Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

0988075138

THINKING SKILLS **9694/11**

Paper 1 Problem Solving **October/November 2023**

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.

1 The dates on which Jemima visited her grandmother in 2018 are given in the table below.

Visit	*Date*
1	4 March
2	14 March
3	27 March
4	9 April
5	25 April
6	9 May
7	22 May
8	3 June
9	18 June
10	1 July

(a) On which visit had it been the longest gap since the previous visit? [1]

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(b) Which three consecutive visits took place over the shortest total time interval? [1]

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2 The charges for entry to a wildlife park are shown in the following table.

Number of people in group	*Charge per person*
1	$25
2–5	$20
6–10	$15
11–20	$12

A school party consisting of 8 adults and 38 children is visiting the park together. They want to pay as little as possible.

(a) What is the least possible total charge for the party? [1]

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The park introduces a reduction of $2 per person for any group consisting entirely of children.

(b) What would now be the least possible total charge for this school party? [2]

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3 Edward is purchasing chairs for a new conference venue. Identical chairs come in boxes of 7 or boxes of 12. Boxes of 7 chairs cost $25 and boxes of 12 chairs cost $40.

Edward purchases a total of exactly 100 chairs.

(a) How many of each kind of box does he purchase? [1]

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The design for the new conference venue changes and it can now accommodate an additional 71 chairs.

(b) How many of each kind of box should Edward purchase to obtain exactly 71 chairs? [1]

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(c) Could Edward save money by buying more chairs than he needs? Explain your answer. [1]

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4 Ali, who works in a fruit and vegetable store, is making up packs of three onions from the contents of a box of loose onions. Each pack should weigh 360 g, but may be up to 2 g heavier or lighter.

There are now only seven onions left in the box. Their weights are: 103 g, 107 g, 114 g, 123 g, 128 g, 135 g and 140 g.

Ali knows that he can make up two more packs.

(a) What are the only three possibilities for making up a pack from three of the remaining seven onions? [2]

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(b) Which one of the onions will be left in the box after Ali has made up two more packs? [1]

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5 Mr Richmond needs to select 4 players for a team to take part in a tennis tournament next week. He has 8 players to choose from and has given them scores out of 30 for their skill, speed and fitness. The rankings are shown in the table.

Name	*Skill*	*Speed*	*Fitness*
Donald	17	14	20
Frank	24	20	7
James	9	10	8
Mark	25	11	12
Pete	12	8	25
Simon	15	13	11
Tony	2	22	13
William	16	21	14

Mr Richmond announces that he will choose the top four players in one of the categories to make up his team. This means that it is certain that Donald will be on the team.

(a) (i) Which other player is certain to be on the team? [1]

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(ii) Which players are certain **not** to be on the team? [1]

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After the players complain that the selection should not be based on just one of the categories, Mr Richmond decides to choose the player with the best rating in each category. The player from those that are left who has the highest total score will be the fourth member of the team. If there is a tie then the player with the highest rating for skill will be chosen.

(b) Which players will now be on the team? [2]

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James has suggested that the top players in each category should not automatically get onto the team. Instead, he suggests that each player should be given an overall score by adding together multiples of the three individual ratings. For example, if the multiples were 2 for skill, 3 for speed and 2 for fitness then Donald would have an overall score of $17 \times 2 + 14 \times 3 + 20 \times 2 = 116$. The four players with the highest overall scores should then be chosen.

(c) Explain why there is no possibility that James will be selected for the team, no matter what multiples of the individual ratings are used. [2]

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6 Speak Radio encouraged listeners to phone in to their shows for a week by giving them prizes. Every third caller received a Speak Radio pen, every eighth caller received a Speak Radio baseball cap, and every tenth caller received a Speak Radio T-shirt.

The final caller at the end of the first three-hour show received both the tenth pen and the third T-shirt to be given away.

(a) How many baseball caps were given away to callers during the first show? [1]

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By the end of the first day they had given away 68 prizes.

(b) What is the greatest number of callers that could have called the radio station during the first day? [3]

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The radio station plans to repeat this promotion next month for 7 days, for 10 hours each day. This time however they will give every caller a pen, every fifth caller a baseball cap and every tenth caller a T-shirt. They do not have any left over from their previous promotion.

To estimate the number of each type of prize they will need, they assume that there will be 10 callers per hour. They will buy 10% more of each type of prize than their estimate suggests will be needed.

(c) How many pens, how many baseball caps and how many T-shirts will they buy? [2]

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7 Upon arrival at River Street car park, drivers receive a ticket at the entrance showing the time of entry. Payment is calculated when the ticket is inserted into a machine at the exit.

Charges, which are always for a whole number of minutes, are as follows:

Entry before 14:00	\$2.50 + 6¢ per minute (including after 14:00)
Entry from 14:00 onwards	\$1.50 + 4¢ per minute

Dee was charged \$8.94 at the exit yesterday.

(a) For what length of time was Dee charged? [2]

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Don arrived at the entrance at 13:56 one day last week. He realised that, as his dental appointment was not until 14:30, it would benefit him to drive around for a few minutes. Eventually he entered at 14:03 and was charged to 15:17.

(b) How much less did Don have to pay than if he had entered at 13:56? [2]

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8 This table gives the letters that occur in the names of the months.

A								J			N			R			U		Y
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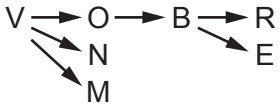
A						G										S	T	U		
	B			E							M			P	R	S	T			
	B	C		E									O		R		T			
	B			E							M	N	O		R				V	
	B	C	D	E							M				R					

Whenever there is a V there is also an O, whenever there is an O there is a B, and whenever there is a B there is an R as well as an E.

These relationships can be drawn as a tree. The one starting at V is:



(a) Draw the tree starting at G. [2]

The tree starting at I joins the one from V at R.

(b) Where do the trees from O and D join? [2]

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9 The path between the east and west gates of my local park is 600 m long. There is an oak tree by the side of the path, 120 m from the east gate. Whenever my grandson and I go through the park together from east to west, he walks with me as far as the oak tree. However, as soon as we reach the oak tree he runs to the west gate and then back to me, while I keep walking. Upon his return he always asks me how long he took, as we continue together to the west gate.

Today he took 3 minutes 20 seconds to run to the gate and back to me.

I always walk at a constant speed of 1.5 m/s through the park.

What was the total distance that my grandson covered in the park today as I walked from the east gate to the west gate? [3]

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10 Mr Beach was born on 25 May 1989.
Mrs Beach was born on 4 June 1995.
Their daughter, Sandy, was born on 11 June 2017.

Mr and Mrs Beach want to plan a celebratory dinner for a day when the total of their three ages will be 100. They want to arrange this dinner well in advance.

(a) State the range of possible dates when they could have their celebratory dinner. [3]

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Mr Beach says, 'If we celebrate 99 years, instead of 100, there will be more available days when we could have our celebratory dinner'.

(b) Is he correct? Justify your answer. [1]

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11 Tom has entered a quiz this evening. There are 5 rounds in the quiz. Each round consists of 20 questions. Each contestant starts each round with 20 points. Each correct answer is worth 3 points and 1 point is lost for each incorrect answer. There is no penalty if no answer is given for a question.

Tom's score for round 1 was 51 points.

(a) (i) What is the smallest number of questions that Tom could have answered correctly? [1]

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(ii) What is the largest number of questions that Tom could have answered correctly? [1]

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The contestants must choose one round in which they can boost their score (their 'Booster' round). In the chosen round the contestant starts with 40 points. Correct answers score 5 points, but 3 points are lost for incorrect answers. If the score is less than 0 at the end of the round then it is changed to 0.

(b) What is the largest possible number of questions that a contestant could answer correctly and still score 0 in a Booster round? [2]

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Unfortunately, in the round that Tom chose he answered 13 of the questions incorrectly and only 2 correctly. This meant that his score for this round was less than it would have been if he had not chosen it as his Booster round.

(c) How many points did Tom lose in this round by choosing it as his Booster round? [2]

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(d) What is the maximum number of points that could be lost by choosing to boost a round? [3]

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[Turn over for Question 12]

12 In the Bolandian jungle:

- one half of all *mallocks* are *wooblers*
- one fifth of all *wooblers* are *mallocks*
- one third of all *quinbins* are *mallocks*
- one twelfth of all *mallocks* are *quinbins*
- one thirtieth of all *wooblers* are *quinbins*.

There are 12 *quinbins*.

What fraction of *quinbins* are *wooblers*? [3]

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