



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

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**CAMBRIDGE INTERNATIONAL MATHEMATICS**

**0607/31**

Paper 3 (Core)

**May/June 2017**

MARK SCHEME

Maximum Mark: 96

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**Published**

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## MARK SCHEME NOTES

The following notes are intended to aid interpretation of mark schemes in general, but individual mark schemes may include marks awarded for specific reasons outside the scope of these notes.

### Types of mark

- M Method marks, awarded for a valid method applied to the problem.
- A Accuracy mark, awarded for a correct answer or intermediate step correctly obtained. For accuracy marks to be given, the associated Method mark must be earned or implied.
- B Mark for a correct result or statement independent of Method marks.

When a part of a question has two or more ‘method’ steps, the M marks are in principle independent unless the scheme specifically says otherwise; and similarly where there are several B marks allocated. The notation ‘**dep**’ is used to indicate that a particular M or B mark is dependent on an earlier mark in the scheme.

### Abbreviations

|      |                            |
|------|----------------------------|
| awrt | answers which round to     |
| cao  | correct answer only        |
| dep  | dependent                  |
| FT   | follow through after error |
| isw  | ignore subsequent working  |
| nfww | not from wrong working     |
| oe   | or equivalent              |
| rot  | rounded or truncated       |
| SC   | Special Case               |
| soi  | seen or implied            |

| Question  | Answer  | Marks | Part Marks   |
|-----------|---|-------|--|
| 1(a)      | Accept any two from:<br>whole [number], prime [number], odd,<br>integer, real [number], natural [number],<br>rational [number], positive [number] | 2     | <b>B1</b> for one correct  |
| 1(b)(i)   | Any multiple of 7   | 1     |  |
| 1(b)(ii)  | $\frac{7}{100}$   | 1     |  |
| 1(b)(iii) | 399   | 1     |  |
| 1(c)(i)   | 0.14  | 2     | <b>B1</b> for 0.143 or 0.1428 to 0.1429  |
| 1(c)(ii)  | 2.65  | 2     | <b>B1</b> for 2.645 to 2.646   |
| 1(c)(iii) | $8.24 \times 10^5$ or $8.235... \times 10^5$  | 2     | <b>B1</b> for 823543 soi   |
| 2(a)      | 100   | 1     |  |
| 2(b)      | 27  | 1     |  |
| 2(c)      | $\frac{9}{20}$  | 2     | <b>FT</b> $\frac{45}{their(a)}$ correctly cancelled<br><b>B1FT</b> for $\frac{45}{100}$ or $\frac{45}{their(a)}$ |
| 2(d)      | Bars with heights at 45 and 18  | 2     | <b>B1</b> for one bar correct height   |
| 3(a)(i)   | 94.5[0]   | 1     |  |
| 3(a)(ii)  | 90  | 1     |  |
| 3(a)(iii) | The Valley, 4.5[0]  | 1     | <b>FT</b> <i>their</i> (a)(i) and (a)(ii)  |
| 3(b)      | 14  | 3     | <b>M1</b> for $200 \div 13.50$ soi<br><b>A1</b> for 14.8...  |
| 4(a)      | 29  | 1     |  |
| 4(b)(i)   | Equilateral   | 1     |  |
| 4(b)(ii)  | 60  | 2     | <b>M1</b> for $180 \div 3$   |
| 4(b)(iii) | 3   | 1     |  |
| 4(c)      | 78  | 2     | <b>M1</b> for $(180 - 24) \div 2$ soi  |
| 5(a)      | $x^{11}$  | 1     |  |
| 5(b)      | $x^8$   | 1     |  |
| 5(c)      | $x^{18}$  | 1     |  |

| Question | Answer   | Marks     | Part Marks  |
|----------|--|-----------|---|
| 6(a)(i)  | Correct diagram  | 1         |   |
| 6(a)(ii) | 12   | 1         |   |
| 6(b)     | 8, 16, 32  | 2         | <b>B1</b> for two values  |
|          | Multiply by 2 oe   | 1         |   |
|          | 7, 11, 16  | 2         | <b>B1</b> for two values  |
|          | +1, +2, +3 oe  | 1         |   |
| 7(a)     | 14   | 4         | <b>M3</b> for $27.5 \times 15 \times 4 - 16 \times 16 \times 6.5$ oe<br>or<br><b>M1</b> for $27.5 \times 15 \times 4$ or $16 \times 16 \times 6.5$ oe<br><b>A1</b> for $A = 1650$<br><b>A1</b> for $B = 1664$ |
| 7(b)     | Area of 6 faces of $B$   | <b>M2</b> | <b>M1</b> for area of 3 faces of $B$  |
|          | $B = 928$  | <b>A1</b> |   |
|          | $\frac{\text{their } B}{1165} [\times 100]$                                  | <b>M1</b> |   |
|          | 79.6 to 79.7   | <b>A1</b> |   |
| 8(a)     | 7  | 2         | <b>M1</b> for $5 \times 3 - 4 \times 2$<br>or <b>B1</b> for 15 or $-8$ seen   |
| 8(b)     | $3x(x - 3)$  | 2         | <b>B1</b> for $3(x^2 - 3x)$ or $x(3x - 9)$  |
| 8(c)(i)  | 2  | 2         | <b>M1</b> for $4x = 13 - 5$ oe  |
| 8(c)(ii) | 9  | 2         | <b>M1</b> for $3x - 12 = 15$ or $x - 4 = 5$   |
| 8(d)     | $\frac{F - B}{2}$ oe final answer  | 2         | <b>M1</b> for $F - B = 2A$ or $\frac{F}{2} = A + \frac{B}{2}$ seen<br><br>If 0 scored <b>SC1</b> for answer $\frac{F}{2} - B$ or<br>$F - B \div 2$  |
| 9(a)     | Rotation<br>90 [anti-clockwise] or 270 clockwise<br>[About] (0, 0) or Origin | 3         | <b>B1</b> for each  |
| 9(b)     | Correct translation  | 2         | <b>M1</b> for translation $\begin{pmatrix} k \\ 1 \end{pmatrix}$ or $\begin{pmatrix} 4 \\ k \end{pmatrix}$  |
| 9(c)     | Correct reflection   | 2         | <b>M1</b> for correct reflection in any vertical line   |

| Question  | Answer  | Marks | Part Marks   |
|-----------|---|-------|--|
| 10(a)     | 4 points correctly plotted  | 2     | <b>B1</b> for 2 or 3 points correctly plotted  |
| 10(b)     | Negative  | 1     |  |
| 10(c)(i)  | 6   | 1     |  |
| 10(c)(ii) | 5.5   | 1     |  |
| 10(d)     | Ruled line of best fit through <i>their</i> mean point and within tolerance | 2     | <b>M1</b> for ruled line within tolerance not through <i>their</i> mean point or for ruled line with negative gradient through <i>their</i> mean point |
| 10(e)     | 9   | 1     | <b>FT</b> <i>their</i> line with negative gradient   |
| 10(f)(i)  | 21 to 40  | 1     |  |
| 10(f)(ii) | Largest 100   | 1     |  |
|           | Smallest 61   | 1     |  |
| 11(a)     | 14  | 2     | <b>M1</b> for $7 \div 30$ or $30 \div 60$  |
| 11(b)     | 46  | 2     | <b>M1</b> for $50 \times 0.08$ oe or for 0.92 oe seen  |
| 11(c)     | 176   | 2     | <b>M1</b> for $208 \div (11 + 2)$ soi by 16  |
| 12(a)     | 38.3 or 38.29 to 38.30  | 4     | <b>B1</b> for 139<br><b>B2</b> for 100.7...<br>or <b>M1</b> for $85^2 + 54^2$  |
| 12(b)     | 32.4 or 32.42 to 32.43  | 2     | <b>M1</b> for $\tan [\dots] = \frac{54}{85}$ oe<br><b>FT</b> <i>their</i> AB if using sine or cosine   |
| 13(a)     | Correct sketch  | 2     | <b>B1</b> for correct shape, wrong position  |
| 13(b)     | Correct sketch  | 2     | <b>B1</b> for correct shape but touching axes and/or with branches connected   |
| 13(c)     | 1.83 or 1.826 to 1.827  | 1     |  |
|           | -0.442 or -0.4415 to -0.4419  | 1     | If 0 scored <b>SC1</b> for 1.8 and 0.44  |