**THINKING SKILLS** **9694/11**

Paper 1 Problem Solving **October/November 2015**

**1 hour 45 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.**

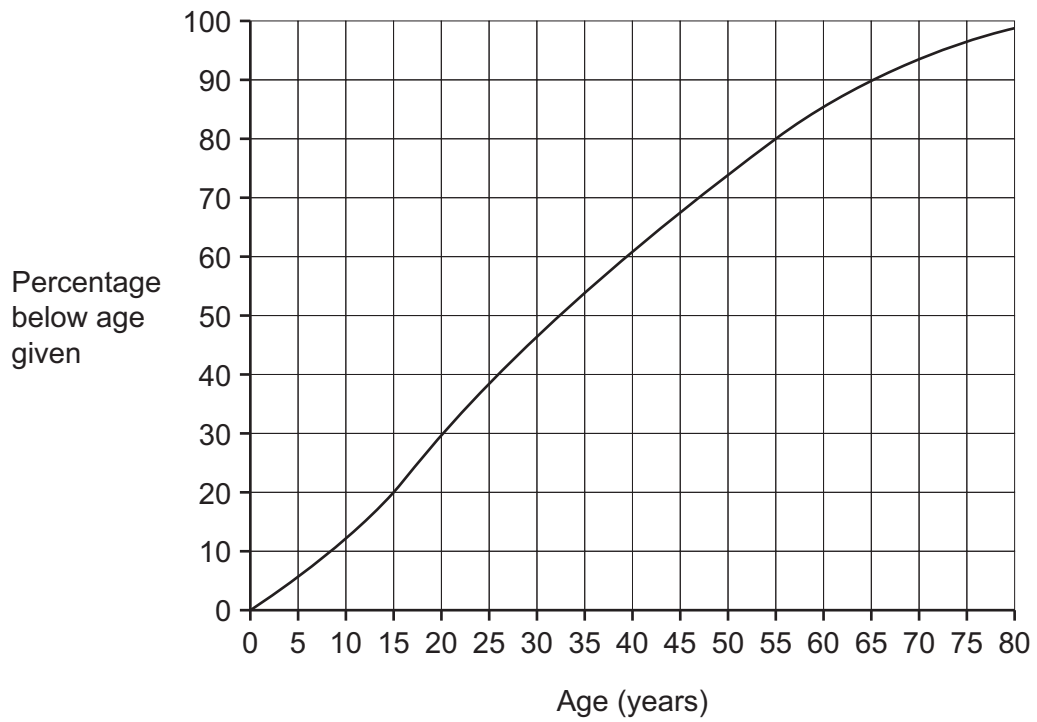DO **NOT** WRITE IN ANY BARCODES.

## INFORMATION FOR CANDIDATES

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
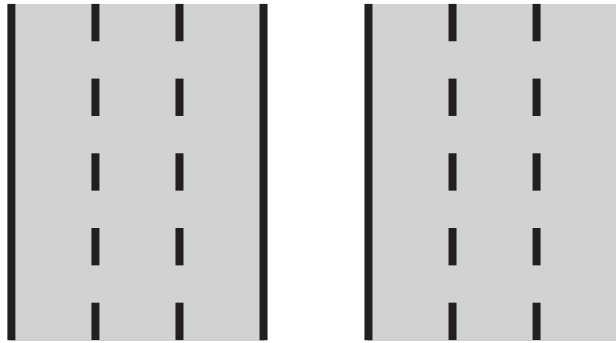
**[Turn over**

1   The graph below shows the cumulative distribution of ages in the Bolandian population.



Ashley realises that exactly 20% of the population are older than him. How old is he?

**A**   15 years

**B**   30 years

**C**   55 years

**D**   98 years

**2** A British 3-lane motorway has 2 carriageways with 3 lanes each; it would be called a 6-lane highway in America.

Each carriageway has a line of reflective paint on each edge, and broken lines painted between the lanes. The cost of paint for a kilometre of 2-lane motorway is $10 000 and for a 3-lane motorway it is $12 000.

What is the total cost of paint per kilometre for a 4-lane motorway?

**A**  $14 000

**B**  $15 000

**C**  $16 000

**D**  $20 000

**3** YOURCAB is a taxi firm. On a particular day it has bookings to collect four customers, one from each of four hotels, at 2 pm. The following table shows the time in minutes it will take each driver to get to each hotel.

| Driver | Hotel | | | |
|--------|-----|-------|-------|------|
|        | Inn | Villa | Lodge | Hall |
| Alan   | 5   | 3     | 4     | 2    |
| Bill   | 8   | 3     | 5     | 5    |
| Jean   | 2   | 5     | 3     | 6    |
| Sam    | 3   | 6     | 9     | 5    |

The manager pays each of the drivers $1 per minute for the time it takes to reach their customer.

What is the smallest amount he will have to pay the four drivers altogether?

**A**  $10

**B**  $11

**C**  $14

**D**  $16

4   There are only six teams in the Citrian Football League. They all play each other four times every season. Teams gain 5 points for a win, 2 points for a scoring draw (1 – 1, 2 – 2 etc.) and 1 point for a scoreless draw (0 – 0).

This is last season's final league table.

|  | Played | Won | Drawn | Lost | Points |
|---|---|---|---|---|---|
| *Tangerines* | 20 | 16 | 2 | 2 | 84 |
| *Pomelos* | 20 | 12 | 4 | 4 | 67 |
| *Lemons* | 20 | 10 | 3 | 7 | 54 |
| *Clementines* | 20 | 7 | 2 | 11 | 38 |
| *Oranges* | 20 | 3 | 5 | 12 | 23 |
| *Limes* | 20 | 2 | 4 | 14 | 16 |

How many of last season's league matches were **scoreless** draws?

A   4

B   6

C   8

D   10

5   The post at our house never seems to get delivered at the same time every day. The same van parks in the same place on our road at the same time each day, but the post can be anything between fifteen and fifty-five minutes after the van parks. The van always leaves after roughly an hour and a quarter.

Which one of the following best explains this variation?

A   The amount of post the postman has to carry varies from day to day

B   The postman walks at different speeds

C   The postman parks outside our house and delivers to us at the start or end of his round

D   The postman does not always choose the same route in making his deliveries

**6** Packaging for chocolates is in the form of a prism, as shown below. The prism is made by folding up card from a net.
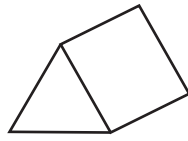
Which one of the nets below will **not** fold into the prism?

| A | B | C | D |
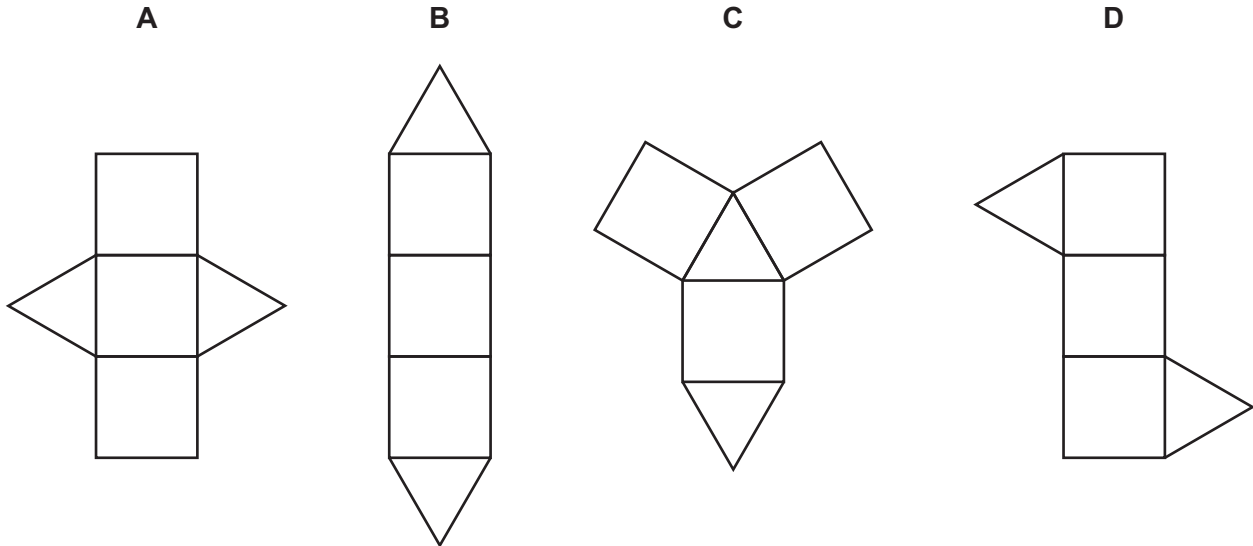
**7** James has to schedule five different activities for a group of businessmen. The table shows the activities that need to happen and the restrictions that exist.

| Activity | Duration | Comments |
|---|---|---|
| Introductory meeting | 60 minutes | Must be the first activity<br>Starts at 09:30 |
| Team-building | 60 minutes | One of the team-building and group work sessions must be in the morning and the other one must be in the afternoon |
| Group work | 90 minutes | |
| Presentation | 45 minutes | |
| Closing meeting | 30 minutes | Must be the last activity |

There will be a 15-minute break between sessions, except for lunch, which has already been organised to start at 12:30 and finish at 13:30. James wants the day to finish as early as possible.

At what time will the day's activities finish?

**A** 15:45

**B** 16:00

**C** 16:15

**D** 16:30

8   The following table shows the retail price index in the republic of Thatwormia in the 1960s (using 1959 as base year = 100).

| 1960 | 104 |
|------|-----|
| 1961 | 102 |
| 1962 | 105 |

| 1963 | 108 |
|------|-----|
| 1964 | 111 |
| 1965 | 110 |

| 1966 | 110 |
|------|-----|
| 1967 | 111 |
| 1968 | 113 |

| 1969 | 115 |
|------|-----|
| 1970 | 112 |

Which one of the following charts shows the movement of retail prices up and down each year during the decade?
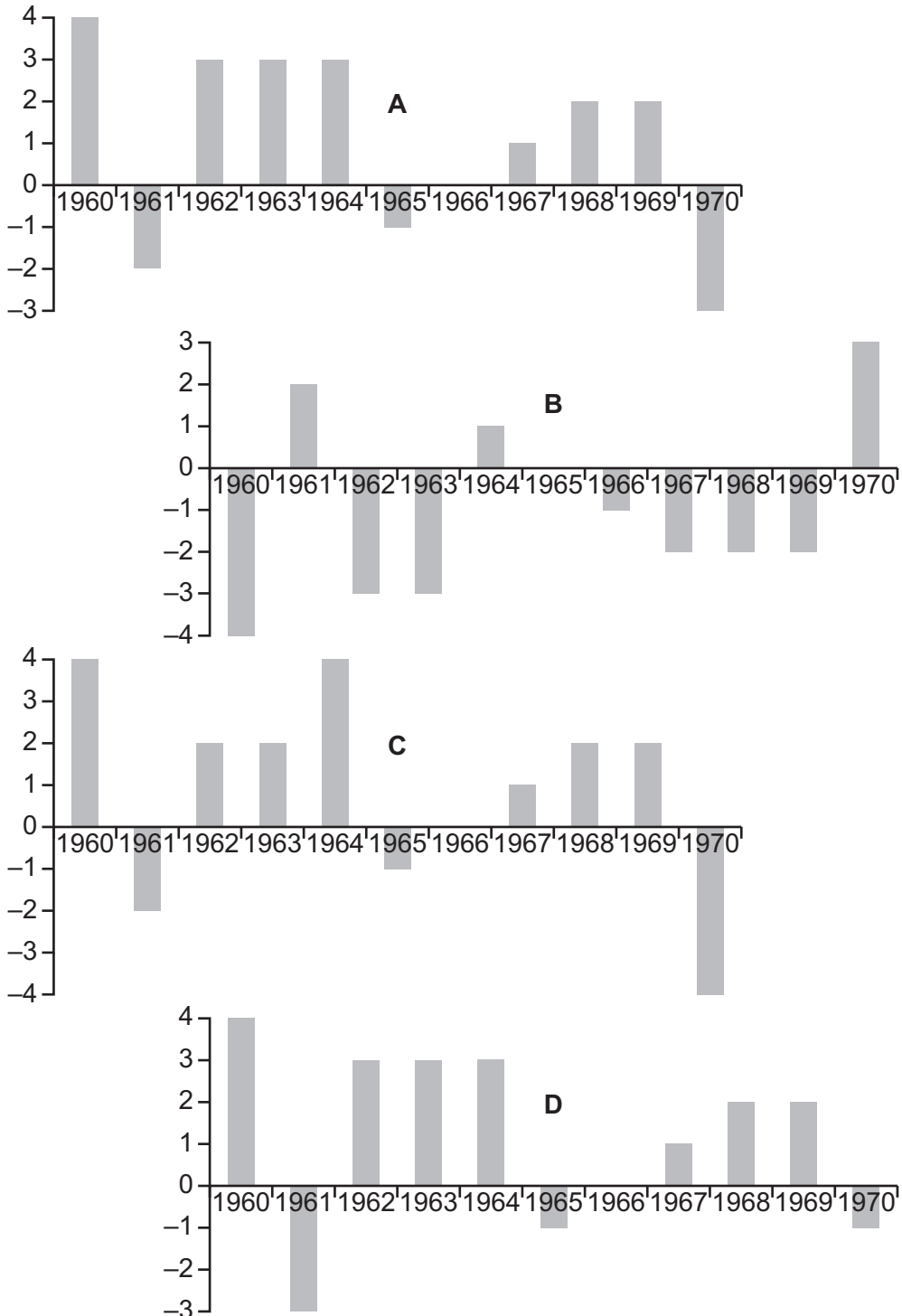
9   Two trains arrive in Barking Junction at the same time. One is an express from London and the other is a local branch line train from a nearby market town. The express travels along the main line at an average speed of 90 km/h. With the narrow single track, and many stations, the branch line train averages 35 km/h. The express train leaves London at 9.30 am.

What further piece of information is sufficient to determine the two trains' time of arrival at Barking Junction?

**A**   The branch line train's departure time

**B**   The distance between London and Barking Junction

**C**   The number of stations on the branch line

**D**   The number of stops made by the express

10   Below is an alpha-numeric keypad.

| 1<br>.?! | 2<br>abc | 3<br>def |
|---|---|---|
| 4<br>ghi | 5<br>jkl | 6<br>mno |
| 7<br>pqrs | 8<br>tuv | 9<br>wxyz |
| | 0<br>space | |

Each letter is obtained by pressing the relevant button a number of times.
For example, f = 3+3+3 and k = 5+5.
No predictive text function is being used.

John wishes to write the word *success*.

What is the sum of all the necessary button-presses?

**A**   36

**B**   90

**C**   118

**D**   145

**11** Walter is attempting to cycle the 1800 kilometres from Penvic to Cavmar in 15 days. In the first 6 days he has averaged 90 kilometres per day.

What is the minimum that Walter must average during the rest of his ride if he is to achieve his target?

- **A** 120 kilometres per day

- **B** 140 kilometres per day

- **C** 150 kilometres per day

- **D** 210 kilometres per day

**12** A walking route is described as follows:

> **Three Valleys Ramble**
> Length 7.2 km
>
> Start at car park, follow sign-posted footpath steadily uphill until just above the woods; at 1.6 km, the path levels out and follows the 340 m contour for 2.6 km. After 4.2 km follow grassy path downhill as it becomes steeper and stonier. At 5.6 km the 150 m contour is reached. Follow footpath steeply uphill for 0.5 km, where it levels out for 0.5 km before descending sharply into the valley and the route's end.

John decides to walk this route in the reverse direction. Which of the following cross-sections could show the route he followed?

**A**

**B**

**C**

**D**
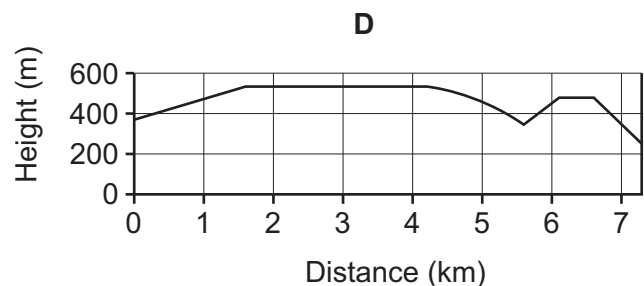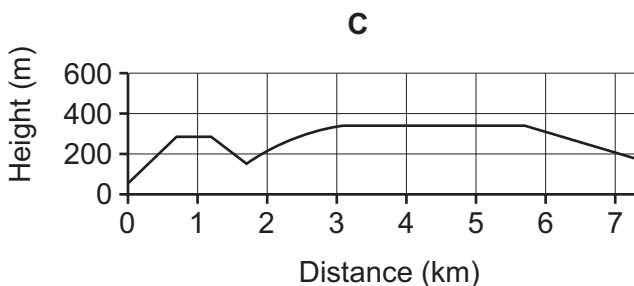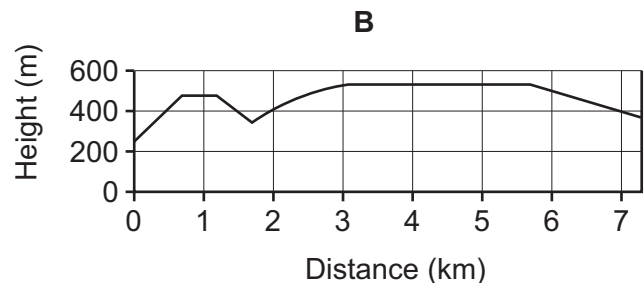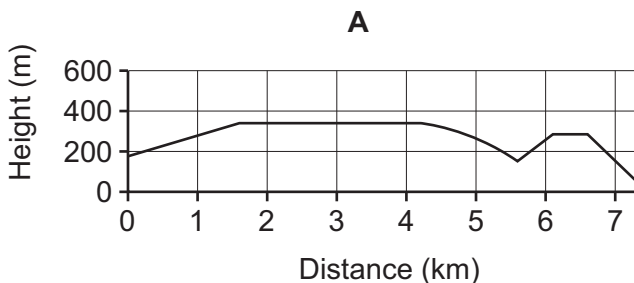
**13** At a wedding, five people sit around a circular table.
In between courses, the guests get up to fetch more drinks.
When they sit down again, they must sit so that no one is next to anyone they have sat next to before.

What is the maximum number of courses that there can be?

**A** 2

**B** 4

**C** 5

**D** 6

**14** Bill and Daphne are going on holiday to Prapest. When on holiday they always stay in different hotels, and always look, in advance of booking, at a website that gives customers' ratings of the possible hotels. The table below shows these ratings, and the price of a single room, for hotels in Prapest that have rooms available.

| Hotel | Situation | Comfort | Service | Food | Amenities | Price per night ($) |
|---|---|---|---|---|---|---|
| Albany | 4.0 | 3.0 | 4.0 | 3.0 | 5.0 | 90 |
| Belle Vue | 4.5 | 3.5 | 3.5 | 5.0 | 3.5 | 95 |
| Charles | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 100 |
| Dumbarton | 4.0 | 4.0 | 4.0 | 3.5 | 4.5 | 105 |
| Eagle | 4.0 | 5.0 | 2.5 | 4.0 | 4.0 | 110 |
| Fitzroy | 5.0 | 4.0 | 4.0 | 3.5 | 3.5 | 115 |
| Grace | 3.5 | 4.5 | 4.5 | 4.5 | 4.5 | 120 |
| Highlife | 5.0 | 3.5 | 5.0 | 2.5 | 5.0 | 125 |

Daphne will only stay in hotels that score at least 4 in three different aspect ratings including "situation", and with a total score from the five aspects of at least 20. Bill simply demands that his hotel should be rated at least 4 in "comfort", "food" and "amenities".

What is lowest price per night that Bill and Daphne could pay in total, and stay in different hotels that satisfy their individual requirements?

**A** $195

**B** $200

**C** $205

**D** $210

15 Tom is flying to Rome for the weekend. His flight is scheduled to arrive on Saturday at 08:23 and to leave on Sunday at 23:50. When in Rome, he will use a shuttle bus each way between the airport and the city centre. The shuttle bus timetable is as follows:

Airport to Centre of Rome

| Depart | 08:00 | 08:20 | 08:40 | 09:00 | 09:20 | 09:40 | 10:00 |
|--------|-------|-------|-------|-------|-------|-------|-------|
| Arrive | 08:25 | 08:45 | 09:05 | 09:25 | 09:45 | 10:05 | 10:25 |

Centre of Rome to Airport

| Depart | 20:10 | 20:30 | 20:50 | 21:10 | 21:30 | 21:50 | 22:10 |
|--------|-------|-------|-------|-------|-------|-------|-------|
| Arrive | 20:35 | 20:55 | 21:15 | 21:35 | 21:55 | 22:15 | 22:35 |

His arrival in Rome has been delayed by 45 minutes. It will take him 30 minutes to collect his bags and clear customs on arrival. The airline requires him to be at the airport at least 2 hours before his return flight is scheduled to leave.

What are the times of the buses he will take to and from the city centre?

A   08:40 and 21:10

B   08:40 and 21:30

C   09:40 and 21:10

D   09:40 and 21:30

16 A nurse has to visit four patients – a baker, a teacher, a painter and a gardener – in their homes every day. The diagram below shows the distances, in kilometres, between their houses. The nurse starts and finishes at her own house.
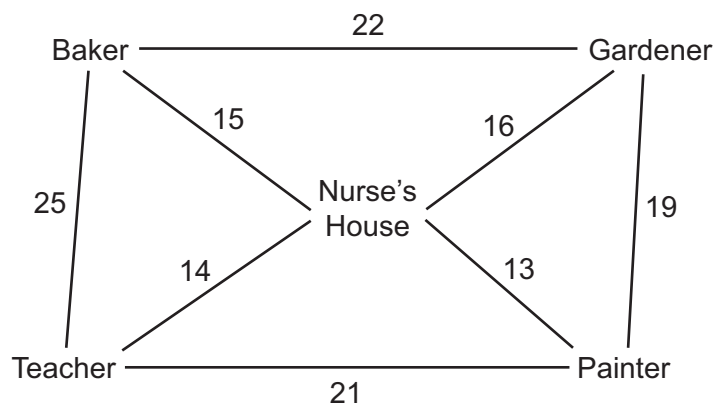


What is the shortest distance she could travel to visit all four patients and return home?

A   90 km

B   91 km

C   93 km

D   96 km

17 The table below is used by a farmer to monitor the variation in the price of beef. It contains the current price per kg and the change in price per kg in the last 7 days.

| Beef | Current price (¢/kg) | Price change (¢/kg) |
|---|---|---|
| Topside | 985 | 85 |
| Sirloin steak | 2092 | −50 |
| Rump steak | 1457 | 71 |
| Fillet steak | 3253 | 600 |
| Diced stewing steak | 848 | 8 |
| Braising steak | 878 | −16 |
| Premium mince | 444 | −50 |

Which two of the meats had the greatest percentage change in price in the last 7 days?

A   Topside and fillet steak

B   Topside and premium mince

C   Sirloin steak and fillet steak

D   Fillet steak and premium mince

**18** George is a car salesman and he records information about his monthly sales on his computer. Unfortunately, his computer has malfunctioned and the only information that he can find is an unlabelled pie chart and four tables of monthly figures. He knows that the pie chart relates to the numbers of cars sold in the first six months of 2014 and that the tables relate to the first six months of the years 2011, 2012, 2013 and 2014, in some order.
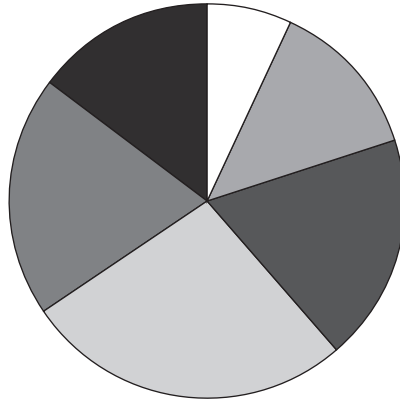


Which of these tables could represent the 2014 figures?

**A**

| Month | January | February | March | April | May | June |
|---|---|---|---|---|---|---|
| Number of cars sold | 10 | 36 | 60 | 38 | 20 | 20 |

**B**

| Month | January | February | March | April | May | June |
|---|---|---|---|---|---|---|
| Number of cars sold | 11 | 36 | 48 | 49 | 25 | 14 |

**C**

| Month | January | February | March | April | May | June |
|---|---|---|---|---|---|---|
| Number of cars sold | 12 | 47 | 35 | 24 | 37 | 25 |

**D**

| Month | January | February | March | April | May | June |
|---|---|---|---|---|---|---|
| Number of cars sold | 22 | 36 | 34 | 35 | 25 | 27 |

**19**
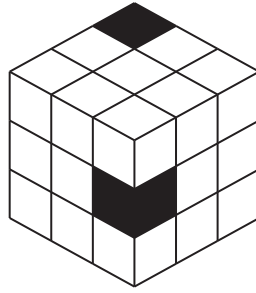


This is a paperweight made up of 24 white cubes and 3 black cubes. The black cubes are positioned in such a way that on each face of the paperweight exactly one of the nine squares is black.

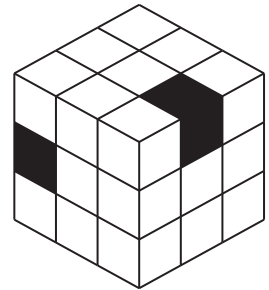Which one of the following could **not** be the appearance of the paperweight from any direction?
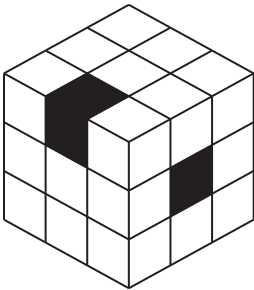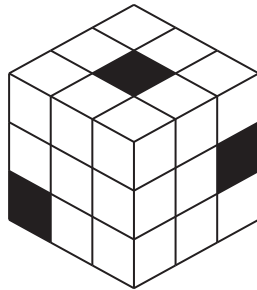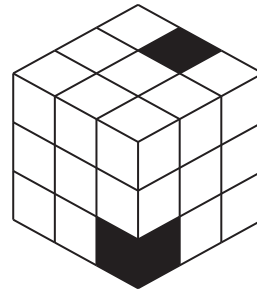
| A | B | C | D |
|---|---|---|---|

**20** Fred does not drive and so he regularly uses taxis. There are three local taxi firms – Quickhops, Big Green Taxis and Simply Cars. For each journey, Fred always chooses the firm that will cost him the least.

Quickhops charges $10 per journey, plus $0.50 for every kilometre.
Big Green Taxis charges $20 for a journey up to 20 km, then an additional $0.25 for each further kilometre.
Simply Cars charges $30 per journey, regardless of the distance.

Which of the following graphs represents the amount that Fred pays for taxi journeys over different distances?

**A**

Cost

**B**

Cost

**C**

Cost

**D**

Cost
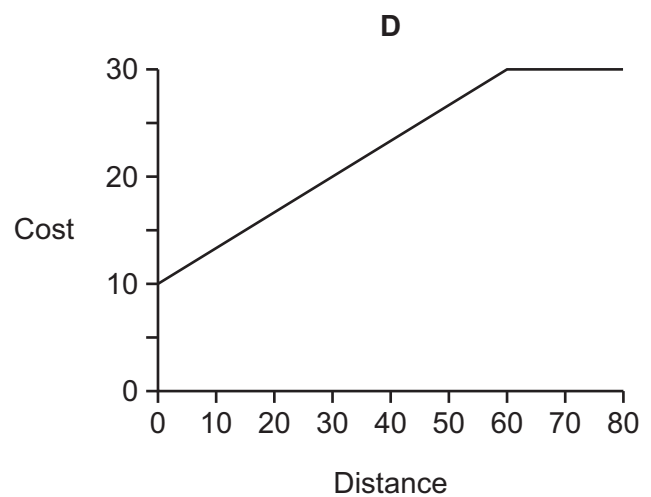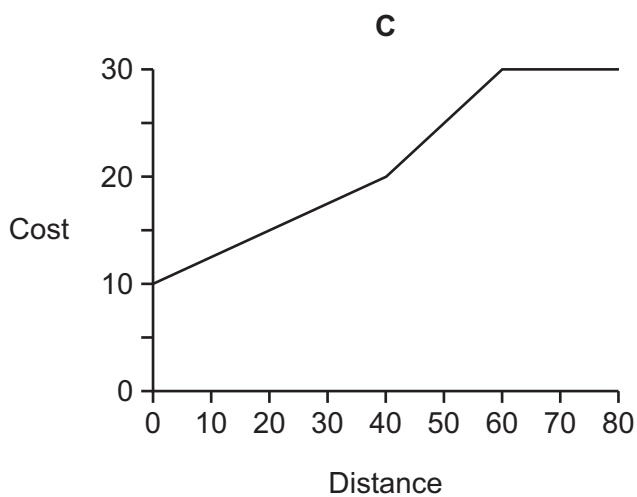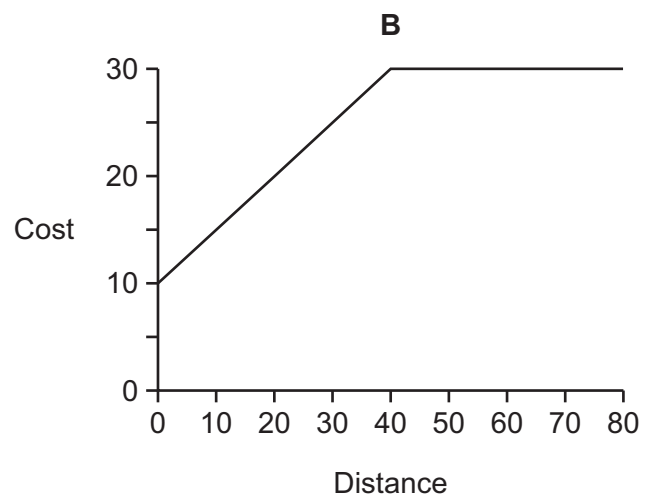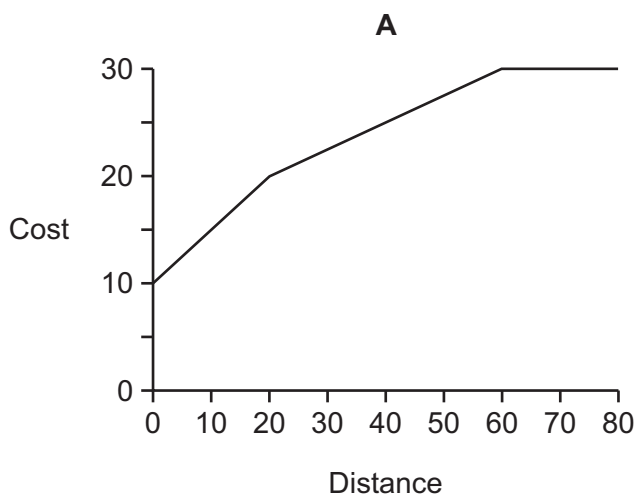
**21** Yvonne needs to book an appointment to see the doctor this week. She works every day from Monday to Friday from 9 am until 6 pm, apart from Wednesday when she finishes work at 3 pm. She is able to take a one-hour lunch break each day, but it must not start before 11.30 am or finish after 2 pm. It takes Yvonne 10 minutes to travel between her work and the doctor's surgery.

Yvonne wants to book the appointment to keep the amount of time that she is away from work when she should be working as small as possible. She has been offered one of four possible appointment times. They are: Tuesday at 2.10 pm; Wednesday at 11.10 am or 1.40 pm; or Thursday at 3 pm. The appointment will last for 30 minutes.

Which of the appointments should Yvonne choose?

**A** Tuesday 2.10 pm

**B** Wednesday 11.10 am

**C** Wednesday 1.40 pm

**D** Thursday 3 pm

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

While Dennis is driving the bus to Casford, how frequently, on average, does he pass an S6 bus going the other way?

**A** Every 15 minutes

**B** Every 30 minutes

**C** Every 45 minutes

**D** Every 60 minutes

**23** I took part in a quiz last night. There were 40 questions. Each correct answer scored 2 points, with 1 point deducted for every wrong answer. There was no penalty for questions that were not attempted.

The winning team scored 57 points. The runners-up scored 54 points, despite having 2 more correct answers than the winners.

How many wrong answers did the runners-up have?

**A** 6

**B** 7

**C** 8

**D** 9

**24** A company decides to give bouquets of flowers to its top 15 female employees. Each bouquet is to consist of 10 cream roses and 2 lilac roses. The roses are supplied by a garden nursery in boxes containing only cream roses and lilac roses. Each box contains at least 30 roses and at most 36 roses in total. The nursery is able to guarantee that each box contains at least 8 lilac roses and at most 12 lilac roses.

What is the minimum number of boxes of roses that the company needs to buy in order to ensure that it has a sufficient number of each colour of rose to make the required bouquets?

**A**  4

**B**  6

**C**  7

**D**  9

**25** A company employs 6 people to make wooden toys. The day is split into three sessions.

The morning session lasts for 2 hours and in this time all of the workers carve toys. The second session lasts for 4 hours. During this session each worker either continues to carve toys or paints some of the toys that have already been carved. For the whole of this 4-hour period each worker is assigned just one of these tasks. The final session lasts for 2 hours and in this time all of the workers paint toys. At the end of the day every toy that has been carved has also been painted. It takes twice as long to paint a toy as it does to carve a toy.

How many workers continue to carve toys in the middle session of the day?

**A**  1

**B**  2

**C**  3

**D**  4

**26** Detinu United have played 7 matches so far this season in the Palindrome Football League. They have scored a total of 11 goals in these matches, despite failing to score in two of them. They have scored 2 goals in a match more often than any other number of goals (including 0).

Which one of the following additional pieces of information is **not** sufficient by itself to enable deduction that Detinu United must have scored 0 goals twice, 1 goal once, 2 goals three times and 4 goals once?

**A**  Their highest score has been 4 goals

**B**  They have scored more than 2 goals once

**C**  They have scored 1 goal once

**D**  They have scored 2 goals three times

**27** Carla runs a shop which sells bridal accessories. She currently has orders for 27 wedding dresses. She employs two dressmakers, one of whom takes 4 days to make a dress and the other takes 7 days. They never share work on one dress.

What is the shortest time it can take until all the current orders are fulfilled?

**A**   36 days

**B**   70 days

**C**   76 days

**D**   98 days

**28** Clive and Dan are training for the Bolandia cycling marathon. They cycle along the road between the villages of Arton and Borton.  These villages are 6 km apart.  Each Saturday at 12 noon, Clive starts from Arton and cycles at 20 km/h and Dan starts from Borton and cycles at 16 km/h. Each time either cyclist reaches Arton or Borton he turns round immediately and goes back along the road to the other village.

How far is Clive from Arton when he passes Dan for the **third** time?

**A**   $1\frac{1}{2}$ km

**B**   2 km

**C**   $3\frac{1}{3}$ km

**D**   $4\frac{2}{3}$ km

**29** The graph below shows the predicted currency exchange rates against the US dollar for the first 5 months of next year. For example, 100 USD will buy 77 GBP in April next year.
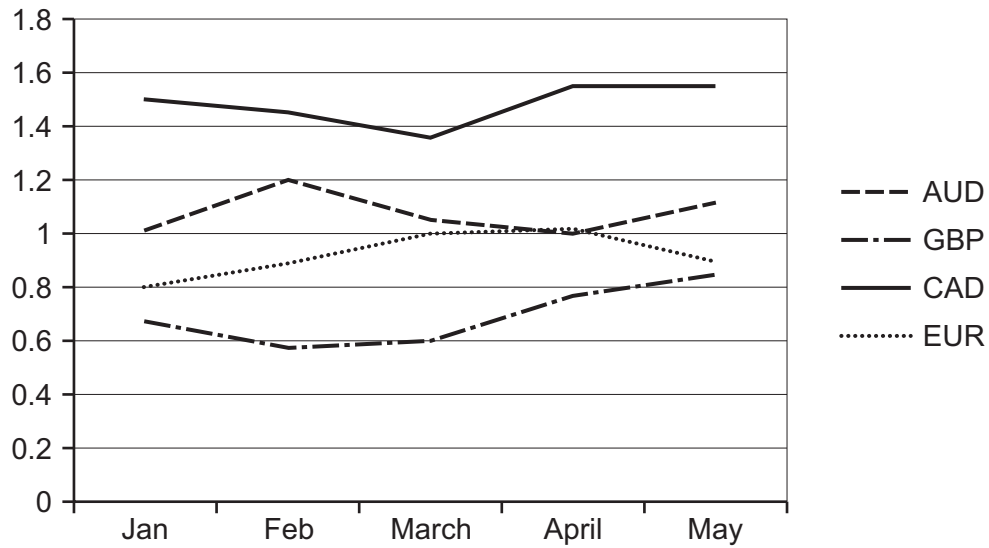


Jeremy has some USD, and wishes to end up with more.

Which of the following strategies would make the most profit?

**A** Buy GBP in January and sell it back in May

**B** Buy AUD in January, sell in February buy EUR, sell in March buy CAD, sell in April buy AUD, sell AUD in April

**C** Buy CAD in January, sell in February buy AUD, sell in March buy EUR, sell in May

**D** Buy GBP in January, sell in February buy AUD, sell in April buy EUR, sell in May

**30** In the middle of the foyer of Hotel Plus there is a sculpture that is a single piece of cast aluminium. Its design is such that, when viewed square-on from the side, its two-dimensional appearance is H from two directions and + from the other two directions.

When guests enter the hotel, their immediate view of the sculpture is as follows:
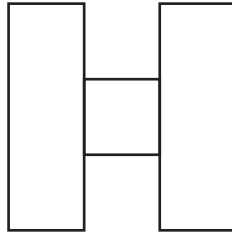
Anyone who walks clockwise around it will subsequently see (in order):
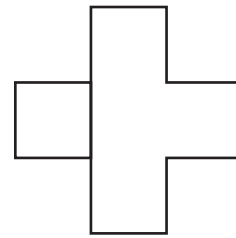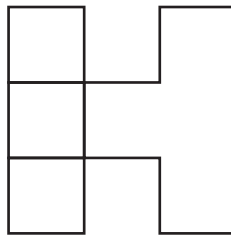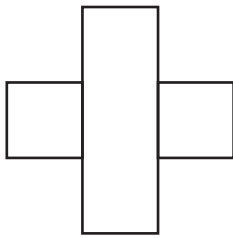
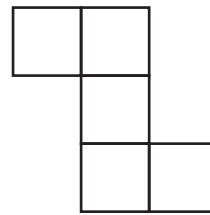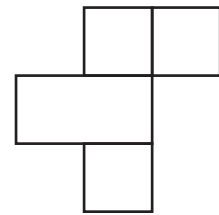Which one of the following is a two-dimensional view of the sculpture from directly above?

|   A   |   B   |   C   |   D   |
|-------|-------|-------|-------|

**20**

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