OCR
Oxford Cambridge and RSA

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Date – Morning/Afternoon

GCSE (9-1) MATHEMATICS
J560/06   Paper 6 (Higher Tier)

PRACTICE PAPER (SET 2) MARK SCHEME

Duration: 1 hour 30 minutes

MAXIMUM MARK   100

DRAFT

Subject-Specific Marking Instructions

1. **M** marks are for <u>using a correct method</u> and are not lost for purely numerical errors.
    A marks are for an <u>accurate</u> answer and depend on preceding **M** (method) marks. Therefore **M0 A1** cannot be awarded.
    B marks are <u>independent</u> of **M** (method) marks and are for a correct final answer, a partially correct answer, or a correct intermediate stage.
    SC marks are for <u>special cases</u> 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 <u>not from wrong working</u> **full marks** should be awarded.

    Do <u>not</u> award the marks if the answer was obtained from an incorrect method, i.e. incorrect working is seen <u>and</u> 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.
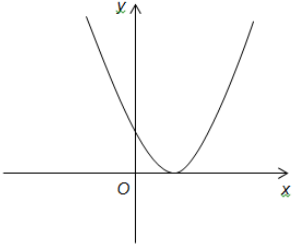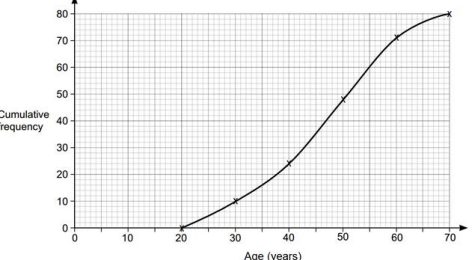   -   **soi** means **seen or implied**.

6.   In questions with no final answer line, make no deductions for wrong work after an acceptable answer (i.e. **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)		1.58 final answer	**2** 1 AO1.2 1 AO1.3a	**M1** for 1.57[7…] **seen** or *their* answer seen to more than 2dp corrected to 2dp	Both rounded and unrounded value must be seen
	(b)	(i)	$(1 + n)^3 = 27^2 = 729$	**1** 1 AO2.2		
		(ii)	8	**1** 1 AO3.1a		
2	(a)		Any two from 1, 2, 3, 4, 6	**1** 1 AO2.1a		
	(b)		Any valid explanation	**1** 1 AO2.4a		e.g. $\sqrt{S}$ is a factor
3	(a)		Insufficient trials	**1** 1 AO2.5a		Any acceptable reason
	(b)		11 8 1	**3** 1 AO1.3b 2 AO2.1b	**B2** for two correct or for one correct with total balls = 20 Or **M1** for $\dfrac{66}{120} \times 20$ or $\dfrac{47}{120} \times 20$ or $\dfrac{7}{120} \times 20$	
4	(a)		Final amount is less than initial investment	**1** 1 AO3.4b		Or equivalent correct reason
	(b)		Used an incorrect multiplier for the interest rate	**1** 1 AO3.4a		Or equivalent correct reason

Question			Answer	Marks	Part marks and guidance	
	(c)		6498.40 or 6498.39	3 3 AO1.3a	**M2** for 5800×1.023^5 Or **M1** for 5800×1.023^n **oe**	Where $n \geq 1$, $n \neq 5$
5	(a)		1.6 or $\dfrac{8}{5}$ **oe**	3 3 AO1.3b	**M1** for $2(3x - 4) = x$ or $6x - 8 = x$ **M1FT** for $6x - x = 8$	Alternative method: **M2** for $3x - \dfrac{x}{2} = 4$ Or **M1** for $3x - 4 - \dfrac{x}{2} = 0$
	(b)		$x = [\pm]\sqrt{\dfrac{y+2}{3}}$	3 3 AO1.3a	**M1** for $y + 2 = 3x^2$ **M1FT** for $\dfrac{y+2}{3} = x^2$	
6	(a)		175	1 1 AO1.3a		
	(b)		28 to 31 with correct working	4 2 AO3.1d 1 AO3.2 1 AO3.3	**M2** for $0.7 \times$ *their* 175 **oe** and $0.85 \times$ *their* 175 **oe** Or **M1** for $0.7 \times$ *their* 175 **oe** or $0.85 \times$ *their* 175 **oe** AND **M1** for reading from graph using *their* cardio interval	Implied by 122.5 or 123 and 148.75 or 149 **seen** Using *their* max and min cardio rates
	(c)		Heart rate out of zone for about 4 minutes	1 1 AO2.4a		Or heart rate less than 87.5 during the 50 minutes
7			69	4 1 AO1.3b 2 AO3.1d 1 AO3.3	**M1** for $n - 6 + n + 3n = 109$ **oe** **M1FT** for $5n = 109 + 6$ **A1** for $n = 23$	Allow equivalent part marks for use of different person as starting point Rearrangement of *their* equation to isolate n terms

Question			Answer	Marks	Part marks and guidance	
8			604.8 kg	4 1 AO1.1 1 AO1.3b 1 AO3.1d 1 AO3.2	**B3** for answer 10.08 [kg] OR **M1** for 400 × 400 × 28 **soi** **M1** for *their* volume ÷ 1000^3 **soi** **M1** for 2250 × *their* volume [× 60] **soi**	Volume calculation using consistent units Conversion of mm to m for all 3 dimensions done at any stage Calculation of mass of 1 or 60 slabs
9	(a)		$\frac{4}{10}$ **oe** on first set of branches $\frac{5}{9}$, $\frac{4}{9}$, $\frac{6}{9}$, $\frac{3}{9}$ on second set of branches	2 2 AO2.3b	**B1** for two or more correct probabilities	
	(b)		$\frac{8}{15}$	3 2 AO1.3b 1 AO2.3a	**M2** for $\frac{6}{10} \times \frac{4}{9} + \frac{4}{10} \times \frac{6}{9}$ **oe** Or **M1** for $\frac{6}{10} \times \frac{4}{9}$ **oe** or $\frac{4}{10} \times \frac{6}{9}$ **oe**	FT probabilities from *their* tree diagram for method marks
10	(a)		3.20×10^6 4.04×10^5	2 1 AO1.2 1 AO2.3b	**B1** for one correct or for $3.195[3] \times 10^6$ and 4.042×10^5 or for 3.20×10^m and 4.04×10^n	Where m and n are integers
	(b)		3.54×10^7	1 1 AO1.3a		
	(c)		$5.7[0] \times 10^5$	3 2 AO1.3b 1 AO2.3a	**B1** for 2.455×10^6 or 1.885×10^6 **seen** **M1** for *their* $(2.455 - 1.885) \times 10^6$	Using values in ranges $2.445 \le n \le 2.455$ and $1.885 \le n \le 1.895$
11	(a)		E F	**B1** **B1** 2 AO2.3a		

Question			Answer	Marks	Part marks and guidance	
	(b)			**1** 1 AO2.3b		Clear intention
12	(a)		24 48 71	**1** 1 AO2.3b		
	(b)			**2** 2 AO2.3b	**B1FT** for at least 5 points plotted correctly If **0** scored, **SC1** for translation of correct curve	
	(c)		States correct with comparison showing approximately 18 employees over 55 and one quarter of 80 = 20	**2** 1 AO2.1b 1 AO2.5a	FT reading from *their* cumulative frequency curve at 55 **B1** for one quarter of employees = 20 or for approximately 18 employees over 55 FT *their* curve	
13			AM = MD given ∠BMA = ∠CMD vertically opposite ∠BAM = ∠CDM alternate angles Triangles AMB, DMC congruent, ASA	**M1** **M1** **M1** **A1** 4 AO2.4b	After **M0**, **B2** for two pairs of equal angles and one pair of equal sides with insufficient or no reasons Or **B1** for two pairs of equal angles identified	Accept any correct proof

Question			Answer	Marks	Part marks and guidance	
14	(a)		$x \leq {}^-3,\ x \geq 4$	3 3 AO1.3b	**M1** for $(x-4)(x+3)$ **A1** for solutions $^-3$ and 4 seen	
	(b)		$^-2$	4 2 AO2.1a 2 AO3.1b	**M1** for $2y = x + 4$ drawn **M1** for $x + y = 5$ drawn **M1FT** for correct region/points identified on graph	
15	(a)		$\dfrac{x^6}{y^3}$	2 2 AO1.3a	**M1** for $\left(\dfrac{x^2}{y}\right)^3$ or $\dfrac{x^{12}y^3}{x^6y^6}$	
	(b)	(i)	$\dfrac{2x}{y}$	1 1 AO1.3a		
		(ii)	$\dfrac{3x^2 + 14x}{(x-2)(x+3)}$ or $\dfrac{x(3x+14)}{(x-2)(x+3)}$ or $\dfrac{x(3x+14)}{x^2 + x - 6}$	3 3 AO1.3b	**M1** for numerator $4x(x+3) - x(x-2)$ **oe** **M1** for denominator $(x-2)(x+3)$ **oe**	
16	(a)		1.44	3 3 AO1.3a	**M2** for $9 \times 4^2 = y \times 10^2$ **oe** Or **M1** for 9×4^2 or $y = \dfrac{k}{x^2}$ **soi**	
	(b)		56.25	3 1 AO1.3a 1 AO3.1a 1 AO3.3	**M2** for 1.5625 or $\dfrac{1}{0.8^2}$ **soi** Or **M1** for 0.8^2 **soi**	Alternative method: **M1** for calculation of values of y for *their* x and *their* $0.8x$ **M1** for calculation of percentage increase in y values

Question			Answer	Marks	Part marks and guidance	
17	(a)		Gradient AB = $\dfrac{4-2}{7-3}=\dfrac{1}{2}$	M1	Calculation of gradient of AB	
			Gradient BC = $\dfrac{-2-4}{10-7}=-2$	M1	Calculation of gradient of BC	
			Product of gradients = $\dfrac{1}{2}\times-2=-1$	A1		
			Perpendicular because product of gradients is $^-$1	B1 2 AO2.4b 2 AO3.1b		
	(b)		8.06[2…] or $\sqrt{65}$	4 2 AO1.3b 1 AO3.1a 1 AO3.2	B1 for identifying AC as hypotenuse M2 for $\sqrt{(10-3)^2+(2--2)^2}$ Or M1 for attempt to use Pythagoras	
18	(a)		3 hours 12 minutes	6 2 AO1.3b 2 AO3.1d 1 AO3.2 1 AO3.3	M2 for [AC^2] $= 2.8^2 + 6.2^2 - 2 \times 2.8 \times 6.2 \times \cos 95$ Or M1 for attempt to use cosine rule AND A1 for [AC =] 7.02 M2 for (2.8 + 6.2 + *their* 7.02) ÷ 5 Or M1 for attempt at *their* distance ÷ 5	
	(b)		Any sensible assumption about distance, speed or time	1		e.g. he walks in a straight line e.g. he doesn't have a rest
			Any sensible explanation	1 2 AO3.5		e.g. underestimate so time would be longer
19	(a)		4**a** − 3**b**	2 1 AO1.3b 1 AO2.3b	B1 for $\overrightarrow{AD}$ = 3**a** or $\overrightarrow{BC}$ = 2**b** soi	Allow $\overrightarrow{OD}=4\mathbf{a}$ or $\overrightarrow{OC}=3\mathbf{b}$ for B1

Question	Answer	Marks	Part marks and guidance
(b)	$\overrightarrow{AD} = \overrightarrow{CE} = 3\mathbf{a}$	M2	M1 for $\overrightarrow{AD} = 3\mathbf{a}$ or $\overrightarrow{CE} = 3\mathbf{a}$
	$\overrightarrow{AC} = \overrightarrow{DE} = 3\mathbf{b} - \mathbf{a}$	M2	M1 for $\overrightarrow{AC} = 3\mathbf{b} - \mathbf{a}$ or $\overrightarrow{DE} = 3\mathbf{b} - \mathbf{a}$
	Opposite sides equal and parallel hence ACED is a parallelogram	A1 1 AO2.4a 3 AO3.1b 1 AO3.3	

Assessment Objectives (AO) Grid

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