



## Cambridge International AS & A Level

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THINKING SKILLS

9694/12

Paper 1 Problem Solving

October/November 2021

MARK SCHEME

Maximum Mark: 50

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**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 2021 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

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This document consists of **8** 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.

**NOTES FOR MARKERS****Working**

Where a final answer is underlined in the mark scheme, full marks are awarded for a correct answer, regardless of whether there is any supporting working, unless an exception is noted in the mark scheme.

For partial credit, the evidence needed to award the mark will usually be shown on its own line in the mark scheme, or else will be defined in italic text.

For explanations and verbal justifications, apply the principle of ‘words to that effect’.

**No response**

If there is any attempt at a solution award 0 marks not NR. “-” or “?” constitute no attempt at a solution.

**Abbreviations**

The following abbreviations may be used in a mark scheme:

<b>AG</b>	answer given (on question paper)
<b>awrt</b>	answer which rounds to
<b>ft</b>	follow through (from earlier error)
<b>oe</b>	or equivalent
<b>SC</b>	special case
<b>soi</b>	seen or implied

**Annotations**

Where the answer is underlined in the mark scheme, and a candidate's correct final answer is both clear and clearly identified (encircled, underlined etc.), it is not necessary to annotate that item; nor is it necessary to annotate when there is No Response.

Where there is a response that scores 0, either SEEN should be used, or some other annotation(s) to indicate why no marks can be awarded (Caret, TE, NGE, Cross).

Partial credit should be indicated with a 1 (or, occasionally, a 2) at the point at which that mark has been earned.

The highlighter should be used anywhere it is helpful to clarify the marking.

	Correct item
	Incorrect item
	Individual mark of partial credit
	Double mark of partial credit
	Essential element of answer/working missing
	Judged to be not good enough to earn the relevant credit
	Benefit of doubt
	Correct follow through
	Transcription error
	Special case
	Working seen but no credit awarded; blank page checked
<b>Highlight</b>	Use anywhere it is helpful to clarify the marking

Question	Answer	Marks
1(a)	Higher	1
1(b)	Secondary: \$20 m [1] Higher: \$10 m [1]	2

Question	Answer	Marks
2(a)	<u>9</u>	1
2(b)	<u>White</u>	1

Question	Answer	Marks
3(a)(i)	<u>4</u> <i>Award 1 mark for either 8 brown or 12 white seen.</i>	2
3(a)(ii)	<u>07:16</u>	1
3(b)	<u>07:09</u>	1

Question	Answer	Marks
4(a)	Total length of tasks in hours is $1.5 + 1 + 2.25 + 1.75 = 6.5$ hours [1] There will be three breaks of 15 minutes each. 7 hours 15 minutes after 10:00 is <u>17:15</u> <i>SC: 1 mark for 17:30 as final answer.</i>	2
4(b)	Before going to cricket, Amandeep writes the report. [1]  After cricket, Amandeep cleans the kitchen and washes the car [1]  <u>Assemble wardrobe</u> and <u>Practise on drums</u>  <i>If 0 scored, award 1 mark for a final answer of Assemble wardrobe, Practise on drums and Write report</i>	3

Question	Answer	Marks
5(a)	$69 - (6 \times \$3) = \$51$ [1] <u>6 medium, 3 large</u>	2
5(b)	<u>8 medium and 2 large</u> or <u>1 medium and 7 large</u>  <i>1 mark for two correct in a list of no more than three OR one correct in a list of no more than two</i>	2

Question	Answer	Marks
6(a)	<u>021120</u>	1
6(b)	Cannot be 021120 because that is before current date. Hence <u>121121</u>	1
6(c)	<u>12 May 2034</u> <i>1 mark for 5 December 2034 OR 051234 OR 120534</i>	2

Question	Answer	Marks
7(a)	5 boxes are needed [1] 2 with 4 large cakes, 1 with 2 large cakes and 3 small cakes, and 2 with 5 small cakes [1]	2
7(b)	List of ways 3 boxes with 4 large cakes and 1 box with 3 large cakes and 2 small cakes 3 boxes with 4 large cakes and 1 box with 2 large cakes and 3 small cakes 3 boxes with 4 large cakes and 1 box with 5 small cakes.  <i>2 marks for all three correct and no extras</i>  <i>1 mark for any two correct from the list with no more than one incorrect</i> <i>OR for all three correct from the list and one extra incorrect.</i>	2

Question	Answer	Marks
8(a)	Two of each type of coin per day produces a total value of $30 \times 140\text{¢} = 4200\text{¢}$ and a total weight of $30 \times 22$ grams = 660 grams. [1] The minimum amount saved would be if the remaining $900 - 660 = 240$ grams consisted entirely of $60 \times 20\text{¢}$ coins, giving a total of $4200\text{¢} + 1200\text{¢} = \underline{5400\text{¢}}$ .	2
8(b)	The extra 240 grams needs to consist of as many 7 grams as possible. [1] The optimum is $32 \times 7$ grams + $4 \times 4$ grams. [1] The maximum amount saved is $4200\text{¢} + 1600\text{¢} + 80\text{¢} = \underline{5880\text{¢}}$ .	3

Question	Answer	Marks
9	<p>Total saving needs to be \$72 plus the \$6 spent on an additional box  <math>\\$72 + \\$6 = \\$78</math> [1]            Saving on each box is \$2 per box  <math>78 \div 2 = 39</math> [1]  <u>40</u></p> <p>OR</p> <p><i>1 mark for comparison of correct costs for any number of boxes (at least 30) and 1 more than '30'.            1 mark for a second comparison of correct costs for a pair of consecutive numbers closer to 39.</i></p> <p><u>40</u></p> <p>OR</p> <p><i>1 mark for <math>8x = 6(x + 1) + 72</math> oe            1 mark for <math>x = 39</math></i></p> <p><u>40</u></p>	3

Question	Answer	Marks
10	<p>Speed of the downhill tram is <math>(9 \div 18 =) 0.5</math> km/min [1]            (so) speed of the uphill tram is <math>(80\% \text{ of } 0.5 =) 0.4</math> km/min [1]            Journey time of the uphill tram is <math>(9 \div 0.4 =) \underline{22.5}</math> minutes</p> <p><i>Alternatively:</i>            Speed of the downhill tram is <math>(9 \div 18/60 =) 30</math> km/hour [1]            (so) speed of the uphill tram is <math>(80\% \text{ of } 30 =) 24</math> km/hour [1]            Journey time of the uphill tram is <math>(9/24 \text{ hours} =) \underline{22.5}</math> minutes</p>	3

Question	Answer	Marks
11(a)	5 matches in the league then 3 in the knockout stages, so <u>8</u> .	1
11(b)	<p>15 matches in each of four leagues [1]  <math>15 \times 4 + 7 = \underline{67}</math></p> <p><i>SC: 1 mark for 127 (double-counts league matches)</i></p>	2
11(c)	<p>It is possible to use just 2 substitutes with appropriate rotation, making a total of <u>11</u> players.</p> <p><i>1 mark for a complete scheme for 8 matches or their number of matches from 11a, provided it is greater than 5, shown using fewer than 18 players            OR for evidence establishing that 10 is insufficient.</i></p>	2

<b>Question</b>	<b>Answer</b>	<b>Marks</b>
12(a)(i)	The <u>Melbourne</u> office.	<b>1</b>
12(a)(ii)	Singapore <b>[1]</b> 06:00. <b>[1]</b> The Singapore office is the only one open <u>from 06:00 to 07:00</u> .	<b>3</b>
12(a)(iii)	<u>14:00 to 15:00</u> <i>1 mark for 14:00</i> <i>OR Cape Town, Frankfurt, London, Buenos Aires and New York</i>	<b>2</b>
12(b)	The Vancouver office closed at 01:00 on Saturday (London time) and the Auckland office opened at 20:00 on Sunday <b>[1]</b> so the IT Support department was able to close down for <u>43 hours</u> .	<b>2</b>