Cambridge International AS & A Level

THINKING SKILLS	**9694/31**
Paper 3 Problem Analysis and Solution	**May/June 2020**
MARK SCHEME	
Maximum Mark: 50	

Published

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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)	She bought 3 essential éclairs and 2 marvellous macarons.	**1**
1(b)	She bought 4 crunchy croissants and 1 gorgeous gâteau.	**1**
1(c)(i)	The cheapest way to buy 8 cakes of at least three different kinds would be to buy 6 gorgeous gâteaux, 1 essential éclair and 1 marvellous macaron **[1]** but this comes to $3.10 (which is more than $3). **[1]**	**2**
1(c)(ii)	He can buy 6 gorgeous gâteaux and 2 essential éclairs **[1]** for $2.96 or he can buy 7 gorgeous gâteaux and 1 essential éclair **[1]** for $2.88.	**2**
1(d)	If she buys four identical cakes in each purchase, then she will save 65c, 43c, 35c and 57c, a total of $2, so she will pay $8 – $2 = $6 **[1]** On the other hand, if she buys CCCG, CMMG, MMEG and EEEG, for instance, then the cheapest cake in each purchase will be the gorgeous gâteau, so she will save only $4 \times 0.35 = $1.40, so she will pay $8 – $1.40 = $6.60 **[1]** *SC: 1 mark for $2 and $1.40 seen.*	**2**
1(e)	The cheapest way will involve getting one C, one M, two Es and one G free. **[1]** One solution is to buy CCC, EEE, GGG, MMM, CME, and G. She will save a total of $2 from getting one of each free and 43c on the second E making a total cost of $8 – $2.43 = <u>$5.57</u>.	**2**

Question	Answer	Marks
2(a)(i)	<u>31</u> *1 mark for judges' total (including bonuses) of 25 or audience points = 6.*	**2**
2(a)(ii)	<u>55</u> (5 + 5 + 5 + 5 + 5 + 10 + 20)	**1**
2(b)	& = 4 AND @ = 2 **[1]** Total of bonuses = 10, so bonus = 2 AND 4 more needed to make total = 25. **[1]**	**2**
2(c)	16 [1] Set of five numbers that would result in a total of 16 points, or their answer (ft), with a sum of 400. **[1]**	**2**

Question	Answer	Marks
2(d)	Vicky (gave her 2 bonus points to) Louise, Xanthe (gave her 2 bonus points to) Nathan, Yasmin (gave her 2 bonus points to) Nathan **and** Zack (gave his 2 bonus points to) Petra. **[1]** *1 mark for each of the following (maximum 2):* • Adam was not awarded a bonus, so Vicky must have given her bonus points to Louise. • Louise only had one bonus (from Vicky), so Zack must have given his bonus points to Petra. • Nathan had two bonuses, which must have been from Xanthe and Yasmin.	3
2(e)	<u>Adam needs 120 votes</u> **[1]** <u>Erin needs 80 votes</u> **[1]** *If neither of the marks can be awarded, award 1 mark for sight of Adam requiring 6 points AND Erin requiring 4 points.*	2
2(f)	Any set with the following features: • Total 400 votes. • Adam has the highest number of votes. • Louise and Nathan have the same number of votes. **[1]** • Petra's total resulting in at least 3 points fewer than Louise's/Nathan's total. **[1]** • Adam's total not resulting in 6 points more than Louise's/Nathan's total. For example: Louise – 60 Adam – 131 Nathan – 60 Petra – 19 Erin – 130	3

Question	Answer	Marks
3(a)	Saturday **[1]**, B **[1** *(dependent)***]**, because to visit all three he has to go on Saturday, Monday, and Wednesday, and of those days B is only open on Saturday **[1]**.	3
3(b)	Arrival on Saturday **[1]** means that one has to visit B on Friday **[1]**.	2
3(c)	With Monday, Wednesday and Friday all the same, those arriving on Saturday **[1]** cannot use all three restaurants **[1] soi**. *SC: 1 mark for Friday (A), Sunday (A) and Monday (B) arrivals now also have restrictions on when they can dine.*	2
3(d)	14 is not a multiple of 3.	1

Question	Answer	Marks
3(e)	Monday and Wednesday **[1]** because either would make the staff break contiguous OR would avoid any restrictions on options / allow choice for the Thursday and Saturday arrivals. *1 mark for either reason*	**2**

Question	Answer	Marks
4(a)	At most 3 Deal A sessions on a weekday, and 5 on a Saturday **soi [1]** Least income = $((75 \times 3 + 50) \times 5 + 75 \times 5)$ = \$1750 **AG**	**2**
4(b)	\$50 per hour on Monday, Wed, Friday AND \$30 per hour on Tuesday, Thursday **[1]** (50×7) = \$350 on Monday, Wed, Friday (30×7) = \$210 on Tuesday, Thursday $(30 \times 7) + 150$ = \$360 on Saturday (10 hours) Total = <u>\$1830</u> *SC: 1 mark for \$1680, which takes 7 hours on Saturday instead of 10 hours*	**2**
4(c)	$(75 + 75 + 75 + 50)$ on Monday, Wed, Friday $(75 + 75 + 75 + 30)$ on Tuesday, Thursday $75 + 75 + 75 + 75 = 375$ on Saturday Total = <u>\$1710</u> *1 mark for maximising the amount of Deal A (40 hours)* *1 mark for two Deal Bs in remaining time (4 hours)* Award I mark for correct amount stated for any two consecutive days or \$275 and \$255 seen Award 1 mark for either \$375 (for deal A) or \$380 (for deal B) on Saturday *SC: 2 marks for \$1715,* *using* $(75 + 75 + 75 + 30 + 75 + 50)$ = *\$380 on Saturday*	**3**
4(d)	$(50\,000 \div ($*their* $1710 - 620)$ *OR* $1710n - 620n > 50\,000$ **[1]** <u>46</u> weeks	**2**
4(e)	Earliest: 3 two hour sessions and 1 other: 7 hours plus 5 times 30 minutes travel 17:30 **[1]** Latest: 7 one hour sessions plus 8 times 30 minutes travel 19:00 **[1]**	**2**

Question	Answer	Marks
4(f)	Minimum income from Maya = $\$((75 \times 3) + 50) \times 6 \times 80\%$ = \$1320 **[1]** Net income = $\$(1320 - 600 - 300)$ = \$420 **[1]** 60000/50 = \$1200 $1320 - 900 + 275N > \dfrac{60\,000}{50}$ **oe** or 2.83 **[1]** So he will need to work 3 days every week. **[1]**	**4**