

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

### **0444 MATHEMATICS (US)**

**0444/43**

Paper 4 (Extended), maximum raw mark 130

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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**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 $\frac{8}{(11+8+7)} [\times 100]$
	(b) 1211 final answer	5	<b>B4</b> for 13926.5[0] [area A total sales] or <b>B3</b> for 11040 [area B] <b>and</b> 10867.50 [area C] or 21907.5 [area B + area C] or <b>B2</b> for 11040 [area B] or 10867.50 [area C] or <b>M1</b> for 736 [B tickets] and <b>M1</b> for 483 [C tickets]  After 0 scored <b>SC2</b> for answer of 1196 or <b>SC1</b> 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 <b>Angle at centre is twice angle at circumference</b>	1 1	Accept double, 2 × but not middle, edge
	(ii) 128 <b>Opposite angle of cyclic quadrilateral</b> oe	1 1	
	(iii) 34 <b>Angle between tangent and radius = 90°</b>	1 1	

	(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 $kx^8$

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

<p>(b) (i)</p> <p>(ii)</p> <p>(iii)</p>	<p>Completes tree diagram correctly</p> <p><math>\frac{126}{350}</math> oe <math>\left[\frac{9}{25}\right]</math></p> <p><math>\frac{344}{350}</math> oe</p>	<p>3</p> <p><b>B2</b> for 5 values correct or <b>B1</b> for 1 value correct</p> <p>2</p> <p><b>M1</b> for <math>\frac{3}{5} \times \frac{6}{7} \times \frac{7}{10}</math></p> <p>3</p> <p><b>M2</b> for <math>1 - \text{their } \frac{2}{5} \times \text{their } \frac{1}{7} \times \text{their } \frac{3}{10}</math> oe or <math>\frac{3}{5} + \frac{2}{5} \times \frac{6}{7} + \frac{2}{5} \times \frac{1}{7} \times \frac{7}{10}</math> or <b>M1</b> for <math>\text{their } \frac{2}{5} \times \text{their } \frac{1}{7} \times \text{their } \frac{3}{10}</math> oe or identifies the 7 routes or attempt to add 7 probabilities with at least 5 correct <math>\frac{9}{25} + \frac{27}{175} + \frac{3}{50} + \frac{9}{350} + \frac{6}{25} + \frac{18}{175} + \frac{1}{25}</math> oe</p>
<p>6 (a)</p> <p>(b) (i)</p> <p>(ii)</p> <p>(c) (i)</p>	<p><math>\frac{1}{2} \times 8 \times 8 \times \sin 56</math> oe 26.52 to 26.53</p> <p>72.[0] or 71.87 to 72.0</p> <p>21.1 or 21.2 or 21.14 to 21.17</p> <p><math>\frac{30}{360} \times \pi \times r^2 - \frac{1}{2} \times r^2 \times \sin 30</math> oe <math>\frac{1}{12} \times \pi \times r^2 - \frac{1}{4} \times r^2</math> <math>\frac{1}{4} r^2 \left( \frac{1}{3} \pi - 1 \right)</math></p>	<p><b>M1</b> or <math>[\frac{1}{2} \times 2] 8 \sin 28 \times 8 \cos 28</math> or <math>[\frac{1}{2} \times 2] \times 7.06... \times 3.75...</math></p> <p><b>A1</b></p> <p>3</p> <p><b>M2</b> for <math>\frac{26.5}{(\pi \times 6.5^2)} \times 360</math> oe or <b>M1</b> for <math>\frac{x}{360} \times \pi \times 6.5^2 = 26.5</math> or better</p> <p>3</p> <p><b>M2</b> for <math>\frac{\text{their (b)(i)}}{360} \times \pi \times 2 \times 6.5 + 2 \times 6.5</math> oe or <b>M1</b> for <math>\frac{\text{their (b)(i)}}{360} \times \pi \times 2 \times 6.5</math> oe or <math>\frac{\text{their (a)}}{0.5 \times 6.5}</math></p> <p><b>M2</b> <b>M1</b> for <math>\frac{30}{360} \times \pi \times r^2</math> or <math>\frac{1}{2} \times r^2 \times \sin 30</math></p> <p><b>A1</b></p> <p><b>A1</b> Dep on <b>M2 A1</b> and no errors seen</p>



	(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 $x = 3.6$

