Cambridge Assessment International Education

Cambridge International AS & A Level

THINKING SKILLS **9694/32**

Paper 3 Problem Analysis and Solution **May/June 2020**

MARK SCHEME

Maximum Mark: 50

Published

Students did not sit exam papers in the June 2020 series due to the Covid-19 global pandemic.

This mark scheme is published to support teachers and students and should be read together with the question paper. It shows the requirements of the exam. The answer column of the mark scheme shows the proposed basis on which Examiners would award marks for this exam. Where appropriate, this column also provides the most likely acceptable alternative responses expected from students. Examiners usually review the mark scheme after they have seen student responses and update the mark scheme if appropriate. In the June series, Examiners were unable to consider the acceptability of alternative responses, as there were no student responses to consider.

Mark schemes should usually be read together with the Principal Examiner Report for Teachers. However, because students did not sit exam papers, there is no Principal Examiner Report for Teachers for the June 2020 series.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the June 2020 series for most Cambridge IGCSE™ and Cambridge International A & AS Level components, and some Cambridge O Level components.

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.

Abbreviations

The following abbreviations may be used in a mark scheme:

AG answer given (on question paper)
awrt answer which rounds to
cao correct answer only
ft follow through (from earlier error)
oe or equivalent
SC special case
soi seen or implied
www without wrong working

Question	Answer	Marks
1(a)	He must have one 50¢ and three 20¢ coins.	1
1(b)	The maximum is one 50¢, four 20¢, one 5¢ and four 2¢ coins, **[1]** making $1.43. **[1]** *SC: 1 mark for £1.41 or £1.39, from miscounting 2¢ coins* *OR 1 mark for $1.30, considering only 20¢ and 50¢.*	2
1(c)	He needs 9 coins: two 50¢, two 20¢, one 10¢, one 5¢, two 2¢ and one 1¢ coins. *1 mark for one extra or omitted coin, or for 9 without a list.*	2
1(d)	He should have the same set as Wednesday, but add three 50¢ coins: five 50¢, two 20¢, one 10¢, one 5¢, two 2¢, and one 1¢ coins **[1]** meaning that he can make any amount up to $2.50 + $0.60 = $3.10. **[1]** *FT both marks from **(c)***	2
1(e)	The value to weight ratio is very high for 20¢ coins, so a sensible strategy is to maximise the number of these. So he could have e.g. seven 20¢, one 10¢, one 5¢, two 2¢ and one 1¢ coins **[1]** with a total weight of 65 g. **[1]**	2
1(f)	Yes, because five 20¢ could be swapped for four 25¢, saving 5 g. *FT: if their (e) includes a 50¢ coin: two 25¢ weigh less than one 50¢*	1

Question	Answer	Marks
2(a)	Andrew 9th; Dilani 3rd; Graham 6th; Sana 2nd *1 mark (max) for any of the following:* • *two or three positions correct* • *sight of correct number of points for all four riders (1, 12, 6, and 15 respectively)* • *all four correct positions without the names of the riders*	2
2(b)	12 (Tamsin), 20 (Natalie) and 15 (Brian) makes 47 (points)	1
2(c)	Biscuit (ridden by Brian, Tamsin and Sana)	1
2(d)	Graham (rode Meteor, Sapphire and Harvey from Witherston)	1
2(e)	Andrew would have scored 4 instead of 6; Dilani would have scored 0 instead of 1. *1 mark for either* Sana would have scored 12 instead of 0. 12 – 2 – 1 = 9	2

Question	Answer	Marks
2(f)	*1 mark for each of the following:* • None of the (seven) riders who have fewer than 21 points at the end of the fourth round can win. • At least one of the (four) riders with 41 points will score (because only three score no points). • All the riders with 41 points who score will score a different number of points. • Mahela could total 44 points (if he wins the round), but none of those with 41 points could tie with him (because it is not possible to score 3 points).	**4**
2(g)	*4 marks for any assignment of positions to the riders that does not violate the order for the four known riders and is consistent with the correct total points.* *If 4 not scored:* A three-way tie requires each team to have ($5 \times 78 \div 3 =$) 130 points. **[1]** OR (78 – 30 =) 48 points to split between them, so 16 each **[1]** Therefore Frogford need (16 + 13 =) 29 points, Hockingham 16 points and Witherston (16 + 17=) 33 points. **[1]** *1 mark for any valid allocation of points that gives the right total for each team, e.g. 15 + 10 + 4 + 0 = 29; 8 + 6 + 2 + 0 = 16; 20 + 12 + 1 + 0 = 33.*	**4**

Question	Answer	Marks
3(a)	There is a total of $3 \times 1 + 3 \times 3 + 3 \times 5 = 27$ points available, so the winning team must score at least <u>14</u>.	**1**
3(b)	3 2 **1** 1 **3** 2 2 1 3 *1 mark for a completed grid in which there are no repetitions in any row OR no repetitions in any column.*	**2**
3(c)	Any example that is either two allocations to the same group or two allocations in the same row or column.	**1**
3(d)	Griffins: $2\times1 + 2\times5 = 12$ points. **[1]** Hawks: $1\times1 + 3\times3 + 1\times5 = 15$ points. **[1]** *SC: 1 mark for 12 and 15 with no indication of teams.*	**2**
3(e)(i)	<u>16</u> *1 mark for evidence of different decision leading to Roger scoring 8 points instead of 6 OR Tom scoring 3 points instead of 1.*	**2**

Question	Answer	Marks
3(e)(ii)	Specifying group 2 would force all the remaining rounds to be as required / If the captain of the Griffins had specified group 3 for this round then the remaining rounds would not have been determined **[1]** and so the other captain's selection might have put the other Griffin wins into group 1 rather than group 2 (giving the Griffins a score of 12). **[1]**	**2**

Question	Answer	Marks
4(a)	The increase of price between the cheapest and most expensive tickets was \$20 and the drop in sales was approximately 80. The sales for \$20, \$30, \$35 and \$40 are consistent with a drop of sales by 20 for each additional \$5 on the price (the \$30 are consistent as the capacity had been reached, so it is possible that another 20 customers would have bought tickets). The \$25 row is the inconsistent one (allow any clear identification of the row).	**1**
4(b)	The concert with tickets \$35 made the largest donation to charity. **[1]** The income was a total of \$3535. **[1]** The cost of the venue was \$800, so the donation to charity was \$2735.	**3**
4(c)	The options for the amount that Sally earns are: Ticket price / Number sold / Amount made \$20 / 150 / \$3000 \$25 / 140 / \$3500 \$30 / 120 / \$3600 \$35 / 100 / \$3500 \$40 / 80 / \$3200 The total income reduces as the price increases. The most that Sally can receive from sales is therefore \$3600. *1 mark for any correct total income calculated.*	**2**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>4(d)</td><td>Sally's model predicts that 60 tickets would sell at $45 and only 40 would sell at $50, so the best choice of price for the more expensive tickets would be $45. [1]

For the remaining tickets, the options are shown in the table below.

<table>
<tr><th>Ticket price</th><th>Number sold</th><th>Amount made</th></tr>
<tr><td>$20</td><td>90</td><td>$1800</td></tr>
<tr><td>$25</td><td>80</td><td>$2000</td></tr>
<tr><td>$30</td><td>60</td><td>$1800</td></tr>
<tr><td>$35</td><td>40</td><td>$1400</td></tr>
<tr><td>$40</td><td>20</td><td>$800</td></tr>
</table>

1 mark for a correct calculation with the adjusted number sold.

It is therefore best to set the cheaper price as $25. [1]</td><td>3</td></tr>
<tr><td>4(e)(i)</td><td>30 tickets would not be sold at the higher price, reducing the income by $1350.
But 10 additional standard tickets can be sold for an extra $250.
The expected income would be reduced by $1100.

1 mark for $600 or $1350.

ft their $25 in (d).</td><td>2</td></tr>
</table>

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>4(e)(ii)</td><td>Working through the different options, starting with the higher price:

<table>
<tr><th>Higher price</th><th>Number sold</th><th>Income</th><th>Lower price</th><th>Number sold</th><th>Income</th><th>Total income</th></tr>
<tr><td>$30</td><td>60</td><td>$1800</td><td>$25</td><td>80</td><td>$2000</td><td>$3800</td></tr>
<tr><td>$35</td><td>50</td><td>$1750</td><td>$25</td><td>90</td><td>$2250</td><td>$4000</td></tr>
<tr><td>$40</td><td>40</td><td>$1600</td><td>$30</td><td>80</td><td>$2400</td><td>$4000</td></tr>
<tr><td>$45</td><td>30</td><td>$1350</td><td>$30</td><td>90</td><td>$2700</td><td>$4050</td></tr>
<tr><td>$50</td><td>20</td><td>$1000</td><td>$35</td><td>80</td><td>$2800</td><td>$3800</td></tr>
<tr><td>$55</td><td>10</td><td>$550</td><td>$35</td><td>90</td><td>$3150</td><td>$3700</td></tr>
</table>

Sally should therefore charge $45 for the more expensive tickets and $30 for the cheaper tickets.

1 mark for identifying the correct total income for any combination of ticket prices.
1 mark for finding the best lower price to go with a given higher price.
1 mark for reaching a combination that generates an income of at least $4000.</td><td>4</td></tr>
</table>