Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

4760107073

THINKING SKILLS **9694/13**

Paper 1 Problem Solving **October/November 2020**

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. Blank pages are indicated.

1 A local medical centre always reserves a number of appointments on each day for urgent cases. These can only be booked by calling the centre that morning.

Each day, one of the doctors who is working all day will have all of their appointments reserved for urgent cases.
The other doctors who are working on that day will have one quarter of their appointments reserved for urgent cases.
A full day for a doctor has 32 slots for appointments; a half day has 16 slots.

On Friday this week 3 doctors will each be working for a full day and 2 doctors will each work for a half day.

How many of the appointment slots on Friday will be reserved for urgent cases? [2]

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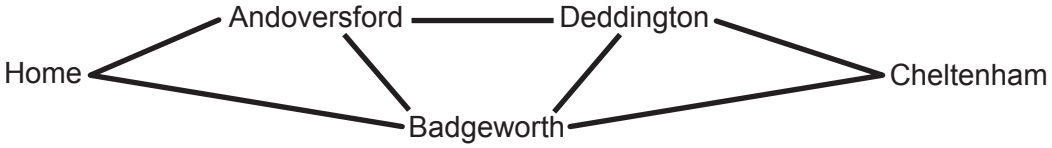
2 Matthew goes to Cheltenham once a year for the races, but he likes to vary the route he takes. The roads are:



He does not visit any town more than once on his journey there.

(a) How many different routes from Home to Cheltenham are there that go through all the towns? [1]

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(b) How many different routes do not go through all the towns? List them. [2]

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3 In a shop where all items cost a whole number of dollars, I bought 3 packets of plain biscuits and 5 packets of chocolate biscuits. The total cost was $34.

Harold says, 'The packets of chocolate biscuits must have cost $2 each'.

Show that Harold is wrong. [2]

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4 The following table shows the times of trains between Juno and Odiham.

Station	*Times*			*Station*	*Times*		
Juno	07:15		22:15	Odiham	07:00		22:00
Kepler	07:24	and every	22:24	Ninar	07:10	and every	22:10
Lemma	07:32	20 minutes	22:32	Morgan	07:25	20 minutes	22:25
Morgan	07:40	until	22:40	Lemma	07:33	until	22:33
Ninar	07:55		22:55	Kepler	07:41		22:41
Odiham	08:05		23:05	Juno	07:50		22:50

Ferdo lives in Juno. He has a business appointment in Odiham and needs to be there for at least two hours between his arrival in and departure from Odiham. He leaves Juno on the first train after 08:30.

(a) What is the earliest time that Ferdo can be back at Juno station after his appointment? [2]

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Derin lives in Kepler and is going to meet his friend Eva in Ninar at 14:00. He wants to be at Ninar station at least 15 minutes before the meeting and he lives a 10-minute walk away from Kepler station.

(b) What is the latest time that Derin can leave home for his meeting with Eva? [2]

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5 I have an old alarm clock, on which the hands move at only 95% of the speed that they should do. I need it to wake me up at 7.30 am, so every night, at 10.30 pm, I change the time shown on the clock so that it will show the correct time at 7.30 am when the alarm goes off.

(a) What time does the clock show at 10.30 pm, immediately before I change it? [2]

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(b) What time do I change it to? [1]

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6 This is the squad that will represent Arboria in next month's Crownball World Cup Tournament.

Name	*Date of birth*	*Career records for Arboria*		
		First appearance	*Matches played*	*Points scored*
L. Ash	23 Oct 1992	2015	30	77
S. Birch	5 May 1997	2017	12	28
E. Cherry	17 Jul 1987	2014	45	90
K. Elder	11 Feb 1988	2012	51	99
N. Hawthorn	29 Mar 1991	2009	37	72
H. Lime	4 Dec 1988	2014	47	95
C. Pine	20 Jul 1994	2011	39	103
F. Spruce	31 Oct 1990	2015	18	33
T. Willow	15 Apr 1986	2007	62	84
A. Yew	2 Nov 1995	2010	57	110

(a) Which two members of the squad are closest in age to each other? [2]

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(b) Which three members of the squad have played more than 150 matches in total **and** scored more than 300 points altogether? [2]

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(c) D. Rowan, who has played 43 times for Arboria and scored 94 points, was originally named in the squad of ten, but had to withdraw due to injury. The replacement has reduced the average number of matches played per squad member, but increased the average number of points scored per squad member.

Who has replaced D. Rowan in the squad? [1]

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7 A customer in a restaurant has two discount vouchers that would be valid for her dinner, but she can use only one of them. She will use whichever voucher gives her the lower total cost for her entire meal.

Voucher 1: 40% off main course

Voucher 2: 30% off entire meal

Her entire meal will consist of a main course, which costs $9.60, and which she has already eaten, and a dessert, which she is now choosing.

(a) If she eats a dessert costing $3.50, how much will she pay in total after the voucher deduction? [2]

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(b) If she eats a dessert costing $2.50, how much will she pay in total after the voucher deduction? [2]

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(c) For what price of dessert will it make no difference which voucher she uses? [2]

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8 The tracks of a path for two-wheeled carts should be paved with large square stones, but some are missing. Tony is driving his two-wheeled cart and wants to reduce the total amount of jolting. He has devised a scoring system to assess how bad a particular path is.

He considers that both wheels going up or down, which he counts as 1 point, is not as bad as the twist when only one changes, to which he gives 2 points, and much better than when one goes up and the other down, which he gives 5 points.

The diagram below represents the tracks of a path with three stones missing.

(a) (i) Show that this path scores 5 points in Tony's system. [1]

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(ii) Explain how removing further stones could reduce the number of points for this path. [1]

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(b) What is the maximum number of points from 3 missing stones? Give an example. [2]

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9 The central sheet of paper in a newspaper contains the four page numbers 35, 36, 37 and 38.

(a) Which other three page numbers are on the sheet containing page 22? [2]

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In a **different** newspaper, pages 52 and 90 are on the same sheet of paper.

(b) How many pages are there in this whole newspaper? [2]

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10 I change my 6-digit passcode for internet banking regularly.

I always choose a new passcode according to the following conditions:

1. The six digits are all different.

2. The first and second digits multiply together to produce a number that makes up the third and fourth digits. If this number has just one digit then a zero is placed in front.

3. The third and fourth digits multiply together to produce a number that makes up the fifth and sixth digits. If this number has just one digit then a zero is placed in front.

Yesterday I changed my passcode from 483206 to 965420.

(a) (i) Explain why my passcode will never begin with 5. [2]

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(ii) Explain why my passcode will never begin with 2. [2]

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(b) What is the only passcode I could choose that begins with 3? [1]

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(c) I want my next passcode to begin with a different digit from my current passcode and also to contain all four of the digits that are not part of my current passcode.

What will my next passcode be? [2]

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11 Austin Street car park in Datsunford has spaces for 100 cars. It opens at 08:00 every morning. Any cars that are still there at 19:00, when it closes, are towed away.

Upon entry, drivers are issued with a ticket that shows the time of arrival. Payment is made to the attendant as they leave.

The charges are:

up to 4 hours	$2
over 4 hours	$5

The attendant keeps an hourly record throughout each day of the number of spaces available and the total amount of money taken since the beginning of the day.

Today's record so far is as follows:

Time	*Spaces available*	*Total takings*
09:00	64	$20
10:00	43	$50
11:00	38	$94
12:00	47	$152
13:00	36	$214
14:00	52	$287

The attendant filled in the figures for 14:00 a few minutes ago, and no cars have entered or left since.

(a) How many tickets had been issued this morning by 10:00? [2]

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(b) What is the minimum number of tickets that have been issued in total so far today? [4]

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12 A lorry contains two sections in which items may be placed for transportation. The total weight that can be carried by the lorry is 25 tonnes, and the total weight of the items in each section must be approximately the same, for safety reasons. The difference in total weight between the items in the two sections can be no more than 0.1 tonnes.

Boxes with these weights need to be transported:

1.2 tonnes, 1.4 tonnes, 2.1 tonnes, 2.4 tonnes, 2.6 tonnes,
3.2 tonnes, 3.7 tonnes, 3.9 tonnes, 4.6 tonnes

(a) Explain why this set of boxes cannot be transported on one journey. [1]

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(b) The manager correctly states that if one box is removed then the remaining set of boxes can be transported in one journey.

State a box which could be removed and how the remaining boxes should be distributed between the two sections. [3]

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