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

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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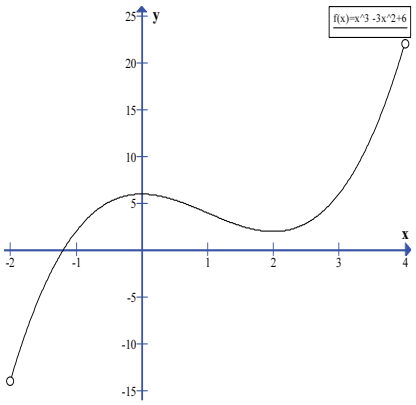
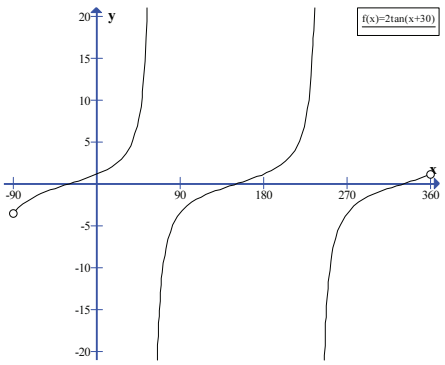
Abbreviations

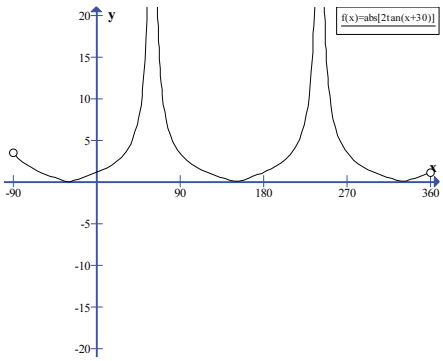
cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
oe	or equivalent
SC	Special Case
nfww	not from wrong working
soi	seen or implied

1	**(a)** **(i)**	40 000	**3**	**M2** for 76 000 ÷ 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 *their* 40 000) $\times 1.9^k$, $k \neq 1$ oe seen
	(b)	2035	**2**	**M1** for 76 000 (or *their* **(a)(i)** or *their* **(a)(ii)**) $\times 1.9^k$ = (or > or ⩾) 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)	$\begin{pmatrix} 7 \\ k \end{pmatrix}$	**1**	any k
		$y = \frac{1}{2}k + 3$	**1**	Must be $\frac{1}{2}$*their* 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 ÷ 9.416... (or *their* 9 h 25m converted to h)
	(b)	58.2 or 58.23 to 58.24 … cao	**3**	**M1** for 520 ÷ 105 **M1** for *their* 9.41666 – *their* (520 ÷ 105) or for *their* 565 – *their* 520 ÷ 105 × 60
	(c)	99.96 cao	**4**	**M2** for $\frac{520}{100} \times 6 + \frac{\textit{their}260}{100} \times 8$ soi by 52 or 31.2 + 20.8 or **M1** for either, soi by 31.2 or 20.8 **M1** for *their* 52 × 1.63 soi by 84.76

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

6	**(a)**	150	**2**	**M1** for $\sqrt{120^2 + 90^2}$
	(b)	$\tan^{-1}\frac{90}{120}$ oe	**M1**	i.e. trig ratio for any appropriate angle
		53.13… or 36.86 to 36.87 or 106.26	**A1**	or **M1** [cos =] $\frac{150^2 + 150^2 - 180^2}{2 \times 150 \times 150}$ **A1** 0.28 oe
		73.739…	**A1**	
	(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 *their* **(c)** × 8 × 2 ÷ 60 000 oe or **M1** for *their* **(c)** × 8 × 2 ÷ figs 6 or *their* **(c)** × 8 ÷ 60 000 or *their* **(c)** × 2 ÷ 60 000
7	**(a)**	$x = -1$ ruled	**1**	
		$y = 2$ ruled	**1**	
		$y = 2x - 3$ ruled	**2**	**B1** for line with gradient 2 or y-intercept –3
		$3x + 5y = 30$ ruled	**2**	**B1** for line with negative gradient through (0, 6) or through (10, 0)
		Correct region clearly indicated cao	**1**	
	(b) (i)	6.5 to 6.7 cao	**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**	
	(ii)	165 170	**1**	
	(iii)	166	**2**	**M1** for at least 3 midpoints soi
	(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

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 $\frac{2}{11} \times \textit{their}\ \frac{2}{11}$
	(ii)	$\frac{32}{110}$ oe	3	**M2** for $\frac{5}{11} \times \textit{their}\ \frac{4}{10} + \frac{4}{11} \times \textit{their}\ \frac{3}{10}$ oe or **M1** for one of above products without incorrect extras
	(iii)	$\frac{189}{605}$ oe	3	**M2** for $\frac{5}{11} \times \textit{their}\ \frac{2}{10} + \frac{2}{11} \times \textit{their}\ \frac{5}{11} + \frac{2}{11} \times \textit{their}\ \frac{4}{11} + \frac{4}{11} \times \textit{their}\ \frac{2}{10}$ oe or **M1** for 2 of above products or one of $\left(\frac{5}{11} + \frac{4}{11}\right) \times \textit{their}\ \frac{2}{10}$, $\frac{2}{11} \times \left(\textit{their}\ \frac{5}{11} + \textit{their}\ \frac{4}{11}\right)$
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	

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

(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 identified 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. $\frac{\frac{1}{2}\times their ED\times 4}{10\times their DC}$