Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

THINKING SKILLS **9694/13**

Paper 1 Problem Solving **October/November 2014**

1 hour 30 minutes

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.

There are **30** questions on this paper. Answer **all** the questions.

For each question there are four possible answers **A**, **B**, **C** and **D**. Choose the **one** you consider correct and record your choice in pencil on the separate answer sheet.

Read very carefully the instructions on the answer sheet. Ignore responses numbered 31 – 40 on the answer sheet.
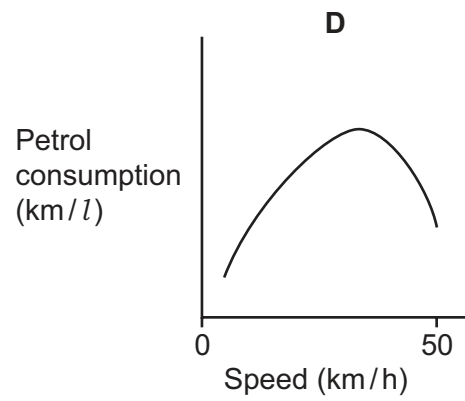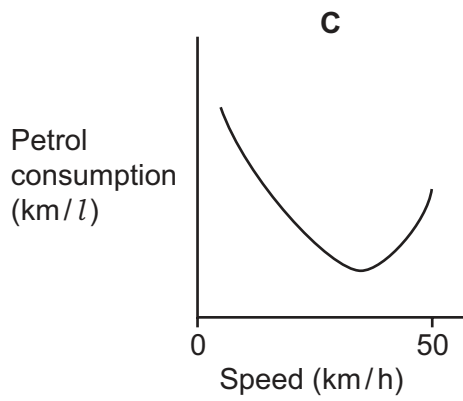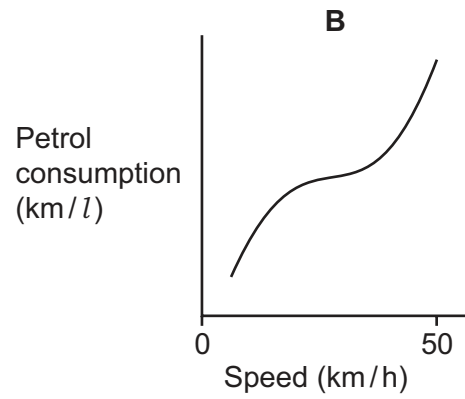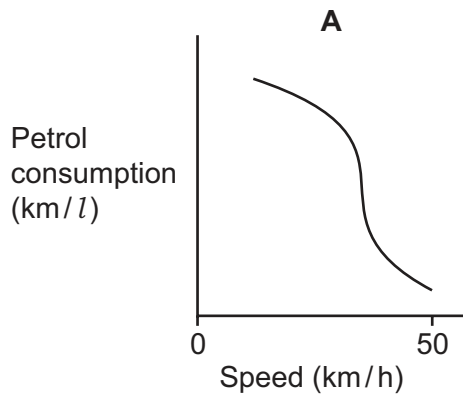
DO **NOT** WRITE IN ANY BARCODES.

INFORMATION FOR CANDIDATES

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

International Examinations

[Turn over

1   Roger draws a graph which shows that his car travels furthest on 1 litre of petrol when it is travelling at 35 km/h.

Which of the following is Roger's graph?

A

Petrol
consumption
(km/l)

0   50
Speed (km/h)

B

Petrol
consumption
(km/l)

0   50
Speed (km/h)

C

Petrol
consumption
(km/l)

0   50
Speed (km/h)

D

Petrol
consumption
(km/l)

0   50
Speed (km/h)

2 I wish to send a letter and a parcel to Pakistan. The rates are as follows:

To India, Sri Lanka and Pakistan			
Letters not exceeding	25 g	$0.50	
	40 g	$0.80	
	100 g	$1.50	
	200 g	$2.50	but $4.00 to Sri Lanka
	500 g	$5.00	but $6.00 to Sri Lanka and India
Parcels not exceeding	400 g	$3.00	
	500 g	$4.00	but double this amount to Pakistan
	1 kg	$8.50	
	2 kg	$14.00	
	3 kg	$15.00	but not to Pakistan, where a special rate applies

My letter weighs 450 g and the parcel 475 g. What will the total cost be?

A $9.00

B $10.00

C $13.00

D $14.00

3 The Square Deal restaurant has a stock of square and rectangular tables which it uses depending on the number of bookings for dinner. Each rectangular table seats 6 and each square table seats 4. Tonight they have 50 people booked for dinner.

If they used the smallest number of tables possible with no empty seats, how many square tables must they use?

A 0

B 1

C 2

D 3

 [Turn over

4   Moses visits his sister by taking the bus part of the way and then the train for the rest of the way.
    He arrives at the railway station by bus.
    The buses are scheduled to arrive at 12, 32, and 52 minutes past each hour.
    The trains are scheduled to depart at 05, 20, 35, and 50 minutes past each hour.
    Moses is equally likely to arrive on any of the buses.

    If the buses and trains run on time, how long on average will there be between his bus arriving
    and the next train departing?

    A   3 minutes

    B   5 minutes

    C   8 minutes

    D   12 minutes

5   I am lost in a strange town but have found a bus stop with a timetable as shown below.

	Eastbound	Westbound
The first bus runs at the times shown, then every 15 minutes. The last bus leaves the market at 11.05 pm.		
Market	(depart) 6.05 am	(arrive) 7.55 am
Northgate	6.15 am	7.45 am
Radcliffe Road	6.20 am	7.40 am
Brook Avenue	6.30 am	7.20 am
Dene Park	6.35 am	7.15 am
Bridge Street	6.45 am	7.05 am
Viking Estate	(arrive) 6.50 am	(depart) 7.00 am

As I arrived at the bus stop at 10.10 am, a bus was just leaving.

Where am I, and in which direction is the bus going?

    A   At Brook Avenue, going east

    B   At Brook Avenue, going west

    C   At Radcliffe Road, going east

    D   At Radcliffe Road, going west

6 Ringway Airport is a very busy single runway airport. Planes arriving and departing all have to use the same concrete strip. At busy times this leads to delays, as some incoming planes arrive either early or late.

One busy period is between 08:00 and 10:00, when planes are due to depart every 5 minutes. This can be achieved if no planes arrive. When there is an arrival, the 5 minutes between the departures lengthens to 15 minutes for the next plane waiting to take off. Thus on one particular Friday the 08:15 flight did not leave until 08:25 because of an incoming flight. The 08:20 flight then left at 08:30.
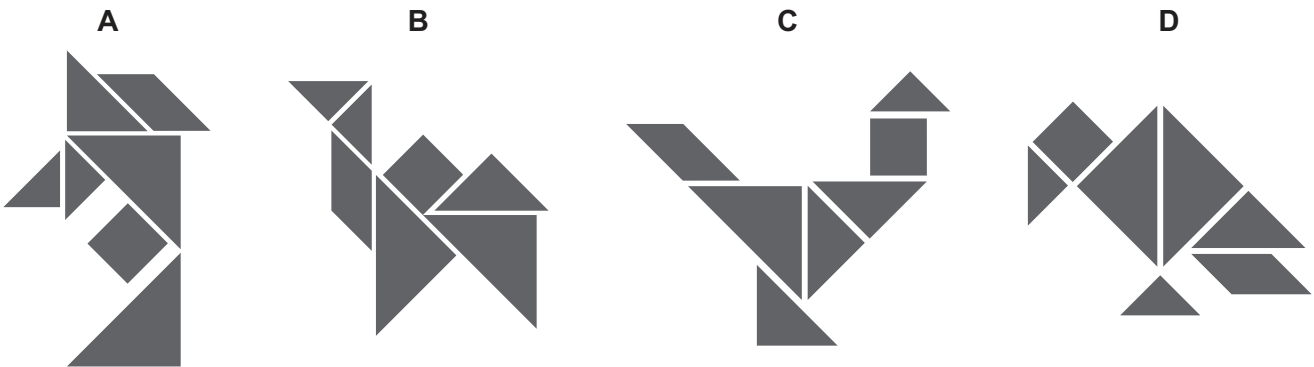
If 3 more planes arrived at 08:35, 09:00 and 09:55, at what time did the 09:10 flight leave?

A 09:20

B 09:30

C 09:40

D 09:50

7 A Tangram puzzle set is made up of 7 tile pieces, as shown below.
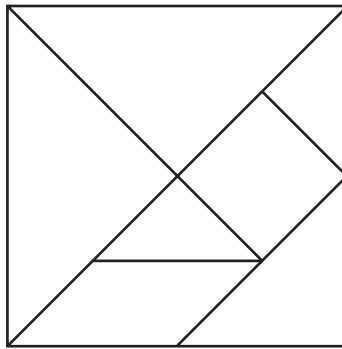
Which of the arrangements below can **not** be made using the Tangram puzzle set?

A	B	C	D

8 On the train line between Bigton and Hilport there are stations for the airport, the hospital and three villages, Henton, Shorton and Thredley.

	Bigton	Airport	Henton	Shorton	Hospital	Thredley	Hilport
Airport service	✓	✓	✗	?	?	✓	✓
Hospital service	✓	?	✓	✗	✓	✗	✓
City Link service	✓	✗	✗	?	?	?	✓

✓ means that all trains running this service stop at this station.
✗ means that no trains running this service stop at this station.
? means that some, but not all, of the trains running this service stop at this station.

I got on a train at Thredley travelling to Hilport.

Which one of the following pieces of information would be sufficient for me to work out which service I was on?

A The train had stopped at the airport.

B The train had stopped at Henton.

C The train had stopped at Shorton.

D The train had stopped at the hospital.

9 This evening I need to collect the entry fee from all of the participants in a competition. The entry fee is $1 and I know that anyone using coins with a value of less than $1 must be able to pay the exact entry fee. It is possible that participants will arrive with $2 coins, $5 notes or $10 notes in which case I will need to be able to give them change.
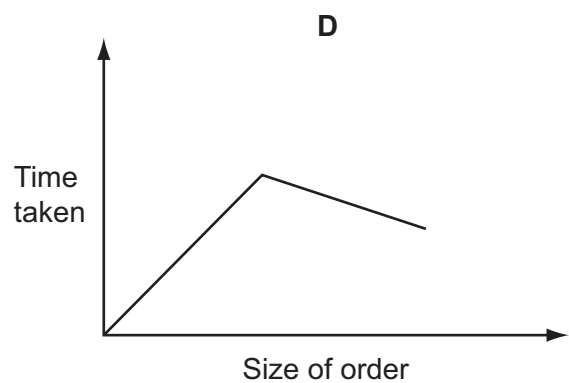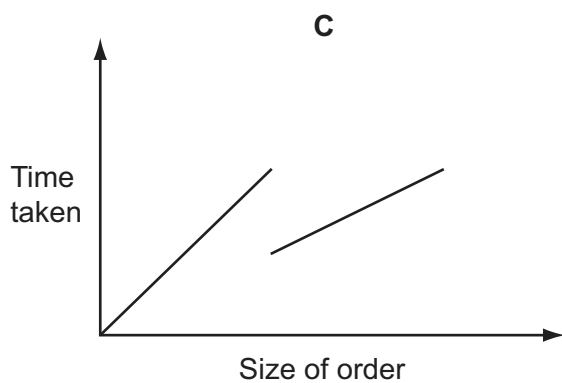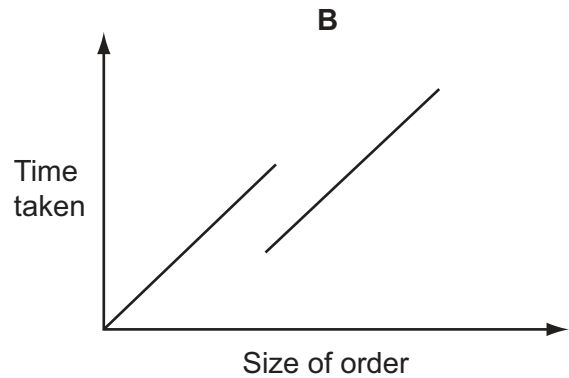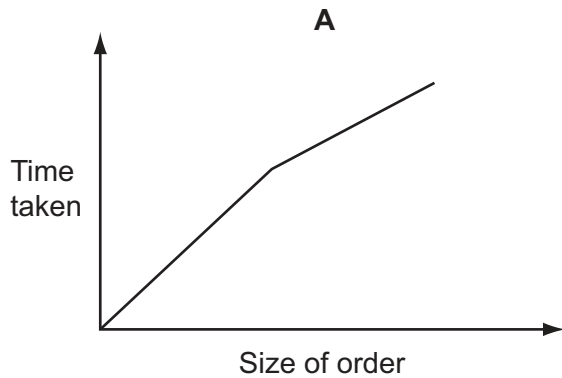
There will be 32 participants in tonight's competition and I know that 25 of them will come with the correct change. I plan to take enough money with me (in $1 coins and $5 notes) to be able to give change immediately to anyone not able to pay the exact money.

What is the smallest number of $1 coins that I need to have with me?

A 3

B 9

C 28

D 63

10 A local company produces souvenirs which can be given out at parties and conferences. Each souvenir is hand-made and takes 5 minutes to produce. When an order is received one of the employees of the company is assigned to produce the souvenirs, but if the order is for more than 100 then a second employee is assigned to help. If there are two employees working on the order they produce half of the souvenirs each.

Which of the following graphs represents the amount of time that it takes to produce an order?

A

Time taken

Size of order

B

Time taken

Size of order

C

Time taken

Size of order

D

Time taken

Size of order

11 Patricia produces wall calendars which she sells at the weekend. Each calendar requires 12 sheets of paper and a cover. The paper costs $50 for a pack of 200 sheets and the covers cost $40 for 100. Patricia estimates that the other costs for producing 1 calendar come to $3. She sells the calendars for 20% more than the amount that it costs her to produce them.

How much does Patricia sell each calendar for?

A $6.40

B $7.08

C $7.44

D $7.68

12 Yesterday I received a mysterious letter. Inside was a strip of paper with a series of shapes on it, and no explanation. I tore the paper up and threw it away.

Today I received an invitation to a friend's party. The party is to have the theme "Secret Agents", and guests must give the correct 7-letter password to be allowed in. Attached to the invitation was this document.

△ △ △ = A	◇ △ △ = J	□ △ △ = S
△ △ ◇ = B	◇ △ ◇ = K	□ △ ◇ = T
△ △ □ = C	◇ △ □ = L	□ △ □ = U
△ ◇ △ = D	◇ ◇ △ = M	□ ◇ △ = V
△ ◇ ◇ = E	◇ ◇ ◇ = N	□ ◇ ◇ = W
△ ◇ □ = F	◇ ◇ □ = O	□ ◇ □ = X
△ □ △ = G	◇ □ △ = P	□ □ △ = Y
△ □ ◇ = H	◇ □ ◇ = Q	□ □ ◇ = Z
△ □ □ = I	◇ □ □ = R	

Realising now the meaning of yesterday's communication, I sifted through my waste-paper basket and tried to reconstruct the password, as follows:

However, I couldn't find the two end pieces.

What is the 5th letter of the password?

A E

B G

C N

D T

13 Ben, a magician, has to paint a large cube for his magic act. Paint of all colours can be bought in different size cans. The prices of these cans are shown in the table below.

Can size (litres)	1	2	3	4
Price ($)	10	16	20	22

Each face of the cube requires exactly one litre of paint. For the purpose of the magic act, it is essential that no more than one pair of opposite faces and no more than one pair of adjacent faces are the same colour.

What is the least amount Ben can spend on paint to complete the job?

A $40

B $48

C $52

D $56

14 A survey of 66 students was taken to determine the proportion wearing glasses. The results are shown in the two-way table below.

	Wears glasses	Does not wear glasses
Boys	9	29
Girls	7	21

If these data are representative of the whole population, which hypothesis is supported by the results?

A   Boys and girls are equally likely to wear glasses

B   Girls are more likely to wear glasses than boys

C   Boys are more likely to wear glasses than girls

D   Cannot tell from the data

15 I need to send 7 items through the post. I can send each item on its own or in a parcel with another item. However, no parcel can ever contain more than two items. If I send two items together then I add together the postage costs for the two items. The costs to post my items are 9¢, 12¢, 14¢, 15¢, 17¢, 18¢ and 25¢.

I will pay the postage for each parcel with stamps. I have two 1¢ stamps and the rest are all 5¢ stamps so, for example, I would need to pay 20¢ for a parcel that normally costs 18¢ to post, but could pay 17¢ for a 17¢ parcel.

What is the smallest total amount I need to pay to send all of the items?

A 110¢

B 111¢

C 112¢

D 115¢

16 Outside an office there are four car parking spaces, labelled 1, 2, 3 and 4, with 1 the nearest to the door and 4 the furthest away.

Alex has a physical disability and always parks in the nearest space to the door that is available when he arrives.
Bonny never parks in space 1, but will park in the next nearest space to the door that is available when she arrives.
Craig parks in the nearest space to the door that is available when he arrives, unless Alex has not yet arrived, in which case he parks in the second nearest space to the door that is still available.
Dan just parks in the nearest space to the door that is available when he arrives.

On a certain morning, after everyone has arrived, the cars are positioned as shown below.

1	2	3	4
Dan	Craig	Bonny	Alex

Who was the first person to arrive?

A Alex

B Bonny

C Craig

D Dan

17 The living room of my house contains a mirror which is positioned so that I can see a reflection of the digital clock when I am standing in the hallway. For example, at 12:15 I can see the following:

$$\textbf{21:51}$$

I have to be careful, because if I forget that it is a reflection I might think that it is 21:51.

On the next occasion that the mirror appears to show a real time, what time will be shown in the mirror?

A 05:51

B 12:20

C 15:51

D 21:52

18 Henry bought a book of stamps in Bolandia which cost him $1.50. It contained 6 first class stamps and 13 second class stamps.

Helga wants to buy 3 second class stamps and 2 first class stamps from him.

How much should she pay?

A 37¢

B 42¢

C 45¢

D 48¢

19 In my area rubbish is collected every week and recycling every two weeks. Petersfield Road gets collections on Monday and Wednesday. This year, whenever there is a public holiday, collections in the week of the holiday will be delayed by 2 days for rubbish and 1 day for recycling.

Which of the following is **not** possible?

A There are collections on Tuesday and Friday

B The only collection is on Wednesday

C There are collections on Wednesday and Friday

D The only collection is on Friday

9694/13/O/N/14 **[Turn over**

20 How to cook a joint of beef:

Start by giving it 20 minutes at 250°C, then reduce the oven temperature to 190°C and cook for 15 minutes per 450 grams for rare – add 15 extra minutes for medium rare or 30 minutes for well-done. It should then rest for 30 minutes before being served.

My oven is inefficient. It takes 10 minutes to warm to 250°C and I always add an extra 10% to overall cooking times as it takes longer to cook than the books say.

I bought a joint of beef weighing 1800 grams and we like the meat well-done.

How long will it take from when I switch the oven on until we eat?

A   131 minutes

B   151 minutes

C   161 minutes

D   165 minutes

21
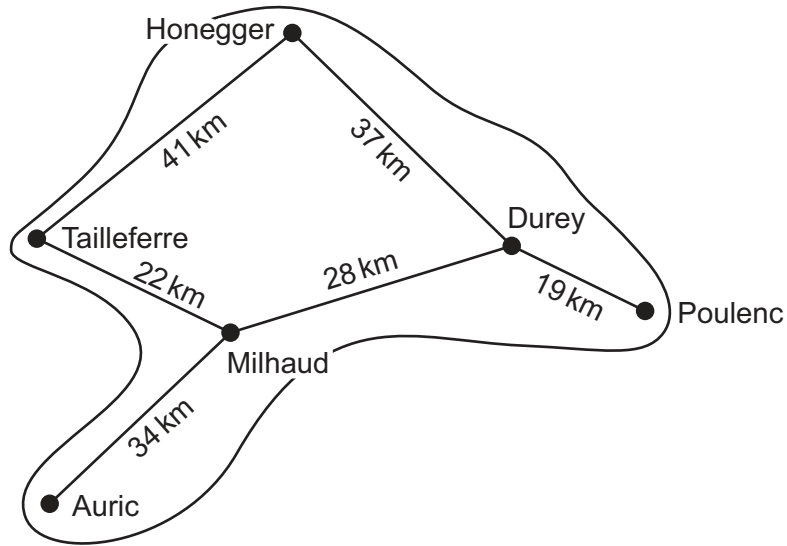
The map above shows the roads that link the six towns on the island of Sateau, and the distances between adjacent towns.

Which of the following charts shows the shortest distance by road, in kilometres, between each pair of towns?

A

Auric

62	Durey			
99	37	Honegger		
34	28	65	Milhaud	
81	19	56	47	Poulenc
56	50	41	22	69	Tailleferre

B

Auric

62	Durey			
97	37	Honegger		
34	28	63	Milhaud	
53	19	56	47	Poulenc
56	50	41	22	69	Tailleferre

C

Auric

62	Durey			
99	37	Honegger		
34	28	65	Milhaud	
53	19	56	47	Poulenc
56	50	41	22	69	Tailleferre

D

Auric

62	Durey			
97	37	Honegger		
34	28	63	Milhaud	
81	19	56	47	Poulenc
56	50	41	22	69	Tailleferre

22 A certain gas is formed by adding quantities of ore to water. It is then transported by tanker to a refinement plant before being sold. Graph X shows how much gas is formed by adding different quantities of ore to water. Graph Y shows how much gas is normally lost in the transportation of the gas to the refinement plant, given how much the tanker sets off with.

Graph X

Amount of gas produced (litres) — Amount of ore used (kg)

Graph Y

Amount of gas lost in transportation (litres) — Amount of gas that the tanker sets off with (litres)
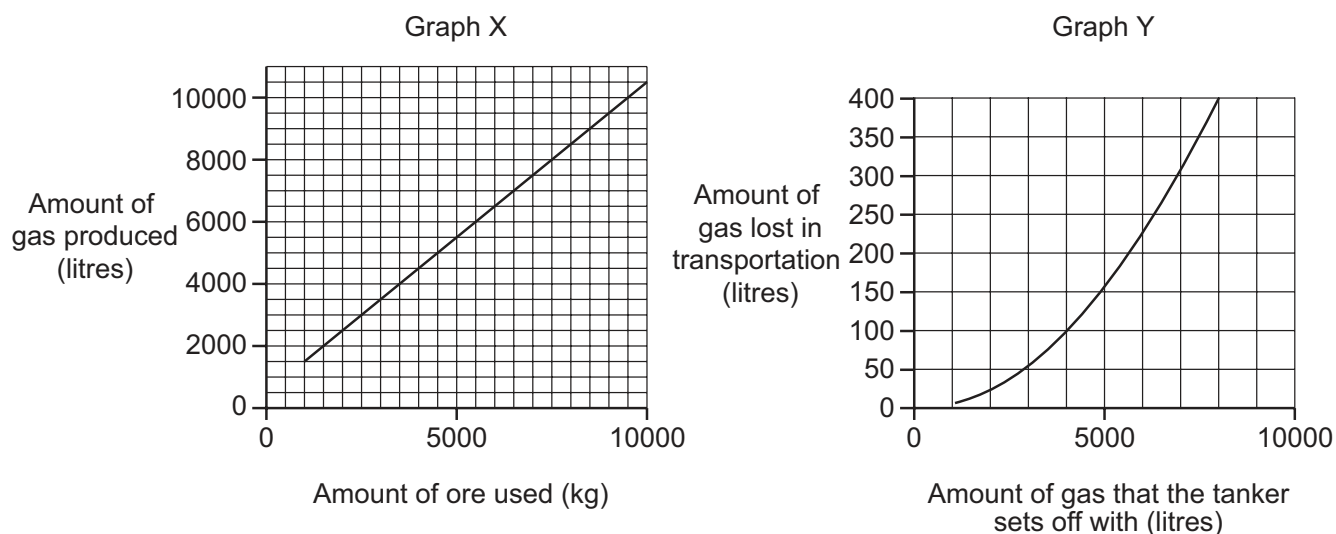
If the tanker arrives at the refinement plant with 6000 litres of gas, which of the following is **closest** to the amount of ore used to produce the gas?

A 5500 kg

B 5750 kg

C 6250 kg

D 6500 kg

23 Each day at summer camp swimming lessons we have had three triplets in the group, and we made sure that each one had a different coloured 'noodle'. Each noodle also has a letter painted on it in case the swimmer or instructor is colour-blind. The letters used are B, X, T, S, C, W and Z.

Not only have we managed to give each of the triplets a different colour, we've never given the same three noodles to the triplets, but next time we'll have to use a set of letters again. There are three blue, two green, one yellow, and one purple noodle.

How many days have now passed?

A 4

B 15

C 17

D 35

24 A square piece of card 30 cm x 30 cm has 4 equal squares, each a whole number of cm on a side, cut out from each corner as shown below. The remaining card is then folded along the dotted lines shown to form an open box.
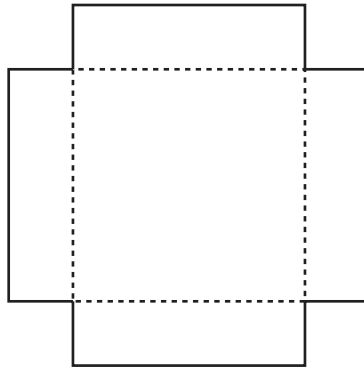

What is the maximum volume of the open box?

A 784 cm^3

B 1000 cm^3

C 2000 cm^3

D 3375 cm^3

25 A marketing expert has told Brijan, who runs a corner shop, that, for every 10¢ he takes off the price of a sandwich, he will sell 5 more, and for every 10¢ he adds to the price, he will sell 5 fewer. The current price of a sandwich is $2.00 and he buys them in at 80¢ each. He currently sells 40 a day and the supplier returns the 80¢ for any unsold by their sell-by date.

What price should Brijan charge to make the maximum profit?

A 90¢

B $1.80

C $2.20

D $2.70

26 The 'dual' of a solid may be created by joining together the centres of the faces so that the lines joining them become the edges of the new solid. So, for example, the dual of a cube is an octahedron as shown below. (An octahedron may be thought of as two square pyramids stuck together by the square face.)
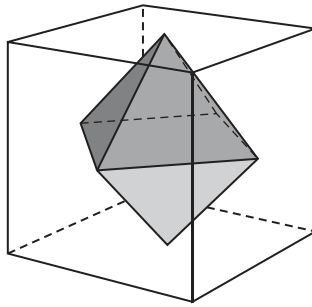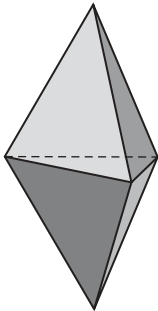
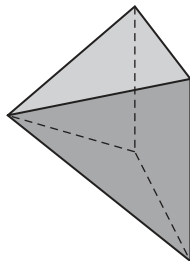The figure shown below is a triangular prism.
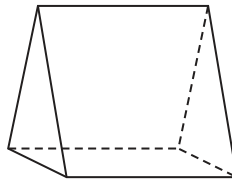
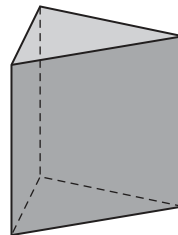Which of the following is the dual of a triangular prism?
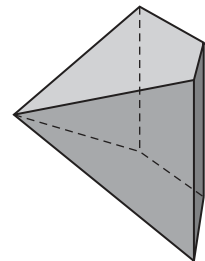
A	B	C	D

27 In our local badminton competition each of the ten teams plays each other team once. In each match a total of 9 games are played and each team gets 1 point for each game won, plus an additional 3 points if the team wins at least 5 of the games. After all the teams had played eight of their matches the total scores were as follows:

Team	Total points
Blue	66
Green	62
Red	56
Yellow	49
White	46
Black	44
Pink	41
Silver	41
Orange	40
Gold	35

I play on the White team and our ninth match was against the Black team. Unfortunately we only managed to win two of the games so we are worried about what position we will finish in.

Which match result, from the matches still to be played, would be sufficient for me to determine our final position in the league?

A   Blue vs Orange

B   Green vs Gold

C   Pink vs Silver

**D**   Red vs Yellow

[Turn over

28 Kevin is planning to replace the tiles on his bathroom floor. When tiled the floor has ten rows of five tiles. There are three types of tile that Kevin can use: one is white; one is two-thirds white and one-third black; the other is one-third white and two-thirds black. An example of each tile is shown below.

Each type of tile is sold in boxes of 10 which cost $15 for the white tiles, $20 for the tiles which are two-thirds white, and $30 for the tiles which are one-third white. It is not possible to buy individual tiles. Kevin wants a design that has equal amounts of black and white in it.

What is the least amount that Kevin will have to pay for the tiles?

A $130

B $135

C $145

D $150

29 Five bridges connect three islands as shown below. Each bridge has a locked gate at both ends. All gates must be locked up again after they have been used. One morning Gavin goes for a walk around the islands. He starts and ends on the same island, crosses every bridge at least once and completes his journey in the minimum number of crossings.
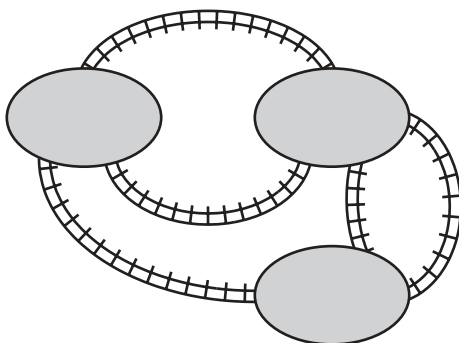
If Gavin is going to use a gate more than once during his walk, he will only lock the gate after the final time that he uses it.

Assuming that Gavin is the only person to use the bridges, what is the minimum number of times that he will have to unlock or lock a gate?

A 12

B 20

C 24

D 28

30 Here are a family's Canadian visa numbers:

```
J0118635<8GB<5904309M0301143<<<<<<<<
J0118646<2GB<6006211F0301143<<<<<<<<
J0118650<7GB<9508037F0301143<<<<<<<<
J0118661<4GB<9311125F0301143<<<<<<<<
J0118672<2GB<9809077M0301143<<<<<<<<
J0166154<8GB<5904309M0304225<<<<<<<<
J0166165<2GB<6006211F0304225<<<<<<<<
J0166176<2GB<9809077M0304225<<<<<<<<
J0166180<4GB<9311125F0304225<<<<<<<<
J0166191<7GB<9508037F0304225<<<<<<<<
J0184682<3GB<5904309M0404158<<<<<<<<
J0184693<2GB<6006211F0404158<<<<<<<<
J0184704<0GB<9311125F0404158<<<<<<<<
J0184715<8GB<9508037F0404158<<<<<<<<
J0184726<9GB<9809077M0404158<<<<<<<<
```

Canada uses the ISO standard year-month-day format for dates (YYMMDD).

What was the age of the eldest child when the third set of visas expired?

A 8

B 9

C 10

D 11

20

BLANK PAGE