

**MARK SCHEME for the May/June 2011 question paper
for the guidance of teachers**

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.

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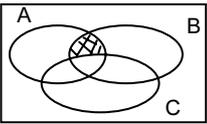
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Abbreviations

cao	correct answer only
cso	correct solution only
dep	dependent
ft	follow through after error
isw	ignore subsequent working
oe	or equivalent
SC	Special Case
www	without wrong working

Qu	Answers	Mark	Part marks
1	(a) 7	1	
	(b) 0.52 oe	1	
2	(a) Any decimal n such that $0.2 < n < 0.25$	1	
	(b) 80	1	
3	(a) $\frac{7}{24}$ oe Final ans.	1	
	(b) $\frac{7}{18}$ cao	1	
4	(a) $(y) > 7.5$ oe	1	
	(b) -2, -1, 0, 1	1	
5	(a) $\begin{pmatrix} -2 \\ 10 \end{pmatrix}$	1	
	(b) 10	1	
6	$\frac{9\pi}{2} + 27$ oe	2	B1 for $\frac{\pi \times 3^2}{2}$ or $\frac{1}{2} \times 9 \times 6$ soi or for $\frac{\pi r^2}{2} + \frac{1}{2}bh$ with r , b and h clearly identified.
7	(a) $\frac{4}{9}$ oe	1	
	(b) 840	1	
8	12.5 oe	2	B1 for $y = kx^2$ or $(k =) \frac{1}{8}$ soi or $2 : 4^2 = y : 10^2$ oe

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9	$y \geq 3$ $y \leq -2x$	2	C1 for either inequality correct or both statements $y \geq 3$ and $y \leq -2x$ given () may contain =, < etc
10	18	2	B1 for attempt at $\sqrt[3]{8} : \sqrt[3]{27}$ or M1 for $12^3 : x^3 = 8 : 27$ oe
11	50	2	M1 for $\frac{35-21}{AD} = \cos \theta$ oe
12	<p>(a) </p> <p>(b) (i) 2</p> <p>(ii) 2, 3, 4, 5, 7</p>	1 1 1	
13	<p>(a) 2×10^{-5}</p> <p>(b) (i) $7.6 \times 10^6, 2.1 \times 10^7, 8.0 \times 10^7, 1.2 \times 10^8$</p> <p>(ii) 1.34×10^7</p>	1 1 1	
14	<p>(a) $2^2 \times 3^3$</p> <p>(b) $(p =) 3, (q =) 2, (r =) 1$</p>	1 2	C1 for two correct
15	<p>(a) $3q(3p - 4q)$</p> <p>(b) $(4p - 3)(2x + y)$</p>	1 2	M1 for $4p(2x + y) - 3(2x + y)$ or $2x(4p - 3) + y(4p - 3)$ oe or B1 for the correct extraction of a common factor at any stage
16	<p>(a) $(0)57^\circ$</p> <p>(b) 237°</p> <p>(c) 237.5</p>	1 1 ft 1	ft their (a) + 180
17	<p>(a) 5.963</p> <p>(b) 6999</p> <p>(c) 381 cao</p>	1 1 1	

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18	(a) (i) Bisector of SPQ	1	
	(ii) Perpendicular bisector of QR	1	
	(b) Correct region shaded	1	
19	(a) 0.05 cao	1	B1 for two of 200, 2 and 0.8 seen
	(b) 14	1	
	(c) 1000	2	
20	(a) $20 < n < 40$	1	B1 for $\sum fn$ and independent B1 for dividing by (5 + 20 + 10 + 5)
	(b) 37.5	3	
21	(a) 16	1	C1 for two of 2, y^4 and x correct or B1 for $\frac{4y^8}{x^2}$ seen or $\frac{4^{\frac{1}{2}}xy^{\frac{9}{2}}}{x^2y^{\frac{1}{2}}}$ or better
	(b) 16	1	
	(c) $\frac{2y^4}{x}$	2	
22	(a) 140	1	ft $\frac{1}{2}$ their (a) B2 for $AB = CD$ stated, $EAB = EDC$ soi or $DCE = ABE$ and $DEC = BEA$ or B1 for any correct pair of equal angles.
	(b) 70	1ft	
	(c) Congruency established	3	
23	(a) (i) 560	1	B1 for 19.2 or 3.2 oe soi B1 for figs $\frac{270}{1.8}$ seen
	(ii) 76.8(0)	2	
	(b) 150	2	

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24	(a) (0.5, 4) oe	1	B1 for substitution of $(-2, 1)$ in $2y + 3x + k = 0$ SC1 for answer -23 or any correct ft after substitution of $(\pm 2, \pm 1)$
	(b) 1.2 oe	1	
	(c) (i) 4	2	
	(ii) -1.5 oe	1	
25	(a) $\frac{1}{13}$ oe	2	M1 for $10 - 6x + 3 = 3x + 1$ or better
	(b) $(x =) 5, (y =) -3$ oe	3	C2 for one correct with supporting working or both answers without working or M1 for correct method to eliminate one variable reaching such as $26x = k, hx = 130,$ $13y = p, qy = -39$ or multiples of these.
26	(a) Correct reduction to $2x^2 + x - 15 = 0$	2	M1 for $(2x + 3)(x - 1) = 12$
	(b) 2.5 -3	2	C1 for one correct with supporting working or both with signs reversed or both correct and no working or B1 for $(2x - 5)(x + 3)$ or $\frac{-1 \pm \sqrt{1^2 - 4 \times 2 \times (-15)}}{2 \times 2}$ seen
	(c) 19	1ft	ft $6(\text{their positive } x) + 4$