

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

Cambridge International General Certificate of Secondary Education

**MARK SCHEME for the October/November 2015 series**

**0607 CAMBRIDGE INTERNATIONAL MATHEMATICS**

**0607/41**

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 should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

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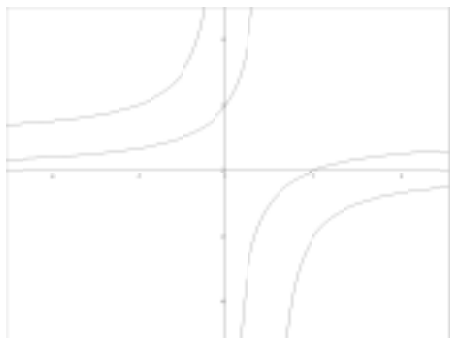
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**Abbreviations**

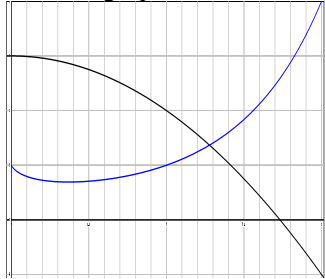
cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
oe	or equivalent
SC	Special Case
nfww	not from wrong working
soi	seen or implied

<b>Question</b>	<b>Answer</b>	<b>Mark</b>	<b>Part Marks</b>
<b>1 (a)</b>	16 : 15	<b>1</b>	
<b>(b) (i)</b>	30	<b>1</b>	
<b>(ii)</b>	24.3[0] or 24.29 to 24.30	<b>4</b>	<b>M3</b> for $50 \times 1.02^{20} - 50$ or <b>M2</b> for $50 \times 1.02^{20}$ or <b>M1</b> for $50 \times 1.02^n$ , $n \geq 2$ oe
<b>(c) (i)</b>	48	<b>2</b>	<b>M1</b> for $75 \times (0.8)^2$ oe
<b>(ii)</b>	13	<b>3</b>	<b>B2</b> for answer 12.13 to 12.14 or <b>M1</b> for $75 \times 0.8^n = 5$ oe
<b>2 (a) (i)</b>	$\begin{pmatrix} 46 \\ 30 \end{pmatrix}$	<b>2</b>	<b>B1</b> each component <b>SC1</b> for $\begin{pmatrix} 46 \\ 30 \end{pmatrix}$
<b>(ii)</b>	13	<b>3</b>	<b>M2</b> for $\sqrt{12^2 + 5^2}$ or <b>M1</b> 14 – 2 and 8 – 3 or better seen
<b>(b)</b>	[u = ] –2 [v = ] 0	<b>1</b> <b>1</b>	
<b>(c) (i)</b>	Image at (1, –3), (1, –6), (2, –6)	<b>3</b>	<b>SC2</b> for rotation about (–1, –1) 90° anti-clockwise or <b>SC1</b> for rotation 90° clockwise with different centre
<b>(ii)</b>	Reflection $x = -1$	<b>1</b> <b>1</b>	
<b>(iii)</b>	Stretch [factor] 4 invariant $x$ -axis oe	<b>1</b> <b>1</b> <b>1</b>	

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Question	Answer	Mark	Part Marks		
3 (a),(d)		2	M1 for inaccurate rectangular hyperbola but with correct orientation.		
		2	M1 for inaccurate rectangular hyperbola but with correct orientation.		
	(b)	$0 < x < 2$ oe	2	B1 for $0 < x$ oe or $x < 2$ oe	
	(c)	$\frac{2}{1-x}$ oe	3	M1 for correct and appropriate rearrangement M1 for correct multiplication M1 for correct changing $x$ and $y$ M1 for correct division <b>If answer incorrect maximum possible is M2</b>	
(e)	Reflection $y = x$	1 1			
4 (a)	6.75	2	M1 for $\frac{4}{9} = \frac{3}{CX}$ oe or better		
		(b)	3	2	M1 for $\frac{8}{6} = \frac{4}{RY}$ oe or better
		(c)	8.49 or 8.484 to 8.485...	3	M2 for $\frac{12}{w} = \sqrt{\frac{90}{45}}$ oe or better or M1 for $\sqrt{\frac{90}{45}}$ or $\sqrt{\frac{45}{90}}$ oe soi or $\left(\frac{12}{w}\right)^2 = \frac{90}{45}$ oe
5 (a)	9.83 or 9.829 to 9.830	2	M1 for $\frac{BC}{12} = \cos 35$ or better		
		(b)	59.2 or 59.16 to 59.17	3	M2 for $[\cos =] \frac{12^2 + 10^2 - 11^2}{2 \times 12 \times 10}$ or M1 for $11^2 = 12^2 + 10^2 - 2 \times 12 \times 10 \cos \theta$
		(c)	85.3 or 85.4 or 85.34 to 85.37	3	M1 for $0.5 \times 12 \times \text{their } BC \times \sin 35$ oe M1 for $0.5 \times 12 \times 10 \times \sin(\text{their } CAD)$ oe

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Question	Answer	Mark	Part Marks
6 (a)	1.31 or 1.308...	2	<b>M1</b> for mid-values soi
(b)	Fully correct histogram	3	<b>B1</b> for correct widths 0.2, 0.2, 0.2, 0.4 <b>B2</b> for 4 correct heights or <b>B1</b> for 2 or 3 correct heights or for 180, 200, 160, 20 seen
7 (a) (i)	2512 final answer	2	<b>M1</b> for $20 \times 8 \times 2 \times 7.85$
(ii)	34.56 cao	3	<b>M2</b> for $2(20 \times 8 + 20 \times 2 + 8 \times 2) \times 0.08$ oe or <b>M1</b> for $2(20 \times 8 + 20 \times 2 + 8 \times 2)$ oe or for area $\times 0.08$
(b)	48	2	<b>M1</b> for $8 \times 3 \times 2$ oe
(c) (i)	67	3	<b>M2</b> for $(20 \times 12 \times 4) \div \left(\frac{4}{3}\pi \times 1.5^3\right)$ or <b>M1</b> for $\left(\frac{4}{3}\pi \times 1.5^3\right)$
(ii)	12.6 or 12.7 or 12.8 or 12.62 to 12.82...	2	<b>M1</b> for $(20 \times 12 \times 4) - \text{their } 67 \times$ $\text{their } \left(\frac{4}{3}\pi \times 1.5^3\right)$ oe must be positive
(iii)	1.44 or 1.45 or 1.444 to 1.452 cao	2	<b>M1</b> for $\frac{4}{3}\pi r^3 = \text{their (ii)}$ oe or better
(d)	$\frac{3}{8}$	4	<b>B3</b> for equivalent fraction or 0.375 <b>SC2</b> for answer $\frac{3}{16}$ or <b>M1</b> for $\frac{1}{3}\pi r^2 \times 3r \times 0.9$ and <b>M1</b> for $\left[\frac{1}{2}\right] \times \frac{4}{3}\pi(2r)^3 \times 0.45$
8 (a)	Correct graphs 	2 2	<b>B1</b> for inaccurate parabola <b>B1</b> for correct shape but inaccurate
(b)	1.28 or 1.277 to 1.278	1	

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Question	Answer	Mark	Part Marks
(c)	1.73 or 1.732...	1	
(d) (i)	0.368 or 0.3678 to 0.3679 0.692 or 0.6922...	1 1	SC1 for (0.37, 0.69)
(ii)	$0.692 \leq y \leq 4$ oe	2FT	B1FT for $0.692 \leq y$ oe or B1 for $y \leq 4$ oe or B1FT for 0.692 and 4 SC1FT for $0.692 < y < 4$
(e) (i)	0.794 or 0.7943... 0.955 or 0.9549 to 0.9550 0.993 or 0.9931...	1 1 1	
(ii)	1	1	
9 (a) (i)	$\frac{3}{36}$ oe	2	M1 for $\frac{1}{6} \times \frac{3}{6}$ oe
(ii)	$\frac{5}{36}$ oe	3	M2 for $\frac{1}{6} \times \frac{2}{6} + \frac{3}{6} \times \frac{1}{6}$ oe or M1 for $\frac{1}{6} \times \frac{2}{6}$ or $\frac{3}{6} \times \frac{1}{6}$ oe or for list or space diagram showing at least 3 combinations
(b)	$\frac{128}{1296}$ oe	2	M1 for $\frac{4}{6} \times \frac{4}{6} \times \frac{4}{6} \times \frac{2}{6}$ oe
(c)	6	2	M1 for $\left(\frac{5}{6}\right)^k \times \frac{1}{6}$ or SC1 for answer 5
10 (a)	5	2	M1 for [h(9)=] 1 or for $2(\log(x+1)) + 3$
(b)	$2x + 2$ or $2(x + 1)$	2	M1 for $2x + 3 - 1$
(c)	$\frac{3x + 2}{(2x + 3)(x - 1)}$ oe final answer	3	B1 for denominator $(2x + 3)(x - 1)$ oe B1 for $x - 1 + 2x + 3$ as numerator
(d)	$-\frac{9}{10}$ oe	2	M1 for $x + 1 = 10^{-1}$ oe or appropriate sketch

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Question	Answer	Mark	Part Marks
(e)	$1 \pm \sqrt{5}$ final answer cao	3	<p><b>B2</b> for <math>x-1 = \sqrt{5}</math> or <math>x-1 = -\sqrt{5}</math>  or <math>\frac{2 \pm \sqrt{20}}{2}</math> oe or for <math>-1.24</math> (or <math>-1.236\dots</math>)  <b>and</b> <math>3.24</math> (or <math>3.236\dots</math>)  or <b>M1</b> for <math>(x-1)^2 = 5</math> oe</p>
11 (a)	2.79 cao nfw 6	6	<p><b>B1</b> for <math>2x + y = 157</math> oe  <b>B1</b> for <math>x + 3y = 296</math> oe  <b>M1</b> for eliminating one variable or appropriate sketch</p> <p><b>B1</b> for <math>[x =] 35</math> oe  <b>B1</b> for <math>[y =] 87</math> oe  or <b>M1</b> for <math>x</math> and <math>y</math> working in one equation</p>
(b)	3 nfw 4	4	<p><b>M2</b> for <math>\frac{24}{x} + \frac{24}{x+5} = 11</math> oe  or <b>B1</b> for <math>\frac{24}{x}</math> or <math>\frac{24}{x+5}</math>  <b>M1</b> for full method e.g. sketch of graph showing solution or quadratic with correct factors or <math>\frac{-7 \pm \sqrt{7^2 - 4(11)(-120)}}{2 \times 11}</math></p> <p><b>Note that <math>x + x + 5 = 11</math> is wrong working</b></p>