



# Cambridge IGCSE<sup>®</sup>

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**CAMBRIDGE INTERNATIONAL MATHEMATICS**

**0607/06**

Paper 6 Investigation and modelling (Extended)

**For examination from 2020**

MARK SCHEME

Maximum Mark: 60

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**Specimen**

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This document has **10** pages. Blank pages are indicated.

### 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.

<p>GENERIC MARKING PRINCIPLE 1:</p> <p>Marks must be awarded in line with:</p> <ul style="list-style-type: none"> <li>● the specific content of the mark scheme or the generic level descriptors for the question</li> <li>● the specific skills defined in the mark scheme or in the generic level descriptors for the question</li> <li>● the standard of response required by a candidate as exemplified by the standardisation scripts.</li> </ul>
<p>GENERIC MARKING PRINCIPLE 2:</p> <p>Marks awarded are always <b>whole marks</b> (not half marks, or other fractions).</p>
<p>GENERIC MARKING PRINCIPLE 3:</p> <p>Marks must be awarded <b>positively</b>:</p> <ul style="list-style-type: none"> <li>● 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</li> <li>● marks are awarded when candidates clearly demonstrate what they know and can do</li> <li>● marks are not deducted for errors</li> <li>● marks are not deducted for omissions</li> <li>● 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.</li> </ul>
<p>GENERIC MARKING PRINCIPLE 4:</p> <p>Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.</p>
<p>GENERIC MARKING PRINCIPLE 5:</p> <p>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).</p>

**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.

**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, given 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.
- C** Mark for clear communication.

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
cfs	correct figures seen
dep	dependent
<b>FT</b>	follow through after error
isw	ignore subsequent working
nfww	not from wrong working
oe	or equivalent
rot	rounded or truncated
<b>SC</b>	special case
soi	seen or implied


## Part A

Question	Answer	Marks	Partial Marks																								
1	$6 \times 4.5$ 27	2	C1 for $6 \times 4.5$ B1 for 27																								
Question	Answer	Marks	Partial Marks																								
2(a)	<table border="1"> <thead> <tr> <th>Sequence</th> <th>Number of terms</th> <th>Mean</th> <th>Sum of all the terms</th> </tr> </thead> <tbody> <tr> <td>5, 6, 7, 8, 9, 10</td> <td>6</td> <td>7.5</td> <td>45</td> </tr> <tr> <td>10, 11, 12, ....., 40</td> <td>31</td> <td>25</td> <td>775</td> </tr> <tr> <td>2, 3, 4, 5, 6, 7, 8</td> <td>7</td> <td>5</td> <td>35</td> </tr> <tr> <td>9, 10, 11, 12</td> <td>4</td> <td>10.5</td> <td>42</td> </tr> <tr> <td>4, 5, 6, 7, 8, 9, 10 OR 24, 25</td> <td>7 2</td> <td>7 24.5</td> <td>49</td> </tr> </tbody> </table>	Sequence	Number of terms	Mean	Sum of all the terms	5, 6, 7, 8, 9, 10	6	7.5	45	10, 11, 12, ....., 40	31	25	775	2, 3, 4, 5, 6, 7, 8	7	5	35	9, 10, 11, 12	4	10.5	42	4, 5, 6, 7, 8, 9, 10 OR 24, 25	7 2	7 24.5	49	9	B1 for each white cell C1 for a relevant calculation
Sequence	Number of terms	Mean	Sum of all the terms																								
5, 6, 7, 8, 9, 10	6	7.5	45																								
10, 11, 12, ....., 40	31	25	775																								
2, 3, 4, 5, 6, 7, 8	7	5	35																								
9, 10, 11, 12	4	10.5	42																								
4, 5, 6, 7, 8, 9, 10 OR 24, 25	7 2	7 24.5	49																								
2(b)	Relevant calculation Add and divide by 2 oe Correct example	2	B1 for 'add and divide by 2' oe C1 for a correct example																								
Question	Answer	Marks	Partial Marks																								
3(a)	100	1																									
3(b)	$\frac{2k + 99}{2}$ oe	1																									
3(c)	$100 \times \frac{2k + 99}{2}$ oe isw	1	FT <i>their (a)</i> $\times$ <i>their (b)</i>																								

Question	Answer	Marks	Partial Marks
4	Number of terms = $n$ oe Mean = $\frac{2k + n - 1}{2}$ oe	2	<b>B1</b> for each statement
Question	Answer	Marks	Partial Marks
5(a)	$2k$ is even $n - 1$ is even even + even = even $\frac{\text{even}}{2}$ is an integer	2	<b>B1</b> for $\frac{\text{even}}{2}$ is an integer and one other correct statement
5(b)	$2k$ is even $n - 1$ is odd even + odd = odd $\frac{\text{odd}}{2} = \dots .5$	2	<b>B1</b> for $\frac{\text{odd}}{2} = \dots .5$ and one other correct statement
Question	Answer	Marks	Partial Marks
6(a)	3 terms with mean 28 7 terms with mean 12 8 terms with mean 10.5	4	<b>B3</b> for all three pairs with no extras or <b>B1</b> for each pair (no extras) OR <b>B2</b> for all three pairs with extras or <b>B1</b> for two correct pairs with extras OR <b>B2</b> for 3 terms, $k = 27$ for 7 terms, $k = 9$ for 8 terms, $k = 7$ or <b>B1</b> for two of these
6(b)	With annotation of terms and mean 27, 28, 29 9, 10, 11, 12, 13, 14, 15 7, 8, 9, 10, 11, 12, 13, 14	2	<b>C1</b> for annotating terms and mean <b>B1</b> for two

Question	Answer	Marks	Partial Marks
7	32 or 64 or 128, etc. With relevant working	2	<b>B1</b> for 32 or 64 or 128, etc. <b>C1</b> for showing relevant working, e.g. identify number must be even or attempt to find a sequence for number greater than 20

## Part B

Question	Answer	Marks	Partial Marks
8(a)	$\frac{54\,000}{60 \times 60}$ or $\frac{54\,000}{3600}$ 15	2	C1 for $\frac{54\,000}{60 \times 60}$ or $\frac{54\,000}{3600}$ B1 for 15
8(b)	$\frac{1000x}{60 \times 60}$ oe	1	
Question	Answer	Marks	Partial Marks
9	$20 = k 50^2$ $k = \frac{20}{50^2}$ oe $\frac{1}{125}x^2$ or $0.008x^2$	3	C1 for $20 = k 50^2$ C1 for $k = \frac{20}{50^2}$ oe B1 for $\frac{1}{125}x^2$ or $0.008x^2$
Question	Answer	Marks	Partial Marks
10(a)	1000x	1	
10(b)	Number of times $a + b + 4$ goes into the distance travelled in an hour oe	1	
10(c)	Correct curve 	4	FT <i>their k</i> B1 curve through (0, 0) B1 single max turning point B1 straightens out for increasing $x$  Following C1 may only be awarded if maximum point above mid-point of $N$ -axis C1 correct scale on $N$ -axis (may be implied by one non-zero value appropriately placed or coordinates of maximum)
10(d)	Correct scale on $N$ -axis 1570 or 1572 to 1573	1	FT <i>their k</i>

Question	Answer	Marks	Partial Marks
10(e)(i)	22.3 to 22.4 km/h	2	FT their $k$ B1 for 22.3 to 22.4 C1 for km/h
10(e)(ii)	It is a low speed (implied) oe	1	
10(f)(i)	Decreases oe	1	
10(f)(ii)	Increases oe	1	
Question	Answer	Marks	Partial Marks
11(a)	$2 \times 0.278$ or $\frac{1000}{60 \times 60} \times 2$ oe $\frac{1000x}{4 + 0.556x}$	2	C1 for $2 \times 0.278x$ or $\frac{1000}{60 \times 60} \times 2$ oe B1 for $\frac{1000x}{4 + 0.556x}$
11(b)	Correct curve 	3	FT their $\frac{1000x}{4 + 0.556x}$ if in form $\frac{ax}{[b + cx]}$ B1 through (0, 0) B1 always increasing and concave downwards Following C1 may only be awarded if end point above mid-point of $N$ -axis C1 for correct scale on $N$ -axis (may be implied by one non-zero value appropriately placed)
11(c)	Correct scale on $N$ -axis $\frac{1000x}{4 + 0.556x} = 1800$ $1000x = 1800(4 + 0.556x)$ or $1000x = 7200 + 1000.8x$ $-0.8x = 7200$ or $x = -9000$ No, and because $x$ is negative or too large	B1 C1 C1 B1	FT their $\frac{1000x}{4 + 0.556x}$ if in form $\frac{ax}{[b + cx]}$ FT their equation FT their previous equation FT their $x$ to correct conclusion



Question	Answer	Marks	Partial Marks
12	Relevant intersecting graphs sketched or <i>their</i> $0.556 = 0.278 + 0.008x$ or better 34.7 to 34.8 km/h	3	<b>FT</b> <i>their k</i> <b>C1</b> for relevant intersecting graphs sketched or <i>their</i> $0.556 = 0.278 + 0.008x$ or better <b>B1</b> for 34.7 to 34.8 <b>C1</b> for km/h

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