NON-CALC H · 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

VAT and discount · R9 · Ratio & proportion · AO1 · 3 marks

QN	ANSWER	MARK	GUIDANCE
1	£81.60	M1	For finding the price including VAT, e.g. $80 \times 1.2 = 96$ or $80 + 16 = 96$
		M1	For a correct method to reduce their 96 by 15%, e.g. 96×0.85 or $96 - 14.40$
		A1	For 81.60 (accept 81.6)

Question 2

Inequalities · A22 · Algebra · AO1 · 2 marks

QN	ANSWER	MARK	GUIDANCE
2	$-2, -1, 0, 1, 2$	M1	For $-6 \leqslant 3n < 9$ or $-2 \leqslant n < 3$, or for a list with one error or omission
		A1	For all five values and no others

Question 3

Ratio after a transfer · R5 · Ratio & proportion · AO3 · 3 marks

QN	ANSWER	MARK	GUIDANCE
3	30	P1	For recognising that the total does not change, so both ratios have 8 parts, or forming $3(3x + 12) = 5(5x - 12)$
		P1	For $5 - 3 = 2$ parts $= 12$, so 1 part $= 6$, or for $x = 6$
		A1	cao

Question 4

Comparing box plots · S4 · Statistics · AO2 · 3 marks

QN	ANSWER	MARK	GUIDANCE
4(a)	**Comparison**	C1	For comparing the medians in context, e.g. the median for Year 11 (33) is higher than for Year 10 (26), so on average Year 11 took longer
		C1	For comparing the IQRs (or ranges) in context, e.g. the IQR for Year 11 (10) is smaller than for Year 10 (14), so Year 11's times were more consistent
4(b)	**Yes, with reason**	C1	For Yes, as the median for Year 11 is 33 minutes, which is more than 30 minutes

Question 5

Transformations · G7 · Geometry & measures · AO1 · AO2 · 4 marks

QN	ANSWER	MARK	GUIDANCE
5(a)	**Vertices** $(1, -2)$, $(1, -5)$, $(3, -2)$	B2	For the correct triangle. B1 for a rotation of 90° clockwise about a different centre, or 90° anticlockwise about O
5(b)	**Reflection in** $y = x$	B1	For reflection
		B1	For in the line $y = x$ (no other transformation stated)

Question 6

Arc length · G18 · Geometry & measures · AO3 · 3 marks

QN	ANSWER	MARK	GUIDANCE
6	$18 + 2\pi$ **cm**	P1	For $\frac{40}{360} \times 2\pi r = 2\pi$ oe
		P1	For $r = 9$
		A1	For $18 + 2\pi$ oe

Question 7

Quadratic sequences · A25 · Algebra · AO1 · 3 marks

QN	ANSWER	MARK	GUIDANCE
7	$-2n^2+3n+30$	M1	For a second difference of -4, or for $-2n^2$ seen
		M1	For subtracting $-2n^2$ (adding $2n^2$) to give $33, 36, 39, 42, 45$ (i.e. $3n+30$)
		A1	For $-2n^2+3n+30$ oe, e.g. $30+3n-2n^2$

Question 8

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

QN	ANSWER	MARK	GUIDANCE
8	**14 hours**	P1	For the total work $= 6 \times 20 = 120$ machine-hours
		P1	For $(120 - 6 \times 5) \div 10$ $(= 9)$
		A1	For $5 + 9 = 14$

Question 9

Surds · N8 · Number · AO1 · AO2 · 4 marks

QN	ANSWER	MARK	GUIDANCE
9(a)	$3\sqrt{3}$	M1	For $\sqrt{75} = 5\sqrt{3}$ or $\sqrt{12} = 2\sqrt{3}$
		A1	cao
9(b)	**Shown**	M1	For at least 3 of the 4 terms correct in $10 + 5\sqrt{3} - 2\sqrt{3} - 3$
		C1	For all four terms correct, with $\sqrt{3} \times \sqrt{3} = 3$ shown, leading to $7 + 3\sqrt{3}$

Question 10

Venn diagrams · P9 · Probability · AO3 · 3 marks

QN	ANSWER	MARK	GUIDANCE
10	$\frac{6}{19}$	P1	For finding the number with both, $28 + 19 + 9 - 50 = 6$, or a correct Venn diagram (22, 6, 13, 9)
		P1	For using 19 as the denominator, i.e. their $6 \div 19$
		A1	For $\frac{6}{19}$ oe

Question 11

Changing the subject · A5 · Algebra · AO1 · 3 marks

QN	ANSWER	MARK	GUIDANCE
11	$x = \frac{4y+2}{y-3}$	M1	For multiplying both sides by $x - 4$, i.e. $xy - 4y = 3x + 2$
		M1	For collecting the x terms on one side and factorising, e.g. $x(y - 3) = 4y + 2$
		A1	For $x = \frac{4y+2}{y-3}$ oe, e.g. $\frac{-4y-2}{3-y}$

Question 12

Equation of a circle · A16 · N8 · Algebra · AO1 · AO2 · 3 marks

QN	ANSWER	MARK	GUIDANCE
12(a)	**Shown**	C1	For $(-1)^2 + 7^2 = 1 + 49 = 50$
12(b)	$5\sqrt{2}$	B1	cao
12(c)	**Outside, with reason**	C1	For outside, as $6^2 + 4^2 = 52$ and $52 > 50$, or as the distance from O is $\sqrt{52} > \sqrt{50}$

Question 13

Algebraic proof · A6 · Algebra · AO2 · 3 marks

QN	ANSWER	MARK	GUIDANCE
13	**Proof**	**M1**	For two consecutive odd numbers written as, e.g., $2n-1$ and $2n+1$ (or $2n+1$ and $2n+3$)
		M1	For a correct expansion of their product, e.g. $(2n-1)(2n+1) = 4n^2 - 2n + 2n - 1$
		C1	For $4n^2 - 1$ (or $4n^2 + 8n + 3 = 4(n^2 + 2n + 1) - 1$), which is 1 less than $4n^2$, a multiple of 4, with a conclusion

Paper overview

Q	TOPIC	SPEC REF	STRAND	AO	MARKS
1	VAT and discount	R9	Ratio & proportion	AO1	3
2	Inequalities	A22	Algebra	AO1	2
3	Ratio after a transfer	R5	Ratio & proportion	AO3	3
4	Comparing box plots	S4	Statistics	AO2	3
5	Transformations	G7	Geometry & measures	AO1 · AO2	4
6	Arc length	G18	Geometry & measures	AO3	3
7	Quadratic sequences	A25	Algebra	AO1	3
8	Inverse proportion	R10	Ratio & proportion	AO3	3
9	Surds	N8	Number	AO1 · AO2	4
10	Venn diagrams	P9	Probability	AO3	3
11	Changing the subject	A5	Algebra	AO1	3
12	Equation of a circle	A16 · N8	Algebra	AO1 · AO2	3
13	Algebraic proof	A6	Algebra	AO2	3
Total					**40**

Marks by strand

Number	**4 marks (10%)**
Algebra	**14 marks (35%)**
Ratio & proportion	**9 marks (22%)**
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%)**