

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

Cambridge International General Certificate of Secondary Education

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

**0580 MATHEMATICS**

**0580/23**

Paper 2 (Extended), maximum raw mark 70

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.

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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
nfw	not from wrong working
soi	seen or implied

<b>Question</b>	<b>Answer</b>	<b>Mark</b>	<b>Part marks</b>
<b>1</b>	170 cao	<b>1</b>	
<b>2</b>	[0].101 or [0].1005 to [0].1006	<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 $5 + ku$ or $j - u$ , $k \neq 0$ as final answer
<b>7</b>	$2x(1 - 2x)$ final answer	<b>2</b>	<b>B1</b> for $2(x - 2x^2)$ or $x(2 - 4x)$ as final answer
<b>8</b>	4140	<b>2</b>	<b>M1</b> for $(25 - 2) \times 180$ or $25 \times \left(180 - \frac{360}{25}\right)$
<b>9</b>	23.6 or 23.57 to 23.58	<b>2</b>	<b>M1</b> for $\sin[=] \frac{2}{5}$ oe
<b>10 (a)</b>	625	<b>1</b>	
<b>(b)</b>	9	<b>1</b>	
<b>11 (a)</b>	$\frac{3x}{2}$ oe final answer	<b>1</b>	
<b>(b)</b>	$\frac{x^2 + 2}{x}$ oe final answer	<b>1</b>	
<b>12 (a)</b>	10	<b>1</b>	
<b>(b)</b>	$P \cup Q'$ oe	<b>1</b>	
<b>13</b>	10	<b>2</b>	<b>B1</b> for $7 \times 3 - 2 \times u$

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Question	Answer	Mark	Part marks
14	6	3	<b>M2</b> for $4.5 \times \sqrt[3]{\frac{128}{54}}$ oe or better <b>M1</b> for $\sqrt[3]{\frac{128}{54}}$ or $\sqrt[3]{\frac{54}{128}}$ oe or $\frac{54}{128} = \left(\frac{4.5}{x}\right)^3$ oe
15	Any two of $\frac{8}{12}, \frac{2}{12}$ or $\frac{3}{12}$ oe  $\frac{8}{12} + \frac{2}{12} - \frac{3}{12}$ oe  $\frac{7}{12}$	<b>M1</b>  <b>M1</b>  <b>A1</b>	<b>M1</b> for any 2 correct over a common denominator e.g. $\frac{4}{6}$ and $\frac{1}{6}$  or <b>SC2</b> for final answer $\frac{13}{12}$ or $1\frac{1}{12}$ with full working
16	$\frac{2(s-ut)}{t^2}$ oe final answer	3	<b>M1</b> for correctly isolating term in $a$ <b>M1</b> for correctly multiplying by 2 (or $-2$ ) <b>M1</b> for correctly dividing by $t^2$ (or $-t^2$ )
17	$\frac{x^{16}}{2y^4}$ final answer	3	<b>B2</b> for fraction as final answer with two of $x^{16}, 2, y^4$ correct and in correct position or <b>B1</b> for fraction as final answer with one of $x^{16}, 2, y^4$ correct and in correct position
18	0.96 oe	3	<b>M2</b> for $1 - 0.2 \times 0.2$ or $0.8 + 0.2 \times 0.8$ or $0.8 \times 0.8 + 0.8 \times 0.2 + 0.2 \times 0.8$  or <b>B1</b> for one of $0.2 \times 0.2, 0.8 \times 0.8, 0.8 \times 0.2, 0.2 \times 0.8$ seen
19	$\frac{18}{(x+2)^2}$ oe	2	<b>M1</b> for $y = \frac{k}{(x+2)^2}$ or better If zero scored <b>SC1</b> for final answer of $y = \frac{k}{(x+2)^2}$ where $k \neq 0$ or 18
20	18 cao nfw	3	<b>M2</b> for $\frac{877.5}{7.5 \times 6.5}$ or <b>B1</b> for any two of 877.5, 7.5 and 6.5 seen

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Question	Answer	Mark	Part marks
21	$\sqrt{(4)^2 - 4(3)(-5)}$ or better seen if $\frac{p+\sqrt{q}}{r}$ or $\frac{p-\sqrt{q}}{r}$ seen then  $p = -4$ and $r = 2(3)$  $-2.12$ $0.79$ final answers	<b>B1</b>  <b>B1</b>  <b>B1</b> <b>B1</b>	If completing the square  <b>B1</b> for $\left(x + \frac{2}{3}\right)^2$ oe  <b>B1</b> for $-\frac{2}{3} + \sqrt{\frac{5}{3} + \frac{2^2}{3^2}}$ or $-\frac{2}{3} - \sqrt{\frac{5}{3} + \frac{2^2}{3^2}}$  <b>B1</b> for $0.786[299]$ <b>and</b> $-2.119[632]$ $-2.1$ <b>and</b> $0.8$ or $-2.120$ or $-2.119$ <b>and</b> $0.786$ or $2.12$ <b>and</b> $-0.79$ final answers $-2.12$ <b>and</b> $0.79$ seen not as final answers
22	$\frac{1}{2-5w}$ final answer nfw	4	<b>B1</b> for $2(2+5w)$ <b>B1</b> for $2(4-25w^2)$ <b>B1</b> for $[2](2+5w)(2-5w)$  ALT method <b>B3</b> for $\frac{4+10w}{(4+10w)(2-5w)}$ or <b>B2</b> for $(4+10w)(2-5w)$
23 (a)	$\frac{1}{3}(-\mathbf{a} + \mathbf{b})$ oe	2	<b>M1</b> for any correct route eg $AO+OB+\frac{2}{3}BA$ or <b>B1</b> for $\overrightarrow{AB} = -\mathbf{a} + \mathbf{b}$ oe
(b)	$\frac{2}{3}\mathbf{a} + \frac{1}{3}\mathbf{b}$ oe simplified	2FT	<b>FT</b> their (a) + $\mathbf{a}$ simplified only if in terms of $\mathbf{a}$ and $\mathbf{b}$ .  <b>M1</b> for identifying $\overrightarrow{OC}$ as position vector or correct route in any form or for correct unsimplified answer
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	2.9[0] or 2.898 to 2.901	5	<b>M4</b> for $\frac{30}{360} \times \pi \times 8^2 - 0.5 \times 8 \cos 30 \times 8 \sin 30$ or <b>M1</b> for $\frac{30}{360} \times \pi \times 8^2$ and <b>M2</b> for [area of triangle =] $0.5 \times 8 \cos 30 \times 8 \sin 30$ oe or <b>M1</b> for $\frac{OC}{8} = \cos 30$ oe or $\frac{BC}{8} = \sin 30$ oe

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<b>26 (a)</b>	12.5 oe	<b>2</b>	<b>M1</b> for $45 \times 1000 \div 60 \div 60$ oe
<b>(b)</b>	1.25 oe	<b>1FT</b>	<b>FT</b> <i>their (a)</i> $\div 10$
<b>(c)</b>	312.5 oe	<b>3FT</b>	<b>FT</b> for $25 \times$ <i>their (a)</i> <b>M2</b> for $20 \times$ <i>their</i> 12.5 + $0.5 \times 10 \times$ <i>their</i> 12.5 oe or <b>M1</b> for one correct relevant area calculation or <b>SC2</b> for final answer 1125