



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

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**MATHEMATICS**

**0580/32**

Paper 3 (Core)

**May/June 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               |
| nfww | not from wrong working     |
| soi  | seen or implied            |

| Question                               | Answer  | Mark  | Part marks  |
|--|---|---|---|
| <b>1</b>                               | <b>(a) (i)</b> Frequencies 4, 7, 3, 5, 1  | <b>2</b>                                    | <b>B1</b> for 3 or 4 correct in frequency column or for fully correct tally in tally column or for 4, 7, 3, 5, 1 in tally column  |
|  | <b>(ii)</b> Correct bar chart   | <b>3FT</b>                                  | <b>B1</b> for linear vertical scale<br><br><b>B2FT</b> for all bars correct height and equal width, with equal gaps or no gaps<br>or<br><b>B1FT</b> for all bars correct height with unequal widths and/or gaps<br>or at least four bars correct height and equal width, with equal gaps or no gaps |
|  | <b>(iii)</b> 3  | <b>1</b>                                    |   |
|  | <b>(b)</b> $\frac{11}{20}$ final answer   | <b>2</b>                                    | <b>M1</b> for $\frac{550}{1000}$ oe seen  |
|  | <b>(c)</b> Three correct evaluated, to at least 3 significant figures, consistent divisions | <b>M2</b>                                   | <b>M2</b> implied by 2.67 or 2.66... <b>and</b> 2.52 <b>and</b> 2.59...<br>or<br><b>M1</b> for one correct evaluated division soi, implied by one of 2.67 or 2.66..., 2.52, 2.59... [\$/litre]<br>or one of $2.40/0.9 = 2.7$ , $3.15/1.25 = 2.5$ , $3.50/1.35 = 2.6$                                |
| <b>(d)</b> 1.25 litre bottle indicated | <b>A1</b>   | Dependent on M2                             |   |
| <b>(d)</b> 145 155                     | <b>1, 1</b>   | <b>B1</b> for both correct in reverse order |   |
| <b>2</b>                               | <b>(a) (i)</b> 21 or 28   | <b>1</b>                                    |   |
|  | <b>(ii)</b> 16 or 81  | <b>1</b>                                    |   |
|  | <b>(iii)</b> 27   | <b>1</b>                                    |   |
|  | <b>(iv)</b> 17 or 61 or 67 or 71  | <b>1</b>                                    |   |
|  | <b>(b)</b> $\sqrt{2}$ <b>and</b> $\pi$  | <b>1</b>                                    |   |
|  | <b>(c)</b> $7 \times (5 - 2 + 3) = 42$  | <b>1</b>                                    |   |

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| <b>Question</b>  | <b>Answer</b>   | <b>Mark</b> | <b>Part marks</b>  |
|------------------|---|-------------|--|
| <b>(d) (i)</b>   | 0.9 or $\frac{9}{10}$                                     | <b>1</b>    |  |
| <b>(ii)</b>      | 625   | <b>1</b>    |  |
| <b>(iii)</b>     | 0.0625 or $\frac{1}{16}$                                  | <b>1</b>    |  |
| <b>(e) (i)</b>   | $2^2 \times 3 \times 5$ or $2 \times 2 \times 3 \times 5$ | <b>2</b>    | <b>B1</b> for prime factors 2, 3 and 5 (and no others) identified<br>or a correct product eg $6 \times 10$ , $4 \times 15$ , $5 \times 12$ , $4 \times 3 \times 5$ etc                         |
| <b>(ii)</b>      | 180   | <b>2</b>    | <b>M1</b> for $2 \times 2 \times 3 \times 3$ or $2^2 \times 3^2 [= 36]$<br>or<br><b>B1</b> for any other multiple of 180<br>or for listing at least 5 multiples of each with maximum one error |
| <b>3 (a) (i)</b> | 11 04   | <b>1</b>    |  |
| <b>(ii)</b>      | 11 50   | <b>1FT</b>  |  |
| <b>(iii)</b>     | 38  | <b>1</b>    |  |
| <b>(b)</b>       | 4.5   | <b>1</b>    |  |
| <b>(c) (i)</b>   | 2.2   | <b>2</b>    | <b>B1</b> for 11 or 2200 seen  |
| <b>(ii)</b>      | 150°  | <b>1</b>    |  |
| <b>(iii)</b>     | Correct position  | <b>2</b>    | <b>B1</b> for bearing 195°<br><br><b>B1</b> for distance 2.5 cm  |
| <b>(iv)</b>      | 3770 or 3769.9 to 3770.4                                  | <b>4</b>    | <b>B2</b> for diameter 1200 [metres] soi<br>or <b>B1</b> for diameter 6 [cm] soi<br><br><b>M1</b> for $\pi \times$ <i>their</i> diameter soi   |
| <b>4 (a) (i)</b> | 18  | <b>2</b>    | <b>M1</b> for $4 \times 3 \times 1.5$  |
| <b>(ii)</b>      | Correct net   | <b>3</b>    | <b>B2</b> for 6 rectangles correctly positioned to form net of cuboid<br>or<br><b>B1</b> for two 4 cm by 3 cm rectangles, two 4 cm by 1.5 cm rectangles and two 3 cm by 1.5 cm rectangles seen |
| <b>(b) (i)</b>   | $16x + 8$ or $8(2x + 1)$                                  | <b>2</b>    | <b>M1</b> for $2(5x + 4 + 3x)$ oe<br>or $16x + k$ as answer<br>or for $3x + 4$ or $2x - 1$ seen  |

|        |                                 |          |       |
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| Question  | Answer  | Mark | Part marks   |
|-----------|---|------|--|
| (ii)      | 4   | 2FT  | M1FT for <i>their</i> (b)(i) = 72 if <i>their</i> (b)(i) is linear   |
| (iii)     | 176   | 3    | M2FT for $(5x + 4) \times (x + 1) + (2x - 1) \times (2x)$ or better soi<br>or<br>$(2x) \times (3x) + (3x + 4) \times (x + 1)$ or better soi<br>or<br>$(5x + 4) \times (3x) - (3x + 4) \times (2x - 1)$ or better soi<br>or<br>M1FT for two sides length from ( $5x + 4, 3x, 2x, x + 1, 2x - 1, 3x + 4$ ) evaluated soi |
| 5 (a) (i) | 7.5   | 2    | M1 for $(5+9+12+3+7+4+10+11+5+9) \div 10$ or better  |
| (ii)      | 4 points correct  | 2    | B1 for 3 correct   |
| (iii)     | Positive  | 1    |  |
| (iv)      | Ruled line of best fit                                      | 1    |  |
| (v)       | 84 to 96  | 1FT  | FT their positive line of best fit   |
| (vi)      | (Point) below /lower than/right of/under line (of best fit) | 1    |  |
| (b) (i)   | 5 : 3 : 2   | 2    | M1 for 75 : 45 : 30 or better  |
| (ii)      | 2244  | 2    | M1 for $[ 2550 \times ] 0.88$ oe   |
| (iii)     | 495   | 3    | M2 for $36 \times 120 + 0.15 \times 4500$ soi<br>or M1 for $36 \times 120$ or $0.15 \times 4500$ soi   |
| 6 (a) (i) | Ruled continuous line $y = 3$                               | 1    |  |
| (ii)      | Ruled continuous line $x = 1$                               | 2    | B1 for (1, -4) plotted<br>or<br>B1 for any line perpendicular to <i>their</i> $y = 3$ drawn  |
| (b)       | -8, 4, 4, -8  | 2    | B1 for 3 correct   |
| (c)       | Completely correct curve                                    | 4    | B3FT for 7 or 8 points correctly plotted<br>B2FT for 5 or 6 points correctly plotted<br>B1FT for 3 or 4 points correctly plotted   |
| (d)       | (-1.5, 4.1 to 4.4)  | 1    |  |
| (e)       | -2.5 to -2.7 and -0.3 to -0.5                               | 2FT  | FT intersection of <i>their</i> (a)(i) with <i>their</i> curve<br>B1FT for one correct   |

|        |                                 |          |       |
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| Question | Answer              | Mark  | Part marks   |   |
|----------|---------------------|---|--|---|
| 7        | (a) (i)             | 25  | 1  |   |
|          | (ii)                | 57  | 1  |   |
|          | (b)                 | [ $\angle BCA =$ ] $180 - 49 - 41 = 90^\circ$               | B1   |   |
|          |                     | Angle [in a ] semicircle                                    | B1   |   |
|          | (c)                 | 14.6 or 14.58...  | 2  | M1 for $\cos 35 = \frac{PR}{17.8}$ or better                                      |
| (d)      | 19.3 or 19.31...    | 3   | M2 for [ $KL =$ ] $\sqrt{28.9^2 - 21.5^2}$ or better<br>or M1 for $28.9^2 = KL^2 + 21.5^2$ or better |   |
| 8        | (a) (i)             | Correct reflection<br>vertices (4, -5), (5, -5) and (4, -7) | 2  | B1 for reflection in $y = k$  |
|          | (ii)                | Translation   | 1  |   |
|          |                     | $\begin{pmatrix} -7 \\ -5 \end{pmatrix}$                    | 1  |   |
|          | (iii)               | Rotation  | 1  |   |
|          |                     | $90^\circ$ [anticlockwise] oe                               | 1  |   |
|          |                     | [centre] (0, 0) oe  | 1  |   |
| (b)      | Correct enlargement | 2   | B1 for correct size and orientation, incorrect position  |   |
| 9        | (a) (i)             | 38  | 2  | M1 for $4 \times 5 - 3 \times -6$ or better<br>or B1 for 20 or 18 or -18 seen     |
|          | (ii)                | $\frac{p+3t}{4}$ oe   | 2  | M1 for $4r = p + 3t$ or $\frac{p}{4} = r - \frac{3t}{4}$                          |
|          | (b)                 | $9x + 7$ final answer                                       | 2  | B1 for $12x - 8$ or $-3x + 15$ or $9x$ or $+7$ seen in working                    |
|          | (c)                 | $4a(3b - 5a)$ final answer                                  | 2  | M1 for $a(12b - 20a)$ or $4(3ab - 5a^2)$<br>or $2a(6b - 10a)$ or $2(6ab - 10a^2)$ |