OCR
Oxford Cambridge and RSA

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Date – Morning/Afternoon

GCSE (9–1) Mathematics

J560/05 Paper 5 (Higher Tier)

SAMPLE MARK SCHEME

Duration: 1 hour 30 minutes

MAXIMUM MARK 100

DRAFT

Subject-Specific Marking Instructions

1. **M** marks are for using a correct method and are not lost for purely numerical errors.
   A marks are for an accurate answer and depend on preceding **M** (method) marks. Therefore **M0 A1** cannot be awarded.
   B marks are independent of **M** (method) marks and are for a correct final answer, a partially correct answer, or a correct intermediate stage.
   SC marks are for special cases that are worthy of some credit.

2. Unless the answer and marks columns of the mark scheme specify **M** and **A** marks etc, or the mark scheme is 'banded', then if the correct answer is clearly given and is not from wrong working **full marks** should be awarded.

   Do not award the marks if the answer was obtained from an incorrect method, ie incorrect working is seen and the correct answer clearly follows from it.

3. Where follow through (**FT**) is indicated in the mark scheme, marks can be awarded where the candidate's work follows correctly from a previous answer whether or not it was correct.

   Figures or expressions that are being followed through are sometimes encompassed by single quotation marks after the word *their* for clarity, e.g. FT 180 × (*their* '37' + 16), or FT 300 – √(*their* '$5^2 + 7^2$'). Answers to part questions which are being followed through are indicated by e.g. FT 3 × *their* (a).

   For questions with FT available you must ensure that you refer back to the relevant previous answer. You may find it easier to mark these questions candidate by candidate rather than question by question.

4. Where dependent (**dep**) marks are indicated in the mark scheme, you must check that the candidate has met all the criteria specified for the mark to be awarded.

5. The following abbreviations are commonly found in GCSE Mathematics mark schemes.

   - **figs 237**, for example, means any answer with only these digits. You should ignore leading or trailing zeros and any decimal point e.g. 237000, 2.37, 2.370, 0.00237 would be acceptable but 23070 or 2374 would not.
   - **isw** means **ignore subsequent working** after correct answer obtained and applies as a default.
   - **nfww** means **not from wrong working**.
   - **oe** means **or equivalent**.
   - **rot** means **rounded or truncated**.
   - **seen** means that you should award the mark if that number/expression is seen anywhere in the answer space, including the answer line, even if it is not in the method leading to the final answer.

- **soi** means **seen or implied**.

6. In questions with no final answer line, make no deductions for wrong work after an acceptable answer (ie **isw**) unless the mark scheme says otherwise, indicated by the instruction 'mark final answer'.

7. In questions with a final answer line following working space:

(i) If the correct answer is seen in the body of working and the answer given on the answer line is a clear transcription error allow full marks unless the mark scheme says 'mark final answer'. Place the annotation ✓ next to the correct answer.

(ii) If the correct answer is seen in the body of working but the answer line is blank, allow full marks. Place the annotation ✓ next to the correct answer.

(iii) If the correct answer is seen in the body of working but a completely different answer is seen on the answer line, then accuracy marks for the answer are lost. Method marks could still be awarded. Use the M0, M1, M2 annotations as appropriate and place the annotation ✗ next to the wrong answer.

8. In questions with a final answer line:

(i) If one answer is provided on the answer line, mark the method that leads to that answer.

(ii) If more than one answer is provided on the answer line and there is a single method provided, award method marks only.

(iii) If more than one answer is provided on the answer line and there is more than one method provided, award zero marks for the question unless the candidate has clearly indicated which method is to be marked.

9. In questions with no final answer line:

(i) If a single response is provided, mark as usual.

(ii) If more than one response is provided, award zero marks for the question unless the candidate has clearly indicated which response is to be marked.

10. When the data of a question is consistently misread in such a way as not to alter the nature or difficulty of the question, please follow the candidate's work and allow follow through for **A** and **B** marks. Deduct 1 mark from any **A** or **B** marks earned and record this by using the MR annotation. **M** marks are not deducted for misreads.

11. Unless the question asks for an answer to a specific degree of accuracy, always mark at the greatest number of significant figures even if this is rounded or truncated on the answer line. For example, an answer in the mark scheme is 15.75, which is seen in the working. The candidate then rounds or truncates this to 15.8, 15 or 16 on the answer line. Allow full marks for the 15.75.

12. Ranges of answers given in the mark scheme are always inclusive.

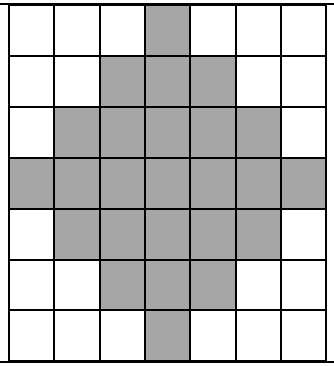
13. For methods not provided for in the mark scheme give as far as possible equivalent marks for equivalent work. If in doubt, consult your Team Leader.

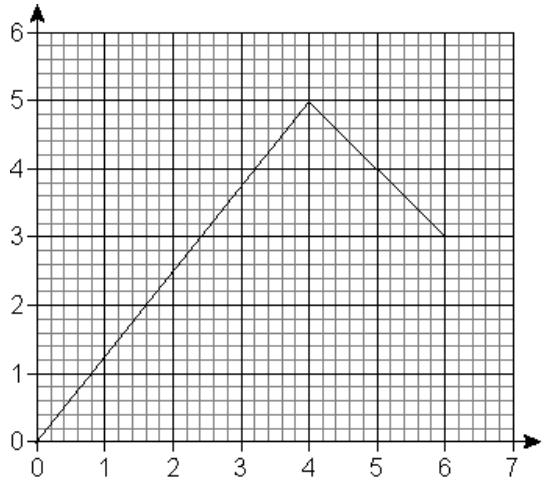
14. Anything in the mark scheme which is in square brackets […] is not required for the mark to be earned, but if present it must be correct.

Question			Answer	Marks	Part marks and guidance	
1	(a)		[p =] 5 [q =] $^{-}$5	**2** **1 AO1.2** **1 AO1.3a**	**B1** for each	
	(b)		**c** = 3**a** **d** = **a** + **b** **e** = **a** – **b**	**3** **3 AO1.3a**	**B1** for each	
2	(a)		800	**2** **1 AO1.3b** **1 AO3.1c**	**M1** for unitary work, e.g. 1 person does 200 letters in 2 hours	
	(b)		30 minutes **oe**	**4** **2 AO2.1a** **2 AO3.1d**	**M1** for 1 person does 100 letters in 1 hour **M1** for 5 people do 1000 letters in 2 hours **M1** for 4 people do 1000 letters in 2.5 hours **FT** from *their* rate in **(a)** throughout	
	(c)		Correct comment on the reasonableness of her assumption e.g. 'She has assumed that 'all day' means 'for 24 hours', but it is not reasonable for them to work without a break.' Correct comment on the effect it will have on the answer e.g. 'They can't work at that rate for that long, so her answer is an over-estimate.'	**2** **1 AO3.4a** **1 AO3.5**	**B1** for each	
3	(a)		Outcomes not equally likely **oe**	**1** **1 AO3.4b**		

Question			Answer	Marks	Part marks and guidance	
	(b)		Larger number of trials	**1** **1 AO3.4a**		
	(c)		0.09 - 0.16	**2** **1 AO1.3a** **1 AO2.1b**	**M1** for $\left(\frac{48}{150}\right)^2$ or 0.35^2 or any reasonable estimate (**FT** *their* **(b)**)	
4	**(a)**		400 g 200 g 300 g	**2** **1 AO1.3a** **1 AO3.1c**	**M1** for 9 **soi**	
	(b)		Profit = £18.20	**5** **2 AO1.3b** **2 AO3.1d** **1 AO3.3**	**M1** Multiply *their* weights by 5 **M1** Find number of each required **M1*** calculate total cost ***M1 dep** subtract from £60	
5			$2a + 1$	**4** **1 AO1.3b** **2 AO3.1b** **1 AO3.2**	**M1** for $a + 2 + 3a + 3 + 4a - 1$ **M1** for collecting terms **M1** for dividing *their* '$8a + 4$' by 4	
6			5 red 20 blue	**3** **1 AO1.3b** **1 AO3.1b** **1 AO3.2**	**M1** for listing at least two pairs of red and blue marbles giving a probability $\frac{1}{5}$ **M1** for at adding 5 red marbles to at least two pairs **SC2** for 10 and 20 pairing **seen**	

Question			Answer	Marks	Part marks and guidance	
7			8 cm 10 cm	**3** **1 AO1.3a** **1 AO3.1b** **1 AO3.2**	**M1** for listing square numbers and finding differences **M1** for square rooting *their* pair of square numbers	
8			6	**3** **1 AO1.3b** **1 AO3.1d** **1 AO3.3**	**B1** for 0.75 m **M1** for $\frac{4}{\textit{their}\ '0.75'}$ Or 5 x 0.75 = 3.75	
9			Volume of cuboid = 100 000 cm^3 Mass of cuboid = 270 kg Yes, because 270 < 300 kg	**4** **1 AO1.3b** **2 AO3.1d** **1 AO3.3**	**B3** for 270 kg or **M1** for 100 000 cm^3 OR 0.1 m^3 OR 100 cm × 50 cm × 20 cm OR 1 m × 0.5 m × 0.2 m **M1** for 2.7 × *their* '100 000' OR 2 700 000 × *their* '0.1'	
10	(a)		19	**1** **1 AO2.3a**		

Question			Answer	Marks	Part marks and guidance	
	(b)			**1** **1 AO2.3b**		
	(c)		13 25	**2** **2 AO2.1a**	**M1** for 13 or 25	**FT** *their* bottom layer in **(b)** and *their* number of cubes in **(a)**
	(d)		$2n^2 - 2n + 1$ **oe**	**4** **2 AO1.3b** **2 AO2.1a**	**M3** for expression with $2n^2 - 2n$ **oe** or **M2** for expression with $2n^2$ or **M1** for expression with n^2 or first differences	

Question			Answer	Marks	Part marks and guidance	
11	(a)		Both sections of graph correct  	**3** **1 AO1.3b** **2 AO2.3b**	**B1** for plotting a line segment from the origin to (4, 5) **B1** for plotting a line segment from *their* '(4, 5)' to *their* ('4' + 2, '5' – 2)	
	(b)		18	**3** **2 AO1.3a** **1 AO2.3a**	**M2** for $\frac{1}{2}(5\times 4)+\frac{1}{2}(5+3)\times 2$ or **M1** for attempt to find area under graph	Accept alt ways to split area **FT** *their* graph
12			$\frac{2}{3}$	**3** **1 AO1.3a** **1 AO3.1b** **1 AO3.2**	**B1** for radius of large circle = 3 × radius of small circle **M1** for $\frac{9\pi r^2-3(\pi r^2)}{9\pi r^2}$ **oe**	
13	**(a)**		42	**2** **1 AO1.3a** **1 AO2.3a**	**M1** for 46 or 4 seen	
	(b)		World War I in film Smallest range / IQR	**2** **2 AO2.1b**	**M1** **M1**	

Question			Answer	Marks	Part marks and guidance	
	(c)		Correct similarity Correct difference	**2** **1 AO2.3a** **1 AO2.3b**	**B1** for similarity **B1** for difference	Exemplar response: Similarity: They have the same median value Difference: There was less variation in the visitor times for The Philippine Revolution than for Origins of the Steam Engine To be awarded both marks at least one statement must be in context
	(d)		No, as there is no indication of total numbers who visited each	**2** **1 AO2.4a** **1 AO2.5b**	**M1** for 'No' with insufficient reason	
14			Fully correct explanation, finding gradients of both lines and showing that the gradients' product equals $^-1$	**4** **1 AO1.3a** **2 AO2.2** **1 AO2.4b**	**B1** for gradient of first line is $\frac{4}{3}$ **B1** for gradient of second line is $\frac{^-3}{4}$ **M1** for finding the product of *their* gradients **oe**	
15	**(a)**		$\sqrt{35}$, 2.5^2, $\frac{20}{3}$, 6.83	**2** **2 AO1.3b**	**B1** if one is in the wrong place, but others are in the correct order or reverse order	
	(b)		$4+2\sqrt{3}$	**3** **3 AO1.3a**	**M1** for expanding $\left(1+\sqrt{3}\right)^2 = 1+\sqrt{3}+\sqrt{3}+\sqrt{3}\times\sqrt{3}$ **B1** for $\sqrt{3}\times\sqrt{3} = 3$ **soi**	

Question			Answer	Marks	Part marks and guidance	
16			e.g. When $x = 0.1$ $(2x)^2 = 0.04$ $2x = 0.2$ So $(2x)^2 < 2x$ which contradicts Bethany's statement So it is not always true	**3** **2 AO2.4a** **1 AO2.5a**	**M1** for attempting to demonstrate that for some value of x in range $0 < x < \frac{1}{2}$ it is not true **A1** for complete working **A1** for explanation or **M1** for attempt including squaring bracket **A1** for complete solution for either $x < 0$ or $x \geq \frac{1}{2}$ **A1** for explanation or **B1** for a counter example given without working	
17	**(a)**		$\sqrt{3}$	**1** **1 AO1.1**		
	(b)		$24\sqrt{3}$	**4** **4 AO1.3b**	**M1*** for $\frac{\text{height}}{4\sqrt{3}} = \textit{their}\ \tan 60°$ **A1** for 12 or $4\sqrt{3} \times \sqrt{3}$ ***M1 Dep** for $\frac{1}{2} \times 4\sqrt{3} \times$ *their* '12'	

Question			Answer	Marks	Part marks and guidance	
18			$\vec{ZY} = -2\mathbf{c} + 2\mathbf{a} + 2\mathbf{b}$ $\vec{SR} = \mathbf{c} + (-\mathbf{c} + \mathbf{a} + \mathbf{b})$ so $\vec{SR} = \mathbf{a} + \mathbf{b}$ $\vec{PQ} = \mathbf{a} + \mathbf{b}$ $\vec{SR} = \vec{PQ}$ so they are parallel	**5** **1 AO1.3a** **2 AO2.2** **2 AO2.4b**	**M1** for $\vec{ZY} = -2\mathbf{c} + 2\mathbf{a} + 2\mathbf{b}$ **M1** for $\vec{SR} = \mathbf{c} + (-\mathbf{c} + \mathbf{a} + \mathbf{b})$ **M1** for $\vec{SR} = \mathbf{a} + \mathbf{b}$ **M1** for $\vec{PQ} = \mathbf{a} + \mathbf{b}$	
19			4 : 1	**6** **2 AO1.3b** **4 AO3.1d**	**M1** for $(x + 20) : (y + 20) = 5 : 2$ or $(x - 5) : (y - 5) = 5 : 1$ **A1** for $\frac{x+20}{y+20} = \frac{5}{2}$ **oe** **A1** for $\frac{x-5}{y-5} = \frac{5}{1}$ **oe** **M1** for solving *their* simultaneous equations **A1** for $x = 80$ or $y = 20$	Do not accept wrong notation for ratio in the final mark, e.g. for 4/1, 4, etc
20	**(a)**		$2 \leq x \leq 5$	**3** **3 AO1.3b**	**M1** for factorising $(x-5)(x-2)$ **soi** **A1** for 2 and 5	Answer may be on a number line in which case the ends must be clearly seen
	(b)		[a =] 6 [b =] 5	**3** **1 AO1.3b** **1 AO2.1a** **1 AO3.1b**	**M1** for $y = (x + 3)^2 - 4$ **M1** for multiplying out and simplifying *their* $y = (x + 3)^2 - 4$	

Assessment Objectives (AO) Grid

Question	AO1	AO2	AO3	Total
1(a)	2			2
1(b)	3			3
2(a)	1		1	2
2(b)		2	2	4
2(c)			2	2
3(a)			1	1
3(b)			1	1
3(c)	1	1		2
4(a)	1		1	2
4(b)	2		3	5
5	1		3	4
6	1		2	3
7	1		2	3
8	1		2	3
9	1		3	4
10(a)		1		1
10(b)		1		1
10(c)		2		2
10(d)	2	2		4
11(a)	1	2		3
11(b)	2	1		3
12	1		2	3
13(a)	1	1		2
13(b)		2		2
13(c)		2		2
13(d)		2		2
14	1	3		4
15(a)	2			2
15(b)	3			3
16		3		3
17(a)	1			1
17(b)	4			4
18	1	4		5
19	2		4	6
20(a)	3			3
20(b)	1	1	1	3
Totals	**40**	**30**	**30**	**100**