

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

0607 CAMBRIDGE INTERNATIONAL MATHEMATICS

0607/31

Paper 3 (Core), maximum raw mark 96

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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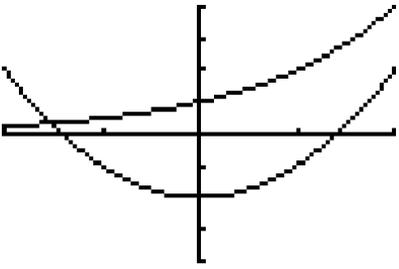
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1	(a)	(i) 6 : 7 (ii) 117 (116.6 to 116.7) ft	B1 B2 ft	ft their (i) if used. If B0, M1 for $28 \div 24 (\times 100)$ o.e. If B0, M1 for $24 \div 8 \times 7$ or 3 or 168 seen If B0, M1 for $35 \div 7 \times 3$ or 5 or 105 seen [7]
	(b)	21	B2	
	(c)	15	B2	
2	(a)	(i) $48x^7$ (ii) $5x^{-12}$ or $\frac{5}{x^{12}}$ (iii) $\frac{4x}{t}$ final answer	B2 B2 B2	
	(b)	$\frac{4c + 5d}{10}$	B2	B1 for $48x^k$ or kx^7 B1 for $5x^k$ or kx^{-12} or $\frac{k}{x^{12}}$ or SC1 for 5^{-12} M1 for $\frac{12xy}{3ty}$ seen (or better) or correct cancelling of y and 3 seen M1 for $\frac{4c}{10} + \frac{5d}{10}$ or $4c + 5d$ seen or common denominator of 10 [8]
3	(a)	(0)1 10	B1	Accept any reasonable notation. If B0, M1 for dist / time and M1 for converting minutes to hours M's independent (Allow dividing by 1.55 for first M1) M2 for 40×1.05^2 o.e. M1 for 40×1.05 o.e. (implied by 42) Answer of 44 implies M1 (i.e. first year) [7]
	(b)	22.39 to 22.44	B3	
	(c)	44.1(0)	B3	
4	(a)	(i) Reflection $y = -1$ (ii) Rotation (0, 0) 90° (anti-clockwise) oe	B1 B1 B1 B1 B1	Independent Independent SC1 for translation $\begin{pmatrix} 1 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ -3 \end{pmatrix}$ or $\begin{pmatrix} \frac{1}{2} \\ \frac{-3}{2} \end{pmatrix}$ SC1 any other enlargement, sf $\frac{1}{2}$ correct orientation or sf $-\frac{1}{2}$, centre (0, 0) [9]
	(b)	(i) Triangle at (2, -2), (6, -2), (6, 0)	B2	
		(ii) Triangle at (0.5, 0.5), (2.5, 0.5), (2.5, 1.5)	B2	

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5	(a) (i) -23 (ii) $\frac{y+8}{3}$ oe www 2 (b) 2.5, -2	B1 M1 M1 M1 A1A1	Correctly re-arranging with x term isolated Correctly dividing M's independent M1 for correctly eliminating one variable to one equation in other, or for sketch of both lines, one positive gradient, one negative gradient and intersection in bottom right quadrant (can be freehand) trial and improvement both correct 3 (one correct 0) ww or other GDC applications both correct SC2 (one correct 0)	[6]
6	(a) 27 (b) 8 (c) 88 or 89	B1 B2 B2	B1 for (l.q. =) 24 or (u.q. =) 32 M1 for 12 seen	[5]
7	(a) 400 (b) (i) 65 (ii) 360 ft	B2 B2 B2 ft	If B0, M1 for $\frac{1}{3} \times 10^2 \times 12$ If B0, M1 for $0.5 \times 10 \times 13$ ft their (i). If B0, M1 for $4 \times$ their (i) + 10^2	[6]
8	(a) (i) 135° (ii) 12 ft (iii) 24 (b) 4, 4,,, 12, 4 ft (c) (i) 2.9375 or 2.938 or 2.94 ft (ii) 4 ft (iii) 3.5 ft	B1 B1 ft B2 B2 ft B1 ft B1 ft B1 ft	$\pm 2^\circ$ ft their (a)(i) only if their angle gives an integer M1 for $\frac{90}{360}$ or $\frac{270}{360}$ or 8 B1 for 3 correct ft their (a)(ii) ft their (b) ft their (b) ft their (b)	[9]
9	(a) 320 (b) 77.1 (3.....) (c) (i) R shown on diagram to make triangle PQR look isosceles (may be freehand) (ii) 220	B1 B3 B1 B1	If B0, B1 for angle $P = 40$ (or $Q = 50$) (may be on diagram), M1 for $\sin 40 = \frac{SQ}{120}$ oe	[6]

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<p>10 (a)</p> <p>(i) $x = 3$</p> <p>(ii) $y = 2$</p> <p>(iii) $x + y = 8$ oe</p> <p>(b)</p> <p>(i) (6, 2) ft</p> <p>(ii) (4.5, 2) cao</p> <p>(iii) 4.24 (4.242 to 4.243) ft www 3</p>	<p>B1</p> <p>B1</p> <p>B2</p> <p>B1B1 ft</p> <p>B1</p> <p>B3 ft</p>	<p>SC1 if (i) is $y = 3$ and (ii) is $x = 2$</p> <p>If B0, M1 for gradient = $-\frac{8}{8}$ (or better) or $x + y = k$</p> <p>ft their line 2, line 3 but can recover</p> <p>M2 for $3^2 + (\text{their } AB)^2$ (If M0, B1 for $AC = 3$) ft their x-coord of B for AB Accept $\sqrt{18}$ or $3\sqrt{2}$</p> <p style="text-align: right;">[10]</p>
<p>11 (a)</p> <p>(i) 90 and semi-circle</p> <p>(ii) 90 and tangent/radius</p> <p>(b)</p> <p>(i) 40</p> <p>(ii) 80</p> <p>(iii) 140</p> <p>(c)</p> <p>(i) AB and UV extended to meet at X (may be freehand)</p> <p>(ii) 10</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p>	<p>Allow AB is diameter as reason. Allow right angle for 90.</p> <p>Allow right angle for 90.</p> <p style="text-align: right;">[7]</p>
<p>12 (a)</p>  <p>(b) -1.41 (4...), 1.41 (4...)</p> <p>(c) -1.53 (-1.532 to -1.531)</p> <p>(d) $0.25 \leq y \leq 4$</p>	<p>B1 B1 B1 B1</p> <p>B1 B1</p> <p>B1</p> <p>B1B1</p>	<p>B1 U-shaped parabola, cutting x-axis twice. B1 symmetry about y-axis B1 exponential shape at least from -1.7 to 1 B1 not below x-axis</p> <p>Condone $<$ and allow in words. Allow $f(x)$ or x for y. M1 for 0.25 and 4 soi. (3.75 implies this M1)</p> <p style="text-align: right;">[9]</p>

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13 (a)	$\frac{4}{11}, \frac{4}{10}, \frac{7}{10}, \frac{3}{10}$	B2	Throughout this question allow decimal or percentage equivalents (at least 3 sf) but ratios or words score 0. Penalise 2 sf once. isw any cancelling or converting. B1 for 2 or 3 correct
(b) (i)	$\frac{42}{110}$ oe	B2	0.382 or 0.3818.... If B0, M1 for $\frac{7}{11} \times \frac{6}{10}$
(ii)	$\frac{56}{110}$ oe ft	B3 ft	0.509(0) to 0.5091 ft their diagram M2 for $\frac{7}{11} \times$ their $\frac{4}{10}$ + their $\frac{4}{11} \times$ their $\frac{7}{10}$ M1 for one of these products [7]