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# Mark Scheme (Results)

## January 2014

## Pearson Edexcel International GCSE Mathematics A (4MA0/3HR) Paper 3HR

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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
    - eeoo – 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.

Apart from Questions 4(b), 13 and 18, where the mark scheme states otherwise, the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| **1** | $1 \times 6 + 2 \times 8 + 3 \times 7 + 4 \times 3 + 5 \times 1$ or $6 + 16 + 21 + 12 + 5$ or 60 | | 3 | M1 for at least 4 correct products stated or evaluated |
| | "60" ÷ 25 | | | M1 (dep) |
| | | 2.4 oe | | A1 Also accept 2 if both method marks are scored |
| | | | | **Total 3 marks** |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| **2** (a) | $24 \times \frac{5}{3}$ | | 2 | M1 or 24 ÷ 3 (=8) |
| | | 40 | | A1 cao |
| (b) | $\frac{45}{5} \times 4$ oe | | 2 | M1 or 45 ÷ (4 + 1) (=9) |
| | | 36 | | A1 cao |
| | | | | **Total 4 marks** |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| **3** (a) | eg $\frac{(5-2)\times 180}{5}$, $180-\frac{360}{5}$ | | 2 | M1 for $(5-2)\times 180$ or $3\times 180$ or 540 |
| | | 108 | | A1 cao |
| (b) | $y=\frac{360}{6}$ | | 2 | M1 |
| | | 60 | | A1 cao |
| | | | | **Total 4 marks** |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| **4** (a) | | $t(t+6)$ | 2 | B2 Also award B2 for $(t+0)(t+6)$<br><br>B1 for factors which, when expanded and simplified, give two terms, one of which is correct. |
| (b) | $7x-5x=-4+5$ or $2x-5=-4$<br>or $7x=5x+1$ etc | | 3 | M1 for correct rearrangement with $x$ terms on one side and numbers on the other or for correct collection of either $x$ terms or numbers on one side in a correct equation |
| | $2x=1$ | | | M1 Award also for $-2x=-1$ |
| | | $\frac{1}{2}$ oe | | A1 Award 3 marks if answer is correct and at least one method mark scored |
| (c) | $8y+12+2y-12$ | | 2 | M1 For 3 terms with correct signs or 4 terms without signs |
| | | $10y$ | | A1 Also accept $10y+0$ |
| | | | | **Total 7 marks** |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| **5** | | 2 4 | 2 | B2 −withhold B1 mark for eeoo |
| | | | | **Total 2 marks** |

| Question | Working | | Answer | Mark | Notes | | |
|---|---|---|---|---|---|---|---|
| **6** (a) | $\frac{12}{100} \times 675$ oe or 81 | | | 3 | M1 | | M2 for 675 × 1.12 oe |
| | 675 + "81" | | | | M1 | (dep) | |
| | | | 756 | | A1 | cao | |
| (b) | 23% of amount = 2162<br>or $(1\% =) \frac{2162}{23}$ or 94 seen | | | 3 | M1 | M2 for $\frac{2162}{23} \times 100$ oe | |
| | "94" × 100 or 9400 or "94" × 77 | | | | M1 | | |
| | | | 7238 | | A1 | cao | |
| (c) | $\frac{40}{100} \times 1500$ oe or 600 | OR<br>$1500 \times 0.6^3$ | | 3 | M1 | for eg $\frac{40}{100} \times 1500$ or 600 | OR M2 for $1500 \times 0.6^3$ (M1 for $1500 \times 0.6$ or 900 or $1500 \times 0.6^2$ or 540 or $1500 \times 0.6^4$) |
| | $\frac{40}{100} \times (1500 - "600")$ = 360<br>$\frac{40}{100} \times (1500 - "600" - "360") =$ 216<br>1500−"600"−"360"−"216" | | | | M1 | for completing method | |
| | | | | | | Accept (1− 0.4) as equivalent to 0.6 | |
| | | | 324 | | A1 | cao | |
| | | | | | | | **Total 9 marks** |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| **7** (a) | $64.8^2 + 48.6^2$ or $4199.04 + 2361.96$ or $6561$ | | 3 | M1 for squaring and adding |
| | $\sqrt{64.8^2 + 48.6^2}$ | | | M1 (dep) for square root |
| | | 81 | | A1 |
| (b) | $\frac{w}{38.4} = \frac{102}{48}$ oe eg $38.4 \times \frac{102}{48}$ | | 2 | M1 for a full method |
| | | 81.6 | | A1 cao |
| | | | | **Total 5 marks** |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| **8** (a) | $\frac{4}{10}+\frac{2}{10}$ or 4 + 2 or 6 | | 2 | M1 |
| | | $\frac{6}{10}$ or $\frac{3}{5}$ | | A1 |
| (b) | eg $\frac{4}{10}\times 200$ | | 2 | M1 |
| | | 80 | | A1 cao |
| (c)(i) | $\frac{3}{10}\times\frac{2}{9}$ | | 5 | M1 |
| | | $\frac{6}{90}$ oe | | A1 $\frac{6}{90}$ oe inc $\frac{1}{15}$<br>SC M1 for $\frac{3}{10}\times\frac{3}{10}$ |
| (ii) | $\frac{3}{10}\times\frac{2}{9}+\frac{4}{10}\times\frac{3}{9}+\frac{2}{10}\times\frac{3}{9}$ | | | M1 for one correct product<br>M1 for sum of all 3 correct products |
| | | $\frac{24}{90}$ oe | | A1 for $\frac{24}{90}$ oe inc $\frac{4}{15}$ |
| | | | | ***SC***: M1 for<br>$\frac{3}{10}\times\frac{2}{10}$ or $\frac{4}{10}\times\frac{4}{10}$ or $\frac{2}{10}\times\frac{3}{10}$<br>M1 for<br>$\frac{3}{10}\times\frac{2}{10}+\frac{4}{10}\times\frac{4}{10}+\frac{2}{10}\times\frac{3}{10}$ |
| | | | | **Total 9 marks** |

| Question | | Working | Answer | Mark | Notes |
|---|---|---|---|---|---|
| **9** | (a) | | $y^5$ | 1 | B1 cao |
| | (b) | $4x + 12 > 8$ or $x + 3 > 2$ | | 2 | M1 |
| | | | $x > -1$ | | A1 |
| | | | | | **Total 3 marks** |

| Question | | Working | Answer | Mark | Notes |
|---|---|---|---|---|---|
| **10** | (a) | 20 55 115 148 155 160 | | 1 | B1 |
| | (b) | | Points correct | 2 | B1 $\pm$ ½ sq |
| | | Curve or line segments | | | B1 ft from points if 4 or 5 correct or if points are plotted consistently within each interval at the correct heights<br>Accept curve which is not joined to the origin |
| | (c) | 40 or $40\frac{1}{4}$ indicated on cumulative frequency axis or stated | | 2 | M1 for 40 or $40\frac{1}{4}$ indicated on cumulative frequency axis or stated |
| | | | approx 63 | | A1 If M1 scored, ft from cf graph<br>If M1 not scored, ft only from correct curve and, if answer is correct ($\pm$ ½ sq tolerance) award M1 A1 |
| | | | | | **Total 5 marks** |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| **11** | $20 = 2^2 \times 5$ and $24 = 2^3 \times 3$ or $2^3 \times 3 \times 5$<br>or 20,40,60,80,100,120 and 24,48,72,96,120 | | 2 | M1 |
| | | 120 | | A1 or $2^3 \times 3 \times 5$ oe |
| | | | | **Total 2 marks** |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| **12** (a) | $7.2\times\frac{2}{6}$ or $7.2\div\frac{6}{2}$ | | 2 | M1 |
| | | 2.4 | | A1 cao |
| (b) | scale factor = $\frac{8}{2}$ or 4 or $\frac{2}{8}$ or $\frac{1}{4}$ | | 3 | M1 for $\frac{8}{2}$ or 4 or $\frac{2}{8}$ or $\frac{1}{4}$ |
| | $3.7\times 4$ or $3.7\div\frac{1}{4}$ | | | M1 (dep) |
| | | 14.8 | | A1 Cao<br>**SC:** M1 for answer of 11.1 |
| (c) | $4^2$ **or** $(8\div 2)^2$ **or** $(2\div 8)^2$ **or** $(1\div 4)^2$ | | 2 | M1 or for complete correct method of finding vert ht ($h$ cm) of $\Delta PQR$ and vert ht ($H$ cm) of $\Delta ABC$<br>eg $\frac{1}{2}\times"14.8"\times h=72$<br>$h=\frac{144}{"14.8"}$ (9.7297...)<br>$H=\frac{144}{"14.8"}\div"4"$ (2.4324...) |
| | | 4.5oe | | A1 **SC :** M1 for an answer of 8 |
| | | | | **Total 7 marks** |

| Question | Working | | Answer | Mark | Notes |
|---|---|---|---|---|---|
| **13** (a) | $12x + 20y = 56$<br>$12x + 9y = 12$ | $9x + 15y = 42$<br>$20x + 15y = 20$ | | 4 | M1 for coefficients of $x$ or $y$ the same or for correct rearrangement of one equation followed by substitution in the other eg $3x + 5\left(\frac{4-4x}{3}\right) = 14$ |
| | ($y$ =) 4 | ($x$ =) −2 | | | A1 dep on M1 |
| | eg $3x + 5 \times 3 = 14$ | | | | M1 (dep on first M1) for substituting for the other variable |
| | | | −2 4 | | A1 cao dep Award full marks for correct values if at least first M1 scored |
| (b) | | | −2, 4 | 1 | B1 ft from (a) |
| | | | | | **Total 5 marks** |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| **14** | $2 \times \pi \times 2.7 \times 4.9$ or 83(.12654...) | | 3 | M1 May be rounded or truncated to at least 2 sf (83.0844 if 3.14 used) |
| | $6 \times 8.7^2$ oe or 454.14 | | | M1 May be rounded or truncated to at least 2 sf |
| | | 537 | | A1 for answer rounding to 537 |
| | | | | **Total 3 marks** |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| **15** (a) | | $3t^2 - 6$ | 2 | B2 for $3t^2 - 6$ |
| | | | | B1 for two of three terms differentiated correctly |
| (b) | $6t$ | | 2 | M1 ft from quadratic (a) |
| | | 30 | | A1 |
| | | | | **Total 4 marks** |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| **16** | $A = (4-\pi)r^2$ **or** $\frac{A}{r^2} = 4-\pi$ | | 3 | M1 |
| | $r^2 = \frac{A}{4-\pi}$ | | | M1 for isolating $r^2$ |
| | | $\sqrt{\frac{A}{4-\pi}}$ | | A1 Also accept $\pm\sqrt{\frac{A}{4-\pi}}$ |
| | | | | **Total 3 marks** |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| **17** | $(CD^2 =)\ \sqrt{8.3^2 - 4.7^2}$ or $\sqrt{68.89 - 22.09}$ or $\sqrt{46.8}$ | | 4 | M1 |
| | $(CD =)\ 6.841\ldots$ | | | A1 for value which rounds to 6.8 (6.84105…) |
| | $\tan\angle ABC = \frac{"6.84"}{7.5}$ **or** $\tan\angle ABC = 0.912$ | | | M1 dep on first M1 |
| | | 42.4 | | A1 for awrt 42.4 (42.3692…) |
| | | | | **Total 4 marks** |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| **18** (i) | $\frac{-6 \pm \sqrt{6^2 - 4 \times -5 \times 2}}{2 \times -5}$ | | 4 | M1 for correct substitution<br>condone + in place of ± and<br>condone one sign error in substitution |
| | $\frac{-6 \pm \sqrt{76}}{-10}$ or $\frac{-6 \pm \sqrt{36+40}}{-10}$ | | | M1 for correct simplification |
| | | −0.272 1.47 | | A1 Award for answers which round to −0.272 (−0.2717...) and 1.47 (1.4717…)<br>Award 3 marks for correct answers, if at least M1 scored. Condone missing negative solution |
| (ii) | | 1.47 | | B1 for answer which rounds to 1.47<br>ft from (i) if only one positive solution given |
| | | | | **Total 4 marks** |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| **19** | $3 + \sqrt{x} + 3\sqrt{x} + \left(\sqrt{x}\right)^2$ oe | | 3 | M1 |
| | | ($x$ =) 5 | | A1 |
| | | ($y$ =) 8 | | A1 |
| | | | | **Total 3 marks** |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| **20** | $\frac{(x+4)(x-4)}{(x-4)(x-2)}$ | | 3 | M1 for $(x + 4)(x - 4)$<br>M1 for $(x - 4)(x - 2)$ |
| | | $\frac{x+4}{x-2}$ | | A1 cao |
| | | | | **Total 3 marks** |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| **21** | $(\angle AOB =)72°$ | | 5 | B1 May be stated, appear in working or be marked on the diagram |
| | $AT = 7\tan 72°$ or 21.54…<br>or $OT = \frac{7}{\cos 72°}$ or 22.65… | | | M1 |
| | $(\text{Area } \Delta OAT =)\frac{1}{2} \times 21.54... \times 7$<br>or $(\text{Area } \Delta OAT =)\frac{1}{2} \times 7 \times 22.65... \times \sin 72°$<br>or 75.40… | | | M1 |
| | $(\text{Area } \Delta OAB =)\frac{1}{2} \times 7 \times 7 \times \sin 72°$<br>or 23.30… | | | M1 |
| | | 52.1 | | A1 for awrt 52.1 |
| | | | | **Total 5 marks** |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| **22** (a) | $\frac{1}{x-2}+3$ | | 3 | M1 |
| | $\frac{1+3(x-2)}{x-2}$ or $\frac{1+3x-6}{x-2}$ | | | M1 |
| | | $\frac{3x-5}{x-2}$ | | A1 |
| (b) | $y(x-2)=1$ or $xy-2y+1$ | | 3 | M1 Alternative method $x(y-2)=1$ or $xy-2x=1$ |
| | $xy=2y+1$ | | | M1 $xy=1+2x$ |
| | | $\frac{2x+1}{x}$ | | A1 or $\frac{1}{x}+2$ |
| | | | | **Total 5 marks** |

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