

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

0607 CAMBRIDGE INTERNATIONAL MATHEMATICS

0607/42

Paper 4 (Extended), maximum raw mark 120

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 must be read in conjunction with the question papers and the report on the examination.

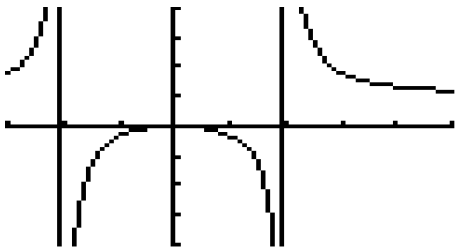
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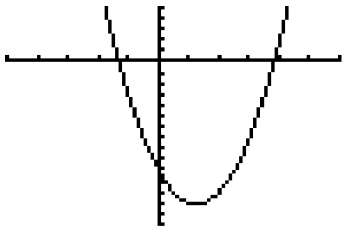
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1	(a) (i)	$4620 \div 20$ $\times 7$ oe	M1 M1	Either order for the M's. 231 or 32340 imply M1 Also M2 for $1617 \div 7 \times 20 = 4620$ oe or $\frac{7}{20}$ of 4620 = 1617
	(ii)	9.63 (9.627....)	B3	If B0, M2 for $(1617 - 1475) \div 1475 (\times 100)$ oe M1 for $1617 - 1475$ soi (142) or $\frac{1617}{1475}$
	(b)	4389	B2	Accept 4390. If B0, M1 for 4620×0.95 oe
	(c)	700	B3	If B0, M2 for $1155 \div 1.65$ oe M1 for 165% = 1155 [10]
2	(a) (i)	Translation $\begin{pmatrix} -7 \\ 3 \end{pmatrix}$	B1 B1	B's independent Accept other notation for vector.
	(ii)	Reflection $x = 3.5$	B1 B1	B's independent
	(b)	Quadrilateral with vertices $(-1, -7)$, $(5, -4)$, $(2, -1)$, $(-1, -1)$	B2	B1 for three correct vertices
	(c)	Similar	B1	[7]
3	(a) (i)	7	B1	
	(ii)	52	B1	
	(iii)	3	B1	
	(iv)	14	B1	
	(b) (i)	88	B1	
	(ii)	15	B1	
	(c)	0.4 oe	B1	
	(d)	$\frac{37}{85}$	B2	

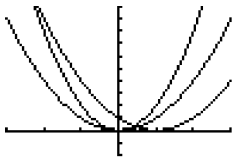
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<p>4 (a) (i)</p> <p>(ii)</p> <p>(b)</p> <p>(c)</p> <p>(d) (i)</p> <p>(ii)</p> <p>(iii)</p>	<p>32</p> <p>15 07 ft</p> $(\cos(Q)) = \frac{80^2 + 100^2 - 130^2}{2 \times 80 \times 100}$ <p>91.79....</p> <p>$0.5 \times 80 \times 100 \sin(91.8 \text{ or } 91.78 \text{ to } 91.79 \dots)$ oe</p> <p>4000 (3998. ...) ft</p> <p>PS sketched with S labelled</p> <p>68.2 to 68.22 cao</p> $\frac{80}{\sin(\text{their(d)(ii)})} \times \sin 20$ <p>29.5 (29.46 to 29.47) ft www 3</p>	<p>B2</p> <p>B2 ft</p> <p>M2</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>B1</p> <p>B1</p> <p>M2</p> <p>A1 ft</p>	<p>If B0, M1 for $80 \div 2.5$</p> <p>ft is 15 06 28 + their (i). Accept different notations of time.</p> <p>If B0, B1 for 12 (mins) or 720 (seconds)</p> <p>M1 for correct implicit expression with 80, 100 and 130 but becomes M2 if answer is 91.79...</p> <p>SC2 for 91.79... without working</p> <p>Must see method when only answer is 4000</p> <p>SC1 for 3998. Without working</p> <p>Can be freehand S just needs to be on QR.</p> <p>M1 for $\frac{QS}{\sin 20} = \frac{80}{\sin(\text{their(d)(ii)})}$</p> <p>ft 27.36 \div sin (their (d)(ii)) [14]</p>
<p>5 (a)</p> <p>(b)</p> <p>(c)</p> <p>(d) (i)</p> <p>(ii)</p>	<p>Positive</p> <p>(4.5, 4.4)</p> <p>$0.719x + 1.16$ (0.7191..., 1.164....)</p> <p>3</p> <p>$\frac{6}{90}$ oe ft</p>	<p>B1</p> <p>B1 B1</p> <p>B2</p> <p>B1</p> <p>B3 ft</p>	<p>B1 for $0.719x + c$ or $mx + 1.16$</p> <p>If B0, SC1 for $0.72x + 1.2$</p> <p>ft their (d)(i) if > 1</p> <p>If B0, M1 for $\frac{\text{their(d)(i)}}{10}$ used with one other fraction, M1 for second fraction in form $\frac{j-1}{9}$ oe following first fraction $\frac{j}{10}$ oe in a product [9]</p>
<p>6 (a)</p> <p>(b)</p> <p>(c)</p> <p>(d) (i)</p> <p>(ii)</p>	 <p>$x = -2, x = 2$</p> <p>$y = 1$</p> <p>(0, 0)</p> <p>$y \leq 0, y > 1$ oe</p> <p>Any k in the interval $0 < k \leq 1$</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1 B1</p> <p>B1</p> <p>B1</p> <p>B1 B1</p> <p>B1</p>	<p>Branch to left of $x = -2$ (or close to it) and above x-axis</p> <p>Branch roughly correct shape between $x = -2$ and $x = 2$ and not above x-axis.</p> <p>Branch to right of $x = 2$ (or close to it) and above x-axis</p> <p>(Condone slight turning back up on outside branches)</p> <p>Outside branches approaching approx $y = 1$ i.e. not x-axis</p> <p>Centre branch approaching $x = -2$ and $x = 2$</p> <p>Penalty of -1 (max) if branches joined</p> <p>Allow words for inequality signs.</p> <p>Allow $f(x)$ or x for y</p> <p>Accept a correct inequality [12]</p>

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7	(a) (i) 1020 (1017 to 1018)	B3	If B0, M1 for $4 \times \pi \times 6^2$ oe (144 π or 452 to 452.50 and M1 for $\pi \times 12 \times 15$ (180 π or 565 to 566 (M's indep) Allow 324 π
	(ii) 10.2 (10.17 to 10.18....) ft	B1 ft	ft their (i) $\div 100$. Allow 3.24 π
	(b) (i) 2600 (2599 to 2602)	B3	If B0, M1 for $\frac{4}{3}\pi \times 6^3$ oe (288 π or 904 to 905) and M1 for $\pi \times 6^2 \times 15$ (540 π or 1695 to 1697) (M's indep) Allow 828 π
	(ii) 1600 (1595 to 1597) ft	B3 ft	ft their (b)(i) $\times 0.61374$ M1 their (b)(i) $\times 0.0193$ (50.16 to 50.22). M1 for $\times 31.8$ either order [10]
8	(a) 70, 80, 108 ft	B1B1 B2 ft	ft is $180 - 2(116 - q)$. If B0, M1 for angle $TDA = 36^\circ$ ft oe (may be on diagram)
	(b) (i) 26	B1	
	(ii) 64	B1	[6]
9	(a) 2.57 (2.571....)	B4	If B0, M3 for $\frac{9}{\frac{5}{2} + \frac{4}{4}}$ or better (M2 for $\frac{5}{2} + \frac{4}{4}$, M1 for $\frac{5}{2}$ or $\frac{4}{4}$)
	(b) (i) $\frac{5}{x} + \frac{4}{x+2}$	B2	Allow correct single fraction, simplified or unsimplified if $\frac{5}{x} + \frac{4}{x+2}$ not seen. B1 for one correct fraction
	(ii) $\frac{5}{x} + \frac{4}{x+2} = \frac{9}{4.5}$ oe $5(x+2) + 4x = 2x(x+2)$ oe $5x + 10 + 4x = 2x^2 + 4x$ $2x^2 - 5x - 10 = 0$	M1 M1	M1 Must be still equivalent to three terms (each part could be expanded) but could be all over common denominator
	(iii)  oe -1.31, 3.81	E1 M1	E1 Correctly established with at least one intermediate line and no errors or omissions M1 oe fully correct substitution into formula $\frac{-(-5) \pm \sqrt{(-5)^2 - 4(2)(-10)}}{2(2)}$ or better allowing recovery of $(-5)^2$ and full line – can be implied by correct answer If M0, or other GDC applications SC2 for – 1.31 and 3.81
	(iv) 1.31 (1.311 to 1.312) ft	A1A1 B1 ft	SC1 for –1.3 and 3.8 or –1.312 to –1.311 and 3.811 to 3.812 from M1 or M0. ft 5 \div their positive answer in (iii) [13]

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10 (a)	$250 \leq d < 300$	B1	Condone absence of inequality signs If B0, M1 for at least two correct mid-values seen [5]
(b)	270.5 or 271 or 270	B2	
(c) (i)	1.12	B1	
(ii)	0.1	B1	
11 (a)	$y = \frac{6}{\sqrt{x}}$	B2	If B0, M1 for $\frac{k}{\sqrt{x}}$ oe ($k \neq 1$) ft only if inverse of square or direct of square root used in (a) ft only if inverse of square or direct of square root used in (a) so only two M's will be available k must be numerical M1 ft Squaring correctly M1 ft Multiplying or dividing out fractions correctly M1 ft Dividing by y term correctly SC2 for $\left(\frac{k}{y}\right)^2$ oe If B0, M1 for using $\frac{y}{2}$ in their expression oe (may use numbers) [8]
(b)	1 ft	B1 ft	
(c)	$\frac{36}{y^2}$ oe ft	M1 ft M1 ft M1 ft	
(d)	4 cao	B2	
12 (a)	12.2 (12.24 to 12.25)	B3	If B0, M2 for $10^2 + 5^2 + 5^2$ (M1 for $10^2 + 5^2$ or $5^2 + 5^2$) Allow $5\sqrt{6}$ If B0, M1 for $\text{inv sin}\left(\frac{5}{\text{their (a)}}\right)$ or $\text{inv tan}\frac{5}{\sqrt{125}}$ or $\text{inv cos}\left(\frac{\sqrt{125}}{\text{their (a)}}\right)$ oe If B0, M1 for $\text{inv tan}\frac{5}{10}$ oe [7]
(b)	23.59 to 24.2 cao	B2	
(c)	26.6 (26.56 to 26.57) cao	B2	
13 (a)	4	B1	Clear graph of $y = x^2$ Parabola vertex (1, 0) approx. Parabola inside first graph, vertex (0, 0) Condone the absence of labels if clear B's independent. Accept other forms of vector or in words. B's independent or y -axis invariant and factor $\sqrt{2}$ [10]
(b)	-3 and 3	B1	
(c)		B1 B1 B1	
(d) (i)	Translation $\begin{pmatrix} 1 \\ 0 \end{pmatrix}$	B1 B1	
(ii)	Stretch x -axis invariant, factor 2	B1 B1 B1	