higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

NOVEMBER EXAMINATION 2011

MATHEMATICS
(Second Paper)

NQF LEVEL 2

9 NOVEMBER 2011

This marking guideline consists of 10 pages.

✓ = 1 MARK √ $= \frac{1}{2}$ MARK

QUESTION 1

1.1 1.1.1

$$D_{AB} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
$$= \sqrt{[4-(-3)]^2 + [4-1]^2}$$ Correct substitution of x-coordinates) ✓ (Correct substitution of y-coord.) ✓
$$= \sqrt{58}$$ ✓ Do not carry forward mistake

(3)

1.1.2

$$M = \left(\frac{x_1 + x_2}{2} ; \frac{y_1 + y_2}{2}\right)$$
√ √
$$= \left(\frac{4+7}{2} ; \frac{4+1}{2}\right)$$
√ √
$$= \left(\frac{11}{2} ; \frac{5}{2}\right) or\ (5{,}5;2{,}5)$$ Do not carry forward mistake

(2)

1.1.3

$$m_{AD} = \frac{1-(-4)}{-3-2}$$ ✓
$$= \frac{5}{-5}$$
$$= -1$$ ✓
$$m_{CD} = \frac{-4-1}{2-7}$$ ✓
$$= \frac{-5}{-5}$$
$$= 1$$ ✓
$$m_{AD} \times m_{CD} = -1$$ ✓
Therefore $AD \perp DC$

(5)

1.1.4

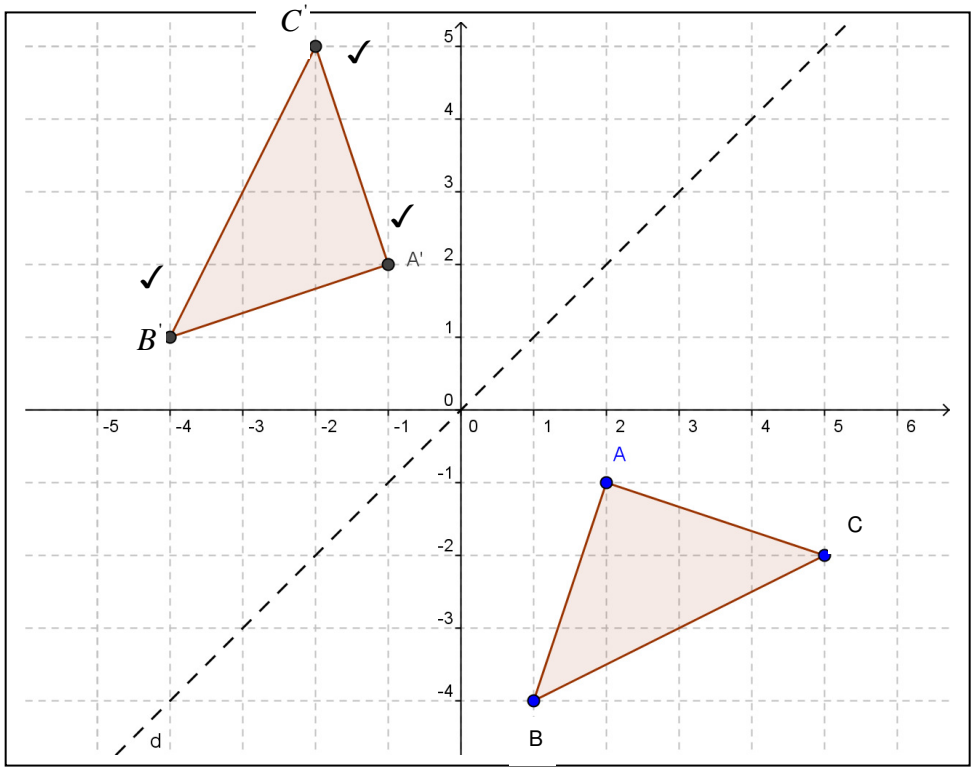
$$\tan\theta = 1$$ ✓
$$\theta = 45°$$ ✓

(2)

1.2 1.2.1 Triangle ✓ (1)

1.2.2 (-1 ; 1) ✓ ✓ (2)

1.2.3



The line y=x in the Question paper is incorrect, therefore if student uses the line in Question paper the coordinates of e.g.:
C' will be (-1;4) etc.

(3)

1.3 1.3.1 Cylinder ✓ (1)

1.3.2

$c = 40$

$2\pi r = 40$ ✓

$r = \frac{40}{2\pi}$ ✓

$= 6{,}366\,cm$ ✓

$V = \pi r^2 h$ √ Incorrect formula: NO further marks for 1.3.2

$h = \frac{V}{\pi r^2}$ √

$= \frac{2654}{\pi(6{,}366)^2}$ ✓ Carry forward mistake made with radius calculation

$= 20{,}846\,cm$ ✓ Do not subtract a mark for incorrect / no units

(6)

1.3.3 √ √

$d_{lid} = 6{,}366 \times 2 + 0{,}2$ Carry forward mistake made with radius calculation in 1.3.2

$= 12{,}932\,cm$ ✓ Do not subtract a mark for incorrect / no units

(2)

1.3.4 $A_{hexagon} = \frac{3\sqrt{3}}{2}L^2$ ✓ Incorrect formula: NO marks

$= \frac{3\sqrt{3}}{2}(3)^2$ ✓

$= 23{,}383\,cm^2$ ✓ Do not subtract a mark for incorrect / no units (3)

[30]

QUESTION 2

2.1 $AB^2 = AX^2 + BX^2$ ✓

$= \sqrt{800^2 + 600^2}$ ✓

$= \sqrt{640\,000 + 360\,000}$ √ Carry forward one mistake only

$= \sqrt{1000\,000}$ √ Do not subtract a mark for incorrect/no units

$AB = 1000\,m$ ✓ (4)

2.2 $\tan 30° = \frac{c}{20}$ ✓

$c = 20\tan 30°$ √

$= 11{,}547$ √

$\cos 30° = \frac{20}{b}$ ✓

$b = \frac{20}{\cos 30°}$ √

$= 23{,}094$ √

Or

$\tan 60° = \frac{20}{c}$ ✓

$c = \frac{20}{\tan 60°}$ √

$= 11{,}547$ √

$\sin 60° = \frac{20}{b}$ ✓

$b = \frac{20}{\sin 60°}$ √

$= 23{,}094$ √

Or

$\tan 30° = \frac{c}{20}$ ✓
$c = 20\tan 30°$ √
$= 11{,}547$ √

$\sin 30° = \frac{11{,}547}{b}$ ✓
$b = \frac{11{,}547}{\sin 30°}$ √
$= 23{,}094$ √

or

$\tan 30° = \frac{c}{20}$ ✓
$c = 20\tan 30°$ √
$= 11{,}547$ √

$b = \sqrt{11{,}547^2 + 20^2}$ ✓
$= 23{,}094$ ✓

(4)

2.3 2.3.1 $BC = \sqrt{8^2 + 6^2} = 10$ ✓ Carry forward mistake

$\sin\theta = \frac{6}{10}$ ✓

$= \frac{3}{5}$ *or* 0,6

(2)

2.3.2 $\sin^2\theta + \cos^2\theta$

√ √
$= \left(\frac{3}{5}\right)^2 + \left(\frac{8}{10}\right)^2$ Carry forward mistake from 2.3.1

√ √
$= \frac{9}{25} + \frac{64}{100}$ Carry forward one mistake only from previous step

$= \frac{36+64}{100}$ √

$= \frac{100}{100}$

$= 1$ √

(3)

2.3.3 $\frac{\sin\alpha}{\cos\alpha}$

$= \frac{\frac{8}{10}}{\frac{6}{10}}$ ✓ ✓

$= \frac{8}{10} \times \frac{10}{6}$ √

$= \frac{8}{6}$ √

$= \frac{4}{3}$

Carry forward incorrect hypotenuse in 2.3.1

Or

$\frac{\sin\alpha}{\cos\alpha} = \tan\alpha$ ✓

$= \frac{8}{6}$ ✓ ✓

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

2.4 $\sin 28° = \frac{14}{x}$ ✓

$x = \frac{14}{\sin 28°}$ ✓

$= 29{,}821m$ ✓ (3)

2.5 2.5.1 $h = 5$ √

$\sin\theta \times \cos\theta$

✓ ✓

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

$= -\frac{12}{25}$ √ (3)

Carry forward incorrect hypotenuse

2.5.2 $(\sin\theta + \cos\theta)^2$

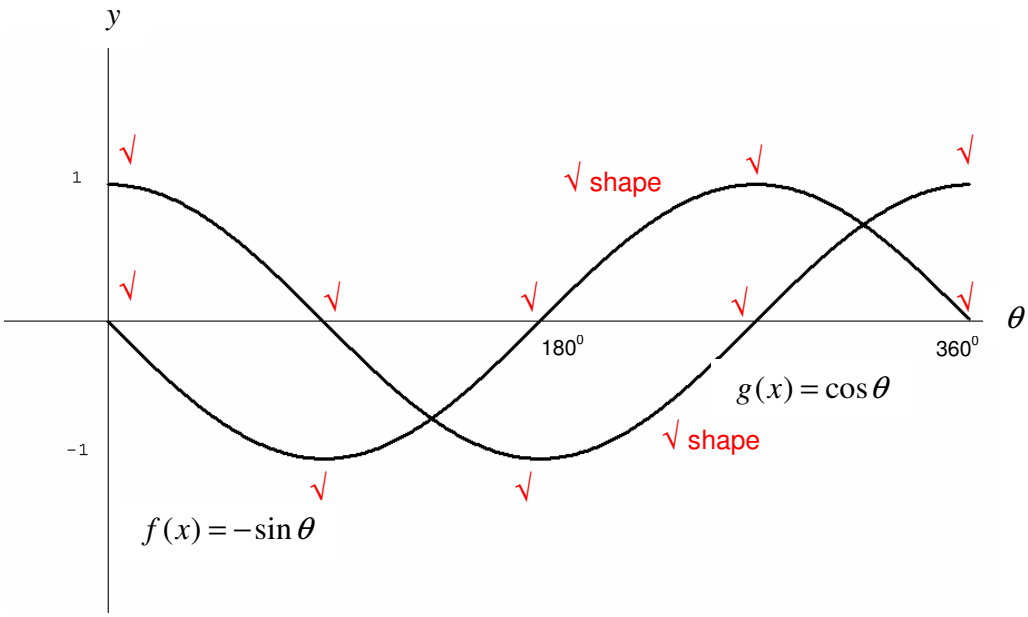
$= \left(\frac{4}{5} + \frac{-3}{5}\right)^2$ ✓

$= \left(\frac{1}{5}\right)^2$ √

$= \frac{1}{25}$ √ (2)

Carry forward all mistakes from 2.5.1

2.6



sine curve - Points of intersection: $x = 0^0; 180^0; 360^0$

cos curve - Points of intersection: $y = 1; x = 90^0; 270^0$

No graphs drawn: NO marks (6)

[30]

QUESTION 3

3.1 3.1.1 Continuous data can take any value in a specific range. Continuous data can be counted, ordered and measured. ✓ (Any acceptable definition)
For example, height, weight etc. ✓ (2)

3.1.2 Discrete data are separate and distinct from one another, within the valid range. They cannot be divided internally. ✓ (Any acceptable definition)
For example , number of people, number of cars , etc. ✓ (2)

3.2 3.2.1

Frequency Distribution table : Choice of Car		
Car	Tally	Frequency
BMW	𝍸 |||	8
Hyundai	MUST SHOW TALLY	13 √√
Toyota		6 √√
VW Golf		8 √√
Audi		5 √√
	Total :	40 ✓

Give half mark for each tally and half mark for each frequency found (5)

3.2.2 Hyundai ✓ (1)

3.2.3

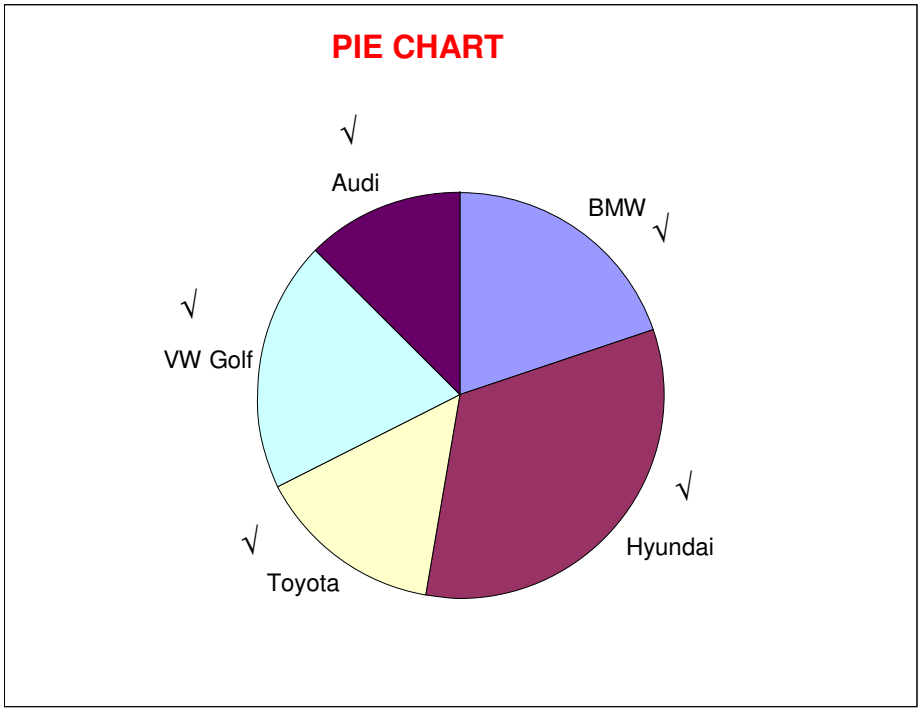
BMW: $\frac{8}{40}\times 360° = 72°$ √

Hyundai : $\frac{13}{40}\times 360° = 117°$ √

Toyota: $\frac{6}{40}\times 360° = 54°$ √

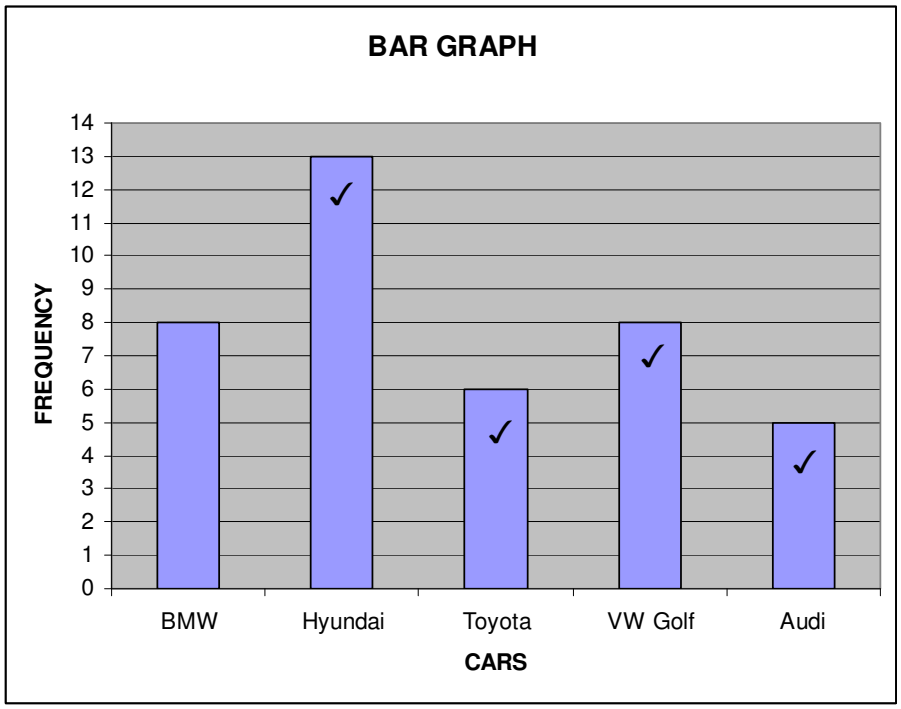
VW Golf: $\frac{8}{40}\times 360° = 72°$ √

Audi: $\frac{5}{40}\times 360° = 45°$ √



(5)

3.2.4



Give maximum of 2 marks for a correct Histogram drawn

(4)

3.3 3.3.1

4	5	9					
5	6	8	5				
6	0	8	9	0	6	8	✓ Stem
7	8	2	8	5	9	8	
8	0	2	8				
9	4	3	0	9			✓ Leaves
10	1	0	4				
11	2	5					
12	3						

Allow 2 mistakes in leaves only

4	5	9					
5	5	6	8				
6	0	0	6	8	8	9	✓✓ Correct numerical order of leaves
7	2	5	8	8	8	9	Carry mistakes from above
8	0	2	8				Full marks if no rough plot is shown
9	0	3	4	9			
10	0	1	4				
11	2	5					
12	3						

(4)

3.3.2 78 ✓ Carry mistakes from stem and leaf (1)

3.3.3 $\text{Median} = \frac{78+78}{2} = 78$ ✓✓✓ (2)

Carry mistakes from stem and leaf
Full marks for answer only

3.3.4 $\text{Range } 123-45 = 78$ ✓✓ (2)

Carry mistakes from stem and leaf
Full marks for answer only

3.4 3.4.1

$$\bar{x} = \frac{6+14+17+19+\ldots}{12}$$
$$= \frac{164}{12} \checkmark\checkmark$$
$$= 13{,}667 \checkmark$$

(3)

Full marks for answer only

3.4.2 Method 1

6 ; 6 ; 8 ; 11 ; 11 ; 13 ; 14 ; 16 ; 17 ; 17 ; 19 ; 26

$$Q_2 = \frac{13+14}{2} = 13{,}5$$
$$Q_1 = \frac{8+11}{2} = 9{,}5 \checkmark\checkmark$$
$$Q_3 = \frac{17+17}{2} = 17 \checkmark\checkmark$$

(4)

Method 2:

$$Q_{1\,position} = \frac{1}{4}(12+1) = 3{,}25 \checkmark$$
$$Q_1 = 8 + (0{,}25)(11-8) = 8{,}75 \checkmark$$
$$Q_{3\,position} = \frac{3}{4}(12+1) = 9{,}75 \checkmark$$
$$Q_3 = 17 + (0{,}75)(17-17) = 17 \checkmark$$

3.4.3 Method 1 :

$$IQR = 17 - 9{,}5 = 7{,}5 \checkmark\checkmark$$

Carry forward mistakes from 3.4.2

Method 2 : (2)

$$IQR = 17 - 9{,}75 = 7{,}25 \checkmark\checkmark$$

3.4.4 $$P_{70\,position} = \frac{70}{100}(12+1) = 9{,}1 \checkmark$$

$$P_{70} = 17 + (0{,}1)(17-17) = 17 \checkmark\checkmark$$ (3)

Full marks for answer only

[40]

TOTAL: 100