NON-CALC E · 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

Error interval (truncation) · N15 · Number · AO1 · 2 marks

QN	ANSWER	MARK	GUIDANCE
1	$6.4 \leqslant y < 6.5$	B2	For a fully correct error interval
			B1 for $6.4 \leqslant y$ or $y < 6.5$, or for $6.4 < y < 6.5$

Question 2

Successive percentages · R9 · Ratio & proportion · AO2 · 3 marks

QN	ANSWER	MARK	GUIDANCE
2	**No, 1% decrease**	M1	For using multipliers, e.g. 1.2×1.1 $(= 1.32)$, or a correct calculation from a starting value such as £100 $\rightarrow$ £120 $\rightarrow$ £132
		M1	For 1.32×0.75 $(= 0.99)$, or £132 $\rightarrow$ £99
		C1	For stating Leo is not correct, as the painting is worth 1% less than at the start

Question 3

Averages from a table · S4 · Statistics · AO1 · 3 marks

QN	ANSWER	MARK	GUIDANCE
3(a)	1.5	B1	cao
3(b)	1.6	M1	For $\sum fx$, i.e. $0 + 7 + 12 + 9 + 4$ $(= 32)$
		A1	For $32 \div 20 = 1.6$, oe

Question 4

Factorise quadratics · A4 · Algebra · AO1 · 2 marks

QN	ANSWER	MARK	GUIDANCE
4	$(3x-2)(x+4)$	M1	For $(3x \pm 2)(x \pm 4)$, or for $3x^2 + 12x - 2x - 8$
		A1	cao

Question 5

Pythagoras with surds · G20 · N8 · Geometry & measures · AO3 · 3 marks

QN	ANSWER	MARK	GUIDANCE
5	$18\sqrt{2}$ **cm**^{2}	P1	For the perpendicular height from A: $h^2 = 9^2 - 3^2$ $(= 72)$
		P1	For $h = \sqrt{72} = 6\sqrt{2}$, or for area $= \frac{1}{2} \times 6 \times \sqrt{72}$
		A1	cao

Question 6

Congruent triangles · G5 · G6 · Geometry & measures · AO2 · 3 marks

QN	ANSWER	MARK	GUIDANCE
6	**Proof**	B1	For two correct pairs with reasons, e.g. $PM = MQ$ (M is the midpoint of PQ) and $PS = QR$ (opposite sides of a rectangle are equal)
		B1	For angle MPS = angle $MQR = 90°$ (angles in a rectangle)
		C1	For a complete proof concluding the triangles are congruent by SAS

Question 7

Linear and quadratic · A19 · Algebra · AO1 · 4 marks

QN	ANSWER	MARK	GUIDANCE
7	$x = 2$, $y = 1$ **and** $x = 4$, $y = 5$	M1	For $x^2 - 4x + 5 = 2x - 3$
		M1	For $x^2 - 6x + 8 = 0$ and $(x - 2)(x - 4)$
		A1	For $x = 2$ and $x = 4$
		A1	For both pairs correctly matched

Question 8

Histograms · S3 · Statistics · AO1 · AO2 · AO3 · 4 marks

QN	ANSWER	MARK	GUIDANCE
8(a)	18	B1	For 5×3.6
8(b)	21	P1	For $\frac{1}{2} \times 10 \times 2.2$ $(= 11)$ or 20×0.5 $(= 10)$
		A1	cao
8(c)	No, with reason	C1	For stating Mo is not correct with a reason, e.g. there are 82 plants, so the median is the 41.5th value; 30 plants are 15 cm or less and 50 are 20 cm or less, so the median is in $15 < h \leqslant 20$

Question 9

Surds · N8 · Number · AO1 · AO2 · 4 marks

QN	ANSWER	MARK	GUIDANCE
9(a)	$5 + 2\sqrt{3}$	M1	For 3 out of 4 terms correct in $8 + 4\sqrt{3} - 2\sqrt{3} - 3$
		A1	cao
9(b)	Shown	M1	For $\sqrt{12} = 2\sqrt{3}$, giving $(3\sqrt{3})^2$, or for expanding to $12 + 2\sqrt{36} + 3$
		C1	For a complete argument, e.g. $9 \times 3 = 27$ or $12 + 12 + 3 = 27$

Question 10

Parallel lines · A9 · Algebra · AO3 · 3 marks

QN	ANSWER	MARK	GUIDANCE
10	$(-4,\ 0)$	P1	For the gradient of **L** $= \frac{3}{2}$, e.g. from $y = \frac{3}{2}x - 4$
		P1	For the equation of **M**: $y = \frac{3}{2}x + 6$, oe
		A1	cao

Question 11

Graph transformations · A13 · Algebra · AO1 · 2 marks

QN	ANSWER	MARK	GUIDANCE
11(a)	$(-1,\ 3)$	B1	cao
11(b)	$(2,\ -3)$	B1	cao

Question 12

Similar triangles · R12 · G19 · Ratio & proportion · AO3 · 4 marks

QN	ANSWER	MARK	GUIDANCE
12	**33 cm**	P1	For the scale factor from triangle *ADE* to triangle *ABC*: $\frac{10}{6} = \frac{5}{3}$
		P1	For $BC = 9 \times \frac{5}{3} = 15$
		P1	For $AC = 7.5 \times \frac{5}{3} = 12.5$, so $EC = 5$
		A1	For $4 + 15 + 5 + 9 = 33$

Question 13

Algebraic proof · A6 · Algebra · AO2 · 3 marks

QN	ANSWER	MARK	GUIDANCE
13	**Proof**	**M1**	For three consecutive integers written as, e.g., $n-1, n, n+1$ and the sum of their squares
		M1	For $n^2 - 2n + 1 + n^2 + n^2 + 2n + 1 = 3n^2 + 2$
		C1	For $3n^2 + 2 = 3(n^2 + 1) - 1$, so always 1 less than a multiple of 3

Paper overview

Q	TOPIC	SPEC REF	STRAND	AO	MARKS
1	Error interval (truncation)	N15	Number	AO1	2
2	Successive percentages	R9	Ratio & proportion	AO2	3
3	Averages from a table	S4	Statistics	AO1	3
4	Factorise quadratics	A4	Algebra	AO1	2
5	Pythagoras with surds	G20 · N8	Geometry & measures	AO3	3
6	Congruent triangles	G5 · G6	Geometry & measures	AO2	3
7	Linear and quadratic	A19	Algebra	AO1	4
8	Histograms	S3	Statistics	AO1 · AO2 · AO3	4
9	Surds	N8	Number	AO1 · AO2	4
10	Parallel lines	A9	Algebra	AO3	3
11	Graph transformations	A13	Algebra	AO1	2
12	Similar triangles	R12 · G19	Ratio & proportion	AO3	4
13	Algebraic proof	A6	Algebra	AO2	3
Total					**40**

Marks by strand

Number	**6 marks (15%)**
Algebra	**14 marks (35%)**
Ratio & proportion	**7 marks (18%)**
Geometry & measures	**6 marks (15%)**
Probability	**0 marks (0%)**
Statistics	**7 marks (18%)**

Marks by assessment objective

AO1 Standard techniques	**16 marks (40%)**
AO2 Reasoning	**12 marks (30%)**
AO3 Problem solving	**12 marks (30%)**