

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

Cambridge Ordinary Level

**MARK SCHEME for the May/June 2015 series**

**4024 MATHEMATICS (SYLLABUS D)**

**4024/12**

Paper 1, maximum raw mark 80

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.

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| Question     | Answers   | Mark | Part Marks  |
|--------------|---|------|---|
| <b>1 (a)</b> | 21  | 1    |   |
| <b>(b)</b>   | $\frac{9}{20}$ oe                                     | 1    |   |
| <b>2</b>     | $\frac{7}{12}$ $\frac{5}{8}$ 0.64 $\frac{13}{20}$ 0.7 | 2    | <b>B1</b> for 3 correct<br>Or completely reversed answer<br>Or <b>SC1</b> for 0.65, 0.583, 0.625 seen             |
| <b>3</b>     | 4   | 2    | <b>M1</b> for $\frac{1}{2} \times 12 \times (b + 4b)$ oe<br>Or <b>B1</b> for correct use of $\frac{1}{2}(a + b)h$ |
| <b>4</b>     | 11  | 2    | <b>B1</b> for answer $\frac{11}{60}$<br>Or $\frac{5}{12} \times 60$ <b>and</b> $\frac{2}{5} \times 60$ soi        |
| <b>5</b>     | 3 hours 30 minutes                                    | 2    | <b>B1</b> for 20 55 oe seen<br>Or <b>M1</b> for $12\ 25 - (05\ 25 - 5)$<br>Or $(12\ 25 + 5) - 05\ 25$ soi         |
| <b>6</b>     | 500   | 2    | <b>B1</b> for two from 30, 2 and 0.9 seen   |
| <b>7</b>     | $\frac{96}{64}$ oe isw                                | 2    | <b>B1</b> for $k = 96$ soi<br>Or <b>M1</b> for $24 \times 2^2 = y \times 8^2$<br>Or $y = (\text{their } k)/8^2$   |
| <b>8 (a)</b> | $p, q, r, s, t, u$                                    | 1    |   |
| <b>(b)</b>   | $s, v$  | 1    |   |
| <b>9 (a)</b> | $5.21 \times 10^{-6}$                                 | 1    |   |
| <b>(b)</b>   | $3 \times 10^5$                                       | 1    |   |
| <b>10</b>    | $p = 3.8$<br>$q = 77^\circ$                           | 2    | <b>B1</b> for one correct   |

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|            |  |   |  |
|------------|--|---|--|
| 11         | (1, 6) (1, 5) (1, 4)   | 2 | <b>B1</b> for 2 correct no extras<br>Or 3 correct no more than 5 extras<br>After <b>B0</b> allow <b>SC1</b> for lines $x = 2$ and $y = 7$ drawn on the diagram |
| 12 (a)     | -2   | 1 |  |
| (b) (i)    | -3   | 1 |  |
| (ii)       | -8, 8  | 1 | Both correct   |
| 13 (a)     | $2^2 \times 3 \times 5$  | 1 |  |
| (b)        | 15   | 1 |  |
| (c)        | 9  | 1 |  |
| 14 (a)     | Correct triangle with arcs   | 2 | <b>B1</b> for correct triangle with no arcs or 1 arc<br>After <b>B0</b> allow <b>SC1</b> for triangle with arcs with 5 cm and 6 cm reversed                    |
| (b)        | 128 to $133^\circ$   | 1 |  |
| 15 (a)     | 6  | 1 |  |
| (b)        | $b = \frac{8a - c^2}{3}$ oe  | 2 | <b>M1</b> for $c^2 = 8a - 3b$  |
| 16 (a) (i) | 9  | 1 |  |
| (ii)       | $\frac{1}{3}$  | 1 |  |
| (b)        | $\frac{1}{16x^4}$  | 1 |  |
| 17 (a)     | Stretch<br>$y$ -axis invariant/parallel to $x$ -axis<br>and factor 4 | 2 | <b>B1</b> for Stretch  |
| (b)        | $\frac{x}{4}$  | 1 |  |
| 18 (a)     | $pq(p - 1)$  | 1 |  |
| (b) (i)    | $(5x - 4)(x + 1)$  | 1 |  |
| (ii)       | 0.8 oe, -1   | 1 | Or FT their factorisation  |

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|            |   |     |  |
|------------|---|-----|--|
| 19 (a)     | 1240  | 2   | <b>M1</b> for $8 \times 140 + 10 \times (8 + \frac{50}{100} \times 8)$ isw<br><br>After <b>B0</b> allow <b>SC1</b> for answer of 1160 or 1280  |
| (b)        | 276   | 2   | <b>B1</b> for $240 \times 0.03 \times 5$ oe seen   |
| 20 (a) (i) | 27 cao  | 1   |  |
| (ii)       | 5 cao   | 2   | <b>B1</b> for $30 \pm 0.2$ and $25 \pm 0.2$ seen   |
| (b)        | Median 28, IQR = 5  | 1   | FT their <b>(a)(i)</b> + 1 and their <b>(a)(ii)</b>  |
| 21 (a)     | $\begin{pmatrix} -1 & 9 \\ -5 & 13 \end{pmatrix}$             | 2   | <b>B1</b> for 2 or 3 correct elements  |
| (b) (i)    | 2.5 oe  | 1   |  |
| (ii)       | $0.5 \begin{pmatrix} -1 & 2 \\ -2.5 & 3 \end{pmatrix}$ isw oe | 1   | FT their <b>(b)(i)</b><br>If 0 scored in <b>(b)(i)</b> and <b>(b)(ii)</b> <b>SC1</b> for correct FT adjoint matrix<br><br>$\begin{pmatrix} -1 & 2 \\ -their(bi) & 3 \end{pmatrix}$ isw |
| 22 (a)     | 0.25  | 1   |  |
| (b)        | 32  | 1FT | FT $8 \div$ their <b>(a)</b> soi   |
| (c)        | 1.9   | 2FT | FT $7.6 \times$ their <b>(a)</b><br><b>M1</b> for figs their <b>(a)</b> $\times$ figs 76 soi   |

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|            |                              |     |   |
|------------|------------------------------|-----|---|
| 23 (a)     | $\frac{1}{2} \leq x < 6$ isw | 2   | <b>B1</b> for $x < 6$ or $x \geq \frac{1}{2}$<br>Or for $2x < 12$ and $2x \geq 1$<br>Or for $x = 6$ and $x = \frac{1}{2}$   |
| (b)        | $x = 5, y = -3$              | 3   | <b>B2</b> for either $x$ or $y$ correct with supporting working<br>Or <b>M1</b> for correct method to eliminate one variable.<br>And <b>A1FT</b> for correct evaluation to find the other variable<br>Or after <b>B0</b> scored, allow <b>SC1</b> for 2 correct values but no working shown or correct substitution and evaluation to find the other variable using one of the original equations |
| 24 (a)     | $h = 4r$                     | 2   | Answer only is 0.<br><b>M1</b> for either version of the full method, that can be accepted in the form<br>$2 \times \frac{2}{3} \pi r^3 = \frac{1}{3} \pi r^2 h$ or $\frac{4}{3} \pi r^3 = \frac{1}{3} \pi r^2 h$<br>After <b>B0</b> , allow <b>SC1</b> for $h = r$   |
| (b)        | 17                           | 2FT | <b>M1</b> for $(\text{their } h)^2 + r^2$   |
| (c)        | $\pi r^2 (2 + \sqrt{17})$ oe | 1FT | FT $\pi r^2 (2 + \sqrt{\text{their } 17})$  |
| 25 (a) (i) | <b>b – a</b>                 | 1   |   |
| (ii)       | <b>3b – 2a</b>               | 1   |   |
| (b) (i)    | $\frac{4}{3} \mathbf{a}$     | 2FT | <b>M1</b> for such as $\overrightarrow{BO} + \overrightarrow{OC} + \overrightarrow{CE}$<br>Or $\overrightarrow{BD} - \overrightarrow{ED}$ or $-\mathbf{b} + \mathbf{a} + \overrightarrow{AE}$<br>Or <b>B1</b> for $(\overrightarrow{CE}) = \pm \frac{1}{3}$ their <b>(a)(ii)</b><br>Or $(\overrightarrow{DE}) = \pm \frac{2}{3}$ their <b>(a)(ii)</b>   |
| (ii)       | trapezium                    | 1   |   |
| 26 (a) (i) | $95 - 6n$ oe isw             | 2   | <b>B1</b> for $-6n$ seen  |
| (ii)       | 16 cao                       | 1   |   |
| (b) (i)    | $2n - 3$                     | 2   | <b>M1</b> for $(n + 1)^2 - 4(n + 1)$ seen   |
| (ii)       | 39 cao                       | 1   |   |