



# Cambridge IGCSE™

---

CAMBRIDGE INTERNATIONAL MATHEMATICS

0607/51

Paper 5 (Core)

May/June 2020

MARK SCHEME

Maximum Mark: 36

---

|                         |
|-------------------------|
| <p><b>Published</b></p> |
|-------------------------|

Students did not sit exam papers in the June 2020 series due to the Covid-19 global pandemic.

This mark scheme is published to support teachers and students and should be read together with the question paper. It shows the requirements of the exam. The answer column of the mark scheme shows the proposed basis on which Examiners would award marks for this exam. Where appropriate, this column also provides the most likely acceptable alternative responses expected from students. Examiners usually review the mark scheme after they have seen student responses and update the mark scheme if appropriate. In the June series, Examiners were unable to consider the acceptability of alternative responses, as there were no student responses to consider.

Mark schemes should usually be read together with the Principal Examiner Report for Teachers. However, because students did not sit exam papers, there is no Principal Examiner Report for Teachers for the June 2020 series.

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

Cambridge International is publishing the mark schemes for the June 2020 series for most Cambridge IGCSE™ and Cambridge International A & AS Level components, and some Cambridge O Level components.

---

This document consists of **6** printed pages.

**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.

| Maths-Specific Marking Principles |                                                                                                                                                                                                                                               |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1                                 | Unless a particular method has been specified in the question, full marks may be awarded for any correct method. However, if a calculation is required then no marks will be awarded for a scale drawing.                                     |
| 2                                 | Unless specified in the question, answers may be given as fractions, decimals or in standard form. Ignore superfluous zeros, provided that the degree of accuracy is not affected.                                                            |
| 3                                 | Allow alternative conventions for notation if used consistently throughout the paper, e.g. commas being used as decimal points.                                                                                                               |
| 4                                 | Unless otherwise indicated, marks once gained cannot subsequently be lost, e.g. wrong working following a correct form of answer is ignored (isw).                                                                                            |
| 5                                 | Where a candidate has misread a number in the question and used that value consistently throughout, provided that number does not alter the difficulty or the method required, award all marks earned and deduct just 1 mark for the misread. |
| 6                                 | Recovery within working is allowed, e.g. a notation error in the working where the following line of working makes the candidate's intent clear.                                                                                              |

### 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  |
| nfw  | not from wrong working     |
| oe   | or equivalent              |
| rot  | rounded or truncated       |
| SC   | Special Case               |
| soi  | seen or implied            |

| Question        | Answer                                                                                                                                                                                                                                                                                                                                                                                                                   | Marks | Partial Marks                                                              |             |   |             |   |             |    |             |    |             |    |  |  |                 |       |   |                                             |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------------------------------------------------------------------------|-------------|---|-------------|---|-------------|----|-------------|----|-------------|----|--|--|-----------------|-------|---|---------------------------------------------|
| 1               | 231 + 22                                                                                                                                                                                                                                                                                                                                                                                                                 | C1    |                                                                            |             |   |             |   |             |    |             |    |             |    |  |  |                 |       |   |                                             |
|                 | 253                                                                                                                                                                                                                                                                                                                                                                                                                      | B1    |                                                                            |             |   |             |   |             |    |             |    |             |    |  |  |                 |       |   |                                             |
|                 | their 253 + 23                                                                                                                                                                                                                                                                                                                                                                                                           | C1    |                                                                            |             |   |             |   |             |    |             |    |             |    |  |  |                 |       |   |                                             |
|                 | 276                                                                                                                                                                                                                                                                                                                                                                                                                      | B1    | If 0 scored SC1 for at least three consecutive differences under the table |             |   |             |   |             |    |             |    |             |    |  |  |                 |       |   |                                             |
| 2(a)            | <table><tr><td><math>T_1</math></td><td>1</td></tr><tr><td><math>T_2 - T_1</math></td><td>2</td></tr><tr><td><math>T_3 - T_2</math></td><td>3</td></tr><tr><td><math>T_4 - T_3</math></td><td>4</td></tr><tr><td><math>T_5 - T_4</math></td><td>5</td></tr><tr><td><math>T_6 - T_5</math></td><td>6</td></tr><tr><td></td><td></td></tr><tr><td><math>T_n - T_{n-1}</math></td><td><math>n</math></td></tr></table>      | $T_1$ | 1                                                                          | $T_2 - T_1$ | 2 | $T_3 - T_2$ | 3 | $T_4 - T_3$ | 4  | $T_5 - T_4$ | 5  | $T_6 - T_5$ | 6  |  |  | $T_n - T_{n-1}$ | $n$   | 2 | B1 for 3, 4 and 5<br>B1 for $n$             |
| $T_1$           | 1                                                                                                                                                                                                                                                                                                                                                                                                                        |       |                                                                            |             |   |             |   |             |    |             |    |             |    |  |  |                 |       |   |                                             |
| $T_2 - T_1$     | 2                                                                                                                                                                                                                                                                                                                                                                                                                        |       |                                                                            |             |   |             |   |             |    |             |    |             |    |  |  |                 |       |   |                                             |
| $T_3 - T_2$     | 3                                                                                                                                                                                                                                                                                                                                                                                                                        |       |                                                                            |             |   |             |   |             |    |             |    |             |    |  |  |                 |       |   |                                             |
| $T_4 - T_3$     | 4                                                                                                                                                                                                                                                                                                                                                                                                                        |       |                                                                            |             |   |             |   |             |    |             |    |             |    |  |  |                 |       |   |                                             |
| $T_5 - T_4$     | 5                                                                                                                                                                                                                                                                                                                                                                                                                        |       |                                                                            |             |   |             |   |             |    |             |    |             |    |  |  |                 |       |   |                                             |
| $T_6 - T_5$     | 6                                                                                                                                                                                                                                                                                                                                                                                                                        |       |                                                                            |             |   |             |   |             |    |             |    |             |    |  |  |                 |       |   |                                             |
|                 |                                                                                                                                                                                                                                                                                                                                                                                                                          |       |                                                                            |             |   |             |   |             |    |             |    |             |    |  |  |                 |       |   |                                             |
| $T_n - T_{n-1}$ | $n$                                                                                                                                                                                                                                                                                                                                                                                                                      |       |                                                                            |             |   |             |   |             |    |             |    |             |    |  |  |                 |       |   |                                             |
| 2(b)(i)         | 100                                                                                                                                                                                                                                                                                                                                                                                                                      | 1     |                                                                            |             |   |             |   |             |    |             |    |             |    |  |  |                 |       |   |                                             |
| 2(b)(ii)        | 50                                                                                                                                                                                                                                                                                                                                                                                                                       | 1     |                                                                            |             |   |             |   |             |    |             |    |             |    |  |  |                 |       |   |                                             |
| 3               | <table><tr><td><math>T_1</math></td><td>1</td></tr><tr><td><math>T_2 + T_1</math></td><td>4</td></tr><tr><td><math>T_3 + T_2</math></td><td>9</td></tr><tr><td><math>T_4 + T_3</math></td><td>16</td></tr><tr><td><math>T_5 + T_4</math></td><td>25</td></tr><tr><td><math>T_6 + T_5</math></td><td>36</td></tr><tr><td></td><td></td></tr><tr><td><math>T_n + T_{n-1}</math></td><td><math>n^2</math></td></tr></table> | $T_1$ | 1                                                                          | $T_2 + T_1$ | 4 | $T_3 + T_2$ | 9 | $T_4 + T_3$ | 16 | $T_5 + T_4$ | 25 | $T_6 + T_5$ | 36 |  |  | $T_n + T_{n-1}$ | $n^2$ | 2 | B1 for two of 16, 25 and 36<br>B1 for $n^2$ |
| $T_1$           | 1                                                                                                                                                                                                                                                                                                                                                                                                                        |       |                                                                            |             |   |             |   |             |    |             |    |             |    |  |  |                 |       |   |                                             |
| $T_2 + T_1$     | 4                                                                                                                                                                                                                                                                                                                                                                                                                        |       |                                                                            |             |   |             |   |             |    |             |    |             |    |  |  |                 |       |   |                                             |
| $T_3 + T_2$     | 9                                                                                                                                                                                                                                                                                                                                                                                                                        |       |                                                                            |             |   |             |   |             |    |             |    |             |    |  |  |                 |       |   |                                             |
| $T_4 + T_3$     | 16                                                                                                                                                                                                                                                                                                                                                                                                                       |       |                                                                            |             |   |             |   |             |    |             |    |             |    |  |  |                 |       |   |                                             |
| $T_5 + T_4$     | 25                                                                                                                                                                                                                                                                                                                                                                                                                       |       |                                                                            |             |   |             |   |             |    |             |    |             |    |  |  |                 |       |   |                                             |
| $T_6 + T_5$     | 36                                                                                                                                                                                                                                                                                                                                                                                                                       |       |                                                                            |             |   |             |   |             |    |             |    |             |    |  |  |                 |       |   |                                             |
|                 |                                                                                                                                                                                                                                                                                                                                                                                                                          |       |                                                                            |             |   |             |   |             |    |             |    |             |    |  |  |                 |       |   |                                             |
| $T_n + T_{n-1}$ | $n^2$                                                                                                                                                                                                                                                                                                                                                                                                                    |       |                                                                            |             |   |             |   |             |    |             |    |             |    |  |  |                 |       |   |                                             |
| 4(a)            | $2T_n = n^2 + n$                                                                                                                                                                                                                                                                                                                                                                                                         | 1     |                                                                            |             |   |             |   |             |    |             |    |             |    |  |  |                 |       |   |                                             |
| 4(b)            | $\frac{1000^2 + 1000}{2}$                                                                                                                                                                                                                                                                                                                                                                                                | C1    |                                                                            |             |   |             |   |             |    |             |    |             |    |  |  |                 |       |   |                                             |
|                 | 500 500                                                                                                                                                                                                                                                                                                                                                                                                                  | B1    |                                                                            |             |   |             |   |             |    |             |    |             |    |  |  |                 |       |   |                                             |

| Question                | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Marks     | Partial Marks                                                                                                                                                        |                     |   |                     |    |                     |    |                     |     |                     |     |   |    |                         |           |                         |                                                   |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---|---------------------|----|---------------------|----|---------------------|-----|---------------------|-----|---|----|-------------------------|-----------|-------------------------|---------------------------------------------------|
| 5(a)                    | <table><tr><td><math>(T_1)^2</math></td><td>1</td></tr><tr><td><math>(T_2)^2 - (T_1)^2</math></td><td>8</td></tr><tr><td><math>(T_3)^2 - (T_2)^2</math></td><td>27</td></tr><tr><td><math>(T_4)^2 - (T_3)^2</math></td><td>64</td></tr><tr><td><math>(T_5)^2 - (T_4)^2</math></td><td>125</td></tr><tr><td><math>(T_6)^2 - (T_5)^2</math></td><td>216</td></tr><tr><td></td><td></td></tr><tr><td><math>(T_n)^2 - (T_{n-1})^2</math></td><td><math>n^3</math></td></tr></table> | $(T_1)^2$ | 1                                                                                                                                                                    | $(T_2)^2 - (T_1)^2$ | 8 | $(T_3)^2 - (T_2)^2$ | 27 | $(T_4)^2 - (T_3)^2$ | 64 | $(T_5)^2 - (T_4)^2$ | 125 | $(T_6)^2 - (T_5)^2$ | 216 |   |    | $(T_n)^2 - (T_{n-1})^2$ | $n^3$     | <b>B2</b>               | <b>B1</b> for 27 and 64<br><b>B1</b> for $n^3$ oe |
|                         | $(T_1)^2$                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1         |                                                                                                                                                                      |                     |   |                     |    |                     |    |                     |     |                     |     |   |    |                         |           |                         |                                                   |
| $(T_2)^2 - (T_1)^2$     | 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |                                                                                                                                                                      |                     |   |                     |    |                     |    |                     |     |                     |     |   |    |                         |           |                         |                                                   |
| $(T_3)^2 - (T_2)^2$     | 27                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |                                                                                                                                                                      |                     |   |                     |    |                     |    |                     |     |                     |     |   |    |                         |           |                         |                                                   |
| $(T_4)^2 - (T_3)^2$     | 64                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |                                                                                                                                                                      |                     |   |                     |    |                     |    |                     |     |                     |     |   |    |                         |           |                         |                                                   |
| $(T_5)^2 - (T_4)^2$     | 125                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |           |                                                                                                                                                                      |                     |   |                     |    |                     |    |                     |     |                     |     |   |    |                         |           |                         |                                                   |
| $(T_6)^2 - (T_5)^2$     | 216                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |           |                                                                                                                                                                      |                     |   |                     |    |                     |    |                     |     |                     |     |   |    |                         |           |                         |                                                   |
|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |                                                                                                                                                                      |                     |   |                     |    |                     |    |                     |     |                     |     |   |    |                         |           |                         |                                                   |
| $(T_n)^2 - (T_{n-1})^2$ | $n^3$                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |           |                                                                                                                                                                      |                     |   |                     |    |                     |    |                     |     |                     |     |   |    |                         |           |                         |                                                   |
|                         | Correct working for one value                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>C1</b> | $6^2 - 3^2$ or $10^2 - 6^2$<br>or $36 - 9$ or $100 - 36$                                                                                                             |                     |   |                     |    |                     |    |                     |     |                     |     |   |    |                         |           |                         |                                                   |
| 5(b)                    | $50^3$                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>C1</b> | <b>FT</b> substitution of 50 into <i>their</i> $n^3$ if at least quadratic.<br><br>or<br>Substitution of 49 and 50 into $\frac{n^2 + n}{2}$<br>and $1275^2 - 1225^2$ |                     |   |                     |    |                     |    |                     |     |                     |     |   |    |                         |           |                         |                                                   |
|                         | 125 000                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>B1</b> |                                                                                                                                                                      |                     |   |                     |    |                     |    |                     |     |                     |     |   |    |                         |           |                         |                                                   |
| 6(a)                    | $T_{15} - T_{14} = 15$<br><br>$T_{15} - T_{14} = T_5$<br><br>$T_5 + T_{14} = T_{15}$<br><br>(5, 14, 15)                                                                                                                                                                                                                                                                                                                                                                         | <b>4</b>  | <b>B1</b> for each row                                                                                                                                               |                     |   |                     |    |                     |    |                     |     |                     |     |   |    |                         |           |                         |                                                   |
| 6(b)                    | <table><tr><td>3</td><td>5</td><td>6</td></tr><tr><td>4</td><td>9</td><td>10</td></tr><tr><td>5</td><td>14</td><td>15</td></tr><tr><td>6</td><td>20</td><td>21</td></tr><tr><td>7</td><td>27</td><td>28</td></tr></table>                                                                                                                                                                                                                                                       | 3         | 5                                                                                                                                                                    | 6                   | 4 | 9                   | 10 | 5                   | 14 | 15                  | 6   | 20                  | 21  | 7 | 27 | 28                      | <b>B4</b> | <b>B1</b> for each cell |                                                   |
|                         | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 5         | 6                                                                                                                                                                    |                     |   |                     |    |                     |    |                     |     |                     |     |   |    |                         |           |                         |                                                   |
| 4                       | 9                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 10        |                                                                                                                                                                      |                     |   |                     |    |                     |    |                     |     |                     |     |   |    |                         |           |                         |                                                   |
| 5                       | 14                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 15        |                                                                                                                                                                      |                     |   |                     |    |                     |    |                     |     |                     |     |   |    |                         |           |                         |                                                   |
| 6                       | 20                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 21        |                                                                                                                                                                      |                     |   |                     |    |                     |    |                     |     |                     |     |   |    |                         |           |                         |                                                   |
| 7                       | 27                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 28        |                                                                                                                                                                      |                     |   |                     |    |                     |    |                     |     |                     |     |   |    |                         |           |                         |                                                   |
|                         | Showing differences<br>or using the method at least once<br>or last column are triangle numbers                                                                                                                                                                                                                                                                                                                                                                                 | <b>C1</b> |                                                                                                                                                                      |                     |   |                     |    |                     |    |                     |     |                     |     |   |    |                         |           |                         |                                                   |
| 6(c)                    | $21 + 210 = 231$                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>1</b>  |                                                                                                                                                                      |                     |   |                     |    |                     |    |                     |     |                     |     |   |    |                         |           |                         |                                                   |

| Question        | Answer                                                                                                                                                                                                                                                                                                                                                                         | Marks       | Partial Marks                                  |             |   |             |   |             |    |             |    |  |  |                 |          |           |                                                                                                 |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------------------------------------|-------------|---|-------------|---|-------------|----|-------------|----|--|--|-----------------|----------|-----------|-------------------------------------------------------------------------------------------------|
| 7(a)            | <table><tr><td><math>T_3 - T_1</math></td><td>5</td></tr><tr><td><math>T_4 - T_2</math></td><td>7</td></tr><tr><td><math>T_5 - T_3</math></td><td>9</td></tr><tr><td><math>T_6 - T_4</math></td><td>11</td></tr><tr><td><math>T_7 - T_5</math></td><td>13</td></tr><tr><td></td><td></td></tr><tr><td><math>T_n - T_{n-2}</math></td><td><math>2n - 1</math></td></tr></table> | $T_3 - T_1$ | 5                                              | $T_4 - T_2$ | 7 | $T_5 - T_3$ | 9 | $T_6 - T_4$ | 11 | $T_7 - T_5$ | 13 |  |  | $T_n - T_{n-2}$ | $2n - 1$ | <b>B3</b> | <b>B1</b> for 7, 9 and 11<br><br><b>B2</b> for $2n - 1$ oe<br>or <b>B1</b> for $2n + k$ oe seen |
|                 | $T_3 - T_1$                                                                                                                                                                                                                                                                                                                                                                    | 5           |                                                |             |   |             |   |             |    |             |    |  |  |                 |          |           |                                                                                                 |
| $T_4 - T_2$     | 7                                                                                                                                                                                                                                                                                                                                                                              |             |                                                |             |   |             |   |             |    |             |    |  |  |                 |          |           |                                                                                                 |
| $T_5 - T_3$     | 9                                                                                                                                                                                                                                                                                                                                                                              |             |                                                |             |   |             |   |             |    |             |    |  |  |                 |          |           |                                                                                                 |
| $T_6 - T_4$     | 11                                                                                                                                                                                                                                                                                                                                                                             |             |                                                |             |   |             |   |             |    |             |    |  |  |                 |          |           |                                                                                                 |
| $T_7 - T_5$     | 13                                                                                                                                                                                                                                                                                                                                                                             |             |                                                |             |   |             |   |             |    |             |    |  |  |                 |          |           |                                                                                                 |
|                 |                                                                                                                                                                                                                                                                                                                                                                                |             |                                                |             |   |             |   |             |    |             |    |  |  |                 |          |           |                                                                                                 |
| $T_n - T_{n-2}$ | $2n - 1$                                                                                                                                                                                                                                                                                                                                                                       |             |                                                |             |   |             |   |             |    |             |    |  |  |                 |          |           |                                                                                                 |
|                 | Differences of 2 shown                                                                                                                                                                                                                                                                                                                                                         | <b>C1</b>   |                                                |             |   |             |   |             |    |             |    |  |  |                 |          |           |                                                                                                 |
| 7(b)            | $their\ 2n - 1 = 45$<br>or<br>differences continued to 45                                                                                                                                                                                                                                                                                                                      | <b>C1</b>   |                                                |             |   |             |   |             |    |             |    |  |  |                 |          |           |                                                                                                 |
|                 | $276 - 231 = 45$ seen<br>or<br>$T_{23} - T_{21} = T_9$                                                                                                                                                                                                                                                                                                                         | <b>C1</b>   |                                                |             |   |             |   |             |    |             |    |  |  |                 |          |           |                                                                                                 |
|                 | (9, 21, 23)                                                                                                                                                                                                                                                                                                                                                                    | <b>B2</b>   | <b>B1</b> for 21 or 23 seen on the answer line |             |   |             |   |             |    |             |    |  |  |                 |          |           |                                                                                                 |