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

**CAMBRIDGE INTERNATIONAL MATHEMATICS** **0607/62**

Paper 6 (Extended) **October/November 2018**

MARK SCHEME

Maximum Mark: 40

**Published**

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2018 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.



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## Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

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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 |

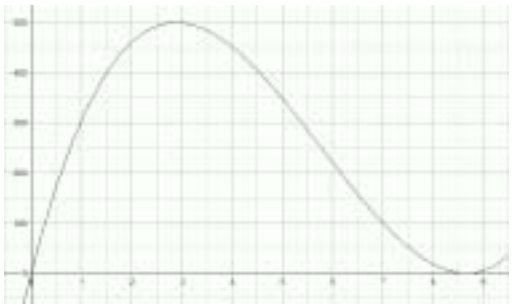
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| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| A | INVESTIGATION RIGHT SPIRALS | | |
| 1(a) | Completely correct spiral to (3, 3) | **1** | |
| 1(b) | 30 | **1** | **C** opportunity |
| 1(c) | 1 + 1 + 2 + 2<br>1 + 1 + 2 + 2 + 3 9<br><br>1 + 1 + 2 + 2 + 3 + 3 + 4 + 4<br>1 + 1 + 2 + 2 + 3 + 3 + 4 + 4 + 5 25<br>(30) | **2** | **B1** for four or five correct cells |
| 2(a) | $n = \frac{k}{2}$ oe | **1** | |
| 2(b) | $[L =] \frac{k}{2}\left(\frac{k}{2}+1\right)$ with no subsequent errors | **1** | Alternative methods:<br>$[L =] \frac{2n}{4}(2n+2)$ … $n^2 + n$<br>$[L =] \frac{k^2}{4} + \frac{2k}{4} \ldots \frac{k}{2}\left(\frac{k}{2}+\frac{2}{2}\right)$ |
| 2(c) | $\frac{14}{4}(14+2) = 56$ | **1** | |
| | 20 + 10 + 12 + 14 = 56 oe | **1** | |
| 3(a)(i) | $\frac{k}{2}$ oe | **1** | **C** opportunity |
| 3(a)(ii) | $\frac{k}{2}+1$ oe | **1** | **C** opportunity |
| 3(b)(i) | $[L_{k+1} =] \frac{k}{2}\left(\frac{k}{2}+1\right) + \textit{their}\left(\frac{k}{2}+1\right)$ oe isw | **1** | **FT** *their* **3(a)(ii)**<br><br>Condone correct formula for *k* odd as final answer |
| 3(b)(ii) | Correct substitution in *their* **(i)** leading to 16 | **1** | |
| 4(a) | 1 + 2 + ... + 7 + 8 + 9 and 45 | **1** | |
| 4(b) | $H = 2x^2 - x$ oe | **2** | **B1** for $2x^2$ seen<br><br>**C** opportunity |
| 4(c) | $V = 2y^2 - y$ oe | **1** | **FT** *their* **4(b)** |
| 4(d)(i) | $y = x$ | **1** | |
| | $2x^2 - x + 2x^2 - x$ oe<br>or $2(2x^2 - x)$ | **1** | |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 4(d)(ii) | 20 | **1** | **C** opportunity |
| Communication: seen in two of the following questions | | **1** | |
| 1(b) | for showing working, 1 + 1 + ... + 5 | | |
| 3(a)(i) | for 2 examples of lengths before $k$ | | |
| 3(a)(ii) | for 2 examples of lengths after $k$ | | |
| 4(b) | for at least three first differences seen<br>or working with simultaneous equations | | |
| 4(d)(ii) | for appropriate working<br>or using quadratic<br>or sketch | | |

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**Modelling**

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| B | MODELLING OPEN BOXES | | |
| 5(a) | $\frac{15}{\cos 30^\circ}$ oe | **1** | |
| | leading to 17.320 to 17.321 | **1** | |
| 5(b)(i) | $\frac{2}{\sin 30^\circ}$ or $\sin 30 = \frac{2}{r}$ each leading to 4 | **1** | |
| 5(b)(ii) | 76.8 or 76.82 to 76.83 | **2** | **M1** for 17.32 – 4 soi 13.32<br>or **B1** for 6.66 or 23.07 to 23.08 or 11.5… |
| 5(b)(iii) | [76.8 × 3 × 2 oe leading to]<br>460.8 to 460. 9... | **1** | |
| 6(a)(i) | $\frac{x}{\sin 30^\circ}$ or $2x$ oe | **1** | |
| 6(a)(ii) | $\frac{1}{2}\sin 120^\circ (17.32 - \frac{x}{\sin 30^\circ})^2$ oe | **1** | |
| 6(a)(iii) | [Area of cross-section =] 3 triangles oe | **1** | |
| 6(a)(iv) | Correct curve<br> | **1** | |
| 6(b) | $0 < x < 8.66$ | **1** | |
| 6(c) | 1.50 and 4.54 or 4.55 | **1** | **C** opportunity |
| 7(a) | 15 becomes $\frac{E}{2}$ oe | **1** | |
| 7(b) | 5.77 or 5.77 to 5.80 | **1** | **C** opportunity |

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| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 8(a) | $[V =] 2x\sin 90^\circ(\frac{E}{2\cos 45^\circ} - \frac{x}{\sin 45^\circ})^2$ oe | **3** | **B1** for cos 45° or sin 45° correctly used<br>**B1** for sin 90° correctly used<br>**B1** for $2x$ oe correctly placed<br>Max **B2** if final answer incorrect<br><br>If 0 scored<br>**SC2** for sketch with $x$, $E$ and $E - 2x$ correctly marked<br>or **SC1** for sketch with $x$ and $E$ correctly marked |
| 8(b) | $x = \frac{E}{6}$ oe | **2** | Accept $x$ = (0.17 or 0.166...)$E$<br>**M1** for sketch of $V$ against $x$ for at least two values of $E$<br>or table of values<br>**C** opportunity |
| Communication: seen in one of the following questions | | **1** | |
| 6(c) | for line on graph | | |
| 7(b) | for drawing graph indicating where maximum is | | |
| 8(b) | for suitable scale on sketch or working from table/pairs of values | | |

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