



**Cambridge International Examinations**  
Cambridge International General Certificate of Secondary Education

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**MATHEMATICS**

**0580/23**

Paper 2 (Extended)

**May/June 2016**

MARK SCHEME

Maximum Mark: 70

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**Published**

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This document consists of **4** printed pages.

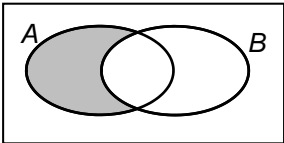
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### Abbreviations

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
1	17	1	
2	71000 cao	1	
3	10.3 oe	2	<b>M1</b> for $5x = 51.5$ oe
4	0.5 or $\frac{1}{2}$	2	<b>M1</b> for correct first step e.g. $6y + 6 = 9$ or $y + 1 = \frac{9}{6}$
5	$\frac{1}{12} \times \frac{6}{5}$ oe  $\frac{1}{10}$ final answer cao	<b>M1</b>  <b>A1</b>	Must be shown
6	Correct perpendicular bisector with 2 pairs of correct arcs	2	<b>B1</b> for correct bisector with no arcs or incorrect arcs or for correct intersecting arcs with no/wrong line
7	$8x^6$ final answer	2	<b>B1</b> for $8x^k$ or $cx^6$
8	$\frac{29}{90}$ oe, must be a fraction	2	<b>M1</b> for $32.\dot{2} - 3.\dot{2}$ or <b>B1</b> for $\frac{k}{90}$
9	$\frac{1}{4}\mathbf{a} - \frac{1}{4}\mathbf{b} - \frac{1}{4}\mathbf{c}$ oe	2	<b>B1</b> for $\overline{GK} = \mathbf{a} - \mathbf{b} - \mathbf{c}$ oe soi or $\overline{GL} = \frac{1}{4}(\overline{GK})$ or for any correct route
10	14	2	<b>M1</b> for $56 = 2 \times 2 \times 2 \times 7$ soi or $70 = 2 \times 5 \times 7$ soi or $2 \times 7$ as final answer
11 (a)	0.6 oe	1	
(b)	20 0.3 oe 0.3 oe	2	<b>B1</b> for 20 <b>B1</b> for 0.3 oe and 0.3 oe
12	110	3	<b>B2</b> for $ADC = 25$ or <b>B1</b> for $AEC = 135$ or $CAE = 25$

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Question	Answer	Mark	Part marks
<b>13 (a)</b>	72	<b>1</b>	
<b>(b)</b>	123	<b>2FT</b>	FT dep. on answer being obtuse <b>M1</b> for $(360 - \text{their}(a) - 42) [\div 2]$
<b>14 (a) (i)</b>	8	<b>1</b>	
<b>(ii)</b>	9, 15	<b>1</b>	
<b>(b)</b>		<b>1</b>	
<b>15</b>	310 or 310.2 to 310.3	<b>3</b>	<b>M2</b> for $7^3 - \frac{1}{2} \times \frac{4}{3} \times \pi \times \left(\frac{5}{2}\right)^3$ or <b>M1</b> for $\frac{1}{2} \times \frac{4}{3} \times \pi \times \left(\frac{5}{2}\right)^3$ or <b>SC1</b> for $7^3 - \frac{4}{3} \times \pi \times \left(\frac{5}{2}\right)^3$ soi
<b>16</b>	90	<b>3</b>	<b>M1</b> for $y = k(x + 2)^2$ <b>A1</b> for $k = 2.5$ or <b>M2</b> for $\frac{(8 + 2)^2}{250} = \frac{(4 + 2)^2}{y}$ oe
<b>17 (a)</b>	10.4675 cao nfw	<b>2</b>	<b>B1</b> for 3.95 or 2.65 seen or <b>M1</b> for $(4.0 - 0.05) \times (2.7 - 0.05)$
<b>(b)</b>	34 nfw	<b>2</b>	<b>B1</b> for 7.65 or 0.225 seen or <b>M1</b> for $(7.6 + 0.05) \div (0.23 - 0.005)$
<b>18 (a)</b>	2 cao	<b>2</b>	<b>M1</b> for rise/run attempted e.g. 4/2 or other correct method for finding gradient or <b>SC1</b> for $y = 2x - 1$ as answer
<b>(b)</b>	$y = 2x + 6$ oe	<b>2FT</b>	<b>FT</b> for $y = \text{their}(a)x + 6$ <b>B1</b> for $y = mx + 6$ ( $m \neq 0$ or 2) or $y = 2x [+ k]$ or $y = \text{their}(a)x [+ k]$ ( $k \neq 6$ ) or for answer $2x + 6$ or answer $\text{their}(a)x + 6$
<b>19 (a)</b>	57 122	<b>2</b>	<b>M1</b> for $20\,000 \times \left(1 + \frac{30}{100}\right)^4$ oe
<b>(b)</b>	15	<b>2</b>	<b>M1</b> for two substitutions greater than 4 e.g. $20\,000 \times \left(1 + \frac{30}{100}\right)^k$ where $k > 4$

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<b>Question</b>	<b>Answer</b>	<b>Mark</b>	<b>Part marks</b>
<b>20</b>	$y < 4$ $y \geq 3$ $x \geq 2$ $y > x$	<b>4</b>	<b>B1</b> for each correct answer to a maximum of 3 marks. First two may be combined as a single inequality e.g. $3 \leq y < 4$ for <b>B2</b>  After 0 scored <b>SC1</b> for use of = signs or incorrect inequality signs in all four equations
<b>21 (a)</b>	5	<b>2</b>	<b>M1</b> for $\frac{9}{k} = \frac{6 + 4.8}{6}$ oe
<b>(b)</b>	24	<b>3</b>	<b>M2</b> for $\sqrt[3]{\frac{2592}{1500}} \times 20$ oe or <b>M1</b> for $\sqrt[3]{\frac{2592}{1500}}$ or $\sqrt[3]{\frac{1500}{2592}}$
<b>22 (a)</b>	1.5 nfw	<b>2</b>	<b>B1</b> for 2.5 or 1
<b>(b)</b>	3.5	<b>2</b>	<b>B1</b> for 114 soi
<b>(c)</b>	18	<b>2</b>	<b>B1</b> for 102 soi
<b>23 (a)</b>	9.11 or 9.110...	<b>4</b>	<b>M3</b> for $\sqrt{5^2 + 3^2 + 7^2}$ or <b>M2</b> for $\sqrt{5^2 + 3^2}$ or $\sqrt{3^2 + 7^2}$ or $\sqrt{5^2 + 7^2}$ or <b>M1</b> for $5^2 + 3^2$ or $3^2 + 7^2$ or $5^2 + 7^2$
<b>(b)</b>	33.3 or 33.28 to 33.29	<b>3</b>	<b>M2</b> for $\sin = \frac{5}{\text{their}(a)}$ oe or <b>B1</b> for identifying angle <i>ECH</i>