

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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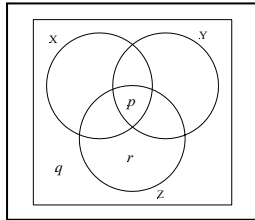
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| Question | Answers | Mark | Part marks |
|----------|--|------|---|
| 1 (a) | $\frac{17}{30}$ oe | 1 | |
| (b) | $\frac{8}{45}$ oe | 1 | |
| 2 (a) | 0.76 oe | 1 | |
| (b) | 15 | 1 | |
| 3 (a) | 120 | 1 | |
| (b) | 16 | 1 | |
| 4 | 220 $2\frac{1}{4}$ 2300 0.021 | 2 | C1 for 3 correct when one is covered or C1 for reversed answer |
| 5 (a) | 21 30 or (0) 9 30 p.m. only | 1 | |
| (b) | 338 (.0) (0) | 1 | |
| 6 (a) | 3.4×10^{-5} | 1 | |
| (b) | $2 (.0) \times 10^{16}$ | 1 | |
| 7 (a) | 5 cao | 1 | |
| (b) | 0.17 | 1 | |
| 8 | 42 | 2 | B1 for 120 or 168 seen |
| 9 | 28 | 2 | B1 for $k = 4$ or B1 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 | B1 for any one pair |
| (b) | $\frac{1}{4}$ oe | 1 | |

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

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

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| | | | |
|-----------|---|----------|---|
| 26 | (a) 264° to 268° inclusive | 1 | |
| | (b) Acceptable quadrilateral $ABCD$ | 1 | |
| | (c) (i) acceptable perp. bisector of AB | 1 | |
| | (ii) acceptable bisector of angle ABC | 1 | |
| | (d) correct region (top l.h. corner) shaded | 1 | dep. on two reasonably accurate intersecting lines |
| 27 | (a) $\begin{pmatrix} -3 & -1 \\ -2 & -1 \end{pmatrix}$ cao | 2 | C1 for 2 or 3 elements correct |
| | (b) (i) 1 row 2 columns | 1 | |
| | (ii) $\begin{pmatrix} 4 & 3 \end{pmatrix}$ | 2 | C1 for $(4p \ 3p)$ or for $\begin{pmatrix} 4 \\ 3 \end{pmatrix}$ or B1 for $(2x - x + 3y)$ or M1 for $x = k \begin{pmatrix} 8 & 5 \\ 3 & 1 \\ 0 & 2 \end{pmatrix}$ |