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 3

6 NOVEMBER 2012

This marking guideline consists of 8 pages.

✓ = MARK √ = $\frac{1}{2}$ MARK

QUESTION 1

1.1 1.1.1

$V_{orange} = \frac{4}{3}\pi r^3$ ✓ for formula

$= \frac{4}{3}\pi\ (1{,}25)^3$ ✓

$= 8{,}181\ cm^3$ ✓ (3)

1.1.2

$V_{cone} = \frac{1}{3}\pi r^2 h$

$= \frac{1}{3}\ \pi\ (5)^2 \times 30$ ✓ ✓

$= 785{,}398\ cm^3$ ✓

$V_{water} = 785{,}398 - 8{,}181$ ✓ Carry forward errors from 1.1.1.

$= 777{,}217\ cm^3$ ✓ (5)

1.1.3

$l = \sqrt{h^2 + r^2}$ ✓

$= \sqrt{50^2 + 30^2}$ ✓ ✓ one mark for each value

$= \sqrt{2500 + 900}$

$= \sqrt{3400}$

$= 58{,}310\ cm$ ✓

Area of curve surface of cone = $\pi r l$ ✓

$= \pi(30)58{,}31$ ✓ Carry forward incorrect l

$= 5495{,}588\ cm^2$ ✓

Ignore area of base as a funnel is open

Area of base = πr^2

$= \pi(30)^2$

$= 2827{,}433\ cm^2$ (7)

Total surface area = 5495,588 + 2827,433 = 8323,021 cm^2

1.2 1.2.1

$AB^2 = 20^2 + 30^2$

$AB^2 = 400 + 900$ ✓

$AB = 36{,}056\ cm$ ✓ (2)

1.2.2 Slant surface area of a pyramid $= \frac{1}{2}a\,l\,n$

$= \frac{1}{2}(40)(36{,}056)(4)$ ✓ Carry forward errors from Q 1.2.1

$= 2884{,}48\ cm^2$ ✓ (2)

1.2.3 $A = 40 \times 40$

$= 1600\ cm^2$ ✓ (1)

1.2.4 Total surface area $= 2884{,}48 + 1600$

$= 4484{,}48\ cm^2$ ✓ Carry forward error from Q 1.2.1 - Q1.2.3 (1)

1.3

$-2y + x = 2$

$-2y = -x + 2$

$y = \frac{1}{2}x - 1$ ✓

$m_1 = \frac{1}{2}$

$m_2 = \frac{1}{2}$ ✓

$y - y_1 = m(x - x_1)$

$y - 4 = \frac{1}{2}(x - (-2))$ ✓

$= \frac{1}{2}(x + 2)$

$y - 4 = \frac{1}{2}x + 1$

$y = \frac{1}{2}x + 5$ ✓

or

$-2y + x = 2$

$-2y = -x + 2$

$y = \frac{1}{2}x - 1$ ✓

$m_1 = \frac{1}{2}$

$m_2 = \frac{1}{2}$ ✓

$y = \frac{1}{2}x + c$

$4 = \frac{1}{2}(-2) + c$ ✓

$c = 5$

$y = \frac{1}{2}x + 5$ ✓

(4)

[25]

QUESTION 2

2.1 $4\sin^2\theta - 4 = -1$

$4\sin^2\theta = 3$ ✓

$\sin^2\theta = \frac{3}{4}$ √

$\sin\theta = \pm\sqrt{\frac{3}{4}}$ ✓

$\theta = 60°$ ✓ *or* $\theta = 240°$ √

$\theta = 180° - 60°$

$= 120°$ √ *or* $\theta = 300°$ √ (5)

2.2 $\frac{2-2\cos^2 x - \sin x}{2\sin x\cos x - \cos x} = \tan x$

LHS

$\frac{2-2\cos^2 x - \sin x}{2\sin x\cos x - \cos x}$ ✓

$= \frac{2(1-\cos^2 x) - \sin x}{\cos x(2\sin x - 1)}$ ✓

$= \frac{2\sin^2 x - \sin x}{\cos x(2\sin x - 1)}$ ✓

$= \frac{\sin x(2\sin x - 1)}{\cos x(2\sin x - 1)}$ ✓

$= \frac{\sin x}{\cos x}$ ✓

$= \tan x$

$= RHS$

or

LHS

$\frac{2-2\cos^2 x - \sin x}{2\sin x\cos x - \cos x}$

$= \frac{2-2(1-\sin^2 x) - \sin x}{\cos x(2\sin x - 1)}$ ✓

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

$= \frac{\sin x(2\sin x - 1)}{\cos x(2\sin x - 1)}$ ✓

$= \frac{\sin x}{\cos x}$ ✓

$= \tan x$

$= RHS$ (5)

2.3 LHS

$\sin 60°.\tan 45°.\tan 30° - \sin 240°.\tan 315°.\tan 210°$

$= \frac{\sqrt{3}}{2} \times .1. \frac{1}{\sqrt{3}} - \sin(180° + 60°).\tan(360° - 45°)\ \tan(180° + 30°)$ √ √ √

$= \frac{\sqrt{3}}{2}.1.\times\frac{1}{\sqrt{3}} + \sin 60°.(-\tan 45°).\tan 30°$ √ √ √

$= \frac{1}{2} + \frac{\sqrt{3}}{2}.(-1).\frac{1}{\sqrt{3}}$ √

$= \frac{1}{2} - \frac{1}{2}$ √ Please note: The principle of only marking to second mistake does not apply

$= RHS$ (5)

2.4 2.4.1

$PR^2 = PQ^2 + QR^2 - 2\,PQ.QR \cos \hat{Q}$ ✓

$= 5^2 + 3^2 - 2(5)(3) \cos 120°$ ✓

$= 25 + 9 + 15$

$= 49$ ✓

$PR = 7\ cm$ ✓ (4)

2.4.2

$\frac{\sin 38°}{5} = \frac{\sin \hat{S}}{7}$ ✓ mark with errors of Q2.4.1

$5 \sin \hat{S} = 7 \sin 38°$

$\sin \hat{S} = \frac{7 \sin 38°}{5}$ ✓

$\sin \hat{S} = 0{,}862$

$\hat{S} = 59{,}54°$ ✓ (3)

2.4.3

$A = \frac{1}{2}(5)(3) \sin 120°$ ✓ ✓

$= 6{,}495\ cm^2$ ✓ Ignore units (3)

[25]

QUESTION 3

3.1 3.1.1

4, 75, 80, 89, 90, 98, 110, 114, 120, 180

Median position $= \frac{10+1}{2} = \frac{11}{2} = 5{,}5$ ✓

Median value $= \frac{90+98}{2} = 94$ ✓Answer only full marks (2)

3.1.2

$Q_1\ position = \frac{1}{4}(n+1) = \frac{1}{4}(10+1) = 2{,}75$ ✓

$Q_1 = 75 + 0{,}75(80 - 75)$

$= 78{,}75$ ✓

$Q_3\ position = \frac{3}{4}(n+1) = \frac{3}{4}(10+1) = 8{,}25$ ✓

$Q_3 = 114 + 0{,}25(120 - 114)$

$= 115{,}5$ ✓ (4)

3.1.3 $IQR = Q_3 - Q_1$

$IQR = 115{,}5 - 78{,}75$

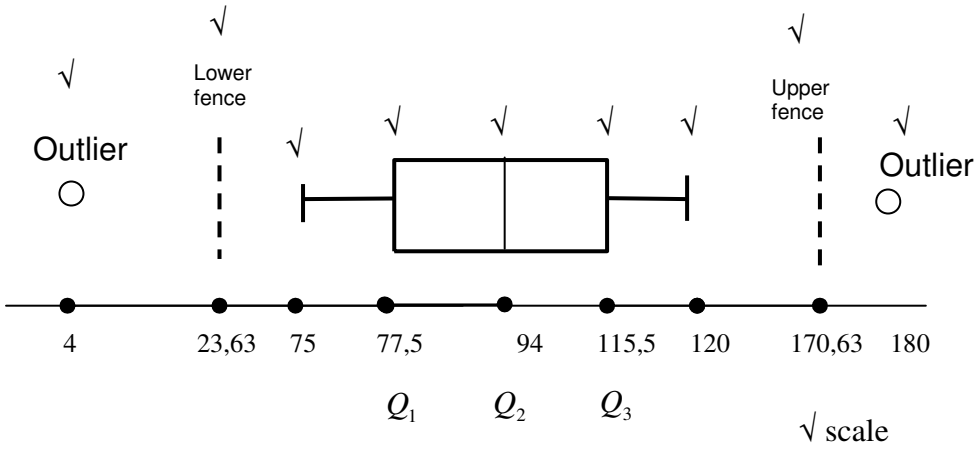
$IQR = 36{,}75$ ✓ Carry forward incorrect Q_3 *and* Q_1

Upper fence value $= Q_3 + 1{,}5\,(IQR)$
$= 115{,}5 + 1{,}5(36{,}75)$ √ Carry forward incorrect IQR
$= 170{,}68$ ✓

Lower fence value $= Q_1 - 1{,}5\,(IQR)$
$= 78{,}75 - 1{,}5(36{,}75)$ √
$= 23{,}63$ ✓

(4)

3.1.4



(5)

3.2 3.2.1

✓ ✓ ✓

Classes (Masses)	Frequency (f_i)	Midpoint (x_i)	$f_i x_i$	< Cumulative frequency
79 – 89	4	84	336	4
90 – 100	8	95	760	12
101 – 111	7	106	742	19
112 – 122	8	117	936	27
123 – 133	2	128	256	29
134 – 144	4	139	556	33
145 – 155	10	150	1500	43
156 - 166	7	161	1127	50
Total	50		$\sum f_i x_i = 6213$ ✓	

Allow one mistake per midpoint and $f_i x_i$ column and carry that error forward but student will lose mark allocated for $\sum f_i x_i$

(4)

3.2.2

$$\bar{x} = \frac{\sum f_i x_i}{n}$$

$$= \frac{6213}{50}$$ ✓ carry forward errors from Q 3.2.1.

$$= 124{,}26$$ ✓ (2)

3.2.3

$$Mo = l + \frac{f_m - f_{m-1}}{2f_m - f_{m-1} - f_{m+1}} \times c$$

$$= 145 + \frac{10-4}{2(10)-4-7} \times 10$$

$$= 151{,}67$$ ✓

✓ accept c =11 *as weight is a continuous data and classes should have been divided into 79 - <90 etc.* Then Answer = 152,333

(2)

3.2.4

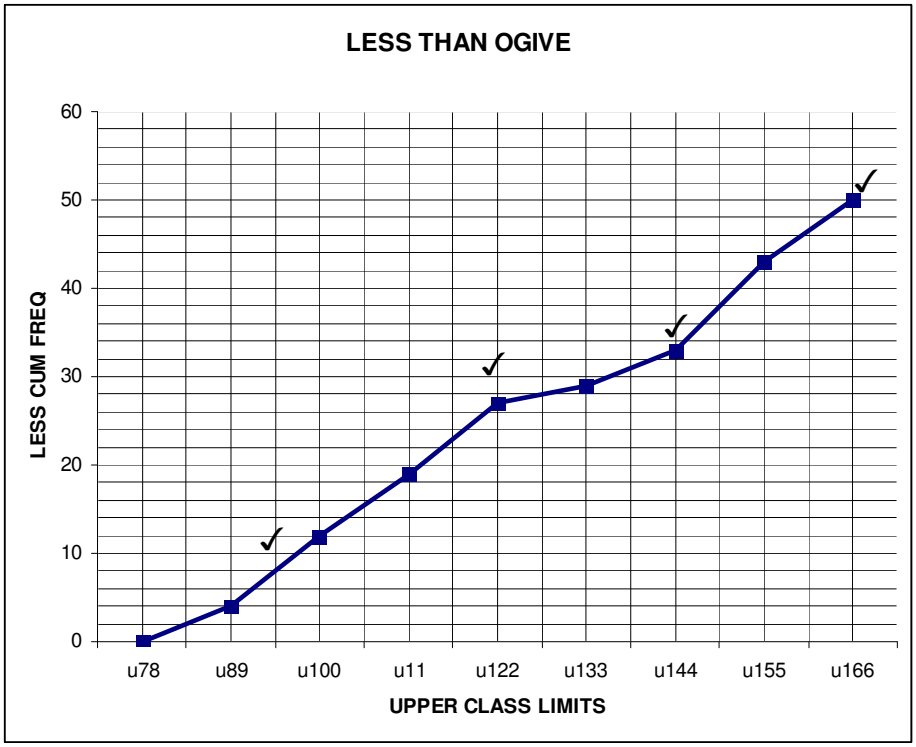
Me (position): $I = \frac{n}{2} = \frac{50}{2} = 25$ ✓

$$Me = l + \frac{\left(\frac{n}{2} - F\right)}{f} \times c$$

$$= 112 + \frac{\left(\frac{50}{2} - 19\right)}{8} \times 10$$ ✓ accept c = 11 Answer 120,25

$$= 119{,}5$$ ✓ (3)

3.2.5



Carry forward errors from Q 3.2.1 (4)

[30]

QUESTION 4

4.1

4.1.1	R60 000	✓
4.1.2	– R5 000	✓
4.1.3	R0	✓
4.1.4	R25 000	✓
4.1.5	R14 000	✓
4.1.6	R13 000	✓
4.1.7	R5 000	✓
4.1.8	R16 000	✓

(8)

4.2

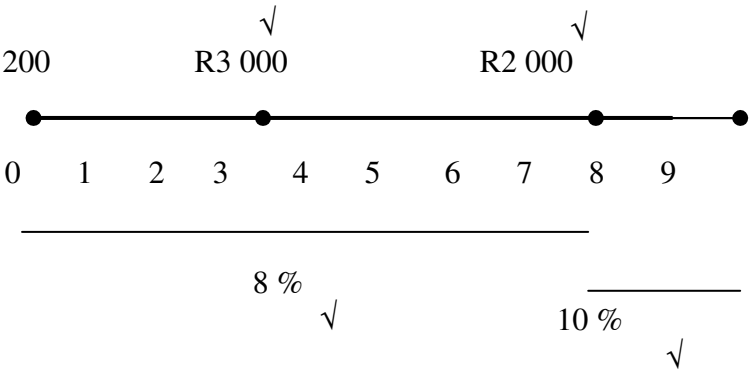
$$_t = P(1+\frac{r}{100\times m})^{n\times m} \checkmark$$

$$A = 5000(1+\frac{9{,}5\checkmark}{100\times 4})^{3\times 4} \checkmark$$

$$= R6\,626{,}69 \checkmark$$

(4)

4.3 4.3.1



(2)

4.3.2

$$A_t = P(1+in)$$
$$= 4200(1+0{,}08\times 3) \checkmark$$
$$= R5\,208 \checkmark$$

$$A_t = P(1+in)$$
$$= 8208(1+0{,}08\times 4) \checkmark$$
$$= R10\,834{,}56 \checkmark$$

$$A_t = P(1+i)^n$$
$$= 12834{,}56(1+0{,}1)^2 \checkmark$$
$$= R15\,529{,}82 \checkmark$$

(6)
[20]

TOTAL: 100