

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

Cambridge International General Certificate of Secondary Education

## **MARK SCHEME for the October/November 2014 series**

# **0607 CAMBRIDGE INTERNATIONAL MATHEMATICS**

**0607/43**

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.

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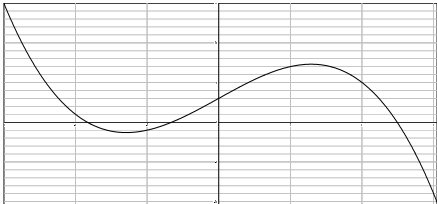
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Page 2	Mark Scheme	Syllabus	Paper
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1	(a)	\$80 000	3	M2 for $65\,600 \div 0.82$ oe or M1 for $65\,600 = 82\%$
	(b) (i)	\$5463.12	3	M2 for $5000 \times 1.04 \times 1.03 \times 1.02$ oe or M1 for $5000 \times (1.04 \text{ or } 1.03 \text{ or } 1.02)$ oe
	(ii)	\$26.79	3	M1 for $5000 \times 1.04 \times 1.03 \times 1.02^3$ (or <i>their</i> (b)(i) $\times 1.02^2$ ) M1 for $5000 \times 1.025^5$
2	(a)	(6, -1)	1	
	(b)	$y = \frac{3}{2}x - 10$ oe ISW	4	B3 for answer $\frac{3}{2}x - 10$ or B2 for $\frac{3}{2}$ oe or B1 for gradient = $-\frac{2}{3}$ oe and M1 for substituting <i>their</i> (a) into $y = (\text{their } m)x + c$ See AG for other methods
	(c)	13	2FT	FT <i>their</i> (b) B1 for (0, 3) soi Condone - 13
3	(a)	Rotation $90^\circ$ [anticlockwise] oe About (2, 1)	1 1 1	
	(b) (i)	Triangle (5, 2) (3, -2) (5, -2)	2	SC1 for enlargement centre (3, 2) s.f. 2 or $-k$ (not -1), or s.f. -2 any centre or 2 points correct
	(ii)	Enlargement centre (3, 2) Scale factor $-\frac{1}{2}$	1 1	
	(c)	Triangle (2, 1) (-2, 1) (-2, 2)	2	SC1 for 2 points correct or stretch with $x$ -axis invariant, s.f. 2

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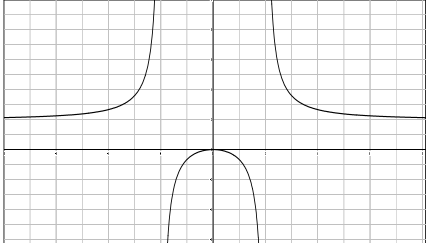
4	(a)	36.869...	2	M1 for $\cos \theta = \frac{4}{5}$ oe
	(b)	41.2 or 41.18 to 41.19	2	M1 for $\left(2 \times \frac{36.87}{360}\right) \times \pi \times 8^2$
	(c)	23.2 or 23.18 to 23.19	2	M1 for $\frac{106.26}{360} \times \pi \times 5^2$
	(d)	12 [.00...]	2	M1 for $\frac{1}{2} \times 8 \times 3$ or $\frac{1}{2} \times 5 \times 5 \times \sin(\text{their } 106.26)$ oe
	(e)	14.9 or 15 or 14.90 to 15.05	2	$\pi \times 5^2 - (\mathbf{b}) - 2(\mathbf{c}) + 2(\mathbf{d})$ evaluated M1 for $\pi \times 5^2 - (\mathbf{b}) - 2(\mathbf{c}) + 2(\mathbf{d})$
5	(a)		2	Correct curve with turning points in correct quadrants B1 for basic cubic shape with $x^3$ term negative
	(b)	-1.83 or -1.834... -0.657 or -0.6566... 2.49 or 2.490 to 2.491	1 1 1	If 0 scored SC1 for all 3 correct to 2 s.f. If y-coordinates included, penalty of 1.
	(c)	(-1.29, -1.30) or (-1.291 to -1.290, -1.303...)	1 + 1	If 0 scored SC1 for (1.29, 7.30) (1.2909 to 1.291, 7.303...)
	(d) (i)	Sketch of $y = 4 - 2x$ seen and crossing curve at all possible points in domain.	M1	
		-2.71 or -2.714..., 0.143 or 0.1432 to 0.1433, 2.57 or 2.571...	B2	B1 for one solution
	(ii)	$x < -2.71$ $0.143 < x < 2.57$	1FT 1FT	FT in order Condone $\leq$ , accept in words

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6	(a)	133 or 133.3...	2	M1 for $\left(\frac{8}{12}\right)^2$ oe seen
	(b)	2610 or 2612.7 to 2613	4	M3 for $600 \times \left(\frac{800}{300}\right)^{\frac{3}{2}}$ oe or M2 for $\left(\frac{800}{300}\right)^{\frac{3}{2}}$ oe or M1 for $\sqrt{\frac{800}{300}}$ soi by 1.63... oe or height = 19.5959...
7	(a) (i)	$\mathbf{b} - \mathbf{a}$ oe	1	
	(ii)	$\frac{1}{2}\mathbf{a} + \frac{1}{2}\mathbf{b}$ oe	1	Allow unsimplified
	(iii)	$\frac{1}{3}\mathbf{a} + \frac{1}{3}\mathbf{b}$ or $\frac{1}{3}(\mathbf{a} + \mathbf{b})$	2	M1 for $\frac{2}{3}$ their (a)(ii)
	(b) (i)	$-\mathbf{a} + \frac{1}{2}\mathbf{b}$ oe	1	
	(ii)	$\frac{1}{3}\mathbf{a} + \frac{1}{3}\mathbf{b}$ or $\frac{1}{3}(\mathbf{a} + \mathbf{b})$	2	B1 for unsimplified or correct route
	(c)	Same Point	1	Dep on (a)(iii) and (b)(ii) correct
8	(a)	360 – 155 – 210 or 65 – 30 oe	1	Allow 360 – 325 and 35 + 155 + 210 = 360
	(b) (i)	54.5 or 54.53...	3	M1 for $80^2 + 95^2 - 2 \times 80 \times 95 \times \cos 35$ A1 for 2970 or 2973 to 2974
	(ii)	332 or 332.7...	4	M2 for $\frac{80 \sin 35}{\text{their (b)(i)}}$ oe implied by [C =] 57.3 or 57.29... or M1 for $\frac{\sin C}{80} = \frac{\sin 35}{\text{their AC}}$ oe M1 for their (360 – C + 30)
	(c) (i)	12 hours 24 minutes or 12 hours 23 to 24 minutes	3	B2 for 12.4 or 12.39... M1 for $\frac{80}{18} + \frac{95}{22} + \frac{\text{their } 54.5}{15}$ and B1 for correct conversion of their hours to hours and minutes
(ii)	18.5 or 18.50 to 18.54 km/h cao	2	M1 for $\frac{80 + 95 + \text{their } 54.5}{\text{their time}}$	

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9	(a)	$\frac{3}{9} \frac{1}{9}$ oe	1	In all parts accept decimal/percentages (correct to 3 s.f.) but not ratios etc. Also, ISW attempts to convert to decimals, %
		$\frac{4}{8} \frac{3}{8} \frac{1}{8}, \frac{5}{8} \frac{2}{8} \frac{1}{8}, \frac{5}{8} \frac{3}{8}$ oe	2	<b>B1</b> for 1 set of branches for second ball correct
	(b) (i)	$\frac{6}{72}$ oe	2	<b>M1</b> for <i>their</i> $\frac{3}{9} \times \text{their} \frac{2}{8}$ (0.0833...)
	(ii)	$\frac{46}{72}$ oe	3	(0.63888...) <b>M2</b> 1 – <i>their</i> $\left(\frac{3}{9} \times \frac{2}{8} + \frac{5}{9} \times \frac{4}{8}\right)$ oe or <b>M1</b> for any 3 products giving different colours or $\frac{3}{9} \times \frac{2}{8} + \frac{5}{9} \times \frac{4}{8}$
	(c)	$\frac{5}{9}$ oe	1	
10	(a)	(4), 10, (16), 30, 22, (18)	2	<b>B1</b> for any 2 correct
	(b)	56.7	2	<b>M1</b> for evidence of midpoints 10, 30, 45, 55, 65, 85 (at least 3) used
	(c)	(4), 14, 30, 60, 82, (100)	2FT	<b>FT</b> from (a), <b>B1</b> for any 2 correct
	(d)	Points plotted 1 Joined by smooth curve	2FT 1	<b>B1FT</b> for 4 correct <b>FT</b> dep on increasing c.f.s
	(e) (i)	soil B with both medians indicated or line on graph	1	(Medians $57 \pm 2, 71 \pm 1$ )
	(ii)	soil B, by 6 to 10	4	<b>B3</b> for both iqrs $26 \pm 2, 19 \pm 2$ or <b>B2</b> for one iqr If 0 scored <b>SC1</b> for lines at 25 and 75 or other clear indication
	(f)	18	2FT	<b>B1</b> for 82

<p><b>11 (a)</b></p>  <p><b>(b)</b></p> <p><math>f(x) \leq -\frac{2}{3}</math> oe</p> <p><math>f(x) &gt; 2</math></p> <p><b>(c) (i)</b></p> <p><math>x = 2</math>  <math>x = -2</math>  <math>y = 2</math></p> <p><b>(ii)</b></p> <p><math>x = -1, x = -5</math>  <math>y = 2</math></p>		<p><b>3</b></p> <p><b>2</b></p> <p><b>1</b></p> <p><b>1</b></p> <p><b>1</b></p> <p><b>1</b></p> <p><b>1FT</b></p> <p><b>1FT</b></p>	<p><b>B1</b> for each branch, middle branch must go through (0, 0), outside branches must not cross x-axis</p> <p>Accept <math>y, x</math>, words. <b>M1</b> for <math>-\frac{2}{3}</math> oe  condone &lt; for <math>\leq</math> and <math>\leq</math> for &lt;</p>
<p><b>12 (a)</b></p> <p><math>x(100 - 2x)</math></p> <p><b>(b)</b></p> <p>sketch of <math>y = x(100 - 2x)</math> or reaching  <math>2x^2 - 100x + 900 = 0</math> or all signs reversed  sketch of <math>y = 900</math> or</p> $\frac{100 \pm \sqrt{(-100)^2 - 4(2)(900)}}{2 \times 2}$ <p>or all signs reversed  11.8 or 11.77... or 38.2 or 38.22 to 38.23</p> <p><b>(c)</b></p> <p>1250</p> <p><b>(d)</b></p> <p>796 or 795.6 to 795.87</p>		<p><b>2</b></p> <p><b>M1</b></p> <p><b>M1</b></p> <p><b>B1</b></p> <p><b>1</b></p> <p><b>4</b></p>	<p><b>B1</b> for <math>100 - 2x</math> oe seen</p> <p><b>M1</b> for <math>2\pi r = 100</math> oe  <b>A1</b> for <math>r = 15.91...</math> or <math>d = 31.8...</math>  <b>M1</b> for <math>\pi \times (\text{their } r)^2</math> with <math>r</math> from attempt at using circumference</p>