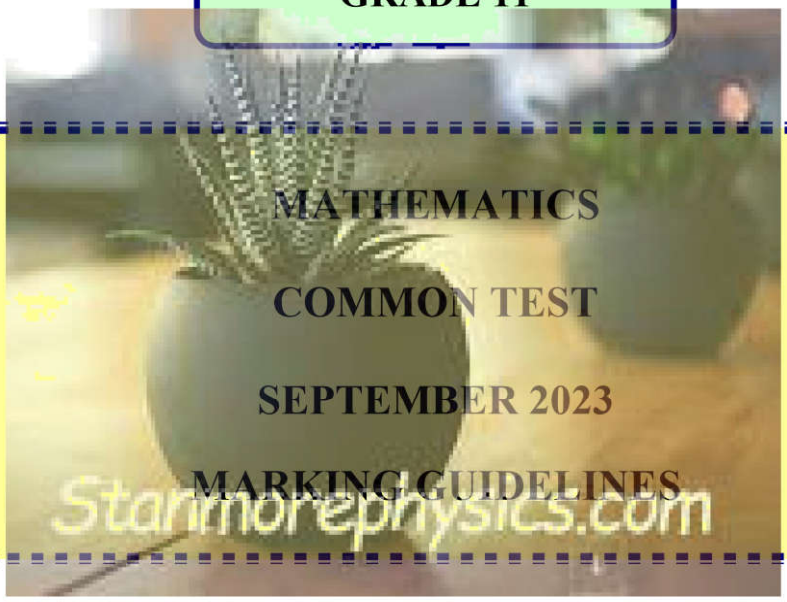
KWAZULU-NATAL PROVINCE

EDUCATION

REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 11



MATHEMATICS

COMMON TEST

SEPTEMBER 2023

MARKING GUIDELINES

MARKS: 75

This marking guidelines consist of 9 pages.

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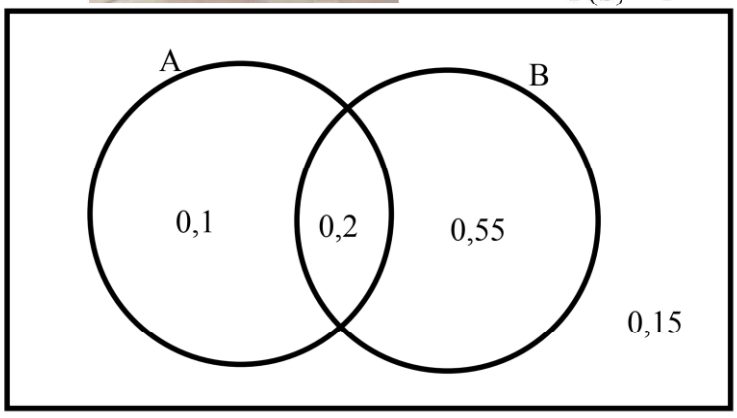
QUESTION 1

1.1.1	$A = P(1-in)$ $= 150\,000\left[1-0,084(10)\right]$ $= R24\,000$	✓ substitution into correct formula ✓ answer (2)
1.1.2	$A = P(1-i)^n$ $= 150\,000(1-0,084)^{10}$ $= R62\,380,09$	✓ substitution into correct formula ✓ answer (2)
1.2.1	R13 282,71	✓ answer (1)
1.2.2	$A = P\left(1+\frac{i}{12}\right)^{12n}$ $13\,282,71 = 10\,000\left(1+\frac{i}{12}\right)^{36}$ $\left(1+\frac{i}{12}\right)^{36} = \frac{13\,282,71}{10\,000}$ $1+\frac{i}{12} = \sqrt[36]{\frac{13\,282,71}{10\,000}}$ $\frac{i}{12} = \sqrt[36]{\frac{13\,282,71}{10\,000}} - 1$ $i = 0,095$ $\therefore x = 9,50$	✓ 36 ✓ substitution into correct formula ✓ taking 36th root ✓ isolating i ✓ answer (5)
1.2.3	$1+i_{eff} = \left(1+\frac{i_{nom}}{m}\right)^m$ $i_{eff} = \left(1+\frac{0,095}{12}\right)^{12} - 1$ $i_{eff} = 0,09924758...$ $r = 9,92\%$ **OR** $A = P(1+i_{eff})^n$ $13\,282,71 = 10\,000(1+i_{eff})^3$ $(1+i_{eff})^3 = \frac{13\,282,71}{10\,000}$ $i_{eff} = \sqrt[3]{\frac{13\,282,71}{10\,000}} - 1$ $i_{eff} = 0,09924769...$ $r = 9,92\%$	✓ formula ✓ substitution into correct formula ✓ answer (3) **OR** ✓ substitution into correct formula ✓ simplification ✓ answer (3)

1.3	$\left[P\left(1+\frac{0,09}{4}\right)^4-70\,000\right]\left(1+\frac{0,09}{4}\right)^4=72\,838,06$	✓ $P\left(1+\frac{0,09}{4}\right)^4$ ✓ subtracting 70 000 ✓ multiplying by $\left(1+\frac{0,09}{4}\right)^4$ ✓ equating LHS to R72 838,06
	$P=\frac{\frac{72\,838,06}{\left(1+\frac{0,09}{4}\right)^4}+70\,000}{\left(1+\frac{0,09}{4}\right)^4}$	✓ making P the subject
	$=R125\,000$	✓ answer (6)
	OR	**OR**
	P_1 — $A_1-R70\,000=P_2$ — $A_2=R72\,838,06$	
	$A_2=P_2(1+i)^n$	
	$72\,838,06=P_2\left(1+\frac{0,09}{4}\right)^4$	✓ equating RHS to 72 838,06 ✓ correct substitution
	$P_2=\frac{72\,838,06}{\left(1+\frac{0,09}{4}\right)^4}$ $A_1=P_2+70\,000$ $A_1=P_1(1+i)^n$	✓ simplification ✓ adding R70 000
	$A_1=P_1\left(1+\frac{0,09}{4}\right)^4$	✓ substitution
	$P_1=\frac{A_1}{\left(1+\frac{0,09}{4}\right)^4}$ $=R125\,000$	✓ answer (6)
		[19]

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QUESTION 2

2.1.1	P(temperature ≥ 25 ºC) $= \frac{139}{365}$ $= 0,38$ OR $38,08\%$	✓ 139 ✓ answer ($\frac{139}{365}$ or 0,38 or 38,08%) (2)
2.1.2	P(temperature ≥ 25 ºC and wind speed ≥ 15 km/h) $= \frac{105}{365}$ $= 0,29$ OR $28,77\%$	✓ 105 ✓ answer ($\frac{105}{365}$ or 0,29 or 28,77%) (2)
2.1.3	P(wind speed ≥ 15 km/h) $= \frac{244}{365}$ $= 0,67$ P(temperature ≥ 25 ºC) × P(wind speed ≥ 15 km/h) $= 0,38 \times 0,67$ $= 0,25$ ∴ P(temperature ≥ 25 ºC and wind speed ≥ 15 km/h) ≠ P(temperature ≥ 25 ºC) × P(wind speed ≥ 15 km/h) ∴ the temperature on a specific day and the wind speed on the same day are **not independent events**.	✓ P(wind speed ≥ 15 km/h) $= \frac{244}{365}$ or 0,67 ✓ P(temperature ≥ 25 ºC) × P(wind speed ≥ 15 km/h) = 0,25 ✓ not equal ✓ concluding (4)
2.2.1	P(S) = 1  	✓ 0,2 and 0,1 ✓ 0,55 ✓ 0,15 (3)
2.2.2	P(A or B) = 0,1 + 0,2 + 0,55 = 0,85 **OR** P(A or B) = P(A) + P(B) – P(A and B) = 0,3 + 0,75 – 0,2 = 0,85	✓ 0,1 + 0,2 + 0,55 ✓ answer (2) **OR** ✓ 0,3 + 0,75 – 0,2 ✓ answer (2)

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2.3.1	$\text{P(passing on 2nd attempt)}$ $= \text{P(failing on 1st attempt)} \times \text{P(passing on 2nd attempt)}$ $= \frac{3}{5} \times \frac{2}{3}$ $= \frac{6}{15} = \frac{2}{5} = 0,40$	✓ $\frac{3}{5} \times \frac{2}{3}$ ✓ answer $(\frac{6}{15}$ or $\frac{2}{5}$ or $0,40)$ (2)
2.3.2	$\text{P(passing on 3rd attempt)}$ $= \text{P(failing on 1st)} \times \text{P(failing on 2nd)} \times \text{P(passing on 3rd)}$ $= \frac{3}{5} \times \frac{1}{3} \times \frac{2}{3}$ $= \frac{2}{15} = 0,13$	✓ $\frac{3}{5} \times \frac{1}{3} \times \frac{2}{3}$ ✓ answer $(\frac{2}{15}$ or $0,13)$ (2)
2.3.3	$\text{P(passing on 4th or more attempt)}$ $= 1 - \text{P(passing on 1st, 2nd or 3rd attempt)}$ $= 1 - \left(\frac{2}{5} + \frac{2}{5} + \frac{2}{15}\right)$ $= \frac{1}{15}$ or $0,07$	✓ $1 - \text{P(passing on 1st, 2nd or 3rd attempt)}$ ✓ answer $(\frac{1}{15}$ or $0,07)$ (2)
		[19]

QUESTION 3

3.1.1

Weight (w) of baby at birth in kg	Number of babies born (frequency)	Cumulative frequency
$1,0 \le w < 1,5$	12	**12**
$1,5 \le w < 2,0$	19	**31**
$2,0 \le w < 2,5$	222	**253**
$2,5 \le w < 3,0$	714	**967**
$3,0 \le w < 3,5$	1131	**2098**
$3,5 \le w < 4,0$	782	**2880**
$4,0 \le w < 4,5$	234	**3114**
$4,5 \le w < 5,0$	43	**3157**

one mark out of 2: if one mistake has been made

two marks: if all values are correct

(2)

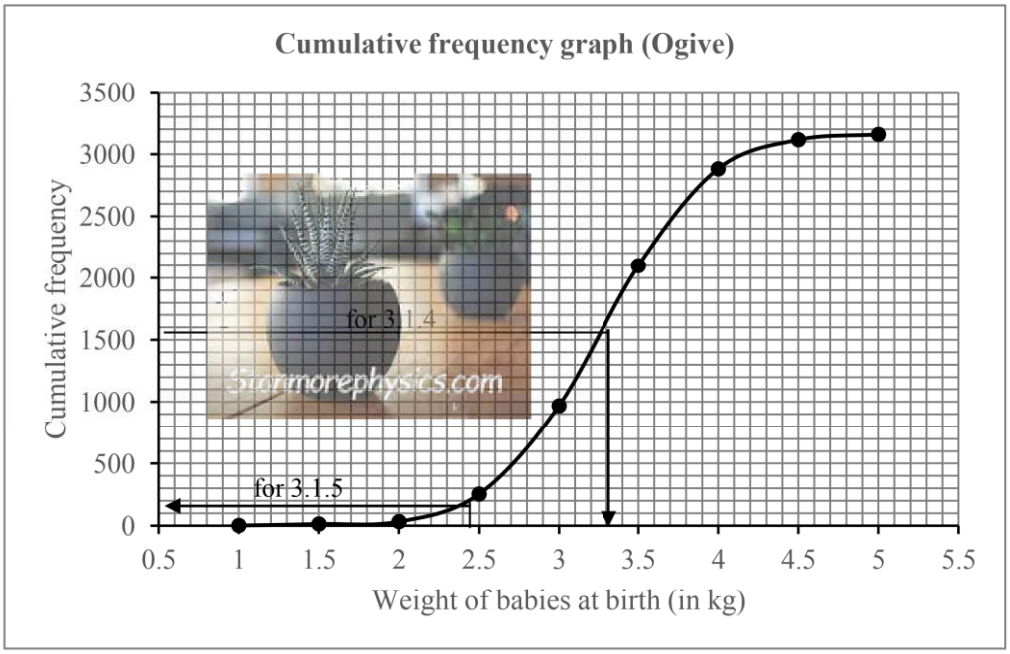
3.1.2

3157

✓ answer

(1)

3.1.3



✓ ogive grounded at (1 ; 0)

✓ points plotted correctly at upper limit

✓ cumulative frequency

✓ points joined using a curve

(4)

3.1.4

birth weight associated with a cumulative frequency of $\frac{3157}{2} \approx 1579$.

Median $\approx$ 3,27 kg (accept 3,2 to 3,4 kg)

✓ using cumulative frequency of $\frac{3157}{2} \approx 1579$

✓ answer

(2)

3.1.5

Cumulative frequency associated with birth weight of 2,4 kg = 180 babies (accept 160 to 200)

% of babies $\frac{180}{3157} \approx 5,70\%$ (accept 5,70% to 6,347%)

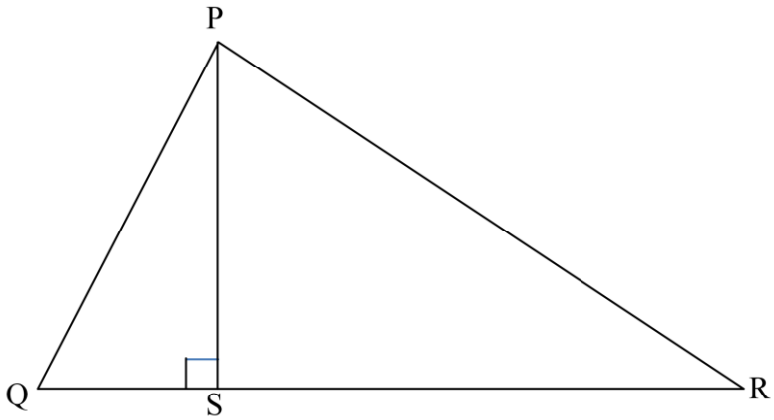
✓ number of babies

✓ answer

(2)

3.2.1	3,8 kg – 2,4 kg = 1,4 kg	✓ 3,8– 2,4 ✓answer (2)
3.2.2	No, this cannot be correct. The data is skewed to the left. Therefore the mean is smaller than the median, and cannot have a value of 3,5, which is bigger than 3,3.	✓ No, cannot be correct ✓ data skewed to the left ✓ mean < median (3)
3.3.1 (a)	$\bar{x} = \frac{258}{12}$ $= 21,5$	✓ $\frac{258}{12}$ ✓answer (2)
3.3.1 (b)	$\sigma = 11,53$	✓ answer (1)
3.3.2	The marks from this test were more closely grouped around the mean. The standard deviation for this test is smaller.	✓ closely grouped around the mean ✓ smaller standard deviation (2)
		[21]

QUESTION 4

4.1.1	$\frac{DF}{DE} = \cos D\hat{E}F$ $\frac{DF}{47^\circ} = \cos 32^\circ$ $\therefore DF = 47\cos 32^\circ$ $= 39,86$ cm	✓ $\frac{DF}{47^\circ} = \cos 32^\circ$ ✓ answer (2)
4.1.2	$DG^2 = DF^2 + FG^2 - 2.DF.FG.\cos \hat{F}_1$ $83^2 = 39,86^2 + 62^2 - 2(39,86)(62)\cos \hat{F}_1$ $\cos \hat{F}_1 = \frac{39,86^2 + 62^2 - 83^2}{2(39,86)(62)}$ $\cos \hat{F}_1 = -0,2946...$ $\hat{F}_1 = 107,13^\circ$	✓ applying cosine rule in ΔDFG ✓ substitution ✓ $\cos \hat{F}_1$ subject of formula ✓ answer (4)
4.2	 Construction: Draw PS, with S on QR, such that PS ⊥ QR. Proof: $\frac{PS}{PQ} = \sin \hat{Q}$ $\therefore PS = PQ\sin \hat{Q}$ …….. line 1 $\frac{PS}{PR} = \sin \hat{R}$ $\therefore PS = PR\sin \hat{R}$ …….. line 2 From line 1 and line 2: $PQ\sin \hat{Q} = PR\sin \hat{R}$ $\therefore \frac{\sin Q}{PR} = \frac{\sin R}{PQ}$	✓ construction ✓ $\frac{PS}{PQ} = \sin \hat{Q}$ ✓ $PS = PQ\sin \hat{Q}$ ✓ $\frac{PS}{PR} = \sin \hat{R}$ ✓ $PQ\sin \hat{Q} = PR\sin \hat{R}$ (5)

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4.3	In ΔABC: $\frac{AC}{\sin \hat{B}} = \frac{BC}{\sin B\hat{A}C}$ $\frac{AC}{\sin x} = \frac{k}{\sin y}$ $AC = \frac{k \sin x}{\sin y}$ $\hat{C}_2 = x + y$ [ext. $\angle$ of ΔABC] Area of $\Delta ACD = \frac{1}{2} AC.CD.\sin \hat{C}_2$ $= \frac{1}{2}\left(\frac{k \sin x}{\sin y}\right).k.\sin(x+y)$ $= \frac{k^2 \sin x.\sin(x+y)}{2 \sin y}$	✓ $\frac{AC}{\sin \hat{B}} = \frac{BC}{\sin B\hat{A}C}$ ✓ $AC = \frac{k \sin x}{\sin y}$ ✓ $\hat{C}_2 = x + y$ ✓ Area $\Delta ACD = \frac{1}{2} AC.CD.\sin \hat{C}_2$ ✓ substitution (5)
		[16]

TOTAL: 75

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