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Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

2449048656

THINKING SKILLS **9694/11**

Paper 1 Problem Solving **October/November 2024**

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 some questions, if you do not show your working, full marks will not be awarded.

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.

[Turn over

1 When Angela was 6 years old, the calendar for June was as shown below.

June

M	T	W	T	F	S	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

On 1 June, Angela's mother gave her $1, and she gave Angela another $1 every 3 days (so the next $1 was given on 4 June).

(a) How much money did Angela receive from her mother in June? [1]

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During the same period of time, her father also gave her money, beginning with $2 on 2 June, and a further $2 every 5 days. However, any money that he paid on a Sunday was given to charity and **not** to Angela.

(b) How much money did Angela receive from her father in June? [1]

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(c) On how many of the four full weeks (Monday to Sunday) in June did Angela receive more money from her father than from her mother? [1]

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2 St John's College caterers have been given a suggested menu for a three-course meal. There are five categories of food that some of their guests are unable to eat.

Dish		*Meat*	*Eggs*	*Dairy*	*Nuts*	*Wheat*
Entrée	Fisher Pie	Y				
	Eagle Eyes				Y	Y
Main	Butler's Surprise		Y	Y	Y	
	Lamb Shrewsbury	Y				
Pudding	Beaufort Cheese			Y		
	Adam's Apple Pie					Y

Guest	*Meat*	*Eggs*	*Dairy*	*Nuts*	*Wheat*
Wilberforce					N
Dirac	N	N			
Hoyle				N	
Singh	N		N		

(a) Which guests would **not** be able to have either of the suggested main courses? [1]

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Butler's Surprise is replaced by Yale Trotters so everyone has at least one option.

(b) Which of the five categories of food could Yale Trotters contain? [1]

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(c) Give two three-course meals so that everyone can have one or the other. [1]

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3 Safira makes scented soaps. She makes five different types of soap: Apple, Coconut, Ginger, Lemon and Vanilla. She makes the soap in 10 kg batches. Each type of soap uses a different amount of scent oil.

	% scent oil in 1 batch	Cost per gram of scent oil
Apple	2.75	$0.25
Coconut	2.25	$0.30
Ginger	1.75	$0.15
Lemon	2	$0.20
Vanilla	1	$0.50

(a) What is the greatest cost of the scent oil used for a batch of soap? [2]

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Safira decides to extend her range by making a batch of soap that combines 6 kg of Vanilla soap with 4 kg of Ginger soap.

(b) How many grams of scent oil will be needed for a batch of this new soap? [2]

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4 We've heard all of Australian Uncle Phil's stories many times. This visit we had some of the 'when I was a cub…' series. They included:

- We had pounds, shillings and pence for money, none of this decimal stuff.
- It was easy for father to drive on the left as it was just like it had been in Sweden.
- The Aboriginal farm hands didn't have a vote in the State elections.
- My brother was conscripted and posted to Vietnam.
- The Moon landing was timed to be convenient for American TV viewers, not Australians.

The encyclopaedia offers the following dates:

Event	*Date*
Voting was extended to all residents, including Aboriginal residents	17 Dec 1965
Sweden and Iceland switched from driving on the left	3 Sep 1967
Australian troops left Vietnam	2 Dec 1972
Australian decimal currency ($) introduced	14 Feb 1966
Man first walked on Moon	20 Jul 1969

To be a cub in Australia he would have to have been at least 8 years old and below 12, and the stories may not have been true for the entire time.

(a) What is the shortest number of (consecutive) calendar months in which he could have been a cub? [2]

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(b) Just using the information above, what are Uncle Phil's earliest and latest possible month and year of birth? [2]

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5 Bags of *Jolly* sweets contain different flavours of sweet in different quantities:

Flavour	*Number in one bag (inclusive)*
Apple	7 to 10
Coffee	8 to 12
Orange	5 to 8
Strawberry	6 or 7

Different bags of *Jolly* sweets may contain different total numbers of sweets.

Ray's bag of *Jolly* sweets contains 30 sweets altogether and there are twice as many coffee sweets as strawberry sweets.

(a) How many apple sweets are in Ray's bag? [1]

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Jemma's bag of *Jolly* sweets contains an **even** number of each flavour of sweet, and every flavour has a different number of sweets.

(b) How many sweets of each flavour are in Jemma's bag? [1]

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6 On each of the last 10 days, there was a higher number of power cuts than had ever been previously recorded. The greatest number of power cuts on any day before this period was 3.

On each of the last 5 days, the number of power cuts was greater than the sum of the number of power cuts on the two previous days.

What is the smallest possible number of power cuts that could have occurred on the final day of this period? [2]

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7 The current production at the Letzy Theatre is a children's show. The theatre has 408 seats.

The price of a ticket for this show is $4 for adults and $10 for children.

At yesterday's performance the theatre was full, and the number of children in the audience was exactly twice as many as the number of adults.

(a) What was the income from ticket sales for yesterday's performance? [2]

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A total of 355 tickets have been sold for today's performance. The income from the sale of these tickets is $2860.

(b) How many children will there be in the audience today? [2]

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All children must be accompanied by at least one adult, but an adult may accompany up to four children.

(c) What would be the maximum possible income from ticket sales for any performance of this show? [2]

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8 A hotel maid must clean each hotel room after the guest leaves it vacant at the end of their stay.

She spends 8 minutes cleaning each room and stops to rest only when there are no vacant rooms to clean. The maid ends her rests and resumes cleaning as soon as another room becomes vacant.

She begins work at 08:00, when there are already 3 vacant rooms.
Further guests leave their rooms vacant at the following times during her shift, which ends at 10:00.

08:04 08:39 08:52 09:03 09:16 09:17 09:41 09:52 09:55

(a) When does the maid begin her first rest and how long does she rest for? [2]

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(b) From this first rest until her shift ends, how many more rooms does she clean, and how many more minutes of rest does she have? [2]

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9 A convenience store buys its bread from a local bakery. It pays a lower price per loaf when it buys more loaves.

Number of loaves	1–9	10–29	30–49	50–69	70+
Bread cost/loaf	$1.10	$1.05	$1.00	$0.90	$0.80

The store sells each loaf of bread for $1.40.

In the first week, the store bought 45 loaves and they were all sold before the end of the week.
In the second week, the store bought more loaves and sold 54 of them.
The store's profit from selling bread was the same in both weeks.

What are the two possible numbers of loaves that the store might have bought in the second week? [3]

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10 Alice needs to select a team for a sporting event next week. She has 6 people to choose from and needs a team of 3. To help her to test their skills, Alice has devised a game for them to play against each other in pairs. In each match the players attempt to score goals and the player with the most goals wins. In the table below, the number in each cell is the number of goals that Player 1 scored in the match against Player 2.

		Player 2					
		Fred	Gemma	Harold	Ian	Jasmine	Kelly
Player 1	Fred		8		4	7	
	Gemma	4			2		3
	Harold				4	5	5
	Ian	4	5	2			
	Jasmine	2		4			6
	Kelly		3	1		3	

For example, when Ian played Gemma, he won the match by 5 goals to 2.

(a) Which two players were involved in the match where there was the biggest difference in the number of goals scored? [1]

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Alice has arranged the schedule so that 3 matches take place at the same time. In the next set of 3 matches Fred will play against Harold.

(b) What are the pairings for the two matches that will be played at the same time as Fred plays Harold? [2]

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Alice awards each player 2 points for each match that they win and 1 point for each match that is a draw. Each player also earns 1 point for each goal that they scored. The table shows the number of points that each player earned in each of their matches and their total number of points.

	Match 1	Match 2	Match 3	Match 4	Match 5	Total
Fred	5	10	9	8	7	39
Gemma	4	4	2	4	11	25
Harold	7	6	7	6	3	29
Ian	5	2	7	8	3	25
Jasmine	4	8	2	0	1	15
Kelly	4	3	1	2	3	13

(c) Who did Harold play in his first match? [2]

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The three players with the highest total numbers of points are chosen for the team. Since Gemma and Ian have the same total number of points, it has been decided that the player who has the highest total number of points if the matches against Fred are ignored will earn the place on the team.

(d) Which one of Gemma and Ian earns the final place on the team? Explain your answer. [2]

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11 Graham is packing chocolates into boxes to sell in his shop. There are 3 sizes of box available. The prices and the numbers of each type of chocolate in each box are shown in the table.

Size	*Price ($)*	*Dark chocolates*	*Milk chocolates*	*White chocolates*
Small	12	4	2	4
Medium	19	6	8	6
Large	29	12	12	12

Graham has 200 of each type of chocolate. Initially he plans to make equal numbers of each type of box.

(a) What will be the total price of the boxes that Graham packs? [2]

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Graham decides instead that he will pack boxes with the maximum total price even if there are different numbers of each type of box.

(b) What is the maximum total price of the boxes that Graham could pack? [2]

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12 In winter it can take each of my ducks from 1 to 2 days to produce an egg. A chicken will take anything from 2 to 4 days to produce an egg.

I sell my eggs in boxes of 12 (a 'dozen').
In any week, I receive orders for at least 5 dozen eggs and at most 7 dozen eggs.

As not everyone likes duck eggs, I can only use them to make up at most a third of the order.

(a) What is the minimum total number of birds I would need to have to make sure I can fulfil the orders for any week? [3]

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In fact, I have 12 ducks and 72 chickens. Any surplus eggs that I do not need to fulfil the orders in any week get taken to a local shop, where I receive a lower price.

(b) What is the maximum number of eggs that could be taken to the shop? [3]

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[Turn over for Question 13]

13 Margaret, David and Andrew enjoy dinner at a local fish restaurant. Afterwards, Andrew pays the bill, which is $78. The three colleagues wish to share the cost of dinner equally among them and at the same time also settle some unpaid debts:

- David owes Andrew $4
- Andrew owes Margaret $9
- Margaret owes David $6.

Margaret has only a $20 note, so she gives this to Andrew.
David has only a $50 note, so he gives this to Andrew.

Following this, Andrew and Margaret correctly conclude that, if each of them gives some money to David, the cost of dinner and all of the debts will be settled.

How much should Andrew give to David and how much should Margaret give to David? [2]

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