Cambridge International AS & A Level

THINKING SKILLS	**9694/12**
Paper 1 Problem Solving	**May/June 2022**
MARK SCHEME	
Maximum Mark: 50	

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 May/June 2022 series for most Cambridge IGCSE, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

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:

AG	answer given (on question paper)
awrt	answer which rounds to
ft	follow through (from earlier error)
oe	or equivalent
SC	special case
soi	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
1	Individual mark of partial credit
2	Double mark of partial credit
^	Essential element of answer/working missing
NGE	Judged to be not good enough to earn the relevant credit
BOD	Benefit of doubt
FT	Correct follow through
TE	Transcription error
SC	Special case
SEEN	Working seen but no credit awarded; blank page checked
Highlight	Use anywhere it is helpful to clarify the marking

Question	Answer	Marks
1(a)	<u>13</u> km (via B)	**1**
1(b)	<u>14</u> km (via C)	**1**

Question	Answer	Marks
2	The two guesses that scored 18 have a difference of 36 **[1]** The only pair of consecutive (in order of size) guesses that fit is 298 and 334, so <u>316</u>	**2**

Question	Answer	Marks
3(a)	Cost of courses: $480, $600, $810, $750, $500 Possible combinations are $480 + $600, $480 + $500, $600 + $500, So <u>French and German, French and Spanish, German and Spanish</u> *1 mark for 2 correct combinations in a list of no more than 4 combinations*	**2**
3(b)	<u>French: Monday</u> *1 mark for final answer French (without specifying day or with wrong day)* *OR* *1 mark for evidence of excluding TWO of* *Russian (is too long (18¾ hours) for G)* *Mandarin (costs too much for G)* *German (session too long for H)*	**2**
3(c)	<u>Yes, could do Mandarin on Fridays</u>	**1**

Question	Answer	Marks
4(a)	To produce the maximum number of tins, the lower 125 g of sardines per can must be used. **[1]** 1000/0.125 = <u>8000</u> tins *SC: 1 mark for 8×10^n*	**2**
4(b)	For the minimum amount of oil, the upper 160 g of sardines must be used Oil in each tin: (180 – 160 – 15 =) 5 g Number of tins: (1000/0.160 =) 6250 *1 mark for either* Minimum weight of vegetable oil is $6250 \times 5 = $ <u>31.25</u> kg	**2**

Question	Answer	Marks
5(a)	<u>July</u>	1
5(b)	<u>February, March and November</u> *1 mark for any two correct months in a list of no more than 3 months* *OR* *1 mark for January and October* *OR* *1 mark for September and December*	2

Question	Answer	Marks
6(a)	<u>90</u>	1
6(b)	Before lunch, 225 minutes or 45 × 5-minute appointments **[1]** 75 minutes or 15 appointments after lunch, so ends at <u>15:15</u> *OR* 30 fewer appointments at 5 minutes each will take 2.5 hours less to complete **[1]** If he doesn't take a break then he could finish at <u>15:15</u> *SC: 1 mark for final answer of 15:30 (tea break taken)*	2
6(c)	Total time worked is either 375 or 360 minutes **[1]** Number of appointments = 15 long and 45 short **[1]** *OR* 12 long and 48 short **[1]**	3

Question	Answer	Marks
7	1 × \$5 + 6 × \$1 = \$11 **[1]** Since the total is a multiple of 10 less than \$200, there must be 10 sets like this. So there must be <u>9</u> \$10 notes. *OR* Search using $11x + 10y = 200$ **oe [1]** $x = 10$, $y = 9$, so <u>9</u> \$10 notes	2

Question	Answer	Marks
8(a)(i)	Lower plus 2 and upper minus 2 must be different by at least 1, so <u>5</u>	1
8(a)(ii)	Within 4 of any point could be, so <u>8</u>	1
8(b)	For example: 2 + 1 + 2 × 3 + 1 + 3 <u>13</u>	1

Question	Answer	Marks
9(a)	$370	1
9(b)	Split the 7 nights as 5 plus 2 which gives a charge of $(120 + 120 + 300) × 0.85 + $200 = $659 *1 mark for final answer of* *$662 (1 + 5 + 1 nights) OR $665 (2 + 5 nights) OR $676 (3 + 3 + 1 nights) OR* *$678 (1 + 3 + 3 nights)* *OR* *$659 seen but not as final answer*	2
9(c)	Splits as 4 + 6 + 3 apart from the 2 Saturdays. 6 nights Sunday to Friday $520 × 0.85 + $100 (= $542) **[1]** 3 nights Sunday to Tuesday $320 × 0.9 (= $288) **[1]** Least total charge = $370 + $542 + $288 + $240 = $1440	3

Question	Answer	Marks
10	Adjacency means order is A-P-C-T-L-S (or S-L-T-C-P-A) **[1]** We are not told if he went P→A or A→ P, but he knows. If he went up from P to A he would be at the top **[1]** so up from A to P means it's the second possibility, so best crew is Sagittarius. **[1]** *OR* (P, C, T and L all have (three) swaps with two different crews, so cannot be best.) S and A have only one swap, so one is best and the other is worst. **[1]** A cannot be best because Alex is in the swap of A and P and neither is best. **[1]** So best crew is Sagittarius. **[1]**	3

Question	Answer	Marks
11(a)	Offer 1: (12 for) $10 + $3 = $13 **[1]** Offer 2: (10 for) $8 + $5 = $13 **[1]** *OR* Offer 1 has been used twice and Offer 2 once; in both cases, 2 free envelopes have been obtained **[1]** at a cost of $13 **[1]**.	2
11(b)	6, 7, 8, 9 (offer 1 applies once, while offer 2 does not apply) 18, 19 (offer 1 applies three times, while offer 2 applies only once) *Award 1 mark for either of these two lists of values.*	2

Question	Answer	Marks
12(a)	10 minutes **[1]** Camel lane **[1]**	**2**
12(b)	*2 marks for* 10 minutes *1 mark for omits* Wallaby Road and Kangaroo Street *If 0 scored, allow 1 mark for sight of arrival times for all stops:* *10:40, 10:46, 10:52, 10:58, 11:09, 11:15*	**3**
12(c)	The whole journey would take 25 minutes driving. The schedule allows 45 minutes, so 20 minutes difference *OR* To have 13 minutes reading time, a total of 38 minutes is needed *OR* One complete correct trial for starting time between 10:35 and 11:00 *1 mark for any one of these* The bus must have left the bus station at <u>10:42</u>	**2**

Question	Answer	Marks
13	Ali passes Kim every 600/(4 – 2.5) = 400 seconds Ali and Viv pass each other every 600/(4 + 3.5) = 80 seconds Kim and Viv pass each other every 600/(2.5 + 3.5) = 100 seconds *1 mark each for any two of the above* They will all be side-by-side again after <u>400</u> seconds. *Must see some evidence that third runner has been considered in order to award 3 marks.* *OR* Ali passes Kim every 600/(4 – 2.5) = 400 seconds In 400 seconds Ali travels 1600 metres and Viv travels 1400 m In 400 seconds Kim travels 1000 metres and Viv travels 1400 m *1 mark each for any two of the above* At this point they are all at the same point on the track, so <u>400</u> seconds is the answer. *Must see some evidence that third runner has been considered in order to award 3 marks.* *OR* Fix Viv, then relative speeds of Ali and Kim are 7.5 m/s and 6 m/s **[1]** HCF of these is 1.5 **[1]** 600 m at 1.5 m/s takes <u>400</u> seconds *SC: 1 mark for final answer 1200 seconds*	**3**