higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

NOVEMBER EXAMINATION 2012

MATHEMATICS
(Second Paper)
NQF LEVEL 2

5 NOVEMBER 2012

This marking guideline consists of 9 pages.

✓= 1 MARK √ $= \frac{1}{2}$ MARK

QUESTION 1

1.1 Define the following terms:

1.1.1 Ungrouped data: Data which has not been categorised into class intervals. ✓✓ (*any acceptable answer)* (2)

1.1.2 Range: The algebraic difference ✓ between the largest ✓ and smallest data points within a data set. (2)

1.1.3 Modal value: The ✓ value that appears ✓ most often in a data set.
(*any acceptable answer).* (2)

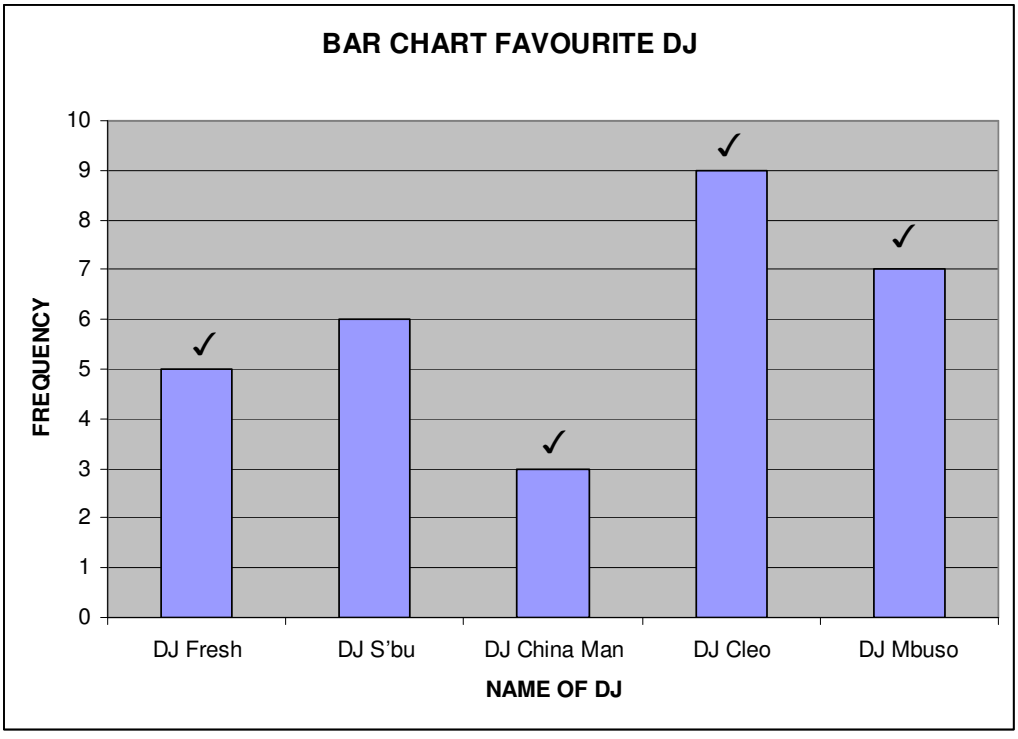
1.2 1.2.1

FREQUENCY DISTRIBUTION TABLE: CHOICE OF DJ		
DJ	TALLY	FREQUENCY
DJ Fresh	𝍸 √	5 √
DJ S'bu	𝍸 |	6
DJ China Man	||| √	3 √
DJ Cleo	𝍸 |||| √	9 √
DJ Mbuso	𝍸 || √	7 √
	Total:	30 ✓

(5)

1.2.2 DJ Cleo ✓ (1)

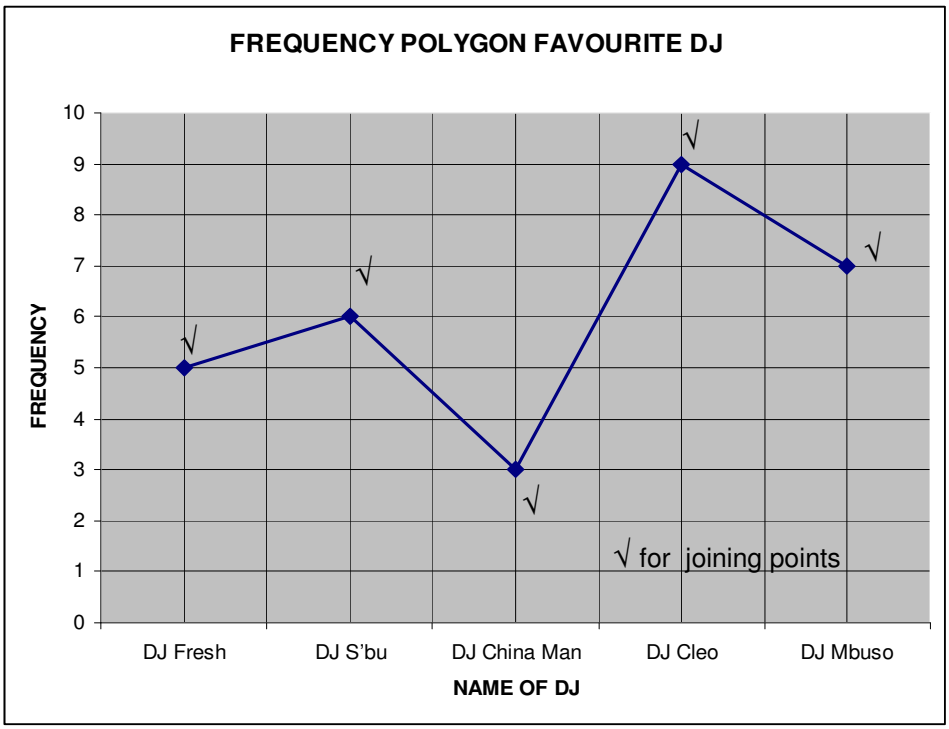
1.2.3



If drawn as a histogram with correct heights max 2 marks. (Half mark for each height.) Carry forward errors from Q 1.2.1

(4)

1.2.4



Carry forward any errors from Q1.2.1.or Q1.2.3 (3)

1.3 1.3.1

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

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

If drawn without rough stem and leaf diagram
✓ ✓ *Stem*
✓ *no leaves omitted.*
✓ *ordered leaves*

(4)

1.3.2 Mode = 69 ✓ (1)

1.3.3

$$Median = \frac{69+69}{2} \quad \checkmark$$
$$= 69 \quad \checkmark$$

$$or \quad posQ_2 = \frac{1}{2}(n+1)$$
$$= \frac{1}{2}(41)$$
$$= 20{,}5 \quad \checkmark$$
$$\text{Therefore } Q_2 = 69 \quad \checkmark$$

(2)

1.3.4 $\surd \quad \surd$

$$Range = 89 - 40$$
$$= 49 \quad \checkmark$$

(Answer only full marks.) (2)

1.4 1.4.1

$$Mean = \bar{x} = \sum_{i=1}^{n} x_i = \sum_{i=1}^{12} x_i = \frac{total\ or\ sum\ of\ all\ terms}{number\ of\ terms}$$
$$= \frac{4+12+15+17+15+6+9+14+24+9+11+4}{12}$$
$$= \frac{140}{12} \checkmark$$
$$= 11{,}667 \quad \checkmark$$

(3)

1.4.2 4 ; 4 ; 6 ; 9 ; 9 ; 11 ; 12 ; 14 ; 15 ; 15 ; 17 ; 24

$$Q_{1\,position} = \frac{1}{4}(12+1)$$
$$Q_{1\,position} = 3{,}25 \quad \checkmark$$
$$Q_1 = 6 + 0{,}25(9-6)$$
$$Q_1 = 6{,}75 \quad \checkmark$$

OR

$$Q_1 = \frac{6+9}{2} \quad \checkmark$$
$$Q_1 = \frac{15}{2}$$
$$Q_1 = 7{,}5 \quad \checkmark$$

$$Q_{3\ position} = \frac{3}{4}(12+1)$$
$$Q_{3\ position} = 9{,}75 \quad ✓$$
$$Q_3 = 15 + 0{,}75(15-15)$$
$$Q_3 = 15 + 0$$
$$Q_3 = 15 \quad ✓$$

OR

$$Q_3 = \frac{15+15}{2} \quad ✓$$
$$Q_3 = \frac{30}{2}$$
$$Q_3 = 15 \quad ✓$$

(4)

1.4.3

$$I.Q.R = Q_3 - Q_1$$
$$= 15 - 6{,}75 \quad ✓$$
$$= 8{,}25 \quad ✓$$

OR

$$I.Q.R = Q_3 - Q_1$$
$$= 15 - 7{,}5 \ ✓$$
$$= 7{,}5 \ ✓$$

Variation is dependant on the method used to calculate the first quartile.
Carry forward mistake from Q1.4.2. No marks if positions are subtracted. (2)

1.4.4

$$P_{j\ position} = \frac{j}{100}(n+1)$$
$$P_{65\ position} = \frac{65}{100}(12+1)$$
$$P_{65\ position} = 0{,}65(13)$$
$$P_{65\ position} = 8{,}45 ✓$$
$$\therefore 65^{th}\ Percentile = P_8 + 0{,}45(P_9 - P_8)$$
$$= 14 + 0{,}45(15-14) ✓$$
$$= 14 + 0{,}45(1)$$
$$= 14 + 0{,}45$$
$$= 14{,}45 \ ✓$$

(3)
[40]

QUESTION 2

2.1

$D^2 = 12^2 + 4^2$ ✓
$= 144+16$
$= 160$ ✓
$D = \sqrt{160}$ ✓
$= 12{,}649\,km$ ✓

or $D = \sqrt{12^2 + 4^2}$ ✓ ✓
$= 12{,}649\,km$ ✓

(4)

2.2

$\tan \hat{C} = \frac{opposite\ side}{adjacent\ side}$
$\tan 60° = \frac{45}{a}$ √ √
$a = \frac{45}{\tan 60°}$
$a = 25{,}981$ *units* √

$\sin \hat{C} = \frac{opposite\ side}{hypotenuse}$
$\sin 60° = \frac{45}{b}$ √ √
$b = \frac{45}{\sin 60}$
$b = 51{,}962$ *units* √

Accept any other mathematically correct solution.
Please note the labelling of the drawing was unclear but enough information was given for the student to complete their own labelling.

(4)

2.3 2.3.1

$AC = \sqrt{5^2 - 4^2}$ ✓
$AC = \sqrt{25-16}$
$AC = \sqrt{9}$
$AC = 3$ ✓

carry forward incorrect AC

$\cos\theta = \frac{adjacent\ side}{hypotenuse} = \frac{3}{5}$ √ *or* 0,6

(3)

2.3.2

$1 + \tan^2\theta = 1 + (\tan\theta)^2$
$= 1 + \left(\frac{4}{3}\right)^2$ √ √
$= 1 + \frac{16}{9}$ ✓
$= \frac{9}{9} + \frac{16}{9}$
$= \frac{25}{9}$ ✓

Carry forward incorrect AC

(3)

2.3.3 $\frac{\cos\alpha}{\sin\alpha} = \frac{4}{5} \div \frac{3}{5}$ ✓ ✓ *Carry forward incorrect AC*

$= \frac{4}{5} \times \frac{5}{3}$

$= \frac{4}{3}$ ✓ (3)

2.4 $\tan 36° = \frac{opposite\ side}{adjacent\ side}$

$\tan 36° = \frac{80}{dis\tan ce}$ √ √

$dis\tan ce = \frac{80}{\tan 36°}$ √ √

$dis\tan ce = 110.111m$ ✓ (3)

2.5 2.5.1 $x = \sqrt{5^2 - 3^2}$

$= \sqrt{25 - 9}$

$= \sqrt{16}$

$= 4$ ✓

and

$\cos\alpha = \frac{adjacent\ side}{hypotenuse}$

$= \frac{-4}{5}$ ✓ ✓ (3)

2.5.2 $\sin^2\alpha + \cos^2\alpha$

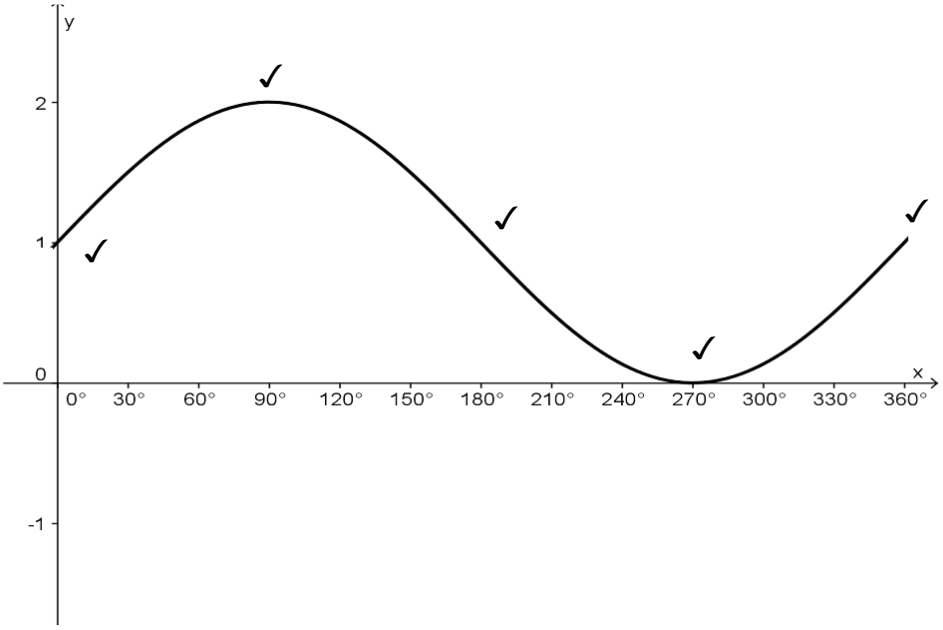
$= \left(\frac{3}{5}\right)^2 + \left(\frac{-4}{5}\right)^2$ ✓ *Carry forward incorrect* $\cos\alpha$ *from Q2.5.1*

$= \frac{9}{25} + \frac{16}{25}$ *Full marks answer only.*

$= \frac{25}{25}$

$= 1$ ✓ (2)

2.6



(5)
[30]

QUESTION 3

3.1 3.1.1

$$mAD = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{6-3}{-1-(-4)} \quad \surd$$
$$= \frac{3}{3}$$
$$= 1 \quad \surd$$

$$mDC = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{3-(-3)}{-4-2} \quad \surd$$
$$= \frac{6}{-6} = -1 \quad \surd$$

$mAD \times mDC = -1$ $\surd$

$\therefore AD \perp DC$ $\surd$

(3)

3.1.2

$$DC = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$
$$= \sqrt{(-4-2)^2 + [3-(-3)]^2} \checkmark$$
$$= 8.485 \checkmark$$

$$AB = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$
$$= \sqrt{(-1-5)^2 + (-6-0)^2}$$
$$= 8{,}485$$

$$AD = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$
$$= \sqrt{[-1-(-4)]^2 + (6-3)^2} \checkmark$$
$$= 4,243 \checkmark$$

$$BC = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$
$$= \sqrt{(5-2)^2 + [0^2 - (-3)^2]}$$
$$= 4{,}243$$

$A_{rec} = 8{,}485 \times 4{,}243 = 36.002\ u^2$ accept $36\,u^2$ $\checkmark$

(5)

3.1.3

$$M_{DC} = (\frac{x_2 + x_1}{2}; \frac{y_2 + y_1}{2}) \qquad M_{AB} = (\frac{x_2 + x_1}{2}; \frac{y_2 + y_1}{2})$$

$$= (\frac{-4+2}{2}; \frac{3+(-3)}{2}) \qquad = (\frac{-1+5}{2}; \frac{6+(0)}{2})$$

$$= (-1;0) \qquad = (2;3)$$

✓ ✓ ✓ ✓

Therefore the partition will have the co-ordinates $(-1;0)$ and $(2;3)$

OR

$$M_{AD} = \left(\frac{-4+(-1)}{2}; \frac{3+6}{2}\right)$$

✓ ✓

$$= \left(\frac{-5}{2}; \frac{9}{2}\right)$$

$$M_{BC} = \left(\frac{5+2}{2}; \frac{0+(-3)}{2}\right)$$

✓ ✓

$$= \left(\frac{7}{2}; \frac{-3}{2}\right)$$

Therefore the partition will have the co-ordinates $\left(\frac{-5}{2}; \frac{9}{2}\right)$ and $\left(\frac{7}{2}; \frac{-3}{2}\right)$ (4)

3.2 3.2.1 (10 ; 1) ✓ ✓ (2)

3.2.2 (2 ; -6) ✓ ✓ (2)

3.2.3 (-8 ; -2) ✓ ✓ (2)

3.2.4 (-7 ; 3) ✓ ✓ (2)

3.3 3.3.1 $V = Area\ of\ base \times perpendicular\ height$ ✓ ✓ ✓

$= (x \times x) \times (x)$ or $(0{,}85 \times 0{,}85) \times (0{,}85)$

$= x^3 \quad where\ x = cube\ length$

$= 0{,}85^3$

$= 0.614 \ m^3$ ✓ ✓ *Full marks answer only* (5)

3.3.2 $New\ length = x_2 = 0{,}85 + 0{,}01 \times 0{,}85$ ✓

$= 0{,}8585m$ ✓

$Area\ of\ lid = (new\ length)^2$ ✓

$= 0{,}8585^2$ ✓

$= 0{,}737\ m^2$ ✓ *Carry forward mistake of new length* (5)

[30]

TOTAL: 100