

**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

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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            |

| Question | Answer                              | Mark | Part marks   |
|----------|-------------------------------------|------|--|
| 1        | 170 cao                             | 1    |  |
| 2        | [0].101 or [0].1005 to [0].1006     | 1    |  |
| 3        | [0].00017                           | 1    |  |
| 4        | 6                                   | 1    |  |
| 5 (a)    | 12, 15                              | 1    |  |
| (b)      | 11, 13                              | 1    |  |
| 6        | $5 - u$ final answer                | 2    | <b>B1</b> for $5 + ku$ or $j - u$ , $k \neq 0$ as final answer                       |
| 7        | $2x(1 - 2x)$ final answer           | 2    | <b>B1</b> for $2(x - 2x^2)$ or $x(2 - 4x)$ as final answer                           |
| 8        | 4140                                | 2    | <b>M1</b> for $(25 - 2) \times 180$ or $25 \times \left(180 - \frac{360}{25}\right)$ |
| 9        | 23.6 or 23.57 to 23.58              | 2    | <b>M1</b> for $\sin[=] \frac{2}{5}$ oe   |
| 10 (a)   | 625                                 | 1    |  |
| (b)      | 9                                   | 1    |  |
| 11 (a)   | $\frac{3x}{2}$ oe final answer      | 1    |  |
| (b)      | $\frac{x^2 + 2}{x}$ oe final answer | 1    |  |
| 12 (a)   | 10                                  | 1    |  |
| (b)      | $P \cup Q'$ oe                      | 1    |  |
| 13       | 10                                  | 2    | <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<br><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<br><br>$\frac{8}{12} + \frac{2}{12} - \frac{3}{12}$ oe<br><br>$\frac{7}{12}$ | <b>M1</b><br><br><b>M1</b><br><br><b>A1</b> | <b>M1</b> for any 2 correct over a common denominator<br>e.g. $\frac{4}{6}$ and $\frac{1}{6}$<br><br>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 $a$<br><b>M1</b> for correctly multiplying by 2 (or $-2$ )<br><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<br>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 $0.8 + 0.2 \times 0.8$<br>or $0.8 \times 0.8 + 0.8 \times 0.2 + 0.2 \times 0.8$<br><br>or <b>B1</b> for one of<br>$0.2 \times 0.2, 0.8 \times 0.8, 0.8 \times 0.2, 0.2 \times 0.8$ seen |
| 19       | $\frac{18}{(x+2)^2}$ oe   | 2   | <b>M1</b> for $y = \frac{k}{(x+2)^2}$ or better<br>If zero scored<br><b>SC1</b> for final answer of $y = \frac{k}{(x+2)^2}$<br>where $k \neq 0$ or 18   |
| 20       | 18 cao nfw  | 3   | <b>M2</b> for $\frac{877.5}{7.5 \times 6.5}$<br>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<br>if $\frac{p+\sqrt{q}}{r}$ or $\frac{p-\sqrt{q}}{r}$ seen then<br><br>$p = -4$ and $r = 2(3)$<br><br>$-2.12$<br>$0.79$ final answers | <b>B1</b><br><br><b>B1</b><br><br><b>B1</b><br><b>B1</b> | If completing the square<br><br><b>B1</b> for $\left(x + \frac{2}{3}\right)^2$ oe<br><br><b>B1</b> for $-\frac{2}{3} + \sqrt{\frac{5}{3} + \frac{2^2}{3^2}}$ or $-\frac{2}{3} - \sqrt{\frac{5}{3} + \frac{2^2}{3^2}}$<br><br><b>B1</b> for $0.786[299]$ <b>and</b> $-2.119[632]$<br>$-2.1$ <b>and</b> $0.8$ or<br>$-2.120$ or $-2.119$ <b>and</b> $0.786$ or<br>$2.12$ <b>and</b> $-0.79$ final answers<br>$-2.12$ <b>and</b> $0.79$ seen not as final answers |
| 22       | $\frac{1}{2-5w}$ final answer nfw   | 4  | <b>B1</b> for $2(2+5w)$<br><b>B1</b> for $2(4-25w^2)$<br><b>B1</b> for $[2](2+5w)(2-5w)$<br><br>ALT method<br><b>B3</b> for $\frac{4+10w}{(4+10w)(2-5w)}$<br>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 $AO+OB+\frac{2}{3}BA$<br>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> <i>their</i> (a) + <b>a</b> simplified only if in terms of <b>a</b> and <b>b</b> .<br><br><b>M1</b> for identifying $\overrightarrow{OC}$ as position vector<br>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 $\frac{30}{360} \times \pi \times 8^2 - 0.5 \times 8 \cos 30 \times 8 \sin 30$<br>or<br><b>M1</b> for $\frac{30}{360} \times \pi \times 8^2$<br>and<br><b>M2</b> for [area of triangle =] $0.5 \times 8 \cos 30 \times 8 \sin 30$ oe<br>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><br><b>M2</b> for $20 \times$ <i>their</i> 12.5 + $0.5 \times 10 \times$ <i>their</i> 12.5 oe<br>or <b>M1</b> for one correct relevant area calculation<br><br>or <b>SC2</b> for final answer 1125 |