NON-CALC I · MARK SCHEME

GCSE Mathematics · Higher Tier

40 marks · 45 minutes · Non-calculator

M method **A** accuracy (depends on M) **B** independent **P** process **C** communication

oe or equivalent cao correct answer only ft follow through Accept any correct, fully justified method.

Question 1

Frequency trees · P3 · Probability · AO1 · 3 marks

QN	ANSWER	MARK	GUIDANCE
1(a)	**Walk 120 (late 15, on time 105); bus 80 (late 20, on time 60)**	B2	For all six values correct. B1 for at least 3 values correct
1(b)	$\frac{15}{35}$	B1	For $\frac{15}{35}$ oe, e.g. $\frac{3}{7}$ (ft their tree)

Question 2

Density · R11 · Ratio & proportion · AO3 · 3 marks

QN	ANSWER	MARK	GUIDANCE
2	**5 cm**	P1	For the density $= 960 \div (6 \times 5 \times 4) = 960 \div 120 = 8$ g/cm^3
		P1	For the volume of the cube $= 1000 \div 8 = 125$ cm^3
		A1	For $\sqrt[3]{125} = 5$

Question 3

Parallel lines · G3 · Geometry & measures · AO1 · AO2 · 3 marks

QN	ANSWER	MARK	GUIDANCE
3	**20**	M1	For $3x + 10 + 5x + 10 = 180$ oe
		A1	cao
		C1	For the reason: co-interior angles add up to 180° (allied angles, interior angles)

Question 4

Fractional indices · N7 · Number · AO1 · 4 marks

QN	ANSWER	MARK	GUIDANCE
4(a)	$\frac{1}{7}$	B1	cao
4(b)	$\frac{4}{9}$	M1	For $\sqrt[3]{\frac{27}{8}} = \frac{3}{2}$, or for the reciprocal $\left(\frac{8}{27}\right)^{\frac{2}{3}}$
		A1	cao
4(c)	-5	B1	cao

Question 5

Straight-line graphs · A9 · Algebra · AO3 · 3 marks

QN	ANSWER	MARK	GUIDANCE
5	-3	P1	For the gradient $= \frac{-7-5}{6-2} = -3$
		P1	For $y = -3x + 11$, or for $\frac{20-5}{k-2} = -3$
		A1	cao

Question 6

Combined mean · S4 · Statistics · AO3 · 3 marks

QN	ANSWER	MARK	GUIDANCE
6	**18**	P1	For the total for class **A**: $12 \times 15 = 180$
		P1	For $180 + 20n = 18(12 + n)$ oe
		A1	cao

Question 7

Speed–time graphs · A15 · R14 · Ratio & proportion · AO1 · AO3 · 3 marks

QN	ANSWER	MARK	GUIDANCE
7(a)	2.5 m/s^2	B1	For $20 \div 8$
7(b)	14 m/s	P1	For the area under the graph: $80 + 240 + 100 = 420$ m, or $\frac{1}{2}(12 + 30) \times 20$
		A1	For $420 \div 30 = 14$

Question 8

Difference of two squares · A4 · Algebra · AO1 · AO2 · 3 marks

QN	ANSWER	MARK	GUIDANCE
8(a)	$(x + y)(x - y)$	B1	cao
8(b)	Shown	M1	For $(1003 + 997)(1003 - 997)$
		C1	For $2000 \times 6 = 12\,000$

Question 9

Similar shapes · G19 · R12 · Ratio & proportion · AO3 · 2 marks

QN	ANSWER	MARK	GUIDANCE
9	9	P1	For the length scale factor $\sqrt{\frac{72}{32}} = \sqrt{\frac{9}{4}} = \frac{3}{2}$
		A1	For $6 \times \frac{3}{2} = 9$

Question 10

Exact trig values · G21 · Geometry & measures · AO2 · 3 marks

QN	ANSWER	MARK	GUIDANCE
10	Shown	M1	For $BC = 8 \sin 30° = 8 \times \frac{1}{2} = 4$
		M1	For $AB = 8 \cos 30° = 8 \times \frac{\sqrt{3}}{2} = 4\sqrt{3}$ (or by Pythagoras, $\sqrt{64 - 16} = \sqrt{48}$)
		C1	For $\frac{1}{2} \times 4 \times 4\sqrt{3} = 8\sqrt{3}$

Question 11

Trigonometric graphs · A12 · Algebra · AO1 · AO2 · 3 marks

QN	ANSWER	MARK	GUIDANCE
11(a)	150	B1	cao
11(b)	210, 330	M1	For using the symmetry of the graph, e.g. $180 + 30$ or $360 - 30$
		A1	For both values and no others

Question 12

Equations with fractions · A18 · Algebra · AO1 · 4 marks

QN	ANSWER	MARK	GUIDANCE
12	$x = 2, x = 9$	M1	For $3(x-1) + 4(x-3) = (x-3)(x-1)$
		M1	For $x^2 - 11x + 18 = 0$
		M1	For $(x-2)(x-9) = 0$
		A1	For both values

Question 13

Vector proof · G25 · Geometry & measures · AO2 · 3 marks

QN	ANSWER	MARK	GUIDANCE
13	Proof	M1	For $\overrightarrow{MP} = -\frac{1}{2}\mathbf{a} + \mathbf{a} + \frac{2}{3}(\mathbf{b} - \mathbf{a}) = -\frac{1}{6}\mathbf{a} + \frac{2}{3}\mathbf{b}$
		M1	For $\overrightarrow{MC} = -\frac{1}{2}\mathbf{a} + 2\mathbf{b}$
		C1	For $\overrightarrow{MC} = 3\overrightarrow{MP}$, so MP and MC are parallel with point M in common, so M, P and C are on a straight line

Paper overview

Q	TOPIC	SPEC REF	STRAND	AO	MARKS
1	Frequency trees	P3	Probability	AO1	3
2	Density	R11	Ratio & proportion	AO3	3
3	Parallel lines	G3	Geometry & measures	AO1 · AO2	3
4	Fractional indices	N7	Number	AO1	4
5	Straight-line graphs	A9	Algebra	AO3	3
6	Combined mean	S4	Statistics	AO3	3
7	Speed–time graphs	A15 · R14	Ratio & proportion	AO1 · AO3	3
8	Difference of two squares	A4	Algebra	AO1 · AO2	3
9	Similar shapes	G19 · R12	Ratio & proportion	AO3	2
10	Exact trig values	G21	Geometry & measures	AO2	3
11	Trigonometric graphs	A12	Algebra	AO1 · AO2	3
12	Equations with fractions	A18	Algebra	AO1	4
13	Vector proof	G25	Geometry & measures	AO2	3
Total					**40**

Marks by strand

Number	**4 marks (10%)**
Algebra	**13 marks (32%)**
Ratio & proportion	**8 marks (20%)**
Geometry & measures	**9 marks (22%)**
Probability	**3 marks (8%)**
Statistics	**3 marks (8%)**

Marks by assessment objective

AO1 Standard techniques	**16 marks (40%)**
AO2 Reasoning	**11 marks (28%)**
AO3 Problem solving	**13 marks (32%)**