CALC F · 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

Best buy · R6 · Ratio & proportion · AO2 · 3 marks

QN	ANSWER	MARK	GUIDANCE
1	**Shop B, with correct comparison**	M1	For the discounted price in Shop B: 6.80×0.8 (= \$5.44)
		M1	For a correct comparison method, e.g. $3.78 \div 1.2$ (= \$3.15 per kg) and $5.44 \div 2$ (= \$2.72 per kg), or cost per 100 g
		C1	For correct values and the conclusion that Shop B is better value

Question 2

Standard form · N9 · Number · AO1 · 2 marks

QN	ANSWER	MARK	GUIDANCE
2	3.06×10^{-4}	M1	For 3.6×8.5 (= 30.6) or 30.6×10^{-5} or 0.000306
		A1	cao

Question 3

Two-way tables · P6 · Probability · AO1 · AO2 · 3 marks

QN	ANSWER	MARK	GUIDANCE
3(a)	$\frac{25}{140}$	B1	oe, e.g. $\frac{5}{28}$
3(b)	**No, with** 0.3 **and** 0.35	M1	For $\frac{24}{80}$ or $\frac{21}{60}$
		C1	For $\frac{24}{80} = 0.3$ and $\frac{21}{60} = 0.35$ oe and stating that Ali is not correct (a Year 11 student is more likely to choose tennis)

Question 4

Length of a line segment · G20 · Geometry & measures · AO1 · 2 marks

QN	ANSWER	MARK	GUIDANCE
4	13.0	M1	For $7^2 + 11^2$ $(= 170)$
		A1	Accept 13.0 to 13.04

Question 5

Half-life · R16 · Ratio & proportion · AO1 · AO2 · 3 marks

QN	ANSWER	MARK	GUIDANCE
5(a)	45 mg	B1	cao (18 hours is 3 half-lives: $360 \rightarrow 180 \rightarrow 90 \rightarrow 45$)
5(b)	No, with 1.40625	M1	For 8 half-lives in 48 hours, e.g. 360×0.5^8 or $360 \div 256$
		C1	For 1.40625 (or 1.4) mg and stating Kiera is not correct

Question 6

Arithmetic sequences · A25 · Algebra · AO3 · 3 marks

QN	ANSWER	MARK	GUIDANCE
6	253	P1	For the common difference $(53 - 23) \div 6 = 5$
		P1	For the first term $23 - 3 \times 5 = 8$, or nth term $5n + 3$
		A1	cao

Question 7

Perimeter of a sector · G18 · Geometry & measures · AO1 · 2 marks

QN	ANSWER	MARK	GUIDANCE
7	37.8	M1	For the arc length $\frac{140}{360} \times 2 \times \pi \times 8.5$ $(= 20.76\ldots)$
		A1	Accept 37.7 to 37.8

Question 8

Similar shapes: area · R12 · Ratio & proportion · AO2 · 2 marks

QN	ANSWER	MARK	GUIDANCE
8	**No, with 12.8**	**M1**	For the length scale factor $\sqrt{\frac{80}{45}} = \frac{4}{3}$
		C1	For 12.8 cm and stating Kai is not correct (he used the area scale factor)

Question 9

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

QN	ANSWER	MARK	GUIDANCE
9	**96.4**	**M1**	For $12^2 = 9^2 + 7^2 - 2 \times 9 \times 7 \times \cos R$ or $\cos R = \frac{9^2+7^2-12^2}{2\times9\times7}$
		M1	For $\cos R = -\frac{14}{126}$ $(= -0.111\ldots)$
		A1	Accept 96.3 to 96.4

Question 10

Bounds · N16 · Number · AO1 · AO2 · 4 marks

QN	ANSWER	MARK	GUIDANCE
10(a)	3.7555...	**M1**	For $8.45 \div 2.25$
		A1	For 3.7555...(accept 3.755 or 3.756)
10(b)	**No, with reason**	**M1**	For the lower bound $8.35 \div 2.35$ $(= 3.553\ldots)$
		C1	For stating no, because the lower bound rounds to 3.6 and the upper bound rounds to 3.8 (they do not agree to 1 decimal place)

Question 11

Median from a histogram · S3 · Statistics · AO3 · 3 marks

QN	ANSWER	MARK	GUIDANCE
11	22.7	P1	For frequencies 12, 26, 22, 24, 16 (total 100)
		P1	For locating the median in the class $20 < d \leqslant 25$ and $20 + \frac{50-38}{22} \times 5$ oe
		A1	Accept 22.7 to 22.9

Question 12

Transforming graphs · A13 · Algebra · AO1 · 4 marks

QN	ANSWER	MARK	GUIDANCE
12(a)	$(-2,\ 5)$	B1	cao
12(b)	$(2,\ 2)$	B1	cao
12(c)	$(2,\ -5)$	B1	cao
12(d)	$(1,\ 5)$	B1	cao

Question 13

3D trigonometry · G20 · Geometry & measures · AO3 · 3 marks

QN	ANSWER	MARK	GUIDANCE
13	21.2	P1	For $AC = \sqrt{9^2 + 5^2}$ $(= \sqrt{106} = 10.29\ldots)$
		P1	For $\tan GAC = \frac{4}{\sqrt{106}}$, or $AG = \sqrt{122}$ and $\sin GAC = \frac{4}{\sqrt{122}}$
		A1	Accept 21.2 to 21.24

Question 14

Quadratic formula · A18 · A21 · Algebra · AO3 · 3 marks

QN	ANSWER	MARK	GUIDANCE
14	2.96	P1	For setting $h = 0$: $4.9t^2 - 14t - 1.5 = 0$ oe
		P1	For $t = \frac{14 \pm \sqrt{14^2 - 4 \times 4.9 \times (-1.5)}}{2 \times 4.9}$
		A1	Accept 2.96 to 2.961 (the negative solution is rejected)

Paper overview

Q	TOPIC	SPEC REF	STRAND	AO	MARKS
1	Best buy	R6	Ratio & proportion	AO2	3
2	Standard form	N9	Number	AO1	2
3	Two-way tables	P6	Probability	AO1 · AO2	3
4	Length of a line segment	G20	Geometry & measures	AO1	2
5	Half-life	R16	Ratio & proportion	AO1 · AO2	3
6	Arithmetic sequences	A25	Algebra	AO3	3
7	Perimeter of a sector	G18	Geometry & measures	AO1	2
8	Similar shapes: area	R12	Ratio & proportion	AO2	2
9	Cosine rule: angle	G22	Geometry & measures	AO1	3
10	Bounds	N16	Number	AO1 · AO2	4
11	Median from a histogram	S3	Statistics	AO3	3
12	Transforming graphs	A13	Algebra	AO1	4
13	3D trigonometry	G20	Geometry & measures	AO3	3
14	Quadratic formula	A18 · A21	Algebra	AO3	3
Total					**40**

Marks by strand

Number	**6 marks (15%)**
Algebra	**10 marks (25%)**
Ratio & proportion	**8 marks (20%)**
Geometry & measures	**10 marks (25%)**
Probability	**3 marks (8%)**
Statistics	**3 marks (8%)**

Marks by assessment objective

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