

$$= \frac{1}{2} \times 14 \times 12,5 \cdot \sin 50^\circ \checkmark$$

$$= 67,029 \text{ km}^2 \checkmark \quad (2)$$

[26]

QUESTION 4

- 4.1 4.1.1 Sponsorship: Money given by a company or an individual to support club events or activities.
- 4.1.2 Fundraising function: An event help by clubs where members and non-members are invited to engage in activities to raise income for the club.
(2 × 1) (2)

- 4.2 4.2.1 A – 6 450
 B: 24 050
 C: 1 200
 D: 1 000
 E: 200
 F: 18 700
(6)

- 4.2.2 Donations or
 Tournament hosting
(1)

- 4.3 $A = P \left(1 + \frac{r}{100m} \right)^{t \times m}$
- $45\,563,70 = 30\,000 \left(1 + \frac{r}{12 \times 100} \right)^{12 \times 3,5}$ ✓
- $\frac{r}{1200} = \sqrt[42]{\frac{45\,563,70}{30\,000}} - 1$ ✓
- $r = 1\,200 \left(\sqrt[42]{\frac{45\,563,70}{30\,000}} - 1 \right)$ ✓
- $r = 12$ ✓ (3)

- 4.4 4.4.1
-
- 14% SI annually 9 % CI, annually (3)

$$4.4.2 \quad A_2 = 15\,000 \left(1 + \frac{14}{100} \times 2\right) \checkmark$$

$$= R19\,200 \checkmark$$

$$A_3 = 31\,200 \left(1 + \frac{14}{100} \times 1\right) \checkmark$$

$$= R35\,568$$

$$A_5 = 35\,568 \left(1 + \frac{9}{100}\right)^2$$

$$= R42\,258,3408 \checkmark$$

$$A_6 = 39\,258,3408 \left(1 + \frac{9}{100} \times 1\right) \checkmark$$

$$= R42\,791,59 \quad \checkmark$$

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