

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the May/June 2015 series

0607 CAMBRIDGE INTERNATIONAL MATHEMATICS

0607/42

Paper 4 (Extended), maximum raw mark 120

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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
nfw	not from wrong working
soi	seen or implied

1	(a) (i)	40 000	3	M2 for $76\,000 \div 1.9$ oe or M1 for $76\,000 = 190\%$ oe soi
	(ii)	521 284 cao	3	M2 for $76\,000 \times 1.9^3$ or $40\,000 \times 1.9^4$ oe or M1 for $76\,000$ (or <i>their</i> $40\,000$) $\times 1.9^k$, $k \neq 1$ oe seen
	(b)	2035	2	M1 for $76\,000$ (or <i>their (a)(i)</i> or <i>their (a)(ii)</i>) $\times 1.9^k$ = (or $>$ or \geq) $10\,000\,000$ seen $k \neq 1$ or evidence of at least 2 correct trials
2	(a)	Rotation [Anticlockwise] 90° oe [About] $(0, 0)$ oe	1 1 1	Combinations of transformations – lose all 3 marks
	(b)	$\begin{pmatrix} 7 \\ k \end{pmatrix}$ $y = \frac{1}{2}k + 3$	1 1	any k Must be $\frac{1}{2}$ <i>their</i> k from vector
	(c)	Triangle at $(1, 2)$, $(2, 2)$, $(1, 6)$	2	SC1 for stretch s.f. 2 with $y = 1$ invariant or triangle at $(2, 1)$, $(4, 1)$, $(2, 3)$ i.e. y -axis invariant
3	(a)	82.8 or 82.83...	3	B1 for 9 h 25 m oe or 9.417 oe or 565 [min] M1 for $780 \div 9.416\dots$ (or <i>their</i> 9 h 25m converted to h)
	(b)	58.2 or 58.23 to 58.24 ... cao	3	M1 for $520 \div 105$ M1 for <i>their</i> $9.41666 - \text{their } (520 \div 105)$ or for <i>their</i> $565 - \text{their } 520 \div 105 \times 60$
	(c)	99.96 cao	4	M2 for $\frac{520}{100} \times 6 + \frac{\text{their}260}{100} \times 8$ soi by 52 or $31.2 + 20.8$ or M1 for either, soi by 31.2 or 20.8 M1 for <i>their</i> 52×1.63 soi by 84.76

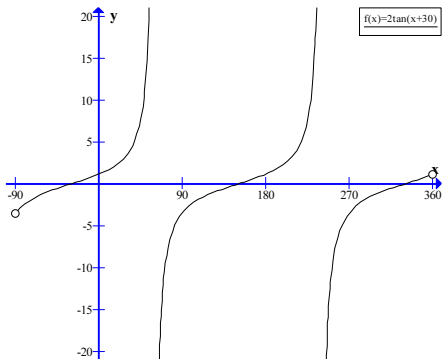
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<p>4 (a)</p> <p>Good curve with x intercept reasonably placed and maximum reasonably placed on y-axis and minimum in 1st quadrant</p> <p>(b) (0, 6) (2, 2)</p> <p>(c) $2 < k < 6$</p> <p>(d) Rotational [Order] 2 [About] (1, 4)</p> <p>(e) $x^3 - 3x^2 + 4$ or $(x - 2)(x - 2)(x + 1)$</p>	<p>2</p> <p>B1 for basic cubic shape (max before min)</p> <p>1 SC1 if answers reversed</p> <p>1</p> <p>2FT FT <i>their</i> y values from (b) SC1 for $2 \leq k \leq 6$ or for $2 < k < n$ or $n < k < 6$ or for $2 < k \leq 6$ or $n \leq k < 6$ or for $2 < x < 6$</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	
<p>5 (a)</p> <p>5 points plotted correctly</p> <p>(b) Positive</p> <p>(c) (i) 63.6 (ii) 42</p> <p>(d) $1.04x - 24.4$</p> <p>(e) 58 800 or 58 790 to 59 150</p>	<p>2</p> <p>1</p> <p>1</p> <p>1</p> <p>2</p> <p>1FT</p>	<p>B1 for 3 or 4 correct</p> <p>Ignore comments on strength</p> <p>Accept 42 000</p> <p>or $a = 1.044\dots$, $b = -24.41$ to -24.40 B1 for $y = ax + b$ with either a or b correct or SC1 for $[1.[0]]x - 24$</p> <p>FT from <i>their</i> equation</p>

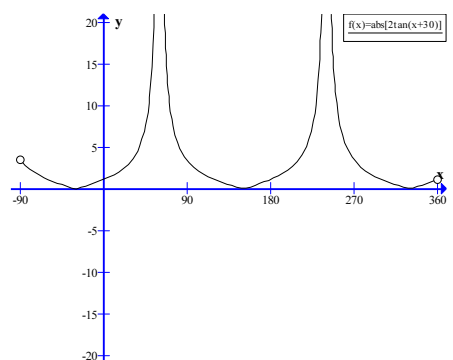
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6	(a)	150	2	M1 for $\sqrt{120^2 + 90^2}$
	(b)	$\tan^{-1} \frac{90}{120}$ oe 53.13... or 36.86 to 36.87 or 106.26 73.739...	M1 A1 A1	i.e. trig ratio for any appropriate angle or M1 [$\cos =$] $\frac{150^2 + 150^2 - 180^2}{2 \times 150 \times 150}$ A1 0.28 oe
	(c)	25 300 or 25 270 to 25 281	3	M2 for $\frac{73.74}{360} \times \pi \times 150^2 + 2 \times \frac{1}{2} \times 120 \times 90$ oe or M1 for $\frac{73.74}{360} \times \pi \times 150^2$ or $2 \times \frac{1}{2} \times 120 \times 90$ oe
	(d)	6.74 to 6.75 or 7	3	M2 for <i>their (c)</i> $\times 8 \times 2 \div 60\,000$ oe or M1 for <i>their (c)</i> $\times 8 \times 2 \div$ figs 6 or <i>their (c)</i> $\times 8 \div 60\,000$ or <i>their (c)</i> $\times 2 \div 60\,000$
7	(a)	$x = -1$ ruled $y = 2$ ruled $y = 2x - 3$ ruled	1 1 2	B1 for line with gradient 2 or y -intercept -3
		$3x + 5y = 30$ ruled	2	
	(b)	(i) 6.5 to 6.7 cao	1	1
		(ii) 7.2 to 7.6 cao	1	
8	(a)	(i) Any counted information	1	e.g. numbers in family, numbers of letters delivered, shoe sizes, marks in a test, number of cats, etc.
		(ii) Any measured information	1	e.g. lengths, ages, masses, heights
	(b)	(i) 160 165	1	M1 for at least 3 midpoints soi
		(ii) 165 170	1	
		(iii) 166	2	
(iv) Continuous information oe	1	e.g. lowest/highest anywhere between 150 and 155, using mid-points, grouped data, actual heights unknown, examples of values in an interval		

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9	(a) (i)	$\frac{4}{10}, \frac{2}{10}, \frac{4}{10}$ $\frac{5}{11}, \frac{2}{11}, \frac{4}{11}$ $\frac{5}{10}, \frac{2}{10}, \frac{3}{10}$	1 1 1	
	(b) (i)	$\frac{4}{121}$ oe	2	M1 for $\frac{2}{11} \times \text{their } \frac{2}{11}$
	(ii)	$\frac{32}{110}$ oe	3	M2 for $\frac{5}{11} \times \text{their } \frac{4}{10} + \frac{4}{11} \times \text{their } \frac{3}{10}$ oe or M1 for one of above products without incorrect extras
	(iii)	$\frac{189}{605}$ oe	3	M2 for $\frac{5}{11} \times \text{their } \frac{2}{10} + \frac{2}{11} \times \text{their } \frac{5}{11} + \frac{2}{11} \times \text{their } \frac{4}{11} + \frac{4}{11} \times \text{their } \frac{2}{10}$ oe or M1 for 2 of above products or one of $\left(\frac{5}{11} + \frac{4}{11}\right) \times \text{their } \frac{2}{10}, \frac{2}{11} \times \left(\text{their } \frac{5}{11} + \text{their } \frac{4}{11}\right)$
10	(a)	Correct curve with no overlaps at 60 and 240, x intercepts at approximately -30, 150, 330 	3	B2 for 'correct' but with overlaps and/or inaccurate intercepts B1 for 1 branch correct
	(b)	38.2 or 38.19 to 38.2 218 or 218.1 to 218.2	1 1	
	(c)	$x = 60$ $x = 240$	1 1	

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(d)	<p>their (a) with negative y parts reflected in x-axis</p> 	2FT	B1FT for 1 branch correct
11 (a) (i)	117 or 116.8 ...	4	<p>M2 for $\sin[\theta] = \frac{70\sin 35}{45}$ oe</p> <p>or M1 for $\frac{\sin[\theta]}{70} = \frac{\sin 35}{45}$ oe</p> <p>M1 for $180 - \text{their } \theta$</p>
(ii)	42.4 or 42.36 to 42.37	4	<p>M2 for $[\cos[\theta]] = \frac{70^2 + 80^2 - 55^2}{2 \times 70 \times 80}$</p> <p>or M1 for $55^2 = 70^2 + 80^2 - 2 \times 70 \times 80 \times \cos[\theta]$</p> <p>A1 for 0.739 or 0.7388 ... or $\frac{8275}{11200}$ or $\frac{1655}{2240}$ or $\frac{331}{448}$</p>
(b)	21.1 to 21.3	2FT	M1 for $45\sin(145 - \text{their (a)(i)})$ oe
12 (a)	4 nfw	2	B1 for $\frac{6}{4+1}$ oe seen or M1 for $5\left(\frac{6}{4x+1}\right) - 2$
(b) (i)	$\frac{6}{20x-7}$ final answer	2	M1 for $\frac{6}{4(5x-2)+1}$
(ii)	$\frac{x+2}{5}$ oe final answer	2	<p>M1 for $y+2 = 5x$ or $x = 5y-2$ or $\frac{y}{5} = x - \frac{2}{5}$</p> <p>or better</p>
(c) (i)	$\frac{1}{x+1}$ final answer	3	<p>M2 for $\frac{5x-2}{(5x-2)(x+1)}$ oe</p> <p>or M1 for $\frac{5x-2}{(5x+a)(x+b)}$ oe where $ab = -2$</p> <p>or $a + 5b = 3$</p> <p>or SC1 for $(5x-2)(x+1)$ seen</p>

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	(ii) $\frac{26x-13}{(4x+1)(5x-2)}$ oe final answer	3	M1 for common denominator $(4x+1)(5x-2)$ soi M1 for $6(5x-2) - (4x+1)$ oe
13	(a) $ABF = DEF$ (alternate angles) $BAF = EDF$ (alternate angles) $AFB = DFE$ ([vert] opposite angles)	1 + 1	One mark for first fully correct and one for second fully correct. or B1 for any 2 pairs of angles <u>identified</u> without a reason or with an incorrect reason
	(b) (i) 4.8 oe	3	Method 1 Triangles ABF, CEB [where $x = AB$] M2 for $\frac{10}{6} = \frac{8}{x}$ oe or M1 for $\frac{BC}{AF} = \frac{EC}{AB}$ oe Method 2 Triangles ABF, DEF [where $x = AB$] M2 for $\frac{8-x}{x} = \frac{4}{6}$ oe or M1 for $\frac{FD}{AF} = \frac{ED}{AB}$ oe Method 3 Triangles EFD, EBC [where $y = ED$] M2 for $ED = 3.2$ or M1 for $\frac{BC}{FD} = \frac{EC}{ED} \left[= \frac{10}{4} = \frac{8}{y} \right]$ oe
	(ii) $\frac{4}{9}$ oe	1	
	(iii) $\frac{4}{30}$ oe	2	M1 for Area of $ABF = \frac{3}{10}$ Area of $ABCD$ or ratio of EFD to $EBC = 4 : 25$ oe soi or correct use of $\frac{1}{2}ab\sin C$ or e.g. $\frac{\frac{1}{2} \times theirED \times 4}{10 \times theirDC}$