

MARK SCHEME for the May/June 2015 series

4024 MATHEMATICS (SYLLABUS D)

4024/22

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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Qu.	Answers	Mark	Part Marks
1 (a)	$\frac{17x+13}{6}$ cao final answer	2	M1 for $\frac{2(4x-1)}{6} + \frac{3(3x+5)}{6}$ or better oe
(b) (i)	$\frac{1}{2}$ or 0.5 cao	1	
(ii)	$y = 1$ final answer	1	
(iii)	Line from (6, 1) to (4, 3)	1	
(iv)	$y = -x + 7$ final answer	2	B1 for any equation with grad -1 and/or intercept 7
(v)	(0, 6)	2	B1 for line from (2, 2) with y-intercept between 5 and 7 soi Or for correct (unsimplified) equation ($y = -2x + 6$)
2 (a)	27	1	
(b)	Constant speed	1	
(c)	0.08 or $\frac{2}{25}$ final answer	1	
(d)	3 to 3.5	1	
(e)	1500	2	M1 for $\frac{1}{2}(200 + 50)12$ Or B1 for $\Delta = 900$ or rectangle = 600 After 0, allow SC1 for 1750
(f)	27 cao	2	M1 for <i>their</i> (total distance $\div$ total time) soi
3 (a) (i)	67.8	3	M1 for $15 \times 10 + 45 \times 15 + 75 \times 11 + 105 \times 7 + 135 \times 5 + 165 \times 2$ i.e. $150 + 675 + 825 + 735 + 675 + 330 (=3390)$ B1 for $\div 50$ (independent of M mark)
(ii)	$90 \leq t < 120$	1	Or clear equivalent
(b) (i)	100 <u>and</u> 76 <u>and</u> 48	2	B1 for 100 and 76, or for 48
(ii)	Completed pie chart with at least one sector correctly labelled	1	
4 (a) (i)	72	1	
(ii)	83	1	
(iii)	108	1	
(iv)	83	1FT	Their (ii)

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(b) (i)	$4(\pi)$ cao	2	B1 for $\pi \times 6^2$ or for $\frac{40}{360}$
(ii)	$12 + \frac{4}{3}\pi$ final answer	2	B1 for $(a =) 12$, or for $(b =) \frac{4}{3}$
(iii)	8	1ft	
5 (a)	$(\pm) 9.3(0)$ to 9.31	4	M2 for $BC^2 = 8^2 + 11^2 - 2 \times 8 \times 11 \cos 56$ Or M1 for $8^2 + 11^2 \pm (2) \times 8 \times 11 \cos 56$ B1 for 86.5 to 86.6
(b)	122.2 to 122.3	3	M2 for $(\sin ADC =) \frac{11 \sin 30}{6.5}$, or 57.7 to 57.8, or 58 Or M1 for $\frac{\sin ADC}{11} = \frac{\sin 30}{6.5}$ oe
(c)	45.7 to 45.71	4	B1 for 27.7 to 27.8 seen M1 for $\frac{1}{2} \times 11 \times 8 \times \sin 56 (= 36.478\dots)$ or for $8 \times \sin 56$ if using heights M1 for $\frac{\text{their stated area}}{\text{their area } ABC} \times 100$ or $\frac{\text{their height } ADC}{\text{their height } ABC} \times 100$
6 (a)	325	2	M1 for $\frac{250}{20500}$ or $\frac{26650}{20500}$ Or B1 for 82 seen
(b)	465 and 2.56 to 2.57	3	B2 for 465 or 2.56 to 2.57 seen Or M1 for 400×1.17 (468)
(c)	170	3	B2 for 420 or 144.5(0) Or M1 for $357 \div 0.85$ or $357 - (250 \times 0.85)$

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SECTION B			
Qu.	Answers	Mark	Part Marks
7 (a) (i)	$f^{-1}(x) = \frac{3x-7}{2}$ oe final answer	2	M1 for $3y = 2x + 7$ or $3x = 2y + 7$ oe
(ii)	$m = -14$	2	M1 for $\frac{2m+7}{3} = \frac{m}{2}$ oe
(b) (i)	4, 4 and smooth correct graph drawn	3	B1 for 4 and 4 B1 for 7 correct plots
(ii)	(y =) 6.2 to 6.4	1	
(iii)	line drawn <u>and</u> $x = -0.7$ to -0.8 $x = 2.7$ to 2.8	2	M1 for correct line drawn
(iv)	line drawn <u>and</u> $x = -2.3$ to -2.7	2	M1 for horizontal line crossing curve at intersection of $x = 3.5$ and their curve or for the line $y = -2.75$
8 (a)	321	1	
(b)	9.43 to 9.44	2	M1 for $\sin 39 = \frac{y}{15}$ oe
(c)	19.3 to 19.31	2	B1 for $\cos 39 = \frac{15}{x}$ oe
(d) (i)	X marked 12cm from A on bearing of 141°	2	B1 for either a correct distance or bearing
(ii)	Correct region shaded	3	B1 for arc, min length 3 cm, radius 6 cm, centre A B1 for bisector of $\angle ABC$, min length 3 cm B1 for shading
(iii)	17.6 to 18.4 dependent on an acceptable X and Y	2	M1 for Y established at northern end of shading
9 (a) (i)	$2x(2x^2 - 5y)$ final answer	1	
(ii)	$(3a + b)(3a - b)$ final answer	1	
(b)	$m = \frac{5}{8}, 0.625$	2	M1 for $7 = 12 - 8m$ or $\frac{7}{4} = 3 - 2m$
(c) (i)	$h^2 + (h + 7)^2 = 23^2$ leading to correct rearrangement	2	M1 for $h^2 + (h + 7)^2 = 23^2$
(ii)	$\frac{h}{2} (h + 7)$ oe isw	1	

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(iii)	120 cao	1	
(iv)	12.4, -19.4	3	B2 for one correct solution, or for 12.38 to 12.40 and -19.38 to -19.40 Or if in form $\frac{p \pm \sqrt{q}}{r}$, B1 for $p = -7$ and $r = 2$ and B1 for $q = 1009$ or $\sqrt{q} = 31.7$ to 31.8
(v)	54.76 to 54.8	1FT	
10 (a) (i)	Rotation 90° anticlockwise about (1,1)	2	B1 for Rotation B1 for 90° anticlockwise and about (1,1)
(ii)	Correct triangle	2	B1 for two correct vertices
(iii)	Correct triangle	2	B1 for two correct vertices
(iv)	24	2	B1 for 4^2 soi or M1 for $\frac{1}{2} \times 12 \times 4$
(b)	2	1	
(c)	4	1	
(d)	Rectangle, Rhombus	2	B1 for one correct
11 (a) (i)	$\frac{7}{30}$ or 0.23... or better	1	
(ii)	$\frac{11}{15}$ cao	1	
(iii) (a)	All probabilities correctly placed	2	B1 for at least 8 correct
(b)	$\frac{308}{870}$ or $\frac{154}{435}$ or 0.354	2	M1 for $\left(\text{their } \frac{7}{30} \times \text{their } \frac{6}{29} \right) + \left(\frac{15}{30} \times \text{their } \frac{14}{29} \right) + \left(\frac{8}{30} \times \text{their } \frac{7}{29} \right)$
(b) (i)	Correct histogram	3	B2 for at least 3 correct bars Or B1 for at least 1 correct bar or correct frequency densities seen
(ii)	61 or 62	2	B1 for 6 or 7 seen
(iii)	10	1	