## **CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**Cambridge International General Certificate of Secondary Education** 

## MARK SCHEME for the October/November 2014 series

## 0444 MATHEMATICS (US)

0444/43

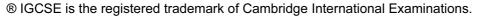
Paper 4 (Extended), maximum raw mark 130

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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

			Correct answer	Mark	Part marks
1	(a)	(i)	$\frac{920}{8} \times 7 = 805$ oe	1	$\frac{2990}{26} \times 7 = 805$
	(	(ii)	30.8 or 30.76 to 30.77	2	<b>M1</b> for $\frac{8}{(11+8+7)}$ [× 100]
	(b)		1211 final answer	5	B4 for 13926.5[0] [area A total sales] or B3 for 11040 [area B] and 10867.50 [area C] or 21907.5 [area B + area C] or B2 for 11040 [area B] or 10867.50 [area C] or M1 for 736 [B tickets] and M1 for 483 [C tickets] After 0 scored SC2 for answer of 1196 or SC1 for 13754 (A total sales)
	(c)		37720	3	<b>M2</b> for $\frac{35834}{0.95}$ oe or <b>M1</b> for 35834 associated with 95%
2	(a)	(i)	104 Angle at centre is twice angle at circumference	1 1	Accept double, 2 × but not middle, edge
	(	(ii)	128 Opposite angle of cyclic quadrilateral oe	1 1	
	(i	iii)	34 Angle between <b>tangent</b> and <b>radius</b> = <b>90°</b>	1 1	Accept right angle, perpendicular

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	(b) (i)	7.65 to 7.651	4	M2 for $8.9^2 + 7^2 - 2 \times 8.9 \times 7 \times \cos 56$ or M1 for correct implicit formula and A1 for 58.5 to 58.6
	(ii)	49.3 or 49.33 to 49.34	3	M2 for $[\sin BEC =] \frac{7\sin 56}{their(\mathbf{b})(\mathbf{i})}$ oe or M1 for $\frac{\sin 56}{their(\mathbf{b})(\mathbf{i})} = \frac{\sin BEC}{7}$ oe
3	(a) (i)	5.37[1]	2	<b>M1</b> for $[AD^2 = ]2.6^2 + 4.7^2$ oe or better
	(ii)	54.1 or 54.11 to 54.12	3	<b>M2</b> for $tan[BCD =] \frac{4.7}{(17-11-2.6)}$ oe
				or <b>B1</b> for 3.4 seen
	(iii)	65.8	2	<b>M1</b> for $\frac{11+17}{2} \times 4.7$ oe
	<b>(b)</b>	263.2 or 263	3FT	FT their (a)(iii) × 4 correctly evaluated
				<b>M2</b> for their (a)(iii) $\times \left(\frac{9.4}{4.7}\right)^2$ oe
				or
				M1 for [scale factor =] $\left(\frac{9.4}{4.7}\right)^2$ or $\left(\frac{4.7}{9.4}\right)^2$
				soi
4	(a) (i)	$\frac{x^8}{3}$ final answer	1	
	(ii)	$15x^7y^3$ final answer	2	M1 for 2 elements correct
	(iii)	$16x^8$ final answer	2	<b>M1</b> for $16x^k$ or $kx^8$

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	(b)	$\sqrt{([-]7)^2 - 4.3 12}$ or better	B1	or for $\left(x - \frac{7}{6}\right)^2$
		and		
		p = []7 and $r = 2(3)$ oe	<b>B</b> 1	Must see $\frac{p+\sqrt{q}}{r}$ or $\frac{p-\sqrt{q}}{r}$ or both
				Must see $\frac{p+\sqrt{q}}{r}$ or $\frac{p-\sqrt{q}}{r}$ or both or for $\frac{7}{6}$ + or $-\sqrt{4+\left(\frac{7}{6}\right)^2}$
		3.48, -1.15 cao	B1B1	After <b>B0</b> , <b>SC1</b> for answer 3.5 and -1.1 or 3.482 and -1.149 to -1.148 seen or for 3.48, -1.15 seen
				or for answer –3.48 and 1.15
	(c)	$\frac{x+5}{x^2}$ or $\frac{1}{x} + \frac{5}{x^2}$ final ans nfww	3	<b>B1</b> for $(x + 5)(x - 5)$ and <b>B1</b> for $x^2 (x - 5)$
5	(a) (i)	Ariven with comparable form for both shown or difference between the two fractions shown	1	Accept probabilities changed to decimals or percentages (to 2sf or better)
		$\frac{6}{15}$ oe	2	<b>M1</b> for $\frac{3}{5} \times \frac{2}{3}$
	(iii)	$\frac{7}{15}$ oe	3	<b>M2</b> for $\frac{3}{5} \times \frac{1}{3} + \frac{2}{5} \times \frac{2}{3}$ oe $1 - their$ (b)(i) –
				$\frac{2}{5} \times \frac{1}{3}$ or
				M1 for $\frac{3}{5} \times \frac{1}{3}$ or $\frac{2}{5} \times \frac{2}{3}$ seen

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(	(b) (i)	Completes tree diagram correctly	3	<b>B2</b> for 5 values correct
				Or D1 for 1 walne as much
				<b>B1</b> for 1 value correct
		126 「9 ]		3 6 7
	(ii)	$\frac{126}{350}$ oe $\left[\frac{9}{25}\right]$	2	M1 for $\frac{3}{5} \times \frac{6}{7} \times \frac{7}{10}$
		550 [25]		3 / 10
		344		<b>NEO</b> C. 1. A. in 2. A. in 1. A. in 3
	(iii)	$\frac{344}{350}$ oe	3	<b>M2</b> for $1 - their \frac{2}{5} \times their \frac{1}{7} \times their \frac{3}{10}$ oe
		330		3 2 6 2 1 7
				or $\frac{3}{5} + \frac{2}{5} \times \frac{6}{7} + \frac{2}{5} \times \frac{1}{7} \times \frac{7}{10}$
				or
				<b>M1</b> for their $\frac{2}{5} \times their \frac{1}{7} \times their \frac{3}{10}$ oe
				, 10
				or identifies the 7 routes
				or attempt to add 7 probabilities with at least 5 correct
				$\left  \frac{9}{25} + \frac{27}{175} + \frac{3}{50} + \frac{9}{350} + \frac{6}{25} + \frac{18}{175} + \right $
				$\frac{1}{25}$ oe
				25
6 (	(a)	1	M1	or $[\frac{1}{2} \times 2]$ 8sin28 × 8cos28 or $[\frac{1}{2} \times 2]$ ×
	,	$\frac{1}{2} \times 8 \times 8 \times \sin 56$ oe		$7.06 \times 3.75$
		26.52 to 26.53	<b>A1</b>	
1	(b) (i)	72.[0] or 71.87 to 72.0	3	<b>M2</b> for $\frac{26.5}{(\pi \times 6.5^2)} \times 360$ oe
'	(8) (1)	72.[0] 01 71.07 to 72.0	J	$(\pi \times 6.5^2)$
				X
				or M1 for $\frac{x}{360} \times \pi \times 6.5^2 = 26.5$ or better
	(ii)	21.1 or 21.2 or 21.14 to 21.17	3	<b>M2</b> for $\frac{their(\mathbf{b})(\mathbf{i})}{360} \times \pi \times 2 \times 6.5 + 2 \times 6.5$ oe
	(-2)			360 their (b)(i)
				or <b>M1</b> for $\frac{their (\mathbf{b})(\mathbf{i})}{360} \times \pi \times 2 \times 6.5$ oe or
				$\frac{their (\mathbf{a})}{0.5 \times 6.5}$
	(c) (i)	$\frac{30}{360} \times \pi \times r^2 - \frac{1}{2} \times r^2 \times \sin 30$ oe	M2	M1 for $\frac{30}{360} \times \pi \times r^2$ or $\frac{1}{2} \times r^2 \times \sin 30$
'		_	1712	$\frac{1}{360}$ $\frac{1}{360}$ $\frac{1}{2}$ $\frac{1}{2}$
		$\frac{1}{12} \times \pi \times r^2 - \frac{1}{4} \times r^2$	<b>A1</b>	
			AI	
		$\frac{1}{4}r^2\left(\frac{1}{3}\pi-1\right)$	<b>A1</b>	Den on M2 A1 and no arrors soon
		$\frac{1}{4}r\left(\frac{\pi}{3}n^{-1}\right)$	AI	Dep on M2 A1 and no errors seen
		,		

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		(ii)	20.6 or 20.7 or 20.55 to 20.71	3	<b>M2</b> for $[r^2=]$ $\frac{5}{\frac{1}{4}(\frac{1}{3}\pi-1)}$
		(11)	20.0 01 20.7 01 20.55 to 20.71	3	/ ᠯ / 3
					or M1 for one correct rearrangement step to $r \text{ from } \frac{1}{4}r^2\left(\frac{1}{3}\pi - 1\right) = 5$
					$7 \operatorname{Hom} \frac{1}{4} \left( \frac{3}{3} \right)^{-1} = 3$
7	(a)	(i)	(1, 2)	1+1	
		(ii)	y = 3x - 1 cao final answer	3	M1 for gradient = $\frac{84}{31}$ oe
					and M1 for substituting (3, 8) or (-1, -4) into their $y = 3x + c$ or for finding y-intercept is -1
	(b)	(i)	(x+5)(x-2) isw solutions	2	SC1 for $(x + a) (x + b)$ where $ab = -10$ or $a + b = 3$
		(ii)	[a =] -5 [b =] 2 [c =] -10	3FT	<b>B1FT</b> for each of <i>their</i> 5 and <i>their</i> $-2$ from <b>(b)(i)</b> and <b>B1</b> for $c = -10$
		(iii)	x = -1.5	1FT	$\mathbf{FT} \ x = (their \ (a+b))/2$
	(c)		Inverted parabola	<b>B</b> 1	
			x-axis intercepts at −2 and 9	B2	B1 for each
			y-axis intercept at 18	B1	After <b>B0</b> allow <b>SC1</b> for $(9-x)(2+x)$ oe
	(d)	(i)	p = 6	3	<b>B2</b> for $(x + 6)^2 - 43$ or $p = 6$ or $q = 43$ or <b>M1</b> for $(x + 6)^2$ or $x^2 + px + px + p^2$
			q = 43		and
					M1 for $-7 - (their \ 6)^2$ or $p^2 - q = -7$ or $2p = 12$
		(ii)	-43	1FT	FT – their q
8	(a)	(i)	7	4	M2 for
					$\frac{16 \times 11 + 17 \times 10 + 18p + 19 \times 4 + 20 \times 8}{11 + 10 + 4 + 8 + p} = 17.7$
					or better or
					M1 for sum of two products or better or for [total =] $11 + 10 + 4 + 8 + p$ and
					<b>B1</b> for $582 + 18p = 17.7 (33 + p)$
		(ii)	17	1FT	<b>STRICT FT</b> median for <i>their p</i> if integer

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	(b) (i)	64	2	<b>M1</b> for $\frac{320}{6.4} \times 1.28$ oe
	(ii)	40	2	<b>M1</b> for $\frac{320}{480} \times 60$ oe
	(iii)	1.6[0]	2FT	FT their (b)(i) / their (b)(ii) evaluated correctly to 2dp
				M1 for their (b)(i) / their (b)(ii) or $\frac{480}{6.4} \times 1.28 \div 60$
9	(a)	$\begin{pmatrix} -4\\2 \end{pmatrix}$	1	
	(b)	5.83 or 5.830 to 5.831	2	<b>M1</b> for $\sqrt{5^2 + 3^2}$
	(c) (i)	$\frac{3}{5}$ oe	1	
	(ii)	$y = -\frac{5}{3}x + 2$	2	<b>B1</b> for $y = -\frac{5}{3}x + b$ $y = mx + 2$
				or M1 for $y = -\frac{1}{their(\mathbf{c})(\mathbf{i})}x + 2$
				<b>SC1</b> for $-\frac{5}{3}x + 2$
10	(a) (i)	5x + 14 final answer	2	<b>M1</b> for $5x + k$ or $kx + 14$
	(ii)	14.2	3	M1 for $5x = 32 - 14$ FT <i>their</i> expression in (a)(i) A1FT for $x = 3.6$

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(b)	8a - 3b + 14 = 32.5 or better	B1	8a - 3b = 18.5
	5a + 4b + 13.5 = 39.75 or better	B1	5a + 4b = 26.25
	Equates coefficients of either a or b	M1	or rearranges one of <i>their</i> equations to make <i>a</i> or <i>b</i> the subject
	40a - 15b = 92.5 $40a + 32b = 210$		e.g. $a = \frac{3b + 18.5}{8}$
	or $32a - 12b = 74$		
	15a + 12b = 78.75		
	Adds or subtracts to eliminate $47b = 117.5$ $47a = 152.75$	M1	Dep on previous method or correctly substitutes into the second equation $eg \frac{5(3b+18.5)}{8} + 4b = 26.25$
	[a =] 3.25 [b =] 2.5	A1 A1	After M0 scored, SC1 for 2 correct values with no working or for two values that satisfy one of their
			original equations
11 (a)	First graph moved one unit to right	1	
	Second graph moved up one unit	1	
	Third graph straight parts moved up to $y = 2$	1	
	Third graph curved part moved so that maximum at (0, 4)	1	
(b)	C	1	
	A	1	
	D	1	
	B	1	