



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

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**MATHEMATICS**

**0580/33**

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 (a)</b>     | 258[.00]<br>25.56<br>758.56                                         | <b>1</b><br><b>1</b><br><b>1FT</b> | <b>FT</b> 475 + <i>their</i> two previous answers                                   |
| <b>(b) (i)</b>   | 85                                                                  | <b>1</b>                           |                                                                                     |
| <b>(ii)</b>      | 739.2[0]                                                            | <b>3</b>                           | <b>M1</b> for 4400 – 3740 or soi by 660<br><b>M1</b> for <i>their</i> 660 × 1.12 oe |
| <b>(c)</b>       | 26.75 cao                                                           | <b>1</b>                           |                                                                                     |
| <b>(d)</b>       | Van <u>and</u> 12.6 > 12.4 oe<br>or 0.0792 < 0.0806<br>or 0.982 < 1 | <b>2</b>                           | <b>B1</b> for 12.6[...] or 0.0806[...] or 0.982[...]                                |
| <b>(e)</b>       | 2800                                                                | <b>2</b>                           | <b>M1</b> for [2×] 4200 ÷ (1 + 2) oe or soi by 1400                                 |
| <b>2 (a) (i)</b> | [0].45                                                              | <b>1</b>                           |                                                                                     |
| <b>(ii)</b>      | 6.115 or 6.12                                                       | <b>2</b>                           | <b>M1</b> for adding the lengths (soi by 48.92) ÷ 8                                 |
| <b>(b) (i)</b>   | 4 correct points                                                    | <b>2</b>                           | <b>B1</b> for 2 or 3 correct points                                                 |
| <b>(ii)</b>      | Negative                                                            | <b>1</b>                           |                                                                                     |
| <b>(iii)</b>     | No [because] the faster an athlete runs the further they jump oe    | <b>1</b>                           | Accept any correct statement                                                        |
| <b>(iv)</b>      | Correct ruled line of best fit                                      | <b>1</b>                           |                                                                                     |
| <b>(v)</b>       | Correct distance from <i>their</i> line of best fit                 | <b>1FT</b>                         | <b>Strict 1FT</b> from straight line with negative gradient                         |

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| Question | Answer                                                           | Mark                   | Part marks                                                                                                                                                                                                                                                                                   |
|----------|------------------------------------------------------------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>3</b> | <b>(a) (i)</b> 35                                                | <b>1</b>               |                                                                                                                                                                                                                                                                                              |
|          | <b>(ii)</b> 74                                                   | <b>1</b>               |                                                                                                                                                                                                                                                                                              |
|          | <b>(b)</b> 43 <b>and</b> valid reasons                           | <b>3</b>               | reasons include exterior angle [of a triangle] equals the sum of the interior opposite angles or angles on a straight line [sum to 180] and angles in a triangle [sum to 180]<br><br><b>B2</b> for 43<br>or <b>M1</b> for $180 - 128$ soi by 52 or $128 - 85$<br><b>B1</b> for valid reasons |
|          | <b>(c)</b> 32.2 or 32.23...                                      | <b>2</b>               | <b>M1</b> for $\sin [\dots] = 8 \div 15$ oe                                                                                                                                                                                                                                                  |
|          | <b>(d) (i)</b> $[AB] = \sqrt{300^2 + 225^2}$                     | <b>2</b>               | <b>M1</b> for $300^2 + 225^2$                                                                                                                                                                                                                                                                |
|          | <b>(ii)</b> 15 35                                                | <b>4</b>               | <b>M1</b> for $375 \div 450$ or $[0].833[\dots]$<br><b>M1</b> for <i>their</i> $[0].833 \times 60$ or soi by 50<br><b>M1</b> for $1445 + \text{their } 50$ soi                                                                                                                               |
| <b>4</b> | <b>(a) (i)</b> <i>B</i> correct<br><i>C</i> correct with arcs    | <b>1</b><br><b>2FT</b> | <b>B1</b> for <i>C</i> correct without arcs or correct pair of arcs or correct lengths reversed with arcs<br>If zero scored, <b>SC1</b> for $AB=8$ or $AC=6$ or $BC=5$                                                                                                                       |
|          | <b>(ii)</b> $[0]37$ to $[0]41$                                   | <b>1</b>               | Correct or <b>FT</b>                                                                                                                                                                                                                                                                         |
|          | <b>(iii)</b> 203                                                 | <b>2</b>               | <b>M1</b> for $180 + 23$                                                                                                                                                                                                                                                                     |
|          | <b>(b)</b> Correct perpendicular bisector of <i>PT</i> with arcs | <b>2</b>               | <b>B1</b> for correct perpendicular bisector of <i>PT</i> with no / incorrect arcs<br>or two correct pairs of intersecting arcs                                                                                                                                                              |
|          | arc centre <i>W</i> radius 6 cm                                  | <b>2</b>               | <b>B1</b> for any arc centred on <i>W</i>                                                                                                                                                                                                                                                    |
|          | both points marked on intersection of line and arc               | <b>1dep</b>            | <b>dep</b> on an attempt at bisector and attempt at the arc                                                                                                                                                                                                                                  |

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| Question         | Answer                               | Mark                 | Part marks                                                                                                                                                                                                                                             |
|------------------|--------------------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>5 (a) (i)</b> | 64<br>81 and no others               | <b>2</b>             | <b>B1</b> for 1 correct and no others or 2 correct and 1 wrong                                                                                                                                                                                         |
| <b>(ii)</b>      | $90k$                                | <b>1</b>             | accept any multiple of 90                                                                                                                                                                                                                              |
| <b>(iii)</b>     | 1, 3, 9, 27 only                     | <b>2</b>             | <b>B1</b> for three correct and no extras or four correct and one extra                                                                                                                                                                                |
| <b>(iv)</b>      | 16                                   | <b>2</b>             | <b>B1</b> for 2, 4 or 8 as answer                                                                                                                                                                                                                      |
| <b>(b)</b>       | $\frac{11}{6}$ oe                    | <b>B1</b>            |                                                                                                                                                                                                                                                        |
|                  | $\frac{11}{6} \times \frac{5}{2}$ oe | <b>M1</b>            | <b>FT</b> <i>their</i> $\frac{11}{6}$                                                                                                                                                                                                                  |
|                  | $\frac{55}{12}$ oe                   | <b>A1</b>            |                                                                                                                                                                                                                                                        |
|                  | $4\frac{7}{12}$                      | <b>B1</b>            | <b>Dep</b> on A1                                                                                                                                                                                                                                       |
| <b>(c) (i)</b>   | 20<br>Add 3 oe                       | <b>1</b><br><b>1</b> |                                                                                                                                                                                                                                                        |
| <b>(ii)</b>      | -7<br>Subtract 8 oe                  | <b>1</b><br><b>1</b> |                                                                                                                                                                                                                                                        |
| <b>(iii)</b>     | 16<br>Differences increase by 1 oe   | <b>1</b><br><b>1</b> |                                                                                                                                                                                                                                                        |
| <b>(iv)</b>      | 125<br>Cube numbers                  | <b>1</b><br><b>1</b> |                                                                                                                                                                                                                                                        |
| <b>6 (a)</b>     | $6h$ oe                              | <b>1</b>             |                                                                                                                                                                                                                                                        |
| <b>(b) (i)</b>   | $4x$ oe                              | <b>1</b>             |                                                                                                                                                                                                                                                        |
| <b>(ii)</b>      | $x^2$ oe                             | <b>1</b>             |                                                                                                                                                                                                                                                        |
| <b>(c)</b>       | 7.5                                  | <b>5</b>             | <b>M1</b> for $2x + 1 + x + 3 + 2x + 1 + x + 3$ oe<br><b>M1</b> for $6x + 8$ or <i>their</i> expression simplified correctly<br><b>M1</b> for <i>their</i> $6x + 8 = 53$<br><b>M1</b> for a correct first step in solving <i>their</i> linear equation |
| <b>(d)</b>       | $6a + b$ final answer                | <b>2</b>             | <b>B1</b> for $6a$ or $[+] b$                                                                                                                                                                                                                          |
| <b>(e) (i)</b>   | $5x - 20$ final answer               | <b>1</b>             |                                                                                                                                                                                                                                                        |
| <b>(ii)</b>      | $x^3 + 3x$ final answer              | <b>2</b>             | <b>B1</b> for $x^3$ or $[+] 3x$                                                                                                                                                                                                                        |
| <b>(f)</b>       | $4x(2x - 1)$ final answer            | <b>2</b>             | <b>B1</b> for $x(8x - 4)$ or $4(2x^2 - x)$ or $2(4x^2 - 2x)$ or $2x(4x - 2)$                                                                                                                                                                           |

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| Question       | Answer                                    | Mark       | Part marks                                                                                                                                                  |
|----------------|-------------------------------------------|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>7 (a)</b>   | Correct reflection                        | <b>1</b>   | <b>B1</b> for either correct horizontal or vertical movement                                                                                                |
| <b>(b)</b>     | Correct translation                       | <b>2</b>   |                                                                                                                                                             |
| <b>(c)</b>     | Rotation                                  | <b>1</b>   |                                                                                                                                                             |
|                | [about] (0,0) oe                          | <b>1</b>   |                                                                                                                                                             |
|                | 90° [anti-clockwise] oe                   | <b>1</b>   |                                                                                                                                                             |
| <b>(d)</b>     | Enlargement                               | <b>1</b>   |                                                                                                                                                             |
|                | [centre] (0,0) oe                         | <b>1</b>   |                                                                                                                                                             |
|                | [sf] 2                                    | <b>1</b>   |                                                                                                                                                             |
| <b>8 (a)</b>   | 15 8 ... 0 ... 0 ... 8                    | <b>3</b>   | <b>B1</b> for 8 and 8 in the correct place<br><b>B1</b> for 0 and 0 in the correct place<br><b>B1</b> for 15 in the correct place                           |
| <b>(b)</b>     | Correct curve                             | <b>4</b>   | <b>B3FT</b> for 7 or 8 correctly plotted points<br>or <b>B2FT</b> for 5 or 6 correctly plotted points<br>or <b>B1FT</b> for 3 or 4 correctly plotted points |
| <b>(c)</b>     | Correct ruled line                        | <b>1</b>   |                                                                                                                                                             |
| <b>(d)</b>     | –1.8 or –1.7 or –1.6<br>3.6 or 3.7 or 3.8 | <b>2FT</b> | <b>B1FT</b> for one correct<br>or <b>B1FT</b> for both correct answers as co-ordinates<br>or <b>B1FT</b> for both answers correct to more than 1dp          |
| <b>9 (a)</b>   | 325<br>150<br>450<br>75                   | <b>3</b>   | <b>B2</b> for 3 correct<br>or <b>B1</b> for 1 or 2 correct<br>or <b>M1</b> for $45 \div 18$ soi by 2.5                                                      |
| <b>(b) (i)</b> | 632                                       | <b>2</b>   | <b>M1</b> for $(395 \times 8) \div 5$ oe                                                                                                                    |
| <b>(ii)</b>    | 0.632                                     | <b>1FT</b> | <b>FT</b> <i>their (b)(i)</i> $\div 1000$                                                                                                                   |