NON-CALC C · 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

Estimation · N14 · Number · AO1 · 2 marks

QN	ANSWER	MARK	GUIDANCE
1	12 000	M1	For rounding at least two of the numbers correctly to 1 significant figure, e.g. $\frac{60\times4}{0.02}$
		A1	For 12 000 cao (from $240 \div 0.02$)

Question 2

LCM problem · N4 · Number · AO3 · 3 marks

QN	ANSWER	MARK	GUIDANCE
2	20	P1	For listing multiples or writing prime factors, e.g. $12 = 2^2 \times 3$, $20 = 2^2 \times 5$, $45 = 3^2 \times 5$
		P1	For the LCM of 180 seconds (3 minutes)
		A1	For $3600 \div 180 = 20$ cao

Question 3

Scatter graphs · S6 · Statistics · AO1 · AO2 · 3 marks

QN	ANSWER	MARK	GUIDANCE
3(a)	Negative correlation	C1	For e.g. the higher the temperature, the fewer hot drinks are sold
3(b)	60 to 68	B1	For an answer in the range 60 to 68, from a suitable line of best fit
3(c)	Explanation	C1	For e.g. 35°C is outside the range of the data, so the trend may not continue (extrapolation)

Question 4

Rearranging formulae · A5 · Algebra · AO1 · AO2 · 3 marks

QN	ANSWER	MARK	GUIDANCE
4(a)	**Explanation**	C1	For e.g. Kai did not multiply the -4 by 3; the first line should be $3y = 5x^2 - 12$
4(b)	$\sqrt{\frac{3y+12}{5}}$	M1	For $3y + 12 = 5x^2$ or $y + 4 = \frac{5x^2}{3}$
		A1	For $x = \sqrt{\frac{3y+12}{5}}$ oe, e.g. $\sqrt{\frac{3(y+4)}{5}}$; accept $\pm$

Question 5

Average speed · R11 · Ratio & proportion · AO3 · 4 marks

QN	ANSWER	MARK	GUIDANCE
5	**48 km/h**	P1	For the time for the first part, $45 \div 60 = 0.75$ hours (45 minutes)
		P1	For the time for the second part, $75 \div 50 = 1.5$ hours (90 minutes)
		P1	For total distance $\div$ total time, $120 \div 2.5$ (including the 15-minute stop)
		A1	cao

Question 6

Describe a transformation · G7 · Geometry & measures · AO1 · 3 marks

QN	ANSWER	MARK	GUIDANCE
6	**Rotation** $90°$ **clockwise, centre** $(0, -1)$	B1	For rotation
		B1	For $90°$ clockwise (or $270°$ anticlockwise)
		B1	For centre $(0, -1)$. Award no marks if more than one transformation is given

Question 7

Inequalities · A22 · Algebra · AO1 · 3 marks

QN	ANSWER	MARK	GUIDANCE
7(a)	$-3 < x \leqslant 3$	M1	For $-9 < 3x \leqslant 9$, or one correct end of the inequality
		A1	cao
7(b)	$-2, -1, 0, 1, 2, 3$	B1	cao; ft their part (a) if it has two ends

Question 8

Product rule for counting · N5 · Number · AO2 · 2 marks

QN	ANSWER	MARK	GUIDANCE
8	**No, 4320**	M1	For $6 \times 10 \times 9 \times 8$
		C1	For 4320 and stating Jo is not correct, as $4320 < 5000$

Question 9

Quadratic sequences · A25 · Algebra · AO1 · 3 marks

QN	ANSWER	MARK	GUIDANCE
9	$2n^2 + n + 1$	M1	For a second difference of 4, or $2n^2$ seen
		M1	For subtracting $2n^2$ to give $2, 3, 4, 5, \ldots$
		A1	oe

Question 10

Circle theorems · G10 · Geometry & measures · AO2 · 4 marks

QN	ANSWER	MARK	GUIDANCE
10	66°	B1	For angle OAP = angle $OBP = 90°$
		B1	For angle $AOB = 360 - 90 - 90 - 48 = 132°$
		B1	For angle $ACB = 66°$
		C1	For all reasons: a tangent is perpendicular to the radius; angles in a quadrilateral add up to 360°; the angle at the centre is twice the angle at the circumference

Question 11

Algebraic fractions · A4 · Algebra · AO2 · 3 marks

QN	ANSWER	MARK	GUIDANCE
11	**Shown**	M1	For factorising, e.g. $(x-3)(x+3)$ and $(2x-1)(x+3)$, or $4x-2 = 2(2x-1)$
		M1	For multiplying by the reciprocal, $\frac{(x-3)(x+3)}{(2x-1)(x+3)} \times \frac{2(2x-1)}{x-3}$
		C1	For cancelling fully to reach 2, with all factorisations correct

Question 12

Inverse proportion · R10 · Ratio & proportion · AO1 · AO3 · 4 marks

QN	ANSWER	MARK	GUIDANCE
12(a)	$y = \frac{60}{x}$	M1	For $y = \frac{k}{x}$ and $10 = \frac{k}{6}$
		A1	oe
12(b)	12	P1	For $\frac{60}{a} = a - 7$ leading to $a^2 - 7a - 60 = 0$
		A1	For 12 cao, from $(a-12)(a+5) = 0$, rejecting -5

Question 13

Conditional probability · P9 · Probability · AO3 · 3 marks

QN	ANSWER	MARK	GUIDANCE
13	$\frac{17}{41}$	P1	For 56 girls and $20 + 3k = 56$, so 12 girls chose kayaking and 24 chose archery
		P1	For $41 - 24 = 17$ boys chose archery
		A1	oe

Paper overview

Q	TOPIC	SPEC REF	STRAND	AO	MARKS
1	Estimation	N14	Number	AO1	2
2	LCM problem	N4	Number	AO3	3
3	Scatter graphs	S6	Statistics	AO1 · AO2	3
4	Rearranging formulae	A5	Algebra	AO1 · AO2	3
5	Average speed	R11	Ratio & proportion	AO3	4
6	Describe a transformation	G7	Geometry & measures	AO1	3
7	Inequalities	A22	Algebra	AO1	3
8	Product rule for counting	N5	Number	AO2	2
9	Quadratic sequences	A25	Algebra	AO1	3
10	Circle theorems	G10	Geometry & measures	AO2	4
11	Algebraic fractions	A4	Algebra	AO2	3
12	Inverse proportion	R10	Ratio & proportion	AO1 · AO3	4
13	Conditional probability	P9	Probability	AO3	3
Total					**40**

Marks by strand

Number	**7 marks (18%)**
Algebra	**12 marks (30%)**
Ratio & proportion	**8 marks (20%)**
Geometry & measures	**7 marks (18%)**
Probability	**3 marks (8%)**
Statistics	**3 marks (8%)**

Marks by assessment objective

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