Cambridge International AS & A Level

THINKING SKILLS   **9694/01**

Paper 1 Problem Solving   **For examination from 2028**

MARK SCHEME

Maximum Mark: 50

<div style="border:1px solid black; text-align:center;">

Specimen

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This document has **10** pages. Any blank pages are indicated.

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Generic Marking Principles

All examiners must apply these general marking principles when marking candidate responses. Examiners must apply them alongside the specific content of the mark scheme or generic level descriptions for a question. Each question paper and mark scheme must 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 descriptions for the question • the specific skills defined in the mark scheme or in the generic level descriptions 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 descriptions.
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 descriptions 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
dep	mark depends on earlier, asterisked (*), mark
ft	follow through (from earlier error)
oe	or equivalent
SC	special case
soi	seen or implied

Annotations guidance for centres

Examiners use a system of annotations as a shorthand for communicating their marking decisions to one another. Examiners are trained during the standardisation process on how and when to use annotations. The purpose of annotations is to inform the standardisation and monitoring processes and guide the supervising examiners when they are checking the work of examiners within their team. The meaning of annotations and how they are used is specific to each component and is understood by all examiners who mark the component.

We publish annotations in our mark schemes to help centres understand the annotations they may see on copies of scripts. Note that there may not be a direct correlation between the number of annotations on a script and the mark awarded. Similarly, the use of an annotation may not be an indication of the quality of the response.

The annotations listed below were available to examiners marking this component in this series.

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.

Annotation	Meaning
✔	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
Highlighter	Use anywhere it is helpful to clarify the marking

Question	Answer	Marks
1(a)	Petro	**1**
1(b)	Hayley	**1**

Question	Answer	Marks
2	Hire of van for three days, $90 \times 3 = $270 **[1]** Distances 153, 400, 413 **[1]** so total 966 km Cost of fuel = 966/6 $\times$ $1.2 = $193.20 **[1]** Total cost, $270 + $193.20 = $463.20 Profit on job, $600 – 463.20 = $136.80	**4**

Question	Answer	Marks
3(a)	Diagram must show all 4 colours with pink and white on different bars.	**1**
3(b)	8	**1**

Question	Answer	Marks
4(a)	9 small, 2 large 8 small, 2 medium, 1 large 7 small, 4 medium *Award marks as follows:*	**3**

Number of answers given

		1	2	3	4	5	6+
	1	**1**	**1**	**1**	0	0	0
Number correct	2		**2**	**2**	1	0	0
	3			**3**	**2**	1	0

Question	Answer	Marks
4(b)	At least two trials to find total cost using twice as many small cakes as large *OR* 3 $\times$ 2L + 5M + 7L = 120 *OR* Search to find a multiple of 13 plus a multiple of 5 giving $120 *1 mark for any of these* Number of medium cakes = 11 *SC: 1 mark for answer of 7*	**2**

Question	Answer	Marks
5	The minimum would occur when 28 seats in each row (14 pairs on either side of the central aisle) are sold at a discount **[1]** Smallest total for rows 1–10 is 10 × (28 × $50 + 2 × $55) = $15 100 Smallest total for rows 11–40 is 30 × (28 × $30 + 2 × $35) = $27 300 Total discount = $5600 *1 mark for any one of these three* Smallest total income is $42 400 *OR* The minimum would occur when 2 seats in each row (1 on either side of the central aisle) are sold without a discount **[1]** If discount is applied to all seats, extra income from non-discounted 80 aisle seats = 40 × $10 = $400 **[1]** Smallest total income = (300 × $50 + 900 × $30) + $400 = $42 400	3

Question	Answer	Marks
6(a)	*1 mark for* Number of matches to be played = 15 OR time to first semi-final start = 420 minutes (7 hours) OR first semi-final starts at 16:00 Least total duration = 15 × 20 + 14 × 15 = 510 minutes = 8 hours 30 minutes. Tournament ends at 17:30	2
6(b)(i)	Jamal is at stadium for 15 × 30 + 14 × 15 = 660 minutes or 11 hours	1
6(b)(ii)	For latest start time, Jamal must play in the 2nd match in the 4th group Number of matches already played = 10 *1 mark for either* Greatest duration 300 minutes + 10 breaks **[1]** = 450 minutes = 7 hours 30 minutes Jamal's first match could start as late as 16:30 *SC: 1 mark for final answer of 16:15*	3

Question	Answer	Marks
7(a)	23 + 49 = 72 **[1]** 25 + 47 = 72 **[1]** 25 + 49 = 74 **[1]** *If 4 answers are given, award 1 mark for 3 correct with 1 incorrect* *No marks if more than 4 answers given*	3
7(b)	56 × 9 = 504 **[1]** 58 × 9 = 522 **[1]** *If 3 answers are given, award 1 mark for 2 correct with 1 incorrect* *No marks if more than 3 answers given*	2

Question	Answer	Marks
8(a)	12	**1**
8(b)	In week 5 I am limited to returning 25 bags **[1]** So I still have 12 bags at the end of week 5 After week 7 delivery I have 43 – 25 + 16 = <u>34</u> bags	**2**
8(c)	I have returned 109 bags **[1]** <u>$5.45</u> *SC: 1 mark for $5.55 (from returning 12 in week 6)*	**2**

Question	Answer	Marks
9(a)(i)	Difference between E and B is 6, so E = 7 (and B = 1) **[1*]** F scores 19 – 2 × 7 = 5 **[1dep] AG** *OR* Max value of F is 7, so E must be 6 or 7. If E = 6, A + C = 10 and B = 0 which is not possible, so E = 7 **[1*]** F scores 19 – 2 × 7 = 5 **[1dep] AG** *OR* FEE = 19 means either E = 6 or 7. If E = 6, A + C + E = 16 implies A + C = 10, but 6 and 7 are taken, (so A + C < 10,) so E = 7 **[1*]** F scores 19 – 2 × 7 = 5 **[1dep] AG**	**2**
9(a)(ii)	11 **[1]** 13 **[1]** *If 3 answers are given, award 1 mark for 2 correct with 1 incorrect* *No marks if more than 3 answers given* *If 0 scored, award 1 mark for A and C are 3 and 6 (or 6 and 3)*	**2**
9(b)	ACE scores 16. Least scores for U, T, L, Y are 21, 14, 8, 22, total <u>81</u>	**1**
9(c)	2 O's and 1 T score (56 – 5 =) 51 1 O and 1 T score (57 – (2 × 5 + 2 × 7)) = 33 *1 mark for either* O = 51 – 33 = 18 and T = <u>15</u> *OR* TOFFEE (57) – FOOT (56) = FEE – O = 1. **[1]** FEE is 19 so O is 18. From FOOT, T = 56 – 5 – 18 – 18 = <u>15</u>	**2**
10(a)	6 red sweets; 14 orange sweets **[1]** 9 red sweets; 10 orange sweets **[1]** 10 red sweets; 9 orange sweets **[1]** *If 4 answers are given, award 1 mark for 3 correct with 1 incorrect* *No marks if more than 4 answers given*	**3**

Question	Answer	Marks
10(b)	*2 marks for any correct final answer or a set of final answers ALL of which are correct* 8 red sweets; 5 orange sweets; 6 yellow sweets 8 red sweets; 6 orange sweets; 5 yellow sweets 6 red sweets; 5 orange sweets; 8 yellow sweets 5 red sweets; 8 orange sweets; 7 yellow sweets 5 red sweets; 9 orange sweets; 6 yellow sweets *If 2 marks for correct final answer (or a set of final answers ALL of which are correct) not awarded, award max of 1 mark for any response in a list of no more than 3 that is worth 1 mark or 2 marks, but not given as a final answer* *1 mark for an answer with a total of 19 or 20 but with (limited) violation of* **one** *other condition:* *Weight no more than 2 g outside the required range* *Only 4 of one type of sweet* *More than one sweet of the same quantity* *No marks if more than 3 answers given*	**2**

Question	Answer	Marks
11(a)	18	**1**
11(b)	35 *1 mark for final answer 36 OR* *1 mark for a correct set with a total in the range 90 to 108* *with $K = P + 7$, $L = P + 8$ or equivalent* *OR* *1 mark for a correct algebraic equality/inequality,* *e.g. $P + P + 7 + P + 8 < 101$*	**2**

Question	Answer	Marks
12	(Halfway is 126 + 88 – 41 =) 173 (km) **[1]** (Distance travelled during the first two hours is 173 – 41 =) 132 (km) **[1]** Distance travelled during the second hour is <u>49</u> km *OR* $x + x + 34 + 41 = ½ (2x + 34 + 88 + 126)$ **oe [2]** $x = 49$, Distance travelled during the second hour is <u>49</u> km	**3**

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