



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CAMBRIDGE INTERNATIONAL MATHEMATICS

0607/43

Paper 4 (Extended)

May/June 2016

MARK SCHEME

Maximum Mark: 120

Published

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Abbreviations

| | |
|------|----------------------------|
| awrt | answers which round to |
| 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 |
|-----------|--|------|---|
| 1 (a) (i) | 13205.2 | 1 | |
| (ii) | 13200 | 1 | |
| (iii) | 13210 | 1 | |
| (iv) | 13205.173 | 1 | |
| (b) | 120 | 1 | |
| 2 (a) | $(3x+2)(x-4)$ | 2 | SC1 for $(3x+a)(x+b)$ where $ab = -8$ or $a+3b = -10$ |
| (b) | $-\frac{2}{3} < x < 4$ | 2FT | B1 for either correct |
| (c) | 221.8 or 221.8... 318.2 or 318.18 to 318.19 | 3 | B2 for either correct or M1 for $\sin x = \text{their} \left(-\frac{2}{3} \right)$ where $-1 < \text{their} \left(-\frac{2}{3} \right) < 1$ or M1 for sketch or M1 for 41.8 or -41.8 seen |
| 3 (a) | 62.5 | 3 | B1 for $y = k(x+1)^3$ B1 for $k = 0.5$ OR M2 for $\frac{y}{32} = \frac{(4+1)^3}{(3+1)^3}$ |
| (b) | 2 | 2 | B1FT for $x+1 = \sqrt[3]{\text{their } 27}$ |
| (c) | $x = \sqrt[3]{2y} - 1$ oe final answer | 3 | M1 for division by <i>their</i> k M1 for cube root M1 for subtracting 1, must be final step |

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| Question | Answer | Mark | Part Marks |
|-----------|---|-------------------|---|
| 4 (a) (i) | $A = 4r^2 - \pi r^2$ oe final answer | 2 | M1 for $ar^2 - b\pi r^2$ |
| (ii) | 30.9 or 30.88 to 30.90[...] | 1 | |
| (b) | $8r + 2\pi r$ oe final answer | 3 | B1 for $8r$ oe B1 for $2\pi r$ oe If B0 scored then M1 for $r + r + \frac{1}{4} \times 2\pi r$ oe |
| 5 (a) | $0.5 \times 12.4 \times x \times \sin 30 [= 34.1]$ oe | 1 | |
| (b) | 6.21 or 6.205 to 6.206 | 3 | B2 for 38.50 to 38.51 or M1 for $11^2 + 12.4^2 - 2 \times 11 \times 12.4 \times \cos 30$ |
| (c) | 62.3 or 62.4 or 62.33 to 62.41... | 3 | M2 for $\sin A = \frac{11 \times \sin 30}{\text{their } 6.21}$ or $\cos A = \frac{12.4^2 + (\text{their } (b))^2 - 11^2}{2 \times 12.4 \times \text{their } (b)}$ or M1 for $\frac{11}{\sin A} = \frac{\text{their } 6.21}{\sin 30}$ oe |
| (d) | 6.2 | 2 | M1 for $12.4 \times \sin 30$ oe |
| 6 (a) | 166 or 165.6 to 165.7 | 2 | M1 for correct use of mid-pts at least 4 of (150, 157.5, 162.5, 167.5, 172.5, 182.5) |
| (b) (i) | 2.6, 13.2, 16.4, 23.6, 16.4, 1.73 | 2 | B1 for 4 or 5 correct |
| (ii) | Suitable vertical scale Correct column widths Correct heights | 1 1 2FT dep | B1 for 4 or 5 correct dep on at least B1 in (b)(i) |
| 7 (a) | 90000 | 4 | M3 for $1.05 \times 1.1 \times a = 103950$ or better M2 for $\frac{103950}{1.05 \text{ or } 1.1}$ oe or M2 for 1.05×1.1 M1 for $103950 = 105\%$ |
| (b) | 2028 | 3 | M2 for $1.05^n = \frac{200000}{103950}$ where $n > 1$ or M1 for 103950×1.05^n where $n > 1$ If 0 scored SC2 for 13.4 or 13.41... seen |

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| Question | Answer | Mark | Part Marks |
|-----------|---|----------------------------------|--|
| 8 | (a) $6\mathbf{p} - \mathbf{q}$ | 2 | B1 for $\overline{XD} = -\mathbf{q}$ or M1 for $\overline{AD} = \overline{AX} + \overline{XD}$ oe |
| | (b) $3\mathbf{p} + \mathbf{q}$ oe | 2 | M1 for $\overline{AC} = 9\mathbf{p}$ or $\overline{XC} = 3\mathbf{p}$ or correct route |
| | (c) $3\mathbf{p} - 2\mathbf{q}$ oe | 3 | M1 for $\overline{BD} = \textit{their (a)}$ M1 for $\overline{CB} = \overline{CD} + \overline{DB}$ oe |
| 9 | (a) $[QR =] P$ $[PQR =] Q$ $[ST =] Q$ $[SQ =] T$ $[PTP =] T$ $[TPP =] S$ | 6 | B1 for each |
| | (b) (i) Points (2, 2) (2, 1) (5, 1) | 2 | B1 for (2, 1) or (5, 1) correct |
| | (ii) Points (2, -2) (2, -1) (5, -1) | 1FT | FT their <i>B</i> reflected in <i>x</i> -axis |
| | (iii) Rotation 90 [anticlockwise] oe [Centre] (0, 0) oe | 1 1 1 | |
| 10 | (a) (i) Points correctly plotted | 3 | B2 for 4 or 5 correct points B1 for 2 or 3 correct points |
| | (ii) Positive | 1 | |
| | (b) (i) 32.7 | 1 | |
| | (ii) 23.6 | 1 | |
| | (c) (i) $[y =] -5.57 + 0.892x$ | 2 | B1 for $-5.57 + kx$, or B1 for $a + 0.892x$, If 0 scored SC1 for $-5.6 + 0.89x$ |
| | (ii) 21.2 or 21.19... | 1FT | FT <i>their (c)(i)</i> using $x = 30$ |
| | (iii) Outside range oe | 1 | |

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| Question | Answer | Mark | Part Marks |
|------------|--|-------------|---|
| 11 (a) | Correct sketch | 4 | B1 Correct graph for $x > 3$ B1 Correct graph for $x < 1$ B1 Correct graph for $1 < x < 3$ B1 Approximately correct intercepts |
| (b) | $x = 1$ $x = 3$ $y = 3$ | 1 1 1 | |
| (c) | (2, 2) | 1 | |
| (d) | 1.38, 2, 3.62 | 3 | B1 for each |
| 12 (a) | 18 | 2 | M1 for $4x + 6x = 180$ |
| (b) | 18 | 2 | M1 for $180 - 6x - 3x$ |
| (c) | 90 | 3 | M2 for $180 - 3x - x - x$ or B1 for $CED = x$ or $DCE = 4x$ |
| 13 (a) (i) | 4.71 or 1.5π or 4.712 to 4.713 | 2 | M1 for $\frac{60}{360} \times \pi \times 3^2$ |
| (ii) | 12.5 or $1.5\pi + 4.5\sqrt{3}$ oe or 12.50 to 12.51 | 3 | M2 for $0.5 \times 3 \times \frac{3}{\cos 60} \times \sin 60 + \text{their(a)}$ oe or M1 for $\frac{3}{\cos 60}$ |
| (iii) | 31.4 or $7.5\pi + 4.5\sqrt{3}$ oe or 31.35 to 31.36 | 3 | B1 for hyp = 6 M1 for $\frac{60}{360} \times \pi \times (\text{their}6)^2$ |
| (b) | 263 or $31.5\pi + 94.5\sqrt{3}$ oe or 262.6 to 262.7 | 4 | M3 for $1.5\pi + 6\pi + 24\pi +$ $4.5 \times \sqrt{3} + 18 \times \sqrt{3} + 72 \times \sqrt{3}$ or M1 for $1.5\pi + 6\pi + 24\pi$ and M1 for $4.5 \times \sqrt{3} + 18 \times \sqrt{3} + 72 \times \sqrt{3}$ or M1 for correct new triangle in diagram 4 or M1 for correct new sector in diagram 5 or M1 for correct new triangle in diagram 6 |

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| Question | Answer | Mark | Part Marks |
|------------|--|------|--|
| 14 (a) (i) | $\left(\frac{x}{x+y}\right)^2$ oe final answer | 2 | B1 for $\frac{x}{x+y}$ |
| (ii) | $2 \times \frac{xy}{(x+y)^2}$ oe final answer | 3 | M2 for $\frac{x}{(x+y)} \times \frac{y}{(x+y)}$ oe or B1 for $\frac{y}{x+y}$ seen |
| (b) (i) | $\frac{x(x-1)}{(x+y)(x+y-1)}$ oe final answer | 3 | B2 for $\frac{x-1}{x+y-1}$ or B1 for $x+y-1$ seen |
| (ii) | $2 \times \frac{xy}{(x+y)(x+y-1)}$ oe final answer | 3 | M2 for $\frac{x}{(x+y)} \times \frac{y}{(x+y-1)}$ oe or B1 for $\frac{y}{x+y-1}$ seen |