



# Cambridge International AS & A Level

CANDIDATE  
NAME

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CENTRE  
NUMBER

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## THINKING SKILLS

9694/12

Paper 1 Problem Solving

October/November 2022

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.

- 1 Joe needs to complete an online training course for his work. There are five sections to the course and each section will take anything from 30 to 45 minutes to complete. Joe will only start a section if he is sure that he has enough time to complete it.

Joe can start the course at any time after 09:00 this morning. He has meetings at 10:30 and 12:30, both of which last for one hour.

What is the earliest time that Joe might complete the last section of his course? [2]

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- 2 A scientist gets the bus to work, but there is no single bus route that goes from her home to her work. She must first get a bus on route A, and then change to a bus on route B.

She changes from route A to route B at the 18th stop after she gets on.

The bus on route A takes one and a half minutes between stops.

The bus on route B takes one minute between stops.

She gets to work at the 9th stop after she changes bus.

One bus arrives at each stop along both routes every ten minutes.

(a) Based on this information:

- (i) what is the shortest time it might take the scientist to get to work? [1]

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- (ii) what is the longest time it might take the scientist to get to work? [1]

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The bus timetables are changed so that a bus on route A arrives only every twenty minutes, but a bus on route B now arrives every five minutes.

- (b) What is now the longest time it might take the scientist to get to work? [1]

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- 4 A taxi company charges its customers 10¢ for each kilometre of a journey, but adds a charge of 4¢ for each kilometre that the taxi needs to travel from the office to the customer and for each kilometre back to the office after the journey has been made.

Peter is booking a taxi for a journey of 10 km tomorrow. He will be collected from a point that is 5 km from the taxi office.

- (a) What is the maximum amount that Peter might be charged for his journey? [2]

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A change to the law means that the charge made for a taxi journey must be based only on the distance travelled with the passenger on board. The manager of the taxi company has therefore decided to increase the amount charged to 16¢ per kilometre.

- (b) Given that the charge for Peter’s journey would remain the same, how far from the taxi office will Peter finish his journey? [2]

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- 5 Ten teams of three athletes took part in a triathlon event. All thirty athletes completed the course and they all recorded different times.

Points were awarded to each athlete according to their finishing position. The first six to finish were awarded the following:

1st	40 points
2nd	35 points
3rd	32 points
4th	29 points
5th	26 points
6th	25 points

Each subsequent athlete was awarded 1 point less than the previous one, down to 1 point for the 30th.

The three members of the Red Team finished 9th, 17th and 28th.

- (a) What was the Red Team's total? [1]

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One of the Brown Team was the first athlete to finish, but the team's total of 72 points was only good enough to be placed second.

- (b) Explain why it is certain that neither of the other two members of the Brown team finished in one of the last five positions. [2]

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The event was won by the Blue Team with 76 points.

The difference between the finishing positions of the first and second members of the Blue Team was exactly the same as the difference between the finishing positions of the second and third members.

(c) What were the finishing positions of the three members of the Blue Team? [3]

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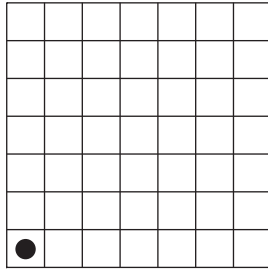
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6 Hector places a disc on the bottom left cell of a  $7 \times 7$  board of square cells.



A 'move' consists of moving either one cell up or three cells to the right.

(a) How many moves will it take Hector to get the disc to the top right cell? [1]

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(b) (i) How many routes can Hector choose from to get the disc to the top right cell? [2]

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(ii) How many of these routes go through the middle cell in the grid? [2]

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7 Ashly takes her children, Estefania and Jorge, to the swimming pool, and enjoys reading a book while they swim lengths. The pool is 60 m long.

Each child swims at a constant speed, and Estefania swims faster than Jorge. They do not lose any time when turning at the ends of the pool.

(a) Ashly sees the two children setting off from one end of the pool, side by side. One minute later, she looks up and they are both again side by side for a brief moment, but now swimming in opposite directions.

If Estefania swims twice as fast as Jorge, what is the shortest distance that Jorge could have swum? [1]

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(b) If Estefania swims three times as fast as Jorge, how far must she swim to pass him five times? [2]

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- 9 In a science lesson, the students obtained the following scores in a practical assessment.

<i>Student</i>	<i>Score</i>
Alex	20
Beth	23
Camilla	16
Dave	22
Ewan	13
Fred	14
Gwen	17
Hattie	25
Iro	30

For the next unit of work, the teacher wishes to put the students into three equal-sized groups so that the total score in each group is the same.

- (a) Which other students will be in the same group as Alex? [2]

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The teacher notices that if either of two students is absent, the remaining students can be placed into two equal-sized groups so that the total score in each group is the same, and this total is greater than 80.

- (b) Who are these two students? [2]

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- 10 An examination paper consists of three types of question: short, medium and long. The number of parts allowed in each type of question, and the total number of marks permitted for each type of question, are shown in the table below.

Question type	Parts	Total marks for question
Short	1	1–4
Medium	2–3	3–6
Long	3–5	7–9

A question writer is asked to write some questions with a total of **exactly** 30 marks.

- (a) What is the smallest total number of question **parts** that she needs to write? [1]

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She is asked to ensure that the numbers of short, medium and long questions are all different from each other.

The question writer writes 9 questions with a total of 20 parts, and still a total of 30 marks. 4 of her questions are short questions.

- (b) Explain why she must write 2 long questions. [3]

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- 11 Jason is making some biscuits to sell for charity tomorrow. He makes the biscuits in batches of 20 and it takes 1 hour in total to make each batch.

Jason has some friends who have offered to help him to make the biscuits. It will take Jason 1 hour 30 minutes to make a batch of biscuits if he is explaining to a friend how to make them. Jason can only show one friend how to make the biscuits at a time. The friends will also take one hour to make a batch of biscuits once they have been shown how to make them.

- (a) Show that it will take at least 8 hours 30 minutes to make 300 biscuits if one friend helps. [2]

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- (b) What is the smallest amount of time that could be needed to make 300 biscuits if two friends help? [3]

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- (c) What is the shortest amount of time that could be needed to make 300 biscuits if Jason can get help from as many friends as he needs? [2]

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12 Karen is organising a tombola at a charity fair this weekend. Participants will pay \$1 to enter and will then draw a ticket out of a box. There is one ticket with each number from 100 to 700 (inclusive) printed on it. If the number on their ticket contains a 5 in any position then the participant will win one of the prizes. The prize that is won is determined by the number of times the digit 5 appears on the ticket:

- If all three digits are 5 then the prize is \$50
- If two of the digits are 5 then the prize is \$5
- If one of the digits is a 5 then the prize is \$2

(a) How many of the \$5 prizes will be required? [2]

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(b) What will be the total amount raised for the charity if all of the tickets are sold? [4]

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