

MARK SCHEME for the May/June 2013 series

4024 MATHEMATICS (SYLLABUS D)

4024/21

Paper 2, maximum raw mark 100

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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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
soi	seen or implied

SECTION A

Qu.	Answers	Mark	Part Marks
1	(a) $x = 3$	2	M1 for $\pm 5x = \pm 15 =$
	(b) $x = 4, y = -1$	3	B2 for one correct value www
	(c) (i) $-1, 0, 1$	1	
	(ii) $y > -2$ final answer	2	B1 for -2 seen
2	(a) 24	2	B1 for 15 seen
	(b) (i) (a) $180 - q$ cao	1	
	(i) (b) $p - q$ cao	1	
	(ii) (a) 8 cm	1	
	(ii) (b) 4.9 cm	1	
3	(a) (i) 10, 12	1	
	(ii) $2m$ oe	1	
	(b) (i) 25, 36	1	
	(ii) n^2	1	
	(iii) 18	1	
	(c) (i) $t^2 + 2t$ oe	1	
	(ii) 675	1	

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4	(a) (i)	$\frac{10}{11}, \frac{1}{11}, \frac{9}{10}, \frac{1}{10}, \frac{10}{10}, \frac{0}{10}$ oe correctly placed	2	B1 for 3 correct values correctly placed	
	(ii) (a)	$\frac{6}{11}$ oe	1		
	(ii) (b)	$\frac{9}{22}$	2		M1 for 3 ×
	(b) (i)	1	1		
	(ii)	2	1		
5	(a) (i)	€ 216	1	B2 for Loss \$43.40 or M1 for two of 87.50, 48.60 and \$27.20 and M1 for attempt at adding any three prices and then subtracting 120	
	(ii)	(\$1 = €) 0.68	1		
	(b) (i)	Profit \$43.3(0)	3		
	(ii)	36 to 36.1%	1 ft		
6	(a) (i)	68.7°	2	M1 for $\tan A = \frac{18}{7}$ M1 for $\tan 55 = \frac{18}{DE}$ A1 for $DE = 12.6$ to 12.61 cm M1 for $\frac{1}{2}(9+7+their\ 12.6) \times 18$ or for a complete alternative method	
	(ii)	257 to 257.5	4		
	(b)	26°	2		M1 for 41.5 or 112.5 used
7	(a)	0.01 m/s cao	2	M1 for 200/19.94 or 100/9.98	
	(b) (i)	$\frac{120}{x}$ or $\frac{120}{x+3}$ $\frac{120}{x} - \frac{120}{x+3} = \frac{6}{60}$ oe Correct eqn with denominator removed	3	B1 B1	
	(ii)	$x = 58.5$ or -61.5	3	B2 for 1 correct answer Or for 58 – 59 AND –61 – –62 B1 for $\frac{-3 \pm \sqrt{14409}}{2}$	
	(iii)	123 – 123.1 minutes	2	C1 for –58.5 AND 61.5 M1 for 120/ <i>their</i> positive 58.5	

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SECTION B

8	(a) (i)	-5.5 or $-5\frac{1}{2}$	1	
	(ii)	$f^{-1}(x) = \frac{2x+3}{4}$	2	C1 for $\frac{2x-3}{4}$ or $\frac{2y+3}{4}$ oe
	(iii)	$g = 0.5$ or $\frac{1}{2}$	2	M1 for $\frac{8g-3}{2} = g$
	(b) (i)	Enlargement Scale factor -3 , Centre A	2	B1 B1
	(ii)	2.2 to 2.24 or $\sqrt{5}$	1	
	(iii)	$\begin{pmatrix} 0 \\ -7 \end{pmatrix}$	2	B1 for 0 B1 for -7
	(iv)	$\begin{pmatrix} 10 \\ 1 \end{pmatrix}$	2	M1 for use of $\overrightarrow{DF} = \begin{pmatrix} -2 \\ 4 \end{pmatrix}$ or $\overrightarrow{AF} = \begin{pmatrix} 1 \\ -2 \end{pmatrix}$
9	(a) (i)	$h = 29.8$ to 29.85	2	M1 for $\pi \times 4^2 \times h (=1500)$
	(ii)	100	1	
	(b)	$x = 2.5$	2	M1 for $\frac{1}{2} \times 12x \times 5x$ or better for cross section
	(c) (i)	$(2y-3)(2y+11)$	1	
	(ii)	$y = 1.5$ or -5.5	1	
	(iii)	67.5 cm^2	1 ft	
	(iv)	495 cm^2	3	B1 $2 \times$ their (iii) B1 $240 \times$ their 1.5
	(d)	$\frac{9}{25}$ cao	1	

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10	(a) (i)	$\frac{2}{3}, \frac{2}{3}$ oe	1	
	(ii)	8 points correctly plotted and one set of 5 joined with a curve	2 ft	B1 for at least 6 correct plots
	(iii)	1.7 to 1.8 AND -1.7 to -1.8	1 ft	M1 for tangent to curve at -1.5 soi After M0, SC1 for 3 to 4
	(iv)	-2.5 to -5 (dep on M1)	2	M1 for $x + y = 2$ drawn
	(v)	-1.3 to -1.4 (dep on M1)	2 ft	One mark for each
	(b) (i)	$a = 3, b = 405$ (cao)	2	
	(ii)	$(0, 5)$ cao	1	
	(iii)	20	1 ft	
11	(a) (i)	510 – 520 m	1	
	(ii)	C positioned 7 cm from A and 6 cm from B with both construction arcs drawn	2	B1 for c positioned 7 cm from A and/or 6 cm from B
	(iii)	$146^\circ \pm 2$	1 ft	
	(iv)	D positioned 10.3 cm ± 0.8 from A and $\hat{D}AC = 34^\circ \pm 2^\circ$	2	B1 for $DAC = 34 (\pm 2^\circ)$
	(b) (i)	164 to 164.11° www	4	B3 for $QPR = 110$ to 110.11 Or B2 for $\frac{-2750}{80000}$ or -0.343 to 0.344 Or B1 for $(\cos P =) \frac{160^2 + 250^2 - 340^2}{(2 \times) 160 \times 250}$ And M1 for their $P + 54^\circ$
	(ii)	18780 – 18800	2ft	M1 for $\frac{1}{2} \times 250 \times 160 \times \sin 110.1$

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12 (a)	(i)	14.8 kg www	3	M1 for $15 \times 3 + 14 \times 8 + 20 \times 12 + 24 \times 15 + 31 \times 17 + 24 \times 20 + 12 \times 26 (= 2076)$ M1 for dividing by 140 (indep)
	(ii)	Correct histogram	3	M2 for 5 correct bars or M1 for 3 correct bars or all correct heights seen
	(iii)	$\frac{11}{35}$ oe	2	M1 for $15 + 14 + 15 (= 44)$ used
(b)	(i)	9	1	
	(ii)	35%	1	
	(iii)	96°	2	M1 for $(15 + 2) \div 64 (\times 360)$