Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

3816501065

THINKING SKILLS **9694/12**

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. Any blank pages are indicated.

DC (LK/CGW) 316830/2

[Turn over

1 Voting intentions were collected for an upcoming local election. There are three candidates and three zones in the city.

	Zone A	Zone B	Zone C	Total
Black	44	61	38	143
Carter		43	60	165
Eagle	12	32	76	119
Total	118	136	173	427

One of the figures was omitted from the table.

(a) What is the missing figure? [1]

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An error was spotted in the table, although the totals are correct.

(b) Which is the incorrect figure? [1]

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Six pie charts were drawn: one for each of the candidates and one for each of the zones. One of these pie charts is shown below.

(c) Which set of data is represented in this pie chart? [1]

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2 The organisers of a one-day korfball tournament originally intended each of the participating teams to play one match against each of the other teams. However, fifteen teams have entered the tournament, which would have required 105 matches to fulfil this original intention.

As a result of the higher than expected entry, the organisers have decided to divide the teams into one group of eight and one group of seven. Each team will now play one match against each of the other teams in the group, then the top team from each group will play one final match against each other.

How many fewer matches will be played than would have been required to fulfil the original intention? [2]

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3 Kay took part in a quiz last night and she was the winner.

There were five rounds of 20 questions each. The categories for each round were as follows:

Round 1	Science
Round 2	History
Round 3	Entertainment
Round 4	Sport
Round 5	Geography

Before the quiz began, Kay had to nominate one category in which she would score 3 points per question and one category in which she would score 2 points per question. Otherwise, correct answers scored 1 point each. There were no penalties for incorrect answers.

Kay correctly answered 11 questions in the first round, 16 in the second round, 18 in the third round, 15 in the fourth round and 12 in the fifth round. Her winning total was 116 points.

Which category did Kay nominate for 3 points per question and which category did she nominate for 2 points per question? [2]

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3 points .....

2 points .....

4 Qasim has been invited to a party this Saturday at his friend's house. The party starts at 18:00 and will finish at 23:30.

The distance between Qasim's house and his friend's house is 15 km. There is a bus service which stops outside both houses. The price for a bus ticket is $2 plus $0.10 for every kilometre of the journey. If a ticket for the return journey on the same day is bought at the same time then there is a discount of 20% on the price of both tickets.

(a) What is the least cost that Qasim could pay to travel to and from the party on the bus? [2]

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Qasim would need to leave the party at 22:20 in order to get the last bus home, so he considers using the local taxi service instead. The prices for taxis are as follows:

- $0.80 for the first complete kilometre.
- $0.50 for each additional complete kilometre for journeys that begin before 23:00.
- $0.70 for each additional complete kilometre for journeys that begin after 23:00.

Qasim decides that he will stay at the party until it finishes.

(b) What is the least cost that Qasim could pay to travel to and from the party? [2]

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Qasim's friend offers to let him stay overnight at his house, so that he does not have to pay the extra for a taxi. He will get the bus home in the morning instead. Qasim decides that he will give his friend half of the money that he is able to save by staying at his house.

(c) How much money will Qasim give to his friend? [1]

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5 A concert hall has 33 seats in the front row. The number of seats in each row increases by a constant amount as you move towards the back of the hall. There are 77 seats in the back row.

There are more than 5 and fewer than 20 rows of seats.

(a) How many seats does the concert hall have? [3]

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For some events, the seats are removed so there is capacity for 1400 people standing.

The price of the tickets varies. The first 300 tickets are sold for 30% less than the standard price, the next 900 tickets are sold at the standard price, and the last 200 tickets are sold for more than the standard price.

The price for the last 200 tickets is such that, when all 1400 tickets are sold, the average ticket price is equal to the standard price.

(b) By what percentage is the price for the last 200 tickets greater than the standard price? [2]

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6 A manufacturer operates a process in which each cycle produces one unit of *aloop* together with one unit of *begum*. On any day the cost of operating the first cycle is \$10, the second \$12, the third \$14 and subsequent cycles cost \$2 more than the previous cycle. The manufacturer receives \$10 for each unit of *aloop* and \$15 for each unit of *begum* she produces. She wants to make as much profit as possible.

How many cycles of the process should she operate each day? [2]

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7 Amy, Bet, Cal, Dev, Eve, Fay, Gus and Huw are competing in a tournament consisting of 6 events. At the end of each event, the eight competitors are ranked in order from first to eighth and awarded points as follows:

First	10 points
Second	8 points
Third	6 points
Fourth	5 points
Fifth	4 points
Sixth	3 points
Seventh	2 points
Eighth	1 point

The first four events have been completed and the top five at present are:

Eve	35 points
Cal	26 points
Gus	22 points
Amy	21 points
Fay	16 points

Fay was disappointed to be ranked seventh in Event 1. However, in the next three events she has improved her position each time.

(a) (i) In which positions was Fay ranked in Events 2, 3 and 4? [2]

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(ii) Can she still win the tournament? Explain your answer. [2]

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Bet, Dev and Huw all have the same number of points as each other after the first four events.

(b) How many points do Bet, Dev and Huw each have? [2]

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Ian and Joy were two of the eight competitors in last year's tournament. The scoring system was exactly the same as it is this year. They both scored 30 points, but Ian was ranked in a different position in each of the six events, while Joy was ranked in the same position in every event.

(c) In which position was neither Ian nor Joy ranked in any of the events last year? [2]

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8 The system log at the biscuit factory recorded all failed attempts to login using a password. The passwords are required to be between 8 and 10 characters, and must contain (at least) one upper case letter, one lower case letter, one number, and one symbol.

Graham sometimes makes a mistake while typing his password: he either misses or mistypes a character. Graham never makes more than one mistake in any attempt to login.

The record shows failures **`ar&724YQ6`** and **`ar7249Q6`**

What was his password? Explain how it can be deduced from these failures. [3]

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9 17% of the population in a large seaside town ate fish on any given day. After it was decreed that everyone must eat fish on Friday, the proportion eating fish on each other day reduced to 2%.

Do these figures suggest that the average daily consumption has increased or decreased, and by what proportion of the population has it changed? [2]

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10 Isabella runs four times per week over various distances and terrains. All her routes take the same amount of time to run. Due to the differing terrains, the average speeds she runs on each route are 4.5 km/h, 6 km/h, 7.5 km/h and 9 km/h. Two of the routes are 3 km and 3.6 km in distance.

(a) What are the distances of the other two routes? [3]

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One day, she runs the four routes one after each other and reduces all her running speeds by a third.

(b) What is her average speed to complete all four routes? [2]

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11 Yesterday I baked 200 cakes and today I am selling them on a market stall.

I am selling the cakes for $5 each, with special offers of 6 for $21 or 10 for $33.

With two hours left before the market closes, I have taken $440, but I still have 82 cakes left. Three customers have bought 10 cakes for $33, but nobody has bought more than 10.

(a) How many cakes have I sold so far today at the full price of $5? [4]

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Any cakes that I don't sell in the next two hours will have to be thrown away.

(b) What would be my minimum further takings for the day if I could sell all the remaining cakes without altering the current price structure? [2]

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I have now decided to reduce the price of the remaining cakes. I will sell them all at the same price each, without any discount for buying 6 or 10. I will fix the price of a cake such that if I sell another 30 my profit for the day will be $200.

The total cost to make the cakes was $205 and I have paid $80 to hire the stall for the day.

(c) (i) At what price will I now sell my cakes? [2]

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(ii) What is now the maximum profit I could make today? [1]

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12 Ian and Barbara are taking part in a sponsored walk.

Ian has been promised $56 for taking part and an additional $41 for each kilometre that he walks. Barbara has been promised $55 for taking part and an additional $26 for each kilometre that she walks.

At the end of the sponsored walk Barbara had walked 10 km more than Ian, and raised $19 more.

How much was raised in total by Ian and Barbara? [4]

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