



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

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**MATHEMATICS**

**0580/31**

Paper 3 (Core)

**October/November 2016**

MARK SCHEME

Maximum Mark: 104

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**Published**

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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   |
|------------------------------|---------------------------------------|---|--|
| <b>1</b>                     | <b>(a) (i)</b> 1700 or 5pm            | <b>2</b>  | <b>B1</b> for 2200 or [0]5 20 or 10pm or 5:20am or <b>6h 40</b>  |
|                              | <b>(ii)</b> 15 575                    | <b>1</b>  |  |
|                              | <b>(b) (i)</b> 2200                   | <b>2</b>  | <b>B1</b> for 440<br>or <b>M1</b> for $660 \times 2 + \textit{their} 440 \times 2$ or $\frac{10}{3} \times 660$<br>or better |
|                              | <b>(ii)</b> 104.5<br>105.5            | <b>1</b><br><b>1</b>  | <b>SC1</b> for both correct but reversed   |
|                              | <b>(c) (i)</b> 30<br>20 72            | <b>1</b><br><b>1 1</b>  |  |
|                              | <b>(ii)</b> Correct pie chart         | <b>1</b>  |  |
| <b>2</b>                     | <b>(a) (i)</b> 94                     | <b>2</b>  | <b>M1</b> for $\frac{160 + 58 + 45 + 82 + 125}{5}$ or $\frac{470}{5}$  |
|                              | <b>(ii)</b> 115                       | <b>1</b>  |  |
|                              | <b>(b)</b> $\frac{1800}{5000}$ oe isw | <b>1</b>  |  |
|                              | <b>(c)</b> [0].15 oe                  | <b>2</b>  | <b>M1</b> for $1 - (0.15 + 0.23 + 0.4 + 0.07)$ or $1 - 0.85$   |
|                              | <b>(d)</b> 39.5[0]                    | <b>2</b>  | <b>M1</b> for [8.50 +] (7.75 × 4) soi by 31<br><br>If zero scored, <b>SC1</b> for 47.25                                      |
| <b>(e)</b> Correct bar chart | <b>3</b>                              | <b>B1</b> for any correct linear scale starting at zero soi<br><br><b>B2</b> for all bars correct height and equal width, with equal gaps or no gaps<br>or<br><b>B1</b> for all bars correct height with unequal widths and/or gaps<br>or at least three bars correct height with equal width, with equal gaps or no gaps |  |

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| Question | Answer            | Mark  | Part marks  |
|----------|-------------------|---|---|
| 3        | (a) (i)           | 63  | 1   |
|          | (ii)              | 8   | 1   |
|          | (iii)             | 11  | 1   |
|          | (iv)              | 144   | 1   |
|          | (b)               | $4^2 [=] 16$ $5^2 [=] 25$                                 | 1   |
|          | (c) (i)           | 16384   | 1   |
|          | (ii)              | 1   | 1   |
|          | (iii)             | 74.1 or 74.08 to 74.09                                    | 1   |
|          | (d)               | $2 \times 3^2 \times 5$ or $2 \times 3 \times 3 \times 5$ | 2   |
| 4        | (a)               | 3   | 1   |
|          |                   | $\text{cm}^2$   | 1   |
|          | (b) (i)           | Rotation  | 1   |
|          |                   | $90^\circ$ [anticlockwise] oe                             | 1   |
|          |                   | [Centre] (0,0) oe   | 1   |
|          | (ii)              | Correct trapezium   | 2   |
| (iii)    | Correct trapezium | 2   | <b>B1</b> for correct size and orientation but incorrect position |

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| Question    | Answer                         | Mark   | Part marks  |
|-------------|--------------------------------|--|---|
| 5           | (a) (i) 17.5                   | 1  |   |
|             | (ii) She stopped oe            | 1  |   |
|             | (iii) 8.75                     | 2  | <b>M1FT</b> for <i>their</i> (a)(i) $\div 2$ soi  |
|             | (b) 660<br>275<br>385          | 3  | <b>M2</b> for one correct value in correct place<br>or $\frac{1320}{(5+12+7)} \times k$ where $k$ is 5, 12 or 7<br>or better in working<br>or <b>M1</b> for $\frac{1320}{(5+12+7)}$ or better   |
|             | (c) 5321.66 cao                | 4  | If zero scored, <b>SC1</b> for all correct answers in incorrect order<br><b>M2</b> for $5000 \times 1.021^3$ oe<br>or<br><b>M1</b> for $5000 \times 1.021 \times 1.021$ oe<br><b>A1</b> for 5321.661.....<br><b>B1 indep</b> for their answer corrected to 2 d.p. if their unrounded answer is shown to at least 3 d.p. |
| 6           | (a) (i) 46                     | 1  |   |
|             | (ii) Add 7 oe                  | 1  |   |
|             | (b) 4, 7, 12                   | 2  | <b>M1</b> for 2 correct or 3, 4, 7  |
|             | (c) (i) $2a - 3h$ final answer | 2  | <b>B1</b> for $2a$ or $-3h$   |
|             | (ii) $13x - 9$ final answer    | 2  | <b>M1</b> for $5x + 15$ or $8x - 24$ or $13x$ or $-9$   |
|             | (d) $3(2g + 5)$ final answer   | 1  |   |
| (e) 11 nfww | 3                              | <b>M2</b> for $5x = 55$ or $x + 6 = 17$<br>or<br><b>M1</b> for $5x + 30 [= 85]$ or $5(x + 6) [= 85]$<br>or<br><b>M1</b> for correct first step of incorrect linear equation if of the form $ax + b = 85, a \neq 1$ |   |

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| Question  | Answer                 | Mark      | Part marks   |
|-----------|------------------------|-----------|--|
| 7 (a)     | $-5x + 6$              | 3         | <b>B2</b> for $-5x$ (oe) + 6 or $-5x + k$<br>or<br><b>B1</b> for $kx + 6$ $k \neq 0$ or [gradient =] $\frac{\text{rise}}{\text{run}}$<br>with correct values or [gradient =] $\pm 5 \frac{k}{k}$   |
| (b) (i)   | 3 12                   | 1, 1      |  |
| (ii)      | Correct curve          | 4         | <b>B3FT</b> for 5 or 6 correctly plotted points<br>or <b>B2FT</b> for 3 or 4 correctly plotted points<br>or <b>B1FT</b> for 1 or 2 correctly plotted points  |
| (c)       | 0.2 to 0.35            | 1         | <b>FT</b>  |
| 8 (a) (i) | Correct net            | 3         | <b>B2</b> for 3 or 4 correct faces in correct position<br>or<br><b>B1</b> for 1 or 2 correct faces in correct position   |
| (ii)      | 36                     | 2         | <b>M1</b> for $6 \times 3 \times 2$ oe   |
| (b)       | Hexagon                | 1         |  |
| (c)       | Obtuse angle indicated | 1         |  |
| (d)       | 16                     | 2         | <b>M1</b> for $\frac{360}{22.5}$ or $\frac{360}{n} = 22.5$<br>or $\frac{180(n-2)}{n} = 157.5$ oe   |
| (e) (i)   | $\sqrt{20^2 - 12^2}$   | <b>M2</b> | <b>M1</b> for $20^2 = 12^2 + x^2$ or $[x^2 =] 20^2 - 12^2$   |
| (ii)      | 153 or 152.5 to 152.6  | 5         | <b>M2</b> for $\frac{\pi 6^2}{2}$ soi by 56.5... or $18 \pi$<br>or<br><b>M1</b> for $\pi 6^2$ soi by 113 or 113.0... or 113.1... or $36 \pi$<br><br><b>M1</b> for $0.5 \times 12 \times 16$ soi by 96<br><br><b>M1dep</b> for <i>their</i> 56.5... + <i>their</i> 96 dep on at least M1 earned soi |

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| Question | Answer                           | Mark | Part marks  |
|----------|----------------------------------|------|---|
| 9 (a)    | 105 806                          | 1    |   |
| (b)      | $1.03 \times 10^5$               | 1    |   |
| (c) (i)  | 46 100                           | 1    |   |
| (ii)     | 100                              | 1    |   |
| (iii)    | $6.82 \times 10^6$               | 2    | <b>B1</b> for figs 682  |
| (d)      | 1.47 or 1.466 to 1.467           | 3    | <p><b>M2</b> for <math>\left(\frac{30\,851}{30\,405} - 1\right) [\times 100]</math> oe soi by 0.0146....<br/>or 0.0147</p> <p>or <math>\left(\frac{30\,851}{30\,405}\right) \times 100 [-100]</math> oe soi by 101.46....<br/>or 101.47</p> <p>or <b>M1</b> for <math>\left(\frac{30\,851}{30\,405}\right)</math> soi by 1.0146..... or 1.0147</p> <p>Alternative method</p> <p><b>M2</b> for <math>\frac{30\,851 - 30\,405}{30\,405} [\times 100]</math> oe soi by 0.0146....<br/>or 0.0147</p> <p>or <b>B1</b> for 30 851 – 30 405 soi by 446</p> |
| 10 (a)   | 35                               | 2    | <b>B1</b> for 7   |
| (b)      | 305                              | 1    |   |
| (c)      | Point marked in correct position | 2    | <b>B1</b> for point at 4.5 cm or $050^\circ$ from <i>Y</i>  |