CALC G · 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

Ratio and percentage loss · R5 · R9 · Ratio & proportion · AO1 · 3 marks

QN	ANSWER	MARK	GUIDANCE
1(a)	**27.5%**	**M1**	For $\frac{8400-6090}{8400} \times 100$, or $\frac{2310}{8400}$, or $1 - \frac{6090}{8400}$
		A1	cao
1(b)	**£3480**	**B1**	For $6090 \div 7 \times 4$

Question 2

Standard form · N9 · Number · AO1 · AO3 · 4 marks

QN	ANSWER	MARK	GUIDANCE
2(a)	**150 000 000 000**	**B1**	cao
2(b)	**242**	**P1**	For a time for one distance, e.g. $(4.5 \times 10^{12}) \div (3.0 \times 10^{8}) = 15\,000$ s or $(1.5 \times 10^{11}) \div (3.0 \times 10^{8}) = 500$ s
		P1	For the difference in seconds converted to minutes, e.g. $(15\,000 - 500) \div 60$
		A1	For 242 (accept 241.6 to 242)

Question 3

Comparing distributions · S4 · Statistics · AO1 · AO2 · 4 marks

QN	ANSWER	MARK	GUIDANCE
3(a)	**Mean 14, range 13**	B1	For a mean of 14 ($112 \div 8$)
		B1	For a range of 13 ($22 - 9$)
3(b)	**Comparison**	C1	For comparing the means in context, e.g. on average, customers waited less time at Garage **B** (ft their mean)
		C1	For comparing the ranges in context, e.g. the times at Garage **B** were more consistent, as the range is smaller (ft their range)

Question 4

Prism volume · G16 · R1 · Geometry & measures · AO1 · 3 marks

QN	ANSWER	MARK	GUIDANCE
4	**16 minutes 15 seconds**	M1	For the area of the cross-section, $\frac{1}{2}(40 + 25) \times 30 = 975$ cm^2
		M1	For the volume $975 \times 150 = 146\,250$ cm^3 and dividing by 1000 and by 9, i.e. $146.25 \div 9 = 16.25$
		A1	cao

Question 5

Simultaneous equations · A19 · Algebra · AO1 · 3 marks

QN	ANSWER	MARK	GUIDANCE
5	$x = 2.75$, $y = 2.5$	M1	For a correct method to eliminate one variable, e.g. $38x = 104.5$ or $19y = 47.5$
		M1	For substituting their found value into one of the equations
		A1	Both values correct

Question 6

At least one · P8 · Probability · AO2 · 3 marks

QN	ANSWER	MARK	GUIDANCE
6	**No, with 0.385875**	**M1**	For $1 - 0.15 = 0.85$ used, e.g. $0.85^3 = 0.614125$
		M1	For $1 - 0.85^3$
		C1	For 0.386 (accept 0.385 to 0.386) and stating Mo is not correct, as $0.386 < 0.4$

Question 7

Iteration · A20 · Algebra · AO1 · 3 marks

QN	ANSWER	MARK	GUIDANCE
7	**1.5703**	**M1**	For $x_1 = \sqrt[3]{7-3} = 1.5874\ldots$
		M1	For $x_2 = 1.5639\ldots$
		A1	For 1.5703 (from 1.570302...)

Question 8

Compound interest · R16 · Ratio & proportion · AO3 · 3 marks

QN	ANSWER	MARK	GUIDANCE
8	**3.6**	**P1**	For $4000 \times m^5 = 4773.74$ oe, where m is the multiplier
		P1	For $m = \sqrt[5]{\frac{4773.74}{4000}} = 1.036$
		A1	For 3.6 (a trial and improvement method that reaches 3.6 with a check scores full marks)

Question 9

Area of a segment · G18 · G23 · Geometry & measures · AO2 · 3 marks

QN	ANSWER	MARK	GUIDANCE
9	**Shown**	**M1**	For the area of the sector, $\frac{110}{360} \times \pi \times 8^2 = 61.43\ldots$
		M1	For the area of triangle OAB, $\frac{1}{2} \times 8 \times 8 \times \sin 110° = 30.07\ldots$
		C1	For $61.43\ldots - 30.07\ldots = 31.36\ldots$, which is 31.4 to 3 s.f.

Question 10

Inverse proportion · R10 · Ratio & proportion · AO3 · 3 marks

QN	ANSWER	MARK	GUIDANCE
10	**30.6%**	**P1**	For $F = \frac{k}{d^2}$, or for choosing values, e.g. $d = 10$ and $d = 12$
		P1	For the new force $= \frac{F}{1.2^2} = 0.6944\ldots F$
		A1	For 30.6 (accept 30.5 to 30.6)

Question 11

Similar solids · G19 · R12 · Geometry & measures · AO2 · 3 marks

QN	ANSWER	MARK	GUIDANCE
11	**No, with 810 cm^2**	**M1**	For the length scale factor $\sqrt[3]{\frac{1350}{400}} = 1.5$
		M1	For 360×1.5^2
		C1	For 810 and stating Lia is not correct, as $810 > 800$

Question 12

Functions · A7 · Algebra · AO1 · AO3 · 5 marks

QN	ANSWER	MARK	GUIDANCE
12(a)	$\frac{x+5}{3}$	M1	For $y = 3x - 5$ rearranged, e.g. $x = \frac{y+5}{3}$, or a correct flow diagram
		A1	For $\frac{x+5}{3}$ oe
12(b)	**3.76, 1.24**	P1	For $fg(x) = 3x^2 - 2$ or $gf(x) = 9x^2 - 30x + 26$
		P1	For $6x^2 - 30x + 28 = 0$ oe, e.g. $3x^2 - 15x + 14 = 0$, and a correct method to solve it
		A1	For 3.76 and 1.24

Paper overview

Q	TOPIC	SPEC REF	STRAND	AO	MARKS
1	Ratio and percentage loss	R5 · R9	Ratio & proportion	AO1	3
2	Standard form	N9	Number	AO1 · AO3	4
3	Comparing distributions	S4	Statistics	AO1 · AO2	4
4	Prism volume	G16 · R1	Geometry & measures	AO1	3
5	Simultaneous equations	A19	Algebra	AO1	3
6	At least one	P8	Probability	AO2	3
7	Iteration	A20	Algebra	AO1	3
8	Compound interest	R16	Ratio & proportion	AO3	3
9	Area of a segment	G18 · G23	Geometry & measures	AO2	3
10	Inverse proportion	R10	Ratio & proportion	AO3	3
11	Similar solids	G19 · R12	Geometry & measures	AO2	3
12	Functions	A7	Algebra	AO1 · AO3	5
Total					**40**

Marks by strand

Number	**4 marks (10%)**
Algebra	**11 marks (28%)**
Ratio & proportion	**9 marks (22%)**
Geometry & measures	**9 marks (22%)**
Probability	**3 marks (8%)**
Statistics	**4 marks (10%)**

Marks by assessment objective

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