Mark Scheme (Results)

January 2014

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

Pearson Edexcel Certificate Mathematics A (KMA0/4H) Paper 4H
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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.
- 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
  - eoo – each error or omission
  - awrt – anything which rounds to
• **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  If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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 3, 15(a), 18(a) and 20, (where the mark scheme states otherwise) the correct answer, unless clearly obtained from an incorrect method, should be taken to imply a correct method.

<table>
<thead>
<tr>
<th>Question</th>
<th>Working</th>
<th>Answer</th>
<th>Mark</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. (a)</td>
<td>$840 : 40 oe$ or $840 \div 40 oe$ or $1 : 21$</td>
<td>21</td>
<td>2</td>
<td>M1 Accept $21 : 1$</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1. (b)</td>
<td>$(105 \div 3) \times 2$</td>
<td>70</td>
<td>2</td>
<td>M1 M1 for $105 \div 3 (=35)$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A1</td>
</tr>
<tr>
<td>1. (c)</td>
<td>$(105 \div (4+3)) \times 3$</td>
<td>45</td>
<td>2</td>
<td>M1 M1 for $105 \div (4+3) (=15)$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total 6 marks</td>
</tr>
<tr>
<td>2. (a)</td>
<td>$0.5 \times (11 + 7) \times 10$</td>
<td>90</td>
<td>2</td>
<td>M1 M1 for $(0.5 \times 2 \times 10) + (7 \times 10) + (0.5 \times 2 \times 10)$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A1</td>
</tr>
<tr>
<td>2. (b)</td>
<td>“90” $\times 12$</td>
<td>1080</td>
<td>2</td>
<td>M1 ft Their area in (a) $\times 12$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A1 ft</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total 4 marks</td>
</tr>
<tr>
<td>3.</td>
<td>$18y + 30 = 39$ or $3y + 5 = 6.5$ or $18y = 39 - 30$ or $3y = 6.5 - 5$</td>
<td>$0.5 oe$</td>
<td>3</td>
<td>M1 M1 for correct expansion ${18y + 30}$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A1 A1 Dependent on at least one M1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total 3 marks</td>
</tr>
<tr>
<td>4.</td>
<td>$(0 \times 2) + 1 \times 10 + 2 \times 7 + 3 \times 6 + 4 \times 3 + 5 \times 2$ “64” $\div 30$</td>
<td>$2.13 \text{ rec oe}$</td>
<td>3</td>
<td>M1 M1 for 5 correct products stated or evaluated</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td>M1 Dependent on first M1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A1 Accept 2.1 or better with no working.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A1 Accept 2 if M2 awarded.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total 3 marks</td>
</tr>
<tr>
<td>5.</td>
<td>rotation $90^\circ$ clockwise or $-90^\circ$ {centre} $(0,0)$ or $O$ or origin</td>
<td>$3$</td>
<td>B1</td>
<td>B1 accept $270^\circ$ or $270^\circ$ anticlockwise.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B1 Award no marks if multiple transformations.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B1 condone lack of brackets around 0,0</td>
</tr>
<tr>
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<td>Total 3 marks</td>
</tr>
</tbody>
</table>
### 6.

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</thead>
<tbody>
<tr>
<td>(a)</td>
<td></td>
<td>$k^5$</td>
<td>1</td>
<td>B1</td>
<td></td>
<td>Mark response on answer line or final statement in body of script, do not isw.</td>
</tr>
<tr>
<td>(b)</td>
<td>14t – 6</td>
<td>1</td>
<td>B1</td>
<td></td>
<td>Mark response on answer line or final statement in body of script, do not isw.</td>
<td></td>
</tr>
<tr>
<td>(c) (i)</td>
<td>$8y + 24 – 6y + 21$</td>
<td>2</td>
<td>M1</td>
<td>M1 for 3 terms with correct signs or 4 terms without signs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) (ii)</td>
<td>$x^2 – 6x – 4x + 24$</td>
<td>2</td>
<td>M1</td>
<td>M1 for 3 terms with correct signs or 4 terms without signs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(d)</td>
<td>$\sqrt{v}$</td>
<td>2</td>
<td>M1</td>
<td>M1</td>
<td>A1</td>
<td>Mark response on answer line or final statement in body of script, do not isw.</td>
</tr>
</tbody>
</table>

|   |   |   |   |   |   | Total 8 marks |

### 7.

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<table>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$3.2 \times 3.2$ ($= 10.24$)</td>
<td></td>
<td>M1</td>
<td>Area of square.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$\pi \times 5^2$ ($= 78.5...$) ${\pi = 3.14$ or better}</td>
<td></td>
<td>M1</td>
<td>Area of circle, accept awrt 78.5 →78.6 incl.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$\pi \times 5^2 – 3.2 \times 3.2$</td>
<td></td>
<td>M1</td>
<td>Intention to subtract areas from correct methods.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>68.3</td>
<td>4</td>
<td>A1</td>
<td>Accept awrt 68.3 or 68.4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

|   |   |   |   |   |   | Total 4 marks |

### 8.

<p>| | | | | | | |</p>
<table>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fully correct factor tree or repeated division to reach prime factors (condone inclusion of 1’s) or $3, 5, 5, 11$ or $3 \times 5 \times 5 \times 11 \times 1$</td>
<td></td>
<td>M2</td>
<td>Factors must multiply to 825</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$3 \times 5 \times 5 \times 11$</td>
<td>3</td>
<td>M2</td>
<td>If not M2 then M1 for correct but incomplete factor tree/ division ladder which includes 2 different primes. (e.g. $25 \times 3 \times 11$)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A1 cao</td>
<td>Accept $3 \times 5^2 \times 11$ and dots in place of multiplication signs.</td>
<td></td>
</tr>
</tbody>
</table>

|   |   |   |   |   |   | Total 3 marks |
### Question 9

(a) (i) \[6, 12\]  
(a) (ii) \[2, 3, 5, 6, 7, 9, 11, 12\]  
(b) Universal set has only numbers less than 13

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### Question 10

4 \(\times\) 2.6 \((= 10.4)\)  
\(4 \times 2.6 - 5\) \(\div 3\)  

- Alternative solution:  
  - Any 4 numbers (including 5) that have a total of 10.4  
  - Or any 3 numbers that have a total of 5.4  
  - (Sum of their 3 numbers) \(\div 3\)  

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### Question 11

(a) Algeria  
(b) \(1.13 \times 10^8 + 2.38 \times 10^8 + 9.24 \times 10^5 + 5.83 \times 10^5\)  
or digits 5017  
(c) \(7.91 \times 10^7 \div 1.13 \times 10^6\)  

---

Total marks

- **Question 9**: 3 marks
- **Question 10**: 3 marks
- **Question 11**: 5 marks
### 12.

**(DBC) = 60 – \(x\)**

(Angles in an) **equilateral triangle** (= 60 degrees)

\[BDC = 60 – x\] or \[BCD = 60 + 2x\] \(\text{oe}\)

**Base/bottom angles** in an **isosceles triangle** (are equal)

**(BCD) = 60 + 2x**

<table>
<thead>
<tr>
<th>Mark</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>Can be marked on diagram.</td>
</tr>
<tr>
<td></td>
<td>[Reason 1]</td>
</tr>
<tr>
<td>B1</td>
<td>Can be marked on diagram.</td>
</tr>
<tr>
<td>B1</td>
<td>(Reason 2) both reasons 1 and 2 needed for B1</td>
</tr>
</tbody>
</table>

**Alternative:** {Call ACD “\(y\)”}

**(BDC and DBC) = 60 – “\(y\)”/2**

**Base/bottom angles** in an **isosceles triangle** (are equal)

\[x + (60 – “y”/2) = 60\] \(\text{oe}\)

(Angles in an) **equilateral triangle** (= 60 degrees)

<table>
<thead>
<tr>
<th>Mark</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B2</td>
<td>B2 for both ((BDC AND DBC) = 60 – (y/2))</td>
</tr>
<tr>
<td>B1</td>
<td>B1 for either ((BDC OR DBC) = 60 – (y/2))</td>
</tr>
<tr>
<td>B1</td>
<td>Can be marked on diagram.</td>
</tr>
<tr>
<td></td>
<td>[Reason 1]</td>
</tr>
</tbody>
</table>

i.e. Angle \(ABC\) is 60

<table>
<thead>
<tr>
<th>Mark</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>(Reason 2) both reasons needed for B1</td>
</tr>
<tr>
<td>B1</td>
<td>Answer only = B3.</td>
</tr>
<tr>
<td></td>
<td>Numerical methods leading to a numerical answer can only score B1 (for giving both reasons adequately).</td>
</tr>
</tbody>
</table>

**Total 4 marks**

### 13.

\((x – 5)\{4(x – 5) + 3\}\)

\((x – 5)(4x – 17)\)

<table>
<thead>
<tr>
<th>Mark</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>Accept ((x – 5){4x – 20 + 3}) or reaching (4x^2 – 37x + 85)</td>
</tr>
<tr>
<td>A1</td>
<td></td>
</tr>
</tbody>
</table>

**Total 2 marks**
### 14. (a)  
- 0.3 in first fail branch
- 0.8, 0.2 in second attempt pass, fail branches

**B1**  
Branches must be labelled. Ignore extra branches leading from “pass”.

**B1**

### (b)  
- “0.3” x 0.8

**M1ft**  
0.24 oe

### (c)  
- (“0.3” x “0.2” x 0.8) + (“0.3” x “0.2” x 0.2 x 0.8) = 0.0576 oe

**M2ft**  
M1ft for “0.3” x “0.2” x 0.8 (=0.048)

Total 7 marks

### 15. (a) (i)  
1. $3x + 2y = 120$
2. $2y = 120 - 3x$ or $1.5x + y = 60$

**B1**  
B1 dependent on first B1

* Answer given on question paper.

#### (ii)  
- $A = x \times y$
- $A = x \times (60 - 1.5x)$

**B1**  
* Answer given on question paper.

#### (b)  
- “$60 - 3x$” = 0
- $x = 20$: $(y = 30)$
- $A = 20 \times 30$ or $60 \times 20 - 1.5 \times 20^2$

**M1ft**  
A1  
A1 cao Answer only = M1A2 (full marks)

Total 8 marks

### 16.  
- $(8x4) + (5x4) + (3x4)$
- or $0.16 \{5x40\} + \{10x12.5\} + \{30x2.5\}$

**M1**  
Correct fd calculated (or marked on vertical axis with no contradictions).

or $28 \div 2$ or $14$

or $32, 20, 12$ frequencies assigned to correct blocks.

or $1$ cm$^2$ = 4 customers oe

or $1$ small square = 0.16 customers oe

**A1**  
Correct calculations to give 3 correct frequencies with the intention to add $(32 + 20 + 12)$

A1 cao

Total 3 marks
17. \[ 5 \times (360 \div 12) = 150 \]
\[ (AB^2) = 10^2 + 7^2 - 2 \times 10 \times 7 \times \cos(150) \]
\[ (AB^2) = 149 - 140 \cos(150) \]
\[ (AB^2) = 270.24... \]

16.4

M1 Angle \( AOB \).

M1 Accept the use of the cosine rule with any angle but sides (10 and 7) must be in correct places.

A1 awrt 270

A1 awrt 16.4

Total 4 marks

18. (a) \[ (3x + 2)(2x + 1) = 100 \]

\[ 6x^2 + 4x + 3x + 2 = 100 \]

\[ 6x^2 + 7x - 98 = 0 * \]

2

M1 or \((2x \times 3x) + 2(2x + 1) + 3x = 100 \) oe

or \((2x \times 3x) + (2 \times 2(x1)) + 1) + 3x + 1 + 1 = 100 \) oe

other partitions are acceptable but partitioning must go on to form a correct equation.

A1 Accept \( 6x^2 + 7x + 2 = 100 \) if M1 awarded

* Answer given

(b) \[ (3x + 14)(2x - 7) = 0 \]

\[ x = 3.5 \]

(Area =) \( 6 \times \text{“3.5”}^2 \) or \((3 \times \text{“3.5”}) \times (2 \times \text{“3.5”}) \)

73.5

5

M2 or \((x) = \frac{-7 \pm \sqrt{49 + 2352}}{12} \) or \((x) = \frac{-7 \pm \sqrt{2401}}{12} \)

If not M2 then M1 for \((3x \pm 14)(2x \pm 7) \)

or \((x) = \frac{-7 \pm \sqrt{7^2 - 4 \times 6 \times -98}}{2 \times 6} \)

condone + in place of ± and 1 sign error.

A1 Dependent on at least M1 Ignore negative root.

M1ft Dependent on at least M1 and \( x > 0 \)

A1 cao Dependent on first M1

Total 7 marks

19. \[ 180 \div (1 + 7) = 22.5 \]

\[ 360 \div \text{“22.5”} \]

16

M1 M1ft dep M2 for \[ \frac{180(n-2)}{n} = \frac{7 \times 180}{8} \] or \[ \frac{7 \times 360}{n} \]

or M2 for \[ 360 \div \frac{180}{(1+7)} \]

A1 cao

Total 3 marks
<table>
<thead>
<tr>
<th>Question</th>
<th>Expression</th>
<th>Marks</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.</td>
<td>((x) = 0.01515\ldots) and ((100x) = 1.515\ldots) ((99x) = 1.5) ((15/990)) oe</td>
<td>2</td>
<td>1/66 *</td>
</tr>
<tr>
<td>21.</td>
<td>(165 \div 1250) or (164.9) rec (\div 1250)</td>
<td>3</td>
<td>0.132</td>
</tr>
</tbody>
</table>
| 22. | \(y = 2x - 7\) \(x^2 + 4x^2 - 14x - 14x + 49 = 34\) \(5x^2 - 28x + 15\) (= 0) \((5x - 3)(x - 5)\) (=0) \(x = 0.6\) \(x = 5\) | 7 | \(x = 0.6\) \& \(y = -5.8\) \(
x = 5\) \& \(y = 3\) | M1 M2 M1 for \(4x^2 - 14x - 14x + 49\) or better A1 correct 3 part quadratic M1 or \(-\frac{28 \pm \sqrt{(-28)^2 - 4 \times 5 \times 15}}{2 \times 5}\) or better or \(5x(x - 5) - 3(x - 5)\) condone no brackets around negative numbers. A1 Dependent on previous M1 (both \(x\) values correct). A1 Dependent on previous M1 (both complete solutions correct). Total 7 marks |
### 23.

| (AC\(^2\)) = 230^2 + 230^2 (= 105800) | MC = \(\frac{1}{2} \sqrt{105800}\) (=162.6..) | M1 M1 for (MC\(^2\)) = 115^2 + 115^2 (=26450) |
| (MT\(^2\)) = 218^2 − “162.6”\(^2\) (=21074) | MT = \(\sqrt{21074}\) | M1 M1 for \(\sqrt{26450}\) (=162.6..) |
| (MT=) \(\sqrt{21074}\) | M1 or M1 for correct trig working leading to one correct acute angle in MCT {either 41.8 or 48.2} | M1 or M1 for correct trigonometry working leading to correct answer |

145 5 A1 Accept awrt 145

**Total 5 marks**

**TOTAL FOR PAPER: 100 MARKS**