

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	M1 for $\frac{8}{(11+8+7)} [\times 100]$
	(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	M2 for $\frac{35834}{0.95}$ oe or M1 for 35834 associated with 95%	
2	(a) (i) 104 Angle at centre is twice angle at circumference	1 1	Accept double, $2 \times$ but not middle, edge
	(ii) 128 Opposite angle of cyclic quadrilateral oe	1 1	
	(iii) 34 Angle between tangent and radius = 90°	1 1	

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	(b) (i)	7.65 to 7.651	4	M2 for $8.9^2 + 7^2 - 2 \times 8.9 \times 7 \times \cos$ 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 $[\sin BEC =] \frac{7 \sin 56}{\text{their (b)(i)}}$ oe or M1 for $\frac{\sin 56}{\text{their (b)(i)}} = \frac{\sin BEC}{7}$ oe
3	(a) (i)	5.37[1...]	2	M1 for $[AD^2 =] 2.6^2 + 4.7^2$ oe or better
	(ii)	54.1 or 54.11 to 54.12	3	M2 for $\tan[BCD =] \frac{4.7}{(17 - 11 - 2.6)}$ oe or B1 for 3.4 seen
	(iii)	65.8	2	M1 for $\frac{11+17}{2} \times 4.7$ oe
	(b)	263.2 or 263	3FT	FT <i>their (a)(iii)</i> $\times 4$ correctly evaluated M2 for <i>their (a)(iii)</i> $\times \left(\frac{9.4}{4.7}\right)^2$ 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	M1 for $16x^k$ or kx^8

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

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	(b) (i) Completes tree diagram correctly	3	B2 for 5 values correct or B1 for 1 value correct
	(ii) $\frac{126}{350}$ oe $\left[\frac{9}{25}\right]$	2	M1 for $\frac{3}{5} \times \frac{6}{7} \times \frac{7}{10}$
	(iii) $\frac{344}{350}$ oe	3	M2 for $1 - \text{their } \frac{2}{5} \times \text{their } \frac{1}{7} \times \text{their } \frac{3}{10}$ oe or $\frac{3}{5} + \frac{2}{5} \times \frac{6}{7} + \frac{2}{5} \times \frac{1}{7} \times \frac{7}{10}$ or M1 for $\text{their } \frac{2}{5} \times \text{their } \frac{1}{7} \times \text{their } \frac{3}{10}$ oe or identifies the 7 routes or attempt to add 7 probabilities with at least 5 correct $\frac{9}{25} + \frac{27}{175} + \frac{3}{50} + \frac{9}{350} + \frac{6}{25} + \frac{18}{175} + \frac{1}{25}$ oe
6	(a) $\frac{1}{2} \times 8 \times 8 \times \sin 56$ oe 26.52 to 26.53	M1 A1	or $[\frac{1}{2} \times 2] 8\sin 28 \times 8\cos 28$ or $[\frac{1}{2} \times 2] \times 7.06... \times 3.75...$
	(b) (i) 72.[0] or 71.87 to 72.0	3	M2 for $\frac{26.5}{(\pi \times 6.5^2)} \times 360$ oe 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	M2 for $\frac{\text{their (b)(i)}}{360} \times \pi \times 2 \times 6.5 + 2 \times 6.5$ oe or M1 for $\frac{\text{their (b)(i)}}{360} \times \pi \times 2 \times 6.5$ oe or $\frac{\text{their (a)}}{0.5 \times 6.5}$
	(c) (i) $\frac{30}{360} \times \pi \times r^2 - \frac{1}{2} \times r^2 \times \sin 30$ oe $\frac{1}{12} \times \pi \times r^2 - \frac{1}{4} \times r^2$ $\frac{1}{4} r^2 \left(\frac{1}{3} \pi - 1 \right)$	M2 A1 A1	M1 for $\frac{30}{360} \times \pi \times r^2$ or $\frac{1}{2} \times r^2 \times \sin 30$ 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	M2 for $[r^2 =] \frac{5}{\frac{1}{4}\left(\frac{1}{3}\pi - 1\right)}$ or M1 for one correct rearrangement step to r from $\frac{1}{4}r^2\left(\frac{1}{3}\pi - 1\right) = 5$
7	(a) (i) (1, 2) (ii) $y = 3x - 1$ cao final answer (b) (i) $(x + 5)(x - 2)$ isw solutions (ii) $[a =] -5$ $[b =] 2$ $[c =] -10$ (iii) $x = -1.5$ (c) Inverted parabola x -axis intercepts at -2 and 9 y -axis intercept at 18 (d) (i) $p = 6$ $q = 43$ (ii) -43	1+1 3 2 3FT 1FT B1 B2 B1 3 1FT	 M1 for gradient = $\frac{8 - -4}{3 - -1}$ oe and M1 for substituting $(3, 8)$ or $(-1, -4)$ into their $y = 3x + c$ or for finding y -intercept is -1 SC1 for $(x + a)(x + b)$ where $ab = -10$ or $a + b = 3$ B1FT for each of their 5 and their -2 from (b)(i) and B1 for $c = -10$ FT $x = (\text{their } (a + b))/2$ B1 B1 for each After B0 allow SC1 for $(9 - x)(2 + x)$ oe B1 B2 for $(x + 6)^2 - 43$ or $p = 6$ or $q = 43$ or M1 for $(x + 6)^2$ or $x^2 + px + px + p^2$ and M1 for $-7 - (\text{their } 6)^2$ or $p^2 - q = -7$ or $2p = 12$ FT – their q
8	(a) (i) 7 (ii) 17	4 1FT	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 B1 for $582 + 18p = 17.7(33 + p)$ STRICT FT median for their p if integer

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	(b) (i)	64	2	M1 for $\frac{320}{6.4} \times 1.28$ oe
	(ii)	40	2	M1 for $\frac{320}{480} \times 60$ oe
	(iii)	1.6[0]	2FT	FT <i>their (b)(i) / their (b)(ii)</i> evaluated correctly to 2dp M1 for <i>their (b)(i) / their (b)(ii)</i> 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	M1 for $\sqrt{5^2 + 3^2}$
	(c) (i)	$\frac{3}{5}$ oe	1	
	(ii)	$y = -\frac{5}{3}x + 2$	2	B1 for $y = -\frac{5}{3}x + b$ $y = mx + 2$ or M1 for $y = -\frac{1}{\text{their (c)(i)}}x + 2$ SC1 for $-\frac{5}{3}x + 2$
10	(a) (i)	$5x + 14$ final answer	2	M1 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 $5a + 4b + 13.5 = 39.75$ or better Equates coefficients of either a or b $40a - 15b = 92.5$ $40a + 32b = 210$ or $32a - 12b = 74$ $15a + 12b = 78.75$ Adds or subtracts to eliminate $47b = 117.5$ $47a = 152.75$ $[a =] 3.25$ $[b =] 2.5$	B1 $8a - 3b = 18.5$ B1 $5a + 4b = 26.25$ M1 or rearranges one of <i>their</i> equations to make a or b the subject e.g. $a = \frac{3b + 18.5}{8}$ M1 Dep on previous method or correctly substitutes into the second equation eg $\frac{5(3b + 18.5)}{8} + 4b = 26.25$ A1 After M0 scored, SC1 for 2 correct values with no working or for two values that satisfy one of their original equations A1
11 (a)	First graph moved one unit to right Second graph moved up one unit Third graph straight parts moved up to $y = 2$ Third graph curved part moved so that maximum at (0, 4)	1 1 1 1
(b)	C A D B	1 1 1 1