higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

MATHEMATICS
(Second paper)
NQF LEVEL 3

11 November 2024

This marking guideline consists of 7 pages.

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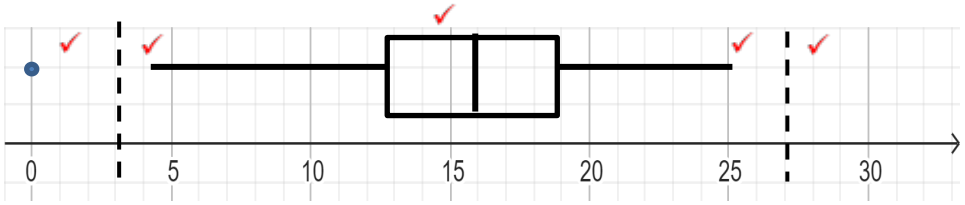
QUESTION 1

1.1.1 Minimum=0
Maximum=24
Q1=12✓
Q2=16✓
Q3=18✓ (4)

1.1.2 Lower fence $= Q_1 - 1{,}5(Q_3 - Q_1)$
$= 12 - 1{,}5(18 - 12)$✓
$= 3$✓

Upper fence $= Q_3 + 1{,}5(Q_3 - Q_1)$
$= 18 + 1{,}5(18 - 12)$ ✓
$= 27$✓ (4)

1.1.3



1-mark outlier at 0
1-mark fences
1-mark box
1-mark New minimum at 4
1-mark maximum at 24 (5)

1.1.4 0/Student number 7✓
Dropped out, changed group, sick, deceased or any other reasonable answer addressing why learner can be absent for abnormally long period.✓ (2)

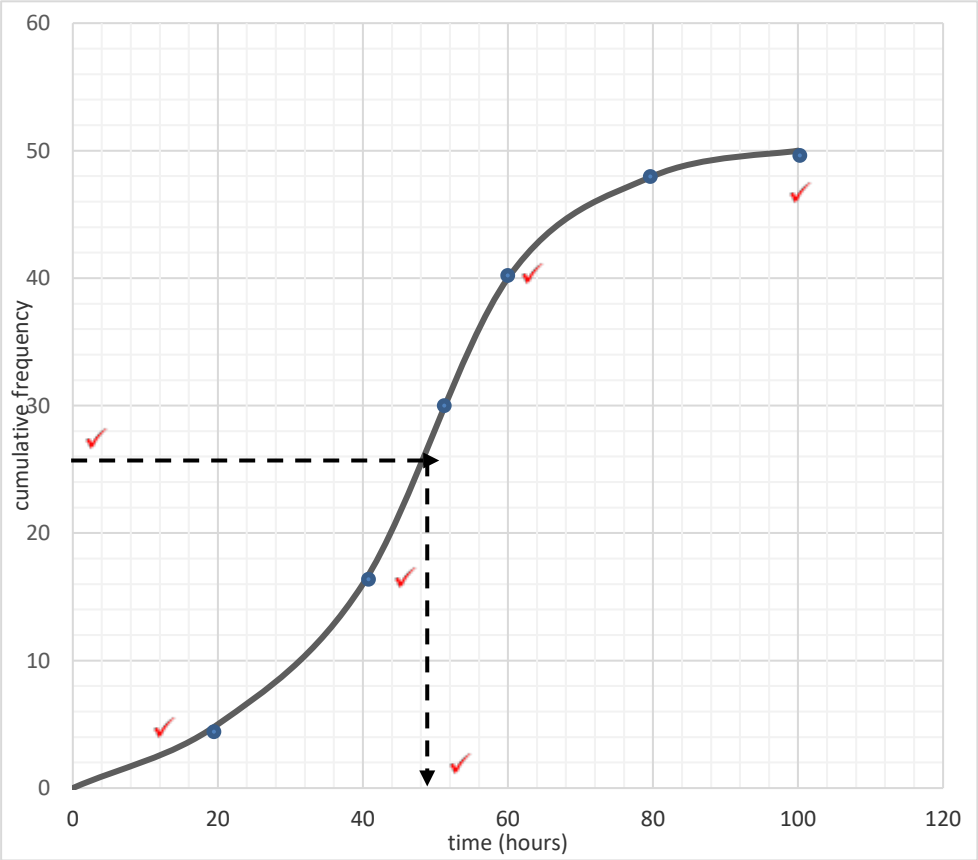
1.2 1.2.1

Number of hours x	Frequency f_i	Midpoint x_i	$f_i x_i$	< Cumulative Frequency
$0 \leq x < 20$	5	10	50	5
$20 \leq x < 40$	11	30	330	$\boldsymbol{d = 16}$✓
$40 \leq x < 60$	24	50	1200	40
$60 \leq x < 80$	8	70	560	48
$80 \leq x < 100$	$\boldsymbol{a}$ =2✓	90	$\boldsymbol{b = 180}$✓	50
TOTAL	$\sum f_i$ =50		$\sum f_i x_i$ $\boldsymbol{c = 2\,320}$✓	

(4)

1.2.2
$$\text{Mean} = \frac{\sum f_i x_i}{\sum f_i}$$
$$= \frac{2\,320}{50}$$✓
$$= 46{,}4$$ ✓ (2)

1.2.3



(4)

1.2.4 median= 48✓
✓✓ 2 marks on graph
Accept 45 to 51 as shown on candidate's graph. (3)

1.2.5

$$\text{Mo} = \text{l} + \frac{\text{f}_\text{m} - \text{f}_{\text{m}-1}}{2\text{f}_\text{m} - \text{f}_{\text{m}-1} - \text{f}_{\text{m}+1}} \times \text{c}$$
$$= 40 + \frac{24 - 11}{2(24) - 11 - 8} \times 20$$
$$= 48{,}966$$

(3)
[31]

QUESTION 2

2.1 2.1.1

$b^2 = 196$ ✓
$b = \sqrt{196}$
$= 14$ cm ✓ (2)

2.1.2

Surface area $= b^2 + \frac{1}{2}pl$
$= 196 + \frac{1}{2} \times 56 \times 15$ ✓✓
$= 616$ cm^2 ✓ (3)

2.1.3

$15^2 = H^2 + 7^2$
$H = \sqrt{15^2 - 7^2}$ ✓
$= 13{,}266cm$ ✓ (2)

2.1.4

$V_{pyramid} = \frac{1}{3}Area_{base} \times H$
$= \frac{1}{3} \times 196 \times 4\sqrt{11}$ ✓
$= 866{,}745$ cm^3 ✓ (2)

2.2 2.2.1

$A_{\text{sphere}} = 4\pi r^2$
$2\,050 = 4\pi r^2$ ✓
$r = \sqrt{\frac{2\,050}{4\pi}}$ ✓
$= 12{,}772$ cm ✓ (3)

2.2.2

$V_{sphere} = \frac{4}{3}\pi r^3$
$= \frac{4}{3}\pi(12{,}772)^3$ ✓
$= 8\,727{,}007$ cm^3 ✓ (2)

2.3 2.3.1

$m_{AB} = \frac{y_2 - y_1}{x_2 - x_1}$
$= \frac{3\frac{1}{2} - 1}{0 - (-5)}$ ✓
$= \frac{1}{2}$ ✓ (2)

2.3.2

$\frac{y_2 - y_1}{x_2 - x_1} = -2$ ✓
$\frac{k - 1}{-3\frac{1}{2} - (-5)} = -2$ ✓
$k - 1 = -3$
$k = -2$ ✓ (3)

2.3.3

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

$-2 = \frac{1}{2}\left(-3\frac{1}{2}\right) + c$ ✓

$c = -\frac{1}{4}$ ✓

$y = \frac{1}{2}x - \frac{1}{4}$ ✓

Alternative solution

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

$y - (-2) = \frac{1}{2}\left(x - \left(-3\frac{1}{2}\right)\right)$ ✓ ✓

$y = \frac{1}{2}x - \frac{1}{4}$ ✓

(3)

2.3.4

$\theta = tan^{-1}(m_{CD})$

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

$= 26{,}565^0$ ✓

(2)

[24]

QUESTION 3

3.1

$$\frac{\cos 109^0.\cos 330^0.\tan 240^0}{\cos 19^0.\tan 225^0.\tan 161^0} = \frac{\cos(90^0 + 19^0).\cos(360^0 - 30^0).\tan(180^0 + 60^0)}{\cos 19^0.\tan(180^0 + 45^0).\tan(180^0 - 19^0)}$$ ✓

$$= \frac{-\sin 19^0.\cos 30^0.\tan 60^0}{\cos 19^0.\tan 45^0.-\tan 19^0}$$ ✓ ✓

$$= \frac{\sin 19^0.\frac{\sqrt{3}}{2}.\sqrt{3}}{\cos 19^0.1.\frac{\sin 19^0}{\cos 19^0}}$$ ✓ ✓ or $= \frac{-\tan 19^0.\cos 30^0.\tan 60^0}{\tan 45^0.-\tan 19^0}$

$= \frac{3}{2}$ ✓

(6)

3.2

$$\frac{\cos(180^o - k).\sin(360^o - k).\tan(180^0 - k)}{sin^2(6^o + k) + cos^2(6^o + k)} - cos^2 k$$

$= \frac{-\cos k.-\sin k.-\tan k}{1}$ ✓ ✓ $- cos^2 k$

$= -\cos k.-\sin k.-\frac{\sin k}{\cos k}$ ✓ $- cos^2 k$

$= -sin^2 k - cos^2 k$ ✓

$= -(sin^2 k + cos^2 k)$ ✓

$= -1$

(6)

3.3 $6sin^2\beta + \cos\beta = 4$

$6(1 - cos^2\beta) + \cos\beta - 4 = 0$ ✓

$6 - 6cos^2\beta + \cos\beta - 4 = 0$

$6cos^2\beta - \cos\beta - 2 = 0$

$(3\cos\beta - 2)(2\cos\beta + 1) = 0$ ✓

$3\cos\beta - 2 = 0$ $\quad$ $2\cos\beta + 1 = 0$

$\cos\beta = \frac{2}{3}$ $\quad$ $\cos\beta = -\frac{1}{2}$

$ref\ angle = cos^{-1}\left(\frac{1}{2}\right) = 60^o$

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

$= 48,190^o$ ✓; $311,810^o$ ✓ $\quad$ $\beta = 120^o$ ✓; 240° ✓ (6)

3.4 3.4.1 $l^2 = m^2 + k^2 - 2\text{mk}\cos\hat{L}$

$\text{l} = \sqrt{4^2 + 6^2 - 2 \times 4 \times 6\cos 103^o}$ ✓✓

$= 7,924$ m ✓ (3)

3.4.2 $\frac{\sin k}{k} = \frac{\sin L}{l}$ ✓

$\frac{\sin k}{6} = \frac{\sin 103^o}{7,924}$ ✓

$k = sin^{-1}(0,7377865205)$

$M\hat{K}L = 47,543^0$ ✓ (3)

[24]

QUESTION 4

4.1 4.1.1 Budgeted income is money the club expects/plans to receive and actual income is the money the clubs receives.

4.1.2 Affiliation fees: money the club pays to be associated with a body and membership fees are paid by individuals to stay part of the club.

(2 × 2) (4)

4.2 4.2.1 B
4.2.2 D
4.2.3 D
4.2.4 B
4.2.5 A
4.2.6 C

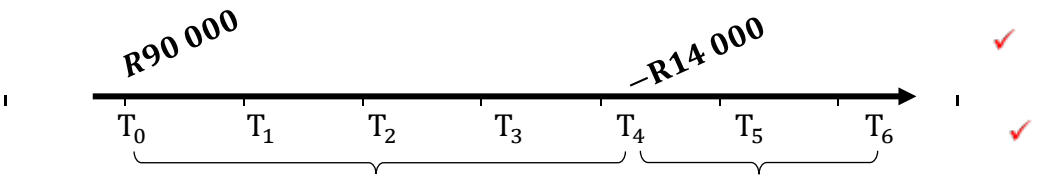
(6 × 1) (6)

4.3 $$A = P\left(1 + \frac{r}{m \times 100}\right)^{t \times m}$$ ✓

$$= 60\,000\left(1 + \frac{14.5}{4 \times 100}\right)^{2,5 \times 4}$$ ✓

$$= R85\,663,67$$ ✓ (3)

4.4 4.4.1



✓ ✓

14% CI annually 18 % CI, SEMI – annually ✓

1 mark for deposit and withdrawal at correct positions.
1 mark for correct splitting of interval into 4 and 2 years.
1 mark for showing at least the two interest rates in each interval. (3)

4.4.2 $A_4 = 90\,000\left(1 + \frac{14}{100}\right)^4$ ✓ Carry forward mistakes for this question.

$= 152\,006,41$ ✓

$A_6 = 138\,006,41\left(1 + \frac{18}{2 \times 100}\right)^{2 \times 2}$ ✓ ✓

$= 194\,807,32$ ✓

He will not afford ✓

Alternative

$A_6 = 90\,000\left(1 + \frac{14}{100}\right)^4\left(1 + \frac{18}{2 \times 100}\right)^{2 \times 2} - 14\,000\left(1 + \frac{18}{2 \times 100}\right)^{2 \times 2}$ ✓ ✓ ✓ ✓

$= 194\,807,32$

He will not afford. (5)

[21]

TOTAL: 100

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