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**THINKING SKILLS**

**9694/12**

Paper 1 Problem Solving

**May/June 2016**

**1 hour 45 minutes**

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

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**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.

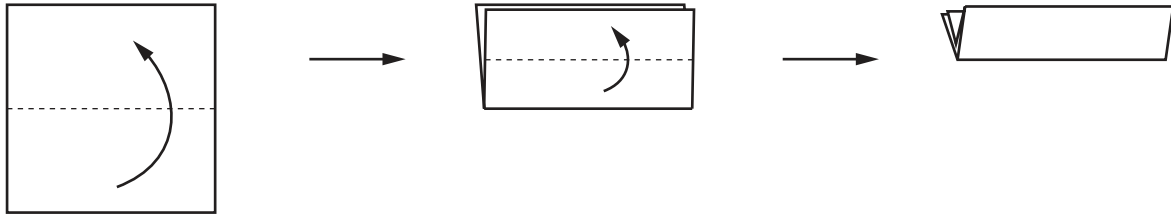
**INFORMATION FOR CANDIDATES**

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

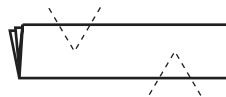
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This document consists of **20** printed pages.

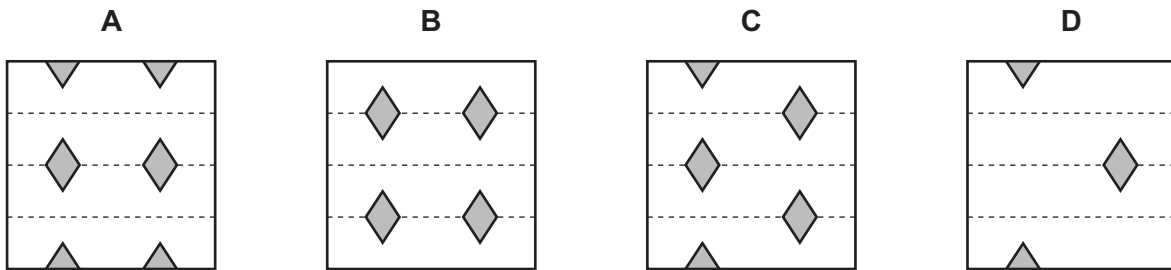
- 1 Decorations are being made for a children's party. A square piece of paper is folded in half. Without unfolding, the paper is then folded in half again, in the same direction, as shown below.



Two V-shaped cuts are now made with scissors, as shown below, and the small pieces are removed.



Which one of the following shows the sheet when it is unfolded?



- 2 My digital alarm clock shows two digits for the hour and two digits for the minutes. It works normally, except that the alarm sounds and wakes me up every time at least 3 consecutive digits are the same (e.g. at 04:44). Nothing else disturbs me during the night, and each time I am woken up I go straight back to sleep. When I go to bed, the alarm clock shows 22:00 and I set the alarm for 07:15.

How long is my longest period of uninterrupted sleep?

- A 20 minutes
- B 71 minutes
- C 80 minutes
- D 98 minutes

- 3 The following table shows the cost in dollars charged by a particular shop to produce quantities of copies of documents on either white or pink paper of various sizes.

| <i>Number of pages</i> | 5     |      | 50    |      | 100   |       | 200   |       |
|------------------------|-------|------|-------|------|-------|-------|-------|-------|
| <i>Paper colour</i>    | White | Pink | White | Pink | White | Pink  | White | Pink  |
| <i>A1 size</i>         | 0.70  | 0.85 | 5.00  | 7.00 | 8.50  | 11.50 | 14.00 | 18.00 |
| <i>A2 size</i>         | 0.60  | 0.75 | 4.50  | 6.50 | 7.20  | 10.20 | 11.00 | 15.00 |
| <i>A3 size</i>         | 0.50  | 0.65 | 3.50  | 5.50 | 6.40  | 9.40  | 8.00  | 12.00 |
| <i>A4 size</i>         | 0.40  | 0.55 | 2.50  | 4.50 | 4.00  | 7.00  | 6.00  | 10.00 |
| <i>A5 size</i>         | 0.30  | 0.45 | 2.00  | 3.80 | 3.20  | 6.20  | 5.00  | 9.00  |

There are extra charges for stapling and binding, as shown in the following table.

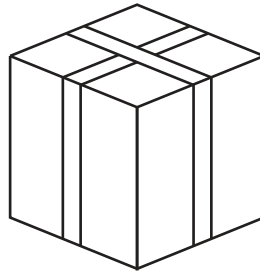
| <i>Number of pages</i> | <i>Stapling (\$)</i> | <i>Binding (\$)</i> |
|------------------------|----------------------|---------------------|
| 2 – 50                 | 2.20                 | 4.60                |
| 51 – 100               | 3.30                 | 6.90                |
| 101 – 200              | 4.40                 | 9.20                |

Kylie, Lily and Molly wish to obtain copies of certain pieces of their college work. Kylie wants one copy of each of 100 pages on A4 white paper, with binding. Lily wants one copy of each of 50 pages on A5 pink paper, with stapling. Molly wants one copy of each of 10 A3 pages on white paper.

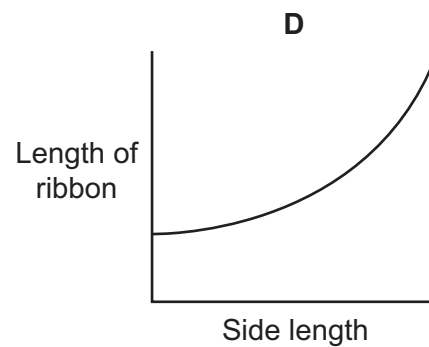
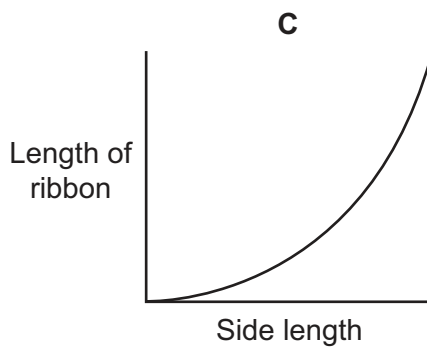
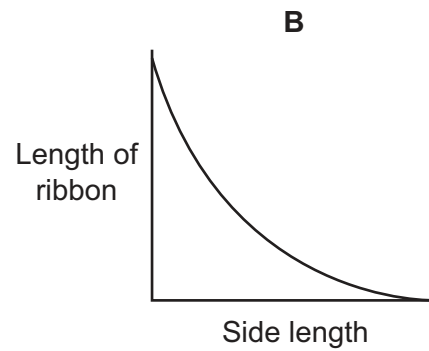
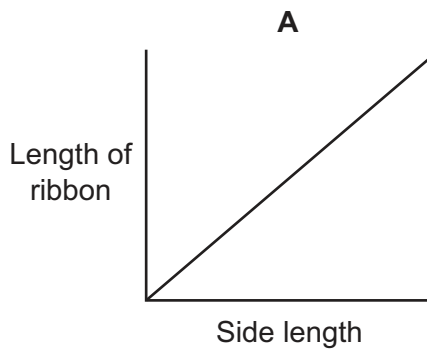
What would be the total charge for all of their copying?

- A \$16.70
- B \$17.90
- C \$18.20
- D \$21.90

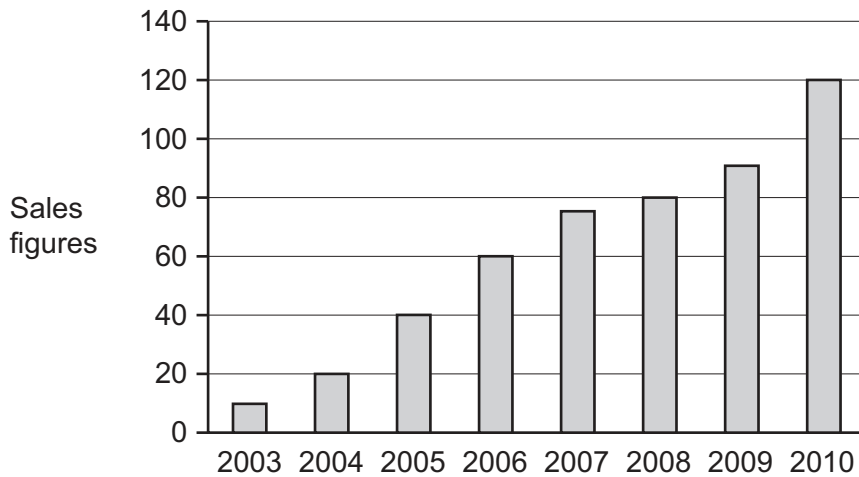
- 4 The parcel below has a ribbon which goes round all four faces exactly in two directions to create a crossed effect. All side lengths of the parcel are equal.



Which one of the graphs below could represent the relationship between the length of ribbon used and the side length of the parcel?

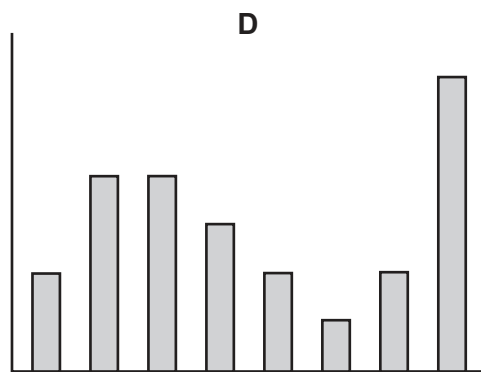
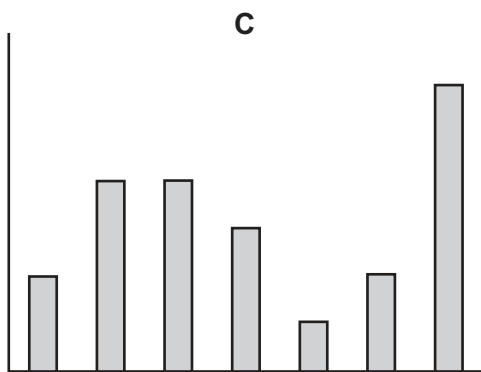
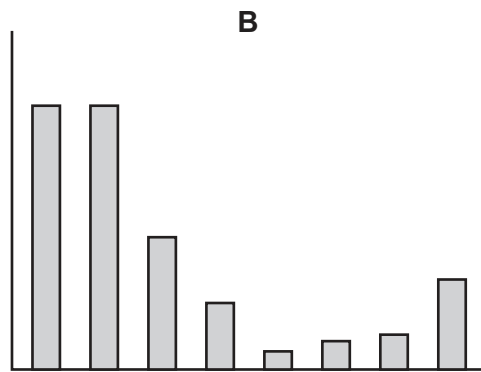
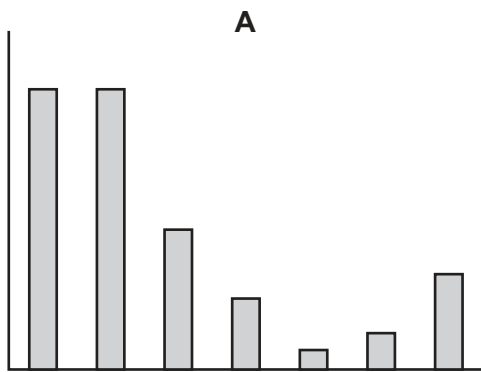


5 The chart shows the annual sales figures (in millions of dollars) for a firm from 2003 to 2010.



The owner wants a chart showing her the percentage growth rate, year upon year, of sales over this period.

Which of the charts below, if suitably labelled, could represent the growth rates indicated in the data above?



- 6 This table gives information about four different car models manufactured by Foxhall.

| <i>Model</i> | <i>Engine capacity<br/>(litres)</i> | <i>Fuel tank capacity<br/>(litres)</i> | <i>Maximum fuel<br/>economy<br/>(km per litre)</i> |
|--------------|-------------------------------------|--|--|
| Wolf         | 1.8                                 | 48                                     | 16   |
| Dingo        | 2.2                                 | 66                                     | 12   |
| Coyote       | 2.4                                 | 70                                     | 11   |
| Jackal       | 3.0                                 | 72                                     | 8  |

David is going to buy the Foxhall car which can travel furthest on a full tank of fuel.

Which model will David buy?

- A Coyote
  - B Dingo
  - C Jackal
  - D Wolf
- 7 I buy muesli in 5 kg bags to eat for breakfast. My husband and I each eat 125 g a day. When we started the bag, both of our daughters were at home from college. The older one eats 150 g of muesli a day, but she has gone back to college so has not eaten at home for the last 4 days. The younger one is still at home.

There was just enough muesli for the three of us this morning – the 10th breakfast since we started the bag.

How much does my younger daughter eat each day?

- A 160 g
- B 190 g
- C 260 g
- D 285 g

- 8 George is planning to subscribe to a puzzle magazine and has found 4 different options which are summarised in the table below.

| <i>Name of magazine</i> | <i>Normal cost per issue (\$)</i> | <i>Subscription price (12 issues) (\$)</i> | <i>Subscription price (24 issues) (\$)</i> | <i>Types of puzzle</i>       |
|-------------------------|-----------------------------------|--|--|------------------------------|
| Demanding Tasks         | 4.50                              | 50   | 95   | Crosswords, Wordsearches     |
| Difficult Problems      | 5                                 | 55   | 95   | Crosswords, Logic problems   |
| Hard Tests              | 5                                 | 50   | 100  | Wordsearches                 |
| Tough Challenges        | 5.50                              | 60   | 115  | Wordsearches, Logic problems |

George wants to take a subscription for 12 issues and is looking for the subscription which reduces the price per issue by the largest number of cents.

Which magazine should George subscribe to?

- A Demanding Tasks
  - B Difficult Problems
  - C Hard Tests
  - D Tough Challenges
- 9 I have three shirts – red, green and blue – and three ties – red, green and blue – in my wardrobe. My boss says that I sometimes wear a tie and a shirt that do not go well together. She says that I may wear my red tie with any shirt except the green one and my red shirt with any tie except the blue one. Also, I should not wear my green tie with my blue shirt. Any other combination is allowed.

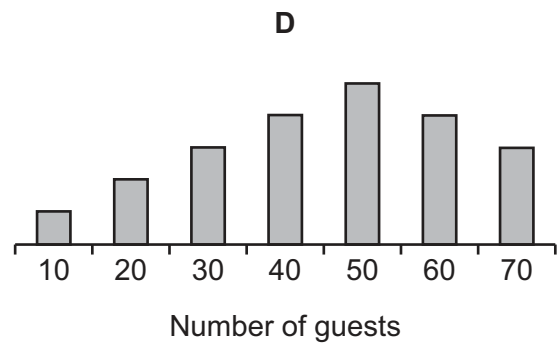
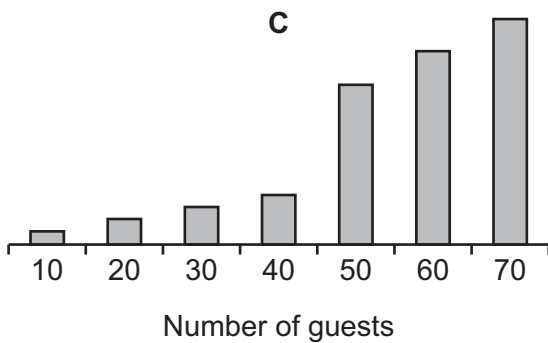
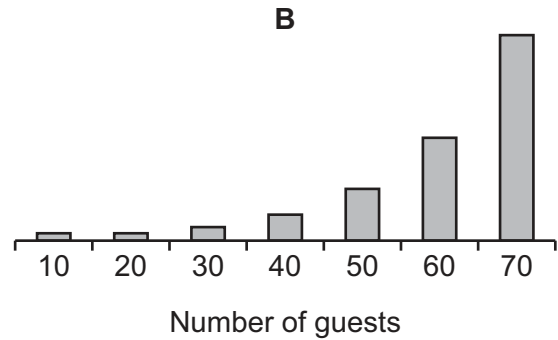
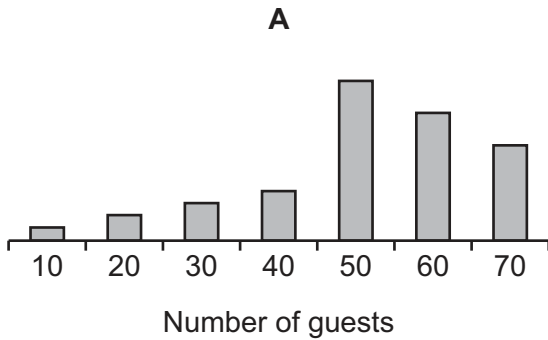
It will be dark tomorrow and I have to choose a shirt and tie at random from the wardrobe.

What is the chance that I will wear a shirt and tie that do **not** go well together?

- A 1 in 2
- B 1 in 3
- C 2 in 3
- D 3 in 4

- 10 Julia is planning a party, for which she is going to hire a function room. If she can get at least 50 guests, then she will hire the room for 5 hours, but if there are fewer than 50 guests she will only hire it for 2 hours. Julia needs to decide how many packets of snacks to buy. She estimates that 10 guests will eat 1 packet of snacks in one hour.

Which of the following graphs best represents the numbers of packets of snacks Julia should buy for different numbers of guests?



- 11 Abel, a train driver, watched another train passing in the opposite direction. He knows that trains on this line always travel at very similar speeds. The train took 5 seconds to pass Abel, sitting in his position in the cab while driving his train. Later, travelling at the same speed it took 8 seconds from Abel entering a tunnel to when he left it.

Which of the following is at least approximately true?

- A** The other train is 25% longer than the tunnel
- B** Abel's train is 60% longer than the other train
- C** The other train is 75% longer than the tunnel
- D** Abel's train's length is 80% of the length of the tunnel



12 This was the Magmatian Premier Football League table before today's matches.

| <i>Team</i> | <i>Played</i> | <i>Won</i> | <i>Drawn</i> | <i>Lost</i> | <i>Goals Scored</i> | <i>Points</i> |
|-------------|---------------|------------|--------------|-------------|---------------------|---------------|
| Tolima      | 15            | 10         | 2            | 3           | 36                  | 34            |
| Hekla       | 15            | 10         | 3            | 2           | 40                  | 33            |
| Vesuvius    | 15            | 9          | 2            | 4           | 38                  | 33            |
| Cumbal      | 15            | 10         | 2            | 3           | 39                  | 32            |
| Surtsey     | 15            | 9          | 1            | 5           | 38                  | 32            |
| Antisana    | 15            | 6          | 0            | 9           | 31                  | 24            |
| Stromboli   | 15            | 5          | 3            | 7           | 24                  | 21            |
| Fujiyama    | 15            | 5          | 4            | 6           | 20                  | 19            |
| Etna        | 15            | 4          | 3            | 8           | 17                  | 18            |
| Cotopaxi    | 15            | 4          | 2            | 9           | 12                  | 15            |
| St. Helens  | 15            | 2          | 5            | 8           | 10                  | 11            |
| Ubinas      | 15            | 1          | 3            | 11          | 7                   | 9             |

Today's results:

| <b>Home team</b> |   | <b>Away team</b> |   |
|------------------|---|------------------|---|
| Cotopaxi         | 2 | Vesuvius         | 2 |
| Etna             | 3 | Cumbal           | 4 |
| Hekla            | 2 | Antisana         | 1 |
| Stromboli        | 0 | Ubinas           | 0 |
| Surtsey          | 3 | St. Helens       | 0 |
| Tolima           | 0 | Fujiyama         | 2 |

Points are awarded in this league as follows:

|                         | <b>Home Team</b> | <b>Away Team</b> |
|-------------------------|------------------|------------------|
| Win by 2 goals or more  | 3 points         | 4 points         |
| Win by 1 goal           | 2 points         | 3 points         |
| Draw                    | 1 point          | 2 points         |
| Lose by 1 goal          | 0 points         | 1 point          |
| Lose by 2 goals or more | 0 points         | 0 points         |

Where two (or more) teams are level on points, positions are decided by the number of goals scored.

Which team has replaced Tolima at the top of the table?

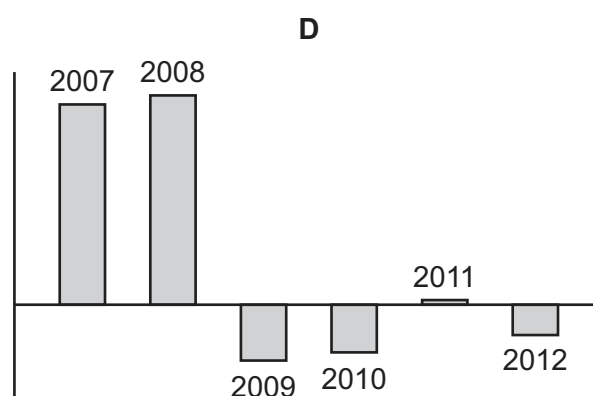
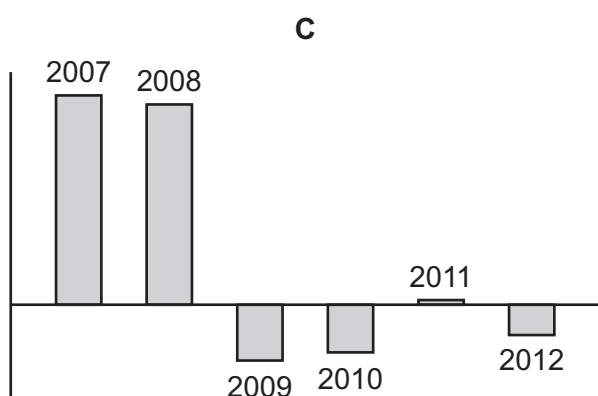
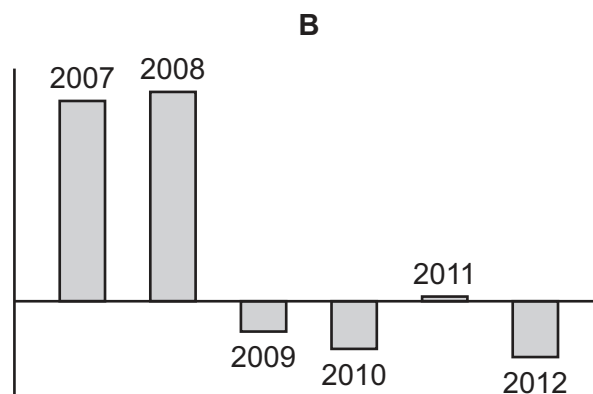
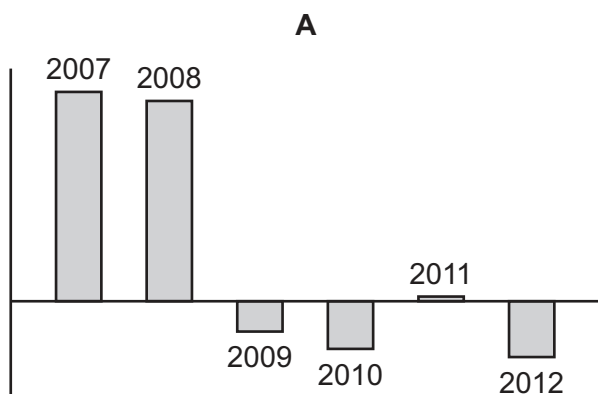
- A** Cumbal
- B** Hekla
- C** Surtsey
- D** Vesuvius

- 13 A country's balance of payments statistic is obtained by subtracting the value of its imports from the value of its exports.

Below are the figures, in millions of dollars, for Canada's imports and exports from 2007 to 2012.

|                | 2007    | 2008    | 2009    | 2010    | 2011    | 2012    |
|----------------|---------|---------|---------|---------|---------|---------|
| <i>Exports</i> | 461 385 | 487 262 | 367 430 | 403 071 | 456 518 | 461 856 |
| <i>Imports</i> | 415 791 | 443 592 | 373 984 | 413 848 | 455 606 | 473 810 |

Which of the following best represents the balance of payments for Canada from 2007 to 2012?

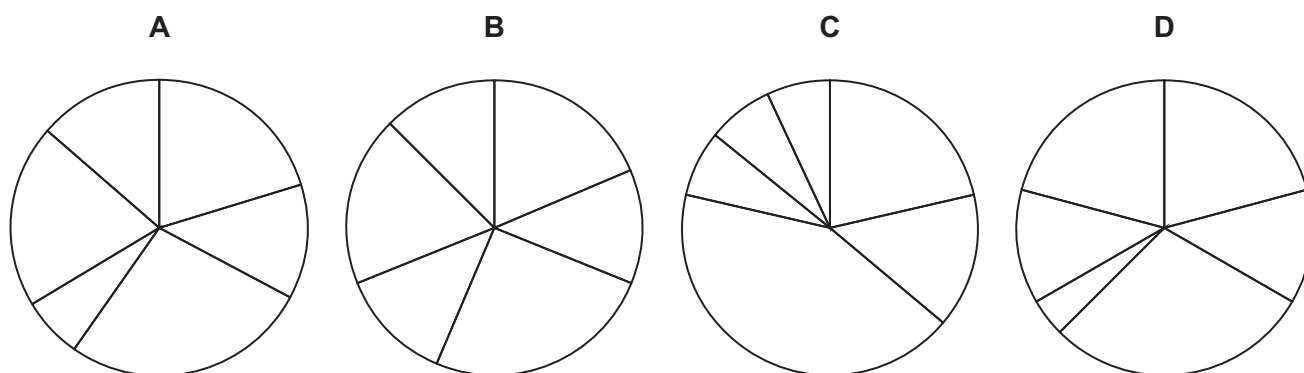


14 Midge's pet parrot has eaten the corner of her paperwork on the sales at her 6 shops.

| Shop             | Sales (\$'000) |
|------------------|----------------|
| Albion Street    | 60             |
| Belvoir Road     | 40             |
| Cazneau Avenue   | 80             |
| Derby Street     | 20             |
| Eglington Centre | ??             |
| Farrell Road     | ??             |

However, she has 4 pie charts, which are shown below, and is certain that one of these represents the sales of all 6 shops. If she can identify which chart it is, at least she can calculate the total sales of the two shops with missing figures.

Which pie chart must be the one representing the sales of Midge's shops?



15 An archaeologist made an exciting discovery: a damaged clay tablet where the ancient scientists of Ceridan, concerned by the onset of drought, recorded the amount of rainfall in each of their major settlements – Peri, Dartbouche, Rowli, Cicien and Badcol. Unfortunately, the list of the settlements and their rainfall had the names broken, but the rainfall amounts were intact. Other information on the tablet allowed him to find out the following information.

- The five cities were each in a different region of Ceridan: the hills, the woods, the plains, the desert, and by a natural harbour.
- The rainfall amounts were: 19 units, 24 units, 29 units, 40 units and 58 units.
- The city in the desert got the least rain; the city in the woods got the most rain.
- Rowli is in the hills.
- Dartbouche got more rain than Badcol, but less rain than Rowli.
- Cicien got 40 units of rain.
- The city in the hills got 29 units of rain; the city on the plains got 24 units of rain.

Which city had the most rain?

- A** Peri
- B** Dartbouche
- C** Rowli
- D** Badcol

- 16 There are various TV channels requiring a monthly subscription. Individual channels are available at \$3 each. They are also sold in packages which offer combinations of channels:

|                     | <i>Sport</i> | <i>Flowers</i> | <i>Films</i> | <i>Dogs</i> | <i>Pop</i> | <i>Nature</i> | <i>Garden</i> | <i>Police</i> | <i>Hospital</i> | <i>News</i> | <i>MPs</i> | <i>Price</i> |
|---------------------|--------------|----------------|--------------|-------------|------------|---------------|---------------|---------------|-----------------|-------------|------------|--------------|
| <i>Couch Potato</i> | ✓            |                | ✓            |             |            |               | ✓             | ✓             | ✓               | ✓           | ✓          | \$8          |
| <i>Dinky</i>        |              | ✓              | ✓            |             |            | ✓             |               |               | ✓               |             |            | \$9          |
| <i>Yuppie</i>       | ✓            |                |              |             | ✓          |               |               | ✓             |                 | ✓           | ✓          | \$7          |
| <i>Outdoor</i>      | ✓            |                |              | ✓           |            | ✓             | ✓             |               |                 |             |            | \$4          |
| <i>Young</i>        |              |                | ✓            | ✓           | ✓          |               |               |               |                 |             |            | \$4          |

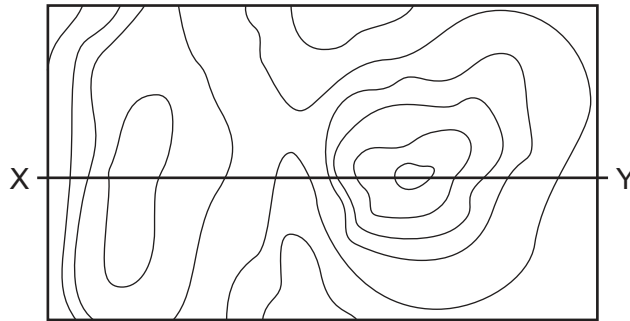
My family wants to watch various channels:

|                 | <i>Sport</i> | <i>Flowers</i> | <i>Films</i> | <i>Dogs</i> | <i>Pop</i> | <i>Nature</i> | <i>Garden</i> | <i>Police</i> | <i>Hospital</i> | <i>News</i> | <i>MPs</i> |
|-----------------|--------------|----------------|--------------|-------------|------------|---------------|---------------|---------------|-----------------|-------------|------------|
| <i>Greg</i>     | ✓            |                | ✓            |             |            |               |               |               |                 | ✓           |            |
| <i>Doris</i>    |              | ✓              |              |             |            |               |               |               | ✓               |             |            |
| <i>Nathalie</i> |              |                | ✓            |             | ✓          |               |               |               | ✓               |             |            |
| <i>James</i>    | ✓            |                |              |             | ✓          |               |               |               |                 |             |            |
| <i>Sam</i>      |              |                |              |             | ✓          |               |               |               |                 |             |            |

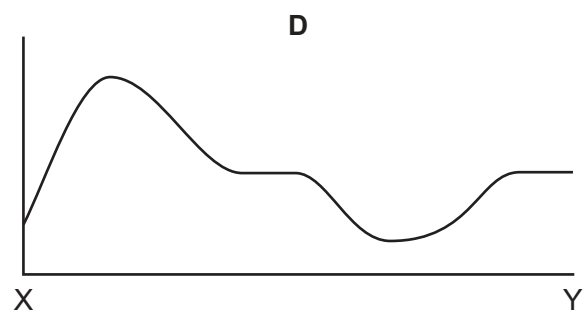
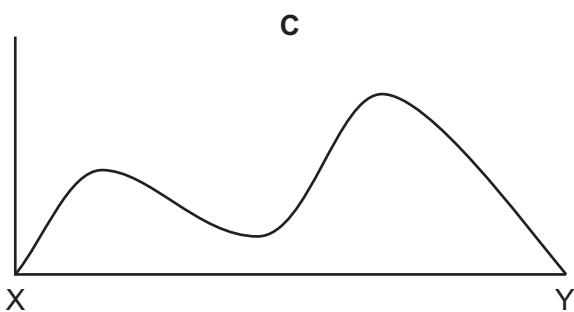
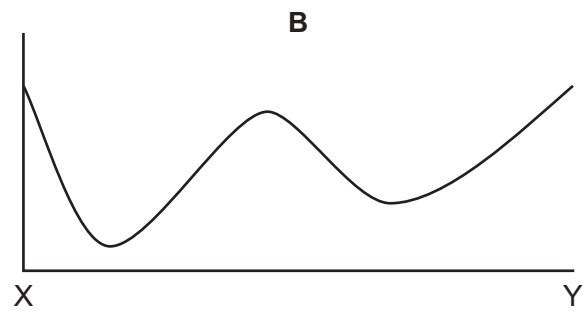
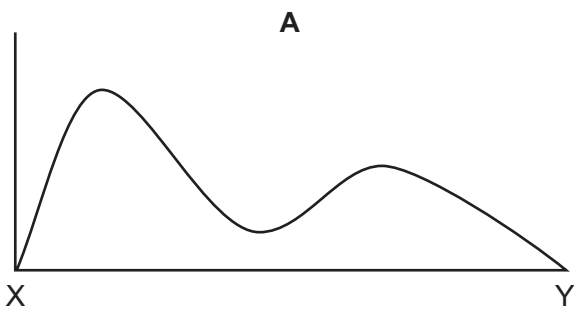
I worked out the cheapest way to satisfy everyone. Which package or packages would I pay for?

- A Young
- B Couch Potato
- C Dinky and Yuppie
- D Couch Potato, Dinky and Young

- 17 The diagram below shows a map of the contour lines for a hilly area of the countryside. All points on a contour line are at the same height above sea level. The map shows contour lines at intervals of 10 metres above sea level.



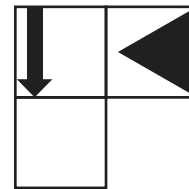
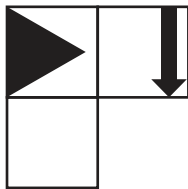
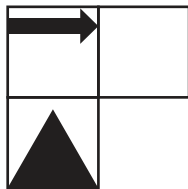
Which of the following elevations could represent the section from X to Y in the map above?



- 18 A patient has to take 3 different pills coloured red, yellow and green several times a day. He starts at 09:00 and takes his first red pill, which he has to take every 30 minutes. At 09:10 he takes his first yellow pill, which he has to take every 40 minutes. At 09:30 he takes his first green pill, which he has to take every hour.

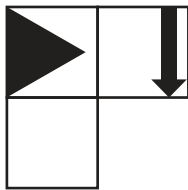
How many times between 09:00 and 16:45 does he take all three pills together?

- A 3  
 B 4  
 C 5  
 D 6
- 19 Thomas is designing a puzzle made of four pieces. Each piece is made of three squares and when they are put together correctly they will form a 3 x 4 grid of squares. The design will also have two lines of symmetry. Three of the pieces are shown below.

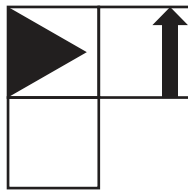


Which of the following could be the final piece?

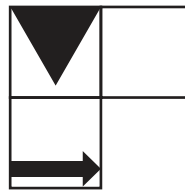
A



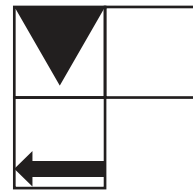
B



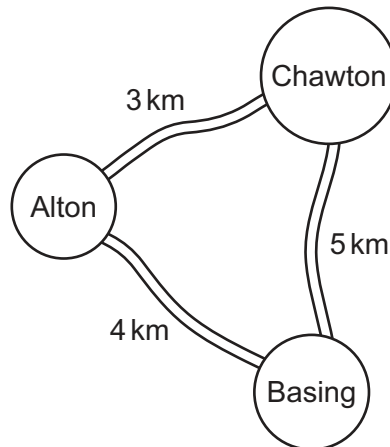
C



D



20 The three villages Alton, Basing and Chawton are joined by roads as shown below:



George starts from Alton at 12:00, and is going to run to Chawton, then Basing, then back to Alton. Jim starts cycling from Alton at 12:30, and is going to cycle to Basing, then Chawton, then back to Alton.

George runs at 6 km/h and Jim cycles at 18 km/h.

How far from Basing are George and Jim when they meet?

- A 2.25 km
  - B 2.75 km
  - C 3.25 km
  - D 5.00 km
- 21 In Kasha and Min's garden are six stepping stones in a line. They can step from one to the next, or jump to the next but one. They are playing a game to see who can find the largest number of different ways to get from the first stone to the last by moving one or two stones at a time, always moving forwards.

How many different ways are there of doing this?

- A 3
- B 8
- C 13
- D 32

- 22 Trains leave Newport towards Oldcastle at regular intervals. The arrival and departure times for the first train are shown below.

|                  | <i>Arrive</i> | <i>Depart</i> |
|------------------|---------------|---------------|
| <i>Newport</i>   |               | 09:10         |
| <i>Clonton</i>   | 09:24         | 09:27         |
| <i>Middleton</i> | 09:33         | 09:35         |
| <i>Redmoor</i>   | 09:54         | 09:56         |
| <i>Dullon</i>    | 10:15         | 10:16         |
| <i>Oldcastle</i> | 10:36         |               |

Once trains reach Oldcastle they wait for a few minutes before starting on the return journey to Newport. All trains wait for the same number of minutes at Oldcastle before they start the return journey, and they travel at the same speed in each direction. On its return journey, the first train arrives at its first stop (Dullon) at the same time as the second train to have left Newport (which is still on its way to Oldcastle). Dullon is the only station at which any two trains ever meet. When trains arrive back at Newport they wait until the next departure time before leaving.

Which one of the following pieces of information would **not** be sufficient to work out the time that the first train leaves Oldcastle?

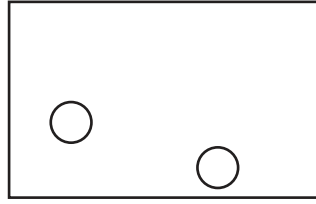
- A The amount of time between train departures from Newport
  - B The time at which the second train leaves Redmoor on its return journey
  - C The time at which the first train leaves Newport for the second time
  - D The time at which the first train arrives back at Newport
- 23 Alex was driving to a meeting yesterday morning. He set off planning to arrive 30 minutes early for the meeting. Halfway through the journey Alex's car broke down. It took 30 minutes for someone to come out to look at the car and a further 30 minutes to repair it. Alex decided to use the motorway for the remainder of the journey because he would be able to travel at twice the speed. From the point at which he broke down, the route on the motorway was a distance of 30 km compared with his original route of 20 km. Alex arrived at the meeting 20 minutes late.

What was Alex's speed on the motorway?

- A 60 km/h
- B 90 km/h
- C 100 km/h
- D 120 km/h



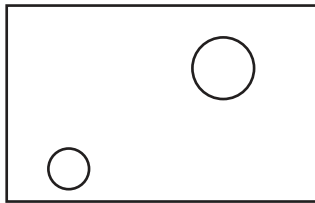
- 24 Bigger bubbles rise faster than smaller ones, but bubbles look smaller if they are further away. This picture of bubbles was taken (horizontally) from one side near the bottom of a swimming pool.



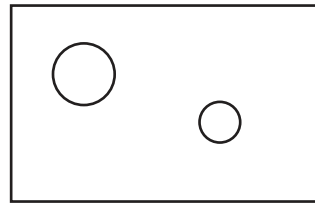
Another picture was taken (horizontally) further up, slightly later, (so the bubbles have not got noticeably bigger from rising). It was taken from the other side of the pool.

Which one of the following could **not** be the second picture?

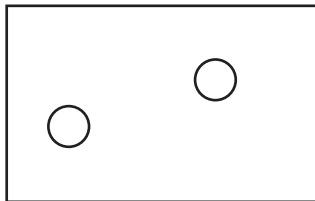
**A**



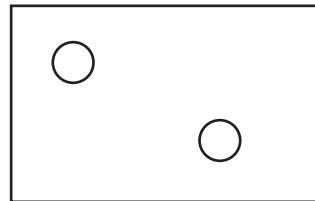
**B**



**C**



**D**



- 25 The company that cleans the offices at work calculates the amount that it charges from the number of rooms that are cleaned. The rooms are classified as one of three sizes (small, medium and large) and there is a different price (which is a whole number of ¢) for each size. There are 30 rooms to be cleaned. The total charge for the cleaning has just been increased by \$12 per night. The company previously charged 80¢ for small rooms, \$1.20 for medium rooms and \$2 for large rooms. The rooms to be cleaned have not changed.

Which one of the following **could** explain the \$12 increase in the price?

- A 10 medium rooms have been reclassified as large rooms, but the prices have not changed
- B 10 medium rooms have been reclassified as large rooms and the price to clean a large room has increased by 20¢
- C 20 small rooms have been reclassified as medium rooms, but the prices have not changed
- D 20 small rooms have been reclassified as medium rooms and the price to clean a small room has increased by 20¢
- 26 I have enough orange juice to fill exactly
- 4 large cups and 3 small cups, or
  - 2 large cups and 5 medium-sized cups, or
  - 7 medium-sized cups and 6 small cups.

How many medium-sized cups can I fill?

- A 8
- B 9
- C 10
- D 11

- 27 My brother and I both have an online account with the same bank. As part of the log in process, two digits of a 5-digit passcode have to be entered. The digits must always be entered in the order they appear in the passcode.

Some time ago, I saw my brother enter 5 followed by 7 when asked to enter the 2nd and 4th digits of his passcode. Since then I have not been able to see which digits he has been asked for, but I have seen him enter 8 followed by 5 and 2 followed by 8. I am hoping to surprise him by deducing his passcode next time I see him log in.

Which of the following entries would **not** allow me to deduce his passcode with certainty next time I see him log in (assuming that I won't know which digits he has been asked for)?

- A 2 followed by 5
  - B 5 followed by 2
  - C 7 followed by 8
  - D 8 followed by 7
- 28 Lisa wants to buy two different games to play this weekend. She has a choice of two stores from which to buy the games. At the first store one of the games is \$10 cheaper than the other game. The second store normally sells each game for \$2 more than the first store, but has an offer at the moment that the more expensive game is half price when the two games are bought together. Lisa can save \$6 in total by shopping at the second store rather than the first.

What is the total that Lisa will pay for the games?

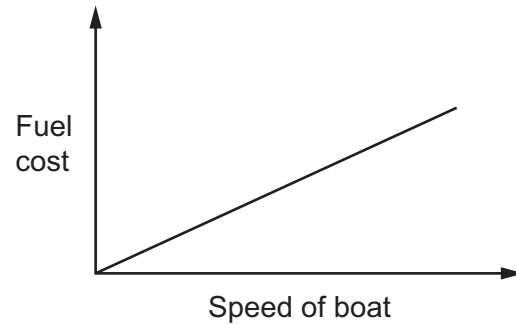
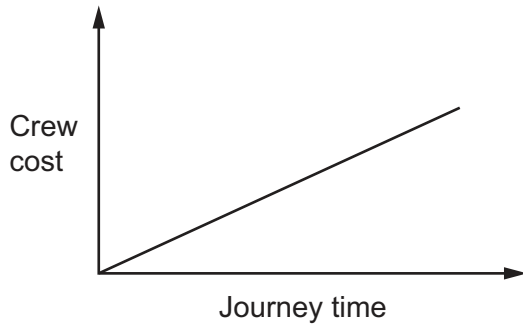
- A \$14
  - B \$16
  - C \$18
  - D \$20
- 29 Every morning, a train leaves the station at Argent, taking tourists for a day out in the historic town of Bagent. It makes the return journey later in the day. The train travels at a steady speed on each of its two journeys, but because Argent to Bagent is uphill, the steady speed on its outward journey is slower than the steady speed on its return journey.

Last Tuesday, on its journey from Bagent to Argent, the train had to stop for a while, because an obstruction had to be removed from the track. It was noted by the driver that on this day the time taken for the outward journey was only 75% of the time taken for the return journey.

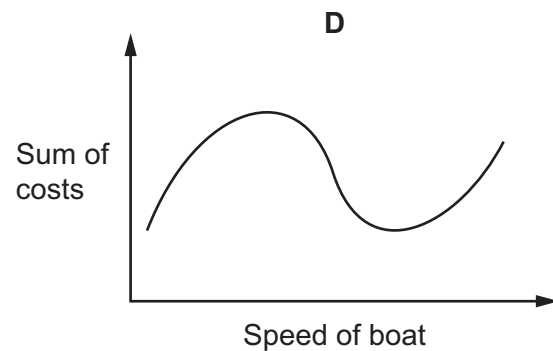
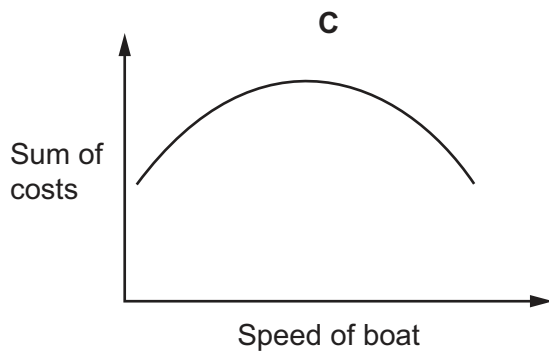
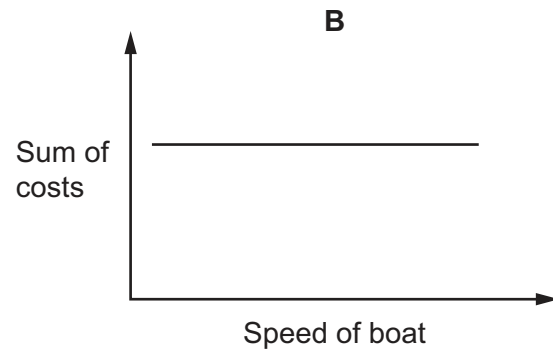
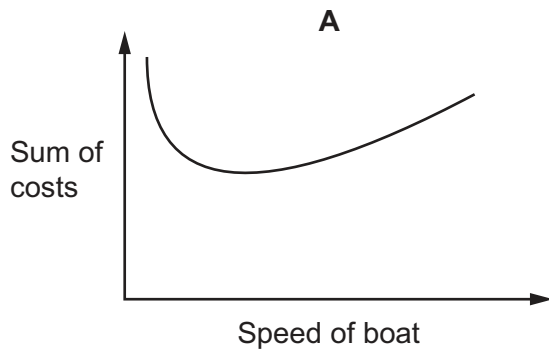
Which **one** of the following pieces of information is sufficient to find the average speed of the train on its return journey from Bagent to Argent last Tuesday?

- A The distance between Argent and Bagent
- B The steady speed on the journey from Argent to Bagent
- C The time for which the train was stationary at the obstruction
- D The time taken for the journey from Argent to Bagent

- 30 A boat owner has two major costs: the cost of the crew and the cost of fuel. The crew are paid by the hour, so the slower the boat goes the more the crew costs – but the slower the boat goes the less fuel it uses. In fact, the owner has noted that the sum of the costs is the same if the boat goes at 2 km/h or 36 km/h. The crew costs and fuel costs are represented by the graphs below.



Which of the following graphs could represent the relationship between the sum of the two major costs and the speed of the boat?



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