

**MARK SCHEME for the May/June 2010 question paper
for the guidance of teachers**

4024 MATHEMATICS (SYLLABUS D)

4024/12

Paper 12, 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.

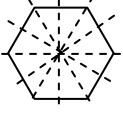
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Qu	Answers	Mark	Part Marks
1	(a) 0.7 (b) 60	1 1	
2	(a) $\frac{11}{35}$ (b) $\frac{18}{35}$	1 1	
3	(a) 22 (b) 1380	1 1	
4	(a) 10 (b) $\frac{1}{3}$	1 1	
5	0.5	2	B1 for two of 50, 0.2 and 4 seen
6	(a) 2.5 (b) $\frac{p+r}{2}$	1 1	
7	(a)  (b) Rectangle, parallelogram or rhombus drawn	1 1	
8	(a) 81 (b) 24	1 1	
9	(a) $2^2 \times 5 \times 7$ (b) 28 (c) 42	1 1 1	
10	(a) 40 24 (b) 2.5	2 1	C1 for one correct or M1 for $\frac{x}{x-16}$ or $\frac{y+16}{y} = \frac{5}{3}$ or $\frac{5}{8}z = \frac{3}{8}z + 16$
11	(a) -1.5 (b) $\frac{5}{3x+2}$	1 2	C1 for $\frac{5}{3y+2}$ or $\frac{5}{ax+b}$ with $a = 3$ or $b = 2$ or B1 for $3xy = 5 - 2x$ or $3yx = 5 - 2y$ or better seen

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12	(a) $\frac{12}{x^2}$	2	C1 for $\frac{k}{x^2}$ or B1 for $k = 12$ seen or $y = \frac{k}{x^2}$ with k or k any number
	(b) 2 -2	1	
13	(x =) 5 (y =) -4	3	C2 for one correct with working. M1 for a correct method to eliminate one variable, reaching such as $11x = k$, $hx = 55$, $11y = p$ or $qy = -44$
14	(a) -2 5.5	1	
	(b) $y = -0.75x + 4$	2	C1 for $y = -0.75x + c$ or $y = mx + 4$ or B1 for $m = -0.75$ or $c = 4$ soi or a line through either point $(-8, 10)$ or $(4, 1)$
15	(a) 52	1	
	(b) 52	1	Accept their (a) ft
	(c) 38	1	Accept 90 – their (b) ft
16	(a) Correct completion with $\frac{4}{10}$, $\frac{4}{9}$, $\frac{6}{9}$ and $\frac{3}{9}$	1	
	(b) $\frac{7}{15}$	2	C2 for a correct ft from (a) M1 for $\frac{6}{10} \times \frac{5}{9} + \frac{4}{10} \times \frac{3}{9}$
17	(a) $2p + 3q$	1	
	(b) $2p + 2q$	1	
	(c) $-2p + q$	1	Accept $3q$ – their (b) ft
18	(a) $\frac{\pi r^2}{6}$	1	
	(b) $2r + \frac{\pi r}{3}$	2	B1 for $\frac{60}{360} \times 2\pi r$ seen
19	(a) $\begin{pmatrix} 3 & -1 \\ 0 & -1 \end{pmatrix}$	1	
	(b) $\begin{pmatrix} 3 & -1 \\ 2 & 1 \\ 1 & 2 \\ 2 & 0 \end{pmatrix}$ o.e.	2	B1 for $\frac{1}{2}$ or $\begin{pmatrix} 3 & -2 \\ 1 & 0 \end{pmatrix}$ or (det =) 2

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20	(a) 39	1	B1 for 46 or 32 seen
	(b) 14	2	
	(c) 9	1	
21	(a) (i) $3x(x - 4)$	1	B1 for $x(x + 4)$ or $(x + 4)(x - 4)$ seen
	(ii) $(x + y)(x - 2y)$	1	
	(b) $\frac{x}{x - 4}$	2	
22	(a) 2 500 000	1	B1 for 5.5 seen
	(b) (i) 395	1	
	(ii) 340	2	
23	(a) 34	2	M1 for $\frac{16}{AB} = \cos \theta$ soi
	(b) 480	2	B1 for height of $ABC = 16 \tan \theta$ o.e. or for $\frac{1}{2} \times 32 \times \text{their } 34 \times \sin \theta$ or M1 for any correct method
24	(a) T with vertices (5, 6), (3, 6) and (3, 2)	2	C1 for two vertices correct or for T same orientation as P and correct size
	(b) Rotation 90° anticlockwise about (0, 0)	2	B1 for Rotation or 90° anticlockwise about (0, 0) oe
	(c) $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$	1	
25	(a) 108	1	C1 for 0.5 – 0.9 or B1 for tangent at $t = 18$ B1 for curve from (0, 0) to (8, 36) with correct curvature or straight line from (8, 36) to (16, 108ft)
	(b) 0.5 – 0.9 with tangent drawn at $t = 18$	2	
	(c) Correct distance / time graph	2	
26	(a) Correct triangle	2	B1 if no arcs seen or arcs seen but sides in the wrong order or arcs seen, but only one side the correct length
	(b) Correct region shaded	3	B1 for arc radius 7, centre B B1 for perp. bisector of AB