MARK SCHEME for the October/November 2012 series

4024 MATHEMATICS (SYLLABUS D)

4024/21 Paper 2, maximum raw mark 100

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners’ meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2012 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.
<table>
<thead>
<tr>
<th>Qu</th>
<th>Answers</th>
<th>Mark</th>
<th>Part Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(a) 4.28</td>
<td>2</td>
<td>M1 for PQ = 4.5cos18 oe</td>
</tr>
<tr>
<td></td>
<td>(b) (i) 36 (.0)</td>
<td>2</td>
<td>M1 for sin A BC = $\frac{6}{10.2}$ oe</td>
</tr>
<tr>
<td></td>
<td>(ii) 5.68 or 5.69</td>
<td>4ft</td>
<td>M3 for $\sqrt{14.3^2 - (10.2^2 - 6^2)} - 6$ oe or M2 for a complete method for CD or M1 for $BC^2 = 10.2^2 - 6^2$ or $DC^2 = 14.3^2$ – their BC oe</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SC1 for their CD – 6</td>
</tr>
<tr>
<td>2</td>
<td>(a) (i) $10p + 1$</td>
<td>2</td>
<td>B1 for $5p + 1 + 5p + 2$</td>
</tr>
<tr>
<td></td>
<td>(ii) $x &lt; -1$</td>
<td>2</td>
<td>B1 for $-2x, 5 - 3$ oe correctly isolated.</td>
</tr>
<tr>
<td></td>
<td>(b) (i) 3</td>
<td>1</td>
<td>SC 2 for $\frac{A}{y+2}$ or $\frac{A}{2-y}$</td>
</tr>
<tr>
<td></td>
<td>(ii) $(x) = \frac{A}{y-2}$</td>
<td>3</td>
<td>M2 for $\frac{A}{x} = y - 2$ or $yx - 2x = A$ or M1 for $y = \frac{A}{x} + 2$ or $yx = A + 2x$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>(a) (i) 30</td>
<td>1</td>
<td>SC 2 for the answer 51.7 or 51.8 or M1 for $200 - a(i)$ or M2 for Figs $\frac{(200 - a(i)) - 131.8}{131.8}$ or M1 for $200 - a(i)$ or M2 for Figs $\frac{200 - 131.8}{131.8}$</td>
</tr>
<tr>
<td></td>
<td>(ii) 29 (.0)</td>
<td>3ft</td>
<td>SC 2 for the answer 129</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>For the answer 129</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>M2 for Figs $\frac{(200 - a(i)) - 131.8}{131.8}$ or M1 for $200 - a(i)$ or M2 for Figs $\frac{200 - 131.8}{131.8}$</td>
</tr>
<tr>
<td></td>
<td>(b) 950</td>
<td>3</td>
<td>M2 for $x - \frac{15}{100} \times - 647.5 = 160$ oe or B1 for 807.50 soi and B1 for division by 85.</td>
</tr>
</tbody>
</table>
### Question 4

(a)  
(i) $20^\circ$  
(ii) $70^\circ$  
(iii) Rectangle stated and justified  

(b)  
(i) Similar triangles established  
(ii) $1.8$  

- B1 for Rectangle stated  
- B1 for establishing a right angle using $20^\circ$ and $70^\circ$  
- B1 for 3 right angles stated.

### Question 5

(a) $15.7$  
(b) $25.7$  

- 1 ft  

- 4  

- $\frac{CO}{DO} = \frac{AO}{BO}$ oe or for $CÔA = DÔB$

### Question 6

(a) $98.2$  

(b)  
(i) $\frac{28}{80}$ oe  
(ii) $\frac{992}{6320}$ oe  

- B1 for $4 \times 70 + 10 \times 85 + 14 \times 92.5 + 20 \times 97.5 + 24 \times 105 + 8 \times 120$ and  
- B1 for division by $4+10+14+20+24+8$

(c) Correct histogram  

- H2 for 3 correct additional columns  
- H1 for 1 correct additional column
### Question 7

**(a)** 130 g tin  

**P2** for 7 or 8 correct plots ft or  
**P1** for at least 4 correct plots ft and (dep)  
**C1** for a smooth curve through all plotted points  

(b)  

(i)  423 to 424  

(ii) 319  

(iii) 1050  

(c) 7.2  

**B1** for one correct rate such as 1.3 (g/cen)t or 0.769 (cent/g) seen.  

**M1** for \( \pi \times r^2 \times 11 \).  

**M2** for \( 2\pi r^2 + 2\pi r11 \) or  
**M1** for either of these  

**M1** for Figs (their 319 + 30) × 3  
**B1** for \( \div 10^4 \)  

**M2** for \( \frac{x}{9} = \frac{\sqrt{512}}{\sqrt{1000}} \) oe or  
**B1** for \( \frac{\sqrt{512}}{\sqrt{1000}} \) soi

### Question 8

**(a)** 4.1  

**B1** for one correct rate such as 1.3 (g/cen)t or 0.769 (cent/g) seen.  

**B1** for \( \frac{x}{9} = \frac{\sqrt{512}}{\sqrt{1000}} \) oe or  
**B1** for \( \frac{\sqrt{512}}{\sqrt{1000}} \) soi

(b) Correct plots and curve.  

**P2** for 7 or 8 correct plots ft or  
**P1** for at least 4 correct plots ft and (dep)  
**C1** for a smooth curve through all plotted points  

(c)  

\( a \) ft 1 cao \( b \) ft  

**B1** for at least one solution  

(d) 1 to 2  

**B1** for the correct tangent drawn  

(e)  

(i) \(-1\)  

(ii) \(-1, 1, 2\)  

**B2** for at least one ft and line drawn or  
**M1** for their \( y = x + a \) drawn.  
**SC1** for all three found by solving the equation
| 9 | (a) 59.2 | 3 | M2 for \( AB = \frac{65 \sin 60}{\sin(180 - (60 + 48))} \) or  
M1 for \( \frac{AB}{\sin 60} = \frac{65}{\sin(180 - (60 + 48))} \) oe  
(b) 2360 | 2 | M1 for \( \frac{1}{2} \times 84 \times 65 \sin((180 - 60) \)  
(c) 129 | 4 | M3 for \( \sqrt{84^2 + 65^2 - 2 \times 84 \times 65 \cos(180 - 60)} \) or  
M2 for \( 84^2 + 65^2 - 2 \times 84 \times 65 \cos(180 - 60) \)  
M1 for \( 84^2 + 65^2 + 2 \times 84 \times 65 \cos(180 - 60) \) and a dep  
A1 for 76.3  
(d) 31.9° | 3 | M2 for \( \tan^{-1} \frac{35}{65 \sin 60} \) oe or  
M1 for \( \tan^{-1} \frac{35}{d} \) or \( \frac{d}{35} \) and  
B1 for for 65 \sin 60 (= 56.3) |
## Mark Scheme

### 10

(a) \( \frac{320}{x} \) oe isw

(b) \( \frac{320}{x-80} \) isw

(c) \( x^2 - 80x - 10240 = 0 \) correctly obtained

(d) \( 148.8 - 68.8 \)

(e) 2 h 9 mins

### 11

(a) (i) (a) \( \frac{1}{2}p + \frac{1}{2}r \)

(b) \( r + p - q \)

(c) \( \frac{1}{2}p + \frac{1}{2}r \)

(ii) Equal and Parallel

(b) (i) Correct triangle

(ii) Correct triangle

(iii) Complete description www

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B1 for \( x - 80 \) seen

B1 for \( \frac{320}{x} - \frac{320}{x-80} = \frac{5}{2} \) oe

M1 for \( a - b = \pm \) their 2½

B1 for \( \sqrt{(-80)^2 - 4 \times 1 \times (-10240)} \) soi and

B1 for \( \frac{(-80) \pm \sqrt{47360}}{2} \) soi and

After B0B1, allow SC1 for a correct ft. or

B2 for 148.8 and – 68.8 Final answer or

B1 for one correct solution seen or

148.81 and – 68.81 or

149 and – 69.

B1 for unsimplified

B1 for two correct vertices or triangle correct size and orientation

B1 for two correct vertices or triangle correct size and orientation

B1 for Rotation

B1 for either 90 anticlockwise or centre (0,3)