

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**GCE Ordinary Level**

**MARK SCHEME for the October/November 2012 series**

**4024 MATHEMATICS (SYLLABUS D)**

**4024/11**

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.

Cambridge will not enter into discussions about these mark schemes.

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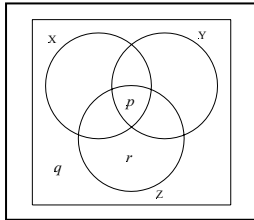
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| Question | Answers                                                                                                                                | Mark | Part marks                                                                                  |
|----------|----------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------------------------------------------------------------------|
| 1 (a)    | $\frac{17}{30}$ oe                                                                                                                     | 1    |                                                                                             |
| (b)      | $\frac{8}{45}$ oe                                                                                                                      | 1    |                                                                                             |
| 2 (a)    | 0.76 oe                                                                                                                                | 1    |                                                                                             |
| (b)      | 15                                                                                                                                     | 1    |                                                                                             |
| 3 (a)    | 120                                                                                                                                    | 1    |                                                                                             |
| (b)      | 16                                                                                                                                     | 1    |                                                                                             |
| 4        | 220 $2\frac{1}{4}$ 2300 0.021                                                                                                          | 2    | <b>C1</b> for 3 correct when one is covered<br>or <b>C1</b> for reversed answer             |
| 5 (a)    | 21 30 or (0) 9 30 p.m. only                                                                                                            | 1    |                                                                                             |
| (b)      | 338 (.0) (0)                                                                                                                           | 1    |                                                                                             |
| 6 (a)    | $3.4 \times 10^{-5}$                                                                                                                   | 1    |                                                                                             |
| (b)      | $2 (.0) \times 10^{16}$                                                                                                                | 1    |                                                                                             |
| 7 (a)    | 5 cao                                                                                                                                  | 1    |                                                                                             |
| (b)      | 0.17                                                                                                                                   | 1    |                                                                                             |
| 8        | 42                                                                                                                                     | 2    | <b>B1</b> for 120 or 168 seen                                                               |
| 9        | 28                                                                                                                                     | 2    | <b>B1</b> for $k = 4$<br>or <b>B1</b> for $\frac{1}{5} \times 20 = y \times \frac{1}{7}$ oe |
| 10 (a)   | 135                                                                                                                                    | 1    |                                                                                             |
| (b)      | 195                                                                                                                                    | 1    |                                                                                             |
| 11 (a)   | 3                                                                                                                                      | 1    |                                                                                             |
| (b)      | 2.5                                                                                                                                    | 1    |                                                                                             |
| 12 (a)   | $\left(\frac{1}{4} \text{ and } \frac{3}{4}\right)$ ; (0 and 1); $\left(\frac{1}{3} \text{ and } \frac{2}{3}\right)$ – all three pairs | 2    | <b>B1</b> for any one pair                                                                  |
| (b)      | $\frac{1}{4}$ oe                                                                                                                       | 1    |                                                                                             |

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|    |                                                                                                                                                                                                                                              |                        |                                                                          |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|--------------------------------------------------------------------------|
| 13 | (a) 1.5<br>(b) 8.4                                                                                                                                                                                                                           | 1<br>2                 | B1 for (figs $345 \times 20$ ), or for figs 69                           |
| 14 | (a) (i) 6<br>(ii) $\frac{9}{16}$<br>(b) $8x^6$ cao                                                                                                                                                                                           | 1<br>1<br>1            |                                                                          |
| 15 | (a) 36<br>(b) 28<br>(c) 112 or $4 \times$ their (b)                                                                                                                                                                                          | 1<br>1<br>1✓           |                                                                          |
| 16 | (a) $\begin{pmatrix} \frac{1}{3} & 0 \\ 0 & 1 \end{pmatrix}$ or $\frac{1}{3} \begin{pmatrix} 1 & 0 \\ 0 & 3 \end{pmatrix}$ oe<br>(b) (one way) stretch<br>parallel to $x$ -axis / $y$ -axis invariant <b>and</b><br>(stretch/scale) factor 3 | 1<br>1<br>1 dep        |                                                                          |
| 17 | (a) $x > 1$<br>$x + y < 9$<br>(b) 10                                                                                                                                                                                                         | 1<br>1<br>1            | C1 for the two correct lines with wrong inequality symbols               |
| 18 | (a) $5p(4 + 5p)$<br>(b) $(3 - 2t)(3 + 2t)$<br>(c) $(9 - x)(1 + 4x)$ or $(x - 9)(-4x - 1)$                                                                                                                                                    | 1<br>1<br>1            |                                                                          |
| 19 | 720 or 540<br><br>$10x = \text{their } (720)$<br>or $5x + \text{their } (180) = \text{their } (540)$<br><br>72                                                                                                                               | B1<br><br>M1<br><br>A1 | Ans. of 72 WW scores 2.                                                  |
| 20 | (a) $2x - 3$<br>(b) $A = -\frac{3}{2}$ oe<br>$B = \frac{1}{2}$ oe                                                                                                                                                                            | 1<br>1<br>1            | B1 for $\frac{-9+3}{2} + \frac{t+3}{2}$ oe<br>or B1 for $f(-9) = -3$ cao |

|        |                                     |          |
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|    |                                                                                                                                                                                                                     |                                        |                                                                                                                                                       |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| 21 | (a) 7<br>(b) correct $p$<br>correct $q$<br>correct $r$                                                                                                                                                              | 1<br>1<br>1<br>1                       |                                                                    |
| 22 | (a) 68<br>(b) 52<br>(c) 56<br>(d) 72                                                                                                                                                                                | 1<br>1<br>1<br>1                       |                                                                                                                                                       |
| 23 | (a) $(-)$ 2<br>(b) 20<br>(c) 600<br>(d) 40 or $10 + 30 \times   \text{their (a)}   / 2$                                                                                                                             | 1<br>1<br>1<br>1✓                      |                                                                                                                                                       |
| 24 | (a) (3, 5)<br>(b) (i) (4, 6)<br>(ii) 29 or $(\text{their } C_x + 1)^2 + (\text{their } C_y - 8)^2$                                                                                                                  | 1<br>1<br>2✓                           | <b>M1</b> for numerical $\overline{AB} + \overline{BC} = \overline{AC}$<br>or <b>B1</b> for $(\overline{AC} =) \begin{pmatrix} 5 \\ -2 \end{pmatrix}$ |
| 25 | (a) $3n - 2$ ( $3n - 1$ ) $3n$<br>(b) (i) 121 and 120<br>(ii) $3n ( 3n - 2 )$ oe or f.t from <i>their</i> (a) response provided it is in terms of $n$ .<br>(iii) $(3n - 1)^2 - 3n (3n - 2)$<br>correctly reaching 1 | 1<br>1<br>1✓<br><b>M1</b><br><b>A1</b> | If [0] scored then award <b>B1</b> for $(3n - 1)^2$ or for $9n^2 - 6n + 1$ seen and used                                                              |

|               |                                            |                 |
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|           |                                                                                                                                                                                                                                                                                                                                                |                                                                                 |                                                                                                                                                                                                                                                                                                                                      |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>26</b> | <p><b>(a)</b> <math>264^\circ</math> to <math>268^\circ</math> inclusive</p> <p><b>(b)</b> Acceptable quadrilateral <math>ABCD</math></p> <p><b>(c)</b> <b>(i)</b> acceptable perp. bisector of <math>AB</math></p> <p><b>(ii)</b> acceptable bisector of angle <math>ABC</math></p> <p><b>(d)</b> correct region (top l.h. corner) shaded</p> | <p><b>1</b></p> <p><b>1</b></p> <p><b>1</b></p> <p><b>1</b></p> <p><b>1</b></p> | <p>dep. on two reasonably accurate intersecting lines</p>                                                                                                                                                                                                                                                                            |
| <b>27</b> | <p><b>(a)</b> <math>\begin{pmatrix} -3 &amp; -1 \\ -2 &amp; -1 \end{pmatrix}</math> cao</p> <p><b>(b)</b> <b>(i)</b> 1 row 2 columns</p> <p><b>(ii)</b> <math>\begin{pmatrix} 4 &amp; 3 \end{pmatrix}</math></p>                                                                                                                               | <p><b>2</b></p> <p><b>1</b></p> <p><b>2</b></p>                                 | <p><b>C1</b> for 2 or 3 elements correct</p> <p><b>C1</b> for <math>\begin{pmatrix} 4p &amp; 3p \end{pmatrix}</math> or for <math>\begin{pmatrix} 4 \\ 3 \end{pmatrix}</math></p> <p>or <b>B1</b> for <math>(2x - x + 3y)</math></p> <p>or <b>M1</b> for <math>x = k \begin{pmatrix} 3 &amp; 1 \\ 0 &amp; 2 \end{pmatrix}</math></p> |