



Cambridge International AS & A Level

CANDIDATE
NAME

CENTRE
NUMBER

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THINKING SKILLS

9694/13

Paper 1 Problem Solving

May/June 2020

1 hour 30 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- Show your working.

Where a final answer is incorrect or missing, you may still be awarded marks for correct steps towards a solution.

In most questions, full marks will be awarded for a correct answer without any working. In some questions, however, you will not be awarded full marks if working needed to support an answer is not shown.

INFORMATION

- The total mark for this paper is 50.
- The number of marks for each question or part question is shown in brackets [].

This document has **16** pages. Blank pages are indicated.

- 2 I am travelling to see a friend this weekend. My trip will consist of a 105km journey along the motorway, followed by a crossing on a ferry which takes 30 minutes and then a further 10km along smaller roads to my friend’s house. I can drive at 70km/h on the motorway, but at only 40km/h once I reach the smaller roads. I have booked my crossing for 14:00 and have told my friend that I will arrive at 15:30.

What is the latest time that I could leave home for my journey? [2]

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- 3 Laura lives in Mainton and her friend Mona lives on Blue Island. When Laura visits Mona, she has to walk for 10 minutes to Mainton station, catch a train to the ferry terminal at Portland, take the ferry to Blue Island, and finally walk for 15 minutes to Mona’s house. To return home, she makes the complete journey in the opposite direction.

Trains between Mainton and Portland leave at 25 and 55 minutes past each hour in both directions and the journey takes 85 minutes. The first and last trains leave each station at 06:55 and 22:25.

There is a single ferry boat between Portland and Blue Island. It leaves Portland on the hour, each hour from 10:00 to 18:00, and it leaves Blue Island at 30 minutes past each hour, from 10:30 to 18:30. The journey takes 20 minutes in either direction.

- (a) On Tuesday Laura will leave home at 09:00.

What is the earliest time that she can arrive at Mona’s house? [3]

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- (b) Next Friday Laura wants to leave home, spend as long as possible at Mona’s house and return home the same day.

- (i) What is the longest amount of time Laura could spend at Mona’s house? [3]

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(ii) For how long in total will Laura be away from home?

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- 4 A standard ticket for the Neesing Metro System costs \$10 and is valid for unlimited travel on the system for the whole of the day it is bought. Also available are a 3-day ticket for \$15 and a 7-day ticket for \$30. These tickets are valid for 3 or 7 consecutive days respectively, starting from the day of purchase.

This table shows the number of tickets sold during the first two weeks of last month.

<i>Date</i>	<i>Standard tickets</i>	<i>3-day tickets</i>	<i>7-day tickets</i>
1st	523	288	173
2nd	641	307	158
3rd	506	345	212
4th	593	382	191
5th	674	311	170
6th	549	326	183
7th	729	355	192
8th	763	394	218
9th	602	337	189
10th	518	266	170
11th	675	323	196
12th	549	366	183
13th	510	264	162
14th	734	343	205

- (a) Explain how it can be deduced, without calculation, that the total income from ticket sales was greater on the 8th than on any other day during the first two weeks of last month. [1]

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(b) On which date during the first two weeks of last month was the income from ticket sales exactly the same for standard, 3-day and 7-day tickets? [2]

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(c) How many tickets valid for travel on the 14th were no longer valid for travel on the 15th? [2]

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- 5 A radio presenter has to find music to exactly fill a 4 minute 50 second gap in her breakfast show schedule. She will not play the same song more than once.

She has 7 songs, lasting the following lengths of time:

<i>Song</i>	<i>Time (minutes:seconds)</i>
A	00:45
B	01:10
C	01:15
D	01:35
E	02:05
F	02:25
G	03:20

- (a) Which songs should she use? [1]

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For the afternoon show, she has another 7 songs available, lasting the following lengths of time:

<i>Song</i>	<i>Time (minutes:seconds)</i>
H	02:12
I	02:28
J	03:40
K	03:48
L	04:25
M	05:10
N	05:17

She needs to separate these songs into two groups which have the same combined length as each other, so that they can be played either side of an advertising break.

- (b) Which songs should she group together? [3]

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6 The only values of coins that are available to Harold are 1¢, 5¢, 10¢, 25¢ and 50¢. Using the coins in his pocket he is able to make various totals, including 47¢ and 63¢, exactly.

(a) What is the smallest number of coins that Harold could have? [2]

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(b) How many different sets of this number of coins are possible? [1]

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- 7 A special type of timber can be bought in 3 lengths. The lengths that can be bought and the price of each plank are shown in the table below.

Length of plank in metres	2.5	3.5	4.5
Price	\$2.50	\$3.50	\$4.50

Sophie needs to buy enough of this type of timber so that by sawing the planks she will have 10 pieces of length 1.50 m, 10 pieces of length 2.00 m and 10 pieces of length 3.00 m.

- (a) What is the least that Sophie can pay for the timber that she needs? [2]

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Sophie's project was successful and she decided to repeat it. Unfortunately, when she went back to the timber merchant the prices had changed. The new prices are in the following table.

Length of plank in metres	2.5	3.5	4.5
Price	\$2.50	\$4.50	\$6.00

- (b) What is the least she could now pay to get enough timber for her needs? [3]

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10 The following message is displayed above the counter in my local bakery:

DOBLE'S

A bakery run by 5 generations of women bakers,
baking fresh bread on these premises.

The bakery was originally opened by Lucy Doble, and has since been run by her and her 4 direct female descendants, one from each successive generation.

While waiting for my Scotch Pie to be warmed, I try to deduce when the bakery might have opened.

I assume that all of the mothers that have had children in the Doble baking dynasty have given birth when they were between 20 and 40 years old (inclusive).

I also assume that none of those working in the shop are younger than 18, or older than 60, and that this has always been the case.

(a) What is the shortest amount of time that the bakery could have been open? [2]

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(b) What is the longest amount of time that the bakery could have been open? [2]

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In fact the pie chart relates to ticket sales for Saturday.

(b) How many of the family tickets sold on Saturday were used for two children to enter the theme park? [3]

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[Turn over for Question 12]

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12 Vera, from Axia, is planning a holiday in neighbouring Baxia. She plans not to change any currency in Baxia. She will buy 100 Baxian pounds (£) in Axia before she goes, and this will be enough for her needs. She expects to spend £60 in Baxia and will convert any pounds she has left back into Axian dollars (\$) on her return.

She has a choice of two currency exchanges that she can use in Axia:

Smartex will charge her \$4.60 for every Baxian pound she buys, but will give her only \$4.40 for every pound she returns at the end of the holiday.

Realex will charge her \$4.65 for each Baxian pound, but will also give her \$4.65 for every one she returns.

(a) Supposing she does spend £60 in Baxia, would the holiday be cheaper by using Realex or Smartex, and by how many Axian dollars? [2]

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(b) What spending by Vera in Baxia would mean that the cost of the holiday would be the same whether she used Realex or Smartex? [3]

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