



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education  
Advanced Subsidiary Level and Advanced Level

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**THINKING SKILLS**

**9694/13**

Paper 1 Problem Solving

**October/November 2012**

**1 hour 30 minutes**

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

\* 4 7 5 5 6 8 8 9 5 9 \*

**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.**

**INFORMATION FOR CANDIDATES**

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

This document consists of **19** printed pages and **1** blank page.



- 1 A survey has been conducted to analyse car usage by age. Data of usage in kilometre bands is shown in the table below.

**Distance travelled on regular journey**

| Age         | Percentage            |                        |                        |                         |                          |                       |                           |                      |
|-------------|-----------------------|------------------------|------------------------|-------------------------|--------------------------|-----------------------|---------------------------|----------------------|
|             | <i>Less than 1 km</i> | <i>1 to under 2 km</i> | <i>2 to under 5 km</i> | <i>5 to under 10 km</i> | <i>10 to under 25 km</i> | <i>25 km and over</i> | <i>No regular journey</i> | <i>All distances</i> |
| 16 to 24    | 15                    | 19                     | 27                     | 18                      | 16                       | 4                     | 2                         | 100                  |
| 25 to 44    | 13                    | 18                     | 22                     | 17                      | 17                       | 9                     | 5                         | 100                  |
| 45 to 54    | 8                     | 13                     | 35                     | 15                      | 17                       | 7                     | 5                         | 100                  |
| 55 to 64    | 9                     | 23                     | 24                     | 22                      | 11                       | 8                     | 4                         | 100                  |
| 65 to 74    | 9                     | 25                     | 29                     | 19                      | 10                       | 6                     | 2                         | 100                  |
| 75 and over | 16                    | 30                     | 34                     | 13                      | 6                        | 1                     | 1                         | 100                  |

Which age group has the highest percentage of journeys of 10 or more kilometres?

- A 25 to 44  
 B 45 to 54  
 C 55 to 64  
 D 65 to 74
- 2 A courier service delivers parcels for a design company on a regular basis. The courier service will use either a motorcycle or a car to deliver the parcels. The route is 30 km through heavy traffic and 60 km on the motorway. Both vehicles are more economical to drive on the motorway, and their fuel economy rates are detailed below.

| <i>Vehicle</i> | <i>Heavy traffic</i> | <i>Motorway</i> |
|----------------|----------------------|-----------------|
| Motorcycle     | 10 km/litre          | 12 km/litre     |
| Car            | 6 km/litre           | 15 km/litre     |

What is the least amount of fuel necessary for this journey?

- A 7 litres  
 B 8 litres  
 C 9 litres  
 D 10 litres

- 3 Amelia is running around a circular 6 km loop. Her friend Boris is injured, so is not going to run the full distance. At the same time that Amelia starts, Boris sets out in the opposite direction around the loop, walking at half her running speed. When they meet, Boris turns around and runs the rest of the way around the loop, starting from the beginning with Amelia, running at her pace.

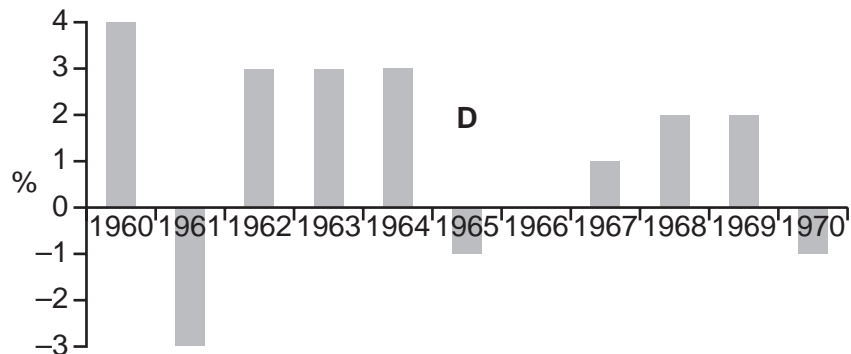
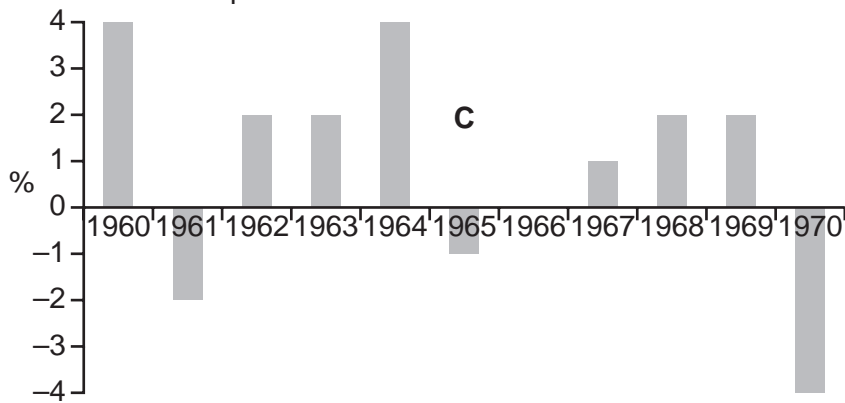
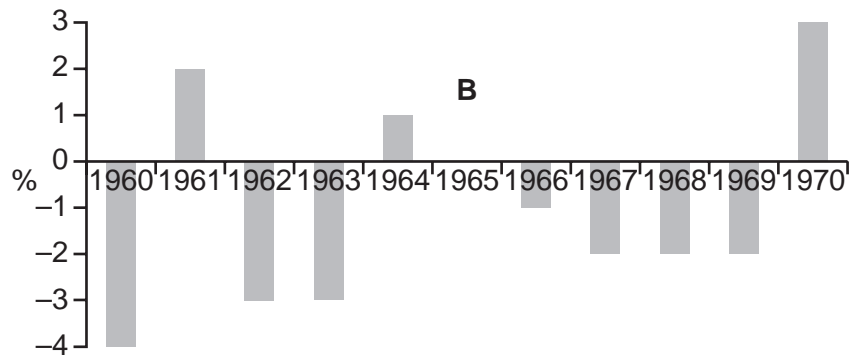
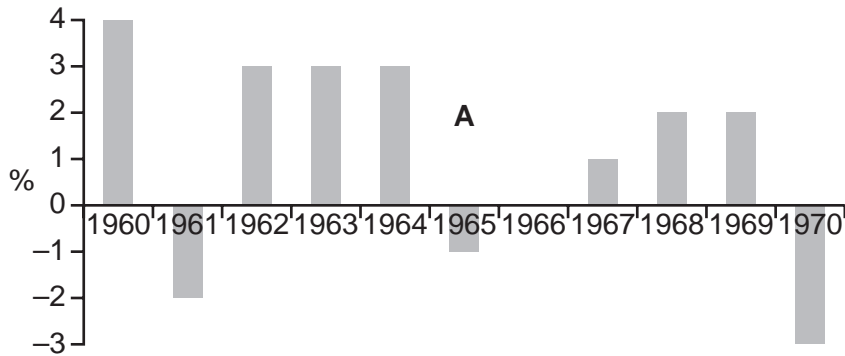
How far did Boris **run**?

- A 1.5 km
- B 2.0 km
- C 3.0 km
- D 4.0 km

- 4 The following table shows the retail price index in the republic of Thatwormia in the 1959 as base year = 100).

|      |     |      |     |      |     |      |     |
|------|-----|------|-----|------|-----|------|-----|
| 1960 | 104 | 1963 | 108 | 1966 | 110 | 1969 | 115 |
| 1961 | 102 | 1964 | 111 | 1967 | 111 | 1970 | 112 |
| 1962 | 105 | 1965 | 110 | 1968 | 113 |      |     |

Which one of the following charts shows the movement of retail prices up and down each year during the decade?



- 5 Jenny peered into her carrier bag of apples, oranges and bananas, and told her friend that the product of the numbers of the three fruits was 30. Carol said that was not enough information to work out how many pieces of fruit were in the bag.

Which one of the following additional pieces of information, on its own, would enable Carol to work out the total number of pieces of fruit in the bag?

- A Half of the total is bananas.  
 B The number of oranges is in the teens.  
 C There are three apples.  
 D The total number ends in 2.
- 6 I have some free time on Monday and Wednesday evenings and so I want to enrol on an evening class for one of those two days. The options available at the local college are shown below. There is more than one class per week for each course and participants choose the day that they want to attend when they enrol.

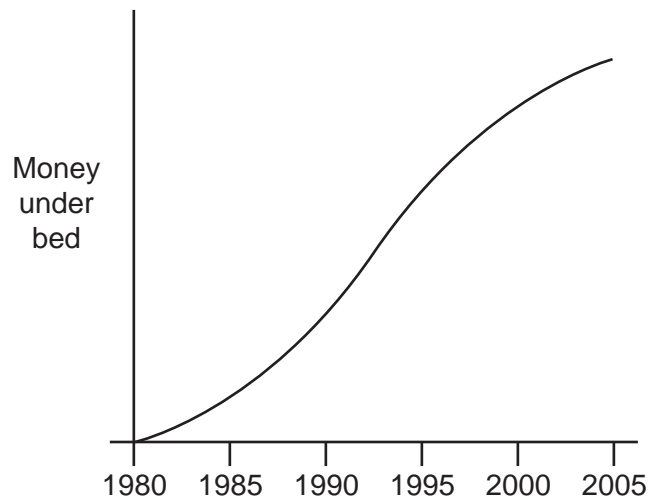
| <i>Course</i>    | <i>Dates and times available</i> | <i>Room</i> | <i>Level</i> | <i>Price (\$)</i> |
|------------------|----------------------------------|-------------|--------------|-------------------|
| Ballroom Dancing | Monday afternoon                 | F34         | Intermediate | 100               |
|                  | Tuesday evening                  | F34         |              |                   |
|                  | Thursday evening                 | F34         |              |                   |
| Bridge           | Monday evening                   | F21         | Beginners    | 150               |
|                  | Wednesday evening                | F21         |              |                   |
| Creative Writing | Tuesday morning                  | F19         | Intermediate | 110               |
|                  | Friday evening                   | F30         |              |                   |
| Website Design   | Monday evening                   | E34         | Beginners    | 120               |
|                  | Thursday afternoon               | E34         |              |                   |

Anyone is allowed to do a beginners course, but intermediate courses may only be attended by those who have done the beginners course previously. I did the beginners Creative Writing course last year but I have never done any Ballroom Dancing.

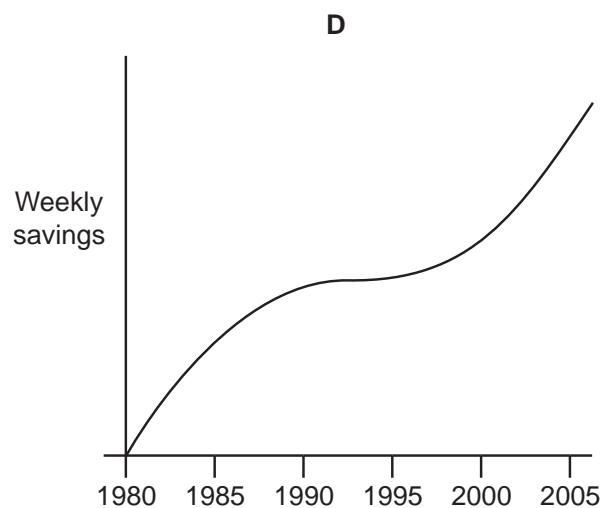
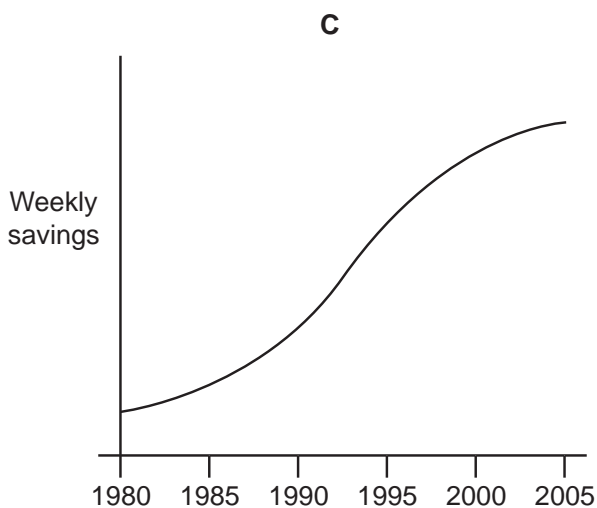
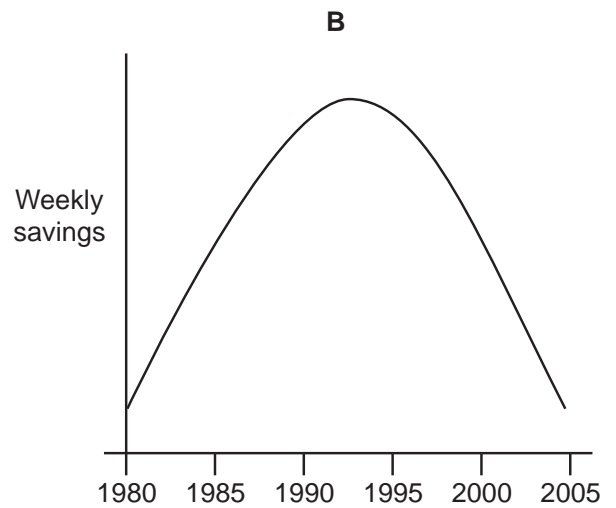
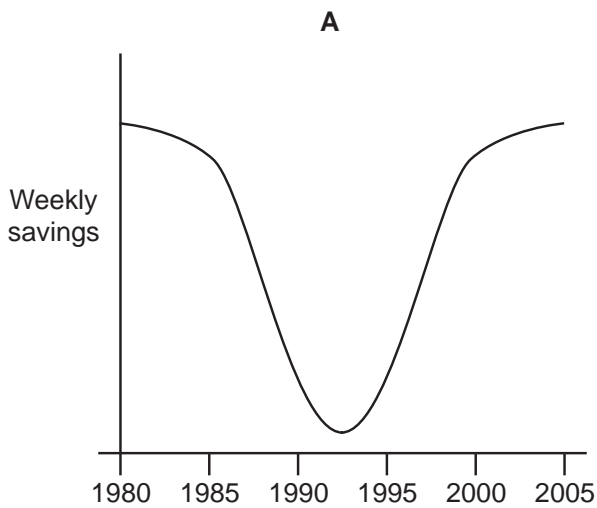
What is the cheapest course that I could attend?

- A Ballroom Dancing  
 B Bridge  
 C Creative Writing  
 D Website Design

- 7 Ian started saving in 1980 by putting money under his bed. He counted it every week and recorded his total savings. His graph looked like the one below.



Which of the diagrams below (not necessarily to the same scale) shows his weekly additions to his savings over the same period?



- 8 Jake's television set has broken and he wishes to replace it. Whenever he makes a purchase like this, Jake looks carefully at all the alternatives. He considers each possible set and decides on the one that is the very most he would pay for it, if no other set were available. From this maximum he subtracts the price he would have to pay for the set. He chooses to buy the item that gives him the biggest difference between the maximum he would pay and the price he has to pay.

His list of alternatives, together with the maximum he would pay for each, and the prices in the three stores he can visit, is given in the table below.

|                   | <i>Maximum prepared to pay</i> | <i>Price in store A</i> | <i>Price in store B</i> | <i>Price in store C</i> |
|-------------------|--------------------------------|-------------------------|-------------------------|-------------------------|
| <i>Ace View</i>   | \$500                          | \$200                   | \$300                   | \$250                   |
| <i>Bigsreen.1</i> | \$700                          | \$500                   | \$400                   | \$450                   |
| <i>Contrasto</i>  | \$900                          | \$550                   | \$600                   | \$599                   |
| <i>Defhigh 3D</i> | \$1000                         | \$1500                  | \$700                   | \$675                   |

Which television set should Jake buy?

- A Ace View  
 B Bigsreen.1  
 C Contrasto  
 D Defhigh 3D
- 9 The time on my clock has just changed to 03:45, showing four different digits.
- How long will it be until the next time the display shows four completely different digits, none of which are the same as those above?
- A 3 hours 12 minutes  
 B 9 hours 22 minutes  
 C 12 hours 22 minutes  
 D 12 hours 42 minutes

- 10 The train from Peru Terminal to Brownsville travels on the fast track through Marmalade Spa as far as Pigtown, and then winds slowly through the hills via Beeching Halt. The stations are approximately the same distance apart, and a simple scheme is used to set the prices for the tickets, which are the same in both directions.

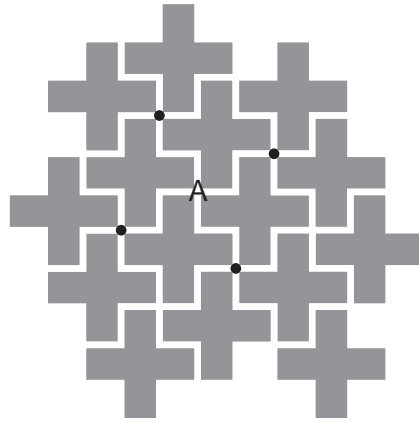
|                      | <i>Marmalade Spa</i> | <i>Pigtown</i> | <i>Beeching Halt</i> | <i>Brownsville</i> |
|----------------------|----------------------|----------------|----------------------|--------------------|
| <i>Peru Terminal</i> | \$21                 | \$40           | \$73                 | \$100              |
| <i>Marmalade Spa</i> |                      | \$19           | \$52                 | \$79               |
| <i>Pigtown</i>       |                      |                | \$33                 | \$60               |
| <i>Beeching Halt</i> |                      |                |                      | \$27               |

Which one of the following models is consistent with the ticket prices?

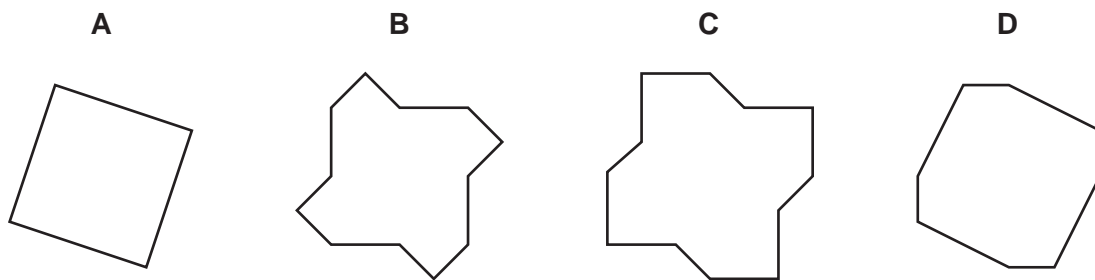
- A** The price depends only upon the distance travelled.
- B** The price depends only upon the time taken for the journey.
- C** The price comprises an amount for the distance travelled plus a single fixed fee for any travel on the fast track.
- D** The price comprises an amount for the time taken for the journey plus a fixed sum for journeys including Beeching Halt.



- 11 In the Cruxford Industrial Estate (see below), all the blocks of buildings (shaded) are cross-shaped. The roads between them are shown as white. The straight section of each edge of a cross is exactly 100 m long. The four dots shown are all the points exactly 500 m along the roads from point A and are arranged at the corners of a square.



If we made an equivalent set of dots for all points 500 m along the roads from A, which one of the following shapes could be made by joining them all?



- 12 In a school, precisely one ninth of the students study at least one musical instrument. Of these, exactly two thirds play a stringed instrument as their main instrument. Of those stringed-instrument players, one quarter play the viola. You may assume that any student who plays a musical instrument has one and only one 'main' instrument.

What is the smallest size that the school could be?

- A 36
- B 54
- C 108
- D 216

- 13 The members of Purlone knitting club decided recently to knit scarves to sell for charity. Their goal was to create a chain one kilometre in length along Purlone promenade by knotting the scarves together.

All 50 members of the club pledged to knit 10 scarves, each 2 metres long. This has now been successfully achieved, except that one member got confused and has only produced 2 scarves, but both are 10 metres long.

It has become clear, however, that **laying** the scarves end to end will be the only way to achieve one kilometre, because each knot in a chain of scarves would reduce the overall length by 40 centimetres.

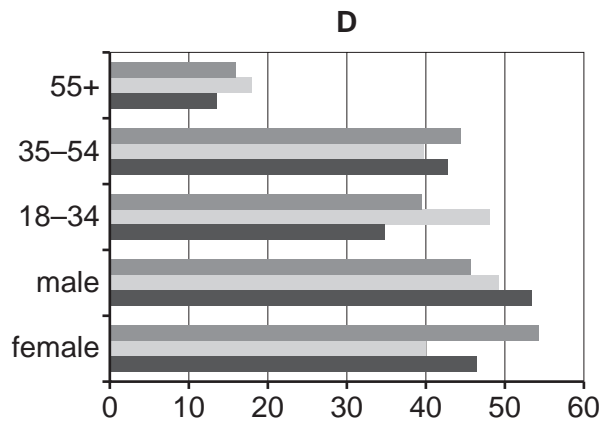
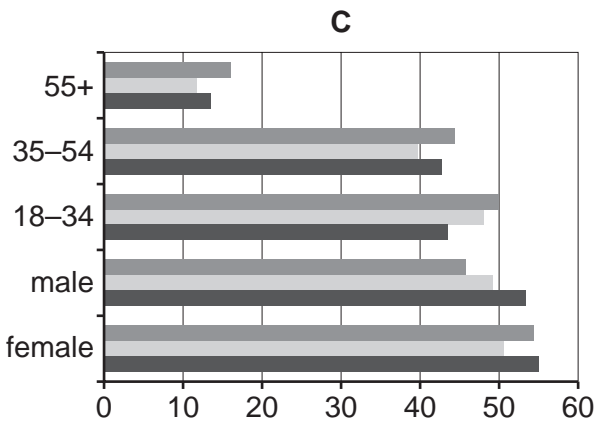
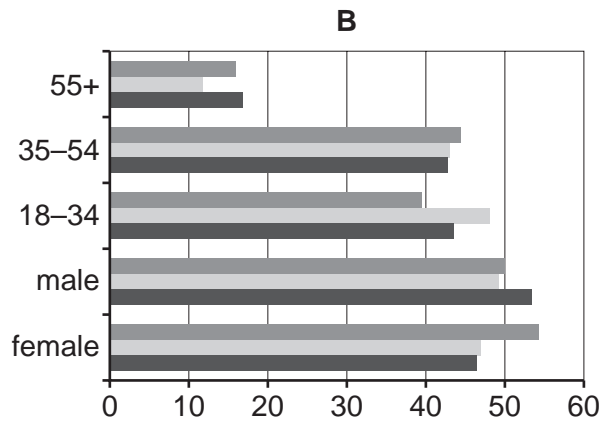
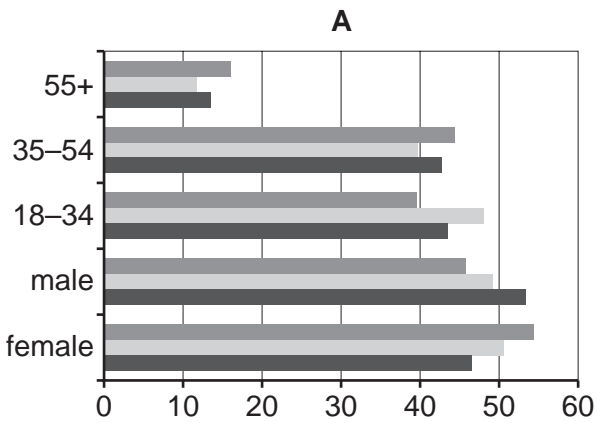
If Purlone knitting club were to make a knotted chain with their scarves, how far short of one kilometre would it be (to the nearest whole metre)?

- A 190 metres
- B 191 metres
- C 196 metres
- D 197 metres

14 The usage of 3 leading Internet search engines (Star, Pluto and Saturn) by different people was researched, and the data produced is shown below.

|        | Female (%) | Male (%) | 18 – 34 (%) | 35 – 54 (%) | 55+ (%) |
|--------|------------|----------|-------------|-------------|---------|
| Star   | 46.58      | 53.42    | 43.57       | 42.85       | 13.57   |
| Pluto  | 50.76      | 49.24    | 48.23       | 39.83       | 11.94   |
| Saturn | 54.26      | 45.74    | 39.53       | 44.49       | 15.99   |

Which one of the following charts correctly represents the data shown above?



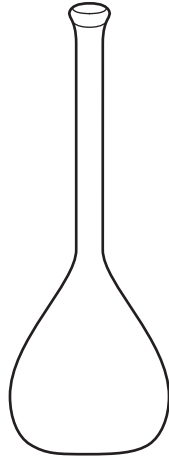
15 A club's football field has a playing area of 105 m x 70 m. Outside the playing area there is a surround, 5 metres wide, which is not used for play.

The club uses the playing area for junior games which are played on pitches of 34 m x 24 m but with 2 metres gap between them for safety.

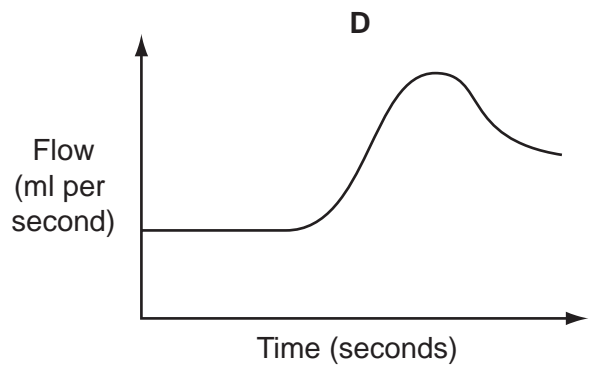
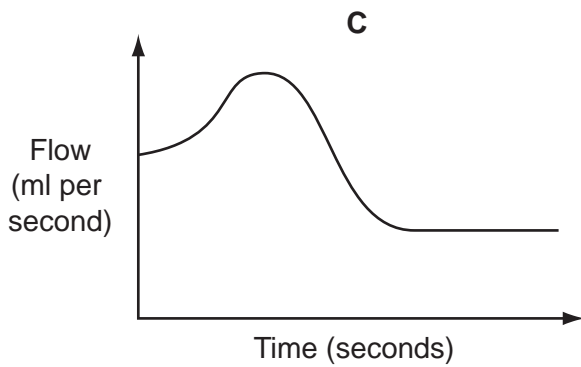
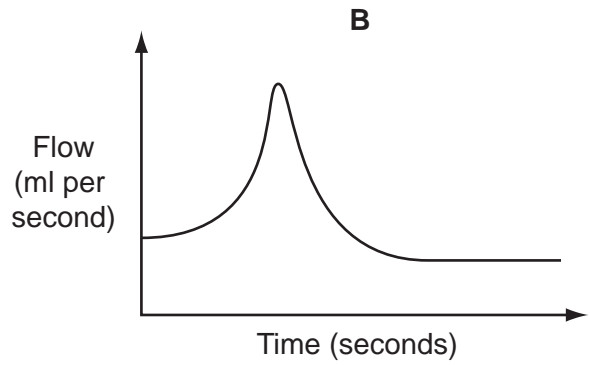
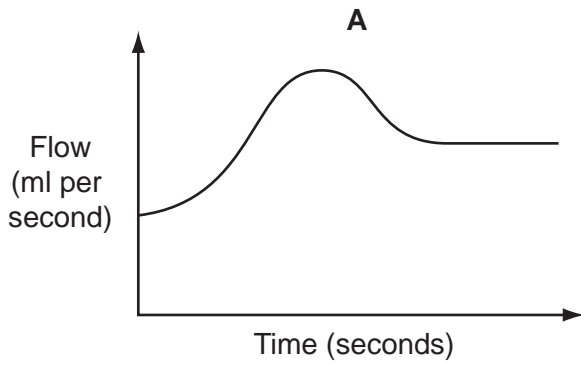
How many junior pitches can be fitted into the playing area?

- A 4
- B 6
- C 8
- D 9

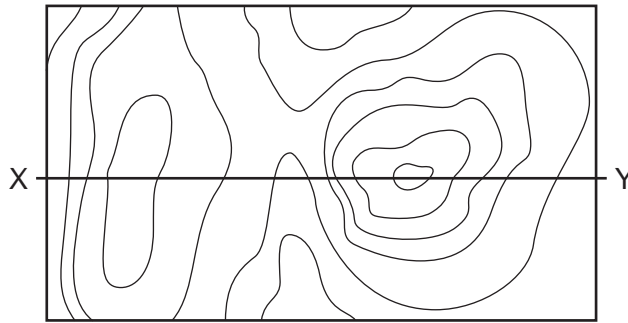
- 16 Having established the relationship between the height and the volume of liquid in a flask, a laboratory worker uses this information to calculate how he should regulate the flow of liquid into the flask so that the height of liquid rises at a constant rate.



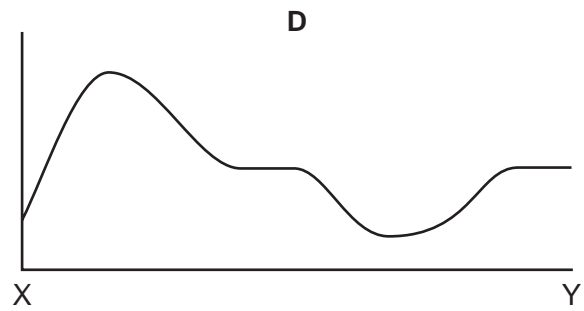
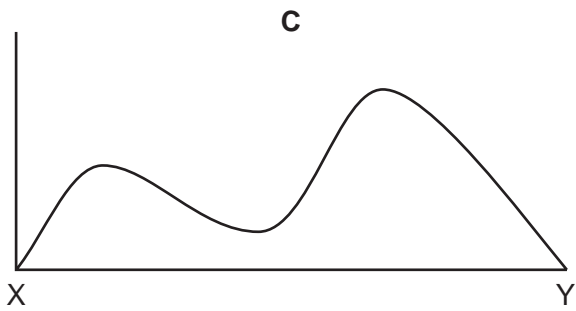
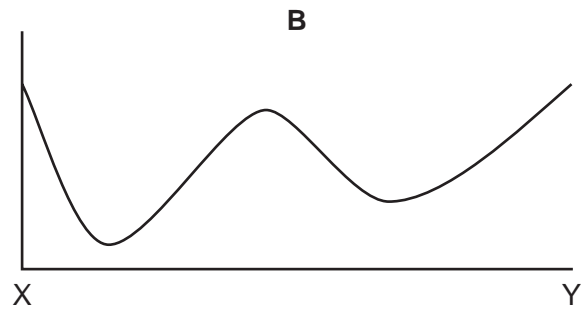
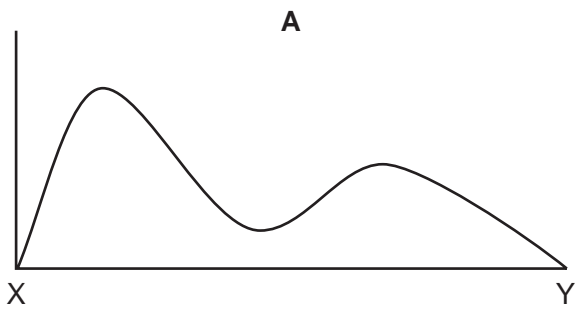
Which one of the following graphs best represents the planned flow of liquid?



17 The diagram below shows a map of the contour lines for a hilly area of the countryside. The contour lines are at the same height above sea level. The map shows contour 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 My four daughters all flew into Dallas airport yesterday.

Carol flew from San Francisco, where the local time is 2 hours behind Dallas. Her flight took 3 hours 20 minutes.

Martha flew from Boston, where the local time is 1 hour ahead of Dallas. Her flight took 4 hours 15 minutes.

Corinne flew from Denver, where the local time is 1 hour behind Dallas. Her flight took 1 hour 50 minutes.

Onora flew from Toronto, where the local time is 1 hour ahead of Dallas. Her flight took 3 hours 35 minutes.

All four flights departed at 11:30 local time.

What was the time interval between the first and last arrival of my daughters' flights at Dallas?

- A 1 hour 40 minutes
- B 2 hours 25 minutes
- C 2 hours 45 minutes
- D 3 hours 30 minutes

- 19 The number of new dwellings completed each quarter by a builder for 3 years is shown below.

| <i>Year</i>                 | <b>2008</b> |          |          |          | <b>2009</b> |          |          |          | <b>2010</b> |          |          |          |
|-----------------------------|-------------|----------|----------|----------|-------------|----------|----------|----------|-------------|----------|----------|----------|
| <i>Quarter</i>              | <b>1</b>    | <b>2</b> | <b>3</b> | <b>4</b> | <b>1</b>    | <b>2</b> | <b>3</b> | <b>4</b> | <b>1</b>    | <b>2</b> | <b>3</b> | <b>4</b> |
| <i>Bungalows</i>            | 7           | 12       | 14       | 9        | 6           | 10       | 13       | 4        | 5           | 8        | 12       | 3        |
| <i>Terraced houses</i>      | 6           | 9        | 11       | 7        | 9           | 12       | 17       | 7        | 10          | 16       | 19       | 9        |
| <i>Semi-detached houses</i> | 15          | 29       | 32       | 20       | 18          | 27       | 34       | 17       | 20          | 33       | 37       | 26       |
| <i>Detached houses</i>      | 8           | 14       | 16       | 13       | 9           | 16       | 19       | 12       | 24          | 27       | 27       | 21       |

How many more semi-detached houses were built in the second half of 2010 than were built in the first half of 2008?

- A 11
- B 19
- C 26
- D 41

- 20 I have just eaten the contents of a pot of fruit salad. It contained 5 pieces of melon, 3 strawberries, 3 pieces of apple and 2 pieces of orange.

The pot lists the ingredients by weight as:

|            |       |
|------------|-------|
| Melon      | (39%) |
| Strawberry | (24%) |
| Orange     | (19%) |
| Apple      | (18%) |

Which of the contents had the largest weight on average?

- A A piece of apple
  - B A piece of melon
  - C A piece of orange
  - D A strawberry
- 21 Many Mediterranean countries require all ceilings to be 3 m above the floor, which means that floor-to-ceiling curtains fit when moving from house to house since everywhere needs a 3 m 'drop'. When making curtains by sewing together lengths of material hanging vertically, it is important to get the repeats in the patterns to line up.

It is also necessary to allow an extra 12 cm of material on each drop to be used for the hems.

Which of the following pattern lengths would result in the least wastage of material for a curtain requiring six drops, if each drop is made from a single piece of material?

- A 25 cm
  - B 31 cm
  - C 32 cm
  - D 33 cm
- 22 Polly and Dolly have the same parents. Polly's son Wally is married to Dolly's daughter Molly. They have one daughter, Holly. Holly is constructing a family tree.

What is the largest possible number of great-great-grandparents that Holly will discover?

- A 6
- B 12
- C 14
- D 16

- 23 In a nursery school where all children stay for 4 years, the total numbers at the school have been as follows.

|      |    |
|------|----|
| 2006 | 40 |
| 2007 | 41 |
| 2008 | 38 |
| 2009 | 39 |

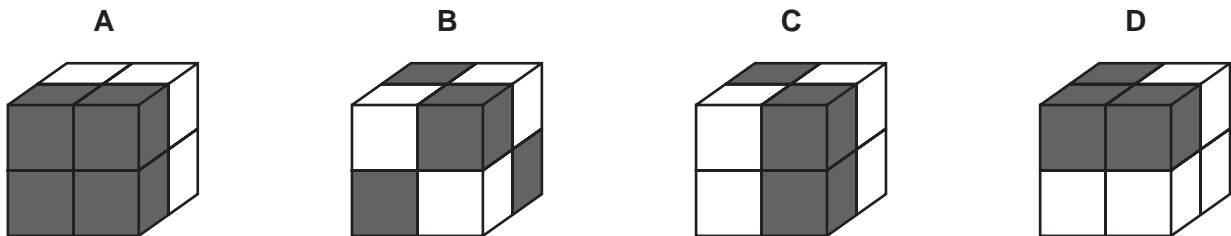
The school year runs from January to December and all new pupils are admitted in January. 11 children were admitted in 2005, 10 in 2006, 8 in 2007 and 9 in 2008. No children left before their due time.

How many children were admitted in 2009?

- A 9  
 B 10  
 C 11  
 D 12
- 24 A large cube can be built out of these four bricks. Each brick consists of two small cubes bonded together; each small cube is either all white or all black.



Which one of the following large cubes can **not** be built?





- 25 A system using satellites to determine location was intended to give a high precision measurement only to users who paid for a special key. Other users would get a measurement that would be one to which a random (whole) number between  $-3$  and  $+4$  had been added.

However, it was found that stationary devices could still obtain an accurate position with some patience.

The following measurements were taken by a stationary device which did not have the special key.

317429                  317426                  317431                  317433                  317431

What is the location of this device?

- A 317429
  - B 317430
  - C 317431
  - D 317432
- 26 Andrew works from 8.30 am to 5.00 pm each day, operating a machine that makes splindons. He is allowed a total of  $1\frac{1}{2}$  hours in breaks during the day.

First thing each morning, and after every break, the machine requires 6 minutes to warm up before any splindons can be made.

Andrew normally takes one  $1\frac{1}{2}$  hour break at lunchtime, and produces splindons at an average rate of 3 per minute.

Yesterday he tried a different routine. He had a 20 minute break mid-morning, a 50 minute lunch break and a 20 minute break mid-afternoon. The result was that he was able to keep up an average production rate of  $3\frac{1}{2}$  splindons per minute throughout the day.

How many more splindons did Andrew produce yesterday than he usually does?

- A 126
- B 162
- C 210
- D 246

- 27 The winner of each edition of *What's The Score?* has the opportunity to scoop the jackpot in the *Winning Score* game. To be successful, all 5 questions must be answered correctly. All 5 questions all have different numerical answers that add up to 20 altogether.

James is today's winner, and his *Winning Score* questions have been revealed, as follows.

How many legs does a lacewing have?

How many days of the week begin with the same letter of the alphabet in both French and German?

How many Oscars did Marilyn Monroe win?

How many points are awarded for a field goal in American football?

How many stars are there on the flag of Tuvalu?

James knows that a lacewing is an insect, and therefore has 6 legs, that Marilyn Monroe did not win any Oscars, and that 3 points are awarded for a field goal in American football. However, he has no idea at all of either of the other 2 answers, so he will have to guess.

Assuming that James doesn't make a silly mistake, such as giving 5 answers that don't add up to 20, what chance does he have of winning the jackpot?

- A 1 chance in 3
  - B 1 chance in 4
  - C 1 chance in 5
  - D 1 chance in 6
- 28 The retirement age in Bolandia will be raised from 66 to 67 over two years: every six months the minimum age will jump up by 3 months. Anyone over the retirement age on the date they apply will immediately get a free retired-person's bus pass.

How much **younger** could one person with a free retired-person's bus pass be than someone not able to get one?

- A It's not possible to be younger.
- B Just under 3 months.
- C Just under 6 months.
- D Just under 1 year.

- 29 Service S6 buses leave Orton every hour on the hour and Casford every hour on the hour. The buses travel to the other town 150 km away. The journey takes 3 hours and the buses then wait for an hour at each terminus before returning.

While Dennis is driving the bus to Casford, how frequently, on average, does he pass a bus going the other way?

- A Every 15 minutes
  - B Every 30 minutes
  - C Every 45 minutes
  - D Every 60 minutes
- 30 In Cameronia you pay no income tax on the first \$20 000 of your annual income. You have to pay 20% in tax of any income above \$20 000 and up to \$100 000, and you have to pay 40% in tax of any income above \$100 000. Edwina is a taxpayer in Cameronia.

Which of the following statements would **not** be sufficient by itself to enable the calculation of Edwina's income before she pays tax?

- A Edwina pays 20% of her total income in tax.
- B Edwina pays \$24 000 less than 40% of her total income in tax.
- C Edwina pays \$24 000 in tax.
- D Edwina's income after tax is \$96 000.

