



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

NOVEMBER EXAMINATION

**MATHEMATICS
(Second Paper)
NQF LEVEL 2**

4 NOVEMBER 2013

This marking guideline consists of 9 pages.

✓ = 1 mark ✓ = half mark

QUESTION 1

1.1 1.1.1 **Inter-quartile Range** : This is the algebraic difference between the upper quartile and lower quartile; $Q_i = Q_3 - Q_1$ (Accept $Q_3 - Q_1$) (2)

1.1.2 **Outlier**: This is a data point which lies below the lower quartile, or beyond the upper quartile. (Accept any reasonable explanation) (2)

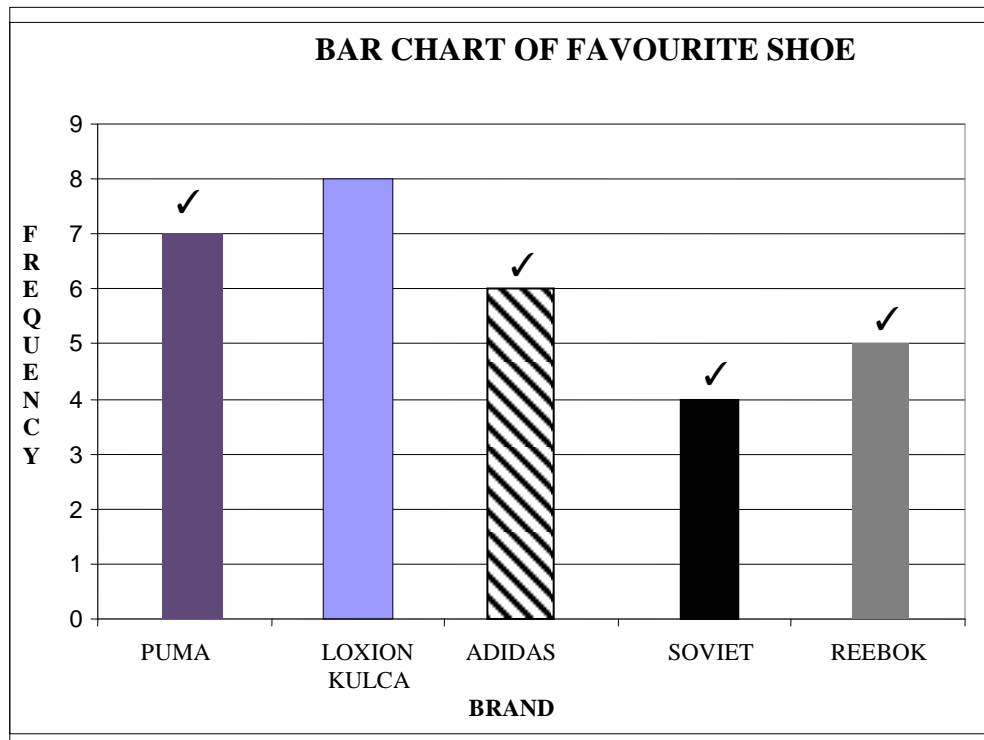
1.2 1.2.1

Frequency Distribution table : Brand of Running Shoe		
Brand	Tally	Frequency
Puma	✓	7 ✓
Loxion Kulca		8 ✓
Adidas	✓	6 ✓
Soviet	✓	4 ✓
Reebok	✓	5 ✓
	Total :	30 ✓

(No carry/forward error from tally to freq.) (5)

1.2.2 Loxion Kulca ✓ (1)

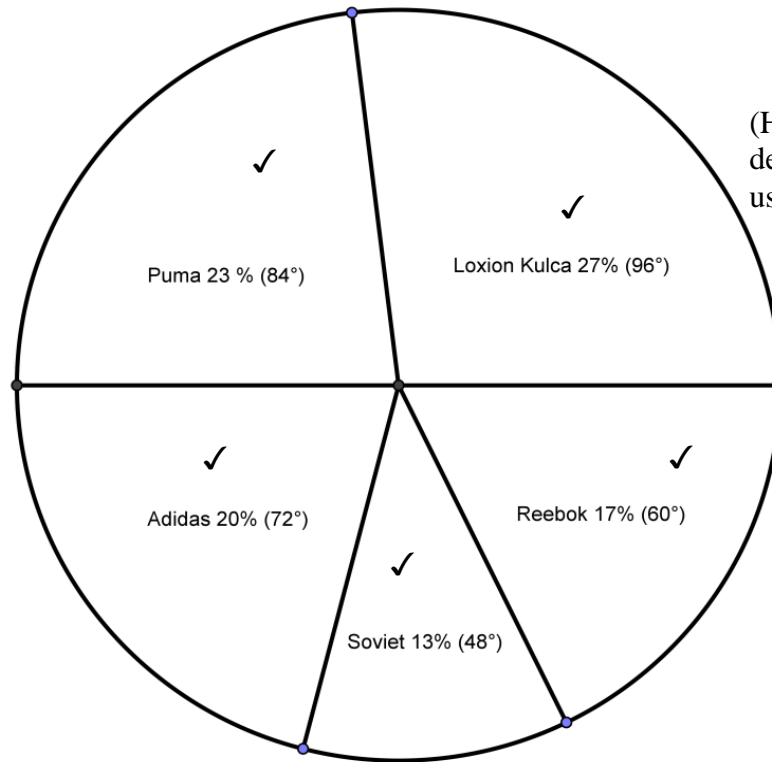
1.2.3



(4)

1.2.4

(Angles must look in perspective and labels/legend shown to get any marks)



(Half mark if only degrees/percentage are used as labels/legend)

(5)

1.3 1.3.1

Stem	Leaf
3	4 3 6 9 0 4 ✓
4	2 5 3 7 2 1 4 4 6 ✓
5	8 6 8 3 0 6 1 6 3 8 ✓

If no rough stem and leaf diagram is shown, but the ordered final stem-leaf diagram is correct, award full marks

✓ correct stem-column

Stem	Leaf
3	0 3 4 4 6 9 ✓
4	1 2 2 3 4 4 5 6 7 ✓
5	0 1 3 3 6 6 6 8 8 8 ✓

(Half mark for each correct rough leaf-row and Half mark each for ordered leaf-row – carry forward mistake from rough leaf-row)

(4)

1.3.2 Modal Values :56[✓] and 58[✓]

(Carry forward mistake from 1.3.1 for 1.3.2 – 1.3.4)

(2)

1.3.3 Median = 45 ✓

(1)

1.3.4 Range = Highest - Lowest
 $= 58 - 30 \checkmark$
 $= 28 \checkmark$ (Answer only full marks) (2)

1.4 1.4.1
$$\bar{x} = \frac{\sum_{i=1}^n x_i}{n}$$

$$= \frac{191 + 144 + 144 + 144 + 130 + 127 + 122 + 122 + 119 + 119}{10}$$

$$= \frac{1362}{10} \checkmark$$

$$= 136,2 \checkmark$$
 (Answer only full marks – carry forward adding-mistake) (3)

1.4.2 Median = $\frac{127 + 130}{2} = 128,5 \checkmark$ (Answer only full marks) (2)

1.4.3 Mode = 144 \checkmark (1)

1.4.4

$\begin{array}{ccccccc} & & \downarrow Q_1 & & & & \downarrow Q_3 \\ 119 & ; & 119 & ; & 122 & ; & 122 & ; & 127 & ; & 130 & ; & 144 & ; & 144 & ; & 144 & ; & 191 \end{array}$

$Q_{j \text{ position}} = \frac{j}{4}(n+1)$ Alternate:
 $Q_1 \text{ position} = \frac{1}{4}(10+1)$ From ordered data:
 $= \frac{1}{4}(11)$ $Q_1 = 122 \checkmark \checkmark$
 $= 2,75 \checkmark$ OR
 $\therefore Q_1 = P_2 + 0,75(P_3 - P_2)$
 $= 119 + 0,75(122 - 119)$
 $= 119 + 0,75(3)$
 $= 119 + 2,25$
 $= 121,25 \checkmark$ variation depends on method used (2)
 (Answer only: full marks)

1.4.5

$$Q_{j \text{ position}} = \frac{j}{4}(n+1)$$

$$Q_{3 \text{ position}} = \frac{3}{4}(10+1)$$

$$= \frac{3}{4}(11)$$

$$= 8,25 \quad \checkmark$$

$$\therefore Q_3 = P_8 + 0,25(P_9 - P_8)$$

$$= 144 + 0,25(144 - 144)$$

$$= 144 + 0$$

$$= 144 \quad \checkmark \quad (\text{Answer only: full marks})$$

Alternate:

From ordered data: $\checkmark \checkmark$

$$Q_3 = 144$$

OR

(2)

1.4.6

$$Q_i = Q_3 - Q_1$$

$$= 144 - 121,25 \quad \text{OR}$$

$$= 22,75 \quad \checkmark$$

$$Q_i = Q_3 - Q_1$$

$$= 144 - 122$$

$$= 22 \quad \checkmark$$

variation depends on method used to find Q_1 above

(1)

1.4.7

$$\text{Range}_{\text{Angola and Mali}} = 191 - 119 = 72 \quad \checkmark$$

(1)

[40]**QUESTION 2**

2.1

$$AC^2 = AB^2 + BC^2$$

$$15^2 = 12^2 + BC^2 \quad \checkmark$$

$$225 = 144 + BC^2$$

$$BC^2 = 81$$

$$BC = 9 \text{ meters} \quad \checkmark$$

$$\text{Perimeter} = AB + BC + CD + DA$$

$$= 12 + 9 + 12 + 9$$

$$= 42 \text{ meters} \quad \checkmark$$

(3)



- 2.2 2.2.1 Hypotenuse ✓ (Ignore Spelling) (1)
- 2.2.2
- (a) $\sin \theta = \frac{3}{5}$ ✓ (1)
- (b) $\cos \theta = \frac{4}{5}$ ✓ (1)
- (c) $\tan \theta = \frac{3}{4}$ ✓ (1)
- 2.3 2.3.1
- $\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}}$
- $\sin \theta = \frac{8}{10}$ ✓
- $\sin \theta = \frac{4}{5} = 0,8$ ✓ (2)
- 2.3.2
- $1 + \cos^2 \alpha = 1 + \left(\frac{8}{10}\right)^2$ ✓
- $= 1 + \left(\frac{64}{100}\right)$
- $= 1 + \frac{16}{25}$
- $= 1\frac{16}{25} = \frac{41}{25} = 1,64$ ✓ (2)
- 2.3.3
- $XY^2 = 10^2 - 8^2$
- $XY = 6$ ✓
- $\frac{\sin \alpha}{\cos \theta} = \left(\frac{6}{10}\right)$ ✓
- $\left(\frac{6}{10}\right)$ ✓
- $= \frac{6}{10} \times \frac{10}{6}$
- $= 1$ ✓ (3)
- 2.4 2.4.1 Hypotenuse = 5 ✓
- $\cos \beta = \frac{\text{adjacent}}{\text{hypotenuse}}$
- $= -\frac{3}{5}$ ✓ (Ratio) ✓ (Negative sign) (2)



$$\begin{aligned}
 2.4.2 \quad \tan^2 \beta + \sin^2 \beta &= \left(\frac{4}{3}\right)^2 + \left(\frac{\sqrt{4}}{5}\right)^2 \\
 &= \frac{16}{9} + \frac{16}{25} \\
 &= \frac{16 \times 25 + 16 \times 9}{9 \times 25} \\
 &= \frac{400 + 144}{225} \\
 &= \frac{544}{225} \\
 &= 2,418 \quad \text{or} \quad 2\frac{94}{225} \quad (2)
 \end{aligned}$$

$$\begin{aligned}
 2.5 \quad 2.5.1 \quad \cos 35^\circ &= \frac{\text{adjacent}}{\text{hypotenuse}} \\
 \cos 35^\circ &= \frac{14}{y} \quad \checkmark \quad (\text{If incorrect ratio is used: No marking}) \\
 \therefore y &= \frac{14}{\cos 35^\circ} \quad \checkmark \\
 &= \frac{14}{0,819} \\
 y &= 17,091\text{m} \quad \checkmark \quad (3)
 \end{aligned}$$

$$\begin{aligned}
 2.5.2 \quad \tan 35^\circ &= \frac{\text{opposite}}{\text{adjacent}} \quad \checkmark & \text{or} \quad \tan 35^\circ &= \frac{\text{opp}}{\text{adj}} \quad \checkmark \\
 \tan 35^\circ &= \frac{x+0,2}{14} \quad \checkmark & &= \frac{\text{height top of bird}}{\text{distance from lamppost}} \\
 14 \times \tan 35^\circ &= x+0,2 \quad \checkmark & &= \frac{h}{14} \quad \checkmark \\
 x &= 14 \times \tan 35^\circ - 0,2 \quad \checkmark & & 14 \times \tan 35^\circ = h \quad \checkmark \\
 x &= 9,603\text{m} \quad \checkmark & & 9,803 = h \quad \checkmark \\
 & & & \text{Lamp post} = 9,803 - 0,2 = 9,603\text{m} \quad \checkmark \quad (5)
 \end{aligned}$$

$$2.6 \quad 2.6.1 \quad A = 2 \text{ units} \quad \checkmark \text{ (ignore units)} \quad (1)$$

$$2.6.2 \quad [-2; 2] \quad \text{or} \quad -2 \leq y \leq 2 \quad (1)$$

$$2.6.3 \quad B = 90^\circ \quad \checkmark$$

$$C = 270^\circ \quad \checkmark \quad (2)$$

[30]

QUESTION 3

3.1 3.1.1 $D_{AD} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ ✓ (formula)

$= \sqrt{[(-3) - (-5)]^2 + [(3) - (0)]^2}$ ✓ (substitution)

$= \sqrt{[2]^2 + [3]^2}$

$= \sqrt{4 + 9}$

$= \sqrt{13} = 3,606 \text{ units}$ ✓ (Decimal answer only: 2 marks) (3)

3.1.2 $M_{AB} = \left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2} \right)$

$= \left(\frac{-3 + 3}{2}; \frac{3 + 2}{2} \right)$

$= \left(\frac{0}{2}; \frac{5}{2} \right)$

$= \left(0; \frac{5}{2} \right)$ (2)

3.1.3 $m_{BC} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{2 - (-1)}{3 - 1}$ ✓

$= \frac{3}{2}$ ✓ (2)

3.1.4 $\theta = \tan^{-1} m_{BC}$

$= \tan^{-1} \left(\frac{3}{2} \right)$ ✓

$= 56,31^\circ$ ✓ (2)



$$\begin{aligned}
 3.1.5 \quad m_{AD} &= \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} \\
 &= \frac{3 - 0}{-3 - (-5)} \\
 &= \frac{3}{2} \quad \checkmark
 \end{aligned}$$

for gradient (m_2) of a line perpendicular to AD :

$$\begin{aligned}
 m_2 \times m_{AD} &= -1 \quad \checkmark & \text{Or } m_2 &= -\frac{2}{3} \quad \checkmark \\
 \therefore m_2 &= -\frac{2}{3} \quad \checkmark & &
 \end{aligned}
 \tag{3}$$

$$3.2 \quad 3.2.1 \quad (-3;6) \quad \checkmark \checkmark \tag{2}$$

$$3.2.2 \quad (-6;3) \quad \checkmark \checkmark \tag{2}$$

$$3.2.3 \quad (1;-3) \quad \checkmark \checkmark \tag{2}$$

$$3.2.4 \quad (-3;4) \quad \checkmark \checkmark \tag{2}$$

$$3.2.5 \quad (8;9) \quad \checkmark \checkmark \tag{2}$$

$$\begin{aligned}
 3.3 \quad 3.3.1 \quad \text{Volume} &= \text{Base Area} \times \text{Height} \perp \\
 &= (\pi r^2) \times h \perp \quad \checkmark \text{ formula (If wrong formula: no further marking)} \\
 &= \pi \times \left(\frac{1,6}{2}\right)^2 \times 2,5 \quad \checkmark \text{ radius} \quad \checkmark \text{ height} \\
 &= \pi \times (0,8)^2 \times 2,5 \\
 &= 5,027 \text{ m}^3 \quad \checkmark
 \end{aligned}
 \tag{4}$$

$$\begin{aligned}
 3.3.2 \quad \text{Base Area of JoJo tank} &= \pi r^2 \\
 &= \pi \times (0,8)^2 \quad \checkmark \\
 &= 2,011 \text{ m}^2 \quad \checkmark
 \end{aligned}$$

(Carry forward mistake from 3.3.2)

\therefore The Jo Jo Tank will not fit on the platform \checkmark (No)

Base area is larger than platform size \checkmark (Reason) (4)
[30]

TOTAL: 100

