

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**Cambridge International General Certificate of Secondary Education**

## **MARK SCHEME for the October/November 2015 series**

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

**0444/23**

Paper 2 (Extended), maximum raw mark 70

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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

Question	Answer	Mark	Part marks
<b>1</b>	170 cao	<b>1</b>	
<b>2</b>	– 7	<b>1</b>	
<b>3</b>	[0].00017	<b>1</b>	
<b>4</b>	6	<b>1</b>	
<b>5 (a)</b>	12, 15	<b>1</b>	
<b>(b)</b>	11, 13	<b>1</b>	
<b>6</b>	$5 - u$ final answer	<b>2</b>	<b>B1</b> for final answer $5 + ku$ or $j - u$ , $k \neq 0$
<b>7</b>	$2x(1 - 2x)$ final answer	<b>2</b>	<b>B1</b> for final answer $2(x - 2x^2)$ or $x(2 - 4x)$
<b>8</b>	1800	<b>2</b>	<b>M1</b> for $(12 - 2) \times 180$ or $12 \times \left(180 - \frac{360}{12}\right)$
<b>9</b>	2 720	<b>1</b> <b>1</b>	If zero scored <b>SC1</b> for correct answers reversed
<b>10 (a)</b>	125	<b>1</b>	
<b>(b)</b>	$\frac{1}{27}$	<b>1</b>	
<b>11 (a)</b>	$\frac{3x}{2}$ final answer	<b>1</b>	
<b>(b)</b>	$\frac{x^2 + 2}{x}$ final answer	<b>1</b>	
<b>12</b>	$5.4 \times 10^{12}$	<b>2</b>	<b>M1</b> for figs 54 or $0.6 \times 10^{12}$ or $60 \times 10^{11}$
<b>13</b>	$x < 2$ oe	<b>2</b>	<b>B1</b> for $3 + 1 < 2x$ or $-2x > -1 - 3$ or better

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14	6	3	<p><b>M2</b> for <math>4.5 \times \sqrt[3]{\frac{64}{27}}</math> oe or better</p> <p><b>M1</b> for <math>\sqrt[3]{\frac{64}{27}}</math> or <math>\sqrt[3]{\frac{27}{64}}</math> oe or <math>\frac{27}{64} = \left(\frac{4.5}{x}\right)^3</math> oe</p>
15	$\frac{7}{12}$	3	<p><b>M2</b> for <math>\frac{8}{12} + \frac{2}{12} - \frac{3}{12}</math> oe</p> <p>or <b>B1</b> for any 2 correct over a common denominator</p> <p>or <b>SC2</b> for final answer <math>\frac{13}{12}</math> or <math>1\frac{1}{12}</math></p>
16	$\frac{2(s-ut)}{t^2}$ oe final answer	3	<p><b>M1</b> for correctly isolating term in <math>a</math></p> <p><b>M1</b> for correctly multiplying by 2 (or <math>-2</math>)</p> <p><b>M1</b> for correctly dividing by <math>t^2</math> (or <math>-t^2</math>)</p>
17	$\frac{x^{16}}{2y^4}$ final answer	3	<p><b>B2</b> for fraction as final answer with two of <math>x^{16}</math>, 2, <math>y^4</math> correct and in correct position</p> <p>or <b>B1</b> for fraction as final answer with one of <math>x^{16}</math>, 2, <math>y^4</math> correct and in correct position</p>
18	$\frac{1}{2}$ oe	3	<p><b>M2</b> for <math>2(1+2)^2 = y(4+2)^2</math> oe</p> <p>or <b>M1</b> for <math>y = \frac{k}{(x+2)^2}</math> or better</p> <p><b>A1</b> for <math>k = 18</math></p>
19 (a)	12	1	
(b)	$5\sqrt{6}$	2	<b>B1</b> for $2\sqrt{6}$ or $3\sqrt{6}$ seen or answer $5\sqrt{2}\sqrt{3}$
20	0.96 oe	3	<p><b>M2</b> for <math>1 - 0.2 \times 0.2</math> or <math>0.8 + 0.2 \times 0.8</math> or <math>0.8 \times 0.8 + 0.8 \times 0.2 + 0.2 \times 0.8</math></p> <p>or <b>B1</b> for one of <math>0.2 \times 0.2</math>, <math>0.8 \times 0.8</math>, <math>0.8 \times 0.2</math>, <math>0.2 \times 0.8</math> seen</p>

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21	$[p =] -2$ $[q =] 3$	3	<b>B2</b> for $\frac{-4 \pm \sqrt{(4)^2 - 4(3)(-5)}}{2(3)}$ or better or $\frac{-2 \pm \sqrt{19}}{3}$ or <b>B1</b> for $\sqrt{(4)^2 - 4(3)(-5)}$ or better seen or $\frac{-4 \pm \sqrt{k}}{2(3)}$ seen
22	$\frac{1}{2-5w}$ nfw	4	<b>B1</b> for $2(2+5w)$ <b>B1</b> for $2(4-25w^2)$ <b>B1</b> for $[2](2+5w)(2-5w)$  Alternative method <b>B3</b> for $\frac{4+10w}{(4+10w)(2-5w)}$ or <b>B2</b> for $(4+10w)(2-5w)$
23	$y = \frac{5}{2}x + 2$ oe	4	<b>B1</b> for (0, 2) soi and <b>M2</b> for correct rearrangement to $y = -\frac{2}{5}x + 2$ or <b>M1</b> for attempt at rearrangement allowing 1 error  If M2 not scored allow <b>M1ft</b> for negative reciprocal of <i>their</i> gradient
24 (a)	6.2	1	
(b)	5.8	2	<b>M1</b> for 24 soi
(c)	70	2	<b>M1</b> for 10 soi
25	$\frac{30}{360} \times \pi \times 8^2$  [area of triangle =] $0.5 \times 8 \cos 30 \times 8 \sin 30$ oe  completion to give answer with no errors $\frac{16\pi}{3} - 8\sqrt{3}$	<b>M2</b>  <b>M2</b>  <b>A1</b>	or <b>M1</b> for $\frac{30}{360}$ oe or $\pi \times 8^2$ or <b>M1</b> for $\frac{OC}{8} = \cos 30$ oe or $\frac{BC}{8} = \sin 30$ oe  must see $[\cos 30 =] \frac{\sqrt{3}}{2}$ and $[\sin 30 =] \frac{1}{2}$

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26 (a)	5	2	M1 for $(-4)^2 + 3^2$ oe
(b) (i)	$\frac{1}{3}(-\mathbf{a} + \mathbf{b})$ oe	2	M1 for any correct route eg $AO + OB + \frac{2}{3}BA$ or B1 for $\overrightarrow{AB} = -\mathbf{a} + \mathbf{b}$ oe
(ii)	$\frac{2}{3}\mathbf{a} + \frac{1}{3}\mathbf{b}$ oe	2FT	FT <i>their</i> (a) + a simplified only if in terms of a and b  M1 for correct route in any form or for correct unsimplified answer