



Mark Scheme (Results)

January 2015

Pearson Edexcel International GCSE
Mathematics A (4MA0)
Paper 4H

Pearson Edexcel Level 1/Level 2 Certificate
Mathematics A (KMA0)
Paper 4H

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January 2015

Publications Code UG040598

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the **candidate's response is not worthy of credit according to the mark scheme.**
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the **mark scheme to a candidate's response, the team leader must be consulted.**
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.
- **Types of mark**
 - M marks: method marks
 - A marks: accuracy marks
 - B marks: unconditional accuracy marks (independent of M marks)
- **Abbreviations**
 - cao – correct answer only
 - ft – follow through
 - isw – ignore subsequent working
 - SC - special case
 - oe – or equivalent (and appropriate)
 - dep – dependent
 - indep – independent
 - eeo – each error or omission

- **No working**

If no working is shown then correct answers normally score full marks

If no working is shown then incorrect (even though nearly correct) answers score no marks.

- **With working**

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

If it is clear from the working that the “correct” answer has been obtained from incorrect working, award 0 marks.

Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks.

If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.

If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

If there is no answer on the answer line then check the working for an obvious answer.

- **Ignoring subsequent work**

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: eg. Incorrect cancelling of a fraction that would otherwise be correct.

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect eg algebra.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

- **Parts of questions**

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

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Apart from Questions 8, 12e, 17b, and 22b where the mark scheme states otherwise, the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.

| Q | Working | Answer | Mark | Notes |
|----------------------|---|--------|------|---|
| 1 | $45 \times 3 + 46 \times 7 + 47 \times 12 + 48 \times 23 + 49 \times 4 + 50 \times 1$ or $135 + 322 + 564 + 1104 + 196 + 50$ or 2371 | | 3 | M1 for at least 3 correct products and summing them |
| | $"2371" \div 50$ or $\frac{45 \times 3 + 46 \times 7 + 47 \times 12 + 48 \times 23 + 49 \times 4 + 50(\times 1)}{50}$ | | | M1 (dep) for division by 50 NB. If division by something other than 50 this must clearly come from adding the frequency column |
| | | 47.42 | | A1 Accept 47, 47.4 if $2371 \div 50$ seen accept $47 \frac{21}{50}$ but not $\frac{2371}{50}$ |
| Total 3 marks | | | | |

| Q | Working | Answer | Mark | Notes |
|----------------------|--|--------|------|--|
| 2 | 32×17 or 544 or $\pi \times 8^2$ oe or $200.9 - 201.602$ | | 3 | M1 |
| | $32 \times 17 - \pi \times 8^2$ | | | M1 dep for the complete, correct method |
| | | 343 | | A1 for awrt 343 |
| Total 3 marks | | | | |

| Q | Working | Answer | Mark | Notes |
|---|------------------------|--------|------|---|
| 3 | $1 - 0.3oe$ or $0.7oe$ | | 3 | M1 accept $100(\%) - 30(\%) = 70(\%)$ |
| | "0.7" $\div 2$ oe | | | M1 dep accept $70(\%) \div 2$ |
| | | 0.35 | | A1 for 0.35 or 35% or $\frac{35}{100}$ oe |
| | | | | Total 3 marks |

| Q | Working | Answer | Mark | Notes | | | | | | | | | | | | | | |
|---|--|--------|------|---|---|---|---|---|---|-----|----|----|----|---|---|---|---|--|
| 4 | <table border="1"> <tr> <td>x</td> <td>-2</td> <td>-1</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td>y</td> <td>-10</td> <td>-7</td> <td>-4</td> <td>-1</td> <td>2</td> <td>5</td> </tr> </table> | x | -2 | -1 | 0 | 1 | 2 | 3 | y | -10 | -7 | -4 | -1 | 2 | 5 | $y = 3x - 4$ drawn from $x = -2$ to $x = 3$ | 4 | B4 For a correct line between $x = -2$ and $x = 3$ |
| x | -2 | -1 | 0 | 1 | 2 | 3 | | | | | | | | | | | | |
| y | -10 | -7 | -4 | -1 | 2 | 5 | | | | | | | | | | | | |
| | | | | B3 For a correct straight line segment through at least 3 of $(-2, -10)$ $(-1, -7)$ $(0, -4)$ $(1, -1)$ $(2, 2)$ $(3, 5)$ OR for all of $(-2, -10)$ $(-1, -7)$ $(0, -4)$ $(1, -1)$ $(2, 2)$ $(3, 5)$ plotted but not joined | | | | | | | | | | | | | | |
| | | | | B2 For at least 2 correct points plotted OR for a line drawn with a positive gradient through $(0, -4)$ and clear intention to use of a gradient of 3 (eg. a line through $(0, -4)$ and $(0.5, -1)$) | | | | | | | | | | | | | | |
| | | | | B1 For at least 2 correct points stated (may be in a table) OR for a line drawn with a positive gradient through $(0, -4)$ but not a line joining $(0, -4)$ and $(3, 0)$ OR a line with gradient 3 | | | | | | | | | | | | | | |
| | | | | Total 4 marks | | | | | | | | | | | | | | |

| Q | Working | Answer | Mark | Notes |
|-------|---------|----------------------------------|------|--|
| 5 (a) | | Enlargement | 3 | B1 |
| | | (scale factor) 2 | | B1 |
| | | (centre) (1, 3) | | B1 condone missing brackets around (1, 3); do not accept $\begin{pmatrix} 1 \\ 3 \end{pmatrix}$ |
| (b) | | Triangle at (9,2) (9,4) (8,2) | 1 | B1 |
| | | | | Total 4 marks |

| Q | Working | Answer | Mark | Notes |
|-------|---------|--|------|--|
| 6 (a) | (i) | 5, 15 | 2 | B1 |
| | (ii) | 4, 5, 8, 10, 12, 15, 16 | | B1 |
| (b) | | No ticked and 5 is a prime number (and a multiple of 5) | 1 | B1 oe explanation eg. 5 is in both sets |
| | | | | Total 3 marks |

| Q | Working | Answer | Mark | Notes |
|---|---|--------|------|----------------------|
| 7 | $240 \times \frac{3}{3+4+8}$ or 48 or $240 \times \frac{8}{3+4+8}$ or 128 | | 3 | M1 |
| | "128" – "48" | | | M1 dep |
| | | 80 | | A1 |
| | | | | Total 3 marks |

| Q | Working | Answer | Mark | Notes |
|---|--|-----------------------|------|--|
| 8 | $3x - 5 + 3x + 4x + 2$ ($=10x - 3$) | | 4 | M1 correct expression for perimeter (may be seen in an equation) |
| | $3x - 5 + 3x + 4x + 2 = 62$ or “ $10x - 3 = 62$ ” | | | M1 dep |
| | eg. $10x - 3 = 62$ | | | M1 (dep) correct method to collect x terms in a correct equation |
| | | 6.5 or $6\frac{1}{2}$ | | A1 dep on all method marks |
| | | | | SC : B2 for $x = 6.5$ and $3 \times 6.5 - 5 + 3 \times 6.5 + 4 \times 6.5 + 2 = 62$ (B1 for a value for x substituted into correct expression for perimeter eg. $3 \times 6 - 5 + 3 \times 6 + 4 \times 6 + 2$) |
| | | | | Total 4 marks |

| Q | Working | Answer | Mark | Notes |
|---|---------|---------|------|--|
| 9 | | 1, 8, 9 | 2 | B2 B1 for 2, 8, 8 or 0, 8, 10 or for three numbers with a mean of 6 or a median of 8 or $6 \times 3 (=18)$ |
| | | | | Total 2 marks |

| Q | Working | Answer | Mark | Notes |
|---------------|----------------------------|--------------------|------|--|
| 10 (a) | $3x < 35 - 8$ or $3x < 27$ | | 2 | M1 allow $3x = 35 - 8$ or $3x = 27$ condone incorrect inequality sign |
| | | $x < 9$ | | A1 for $x < 9$ or $9 > x$ NB: Final answer must be an inequality SC : B1 for $x \leq 9$ or $x = 9$ or 9 as an answer |
| (b) | | $-2 < x \leq 4$ oe | 2 | B2 B1 for one end of inequality correct ie. $-2 < x$ or $x \leq 4$ OR $-2 \leq x < 4$ condone the use of a variable other than x but not O |
| | | | | Total 4 marks |

| Q | Working | Answer | Mark | Notes |
|---------------|---|--|------|---|
| 11 (a) | | Angle between <u>tangent</u> and <u>radius</u> is 90° | 1 | B1 Accept perpendicular or right angle for 90° |
| (b) | angle $POT = 180 - 90 - 46 (=44)$ or $2y + 90 + 46 = 180$ | | 3 | M1 May be on diagram |
| | $(y =) "44" \div 2$ or $(180 - (180 - 44)) \div 2$ or $(y =) (180 - 90 - 46) \div 2$ | | | M1 |
| | | 22 | | A1 |
| | | | | Total 4 marks |

| Q | Working | | Answer | Mark | Notes |
|--------|---------|------------------|--------|------|---|
| 12 (a) | | $c(c - 5)$ | 2 | B2 | Award B2 also for $(c \pm 0)(c - 5)$ or $c \times (c - 5)$ B1 for factors which, when expanded and simplified, give two terms, one of which is correct |
| (b) | | d^{12} | 1 | B1 | |
| (c) | | $(x + 6)(x - 5)$ | 2 | B2 | B1 for $(x \pm 6)(x \pm 5)$ |

| Q | Working | Answer | Mark | Notes |
|--------|---|---------------------------|------|---|
| 12 (d) | $\frac{2P}{a} = b^2$ | | 2 | M1 oe with b^2 as the subject |
| | | $b = \sqrt{\frac{2P}{a}}$ | | A1 oe with b as the subject or $b = \pm\sqrt{\frac{2P}{a}}$ |
| (e) | eg. $2(2x + 1) + 3(x - 5) = 6 \times 4$ or $\frac{2(2x+1)}{6} + \frac{3(x-5)}{6} = 4$ | | 4 | M1 for clear intention to multiply both sides by 6 or by a multiple of 6 or write both fractions with a common denominator |
| | eg. $4x + 2 + 3x - 15 = 24$ or $\frac{4x+2}{6} + \frac{3x-15}{6} = 4$ | | | M1 for correct expansion of brackets in a correct equation |
| | eg. $4x + 3x = 37$ or $-4x - 3x = -37$ or $7x = 37$ or or $-7x = -37$ $7x = 24 + 15 - 2$ or $-7x = 2 - 24 - 15$ | | | M1 for isolating terms in x in a correct equation or $7x - 37 = 0$ or $37 - 7x = 0$ |
| | | $5\frac{2}{7}$ | | A1 oe eg. $\frac{37}{7}$ Award 4 marks if answer is correct and at least one method mark scored Accept 5.285714... rounded or truncated to 3 or more sig figs |
| | | | | Total 11 marks |

| Q | Working | Answer | Mark | Notes |
|---------------|--|----------------------|------|----------------------|
| 13 (a) | | 7.6×10^{-5} | 1 | B1 |
| (b) | | 160 000 000 | 1 | B1 |
| (c) | $\frac{1.6 \times 10^8}{1.4 \times 10^7}$ or $\frac{16}{1.4}$ or $\frac{80}{7}$ or $\frac{160000000}{14000000}$ or 11.428... | | 2 | M1 |
| | | 11 | | A1 cao |
| | | | | Total 4 marks |

| Q | Working | Answer | Mark | Notes |
|-----------|--|----------|------|---|
| 14 | $0.025 \times 40\,000 (=1000)$ or $1.025 \times 40\,000 (=41000)$ or 3000 | | 3 | M1 |
| | "41000" $\times 0.025 (=1025)$ and "42025" $\times 0.025 (=1050.625)$ OR 3075.62 or 3075.625 or 3075.63 | | | M1 (dep) method to find interest for year 2 and year 3 |
| | | 43075.63 | | A1 accept 43075.62 or 43075.625 NB. An answer of 3075.62 or 3075.625 or 3075.63 score M2A0 |
| | | | | Total 3 marks |

| Q | Working | Answer | Mark | Notes |
|--------|---|-----------------|------|--|
| 15 (a) | | | 2 | M1 line $y = 2$ drawn |
| | | -1, 3 | | A1 SC: B1 for (-1, 2) and (3, 2) |
| (b) | $x^2 + 5x - 7 + 6 = 6$ or $x^2 + 5x - 7 - 7x = -7x$ or $x^2 - 2x - 1 = -7x + 6$ | | 2 | M1 addition of 6 to both sides or subtraction of $7x$ from both sides or $a = -7$ or $b = 6$ |
| | | $a = -7, b = 6$ | | A1 SC : B1 for $a = 7$ and $b = -6$ |
| | | | | Total 4 marks |

| Q | Working | Answer | Mark | Notes |
|--------|--|--|------|------------------------------------|
| 16 (a) | | 0.1oe for Chris fail or 0.35 oe for Sunil fail | 3 | B1 stated or in correct position |
| | | correct binary structure | | B1 4 branches needed on RHS |
| | | ALL labels and values correct | | B1 accept P and F |
| (b) | $0.9 \times "0.35" \text{ or } "0.1" \times 0.65 \text{ or}$ $0.9 \times 0.65 \text{ and } 0.1 \times 0.35$ | | 3 | M1 |
| | $0.9 \times "0.35" + "0.1" \times 0.65 \text{ or}$ $1 - (0.9 \times 0.65 + 0.1 \times 0.35)$ | | | M1 complete method |
| | | 0.38 | | A1 for 0.38 oe eg. $\frac{19}{50}$ |
| | | | | Total 6 marks |

| Q | Working | Answer | Mark | Notes |
|--------|---|--------|------|---|
| 17 (a) | $\frac{1}{2} \times 2x \times (x+x+7)$ or $2x \times x$ or $\frac{1}{2} \times 7 \times 2x$ or $2x \times (x+7)$ | | 3 | M1 for area of trapezium or any relevant area Allow $2x$ in place of $x+x$ |
| | $\frac{1}{2} \times 2x \times (x+x+7) = 17$ or $2x \times x + \frac{1}{2} \times 7 \times 2x = 17$ or $2x \times (x+7) - \frac{1}{2} \times 7 \times 2x = 17$ | | | M1 Allow $2x$ in place of $x+x$ |
| | | show | | A1 for deriving the given answer $2x^2 + 7x - 17 = 0$ correctly |
| (b) | $\frac{-7 \pm \sqrt{7^2 - 4 \times 2 \times -17}}{2 \times 2}$ | | 3 | M1 for correct substitution; condone one sign error in substitution Accept $+$ in place of \pm NB. Terms may be simplified eg. accept 4 in place of 2×2 in denominator |
| | $\sqrt{185}$ or $\sqrt{49+136}$ or 13.6.... | | | M1 (independent) for correct simplification of discriminant (if evaluated at least 3sf rounded or truncated) |
| | | 1.65 | | A1 dep on 1 st M mark scored for value rounding to 1.65 given as final answer Award 3 marks if first M1 scored and answer correct |
| | | | | Total 6 marks |

| Q | Working | Answer | Mark | Notes |
|----|--|--------|------|-------------------------|
| 18 | 400.5 or $400.4\dot{9}$ or 399.5 or 50.25 or 50.15 or $50.24\dot{9}$ | | | B1 any correct UB or LB |
| | $\frac{400.5}{50.15}$ or $\frac{400.4\dot{9}}{50.15}$ | | | M1 |
| | | 7.99 | | A1 or 7.986... |
| | | | | Total 3 marks |

| Q | Working | Answer | Mark | Notes |
|--------|--|--|------|--|
| 19 (a) | | $\begin{pmatrix} 10 \\ -4 \end{pmatrix}$ | 1 | B1 |
| (b) | $3\begin{pmatrix} 1 \\ 7 \end{pmatrix} - \begin{pmatrix} -7 \\ 0 \end{pmatrix}$ or $\begin{pmatrix} 3 \\ 21 \end{pmatrix}$ | | 2 | M1 or $\begin{pmatrix} x \\ 21 \end{pmatrix}$ or $\begin{pmatrix} 10 \\ y \end{pmatrix}$ |
| | | $\begin{pmatrix} 10 \\ 21 \end{pmatrix}$ | | A1 |
| (c) | $5^2 + (-2)^2$ or $5^2 + 2^2$ or 29 | | 2 | M1 accept $5^2 + -2^2$ |
| | | $\sqrt{29}$ | | A1 accept answers in the range 5.38 - 5.385 |
| | | | | Total 5 marks |

| Q | Working | Answer | Mark | Notes |
|----|---|--------|------|--|
| 20 | $26 \div 20 (=1.3)$ or 3.6×10 or 3.3×10 or 1×30 or 36 or 33 or 30 or $\frac{26}{130} \left(= \frac{1}{5} \right)$ | | 3 | M1 Any one frequency density (without contradiction) or, eg. $1\text{cm}^2 = 5$ or clear association of area with frequency |
| | $26 + 3.6 \times 10 + 3.3 \times 10 + 1 \times 30$ or $26 + 36 + 33 + 30$ or $625 \times \frac{1}{5}$ or $(130 + 180 + 165 + 150) \times \frac{1}{5}$ | | | M1 Any fully correct complete method; condone one error in bar width or bar height |
| | | 125 | | A1 |
| | | | | Total 3 marks |

| Q | Working | Answer | Mark | Notes |
|----|--|-----------------|------|--|
| 21 | $\frac{4}{3} \times \pi \times (2r)^3$ | | 3 | M1 condone omission of brackets |
| | $\pi \times r^2 \times h = \frac{4}{3} \times \pi \times (2r)^3$ | | | M1 dep brackets must be present or $8r^3$ seen |
| | | $\frac{32}{3}r$ | | A1 |
| | | | | Total 3 marks |

| Q | Working | Answer | Mark | Notes |
|--------|---|----------|------|--|
| 22 (a) | | 2^{-5} | 2 | B2 B1 for $\frac{1}{2^5}$ or $\left(\frac{1}{2}\right)^5$ or 2^5 |
| (b) | $20 - 4\sqrt{3} + 5\sqrt{12} - \sqrt{3}\sqrt{12}$ or $20 - 4\sqrt{3} + 5\sqrt{12} - \sqrt{36}$ or $20 - 4\sqrt{3} + 5\sqrt{12} - 6$ | | 3 | M1 for at least 3 correct terms with correct signs or all 4 terms correct without signs |
| | $\sqrt{12} = \sqrt{4 \times 3}$ or $\sqrt{12} = 2\sqrt{3}$ or $5\sqrt{12} = 5\sqrt{4 \times 3}$ or $5\sqrt{12} = 10\sqrt{3}$ | | | M1 NB. This may be seen before the expansion of the brackets |
| | | show | | A1 dep on both method marks for deriving the given answer |
| | | | | Total 5 marks |

| Q | Working | Answer | Mark | Notes |
|----|---|--------------------|------|---|
| 23 | $x^2 - 4 = (x + 2)(x - 2)$ | | 4 | B1 independent |
| | $[5-](x+2) \times \frac{(x-3)}{(x^2-4)}$ or $[5-](x+2) \times \frac{(x-3)}{(x-2)(x+2)}$ | | | M1 for dealing with division of $(x+2)$ by $\frac{x^2-4}{x-3}$ |
| | $\frac{5(x-2)}{(x-2)} - \frac{(x-3)}{(x-2)}$ or $\frac{5(x-2)(x+2)}{(x-2)(x+2)} - (x+2) \times \frac{(x-3)}{(x-2)(x+2)}$ or $\frac{5(x^2-4)}{x^2-4} - (x+2) \times \frac{(x-3)}{x^2-4}$ | | | M1 For two correct fractions with a common denominator or a correct single fraction |
| | | $\frac{4x-7}{x-2}$ | | A1 from fully correct algebra |
| | | | | Total 4 marks |

| Q | Working | Answer | Mark | Notes |
|----|--|--------|------|---|
| 24 | $\frac{x}{360} \times \pi \times r^2 = 5\pi$ | | 6 | M1 for this mark only condone an incorrect value for r |
| | $x = 50$ | | | A1 cao for angle $AOB = 50$ |
| | $(AB^2 =) 6^2 + 6^2 - 2 \times 6 \times 6 \times \cos("50")$ | | | M1 dep on first M1 or $6 \times \sin("50"/2)$ |
| | $(AB =) \sqrt{25.7...}$ or 5.07.... | | | M1 dep or $2 \times 6 \times \sin("50"/2)$ |
| | $\frac{"50"}{360} \times 2 \times \pi \times 6$ or $\frac{5\pi \times 2\pi \times 6}{\pi \times 6^2}$ or $\frac{5}{3}\pi$ or 5.23... | | | M1 dep on first M1 if "50" used but indep if angle not used |
| | | 10.3 | | A1 for answer in range 10.2 – 10.31 |
| | | | | Total 6 marks |

