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)

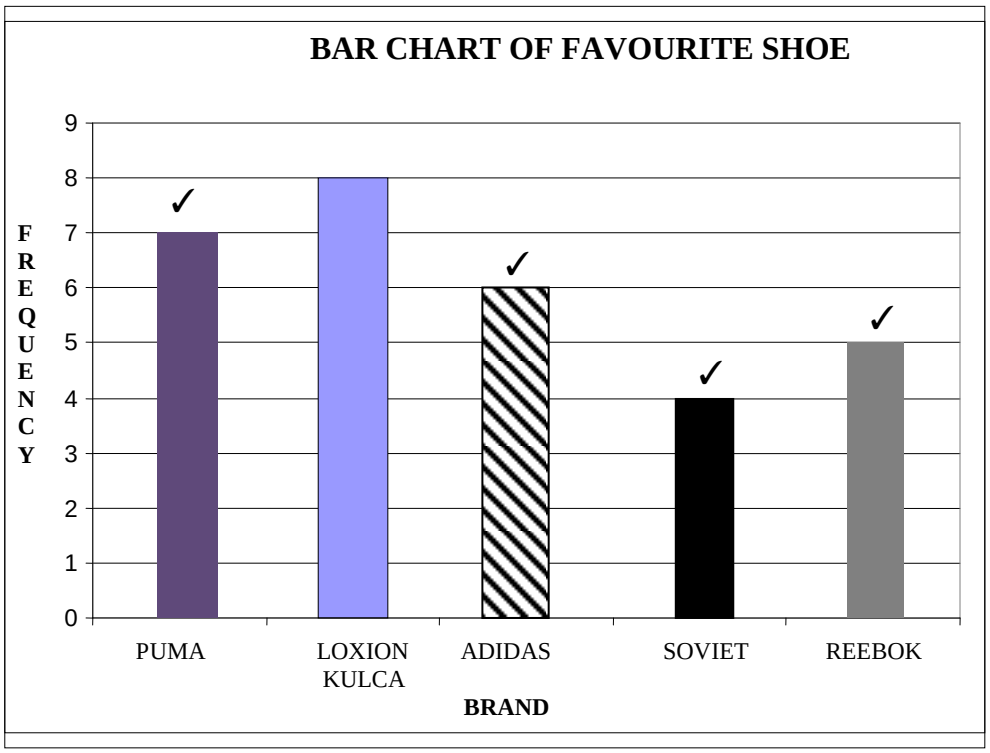
1.2 1.2.1

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

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

1.2.2 Loxion Kulca ✓ (1)

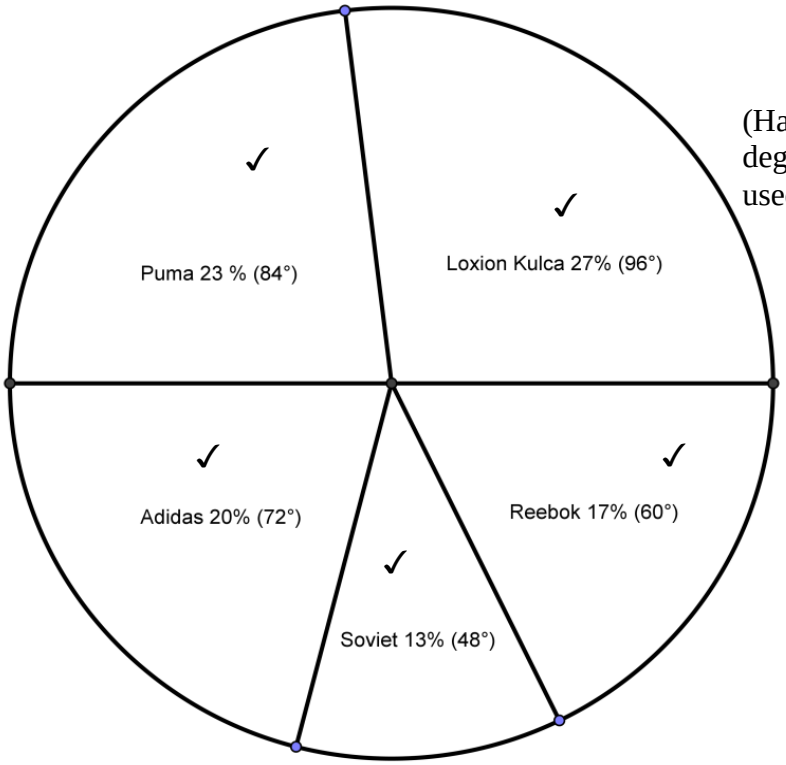
1.2.3



(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

$= 58 - 30$ ✓

$= 28$ ✓ (Answer only full marks) (2)

1.4 1.4.1

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

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

$$= \frac{1362}{10} \checkmark$$ ✓

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

1.4.2

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

1.4.3 Mode = 144 ✓ (1)

Q_1 Q_3

119 ; 119 ; 122 ; 122 ; 127 ; 130 ; 144 ; 144 ; 144 ; 191

1.4.4

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

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

$$= \frac{1}{4}(11)$$

$= 2,75$ ✓

$\therefore Q_1 = P_2 + 0,75(P_3 - P_2)$

$= 119 + 0,75(122 - 119)$

$= 119 + 0,75(3)$

$= 119 + 2,25$

$= 121,25$ ✓ variation depends on method used (2)

(Answer only: full marks)

Alternate:

From ordered data:

$Q_1 = 122$ ✓✓

OR

1.4.5 $Q_{j\ position} = \frac{j}{4}(n+1)$

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

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

$= 8,25$ ✓

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

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

$= 144 + 0$

$= 144$ ✓ (Answer only: full marks)

Alternate:

From ordered data: ✓✓

$Q_3 = 144$ (2)

1.4.6 $Q_i = Q_3 - Q_1$

$= 144 - 121,25$ ✓

$= 22,75$ ✓

OR

$Q_i = Q_3 - Q_1$

$= 144 - 122$ ✓

$= 22$ ✓

variation depends on method used to find Q_1 above (1)

1.4.7 $\text{Range}_{\text{Angola and Mali}} = 191 - 119 = 72$ ✓ (1)

[40]

QUESTION 2

2.1 $AC^2 = AB^2 + BC^2$

$15^2 = 12^2 + BC^2$ ✓

$225 = 144 + BC^2$

$BC^2 = 81$

$\therefore$ BC = 9 meters ✓

Perimeter $= AB + BC + CD + DA$

$= 12 + 9 + 12 + 9$

= 42 meters ✓ (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

$$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\sin\theta = \frac{8}{10} \checkmark$$

$$\sin\theta = \frac{4}{5} = 0{,}8 \checkmark$$ (2)

2.3.2

$$1 + \cos^2\alpha = 1 + \left(\frac{8}{10}\right)^2 \checkmark$$

$$= 1 + \left(\frac{64}{100}\right)$$

$$= 1 + \frac{16}{25}$$

$$= 1\frac{16}{25} = \frac{41}{25} = 1{,}64 \checkmark$$ (2)

2.3.3

$$XY^2 = 10^2 - 8^2$$

$$XY = 6 \checkmark$$

$$\frac{\sin\alpha}{\cos\theta} = \frac{\left(\frac{6}{10}\right)}{\left(\frac{6}{10}\right)} \quad \surd \quad \surd$$

$$= \frac{6}{10} \times \frac{10}{6}$$

$$= 1 \checkmark$$ (3)

2.4 2.4.1 Hypotenuse $= 5$ ✓

$$\cos\beta = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$= -\frac{3}{5} \quad \surd \text{ (Ratio)} \quad \surd \text{ (Negative sign)}$$ (2)

2.4.2 $\tan^2\beta+\sin^2\beta=\left(\frac{4}{3}\right)^2+\left(\sqrt{-\frac{4}{5}}\right)^2$

$=\frac{16}{9}+\frac{16}{25}$

$=\frac{16\times25+16\times9}{9\times25}$

$=\frac{400+144}{225}$

$=\frac{544}{225}$

$=2,418$ or $2\frac{94}{225}$ (2)

2.5 2.5.1 $\cos35°=\frac{\text{adjacent}}{\text{hypotenuse}}$

$\sqrt{}$ $\cos35°=\frac{14}{y}$ $\sqrt{}$ (If incorrect ratio is used: No marking)

$\therefore y=\frac{14}{\cos35°}$ ✓

$=\frac{14}{0,819}$

$y=17,091\text{m}$ ✓ (3)

2.5.2 ✓ $\tan35°=\frac{\text{opposite}}{\text{adjacent}}$

$\tan35°=\frac{x+0,2}{14}$ ✓

$14\times\tan35°=x+0,2$ ✓

$x=14\times\tan35°-0,2$ ✓

$x=9,603\text{m}$ ✓

or ✓ $\tan35°=\frac{\textbf{\textit{opp}}}{\textbf{\textit{adj}}}$

$=\frac{\textbf{\textit{height top of bird}}}{\textbf{\textit{distance from lamppost}}}$

$=\frac{\textbf{\textit{h}}}{14}$ ✓

$14\times\tan35°=\textbf{\textit{h}}$ ✓

$9,803=\textbf{\textit{h}}$ ✓

Lamp post = 9,803-0, 2 = 9,603 m✓

(5)

2.6 2.6.1 A = 2 units ✓ (ignore units) (1)

2.6.2 $\sqrt{}$ $\sqrt{}$ [–2 ; 2] **or** $\sqrt{}$ $-2\le y\le2$ $\sqrt{}$ (1)

2.6.3 $B=90°$ ✓

$C=270°$ ✓ (2)

[30]

QUESTION 3

3.1 3.1.1

$$D_{AD} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \quad \checkmark \text{ (formula)}$$

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

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

$$= \sqrt{4 + 9}$$

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

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

$$= \frac{2 - (-1)}{3 - 1} \quad \checkmark$$

$$= \frac{3}{2} \quad \checkmark$$ (2)

3.1.4

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

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

$$= 56,31° \quad \checkmark$$ (2)

3.1.5 $m_{AD} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{3-0}{-3-(-5)}$

$= \frac{3}{2}$ ✓

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

$m_2 \times m_{AD} = -1$ ✓ Or $\boldsymbol{m}_2 = \checkmark -\frac{2}{3}$ ✓

$\therefore m_2 = -\frac{2}{3}$ ✓ (3)

3.2 3.2.1 ✓✓ (-3;6) (2)

3.2.2 ✓✓ (-6;3) (2)

3.2.3 ✓✓ (1;-3) (2)

3.2.4 ✓✓ (-3;4) (2)

3.2.5 ✓✓ (8;9) (2)

3.3 3.3.1 Volume = Base Area × Height ⊥

$= (\pi r^2) \times h \perp$ ✓ formula (If wrong formula: no further marking)

$= \pi \times \left(\frac{1,6}{2}\right)^2 \times 2,5$ ✓ radius ✓ height

$= \pi \times (0,8)^2 \times 2,5$

$= 5,027\ m^3$ ✓ (4)

3.3.2 Base Area of Jo Jo tank $= \pi r^2$

$= \pi \times (0,8)^2$ ✓

$= 2,011\ m^2$ ✓

(Carry forward mistake from 3.3.2)

∴ The Jo Jo Tank will not fit on the platform ✓ (No)

Base area is larger than platform size ✓ (Reason) (4)

[30]

TOTAL: 100