CALC A · MARK SCHEME

GCSE Mathematics · Higher Tier

40 marks · 45 minutes · 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

Percentage profit · R9 · Ratio & proportion · AO1 · AO3 · 4 marks

QN	ANSWER	MARK	GUIDANCE
1(a)	**38.7%**	**M1**	For $\frac{40\times5.20-150}{150} \times 100$, i.e. $\frac{58}{150} \times 100$
		A1	Accept 38.6 to 38.7
1(b)	**£6**	**P1**	For $150 \times 1.6\ (= 240)$
		A1	For $240 \div 40 = 6$ cao

Question 2

Standard form · N9 · Number · AO1 · 2 marks

QN	ANSWER	MARK	GUIDANCE
2	1.64×10^{14}	**M1**	For 1.6384×10^{14} or 163 840 000 000 000 seen
		A1	cao

Question 3

Stratified sampling · S1 · Statistics · AO1 · 2 marks

QN	ANSWER	MARK	GUIDANCE
3	**16**	**M1**	For $\frac{250}{1240} \times 80\ (= 16.12\ldots)$
		A1	cao

Question 4

Equations from a context · A17 · Algebra · AO3 · 3 marks

QN	ANSWER	MARK	GUIDANCE
4	15	P1	For $28 + 19.5m = 85 + 15.7m$ oe
		P1	For $3.8m = 57$ oe
		A1	cao (both total costs are £320.50)

Question 5

Compound interest · R16 · Ratio & proportion · AO2 · 3 marks

QN	ANSWER	MARK	GUIDANCE
5	Yes, £700.75	M1	For 6000×1.028^4 $(= 6700.75\ldots)$
		A1	For interest of £700.75 (accept 700.7 to 700.8)
		C1	For stating Ella is correct, with £700.75 $>$ £700. Simple interest of £672 scores M0 A0 C0

Question 6

Tree diagrams · P8 · Probability · AO1 · AO2 · 4 marks

QN	ANSWER	MARK	GUIDANCE
6(a)	Correct tree	B1	For 0.85 on the train "not late" branch
		B1	For 0.28 and 0.72 correctly placed on both pairs of bus branches
6(b)	No, 0.346	M1	For $0.15 \times 0.72 + 0.85 \times 0.28$
		C1	For 0.346 and stating Kim is not correct

Question 7

Composite solid volume · G17 · Geometry & measures · AO3 · 3 marks

QN	ANSWER	MARK	GUIDANCE
7	$h = 9.89$	P1	For the hemisphere volume $\frac{2}{3} \times \pi \times 4.5^3$ $(= 190.85\ldots)$
		P1	For $(820 - 190.85\ldots) \div (\pi \times 4.5^2)$
		A1	Accept 9.88 to 9.89

Question 8

Pythagoras and trig · G20 · Geometry & measures · AO3 · 4 marks

QN	ANSWER	MARK	GUIDANCE
8	$49.9°$	P1	For $AC^2 = 6.4^2 + 4.8^2$
		A1	For $AC = 8$ cm
		P1	For $\tan CAD = \frac{9.5}{8}$
		A1	Accept 49.8 to 49.9

Question 9

Iteration · A20 · Algebra · AO1 · AO2 · 4 marks

QN	ANSWER	MARK	GUIDANCE
9(a)	**Shown**	M1	For substituting $x = 1$ and $x = 2$, giving -2 and 7
		C1	For stating there is a change of sign, so there is a solution between 1 and 2
9(b)	**1.3389, 1.3243, 1.3298**	M1	For $x_1 = 1.3388\ldots$ or 1.3389
		A1	For $x_3 = 1.3298$ (with $x_2 = 1.3242\ldots$)

Question 10

Bounds and speed · N16 · R11 · Number · AO1 · AO2 · 4 marks

QN	ANSWER	MARK	GUIDANCE
10(a)	**52.35 s**	**B1**	cao
10(b)	**No, with 7.55 m/s**	**M1**	For 395 ÷ 52.35 (lower bound of distance ÷ upper bound of time)
		A1	For 7.545...(accept 7.54 to 7.55)
		C1	For stating the coach is not correct, as the speed could be less than 7.6 m/s

Question 11

Cosine rule · G22 · Geometry & measures · AO1 · 3 marks

QN	ANSWER	MARK	GUIDANCE
11	**31.5 cm**	**M1**	For $QR^2 = 8.4^2 + 11.2^2 - 2 \times 8.4 \times 11.2 \times \cos 73°$
		M1	For $QR = 11.87\ldots$
		A1	For a perimeter in the range 31.4 to 31.5

Question 12

Quadratic formula · A18 · Algebra · AO1 · AO2 · 4 marks

QN	ANSWER	MARK	GUIDANCE
12(a)	**Shown**	**C1**	For $4x^2 - 4x + 1 = 3x + 5$ leading to $4x^2 - 7x - 4 = 0$
12(b)	**2.20,** -0.45	**M1**	For $\frac{7 \pm \sqrt{(-7)^2 - 4 \times 4 \times (-4)}}{2 \times 4}$
		M1	For $\frac{7 \pm \sqrt{113}}{8}$
		A1	For 2.20 and -0.45 (both correct to 2 decimal places)

Paper overview

Q	TOPIC	SPEC REF	STRAND	AO	MARKS
1	Percentage profit	R9	Ratio & proportion	AO1 · AO3	4
2	Standard form	N9	Number	AO1	2
3	Stratified sampling	S1	Statistics	AO1	2
4	Equations from a context	A17	Algebra	AO3	3
5	Compound interest	R16	Ratio & proportion	AO2	3
6	Tree diagrams	P8	Probability	AO1 · AO2	4
7	Composite solid volume	G17	Geometry & measures	AO3	3
8	Pythagoras and trig	G20	Geometry & measures	AO3	4
9	Iteration	A20	Algebra	AO1 · AO2	4
10	Bounds and speed	N16 · R11	Number	AO1 · AO2	4
11	Cosine rule	G22	Geometry & measures	AO1	3
12	Quadratic formula	A18	Algebra	AO1 · AO2	4
Total					**40**

Marks by strand

Number	**6 marks (15%)**
Algebra	**11 marks (28%)**
Ratio & proportion	**7 marks (18%)**
Geometry & measures	**10 marks (25%)**
Probability	**4 marks (10%)**
Statistics	**2 marks (5%)**

Marks by assessment objective

AO1 Standard techniques	**17 marks (42%)**
AO2 Reasoning	**11 marks (28%)**
AO3 Problem solving	**12 marks (30%)**