# OCR
Oxford Cambridge and RSA

**H**

**Date – Morning/Afternoon**

**GCSE MATHEMATICS**

**J560/04**  Paper 4 (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 <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, ie 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, 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.

J560/04            **Mark Scheme**            **GCSE Maths Practice paper**

**MARK SCHEME**

| Question | | | Answer | Marks | Part marks and guidance | |
|---|---|---|---|---|---|---|
| 1 | (a) | (i) | 67 549 | 1 <br> 1AO1.3a | | |
| | | (ii) | 67 450 | 1 <br> 1AO1.3a | | |
| | (b) | | 6.73   6.74 | 2 <br> 2AO1.2 | **B1** for each | |
| 2 | (a) | | 4200 | 1 <br> 1AO2.1a | | |
| | (b) | | Multiplier is 1.04 and is greater than 1 | 1 <br> 1AO2.1a | | Accept any correct explanation |
| | (c) | | 4 | 1 <br> 1AO2.1a | | |
| | (d) | | 5109[.94…] | 2 <br> 1AO1.3a <br> 1AO2.1a | **M1** for $4200 \times 1.04^5$ | Accept 5110 |
| 3 | | | 40 | 6 <br> 1AO1.3b <br> 5AO3.1d | **M5** for $(1 - ([1] \times [0].8[0] \times [0].75)) \times 100$ <br> Or **M4** for $1 - ([1] \times [0].8[0] \times [0].75)$ <br> Or **M3** for $[1] \times [0].8[0] \times [0].75$ or $[0].6$ <br> Or **M2** for $[0].8[0]$ and $[0].75$ <br> Or **M1** for $[0].8[0]$ or $[0].75$ | Accept correct alternative methods e.g. <br> **M1** for 20% of 100 [= 20] <br> **M1** for 100 – 20 [= 80] <br> **M1** for 25% of 80 = 80 ÷ 4 [= 20] <br> **M1** for 80 – 20 [= 60] <br> **M1** for 100 – 60 |
| 4 | | | 24 | 4 <br> 1AO1.3b <br> 1AO3.1b <br> 1AO3.2 <br> 1AO3.3 | **M2** for $11x + x = 180$ or 15 <br> Or **M1** for $11x$ and $x$ <br> AND <br> **M1** for 360 ÷ *their* 15 | Accept alternative methods e.g. <br> **M2** for $180 - 360/n = 11(360/n)$ <br> **M1** for $180n = 4320$ |
| 5 | (a) | | $3n + 5$ | 2 <br> 2AO1.3a | **B1** for $3n$ | |

| Question | | | Answer | Marks | Part marks and guidance | |
|---|---|---|---|---|---|---|
| | **(b)** | | [$p$ =] 5 <br> [$q$ =] $^-$3 | **4** <br> 4AO1.3b | **M1** for 2nd difference = 10 <br> **A1** for 5[$n^2$] <br> **M1** for $^-$3  [$^-$6  $^-$9  $^-$12] | Accept alternative methods e.g. <br> **M1** for $p + q = 2$ <br> **M1** for $4p + 2q = 14$ <br> **M1** for two equations with a common coefficient in either $p$ or $q$ |
| **6** | | | 0.64 **oe** | **5** <br> 1AO1.3b <br> 4AO3.1d | **M4** for 0.4 × 0.7 + (1 − 0.4) × 0.6 <br> Or **M3** for fully correct tree diagram with probabilities <br> Or **M2** for partially correct tree diagram with one set of correct branches <br> Or **M1** for correctly labelled tree diagram with missing or incorrect probabilities | Accept correct equivalent methods and equivalent percentages and fractions for decimals <br><br> Accept working with expected frequencies |
| **7** | | | 77.8[1…] or 77.82 | **6** <br> 1AO1.3a <br> 1AO1.3b <br> 1AO2.1b <br> 3AO3.1d | **M5** for $\sqrt{60^2 + 40^2} - 10 + \frac{1}{2} \times \pi \times 10$ <br><br> Or **M4** for $\sqrt{60^2 + 40^2}$ and $\frac{1}{2} \times \pi \times 10$ <br><br> Or **M3** for $60^2 + 40^2$ or 5200 and ($\frac{1}{2} \times \pi \times 10$ or 15.7[…]) <br><br> Or **M2** for $\sqrt{60^2 + 40^2}$ or 72.1[1…] or $\frac{1}{2} \times \pi \times 10$ or 15.7[…] <br><br> Or **M1** for $60^2 + 40^2$ or 5200 or $10\pi$ | |

| Question | | | Answer | Marks | Part marks and guidance | |
|---|---|---|---|---|---|---|
| 8 | | | [*a* =] 5.5[0] <br><br> [*c* =] 3[.00] | **5** <br> **1AO1.3a** <br> **1AO2.3b** <br> **2AO3.1d** <br> **1AO3.3** | **M4** for correct method to eliminate 1 variable <br> Or **M3** for correct method to eliminate 1 variable, allow 1 arithmetic error <br> Or **M2** for 2 correct equations with a common coefficient <br> Or **M1** for 6*a* + 2*c* = 39 or 5*a* + 3*c* = 36.50 | |
| 9 | (a) | (i) | 46   77   80 | **2** <br> **2AO1.3a** | **M1** for attempt to work out cumulative frequencies | |
| | | (ii) | Correct graph | **2** <br> **2AO2.3b** | **M1** for all points correctly plotted, tolerance ± 2 mm <br> **A1** for curve through four points |  |
| | (b) | | A correct justification | **1** <br> **1AO2.5b** | | e.g. He does not have the original numbers; he cannot be sure as the graph is only an estimate |

| Question | | | Answer | Marks | Part marks and guidance | |
|---|---|---|---|---|---|---|
| | (c) | | A correct profit from *their* correct readings e.g. using 30 and 69 would get 203.5[0] | **6**<br>1AO1.3a<br>2AO2.3a<br>3AO3.1d | **M5** for (29 to 31) × 2 + (68 to 70 – 29 to 31) × 3.5 + (80 – 68 to 70) × 5 – 80 × 0.6<br>Or **M4** for the above working with one error<br>Or **M3** for *their* '30' × 2 + *their* '39' × 3.5 + *their* '11' × 5 – 80 × 0.6 or two correct readings from the graph at 80 and 120 and 80 × 0.6 or 48<br>Or **M2** for two correct readings from the graph at 80 and 120<br>or one correct reading from the graph at 80 or 120 and 80 × 0.6 or 48<br>Or **M1** for one correct reading from the graph at 80 or 120 or 80 × 0.6 or 48 | |
| 10 | (a) | | 102 | **4**<br>1AO1.3b<br>1AO2.1a<br>2AO3.1b | **M1** for ∠SOR = 88°<br>**M1** for ∠OSR = 46°<br>**M1** for ∠PSR = 78° | Accept any correct method e.g.<br>**M1** for ∠RST = 44°<br>**M1** for 90 – *their* ∠RST<br>**M1** for 32 + *their* ∠OSR |
| | (b) | | 12 | **3**<br>1AO1.3b<br>2AO3.1b | **M1** for ∠PSU = 90 – 32 or 58<br>**M1** for ∠SRP = *their* '∠PSU' – 46 | Accept any correct method |
| 11 | | | 66.8[46..] or 66.85 or 67 | **6**<br>1AO1.3b<br>5AO3.1b | **M2** for 8 ÷ tan 43 or 8.57[8…]<br>Or **M1** for tan 43 = 8 ÷ AD<br>AND<br>**M1** for [DC =] 12 – *their* '8.58' or 3.42[1…]<br>**M2** for tan BCA = 8 ÷ *their* 3.42 | |

| Question | | | Answer | Marks | Part marks and guidance | |
|---|---|---|---|---|---|---|
| 12 | | | $k(5 - j) = 4 + 3j$ <br> $5k - kj = 4 + 3j$ <br> Rearrange *their* equation e.g. $5k - 4 = kj + 3j$ <br> Factorise $5k - 4 = j(k + 3)$ | M1 <br> M1 <br> M1 <br><br> M1 <br> 4AO2.2 | | |
| 13 | (a) | | $y = 7.5\sqrt{x}$ | 3 <br> 3AO1.3a | **M2** for $y = k\sqrt{x}$ and $k = 7.5$ <br> Or **M1** for $y = k\sqrt{x}$ | |
| | (b) | | Fully correct argument | 3 <br> 3AO2.2 | **M2** for $x^2y = 432$ **oe** <br> or $x$ sf $= 4 \div 12$ and $y$ sf $= 1 \div (x\,\text{sf})^2$ **oe** <br> Or **M1** for $x^2y = k$ **oe** or clear $x$ sf $= 4 \div 12$ | |
| 14 | (a) | | $(x + 5)^2 + 4$ | 3 <br> 3AO1.3a | **M2** for *their* 4 correctly FT from *their* '$(x + 5)^{2}$' <br> Or **M1** for $(x + 5)^2$ | |
| | (b) | | (⁻5, 4) | 1FT <br> 1AO2.1a | | FT *their* $(x + a)^2 + b$ |
| 15 | (a) | | ⁻5 … … … 35 | 2 <br> 2AO1.3a | **B1** for 1 correct | |
| | (b) | (i) | 2   3 <br><br> [because] there is a change in sign **oe** | 2 <br> 1AO2.1a <br> 1AO2.4b | **B1** for either 2   3 or [because] there is a change in sign **oe** | |
| | | (ii) | For $x$ accept any value in the range $2 < x < 3$ and the value of $y$ FT from *their* $x$ e.g. [$x =$] 2.5 and [$y =$] ⁻4.375 | 2 <br> 1AO1.3a <br> 1AO2.1a | **B1** for either acceptable $x$ value or correct $y$ value FT *their* $x$ value | |
| | | (iii) | e.g. 2.5 < solution < 3 | 1FT <br> 1AO2.1a | | FT *their* acceptable value in **(b)(ii)** <br> Accept as words |

| Question | Answer | Marks | Part marks and guidance |
|---|---|---|---|
| 16 | $\dfrac{1}{2}$ , $^-2\dfrac{1}{2}$ <br><br> $^-4$, $^-7$ | **6** <br> 6AO1.3b | **M1** for $2x^2 + 8x - 7 = x - 3$ <br> **M1** for rearranging *their* equation to get $= 0$ e.g. $2x^2 + 7x - 4 = 0$ <br> AND <br> **M2** for factorising *their* expression e.g. $(2x - 1)(x + 4)$ <br> Or **M1** for factors with one error or giving two correct terms <br> AND <br><br> **A1** for solutions for $x = \dfrac{1}{2}$ , $^-4$ <br><br> **A1** for solutions for $y = {}^-2\dfrac{1}{2}$ , $^-7$ | |
| 17 (a) | e.g. $\sqrt{396} = \sqrt{4 \times 9 \times 11}$ <br> $= 2 \times 3 \times \sqrt{11}$ <br> $= 6\sqrt{11}$ | **M1** <br><br> **M1** <br> 2AO2.2 | | Partial simplification e.g. $2\sqrt{99}$ scores **M1** |

| Question | | | Answer | Marks | Part marks and guidance |
|---|---|---|---|---|---|
| | **(b)** | | Multiply numerator and denominator by $2 + \sqrt{2}$ | **M1** | Accept correct alternative methods |
| | | | Numerator = $4 \times 2 + 4 \times \sqrt{2} + 2 \times 2\sqrt{2} + \sqrt{2} \times 2\sqrt{2}$ or better | **M1** | |
| | | | Denominator = $2 \times 2 + 2 \times \sqrt{2} - 2 \times \sqrt{2} - \sqrt{2} \times \sqrt{2}$ or better | **M1** | |
| | | | Numerator simplifies to $12 + 8\sqrt{2}$ | **M1** | |
| | | | Denominator simplifies to 2 | **M1** | |
| | | | Show equal to $6 + 4\sqrt{2}$ | **A1**<br>**2AO1.3b**<br>**4AO2.2** | |

## Assessment Objectives (AO) Grid

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