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Cambridge International General Certificate of Secondary Education

MATHEMATICS

0580/31

Paper 3 (Core)

October/November 2016

MARK SCHEME

Maximum Mark: 104

Published

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This document consists of **6** 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 |
| nfw | not from wrong working |
| soi | seen or implied |

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

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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 | |
| | | | B1 for prime factors 2 , 3 , 5 (and no others) identified or B1 for any correct product e.g. 9×10 , 5×18 , $6 \times 3 \times 5$, $1 \times 3 \times 30$ |
| 4 (a) | 3 | 1 | |
| | cm^2 | 1 | |
| | (b) (i) Rotation | 1 | |
| | 90° [anticlockwise] oe | 1 | |
| | [Centre] (0,0) oe | 1 | |
| | (ii) Correct trapezium | 2 | |
| | (iii) Correct trapezium | 2 | |
| | | | B1 for translation of $\begin{pmatrix} 5 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ -2 \end{pmatrix}$ B1 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 | M1FT for <i>their</i> (a)(i) $\div 2$ soi |
| (b) | 660 275 385 | 3 | M2 for one correct value in correct place or $\frac{1320}{(5+12+7)} \times k$ where k is 5, 12 or 7 or better in working or M1 for $\frac{1320}{(5+12+7)}$ or better |
| (c) | 5321.66 cao | 4 | If zero scored, SC1 for all correct answers in incorrect order M2 for 5000×1.021^3 oe or M1 for $5000 \times 1.021 \times 1.021$ oe A1 for 5321.661..... B1 indep 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 | M1 for 2 correct or 3, 4, 7 |
| (c) (i) | $2a - 3h$ final answer | 2 | B1 for $2a$ or $-3h$ |
| (ii) | $13x - 9$ final answer | 2 | M1 for $5x + 15$ or $8x - 24$ or $13x$ or -9 |
| (d) | $3(2g + 5)$ final answer | 1 | |
| (e) | 11 nfww | 3 | M2 for $5x = 55$ or $x + 6 = 17$ or M1 for $5x + 30 [= 85]$ or $5(x + 6) [= 85]$ or M1 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 | B2 for $-5x$ (oe) + 6 or $-5x + k$ or B1 for $kx + 6$ $k \neq 0$ or [gradient =] $\frac{\text{rise}}{\text{run}}$ with correct values or [gradient =] $\pm 5 \frac{k}{k}$ |
| (b) (i) | 3 12 | 1, 1 | |
| (ii) | Correct curve | 4 | B3FT for 5 or 6 correctly plotted points or B2FT for 3 or 4 correctly plotted points or B1FT for 1 or 2 correctly plotted points |
| (c) | 0.2 to 0.35 | 1 | FT |
| 8 (a) (i) | Correct net | 3 | B2 for 3 or 4 correct faces in correct position or B1 for 1 or 2 correct faces in correct position |
| (ii) | 36 | 2 | M1 for $6 \times 3 \times 2$ oe |
| (b) | Hexagon | 1 | |
| (c) | Obtuse angle indicated | 1 | |
| (d) | 16 | 2 | M1 for $\frac{360}{22.5}$ or $\frac{360}{n} = 22.5$ or $\frac{180(n-2)}{n} = 157.5$ oe |
| (e) (i) | $\sqrt{20^2 - 12^2}$ | M2 | M1 for $20^2 = 12^2 + x^2$ or $[x^2 =] 20^2 - 12^2$ |
| (ii) | 153 or 152.5 to 152.6 | 5 | M2 for $\frac{\pi 6^2}{2}$ soi by 56.5... or 18π or M1 for $\pi 6^2$ soi by 113 or 113.0.... or 113.1.... or 36π M1 for $0.5 \times 12 \times 16$ soi by 96 M1dep 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) | 1.03×10^5 | 1 | |
| (c) (i) | 46 100 | 1 | |
| (ii) | 100 | 1 | |
| (iii) | 6.82×10^6 | 2 | B1 for figs 682 |
| (d) | 1.47 or 1.466 to 1.467 | 3 | <p>M2 for $\left(\frac{30\,851}{30\,405} - 1\right) [\times 100]$ oe soi by 0.0146.... or 0.0147</p> <p>or $\left(\frac{30\,851}{30\,405}\right) \times 100 [-100]$ oe soi by 101.46.... or 101.47</p> <p>or M1 for $\left(\frac{30\,851}{30\,405}\right)$ soi by 1.0146..... or 1.0147</p> <p>Alternative method</p> <p>M2 for $\frac{30\,851 - 30\,405}{30\,405} [\times 100]$ oe soi by 0.0146.... or 0.0147</p> <p>or B1 for 30 851 – 30 405 soi by 446</p> |
| 10 (a) | 35 | 2 | B1 for 7 |
| (b) | 305 | 1 | |
| (c) | Point marked in correct position | 2 | B1 for point at 4.5 cm or 050° from <i>Y</i> |