# OCR
Oxford Cambridge and RSA

**H**

**Date – Morning/Afternoon**

**GCSE (9-1) MATHEMATICS**

**J560/05**   Paper 5 (Higher Tier)

**PRACTICE PAPER (SET 2) MARK SCHEME**

**Duration:** 1 hour 30 minutes

**MAXIMUM MARK     100**

DRAFT

**This document consists of 12 pages**

**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.

**MARK SCHEME**

| Question | | | Answer | Marks | Part marks and guidance | |
|---|---|---|---|---|---|---|
| 1 | (a) | (i) | 64 | **2**<br>2 AO1.3a | **M1** for 64 or 1 **seen** | |
| | | (ii) | $\dfrac{1}{25}$ **oe** | **1**<br>1 AO1.3a | | |
| | (b) | | [±] 20 | **3**<br>3 AO1.3b | **M2** for $\sqrt{400}$<br>Or **M1** for 2 of 4, 200 or 2 **seen** | |
| 2 | | | 15 000 | **3**<br>3 AO1.3b | **M2** for $18\,000 \div \dfrac{100+20}{100}$ **oe**<br>Or **M1** for 18 000 associated with (100 + 20)% | |
| 3 | (a) | (i) | $2x + 6y$ final answer | **1**<br>1 AO1.3a | | |
| | | (ii) | $x^2 - 3x - 10$ final answer | **2**<br>2 AO1.3a | **M1** for 3 of $x^2$, $- 5x$, $2x$, $- 10$ | |
| | (b) | (i) | $5x(x + 3y)$ final answer | **2**<br>2 AO1.3a | **M1** for $x(5x + 15y)$ or $5(x^2 + 3xy)$<br>or $5x(x + 3y)$ **seen** | |
| | | (ii) | $(x + 7)(x - 7)$ final answer | **1**<br>1 AO1.3a | | |
| 4 | (a) | (i) | Triangle at (-6, -3), (-6, -5), (-2, -5) | **2**<br>2 AO2.3b | **B1** for correct reflection in $x = 0$<br>or reflection in $y = k$ | |
| | | (ii) | Triangle at (5, 2), (5, 6), (3, 6) | **2**<br>2 AO2.3b | **B1** for correct orientation and size but incorrect position<br>or correct anticlockwise rotation about (0, 0) by 90° | |

| Question | | | Answer | Marks | Part marks and guidance | |
|---|---|---|---|---|---|---|
| | **(b)** | **(i)** | Translation $\begin{pmatrix} 8 \\ -6 \end{pmatrix}$ | **2** <br> 1 AO2.1a <br> 1 AO2.3b | **B1** for either | More than one transformation given spoils all marks |
| | | **(ii)** | Enlargement <br> [SF] $\frac{1}{2}$ **oe** <br> [Centre] (2, 3) | **3** <br> 1 AO2.1a <br> 2 AO2.3b | **B1** for each | More than one transformation given spoils all marks |
| | **(c)** | | Incorrect with correct example | **1** <br> 1 AO2.5a | | e.g. enlargement gives a similar shape <br><br> Accept stretch, shear also |
| **5** | | | 3, 12 and 12 | **6** <br> 1 AO1.3b <br> 1 AO2.1a <br> 2 AO3.1d <br> 2 AO3.2 | **B1** for 3 <br> **AND** <br> **B5** for 12 and 12 <br> **OR** <br> **M2** for $x$ = 150 <br> Or **M1** for $x + x + 60 = 360$ <br> **AND** <br> **M2** for $360 \div (180 - their\ x)$ **oe** dependent on previous **M1** <br> Or **M1** for $360 \div n$ ($0 < n < 180$) <br> or for $180 - their\ x$ | |
| **6** | | | 12% increase | **5** <br> 2 AO1.3b <br> 1 AO2.3b <br> 1 AO3.1d <br> 1 AO3.3 | **B4** for answer 12% or 112% or 1.12 **seen** <br> Or **M3** for [50 ×] 1.4 × 0.8 **oe soi** by 56 <br> Or **M2** for 50 × 1.4 **oe soi** by 70 <br> or *their* (50 × 1.4) × 0.8 **oe** <br> Or **M1** for 1.4 or 0.8 **seen** | Could be longer method in 2 steps |

| Question | | | Answer | Marks | Part marks and guidance | |
|---|---|---|---|---|---|---|
| 7 | | | 128 | **6**<br>1 AO1.3b<br>2 AO3.1b<br>2 AO3.2<br>1 AO3.3 | **M2** for $(48 \div 2) \div 3 \times 2$ **oe**<br>Or **M1** for $(48 \div 2) \div 3$<br>AND<br>**A1** for 8<br>**A1** for 16<br>**M1** for $8 \times 16$ | Alternative method:<br>**B4** for $x = 3$<br>OR<br>**M1** for $2(x + 5) + 4(x + 5) = 48$<br>**M1** for correct collection to $ax + b = 48$ **oe** (FT *their* equation in *x*)<br>**M1** for $(48 - their\ b)/a$ (FT *their* $ax + b = 48$)<br>After **0** scored, **SC1** for use of two other variables in ratio 1 : 2<br>AND<br>**B1FT** for $2(their\ x + 5)(their\ x + 5)$ evaluated (FT *their* solution for *x*) |
| 8 | | | £1.10<br><br>£0.85 | **5**<br>2 AO1.3b<br>2 AO3.1c<br>1 AO3.3 | **M2** for both equations correct<br>Or **M1** for $3c + 2t = 5$ or $4c + 3t = 6.95$<br>AND<br>**M1** for scaling both equations<br>**M1** for correct method to eliminate 1 variable, allow 1 arithmetic error | For method marks, condone use of 500 and 695, use of any consistent variables<br>Answers 110 and 85 imply **M4** |
| 9 | (a) | | Second inequality sign is wrong | **1**<br>1 AO2.5b | | |
| | (b) | | It may not fit **and**<br>5.15 and 5.155 used in reasoning | **3**<br>1 AO1.3a<br>1 AO2.1b<br>1 AO2.4a | **B1** for 5.15 (from 5.2)<br>**B1** for 5.155 (from 5.15)<br>If **0** scored, allow **SC1** for 5.25 or 5.145 **seen** | |

| Question | | | Answer | Marks | Part marks and guidance | |
|---|---|---|---|---|---|---|
| **10** | **(a)** | | Angle ADC = angle ADB [= 90°]<br>Angle ABD = angle CAD = 30° with appropriate geometric reasoning<br>Angle ACD is equal to angle BAD = 60° with appropriate geometric reasoning<br><br>[Triangles are similar] equal angles **oe** | **M2**<br><br><br><br>**A1**<br>**3 AO2.4b** | **M1** for one pair of angles with a reason<br><br>Accept 3$^{rd}$ reason as 3$^{rd}$ angle of triangle<br><br>After **0** scored, allow **SC1** for two pairs of equal angles given/identified but no/incorrect reasons | Only two of the three statements are required for **M2**<br>Accept 'given' instead of 90°<br>Must mention 30° in second statement and show knowledge of sin 30 = 0.5 |
| | **(b)** | | 1 : 3 **oe** | **4**<br>**1 AO1.3b**<br>**1 AO2.3a**<br>**1 AO3.1b**<br>**1 AO3.2** | **B3** for ratio of lengths is 1 : $\sqrt{3}$ **oe**<br>Or **M2** for [AD$^2$ = ] *their* 10² − 5² **soi**<br>or $\dfrac{AD}{5} = \sqrt{3}$ **oe**<br><br>or for correct method to find AC **oe**<br>or correct method to find BC<br>or correct method to find AB<br>Or **B1** for tan 60 = $\sqrt{3}$ | Implied by AD = $5\sqrt{3}$ **oe** or AB = $10\sqrt{3}$ **oe**<br><br>Implied by AC = 10<br>Implied by BC = 15<br>Implied by AB = $10\sqrt{3}$ **oe** |
| **11** | **(a)** | | $0.\dot{4}$ | **2**<br>**1 AO1.2**<br>**1 AO1.3a** | **M1** for 0.44... or 4 ÷ 9 shown in working | |
| | **(b)** | | $\dfrac{4}{15}$ | **3**<br>**1 AO1.2**<br>**2 AO1.3b** | **B2** for $\dfrac{24}{90}$<br>Or **M1** for 2.66... and 26.66... **seen** or answer $\dfrac{k}{90}$ | |

| Question | | | Answer | Marks | Part marks and guidance | |
|---|---|---|---|---|---|---|
| **12** | | | Use of 6000 and 1 at any stage | **B1** | | |
| | | | $\pi \times 1[.06]^2$ | **M1** | | |
| | | | $5940 \div$ *their* $\pi \times 1[.06]^2$ <br> or $6000 \div$ *their* $\pi \times 1[.06]^2$ | **M1** | | |
| | | | 2000 | **A1** <br> **2 AO2.4a** <br> **1 AO3.1b** <br> **1 AO3.2** | | |
| **13** | | | 30 | **4** <br> **1 AO2.1a** <br> **2 AO3.1b** <br> **1 AO3.2** | **M1** for $360 - 5x = 2(2x + 45)$ **oe** <br> **M1** for correct rearrangement of *their* equation to $ax + b = c$ <br> **M1** for solution from *their* $ax + b = c$ | |
| **14** | | | $(3x - 5)(x - 1)$ [= 0] | **M2** | **M1** for $(3x + a)(x + b)$ where $3b + a = {}^-8$ or $ab = 5$ | Consider other correct methods even though they are specifically asked to factorise (non-calculator) |
| | | | 1 and $\dfrac{5}{3}$ **oe** | **A1** <br> **3 AO1.3b** | After **M0** scored, allow **SC1** for both solutions correct | |

| Question | | | Answer | Marks | Part marks and guidance | |
|---|---|---|---|---|---|---|
| 15 | | | $\dfrac{23}{144}$ **oe** | **6**<br>1 AO1.3b<br>5 AO3.1d | **M2** for $\left(\dfrac{1}{6}\times\dfrac{1}{2}\right)$ **oe**<br><br>Or **M1** for $\dfrac{1}{6}$ and $\dfrac{1}{2}$ **oe seen**<br>AND<br>**M2** for $\left(1-\left(their\,\dfrac{1}{6}\times their\,\dfrac{1}{2}\right)\right)\times\left(\dfrac{1}{6}\times\dfrac{1}{2}\right)$<br><br>Or **M1** for $\left(1-\left(their\,\dfrac{1}{6}\times their\,\dfrac{1}{2}\right)\right)$<br><br>AND<br>**M1** for addition of *their* two stages dependent on at least **M1** earned<br><br>If **0** scored, then **SC1** for correct relevant diagram drawn | e.g. sample space |
| 16 | | | $y = 2.5x^2$ **oe** | **3**<br>1 AO1.2<br>2 AO1.3b | **B2** for $k = 2.5$<br>Or **M1** for $y = kx^2$ or better | For **3** marks, condone answer $y = kx^2$ with $k = 2.5$ shown in working |
| 17 | (a) | (i) | 56 | **1**<br>1 AO2.1a | | |
| | | (ii) | 9 | **1**<br>1 AO2.1a | | |
| | (b) | | Box plot drawn with<br>Lowest = 35<br>LQ = 46<br>Median = 51<br>UQ = 59<br>Highest = 80 | **3**<br>2 AO2.3b<br>1 AO3.1c | **B2** for 3 or 4 conditions satisfied<br>Or **B1** for 2 conditions satisfied | |

| Question | | | Answer | Marks | Part marks and guidance | |
|---|---|---|---|---|---|---|
| | **(c)** | | On average scores in history were higher than in geography **oe** or Scores in geography were more widespread **oe** | **1** 1 AO2.1b | [Median is higher in history]<br><br>[IQR higher in geography] | Mark best comment |
| **18** | **(a)** | | $8\sqrt{5}$ final answer | **3** 1 AO1.1 1 AO1.2 1 AO1.3a | **B2** for $2\sqrt{80}$ or $[r =]\ 4\sqrt{5}$<br>Or **B1** for $\sqrt{80}$ **oe seen** | |
| | **(b)** | | Incorrect as 74 < 80 | **2** 1 AO1.3a 1 AO2.4a | **M1** for $5^2 + 7^2$ | |
| | **(c)** | | $x^2 + \left(\dfrac{1}{2}x + 10\right)^2 = 80$<br><br>$\dfrac{1}{4}x^2 + 10x + 100$<br><br>$5x^2 + 40x + 80 \ [= 0]$ **oe**<br><br>$[5](x + 4)^2 = [0]$<br><br><br>Repeated **oe** equal roots hence tangent **oe** | **M1**<br><br>**B1**<br><br><br>**A1**<br><br>**M1**<br><br>**A2** 1 AO1.3b 2 AO2.2 3 AO3.1b | <br><br>Expands bracket correctly<br><br><br><br><br>FT *their* quadratic<br><br><br>**A1** for $x = {}^-4$ [twice] | Allow other complete correct methods<br><br><br><br><br><br>Allow other correct methods e.g. complete the square, use of formula |

**Assessment Objectives (AO) Grid**

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