



# higher education & training

Department:  
Higher Education and Training  
**REPUBLIC OF SOUTH AFRICA**

## **MARKING GUIDELINE**

**NATIONAL CERTIFICATE (VOCATIONAL)**

**NOVEMBER EXAMINATION 2011**

**MATHEMATICS PAPER 2  
NQF LEVEL 3**

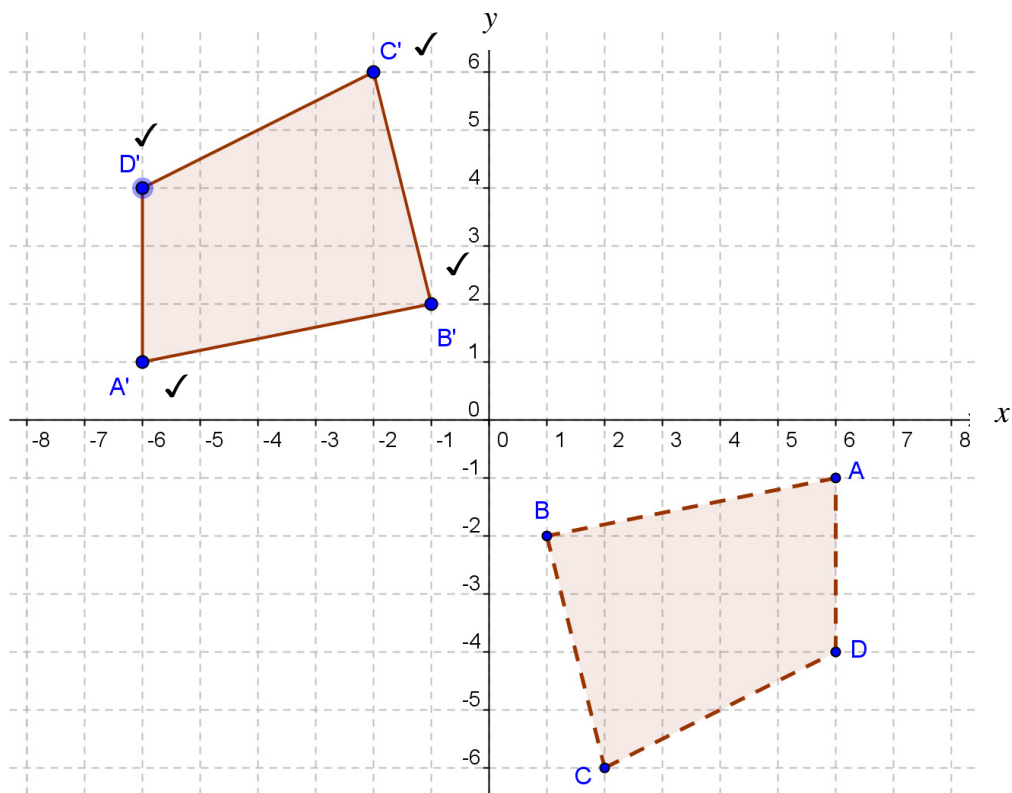
**10 NOVEMBER 2011**

This marking guideline consists of **10 pages**.





1.2



(4)

1.3

$$\frac{\cos(90^\circ - x) \cos(360^\circ - x) \tan x}{\sin(90^\circ - x) \cos(180^\circ + x) \tan(180^\circ + x)}$$

$$= \frac{\overset{\checkmark}{\sin x} \cdot \overset{\checkmark}{\cos x} \cdot \tan x}{\overset{\checkmark}{\cos x} \cdot \overset{\checkmark}{-\cos x} \cdot \overset{\checkmark}{\tan x}}$$

Carry forward one mistake only

$$= -\frac{\overset{\checkmark}{\sin x}}{\overset{\checkmark}{\cos x}} \checkmark$$

or  $= -\tan x$

(4)



1.4  $\sin(-60^\circ) \cdot \tan 120^\circ + \cos 135^\circ \cdot \sin 225^\circ = \dots$

LHS

$$= -\overset{\checkmark}{\sin 60^\circ} \cdot \tan(180^\circ \overset{\checkmark}{-} 60^\circ) + \overset{\checkmark}{\cos(180^\circ - 45^\circ)} \cdot \overset{\checkmark}{\sin(180^\circ + 45^\circ)}$$

$$= -\overset{\checkmark}{\sin 60^\circ} \cdot -\overset{\checkmark}{\tan 60^\circ} + -\overset{\checkmark}{\cos 45^\circ} \cdot -\overset{\checkmark}{\sin 45^\circ}$$

$$= \left( -\overset{\checkmark}{\frac{\sqrt{3}}{2}} \times -\overset{\checkmark}{\frac{\sqrt{3}}{1}} \right) + \left( -\overset{\checkmark}{\frac{\sqrt{2}}{2}} \times -\overset{\checkmark}{\frac{\sqrt{2}}{2}} \right)$$

If the previous two steps are not shown, this step must be shown in order to allocate a maximum of  $4\frac{1}{2}$  marks

$$= \frac{3}{2} + \frac{2}{4}$$

$$= \frac{6}{4} + \frac{2}{4}$$

$$= \frac{8}{4} \checkmark$$

$$= 2$$

Answer only: NO MARKS

(5)

1.5  $\frac{\sin x}{1 + \cos x} - \frac{1 - \cos x}{\sin x} = 0$

LHS

$$= \frac{\overset{\checkmark}{\sin^2 x} - (1 - \overset{\checkmark}{\cos x})(1 + \overset{\checkmark}{\cos x})}{\overset{\checkmark}{\sin x(1 + \cos x)}} \quad \checkmark \text{ Denominator}$$

$$= \frac{\overset{\checkmark}{\sin^2 x} - (1 - \overset{\checkmark}{\cos^2 x})}{\overset{\checkmark}{\sin x(1 + \cos x)}} \quad \checkmark$$

$$= \frac{\overset{\checkmark}{\sin^2 x} - 1 + \overset{\checkmark}{\cos^2 x}}{\overset{\checkmark}{\sin x(1 + \cos x)}} \quad \checkmark \quad \text{or} \quad \frac{\overset{\checkmark}{\sin^2 x} - \overset{\checkmark}{\sin^2 x}}{\overset{\checkmark}{\sin x(1 + \cos x)}}$$

$$= \frac{\overset{\checkmark}{1} - 1}{\overset{\checkmark}{\sin x(1 + \cos x)}}$$

$$= \frac{\overset{\checkmark}{0}}{\overset{\checkmark}{\sin x(1 + \cos x)}}$$

$$= 0$$

$$= RHS$$

Answer only: NO MARKS

(5)

1.6

$$\sin \theta + \sqrt{2} = -\sin \theta$$

$$2 \sin \theta = -\sqrt{2}$$

$$\sin \theta = -\frac{\sqrt{2}}{2} \quad \checkmark \quad \text{Carry forward one mistake only (mark with mistake)}$$

$\therefore$  reference angle  $\theta = 45^\circ \quad \checkmark$

$\therefore \theta = 180^\circ + 45^\circ \quad \checkmark$

$= 225^\circ \quad \checkmark$

or  $\theta = 360^\circ - 45^\circ \quad \checkmark$

$= 315^\circ \quad \checkmark$

(5)

1.7

1.7.1  $x = 180^\circ - 90^\circ - 35^\circ$

$= 55^\circ \quad \checkmark$

(1)

1.7.2

$$\frac{\sin 25^\circ}{10,5} = \frac{\sin 90^\circ}{DB} \quad \checkmark$$

$$DB = \frac{10,5 \sin 90^\circ}{\sin 25^\circ} \quad \checkmark$$

$$= 24,845 \text{ cm} \quad \checkmark \quad \text{Do not subtract a mark for incorrect units / units omitted}$$

or

$$\frac{10,5}{DB} = \sin 25^\circ \quad \checkmark$$

$$10,5 = DB \sin 25^\circ \quad \checkmark$$

$$\therefore DB = \frac{10,5}{\sin 25^\circ}$$

$$= 24,845 \text{ cm} \quad \checkmark$$

(3)

1.7.3

$$\frac{\sin 55^\circ}{24,845} = \frac{\sin 10^\circ}{AB} \quad \checkmark \quad \text{Carry forward mistake from 1.7.1 and/or 1.7.2}$$

$$AB \sin 55^\circ = 24,845 \sin 10^\circ \quad \checkmark$$

$$AB = \frac{24,845 \sin 10^\circ}{\sin 55^\circ} \quad \checkmark$$

$$= 5,267 \text{ cm} \quad \checkmark \quad \text{Do not subtract a mark for incorrect units / units omitted}$$

Or any alternative method:

$$AD = 27,488 \text{ cm}$$

$$AC = 15,767 \text{ cm}$$

$$DC = 22,517 \text{ cm}$$

(4)  
[40]

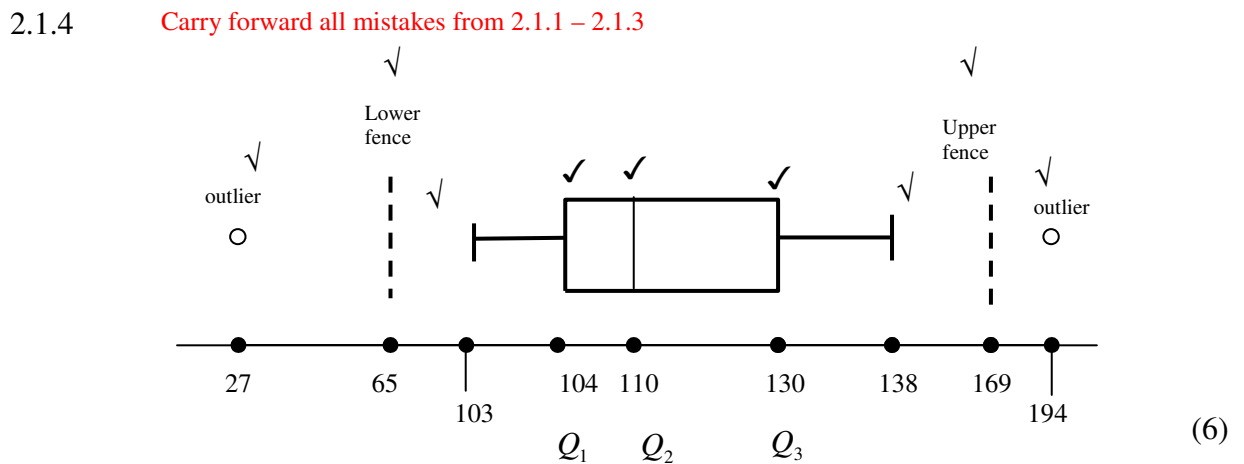


**QUESTION 2**

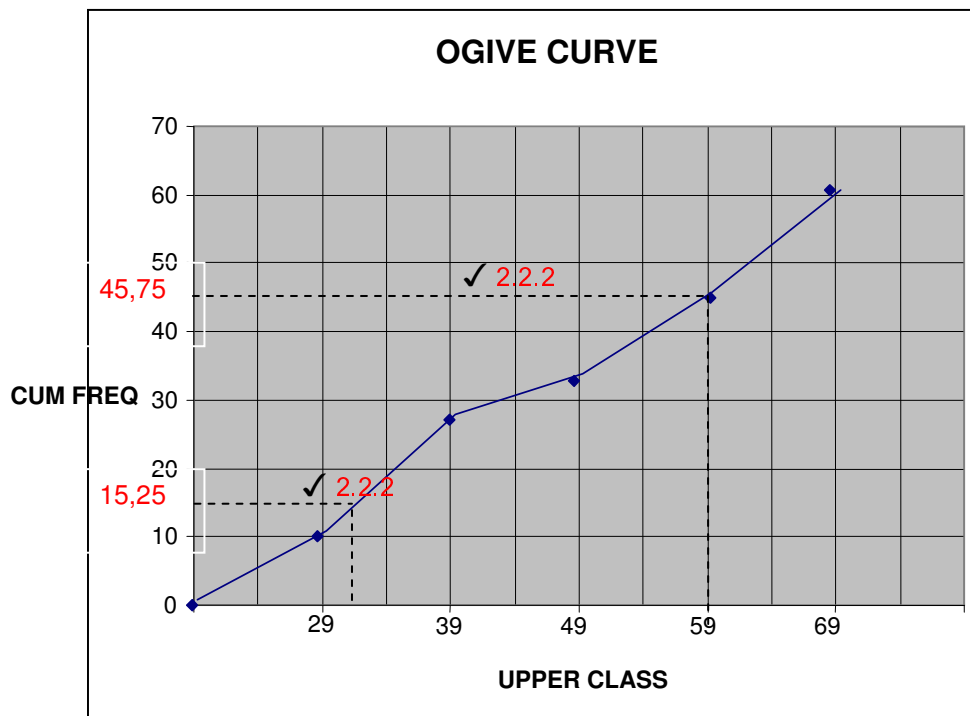
2.1 2.1.1 Median position =  $\frac{n+1}{2} = \frac{10}{2} = 5$  ✓  
 median value = 110 ✓ Full marks for answer only (2)

2.1.2  $Q_1 = \frac{103+105}{2} = 104$  ✓  
 $Q_3 = \frac{122+138}{2} = 130$  ✓  
 $IQR = 130 - 104 = 26$  ✓ Carry forward mistake made in  $Q_1$  and  $Q_3$  (3)

2.1.3 Upper fence value =  $Q_3 + 1,5(IQR)$  Carry forward mistake made in 2.1.2  
 $= 130 + 1,5(26)$  ✓  
 $= 169$  ✓  
 Lower fence value =  $Q_1 - 1,5(IQR)$   
 $= 104 - 1,5(26)$  ✓  
 $= 65$  ✓ (4)



2.2 2.2.1



Give one mark for each correct point plotted. ✓✓✓✓✓  
 Subtract one mark if points are not connected.  
 Do not subtract a mark if graph starts at (20;0)

(6)

2.2.2

$Q_3 = 59$  ✓✓

$Q_1 = 33$  ✓✓

$IQR = Q_3 - Q_1$

$= 59 - 33$

$= 26$  ✓

One for position and one for the Q value  
 Answer only: Full marks for Q values

Carry forward mistake (Except if positions are used)

Allow tolerance of  $\pm 2$

(5)

2.3

Mass	$(x - \bar{x})$	$(x - \bar{x})^2$
53	1	1 ✓
48	-4	16 ✓
51	-1	1 ✓
49	-3	9 ✓
57	5	25 ✓
60	8	64 ✓
47	-5	25 ✓
51	-1	1 ✓
$\bar{x} = 52$ ✓		$\sum (x - \bar{x})^2 = 142$ ✓

Allow a maximum of 2 mistakes in table

$s$  (for sample) =  $\sqrt{\frac{\sum (x_i - \bar{x})^2}{n - 1}}$  Wrong formula: NO further marks

$= \sqrt{\frac{142}{7}}$  ✓

$= 4,504$  ✓

(7)

[33]



**QUESTION 3**

$$\begin{aligned}
 3.1 \quad A &= P(1+i)^n \quad \checkmark \\
 &= 12000(1+0,0725)^3 \quad \checkmark \checkmark \checkmark \\
 &= R14803,80 \quad \checkmark
 \end{aligned}$$

$$\begin{aligned}
 I &= 14803,80 - 12000 \\
 &= R2803,80 \quad \checkmark
 \end{aligned}$$

Carry forward mistake

Do not subtract a mark for 'Rand' omitted in 3.1

(4)

3.2 OPTION A:

$$\begin{aligned}
 A &= P(1+i)^n \\
 &= 21000(1+0,0225)^{12} \quad \checkmark \checkmark \checkmark \\
 &= R27427,05 \quad \checkmark
 \end{aligned}$$

Or

$$\begin{aligned}
 A &= P \left(1 + \frac{r}{100 \times m}\right)^{t \times m} \\
 &= 21000 \left(1 + \frac{9}{100 \times 4}\right)^{3 \times 4} \quad \checkmark \checkmark \checkmark \\
 &= R27427,05 \quad \checkmark
 \end{aligned}$$

OPTION B:

$$\begin{aligned}
 A &= P(1+i)^n \\
 &= 21000(1+0,05)^6 \quad \checkmark \checkmark \checkmark \\
 &= R28142,01 \quad \checkmark
 \end{aligned}$$

or

$$\begin{aligned}
 A &= P \left(1 + \frac{r}{100 \times m}\right)^{t \times m} \\
 &= 21000 \left(1 + \frac{10}{100 \times 2}\right)^{3 \times 2} \quad \checkmark \checkmark \checkmark \\
 &= R28142,01 \quad \checkmark
 \end{aligned}$$

Do not subtract a mark for 'Rand' omitted in 3.2

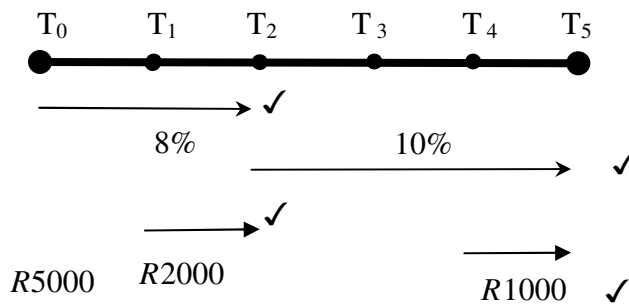
Option A would be more feasible to Andrea  $\checkmark$  Carry forward mistake

(7)





3.3



No timeline: Maximum 5 marks

Time line could vary in appearance.

$$A_t = P(1+i)^n$$

$$= 5000(1+0,08)^1$$

$$= R 5400 \quad \checkmark$$

Carry forward mistakes

Total : R 7400  $\checkmark$

$$A_t = P(1+i)^n$$

$$= 7400(1+0,08)^1$$

$$= R 7992 \quad \checkmark$$

$$A_t = P(1+i)^n$$

$$= 7992(1+0,10)^2$$

$$= R 9670,32 \quad \checkmark$$

Total = R 10670,32

$$A_t = P(1+i)^n$$

$$= 10670,32(1+0,10)^1$$

$$= R 11737,352 \quad \checkmark$$

(9)

Do not subtract a mark for 'Rand' omitted in 3.3

3.4

INCOME AND EXPENDITURE: LADIES CLUB	
INCOME	AMOUNT
Balance brought forward	R 3200
Contribution from Church Board	R 2400 $\checkmark$
Fund raising	R 1100
Sponsors from local business	R 800 $\checkmark$
<b>TOTAL INCOME</b>	<b>R 7500</b> $\checkmark$
EXPENDITURE	AMOUNT
Gifts to Orphanage	R 1400
Trip to Tongaat	R 2000
Catering for the trip	R 1000 $\checkmark$
Purchasing Bibles	R 1400 $\checkmark$
<b>TOTAL EXPENDITURE</b>	<b>R 5800</b> $\checkmark$
<b>SURPLUS/DEFICIT</b>	<b>R 1700</b> $\checkmark$

(7)



**OR** except: (Mistake on Annexure)

<b>INCOME AND EXPENDITURE: LADIES CLUB</b>	
<b>INCOME</b>	<b>AMOUNT</b>
Balance brought forward	R 3200
Contribution from Church Board	R 2400 ✓
Fund raising	R 1100
Sponsors from local business	R 800 ✓
<b>TOTAL INCOME</b>	<b>R 7500</b> ✓
<b>EXPENDITURE</b>	<b>AMOUNT</b>
Gifts to Orphanage	R 1400
Trip to Tongaat	R 8000
Catering for the trip	R 1000 ✓
Purchasing Bibles	R 1400 ✓
<b>TOTAL EXPENDITURE</b>	<b>R 11 800</b> ✓
<b>SURPLUS/DEFICIT</b>	<b>- R 4300</b> ✓

[27]

**TOTAL: 100**

