Cambridge International AS & A Level

CANDIDATE
NAME

CENTRE
NUMBER

CANDIDATE
NUMBER

THINKING SKILLS **9694/01**

Paper 1 Problem Solving **For examination from 2020**

SPECIMEN PAPER **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 **12** pages. Blank pages are indicated.

1 Cans of the brand of beans that I always buy are usually 90 cents each. Last week, however, they had been reduced to 70 cents each, so I bought 36 cans.

This week they are back to 90 cents each, but there is a 'buy 2 cans, get another one free' offer in place.

How much more did I pay for the cans I bought last week than if I had bought them this week instead?

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2 Barry's 6-digit passcode for internet banking consists of six different digits. If a multiplication sign is placed between the second and third digits and an equals sign is placed between the third and fourth digits, a correct calculation appears.

The first digit of the passcode is 6, the third digit is 5 and the fifth digit is 2.

What is Barry's passcode?

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3   A puzzle involves placing square tiles together. Each tile in the set has a symbol on each edge and tiles may only be placed if the symbols on touching edges match.
There are a total of 6 symbols: ✱, +, ■, ●, ◆ and ✕. Each symbol appears on 6 different tiles, no symbol appears more than once on a tile and no two tiles have the same four symbols as each other.

   (a)   How many tiles must there be in the full set?

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   Three of the puzzle tiles are shown below.

   A   B   C
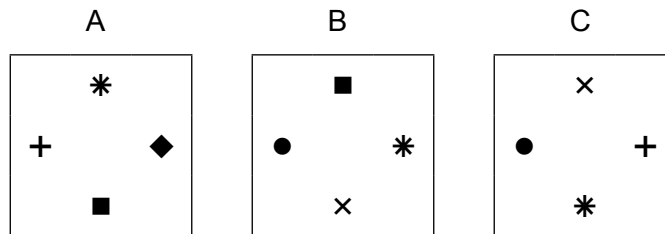
   These three tiles, along with tile D, can be arranged in a 2 × 2 grid as shown below.

A	B
C	D
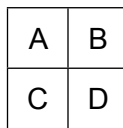
   (b)   Draw a possible design for tile D.

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4 A postage company delivers parcels which are in the shape of a cuboid. The length of every side of the parcel must be a whole number of centimetres. The price in cents is determined by multiplying the weight of the parcel (to the nearest kilogram) by 30 and then adding on 20 times the length of the longest side of the parcel.

(a) What is the price for sending a parcel that measures $3\,cm \times 5\,cm \times 2\,cm$ and weighs $4\,kg$?

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(b) What is the largest a parcel that weighs $5\,kg$ could be if the price for sending it is less than \$3?

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The company usually makes a profit on each delivery, but sometimes the cost to deliver a parcel is more than the price the company charges.

(c) (i) Suggest one reason why a delivery may cost more than the price charged.

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(ii) The company wishes to adjust its pricing system in order to ensure that it makes a profit on every delivery.

With reference to your answer to part **(i)**, state two pieces of additional information the company would need to collect.

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5 A computer game involves creating words of five or more letters. At the beginning of each game, the computer assigns a points value of 1, 2, 3 or 4 to each letter of the alphabet, at random.

In the game that I am currently playing I have so far scored 14 points for EARTH, 12 points for CHART and 11 points for TRACE.

How many points would TEACHER score in this game?

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6 At the supermarket *Pryslide*, 500 ml bottles of shower gel cost $7 each. However, since the beginning of last week there has been a special offer: 'Buy 2 bottles, get another one for $2.'

Yesterday, the total income from the sales of these bottles was $323.

What is the maximum number of bottles that were bought for $2 yesterday?

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7 There are 12 teams in the Jayhook Hockey League. Each team plays every other team twice per season, once at home and once away from home.

Last season 34 of the matches played were drawn. Of the others, 18 more were won by the home team than by the away team.

How many matches were won by the home team last season?

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8 Mary worked from Monday to Saturday last week and bought lunch in the company's restaurant every day.

Her lunches cost a different amount every day.
Each lunch cost a multiple of 20¢.
The most expensive lunch of the week cost $7.60 and the cheapest one cost $4.40.
Friday's lunch cost exactly 1½ times as much as Wednesday's lunch.
Tuesday's lunch cost $1.20 more than Thursday's lunch.

(a) What is the minimum total that Mary's six lunches last week could have cost?

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(b) What is the maximum total that Mary's six lunches last week could have cost?

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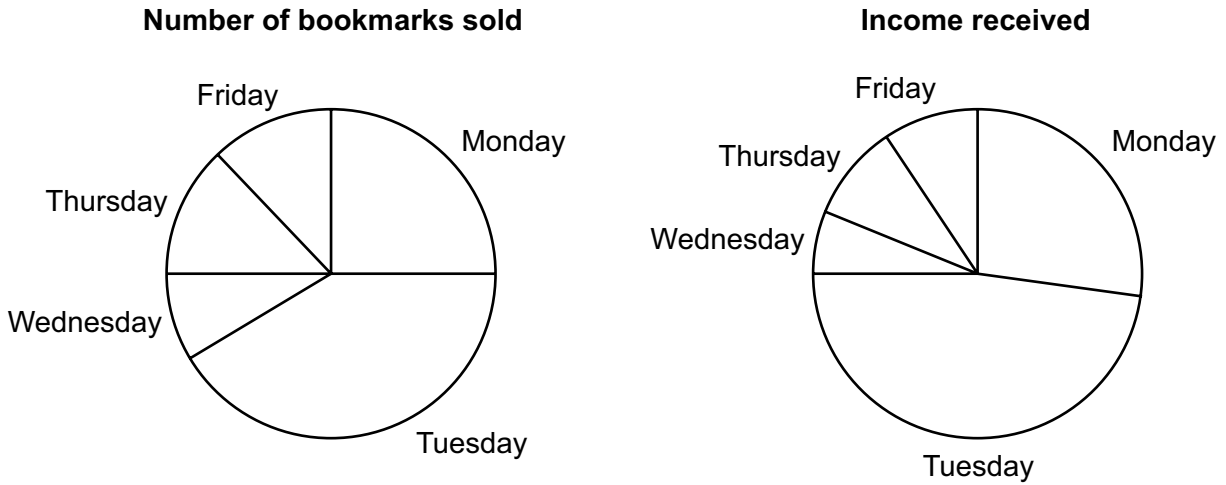.. [2]

9 Each day last week James sold some bookmarks that he had made. He drew pie charts to show how many bookmarks he had sold and how much income he received on each day.

Number of bookmarks sold

Income received

Originally James was charging $6 for each bookmark, but he changed the price that he was charging at the start of one of the days last week.

(a) On which day did James change the price that he was charging for the bookmarks?

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James sold three times as many bookmarks on Monday as he sold on Wednesday.

(b) What was the new price that James charged for the bookmarks?

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10 My local store sometimes runs offers on some of its products. There are three different types of offers that could be in place:

- Buy a certain number of a particular product and get an extra one for half price.
- A percentage discount (always a multiple of 5%) on one particular product.
- A percentage discount (always a multiple of 5%) on purchases worth a total of more than $10.

The store only ever has one of these offers in place at any time.

Last week I bought

    3 cartons of orange juice for $4 each
    1 loaf of bread for $3
    5 packets of snacks for $1 each

This week I bought the same set of items, but only paid $18 even though the individual items still had the same price.

(a) (i) There are two possible offers that could be applied to orange juice that would each explain this reduction in the total bill.

What are these two offers?

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(ii) What are the other two offers that could explain the reduction in the total bill?

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(b) In order to work out which offer is in place this week, I am going to make another purchase.

What is the minimum that I must buy in order to be certain about which offer is in place?

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11 Raj has reached the final of a game show. He must choose one of nine boxes which are arranged in a 3 × 3 grid. Each box contains a different number from 1 to 9. No two adjacent boxes (either horizontally or vertically) contain consecutive numbers.

Raj is allowed to look in three of the boxes. The three that he has looked in are shown in the diagram below.

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The boxes are closed again and the grid of boxes is rotated. Raj is not allowed to watch as the grid is rotated and it is possible that the grid returned to its original position. Raj may now look in two of the boxes before choosing the prize that he will win. Raj decides to look in the box at the bottom left.

(a) Raj knows that he will not see a 2 or a 4. Which other number can he be certain that he will not see?

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(b) Which three numbers could he see that would allow Raj to work out how much the box had been rotated? State what rotation would have taken place in each case.

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Number .... Rotation ....

Number .... Rotation ....

Number .... Rotation .... [3]

In fact, Raj sees the number 9 in the box. He looks in the box on the left of the middle row and sees the number 5.

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(c) Raj wishes to win prize number 6. Which box should he open?

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12 Paul regularly makes the 100 km journey to visit his family. The journey involves three separate stages:

- A stage of 20 km that is travelled on small roads at a constant speed of 30 km/h.
- A stage of 50 km that is travelled on the highway at a constant speed of 100 km/h.
- A stage of 30 km that is travelled on standard roads at a constant speed of 40 km/h.

(a) How long does it normally take Paul to make this journey?

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Last week there were roadworks on a section of the highway, and Paul was only able to travel at 60 km/h for the length of the roadworks. Paul's journey last week took 6 minutes longer than usual.

(b) What was the length of the section of roadworks?

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