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Apart from Questions 3, 13(b) and 17(f) (where the mark scheme states otherwise), the correct answer, unless clearly obtained by 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>
</table>
| 1.       | \[
\frac{4.2}{1.12}
\]   | 2      | M1 for 4.2 or 1.12 or 0.6 or \[
\frac{15}{4}
\]   | A1            |
|          |           |        | 3.75          |               |
|          |           |        |               | Total 2 marks |
| 2.       | \[
\frac{135}{180}
\] \(0.75\text{ oe}\) | 3      | M1            |               |
|          |           |        | 45            | A1 cao        |
|          |           |        |               | Total 3 marks |
3. \[4x = 7 \text{ or } 4x = 2 + 5 \text{ or } 7x - 3x = 7 \text{ oe} \]
\[4x - 7 = 0 \text{ oe} \]

3 M2 for correct rearrangement with \(x\) terms on one side and numbers on the other AND collection of terms on at least one side
or for \(4x - 7 = 0\) oe
M1 for \(7x - 3x = 2 + 5\) oe
ie correct rearrangement with \(x\) terms on one side and numbers on the other

\[\frac{3}{4} \text{ oe} \]

A1 Award full marks for a correct answer if at least 1 method mark scored

Total 3 marks

4. \[1 \ 7 \ 7 \]

3 B2 for \(1 \ 7 \ 7\) in any order
B1 for three positive whole numbers with either a median of 7 or a sum of 15
SC Award B1 for \(0 \ 7 \ 8\)

6 B1 cao

Total 3 marks

5. One correct point plotted or stated
2nd correct point plotted or stated
Correct line between \(x = -2\) and \(x = 4\)

4 B1 May appear in table
B1 May appear in table
B2 B1 for a line joining two correct, plotted points

Total 4 marks
6. (a) \(1 + 7\) or 8

(b) \(32 \times 45\) or 1440 or 14.4(0)m

7. Fully correct factor tree or repeated division or 2, 2, 5, 5 or \(2 \times 2 \times 2 \times 5 \times 5\)

8. \(y^{3+n-1} = y^6\) or \(y^{3+n} = y^7\) oe

or \(3 + n - 1 = 6\) oe

or \(y^n = \frac{y^7}{y^3}\) or \(y^n = \frac{y^6}{y^2}\) or \(y^n = y^4\)
### Question 9

(a) Complete, correct expression which, if correctly evaluated, gives 48 eg
\[
4 \times \frac{1}{2} \times 6 \times 4, \quad 2 \times \frac{1}{2} \times 12 \times 4, \quad \frac{1}{2} \times 12 \times 8
\]

(b) \[4^2 + 6^2 = 16 + 36 = 52\]

\[\sqrt{4^2 + 6^2}\]

### Question 10

(i) \[-1 \frac{1}{2} < x \leq 2\]

(ii) \[-1, 0, 1, 2\]

**Total 6 marks**

**Total 4 marks**
### Question 11

<p>| | | | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>11. (a)</strong></td>
<td>$75 = 3 \times 5^2$ and $90 = 2 \times 3^2 \times 5$ or $1, 3, 5, 15, 25, 75$ and $1, 2, 3, 5, 6, 9, 10, 15, 18, 30, 45, 90$ or $3 \times 5$</td>
<td>2</td>
<td><strong>M1</strong> Need not be products of powers; accept products or lists ie $3, 5, 5$ and $2, 3, 3, 5$ Prime factors may be shown as factor trees or repeated division</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>15</strong></td>
</tr>
<tr>
<td><strong>(b)</strong></td>
<td>$2 \times 3^2 \times 5^2 \text{ oe eg } 6 \times 3 \times 5^2$ or $75, 150, 225, 300, 375, 450$ and $90, 180, 270, 360, 450$</td>
<td>2</td>
<td><strong>M1</strong> Also award for $\frac{75 \times 90}{15}$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>450</strong></td>
</tr>
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<td></td>
<td></td>
<td><strong>Total 4 marks</strong></td>
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### Question 12

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<tr>
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<tbody>
<tr>
<td><strong>12. (a)</strong></td>
<td>Rotation</td>
<td>3</td>
<td><strong>B1</strong> Also accept quarter turn or $-270^\circ$ (B0 for $90^\circ$ clockwise)</td>
</tr>
<tr>
<td></td>
<td>$90^\circ$</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$(0, 0)$</td>
<td><strong>B1</strong> Also accept origin, $O$</td>
<td></td>
</tr>
<tr>
<td><strong>(b)</strong></td>
<td><strong>R correct</strong></td>
<td>1</td>
<td><strong>B1</strong></td>
</tr>
<tr>
<td><strong>(c)</strong></td>
<td>Rotation $90^\circ$</td>
<td>2</td>
<td><strong>B1</strong> Accept quarter turn or $-270^\circ$ instead of $90^\circ$</td>
</tr>
<tr>
<td></td>
<td>$(3, 1)$</td>
<td><strong>B1</strong></td>
<td>ft from their <strong>R</strong> if it is a translation of the correct <strong>R</strong></td>
</tr>
<tr>
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<td></td>
<td></td>
<td><strong>Total 6 marks</strong></td>
</tr>
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</table>
13. (a) \(4y = 10 - 3x\) or \(-4y = 3x - 10\)

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<tbody>
<tr>
<td>3</td>
<td>M1</td>
<td>May be implied by second M1 or by (y = \frac{-3}{4}x + c) even if value of (c) is incorrect. or finds coordinates of 2 points on the line eg ((0, 2.5), x = 2, y = 1,) table, diagram.</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>M1</td>
<td>or for clear attempt to evaluate (\frac{\text{vert diff}}{\text{horiz diff}}) for their pts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-\frac{3}{4})</td>
<td>A1</td>
<td>Award 3 marks for correct answer if either first M1 scored or no working shown. (SC) If M0, award B1 for (-\frac{3}{4}) x</td>
</tr>
<tr>
<td>13 (b)</td>
<td>eg (9x + 12y = 30) (\quad) eg (15x + 20y = 50) (\quad) (10x - 12y = 46) (\quad) (15x - 18y = 69)</td>
<td>5</td>
<td>M1 for coefficients of (x) or (y) the same or for correct rearrangement of one equation followed by correct substitution in the other (\quad) (eg\ \ 5x - 6\left(\frac{10 - 3x}{4}\right) = 23)</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>(x = 4) (\quad) (y = -\frac{1}{2})</td>
<td></td>
<td>A1 cao dep on M1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>M1 (dep on 1st M1) for substituting for other variable</td>
<td></td>
</tr>
<tr>
<td>(x = 4,\ y = -\frac{1}{2})</td>
<td></td>
<td>A1 Award 4 marks for correct values if at least first M1 scored</td>
<td></td>
</tr>
<tr>
<td>((4, -\frac{1}{2}))</td>
<td></td>
<td>B1 Award 5 marks for correct answer if at least first M1 scored ft from their values of (x) and (y)</td>
<td></td>
</tr>
</tbody>
</table>

**Total 8 marks**
### Question 14

**Part (a)**
- 55 115 155 177 190 200
- Total: 1
- B1: cao

**Part (b)**
- Points correct
- Total: 2
- B1: ±⅓ sq ft from sensible table ie clear attempt to add frequencies

**Part (c)**
- 26 indicated on cf graph
- Total: 2
- M1: for 26 indicated on cf graph – accept 26-27 inc

---

### Question 15

- $-4 < x < 4$
- Total: 2
- B2: B1 for $x < 4$ or $x > -4$ or $x < \pm 4$
or $x < \sqrt{16}$
- SC: B1 for $-4 \leq x \leq 4$

---

**Total 5 marks**

**Total 2 marks**
### Question 16

**Part (a)**

\[
\frac{3}{8} + \frac{2}{8} \text{ oe}
\]

**Marks:** 2

**Part (b)(i)**

\[
\frac{2}{8} \times \frac{1}{7} \text{ appearing once only}
\]

**Marks:** 5

**Part (b)(ii)**

\[
\frac{2}{8} \times \frac{3}{7} + \frac{3}{8} \times \frac{2}{7} \text{ or } 2 \times \frac{2}{8} \times \frac{3}{7} \text{ oe}
\]

**Marks:** 5

---

**Total 7 marks**

---

**Note:**
- Sample space method – award 2 marks for correct answer; otherwise no marks.
- Sample space method – award 2 marks for correct answer; otherwise no marks.
- Sample space method – award 2 marks for correct answer; otherwise no marks.
- Sample space method – award 2 marks for correct answer; otherwise no marks.
<p>| | | | | |</p>
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</thead>
<tbody>
<tr>
<td>17.</td>
<td>(a)</td>
<td>2</td>
<td>1</td>
<td>B1 cao</td>
</tr>
<tr>
<td></td>
<td>(b)</td>
<td></td>
<td></td>
<td>x &lt; 6</td>
</tr>
</tbody>
</table>
|   |   |   |   | B2 cao B1 for eg $x \leq 6$
|   |   |   |   | or $-2, -1, 0, 1, 2, 3, 4, 5$
|   |   |   |   | SC B1 for $x > 6$ |
|   | (c) | 7 | 1 | B1 cao |
|   | (d) | g(0) = 15 | 2 | M1 for 15 seen |
|   | (e) | $k = 12$ | 3 | M1 May be stated or indicated on diagram. May be implied by one correct solution. |
|   |   |   |   | $-0.7$ or $-0.8$ |
|   |   |   |   | 3.8 |
|   | (f) | $\tan$ drawn at $x = 3.5$ | 3 | M1 $\tan$ or produced passes between points $(3, 3 \leq y \leq 6)$ and $(4, 11 \leq y \leq 14)$ |
|   |   | vertical difference $\overline{\text{horizontal difference}}$ |   | M1 finds their vertical difference $\overline{\text{horizontal difference}}$ for two points on tan or finds their vertical difference $\overline{\text{horizontal difference}}$ for two points on curve, where one of the points has an $x$-coordinate between 3 and 3.5 inc and the other point has an $x$-coordinate between 3.5 and 4 inc |
|   |   |   |   | 6.5 – 11 inc |
|   |   |   |   | A1 dep on both M marks |

Total 12 marks
18.  \( (\cos x^\circ) = \frac{4^2 + 6^2 - 8^2}{2 \times 4 \times 6} \)  
Or \( 8^2 = 4^2 + 6^2 - 2 \times 4 \times 6 \cos x^\circ \)  
\( (\cos x^\circ) = -0.25 \)  
3  
M1 for correct substitution in Cosine Rule  
A1  
104.5  
A1 for value rounding to 104.5  
(104.4775...)  
Total 3 marks

19.  
(a)  
2  
B2 for all correct  
B1 for 2 or 3 correct  
(b)(i)  
10  
2  
B1 cao  
(ii)  
25  
B1 cao  
Total 4 marks

\[ \begin{array}{c}
\text{(a)} \\
2 \\
B2 for all correct \\
B1 for 2 or 3 correct \\
(b)(i) \\
10 \\
2 \\
B1 cao \\
(ii) \\
25 \\
B1 cao \\
\end{array} \]
20. \[ \pi \times r \times 9 = 100 \text{ oe} \]
\[ (r =) 3.53677\ldots \text{ A1 for 3.53} \]
\[ \sqrt{9^2 - 3.53^2} \text{ M1} \]
\[ (h =) 8.2759\ldots \text{ A1 for 8.27} \]
\[ \text{A1 for answer rounding to 108} \]
\[ (\pi \to 108.40\ldots, 3.14 \to 108.45\ldots) \]
\[ \text{If both M1s scored, award 5 marks for an answer which rounds to 108} \]

Total 5 marks

21. (a) \[ 8y^8 \text{ B2 B1 for 8} \]
(b) \[ 2^p \times (2^3)^q = 2^p \times 2^{3q} = 2^{p+3q} \]
\[ p + 3q \text{ B2 B1 for } 2^{5q} \text{ seen} \]

Total 4 marks

22. (a)(i) \[ 3\mathbf{a} + 3\mathbf{b} \text{ oe} \]
(ii) \[ 2\mathbf{a} + 2\mathbf{b} \text{ oe} \]
(iii) \[ \mathbf{a} + 2\mathbf{b} \text{ oe} \]
(b) \[ \overrightarrow{DF} = 2\mathbf{a} + 4\mathbf{b} \text{ oe} \]
\[ \overrightarrow{DF} = 2 \overrightarrow{DE} \text{ oe} \]
\[ \overrightarrow{DE} = \overrightarrow{EF} \text{ A1} \]

Total 5 marks