OCR
Oxford Cambridge and RSA

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Date – Morning/Afternoon

GCSE MATHEMATICS

J560/06 Paper 6 (Higher Tier)

PRACTICE PAPER MARK SCHEME

Duration: 1 hours 30 minutes

MAXIMUM MARK 100

DRAFT

This document consists of 12 pages

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, eg 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 eg 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 eg 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.

MARK SCHEME

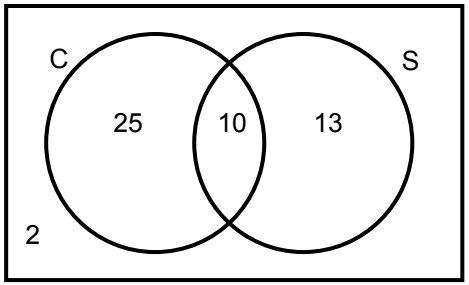
Question			Answer	Marks	Part marks and guidance	
1	(a)		$\frac{2}{10}$ **oe**	**1** 1AO1.2		
	(b)		276	**2** 2AO1.3b	**M1** for 460 ÷ 5	Implied by 92 **seen**
2			No with correct argument e.g. In a right-angled triangle $a^2 + b^2 = c^2$ $23.8^2 + 31.2^2 = 1539.88$ $39.6^2 = 1568.16$ $1539.88 \neq 1568.16$	**4** 1AO1.3b 1AO2.1a 2AO3.1b	**M1** for statement or use of Pythagoras' theorem **M1** for appropriate method e.g. $23.8^2 + 31.2^2$ **M1** for comparison with correct value e.g. 1539.88 with 39.6^2 or 39.24 with 39.6	Alternative method: **M1** for sketch of triangle and correct trig statement for this triangle seen **M1** for angle calculated correctly using one trig ratio **M1** for same angle calculated correctly using a different trig ratio **A1** for comparison and concluding statement Allow equivalent marks for other complete methods e.g. use of cosine rule Do not accept a scale drawing method
3	(a)		$x = 2.5$ **oe**	**3** 3AO1.3a	**M2** for $4x + 2x = 8 + 7$ or better Or **M1** for $4x + 2x = k$ or for $mx = 8 + 7$	Accept equivalent fraction or mixed number for **3** marks
	(b)		$x > 0.8$	**2** 2AO1.3a	**M1** for $5x > 13 - 9$ or better	Accept equivalents of 0.8 for **2** marks
	(c)		$x = \frac{y^2 + 3}{4}$	**3** 3AO1.3b	**M1** for $y^2 = 4x - 3$ **M1FT** for $4x = y^2 + 3$	Eliminating square root Isolating terms in x

Question			Answer	Marks	Part marks and guidance	
4	(a)		07.40 **oe** Or for *their* time earlier than 07.40 with correct supporting working and justification	**5** **1AO1.3b** **2AO3.1d** **2AO3.2**	**B1** for 4.0 $\pm$ 0.1 **soi** **M1** for *their* '4.0' × 50 (= 200) **M1** for *their* '200' ÷ 60 (= 3.33..) **M1** for *their* 3.33 converted correctly to hours and minutes (= 3 hours 20 mins) **M1** for *their* correct leaving time Maximum **4** marks if answer incorrect	Accept 07.35 - 07.45 May be implied by correct leaving time
	(b)		Any sensible assumption about speed, distance or time Under/overestimate and correct effect on time	**1** **1** **2AO3.5**		e.g. route is a straight line, no rest breaks e.g. speed overestimated or distance underestimated so time will be longer Allow if assumptions and effects are stated in **(a)**
5			1800	**3** **1AO1.3a** **2AO3.1c**	**M1** for 1.09 **soi** **M1** for 1962 ÷ 1.09 **oe**	
6	(a)		38 600	**3** **2AO1.3b** **1AO3.3**	**B2** for answer figs 386 OR **M1** for $1.20 \times 10^{11} - 8.14 \times 10^{10}$ **oe** **M1** for 1 million = 10^6 **soi**	

Question			Answer	Marks	Part marks and guidance	
	(b)		Correct statement comparing years 2002 and 2012 with correct supporting calculations showing that spending per person is not doubled	**4** 1AO1.3b 1AO2.4a 1AO3.1d 1AO3.3	**M2** for total healthcare ÷ population calculated for 2002 and 2012 with years identified Or **M1** for total healthcare ÷ population calculated for any year AND **B1** for £1370 in 2002 **or** £2280 in 2012	Year need not be identified Values given to at least 3sf Exact values: 2002 £1370.37[0…] 2007 £1957.58[5…] 2012 £2276.29[5…]
7			$7\pi + 18$	**3** 1AO1.2 2AO1.3b	**M1** for $\frac{140}{360} \times 2\pi \times 9$ **oe** **A1** for 7π or for answer 39.99[…] or 40.0	**M1** implied by 21.99[…] or 22.0 **seen**
8	**(a)**		8^{-1} or $\frac{1}{8}$ or 0.125	**1** 1AO1.1		
	(b)		6	**3** 1AO1.3b 2AO3.1b	**M2** for $2^6 = 2^k$ or $64 = 2^k$ Or **M1** for 2^{10} or 1024 or $\frac{1}{16}$ or 64 **seen**	
9	**(a)**		Triangle **B** with vertices (3, -3), (5, -3), (5, -4)	**3** 1AO2.1a 2AO2.3b	**M2** for triangle vertices (1, -3), (3, -3), (1, -4) OR **M1** for triangle vertices (-1, 3), (-3, 3), (-1, 4) **M1** for reflection of *their* triangle in $x = 3$	Correct rotation of **A** Rotation of **A** anticlockwise about origin

Question			Answer	Marks	Part marks and guidance	
	(b)		Translation by $\begin{pmatrix} 6 \\ 0 \end{pmatrix}$	**3** **1AO2.3b** **2AO3.1b**	**M1** for triangle with vertices (-1, -3), (-3, -3), (-1, -4) seen **B1** for translation stated **B1FT** for correct vector for *their* reflected triangle onto *their* triangle **B**	With no other transformation
10	**(a)**		$y = \frac{1}{2}x - 1$ **oe**	**3** **3AO1.3a**	**B2** for $y = \frac{1}{2}x - k$ OR **M1** for attempt at (change in y) ÷ (change in x) **B1** for $y = kx - 1$	
	(b)		$y = -2x + 9$ **oe**	**3** **1AO1.3a** **2AO3.1a**	**M1FT** for gradient = -2 **soi** **M1FT** for substitution of (4, 1) in *their* $y = -2x + c$	FT *their* gradient from **(a)**
11	**(a)**		12, 26, 15, 12, 1 **seen** Use of widths 2.5, 2.5, 5, 5, 20 in products 2.5×12 + 2.5×26 + 5×15 + 5×12 + 20×1 = 250	**B1** **M1** **A1** **1AO1.3b** **2AO2.1a**		Condone 1 error for **M** mark
	(b)	**(i)**	No, with correct comparison of Omar's survey with newspaper with supporting calculations	**4** **1AO1.3b** **1AO2.4a** **2AO3.1d**	**M2** for [workers on < £7.85 =] 2.5×12 + 0.35×26 [= 39.1] Or **M1** for attempt to find number of workers < £7.85 AND **M1** for *their* $\frac{39.1}{250}$ or 250 ÷ 5	Calculation of fraction of workers earning < £7.85 or one fifth of total number of workers

Question			Answer	Marks	Part marks and guidance	
		(ii)	It isn't known how people are distributed in range £7.50 to £10	1 1AO3.4b		Or equivalent correct reason
	(c)		Overlap on boundaries of ranges	1 1AO2.5b		Accept other correct reason
12			BE = CE, equilateral triangle AE = ED, E midpoint of AD ∠BEA = ∠CED, alternate angles and equilateral triangle ABE, DCE congruent, SAS	M1 M1 M1 A1 4AO2.4b	After **M0, B2** for two pairs of equal sides and one pair of equal angles with insufficient or no reasons Or **B1** for two pairs of equal sides and/or angles identified	Accept any correct proof
13	(a)	(i)	0	1 1AO2.1b		
		(ii)	468	3 2AO1.3a 1AO2.3a	**M2** for $\frac{1}{2}\times(30+22)\times 18$ **oe** Or **M1** for attempt to find area under graph	
	(b)		$67.5 \leq v < 68.5$	2 1AO1.2 1AO2.1a	**B1** for 67.5 and 68.5 **seen**	
	(c)		4.0 - 5.0	4 1AO1.3a 2AO2.1b 1AO2.3a	**M1** for attempt to draw tangent at $t = 5$ AND **M2** for *their* distance ÷ *their* time e.g. (39 – 6) ÷ (10 – 3) with a time gap of at least two seconds Or **M1** for inaccurate attempt at distance ÷ time FT *their* tangent	Tolerance ± 1 mm for readings from *their* tangent

Question			Answer	Marks	Part marks and guidance	
14	(a)			**3** 1AO2.3a 2AO2.3b	**B1** for 25 and 10 correctly positioned **B1** for 13 or 2 correctly positioned	
	(b)	**(i)**	$\frac{38}{50}$ **oe**	**2FT** 1AO1.3a 1AO2.1a	**M1FT** for 38	FT *their* Venn diagram
		(ii)	$\frac{13}{15}$	**2FT** 1AO1.3a 1AO2.1a	**M1FT** for 13 or 15	FT *their* Venn diagram
15			$\frac{4(x+1)-2(x-3)}{(x-3)(x+1)}$ $= \frac{4x+4-2x+6}{(x-3)(x+1)}$ $= \frac{2x+10}{(x-3)(x+1)} = \frac{2(x+5)}{(x-3)(x+1)}$	**M1** **M1** **A1** 1AO1.3b 2AO2.2		
16			164 or 164.1 to 164.2	**5** 3AO1.3b 2AO3.1b	**M2** for $\sin B = \frac{15\sin 54}{23}$ Or **M1** for attempt to use sine rule AND **A1** for B = 31.8[4…] **M1** for 70 + (180 – 54 – *their* B)	

Question			Answer	Marks	Part marks and guidance	
17	(a)		$2\times x\times\frac{x}{2}+2\times x\times(x-4)+2\times\frac{x}{2}\times(x-4)=90$	M3	**B1** for $\frac{x}{2}$ or $x-4$ **seen** **M1** for expression for surface area $2\times x\times\frac{x}{2}+2\times x\times(x-4)+2\times\frac{x}{2}\times(x-4)$	Algebraic or numeric sum of areas of all six faces using *their* length, *their* width and *their* height
			$x^2+2x^2-8x+x^2-4x=90$	M1	FT correct expansion of brackets	
			Correct simplification leading to $2x^2-6x-45=0$	A1 3AO2.2 2AO3.1a		
	(b)		51.6 - 51.9	6 2AO1.3b 2AO3.1b 1AO3.2 1AO3.3	**M2** for $\frac{6\pm\sqrt{(-6)^2-4\times2\times-45}}{2\times2}$ **oe** Or **M1** for attempt to solve quadratic equation **A1** for x = 6.47 and ⁻3.47 **M1** for use of *their* positive solution only in volume calculation **M1FT** for $6.47\times\frac{6.47}{2}\times(6.47-4)$	Condone two substitution errors in correct formula for **M2** e.g. quadratic formula quoted correctly, attempt to complete the square, attempt to factorise into two brackets x = 6.4749… and x = ⁻3.4749… FT algebraic or numeric volume calculation seen using *their* length × *their* width × *their* height

Assessment Objectives (AO) Grid

Question	AO1	AO2	AO3	Total
1(a)	1	0	0	1
1(b)	2	0	0	2
2	1	1	2	4
3(a)	3	0	0	3
3(b)	2	0	0	2
3(c)	3	0	0	3
4(a)	1	0	4	5
4(b)	0	0	2	2
5	1	0	2	3
6(a)	2	0	1	3
6(b)	1	1	2	4
7	3	0	0	3
8(a)	1	0	0	1
8(b)	1	0	2	3
9(a)	0	3	0	3
9(b)	0	1	2	3
10(a)	3	0	0	3
10(b)	1	0	2	3
11(a)	1	2	0	3
11(b)(i)	1	1	2	4
11(b)(ii)	0	0	1	1
11(c)	0	1	0	1
12	0	4	0	4
13(a)(i)	0	1	0	1
13(a)(ii)	2	1	0	3
13(b)	1	1	0	2
13(c)	1	3	0	4
14(a)	0	3	0	3
14(b)(i)	1	1	0	2
14(b)(ii)	1	1	0	2
15	1	2	0	3
16	3	0	2	5
17(a)	0	3	2	5
17(b)	2	0	4	6
Totals	**40**	**30**	**30**	**100**