NON-CALC F · 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

Prime factors and LCM · N4 · Number · AO1 · AO3 · 4 marks

QN	ANSWER	MARK	GUIDANCE
1(a)	$2^2 \times 3 \times 7$	M1	For a factor tree or repeated division with at least two correct steps
		A1	For $2 \times 2 \times 3 \times 7$ or $2^2 \times 3 \times 7$
1(b)	**10:07 am**	P1	For finding the LCM of 84 and 60 = 420 (seconds), e.g. from $2^2 \times 3 \times 5 \times 7$, or listing multiples
		A1	For 10:07 am oe (420 seconds = 7 minutes)

Question 2

Fractions of amounts · R3 · N12 · Ratio & proportion · AO3 · 3 marks

QN	ANSWER	MARK	GUIDANCE
2	**Yes, with £135**	P1	For $\frac{3}{8} \times 360$ (= 135) and 360 − 135 (= 225)
		P1	For $\frac{2}{5} \times 225$ (= 90), or $\frac{3}{5} \times 225$
		C1	For £135 left and stating that Priya is correct

Question 3

Capture–recapture · S1 · R7 · Statistics · AO1 · AO2 · 3 marks

QN	ANSWER	MARK	GUIDANCE
3(a)	250	M1	For $\frac{8}{50} = \frac{40}{N}$ oe, or $\frac{40\times50}{8}$
		A1	cao
3(b)	Assumption	C1	For a correct assumption, e.g. no fish are born, die, join or leave the pond; the marks do not come off; the marked fish mix evenly with the others

Question 4

Expected outcomes · P2 · P3 · Probability · AO3 · AO1 · 3 marks

QN	ANSWER	MARK	GUIDANCE
4(a)	0.15	P1	For $1 - 0.25 - 0.3$ $(= 0.45)$
		A1	For $0.45 \div 3 = 0.15$ oe
4(b)	60	B1	For 60, or ft $2\times$ their (a) $\times 200$

Question 5

Show that: expanding · A4 · A6 · Algebra · AO2 · 3 marks

QN	ANSWER	MARK	GUIDANCE
5	Proof	M1	For $x^2 + 10x + 25$ or $x^2 - 6x + 9$
		M1	For $x^2 + 10x + 25 - (x^2 - 6x + 9)$ or $x^2 + 10x + 25 - x^2 + 6x - 9$
		C1	For $16x + 16 = 16(x + 1)$ with no errors seen

Question 6

Angles in polygons · G3 · Geometry & measures · AO3 · 3 marks

QN	ANSWER	MARK	GUIDANCE
6	**20**	**P1**	For $360 - 108 - 90$ $(= 162)$, using interior angles $108°$ and $90°$
		P1	For exterior angle $180 - 162 = 18$ and $360 \div 18$
		A1	cao

Question 7

Bearings · G15 · Geometry & measures · AO3 · 3 marks

QN	ANSWER	MARK	GUIDANCE
7	$122°$	**P1**	For angle $ABC = 64°$ (alternate angles)
		P1	For angle $BAC = \frac{180-64}{2}$ $(= 58)$
		A1	For $64 + 58 = 122°$

Question 8

Real-life graphs · A14 · R14 · Algebra · AO2 · 4 marks

QN	ANSWER	MARK	GUIDANCE
8(a)	**5 cm per minute**	**M1**	For $\frac{30}{6}$
		C1	For 5 with correct units, e.g. cm/min
8(b)	**Description**	**C1**	For e.g. the depth stayed at 30 cm, or no water was poured in
8(c)	**Yes, with reason**	**C1**	For e.g. the line is steeper, or $\frac{30}{4} = 7.5$ cm/min > 5 cm/min

Question 9

Vectors: midpoint · G25 · Geometry & measures · AO1 · 2 marks

QN	ANSWER	MARK	GUIDANCE
9	$\frac{1}{2}\mathbf{a}+\frac{1}{2}\mathbf{b}$	M1	For $\overrightarrow{AB}=\mathbf{b}-\mathbf{a}$, or $\mathbf{a}+\frac{1}{2}(\mathbf{b}-\mathbf{a})$
		A1	oe, e.g. $\frac{1}{2}(\mathbf{a}+\mathbf{b})$

Question 10

Completing the square · A18 · N8 · Algebra · AO1 · 4 marks

QN	ANSWER	MARK	GUIDANCE
10(a)	$(x+3)^2-20$	M1	For $(x+3)^2$
		A1	cao
10(b)	$-3\pm2\sqrt{5}$	M1	For $x+3=\pm\sqrt{20}$, ft from (a)
		A1	cao

Question 11

Area with exact trig · G21 · G23 · Geometry & measures · AO1 · 2 marks

QN	ANSWER	MARK	GUIDANCE
11	$15\sqrt{3}$ **cm**^{2}	M1	For $\frac{1}{2}\times10\times6\times\sin120°$ with $\sin120°=\frac{\sqrt{3}}{2}$
		A1	cao

Question 12

Direct proportion · R13 · Ratio & proportion · AO1 · AO2 · 4 marks

QN	ANSWER	MARK	GUIDANCE
12(a)	**20**	M1	For $y=k\sqrt{x}$
		M1	For $12=k\times3$, so $k=4$
		A1	cao
12(b)	**No, with reason**	C1	For e.g. y is multiplied by $\sqrt{4}=2$

Question 13

Recurring decimal proof · N10 · Number · AO2 · 2 marks

QN	ANSWER	MARK	GUIDANCE
13	**Proof**	**M1**	For e.g. $1000x = 318.1818\ldots$ and $10x = 3.1818\ldots$, so $990x = 315$
		C1	For $\frac{315}{990} = \frac{7}{22}$ with full working

Paper overview

Q	TOPIC	SPEC REF	STRAND	AO	MARKS
1	Prime factors and LCM	N4	Number	AO1 · AO3	4
2	Fractions of amounts	R3 · N12	Ratio & proportion	AO3	3
3	Capture–recapture	S1 · R7	Statistics	AO1 · AO2	3
4	Expected outcomes	P2 · P3	Probability	AO3 · AO1	3
5	Show that: expanding	A4 · A6	Algebra	AO2	3
6	Angles in polygons	G3	Geometry & measures	AO3	3
7	Bearings	G15	Geometry & measures	AO3	3
8	Real-life graphs	A14 · R14	Algebra	AO2	4
9	Vectors: midpoint	G25	Geometry & measures	AO1	2
10	Completing the square	A18 · N8	Algebra	AO1	4
11	Area with exact trig	G21 · G23	Geometry & measures	AO1	2
12	Direct proportion	R13	Ratio & proportion	AO1 · AO2	4
13	Recurring decimal proof	N10	Number	AO2	2
Total					**40**

Marks by strand

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