**Cambridge Assessment International Education**
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**CAMBRIDGE INTERNATIONAL MATHEMATICS** **0607/43**

Paper 4 (Extended) **October/November 2017**

MARK SCHEME

Maximum Mark: 120

**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 |

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| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 1(a)(i) | 10 | **1** | |
| 1(a)(ii) | 0.1 | **1** | |
| 1(b) | 5 | **2** | **M1** for g(5) = 0.2 oe |
| 1(c) | 0 and –4 nfww | **3** | **M1** for h($x$) = 4 or $3(x+2)^2 - 2[=10]$<br>**B1** for $(x+2)^2 = 4$ oe or $3x^2 + 12x = 0$ oe |
| 1(d) | $\frac{1}{9x^2}$ or $\frac{1}{(3x)^2}$ oe final answer | **2** | **M1** for $(3x - 2 + 2)^2$ |
| 2(a) | 88, 181.5, 110 | **5** | **B4** for any two correct or all three correct values seen<br>OR<br>**M1** for converting times to same units<br>e.g. 160 : 330 : 200<br>**M2** for correct method to find any part<br>e.g. $\frac{their\,160\,or\,330\,or\,200}{their\,690} \times 379.5$ oe<br>or **M1** for correct use of total<br>e.g. $\frac{379.5}{their\,690}$ soi 0.55<br>**A1** for any one value correct, correctly placed |
| 2(b)(i) | 66.69 | **2** | **M1** for $70.2 \times 0.95$ oe |
| 2(b)(ii) | 65[.00] cao | **3** | **M2** for $\frac{70.2}{1.08}$ oe<br>or **M1** for 70.2 = 108% soi |
| 2(c)(i) | $450 \times \frac{3.5}{100}[\times 5]$ or $5 \times \frac{3.5}{100}[\times 450]$ or better | **M1** | |
| | $450 + 450 \times 5 \times \frac{3.5}{100}$<br>leading to 450 + 78.75 or better. | **A1** | i.e. full and correct conclusion to 450 + 78.75 [ = 528.75] |
| 2(c)(ii) | 3.35 or 3.350… | **3** | **M2** for $\sqrt[5]{\frac{530.6}{450}}$<br>or **M1** for $450 \times [\,]^5 = 530.6$ oe |
| 3(a)(i) | Points correctly plotted | **2** | **B1** for 2 or 3 correct points |
| 3(a)(ii) | Negative | **1** | |

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| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 3(b)(i) | 8 | **1** | |
| 3(b)(ii) | 18.3 or 18.33 or $18\frac{1}{3}$ | **1** | |
| 3(c)(i) | $y = 97[.0] - 9.84x$ | **2** | or 97.02... and –9.836...<br>**B1** for 97[.0] + $kx$, or $a - 9.84x$,<br>If 0 scored **SC1** for $97 - 9.8x$ |
| 3(c)(ii) | 21.2 to 21.3 or 21 | **1** | Strict **FT** *their* (c)(i) provided a linear expression |
| 4(a) | 171 cao nfww | **3** | **B2** for 171.25 or 171.3<br>or **M2** for complete method with 1 numerical error<br>or **M1** for at least 3 mid-pts (60, 135, 165, 195, 230, 275) soi |
| 4(b) | $\frac{44}{595}$ cao | **3** | **B2** for $\frac{1056}{14280}$ oe accept 0.0739 or 0.07394 to 0.07395<br>or **M1** for $\frac{33}{120} \times \frac{32}{119}$ |
| 4(c)(i) | 0.1, 0.9, 1.1, 0.5, 0.7, [0.1] | **2** | **B1** for 3 or 4 correct |
| 4(c)(ii) | Correct histogram | **4** | **B1** for suitable scale<br>**B1** for correct column widths<br>**B1FT** for 4 or more correct heights |
| 5(a)(i) | $-6\mathbf{p} + 6\mathbf{q}$ oe | **1** | |
| 5(a)(ii) | $-2\mathbf{p} + 2\mathbf{q}$ oe | **2** | **FT** *their* (a)(i) ÷ 3 provided in form $a\mathbf{p} + b\mathbf{q}$<br>**B1** for $-2\mathbf{p} + k\mathbf{q}$ or for $k\mathbf{p} + 2\mathbf{q}$<br>**M1** for $\overrightarrow{AD} = 2\mathbf{p}$ oe or $\overrightarrow{AE} = 2\mathbf{q}$ or correct route |
| 5(a)(iii) | $4\mathbf{p}$ cao | **1** | |
| 5(a)(iv) | $-6\mathbf{p} + 2\mathbf{q}$ oe | **2** | **B1** for $-6\mathbf{p} + k\mathbf{q}$ or for $k\mathbf{p} + 2\mathbf{q}$<br>**M1** for a correct route |
| 5(b)(i) | 216 | **2** | **M1** for $\left(\frac{1}{3}\right)^2$ or $3^2$ oe soi |
| 5(b)(ii) | 96 | **3** | **M2** for $\left(\frac{1}{2}\right)^2$ or $2^2$ oe soi<br>or **M1** for triangle *EFC* is similar to triangle *EDA* soi |

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| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 6(a) | 192 | **2** | **M1** for $\frac{1}{3}\times\left(\sqrt{72}\right)^2\times 8$ oe |
| | $cm^3$ | **1** | |
| 6(b) | 12 | **2** | **M1** for $(\sqrt{72})^2+(\sqrt{72})^2$ oe |
| 6(c) | 10 | **3** | **M2** for $8^2+\left(0.5\,their\,(b)\right)^2$<br>or **M1** for **[***PD* oe =] $0.5\times$ *their* (b) |
| (d) | 53.1 or 53.13 | **2** | **M1** for tan = $\frac{8}{0.5\times their(b)}$ or sin = $\frac{8}{their(c)}$<br>or cos = $\frac{0.5\times their(b)}{their(c)}$ |
| 6(e)(i) | $\sqrt{82}$ or 9.06 or 9.055... | **3** | **M2** for $8^2+(0.5\times\sqrt{72})^2$ or<br>$(their\ (c))^2-(0.5\times\sqrt{72})^2$<br>or **M1** for $(0.5\times\sqrt{72})^2$ |
| 6(e)(ii) | 62.1 or 62[.0] or 62.00 to 62.10 | **2** | **M1** for tan = $\frac{8}{0.5\times\sqrt{72}}$ oe |
| 6(f) | 4 cao | **3** | **M2** for $\sqrt[3]{\frac{24}{their(a)}}$ or $\sqrt[3]{\frac{their(a)}{24}}$<br>soi by 2 or $\frac{1}{2}$<br>or **M1** for $\frac{24}{their(a)}$ or $\frac{their(a)}{24}$<br>soi by 8 or $\frac{1}{8}$ |
| 7(a) | 6810 or 6806 to 6808 | **3** | **M2** for $\frac{1}{2}\times\frac{4}{3}\pi(15^3-5^3)$<br>or **M1** for either $[\frac{1}{2}\times]\frac{4}{3}\pi\times 15^3$ or $[\frac{1}{2}\times]\frac{4}{3}\pi\times 5^3$ |
| 7(b) | 2200 or 2199… | **5** | **M4** for $2\times\pi\times 5^2+2\times\pi\times 15^2+\pi\times(15^2-5^2)$<br>or **M1** for each term |
| 8(a) | (–1, 5) | **2** | **B1** for each |
| 8(b) | (–1, –5) | **2** | **B1** for each |
| 8(c) | Reflection<br>*y*-axis oe | **2** | **B1** for each |
| 9(a)(i) | Correct graph | **2** | **B1** for correct shape with a max |

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| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 9(a)(ii) | (0, 10)<br>(3.7[0], 0) or (3.701 to 3.702, 0) | **2** | **B1** for each |
| 9(a)(iii) | 3.54 or 3.541… | **1** | |
| 9(b)(i) | Correct graph | **2** | **B1** for correct shape with a min |
| 9(b)(ii) | (1.47, 0.488) or (1.473 to 1.474, 0.4877…) | **2** | **B1** for each |
| 9(b)(iii) | 0.0982 or 0.09819 to 0.09820<br>and 2.98 or 2.975 or 2.976 | **2** | **B1** for each |
| 9(b)(iv) | 1.1[0] or 1.098…<br>3.98 or 3.975 to 3.976 | **2** | **FT** *their* (iii) + 1<br>**B1** for each |
| 10(a) | appropriate sketch giving one positive and one negative answer or fully correct use of formula | **M2** | **M1** for sketch of parabola or parabola and straight line or $\sqrt{3^2-4(4)(-12)}$ or $\frac{-3\pm\sqrt{.....}}{2(4)}$ oe |
| | 1.4[0] and –2.15 final answers | **B2** | **B1** for each<br>If 0 scored **B1** for 1.397… and –2.147...<br>or **SC1** for 2.15 and –1.4[0] |
| 10(b) | $x > 1.40$ and $x < -2.15$ | **2** | **FT** $[x] > \textit{their}$ max(a), $[x] < \textit{their}$ min(a)<br>**B1** for each |
| 10(c) | $-1.75 \leqslant x \leqslant 1$ nfww | **4** | **B3** for 1, $-1.75$ oe<br>**B2** for 1 inequality correct<br>**B1** for 1 correct value seen<br>or **M2** for appropriate sketch or correct factorising or correct use of formula<br>or **M1** for $4x^2 + 3x - 7 \leqslant 0$ |
| 11(a) | [$x$ = ] 5<br>[$y$ = ] 2 with correct working | **4** | **M1** for correctly equating one set of coefficients<br>**M1** for correct method to eliminate one variable<br><br>OR<br><br>**M1** for equation $x =$ or $y =$ from one equation<br>**M1** for correct substitution into other equation<br><br>**B1** for $x = 5$<br>**B1** for $y = 2$<br><br>If zero scored **SC1** for correct subst into one of original equs and evaluation to find other variable |
| 10(b) | [$a$ =] 10<br>[$b$ =] 4 | **2** | **B1** for each<br>**FT** *their* (a) × 2 |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 10(c)(i) | [ $p$ = ] log 5 and [ $q$ = ] log 2<br>Final answers | **3** | **B2 FT** *their* (a) for either seen<br>or **B1 FT** for each correct decimal answer<br>0.699 or 0.6989 to 0.6990<br>0.301 or 0.3010...<br>or **M1** for $10^{p} = their\ 5$ or $10^{q} = their\ 2$ |
| 10(c)(ii) | 1 cao | **1** | |