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Paper 1C

Mark scheme

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2 3 6 Y 9 2 6 0 / 1 C / M S

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Key to mark types and abbreviations

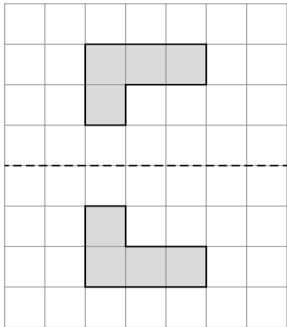
M	Method marks are awarded for a correct method which could lead to a correct answer.
A	Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.
B	Marks awarded independent of method.
ft	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
SC	Special case. Marks awarded for a common misinterpretation which has some mathematical worth.
M dep	A method mark dependent on a previous method mark being awarded.
B dep	A mark that can only be awarded if a previous independent mark has been awarded.
oe	Or equivalent. Accept answers that are equivalent. eg accept 0.5 as well as $\frac{1}{2}$
[a, b]	Accept values between a and b inclusive.
[a, b)	Accept values $a \leq \text{value} < b$
3.14 ...	Accept answers which begin 3.14 eg 3.14, 3.142, 3.1416
Use of brackets	It is not necessary to see the bracketed work to award the marks.

Q	Answer	Mark	Comments
1	36	B1	

Q	Answer	Mark	Comments
2	16	B1	

Q	Answer	Mark	Comments
3	11	B1	

Q	Answer	Mark	Comments
4	Rolling an odd number	B1	

Q	Answer	Mark	Comments
5	Fully correct reflection	B2	B1 correct shape and orientation anywhere on the grid
	Additional Guidance		
			B2
	Allow any or no shading and ignore internal lines		
	Mark intention		

Q	Answer	Mark	Comments
6(a)	2×26 or 52 or 4×19 or 76	M1	oe may be embedded eg $26 + 26 + 19$
	71	A1	
	Additional Guidance		
	M1 may be awarded for correct work with no answer or incorrect answer, even if this is seen amongst multiple attempts		
	$9.5(0) \times 8$		M1A0
	Answer 76		M1A0

Q	Answer	Mark	Comments
6(b)	$19 \div 2$ or $9.5(0)$	M1	oe may be embedded implied by $22.5(0)$
	$35.5(0)$	A1	

Q	Answer	Mark	Comments
7(a)	$(-2, 5)$	B1	

Q	Answer	Mark	Comments
7(b)	$(1, 2)$	B2	B1 $(1, \dots)$ or $(2, 1)$ or correct midpoint marked on diagram SC2 $(5, -2)$ in (a) and $(2, 1)$ in (b) SC1 $(5, -2)$ in (a) and $(\dots, 1)$ in (b)

Q	Answer	Mark	Comments
8(a)	$4.5 + 1 + 2$ or 7.5	M1	oe number of symbols
	$30 \div$ their 7.5 or $1 \text{ circle} = 4$	M1dep	may be seen on diagram implied by Correct = 18 or Incorrect = 4
	8	A1	SC2 22
	Additional Guidance		
	$1 \text{ circle} = 4$ or $\text{half-circle} = 2$		M1M1
	Condone an incorrect row total if working for Not answered is correct		
	Assuming an incorrect key eg $1 \text{ circle} = 2$ or $1 \text{ circle} = 3$		M0M0A0
	$30 \div 15 = 2$, but not linked to half-circles		M0M0A0

Q	Answer	Mark	Comments
8(b)	9×5 or 45	M1	
	6×-1 or -6	M1	$\frac{39}{n}$, $n \neq 150$ implies M2
	39	A1	condone $\frac{39}{150}$

Q	Answer	Mark	Comments
9(a)	$x + 32 + 90 = 180$ or $90 - 32$ or $180 - (90 + 32)$ or $180 - 122$	M1	oe equation or calculation
	58	A1	

Q	Answer	Mark	Comments
9(b)	$2y + 46 = 180$ or $180 - 46$ or 134	M1	oe equation or calculation
	67	A1	
	Additional Guidance		
	180 – 46 with further incorrect work eg $180 - 46 - 46$		M0A0

Q	Answer	Mark	Comments
10	Alternative method 1		
	$0.05 + 0.25 + 0.5$ or 0.8 or $5 + 25 + 50$ or 80	M1	
	$12 \div 0.8$ or $1200 \div 80$	M1dep	implied by 0.75, 3.75 and 7.5 or 75, 375 and 750
	15	A1	SC1 9.6
	Alternative method 2		
	$5 \times n + 25 \times n + 50 \times n$ evaluated where n is an integer ≥ 5	M1	oe working in dollars
	$5 \times 15 + 25 \times 15 + 50 \times 15 = 1200$	M1dep	oe working in dollars
	15	A1	SC1 9.6
	Additional Guidance		
	Up to M2 may be awarded for correct work with no answer or incorrect answer, even if this is seen amongst multiple attempts		
	For Alt 1 M1, 80 must be an amount of money, not 80 coins from $400 \div 5$		
	Embedded $5 \times 15 + 25 \times 15 + 50 \times 15 = 1200$ with answer 12		M1M1A0

Q	Answer	Mark	Comments
11	False False True	B2	B1 2 correct
	Additional Guidance		
	Only one cross in a row – mark the cross		
	A tick and cross in a row – mark the tick		

Q	Answer	Mark	Comments
12(a)	1.5 hours or 90 minutes or 1 hour 30 minutes	B1	oe units required
	Additional Guidance		
	Allow abbreviations for units		
	If correct answer seen ignore incorrect conversion eg 1.5 hours seen followed by answer 1 hour 50 minutes eg 1.30 hours and 90 minutes		B1 B1
	1.30 hours without correct answer		B0
	1 hour 50 minutes without correct answer		B0

Q	Answer	Mark	Comments
12(b)	10:50 + 20 + 6 or 11:16 or 26	M1	may be implied by a journey (lines or curves) ending at 11:16 on the graph
	Straight line from (10:50, 1.7) to (11:16, 0)	A1	$\pm \frac{1}{2}$ square ignore any other working lines on the graph
	Additional Guidance		
	Accept unrulid line if intention clear		

Q	Answer	Mark	Comments
13	$5 \times 13.2(0)$ or $66(.00)$	M1	oe
	$140 - \text{their } 66(.00)$ or $74(.00)$	M1dep	
	$\text{their } 74(.00) \div 4$	M1	their $74(.00)$ must be less than 140
	$18.5(0)$	A1	

Q	Answer	Mark	Comments
14	One correct reading from the graph	M1	eg 10 gallons = 45 litres or 1 gallon = 4.5 litres allow $\pm \frac{1}{2}$ square
	Scales their reading to 250 gallons	M1dep	eg $250 \div 10 \times 45$ or 25×45 or 250×4.5 [1000, 1250] implies M2
	1125	A1	SC1 [55, 56]
	Additional Guidance		
	5 gallons = 22 litres $50 \times 22 = 1100$		M1 M1A0
	First mark may be implied if an accurate reading $\pm \frac{1}{2}$ square from the graph is used eg 9×125 or 5×250		M1M1
	$250 \times 4.54 = 1135$		M1M1A0

Q	Answer	Mark	Comments
15	Four different numbers that sum to 32	B2	B1 4×8 or (total =) 32 or any four numbers that sum to 32 with repeats
	Additional Guidance		
	8, 8, 8, 8		B1
	-8, 8, 8, 24		B1
	7.8, 8, 8, 8.2		B1
	32 only seen as one of the four numbers with sum $\neq 32$		B0

Q	Answer	Mark	Comments
16(a)	$5a + b^2$	B2	B1 $5a$ or b^2 condone $(b)^2$
	Additional Guidance		
	$5a + b^2$ followed by incorrect further work		B1
	$5a$ or b^2 followed by incorrect further work eg $5a + 2b = 7ab$		B1
	$5ab^2$		B1
	$5a^2b^2$		B1
	$5a2b$		B1

Q	Answer	Mark	Comments
16(b)	$2c$ or -5 with no denominator or denominator 1 or $\frac{4c-10}{2}$ or $\frac{4(2c-5)}{4}$ or $\frac{2(2c-5)}{2}$	M1	
	$2c - 5$	A1	
	Additional Guidance		
	$\frac{2c-5}{1}$		M1A0
	$2c - 5$ followed by incorrect attempt to further simplify or to solve eg $-10c$ or $c = 2.5$		M1A0
	$\frac{4c-10}{2}$ followed by incorrect further work		M1A0
	$2c - 20$ or $8c - 5$		M1A0
	$\frac{2c-5}{2}$ or $\frac{2c-5}{4}$		M0A0

Q	Answer	Mark	Comments
16(c)	Alternative method 1		
	$10d - 20$	M1	may be seen in a grid
	$10d = 21 + \text{their } 20$ or $10d = 41$ or $41 \div 10$	M1	
	4.1 or $\frac{41}{10}$ or $4\frac{1}{10}$	A1ft	ft M0M1 or M1M0 if equation of the form $10d = a$
	Alternative method 2		
	$d - 2 = \frac{21}{10}$ or $d - 2 = 2.1$	M1	oe
	their $\frac{21}{10} + 2$	M1dep	oe
	4.1 or $\frac{41}{10}$ or $4\frac{1}{10}$	A1	
	Additional Guidance		
	Ignore simplification or conversion if correct answer seen		
	Correct answer from trial and improvement		M1M1A1
	Embedded answer with no or incorrect answer		M1M1A0
	$10d - 2 = 21$ $10d = 23$ Answer 2.3		M0 M1 A1ft
	$10d - 20$ $10d = 1$ Answer 0.1		M1 M0 A1ft
	Any ft answer must be rounded or truncated to 1 dp or better		
	Collecting terms before the bracket has been expanded		M0M0A0

Q	Answer	Mark	Comments
17(a)	Alternative method 1		
	$(15 - 9) \times 10$ or 60 or 22×9 or 198	M1	oe values may be seen on diagram
	258	A1	
	Alternative method 2		
	$(22 - 10) \times 9$ or 108 or 15×10 or 150	M1	oe values may be seen on diagram
	258	A1	
	Alternative method 3		
	22×15 or 330 or $(15 - 9) \times (22 - 10)$ or 72	M1	oe values may be seen on diagram
	258	A1	
	Additional Guidance		
	Multiplying areas is M0A0 eg 15×10 and 12×9 and 150×108		M0A0
	Only using an incorrect formula for area is M0A0 eg 22×15 and $330 \div 2$		M0A0

Q	Answer	Mark	Comments
17(b)	Alternative method 1		
	10^2 or 100 and 9^2 or 81	M1	oe implied by 181
	$\sqrt{10^2 + 9^2}$ or $\sqrt{100 + 81}$ or $\sqrt{181}$ or [13.4, 13.5]	M1dep	
	[13.4, 13.5] and No with M2 awarded	A1	oe eg $\sqrt{181}$ and $\sqrt{169}$ and No

Alternative methods 2 and 3 and Additional Guidance on the next page

17(b) cont	Alternative method 2		
	10^2 or 100 and 9^2 or 81	M1	oe implied by 181
	$(13^2 =)$ 169	M1	
	181 and 169 and No	A1	
	Alternative method 3		
	13^2 or 169 and 10^2 or 100 or 9^2 or 81	M1	oe implied by 69 or 88
	$\sqrt{13^2 - 10^2}$ or $\sqrt{169 - 100}$ or [8.3, 8.31] or $\sqrt{13^2 - 9^2}$ or $\sqrt{169 - 81}$ or [9.3, 9.4]	M1dep	
	[8.3, 8.31] (and 9) and No with M2 awarded or [9.3, 9.4] (and 10) and No with M2 awarded	A1	
	Additional Guidance		
	Using any method other than Pythagoras' theorem	M0M0A0	

Q	Answer	Mark	Comments
18	$24 \div \frac{1}{3}$ or 24×3 or 72	M1	oe $24 \times 3 \div 4 \times 5$ is M2 allow 0.33(...) for $\frac{1}{3}$
	their $72 \div 4 \times 5$	M1	
	90	A1	SC1 57.6 oe or 10
	Additional Guidance		
	Embedded 90		M1M1A0

Q	Answer	Mark	Comments
19	$\frac{1}{x}$	B1	

Q	Answer	Mark	Comments
20	500%	B1	

Q	Answer	Mark	Comments
21	$2n - \frac{3}{2}$	B1	

Q	Answer	Mark	Comments
22	624	B1	

Q	Answer	Mark	Comments
23(a)	At least 3 points correctly plotted	M1	$\pm \frac{1}{2}$ square (5, 156), (6, 170), (7, 176), (8, 180)
	All 4 points correctly plotted and joined with straight lines	A1	$\pm \frac{1}{2}$ square
	Additional Guidance		
	$\pm \frac{1}{2}$ square for plotting means half a small square horizontally and vertically		
	If a point is within tolerance the line must be within $\pm \frac{1}{2}$ square horizontally or vertically of their point		
	Ignore trend lines that may be working for part (b)		
	Ignore points and lines after Week 8		
	Mark intention for unruled lines		

Q	Answer	Mark	Comments
23(b)	[182, 190]	B1	
	Additional Guidance		
	Answer in range with or without working, with no graph or incorrect graph		B1
	If a range is given on answer line accept if both values are in range eg 184 - 188		B1

Q	Answer	Mark	Comments
24	$x^3 - 4x^2$ $x^2 + 3x - 4$ $x^2 - 4$ $x^2 - 4x$ $x(x - 4)$ $(x - 4)(x + 1)$ $(x - 1)(x + 4)$ $(x - 2)(x + 2)$ $x^2(x - 4)$	B3	B1 each correct match
Additional Guidance			
Two lines from one expression on the left is choice			

Q	Answer	Mark	Comments
25(a)	120 000	B1	oe correct value in the form $a \times 10^b$ eg 12×10^4
	1.2×10^5	B1ft	ft the answer to their calculation converted to standard form
	Additional Guidance		
	1.2×10^5		B1B1
	1.2×10^5 in working but answer 120 000		B1B0
	$\frac{6}{5} \times 10^5$		B1B0

Q	Answer	Mark	Comments
25(b)	smallest 6.2×10^{-5} 3.9×10^{-4} largest 8.5×10^{-4} with no incorrect conversions seen	B2	B1 6.2×10^{-5} the smallest with no incorrect conversion of it seen or 0.000 062 or 0.000 39 or 0.000 85
	Additional Guidance		
	If only two of the answer lines are completed using different numbers, the number on the third answer line is implied		
	Standard form numbers may be written in any equivalent form on answer lines		
	Correct conversion to a fraction does not gain B1 but an incorrect fraction will count as an incorrect conversion		
	smallest 6.2×10^{-5} 8.5×10^{-4} largest 3.9×10^{-4}		B1

Q	Answer	Mark	Comments
26	$12 + 12 + 6$ or 30	M1	oe may be on diagram may be embedded eg 12×30 implied by 360 for area of rectangle
	$\pi \times 6 \times 6$ or 36π or [113, 113.112]	M1	oe eg $[3.14, 3.142] \times \frac{12}{2} \times \frac{12}{2}$ may be embedded eg $2 \times \pi \times 6 \times 6$ or $\frac{1}{2} \times \pi \times 6 \times 6$
	$2 \times \pi \times 6 \times 6 + \frac{1}{2} \times \pi \times 6 \times 6$ or $72\pi + 18\pi$ or 90π or [282.5, 282.8]	M1dep	oe dep on 2nd M1
	$360 - 90\pi$ or [77.2, 77.5]	A1	accept 77 or 78 with correct working
	Additional Guidance		
	360 π does not imply first M1		
	360 – 90 π followed by 270 π		M1M1M1A0

Q	Answer	Mark	Comments
27	$3x + x + 17 + 23 = 100$ or $4x + 40 = 100$	M1	oe
	$(x =) 15$ or $(3x =) 45$	A1	oe may be seen on diagram
	$3 \times \text{their } 15 + 17$ or 62	M1	may be seen on diagram implied by $\frac{62}{100}$ oe fraction or 62% their 15 may be any value
	0.62	A1ft	ft $\frac{3 \times \text{their } 15 + 17}{100}$ written as a decimal if their 15 is a positive integer ≤ 27 SC3 0.45 accept 0.6 if 0.62 or 62 seen
	Additional Guidance		
	Ignore any attempt to convert the correct decimal answer to a fraction or percentage		
	T & I to find $x = 15$		M1A1
	T & I with $x \neq 15$		M0A0

Q	Answer	Mark	Comments
28	Enlargement	B1	oe eg enlarge(d) or enlarging
	$(\times) \frac{1}{3}$	B1	scale factor allow 0.33(...) for $\frac{1}{3}$
	(1, 1)	B1	centre
	Additional Guidance		
	Do not accept terms like reduction, makes smaller, makes bigger or negative enlargement for the first B mark		
	Combined transformation eg enlargement then down 4		1st B0
	Do not accept $\div 3$ for the scale factor		