

Cambridge International AS & A Level

THINKING SKILLS**9694/31**

Paper 3 Problem Analysis and Solution

May/June 2026**MARK SCHEME**Maximum Mark: 50

Published

This mark scheme contains the instructions and marking guidance that our examiners used to mark candidate responses for this component.

Before they start marking, examiners complete a standardisation process. They review a range of candidate responses and discuss the mark scheme in detail to agree which answers can and cannot be accepted. Examiners award marks where it is clear that candidate responses have met the requirements of the mark scheme. These requirements may vary between different components or different versions of the same component, depending on the exact requirements of the question and the candidate responses seen during the standardisation process.

Sometimes, our mark schemes may allow marks to be awarded to responses which contain elements that are factually incorrect or for content not covered by the syllabus. We do this in response to the demands of a specific question to support candidates and make sure that our assessments are fair. However, these allowances should not be used as a guide for teaching and learning.

We cannot discuss the mark scheme with schools, and we recommend that schools read the mark scheme together with the assessment material and the Principal Examiner Report for Teachers.

This document consists of **11** printed pages.

General marking principles

All examiners must apply these marking principles when marking candidate responses.

1	Examiners must award marks for each response in line with: - the specific content defined in the mark scheme - the specific skills defined in the mark scheme or in the level descriptions - the standard of response required as exemplified by the standardisation scripts.
2	Examiners must award whole marks (not half marks, or other fractions).
3	Examiners must award marks positively . This means that: - marks are not deducted for errors or omissions - marks are awarded for correct/valid answers as defined in the mark scheme and also for other valid answers which go beyond the scope of the syllabus and mark scheme referring to your team leader as appropriate - the quality of spelling, punctuation and grammar are judged only when the mark scheme indicates that these features are specifically assessed in the question. However, the meaning of all responses must be unambiguous.
4	Examiners must consistently apply the requirements of the mark scheme and any rules for what to do when candidates have not followed instructions correctly.
5	Examiners must use the full range of marks defined in the mark scheme, unless limited by the quality of the candidate responses seen.
6	Examiners must award marks according to the mark scheme and must not award marks with grade thresholds or grade descriptions in mind.

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

Annotation	Meaning
	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

Annotation	Meaning
SEEN	Working seen but no credit awarded; blank page checked
Highlighter	Use anywhere it is helpful to clarify the marking

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.

Supporting working is **not** needed to gain full marks, unless otherwise stated in the mark scheme.

If working clearly shows, beyond any doubt, that a correct answer derives purely from incorrect reasoning, that answer may be invalidated, unless otherwise stated 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’.

Units

Unless required by the question or mark scheme, units such as \$ do not need to be seen to award the marks.

Incorrectly labelled work

If the candidate has labelled their work with the wrong Question/part number, highlight the label(s) and add a comment to flag it. This will help avoid confusion for anyone checking the script later on.

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
FA	final answer
ft	follow through (from earlier error)
oe	or equivalent
SC	special case
soi	seen or implied

Question	Answer	Marks	Guidance
1(a)	EEATRI	1	
1(b)	$(2 \times 2 \times 2 =) 8$ [1] 34[3/6]1[0/6][2/8] [1]	2	
1(c)	Repeated letters are W (in column 2), Y (in column 3), any one of X or F or Z (in column 5), G (in column 6) / Repeats in columns 2, 3, 5 and 6 [1] Only X or F or Z can be used for the fifth digit $2 \times 2 \times 2 \times 2 = 16$	2	Implied by FA of 32 or 64
1(d)	SJDLGL	1	
1(e)(i)	The first digits must differ by 1, and the second digits must differ by 1 or be 0 and 9 [1] SJD ZYD so <u>10</u> metres (e.g. 603 and 593)	2	Implied by FA 90 OR 110 Mark last if more than one given
1(e)(ii)	RGF LGL so max 0g0 to 9g8 OR 9g9 to 0g1 <u>908</u> metres <i>SC: 1 mark for answer of 907 or 909 or 9n8</i>	2	

Question	Answer	Marks	Guidance
2(a)	$(20 \times \$400) + (40 \times \$200) + \$750$ <i>1 mark for any two correct terms seen in a summation</i> <u>= \$16 750</u>	2	Implied by \$16 000 OR \$8750 seen
2(b)(i)	Alison is \$1150 behind Lionel Each additional correct answer closes the differential by \$600 [1] She would need an additional 2 correct answers <u>13</u>	2	Implied by FA 2 with no working

Question	Answer	Marks	Guidance
2(b)(ii)	If Alison took more than Lionel's 171 seconds: (Lionel's cashpot would be) \$8400 [1] (Alison's cashpot would be) \$5500 [1] <i>If 0 scored, award 1 mark for \$7900 (for Lionel) and \$6000 (for Alison)</i> 2900/600 = 4.833... 5 additional correct answers 16 [1]	3	Both of these marks implied by 2900 (difference) OR final answer 5.
2(c)(i)	\$15 200 – \$9600 = \$5600 earned in R2 160 seconds × \$5 = \$800 lost <i>1 mark for either</i> \$6400/\$400 = <u>16</u>	2	
2(c)(ii)	Lionel is \$7300 behind Sheila 20 correct answers would earn him \$8000 \$700 [1] / \$5 = 140 seconds Maximum time <u>139</u> seconds	2	May use \$7301 or \$7305 Implied by FA 140
2(d)	\$8300 lost in time penalties \$14 800 – \$8300 = \$6500 [1] \$6500/\$500 = 13 incorrect answers <u>15</u>	2	Implied by 13 incorrect OR FA 13
2(e)	\$6400 – (\$5 × 144 = \$720) = \$5680 / (total after round 2 =) \$18 430 \$1500 + \$1300 = \$2800 lost <i>1 mark for either</i> \$<u>15 630</u>	2	

Question	Answer	Marks	Guidance
3(a)(i)	Ballot 1: 14/20 ($> 2/3$) so won by 'Yes' [1] Ballot 2: 13/20 ($< 2/3$) so not won by 'Yes' [1] <i>If neither mark awarded, 1 mark for 14 for housing / 1 and 13 for golf / 2 seen</i>	2	Accept equivalent fractions throughout Q3 Accept e.g. 7–13 for 7/20 throughout Q3
3(a)(ii)	Ballot 1: 2 additional votes against building houses would give 14/22 and so change the result (from Yes to Unresolved) [1] Ballot 2: 1 (or 2) additional votes in favour of the golf course (and no additional votes against) would give 14/21 (or 15/22) and so change the result (from Unresolved to Yes) [1] <i>If 0 marks awarded, 1 mark for either 14/21 or 14/22 for houses/ballot1 AND either 14/21 or 15/22 for golf/ballot2</i>	2	ft from misplaced 13/20 or 14/20 in (a)(i)
3(b)	Ballot 1: 18/20 in favour ($> 2/3$), so won by Yes (to selling the field) [1] Ballot 2: 12/18 in favour of golf ($= 2/3$), so option to sell for golf chosen [1]	2	'18/20 so goes on to second' sufficient
3(c)(i)	Ballot 1: 12/18 prefer golf so won by 'Golf' so option to sell for golf chosen [1] Ballot 2: 13/18 support golf If they both vote No in ballot 2, only 13/20 support golf so the result changes/result is Unresolved [1] (Only one voting No is not sufficient, as $13/19 > 2/3$)	2	13/20 not required if 13/18 seen
3(c)(ii)	Support for golf is now 13/19 [1] If just one of them votes for housing in ballot 1, then the support for golf drops to 13/20 (now $< 2/3$) and the result changes to Unresolved (and so ballot 2 does not occur) [1]	2	Implied by reference to final result of 13/20 or 13/21 in the ballot Accept explanation for both voting for housing, with fraction 13/21

Question	Answer	Marks	Guidance												
4(a)	<u>40 small, 32 medium, 24 large</u> <i>1 mark for one correct</i> <i>OR for 8 small, 6 medium and 4 large in one day</i>	2													
4(b)	1 set of each size of toy takes $60 + 75 + 100 = 235$ minutes [1] 2400 minutes worked in a week, so $2400/235 = 10$ (.2) sets, so <u>30</u> toys	2	3h 55m Accept '10 of each' but not just 10												
4(c)	2 small toys and 1 medium toy take 195 minutes $2400/195 = 12$ (.3) so 12 sets produced, so <u>24 small and 12 medium</u> toys	1	36 with 24 and 12 in working												
4(d)(i)	Alfie cuts out 3 toys in $(5 + 10 + 15 =)$ 30 minutes $480/30 = 16$ so $16 \times 3 = 48$ toys per day AG	1	May use hours												
4(d)(ii)	Brianne (takes 120 minutes to assemble 3 toys, and $480/120 = 4$ so theoretically, she) could assemble 4 of each size in 480 minutes However, she cannot start until Alfie has cut out the first toy, at 9:05	1	Need both Could be other way around – wait 5 so $475/120 < 4$												
4(d)(iii)	(First toy cut out: 09:00–) 09:05 (First toy assembled: 09:05–) 09:40 [1] (Second toy assembled: 09:40–) 10:20 [1] (Third toy assembled: 10:20–) 11:05 [1] (Third toy decorated: 11:05–) 11:45 AG <table border="1"> <tr> <td>Small</td><td>9:00–9:05</td><td>9:05–9:40</td><td>9:40–10:00</td></tr> <tr> <td>Medium</td><td>9:05–9:15</td><td>9:40–0:20</td><td>10:20–10:45</td></tr> <tr> <td>Large</td><td>9:15–9:30</td><td>10:20–11:05</td><td>11:05–11:45</td></tr> </table>	Small	9:00–9:05	9:05– 9:40	9:40–10:00	Medium	9:05–9:15	9:40– 0:20	10:20–10:45	Large	9:15–9:30	10:20– 11:05	11:05–11:45	3	$5 + 35 + 40 + 45 + 40 = 165$ May use elapsed time
Small	9:00–9:05	9:05– 9:40	9:40–10:00												
Medium	9:05–9:15	9:40– 0:20	10:20–10:45												
Large	9:15–9:30	10:20– 11:05	11:05–11:45												

Question	Answer	Marks	Guidance									
4(e)(i)	<table><tr><td>9:00–9:05 A</td><td>9:05–9:40 B</td><td>9:40–10:00 A</td></tr><tr><td>9:05–9:10 A</td><td>9:40–10:15 B</td><td>10:15–10:35 A</td></tr><tr><td>9:10–9:15 A</td><td>10:15–10:50 B</td><td>10:50–11:10 A</td></tr></table> The first toy will be complete at 10:00 [1] They will then be at 35-minute intervals [1] (so at 10:00, 10:35, 11:10, 11:45, 12:20, 12:55, 14:30, 15:05, 15:40, 16:15, 16:50, 17:25, 18:00) 13 in total [1] OR The first toy takes 5 minute to cut out [1] The last toy will take 20 minutes to decorate [1] In 455 minutes she can assemble 13 toys [1]	9:00–9:05 A	9:05–9:40 B	9:40–10:00 A	9:05–9:10 A	9:40–10:15 B	10:15–10:35 A	9:10–9:15 A	10:15–10:50 B	10:50–11:10 A	3	60 minutes implies 10:00 Implied by list of times with 35-minute gaps <i>Implied by 475/t</i> <i>Implied by 460/t</i> <i>Both implied by 455/t</i>
9:00–9:05 A	9:05–9:40 B	9:40–10:00 A										
9:05–9:10 A	9:40–10:15 B	10:15–10:35 A										
9:10–9:15 A	10:15–10:50 B	10:50–11:10 A										
4(e)(ii)	1 mark for Alfie cuts out from 9:00 to 9:40 (when he first decorates) so 8 toys He has a 15-minute gap between decorations, in which he cuts out 3 toys each time Total number = 8 + (‘13’ – 1) × 3 [1] = 44 Of these, 13 are complete, so number incomplete is <u>31</u> OR Alfie spends ‘13’ × 20 = 260 minutes decorating, so 220 minutes cutting out, which is 44 toys [1] Of these, 13 are complete, so number incomplete is <u>31</u>	2	ft their (e)(i) Implied by 44 ft their (e)(i)									