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**THINKING SKILLS**

**9694/12**

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)

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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**

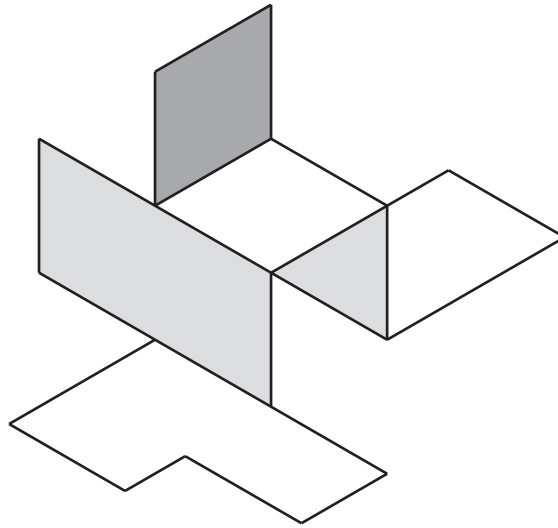
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

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



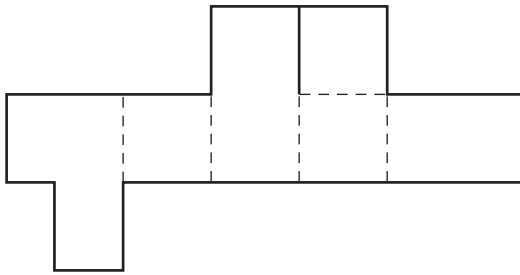
- 1 A piece of card is made into the three-dimensional form shown below.



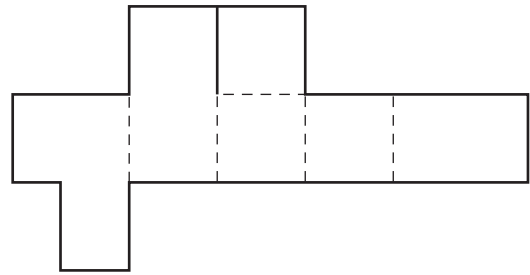
In the diagrams below, cuts are indicated by solid lines and folds by dashed lines.

Which of the following pieces of card could be made into the form above?

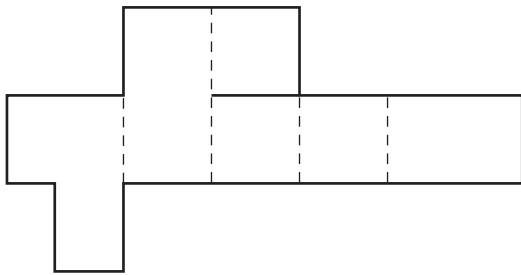
**A**



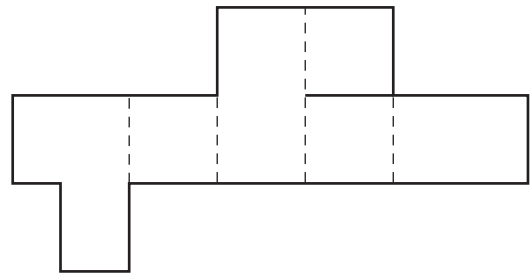
**B**



**C**



**D**



- 2 The Quiver family are planning to spend two consecutive days in Stratford to go to the theatres there. They are determined to see all four plays currently being presented. The weekly timetable of plays is in the table below.

| <b>Royal Shakespeare Theatre</b>               | <i>Sun</i> | <i>Mon</i> | <i>Tue</i> | <i>Wed</i>         | <i>Thu</i> | <i>Fri</i> | <i>Sat</i>         |
|--|------------|------------|------------|--------------------|------------|------------|--------------------|
| <i>Julius Caesar</i><br>(duration 150 minutes) |            | 7.15 pm    | 7.15 pm    | 1.15 pm<br>7.00 pm | 7.15 pm    | 7.15 pm    | 1.15 pm<br>7.15 pm |
| <b>Swan Theatre</b>                            |            |            |            |                    |            |            |                    |
| <i>In a Pickle</i><br>(duration 60 minutes)    | 1.30 pm    | 1.30 pm    |            |                    | 1.30 pm    |            | 1.30 pm            |
| <i>Richard III</i><br>(duration 180 minutes)   |            |            | 7.30 pm    |                    | 7.30 pm    |            | 7.30 pm            |
| <i>King John</i><br>(duration 160 minutes)     |            | 7.30 pm    |            | 1.30 pm<br>7.30 pm |            | 7.30 pm    |                    |

Which two days should the family spend in Stratford?

- A Monday and Tuesday  
 B Wednesday and Thursday  
 C Thursday and Friday  
 D Friday and Saturday
- 3 I normally catch the 08:19 bus to work in the morning. Yesterday, I thought that I had arrived at the bus stop 2 minutes too late and would have to wait for the later bus. However, my watch turned out to be 6 minutes fast and the 08:19 bus was running 3 minutes late.

How long did I wait at the bus stop yesterday morning?

- A 5 minutes  
 B 7 minutes  
 C 9 minutes  
 D 11 minutes

- 4 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 is 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
- 5 Bus routes 27, 37, and 47 all stop at Ferguson Square. Hamish was sitting in the square for some time and noted the order in which they arrived. Sometimes more than one bus arrived at the same time. The order was:

|    |    |    |    |    |    |    |  |    |    |
|----|----|----|----|----|----|----|--|----|----|
|    | 27 | 27 | 27 |    | 27 | 27 |  | 27 | 27 |
| 37 |    | 37 |    | 37 |    |    |  | 37 | 37 |
|    |    | 47 |    |    |    |    |  | 47 |    |

On all the routes the buses are scheduled to arrive at regular intervals, and they always keep to the timetable.

Which one of the following would explain the observed order?

- A** The number 27 arrives at 5-minute intervals, the 37 at 10-minute intervals, and the 47 every 20 minutes.  
**B** The number 27 arrives at 6-minute intervals, the 37 at 10-minute intervals, and the 47 every 20 minutes.  
**C** The number 27 arrives at 9-minute intervals, the 37 at 15-minute intervals, and the 47 every 40 minutes.  
**D** The number 27 arrives at 9-minute intervals, the 37 at 20-minute intervals, and the 47 every 30 minutes.

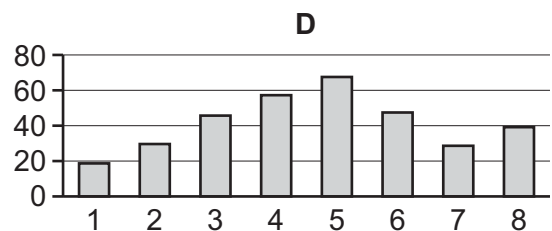
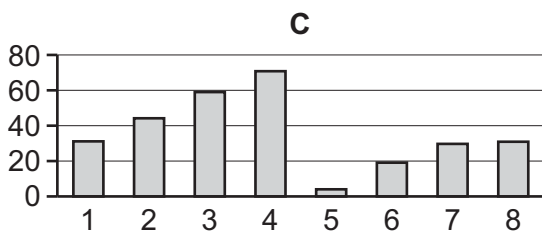
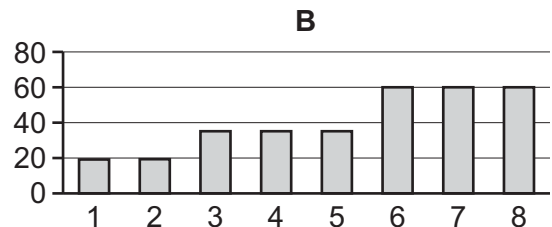
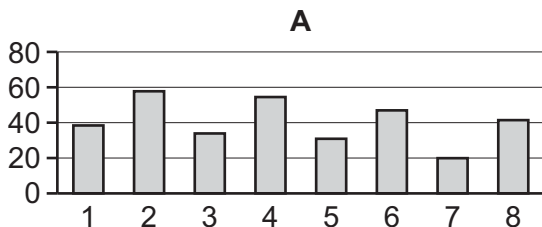
- 6 Four supermarkets are in competition and regularly have special offers on basic food products as a way of attracting customers. The latest promotion of special offers features 500-gram pots of yoghurt.



Which supermarket's special offer will give the customer the lowest price per 500-gram yoghurt pot?

- A ASCO  
 B MORRISBY  
 C SAINSONS  
 D TESDA
- 7 Financial services usually have a disclaimer that "past performance is no indicator of future returns", yet they also advertise using past performance.

Which one of the following graphs is **not** consistent with the claim that "in most years the value of our unit bond has increased by over \$10"?

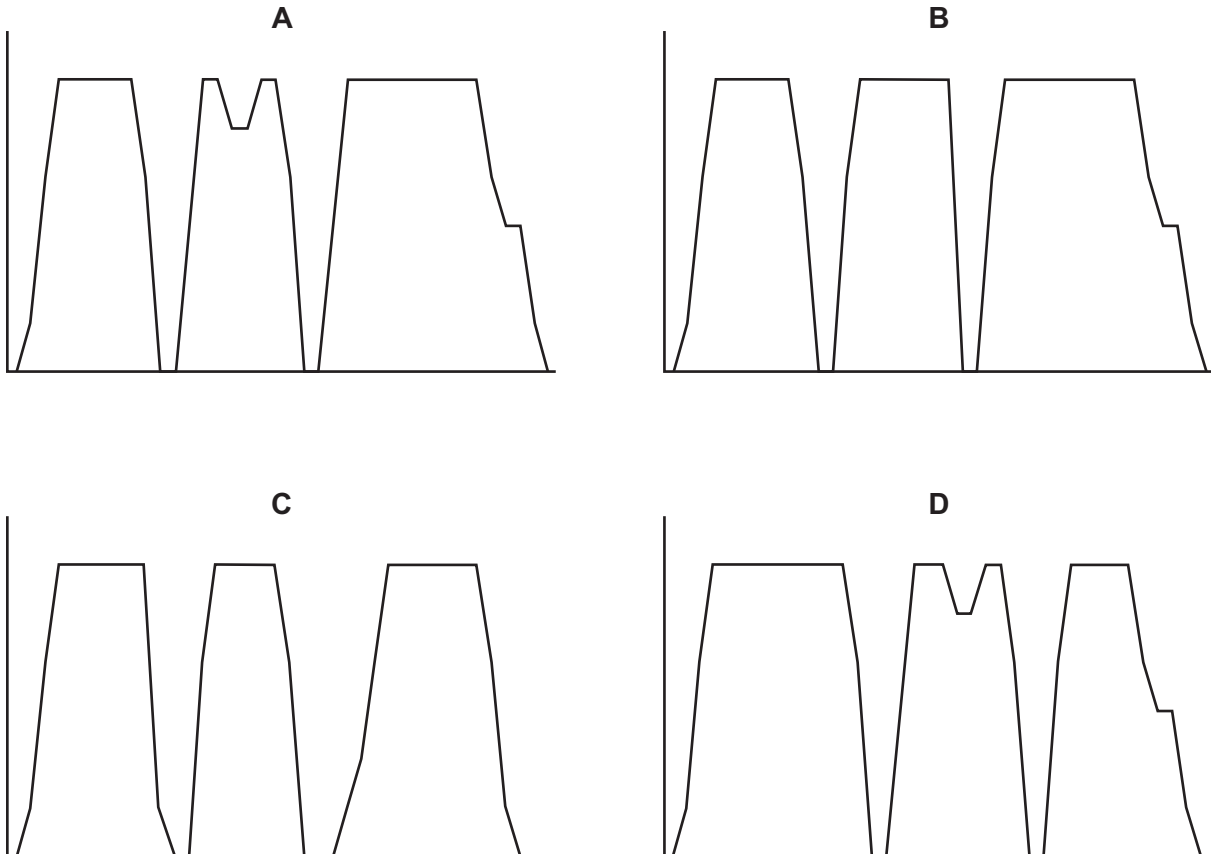


- 8 Al-Jolson Airways runs a scheduled flight from Marseilles to Cairo, stopping at Palermo and Benghazi, every day.

The plane takes off from Marseille at 08:00, and arrives at Palermo an hour later. After a 10-minute stop it takes off again and then lands at Benghazi at 10:00, where it takes 10 minutes to refuel before taking off for Cairo. It finally lands at Cairo at 11:30.

The aeroplane normally flies at 600 km/h, but on today's flight the pilot encountered turbulence and had to slow down to 500 km/h for 15 minutes. The plane was delayed in the approach to Cairo and had to circle at 300 km/h for 10 minutes before landing.

Which of the following graphs best represents the aeroplane's speed during the journey?



- 9 Two of the edges of Mae's rectangular lawn measure 7 metres.

Which one of the following further pieces of information about Mae's lawn would **not** be sufficient by itself to determine how long the other two sides are?

- A The area of the lawn in square metres is numerically equal to its perimeter in metres
- B The length of the lawn is 2.5 times its width
- C The mean of the length and the width of the lawn is 4.8 metres
- D The perimeter of the lawn is 19.2 metres

- 10 Abdullah needs to take a bus to Lahore, which leaves once an hour from his hometown. Nobody in his family knows at exactly how many minutes past the hour the bus is scheduled to depart.

Aisha is sure that the number is such that, if it were divided by 3, the remainder would be 2. Sharif is certain that the number is such that, divided by 4, there would be a remainder of 3. Abdullah's father has no doubt that the number of minutes is a multiple of 5.

Assuming that they have all given correct information, at how many minutes past the hour does the bus depart?

- A 5
- B 15
- C 35
- D 55

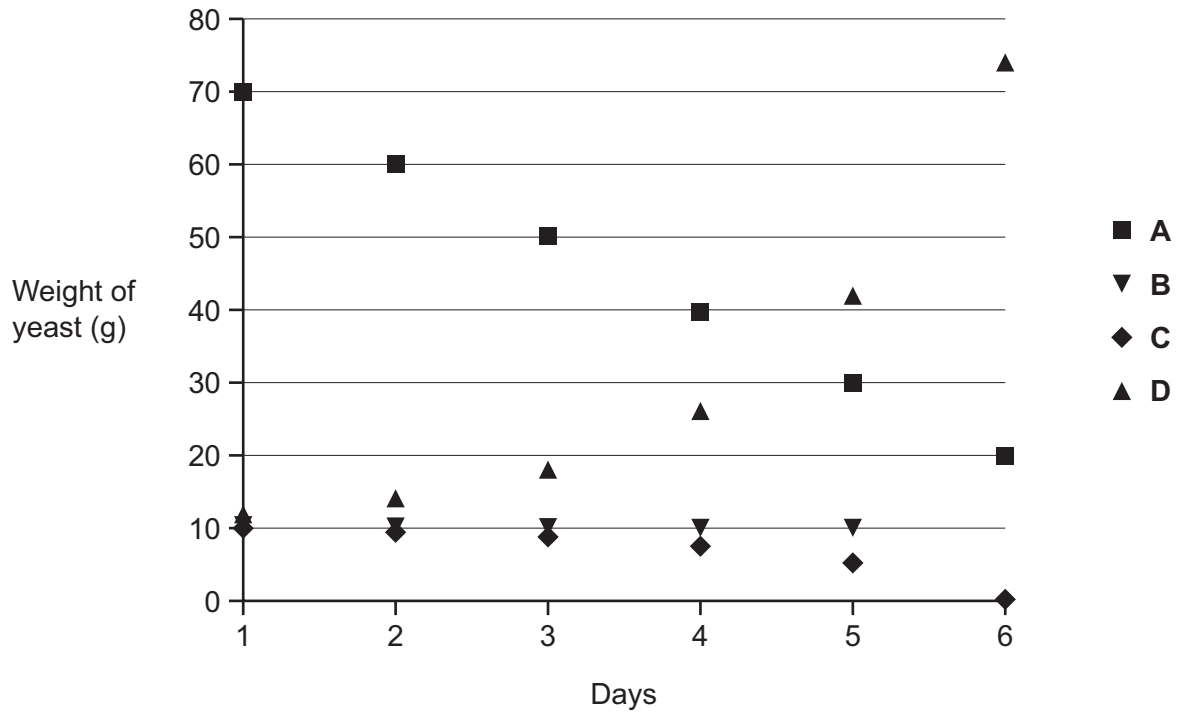
- 11 A child is playing a game by placing four straight sticks on the ground. She scores 1 point for every crossing point made. She cannot break any of the sticks.

What is the largest number of points that she can score?

- A 4
- B 5
- C 6
- D 7

12 The yeast I use to make bread doubles in size overnight, but I take a fixed weight away each day.

Which one of the following plots could **not** show the weight of yeast on consecutive days after the fixed weight has been removed?





13 I received the following email:

E-postings

We offer an electronic messaging service.

These are our costs for one email to each address:

| <i>Destination</i> | <i>Number of Addresses</i> | <i>Cost (\$)</i> |
|--------------------|----------------------------|------------------|
| USA                | 160 000 000                | 1000             |
| CANADA             | 45 000 000                 | 500              |
| RUSSIA             | 20 000 000                 | 200              |
| GERMANY            | 63 000 000                 | 700              |
| UK                 | 39 000 000                 | 500              |
| FRANCE             | 38 000 000                 | 500              |

Second message to the same addresses HALF PRICE!!!

Messages allowed to entire destinations only.

HIGH QUALITY EMAILING!!! THE LOW PRICE!!!

I have only \$2250 but I want to send two messages to the largest number of addresses worldwide.

What is the largest number of addresses I can contact?

- A 123 000 000
- B 205 000 000
- C 223 000 000
- D 320 000 000

- 14 Leillah is going to travel by bus but does not know how much the fare will be. The bus drivers in Bolandia do not give change. Leillah is very cautious and wants to be sure that she will be able to make every possible amount of money (in cents) from 1 cent to 100 cents.

The possible coins she can use are:

1 cent      2 cents      5 cents      10 cents      20 cents      50 cents

What is the minimum number of coins that Leillah needs to have?

- A 6
  - B 7
  - C 8
  - D 9
- 15 Carol wakes up at 7 am and goes to sleep at 7 pm every day. During the day, she has to take two different medicines.

Medicine P must be taken 3 times a day, at the start of a meal.  
Two doses of medicine P must not be taken less than 3 hours apart.  
Medicine Q must be taken once a day.  
Medicines P and Q must not be taken less than 3 hours apart.

Carol always has breakfast at 8 am and dinner at 6 pm. She never eats between meals.

At which one of these times can she **not** have lunch?

- A 12 noon
- B 1 pm
- C 2 pm
- D 3 pm

- 16** A student rock band needs to find a new place to practise their music and have identified Rock House Music Rooms as a suitable venue. They require a room for a two-hour session, on 3 days of the week, but they do not need it to be the same room each time.

The band can meet at any time on Saturday or Sunday, but are unable to meet between 11 am and 5 pm on Monday, Tuesday and Wednesday. They are also unable to meet between 9 pm and 11 pm on Wednesday and Thursday. They never want to practise on two consecutive weekdays (Monday to Friday).

The table below gives the room prices per hour. The Rock House Music Rooms also gives 50% reductions to students on Sundays and Mondays.

|        | Monday –<br>Thursday | Monday –<br>Thursday | Monday –<br>Thursday | Saturday –<br>Sunday |
|--------|----------------------|----------------------|----------------------|----------------------|
|        | 11 am – 5 pm         | 5 pm – 9 pm          | 9 pm – 11 pm         | All day              |
| Pink   | \$8                  | \$10.50              | \$9                  | \$10.50              |
| White  | \$9                  | \$12                 | \$10                 | \$12                 |
| Black  | \$9.75               | \$13                 | \$11                 | \$13                 |
| Blue   | \$7.50               | \$10                 | \$8.50               | \$10                 |
| Green  | \$6.50               | \$8.50               | \$7                  | \$8.50               |
| Red    | \$8                  | \$10.50              | \$9                  | \$10.50              |
| Orange | \$7.50               | \$8                  | \$8.50               | \$8                  |
| Purple | \$6                  | \$9                  | \$7.50               | \$9                  |
| Grey   | \$8.25               | \$11                 | \$9.50               | \$11                 |

Which three days of the week will provide the lowest cost to the band?

- A** Monday, Wednesday and Sunday  
**B** Monday, Thursday and Saturday  
**C** Tuesday, Thursday and Sunday  
**D** Monday, Thursday and Sunday
- 17** A dancer wears out 1 pair of shoes at every performance she gives, but 1 pair will last for 2 rehearsals. During the next 4 weeks she will appear 3 times a week in 'Swan Lake' and also give a one-off performance of 'Giselle'. She must attend 4 rehearsals for 'Giselle' but only 1 rehearsal for each performance of 'Swan Lake'. Another 4 pairs of shoes will be needed for classwork during this 4-week period. She currently has 1 spare pair of shoes, but wants to ensure that she has at least 2 spare pairs in future.

How many pairs of shoes does she need to buy to get through the next 4 weeks?

- A** 13  
**B** 25  
**C** 26  
**D** 34

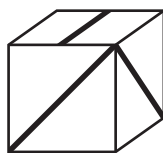
- 18** Bill regularly travels from his home just outside Kimster to visit his father Charlie in Manter. To get there, he has to catch a bus to Kimster station, then a train to Manter station, and finally walk to Charlie's house.

Buses leave from the bus stop outside Bill's home on the hour and at 15, 30 and 45 minutes past each hour. The journey time to the station is between 15 and 20 minutes. Fast trains leave Kimster station on the hour and at 30 minutes past each hour and take between 35 and 45 minutes to reach Manter station. Slow trains leave at 40 minutes past each hour and take an hour for the same journey. The walk from Manter station to Charlie's house takes between 15 and 20 minutes. Bill wants to meet Charlie by 11:00 at the latest.

What is the latest bus that Bill can catch from outside his home?

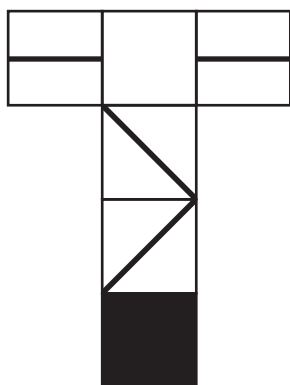
- A** 09:00
- B** 09:15
- C** 09:30
- D** 09:45

- 19 The diagram shows a view of a cube.

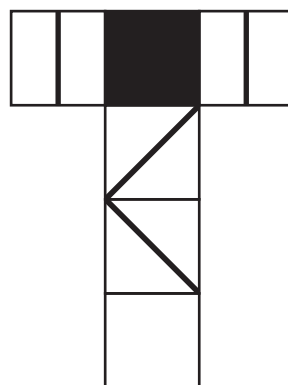


Which of the following could be a net of the cube?

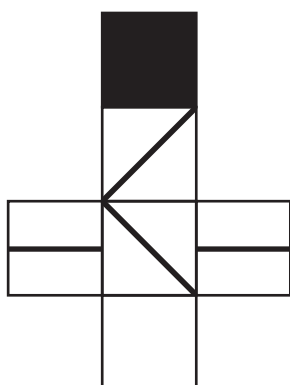
**A**



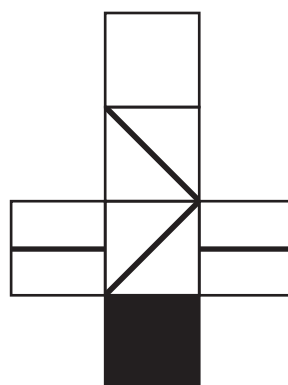
**B**



**C**



**D**



- 20 John set a test for his students last week which was made up of three sections. All three sections had 10 questions. Questions in Section A were worth 2 marks each, those in Section B were worth 3 marks each and those in Section C were worth 5 marks each. John has set the pass mark at 70 out of 100.

What is the difference between the largest number of questions that could be correctly answered while failing the test and the smallest number of questions that could be correctly answered while passing the test?

- A** 1
- B** 3
- C** 6
- D** 10

- 21** Three cars are setting out to see how far one of them can get. They can all carry 80 litres of fuel and each uses 10 litres of fuel every 100 kilometres travelled. They are allowed to transfer fuel from one car to another whenever they wish, provided there is room in the recipient's fuel tank. All of the three cars must have enough fuel to return to the starting point after they turn around. The aim is to have one of the cars, called the 'target car', travel as far as possible away from the starting point.

What is the furthest distance it is possible for the target car to travel away from the starting point, yet still have enough fuel to get back?

- A 400 km
- B 600 km
- C 800 km
- D 1200 km

- 22** When Edward sets up a new account online and is asked to create a security number, he bases the number on the letters of his name. Using a system whereby he replaces each letter with its position in the alphabet (E = 5, D = 4 etc.), he creates a number that is made up of some of the letters of his name in the correct order.

For example, if he is asked to create a 6-digit security number, possibilities include 542314 ( $5+4+23+1+4 = EDWAD$ ) and 423184 ( $4+23+18+4 = DWRD$ ).

How many possibilities does Edward have to choose from when a 5-digit security number is required?

- A 8
- B 10
- C 12
- D 15

- 23** I recently took part in a sponsored swim for charity. Despite the fact that I asked to be sponsored an amount per length of the pool, my uncle decided to use the following rules to determine how much I would receive per length:

- 5¢ per length if the number of lengths is less than 10.
- 20¢ per length if the number of lengths is at least 10, but less than 25.
- 25¢ per length if the number of lengths is at least 25.

I managed to complete 50 lengths. At the end of each length my uncle added the necessary amount of money to a pot so that it contained the correct total for that number of lengths.

What is the greatest amount of money that my uncle added to the pot at any one time?

- A \$1.25
- B \$1.45
- C \$1.55
- D \$2.00

- 24** Every week I buy 3 bottles of lemonade, 4 packets of biscuits and 2 loaves of bread. Last week this cost me \$8, but this week the price had gone up to \$11. When I asked about this I was told that the prices had not changed, but I had benefitted from a special offer last week.

Which of the following could have been last week's special offer?

- A** Buy one loaf of bread and get a second at half price
  - B** Get a packet of biscuits free with every two bottles of lemonade
  - C** Buy two packets of biscuits and get a third packet free
  - D** Buy two bottles of lemonade and get a third bottle free
- 25** Henry wants to travel from Aix to Hix by bus or train or a mixture of both. To do this he has, on the route, to change his bus or train in Bix and Fix.

Buses and trains leave Aix for Bix every hour on the hour. The bus takes 2 hours 20 minutes and costs \$15, while the train takes 1 hour 20 minutes and costs \$25.

From Bix to Fix there is a bus and train at 30 minutes past every hour. The fare on the bus is \$22 and it takes 2 hours 50 minutes, while the fare on the train is \$30 for the 1 hour 50 minutes journey.

Buses and trains also run from Fix to Hix every 60 minutes at 30 minutes past the hour. The bus takes 3 hours 20 minutes and costs \$28, while the train takes 2 hour 20 minutes and costs \$34.

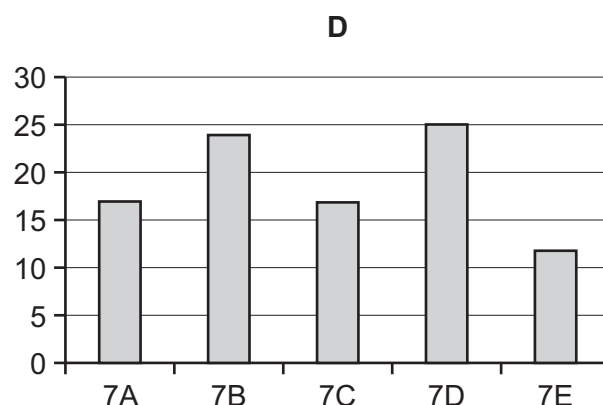
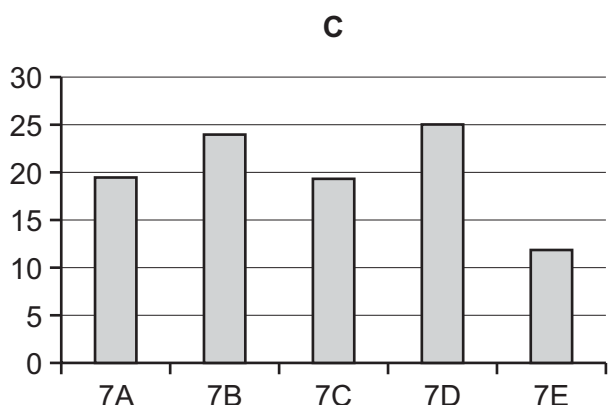
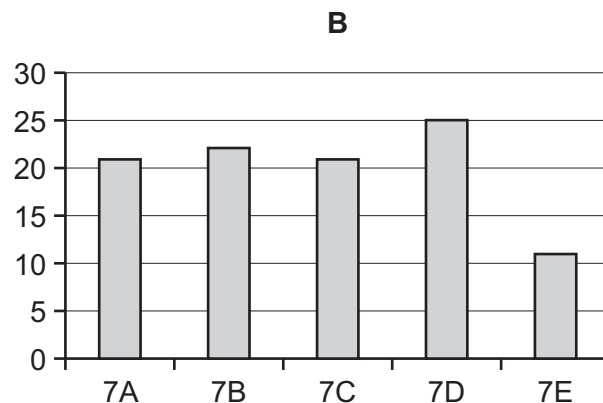
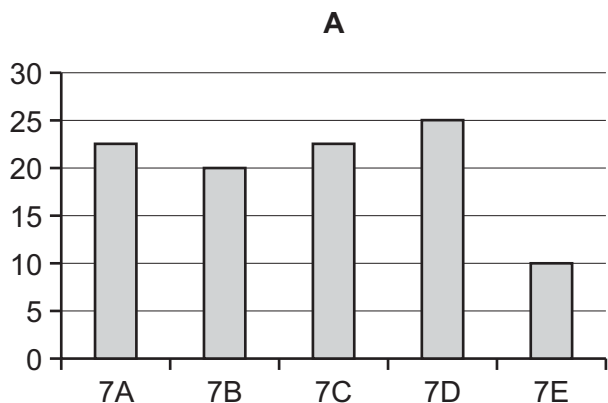
Henry plans to take the 8.00 am bus or train from Aix, but must arrive at Hix no later than 4.00 pm.

What is the least total fare that Henry can pay that will ensure he arrives on time?

- A** \$65
- B** \$71
- C** \$73
- D** \$75

- 26** The students in Year 7 of the local school have just finished their fundraising activities. 7D was the class that collected the most money, raising a quarter of the final total. Of the other classes, 7E raised the smallest amount, which was exactly half the amount raised by 7B. 7A and 7C each raised the same amount.

Which of the following bar charts could **not** represent the amounts raised by each class?



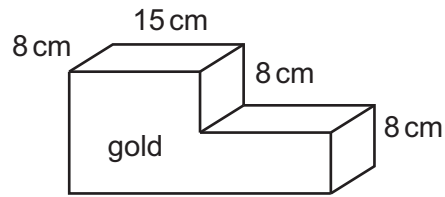
- 27** Colin has a small business servicing computers. He currently has 23 computers awaiting servicing. He has two technicians, one of whom takes 1 hour 30 minutes to complete each service, the other takes 2 hours 15 minutes. They never work on the same computer. The company works Monday to Friday, from 9 am to 5 pm, with a lunch break from 1 pm to 2 pm. It is now 9 am on Monday morning.

When, to the nearest half hour, will the current waiting list be completed?

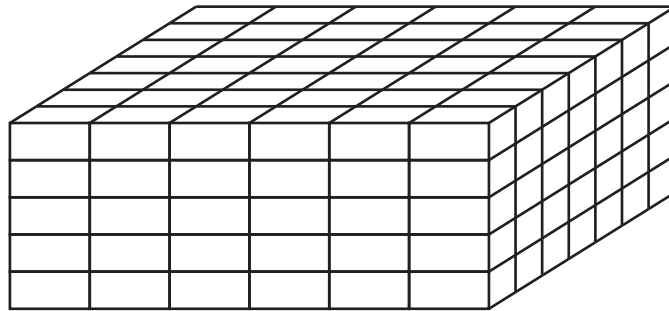
- A** 5.00 pm on Wednesday
- B** 10.30 am on Thursday
- C** 11.00 am on Thursday
- D** 3.00 pm on Thursday



- 28 A rich builder decides to buy some gold and hide it in his garden. To do this he will create a cuboid of bricks and substitute three of the bricks with his gold, which he will melt and make into an L-shape, as shown.



Each brick has dimensions of 8 cm by 8 cm by 15 cm. The cuboid will have dimensions of 6 bricks by 5 bricks by 7 bricks. He will conceal the L-shape of gold within the cuboid so that no gold face is on the outside of the cuboid.



In how many different positions could the gold be placed?

- A 66
- B 140
- C 264
- D 392

- 29 Sergio has to arrange transport for 60 people on a journey of 600 kilometres. There is a choice of vehicle types he can rent for this journey. They go at different speeds and can carry differing numbers of people, but all the vehicles cost \$10 per hour of use. The speeds and capacities of all the vehicle types are shown in the table below.

| <i>Vehicle</i> | <i>Capacity</i><br>(passengers<br>it can carry) | <i>Speed</i><br>(km/h) |
|----------------|---|------------------------|
| Tini           | 1   | 100                    |
| Mini           | 2   | 60                     |
| Medi           | 3   | 50                     |
| Fami           | 4   | 40                     |
| Maxi           | 5   | 30                     |
| Grandi         | 6   | 20                     |

Sergio doesn't care how long the journey takes; he simply wants to arrange the journey so that it costs as little as possible. Accordingly he chooses to use the vehicles that result in him paying the least amount possible for their use.

How much does Sergio have to pay per passenger for use of the vehicles?

- A \$32.50
- B \$37.50
- C \$40.00
- D \$50.00

**30** As part of a job interview, Iris has been given a memory test.

She was given one minute to study a picture of a clock whose numbers 1 to 12 were a variety of colours.

At the end of the minute she was confident of the following:

- Four of the numbers were green, three were blue, three were yellow and two were red.
- The three blue numbers were 2, 7 and 12.
- Except for the two red numbers, no two neighbouring numbers were the same colour.
- No pairs of opposite numbers (12 and 6, 1 and 7 etc.) had repeated colour combinations (so, for instance, two of the green numbers must have been opposite each other, since green cannot have been opposite blue, red or yellow twice).

Now Iris has been asked to name the colour of each of the twelve numbers on the clock face.

The information that Iris has memorised is sufficient for her to be certain of the colour of how many of the twelve numbers?

- A** Three
- B** Four
- C** Eight
- D** Twelve

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