



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

THINKING SKILLS

9694/13

Paper 1 Problem Solving

October/November 2011

1 hour 30 minutes

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

* 7 6 0 3 6 2 7 8 0 3 *

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.

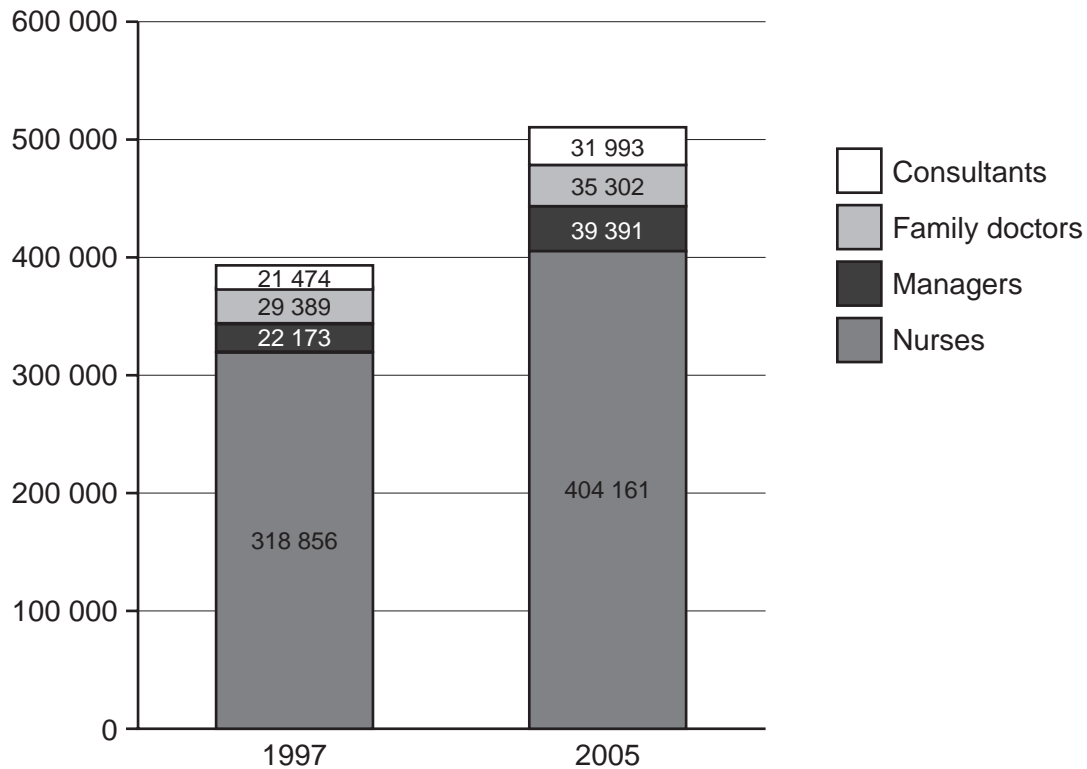
INFORMATION FOR CANDIDATES

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

This document consists of **18** printed pages and **2** blank pages.



- 1 The chart below shows the staff numbers in the UK National Health Service in 1997 and 2005.



Which category showed the biggest percentage increase between these dates?

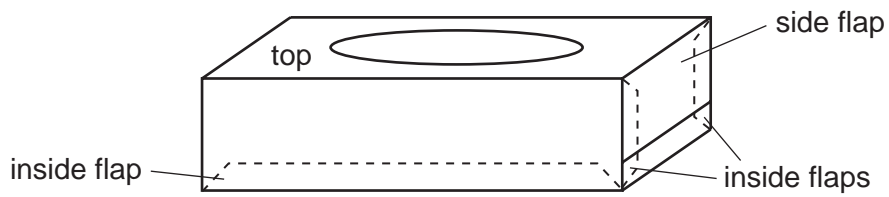
- A Consultants
 B Family doctors
 C Managers
 D Nurses
- 2 A teacher was organising a trip to a conference. The law states that you have to have a ratio of 1 member of staff to 15 students. The conference organisers allow 1 free member of staff per 8 students. The coach company offered to take students in either a 40-seater bus for \$300 or a 65-seater bus for \$350.

The teacher left the college and all the paperwork disappeared. The school's accountant needed to have some idea of the cost of the trip but all she knew was that only 4 teachers went on it (all having free places), and that the fee per student was \$15, which the college paid.

What did she work out was the difference between the lowest and highest possible cost of the trip?

- A \$420
 B \$470
 C \$780
 D \$840

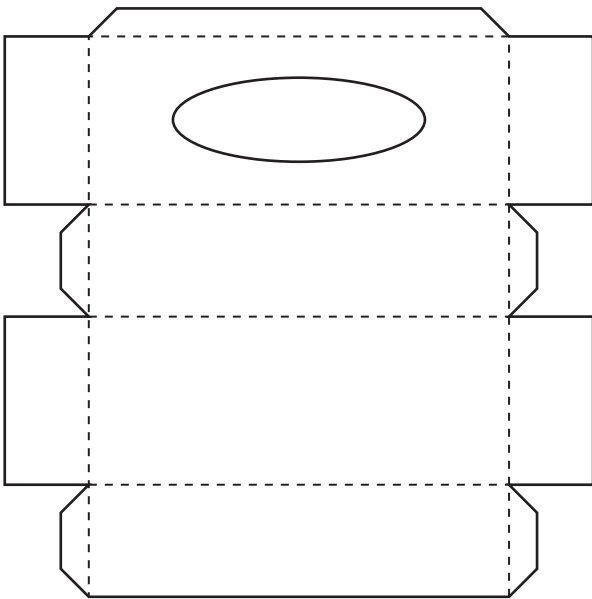
3



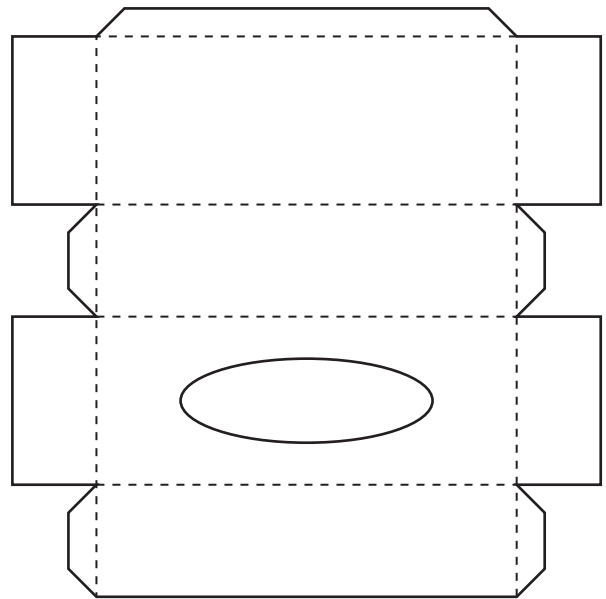
A cardboard container for tissue handkerchiefs as shown above is made up of one piece of cardboard cut and folded to the necessary shape and glued together. The two ends are overlapped and glued and the base is secured to the facing side on the diagram by a glued flap folded from the base. The top has an oval hole which allows the tissues to be withdrawn.

Which one of the four diagrams below represents the outline of the piece of cardboard?

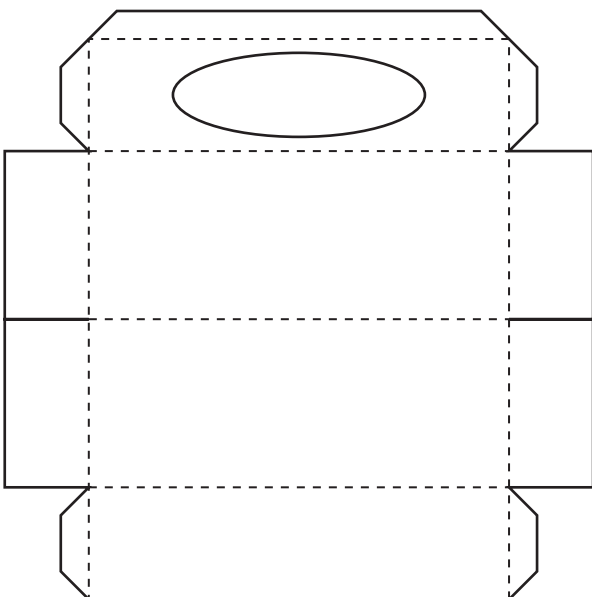
A



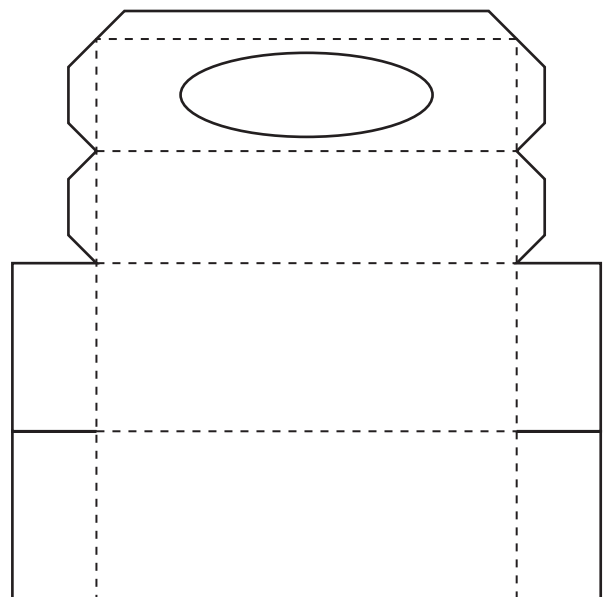
B



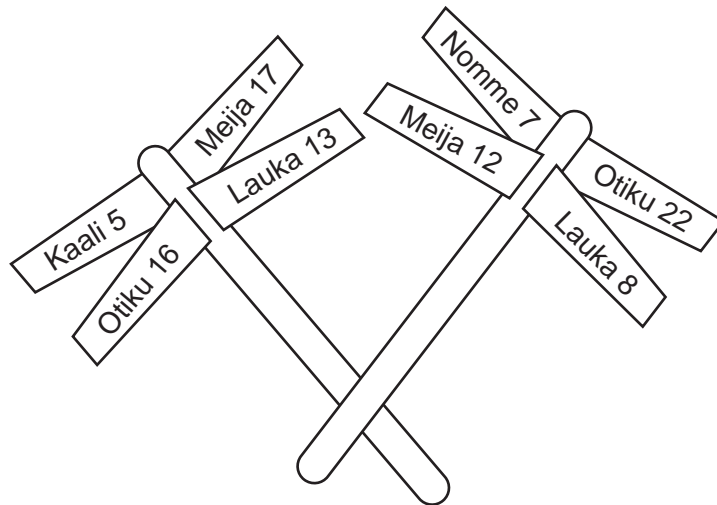
C



D



- 4 When out driving I came across the two signs shown below uprooted and on the ground by a crossroads. Clearly one of the signs did not belong to the crossroads at which I had stopped. I had just come from Kaali and had not been through any of the other towns.



Assuming that one of the signs belonged at the crossroads where I found them, which way should I go for the shortest route to Nomme?

- A Left
 B Right
 C Straight on
 D There is not enough information
- 5 There are four human blood groups: O, A, B and AB. Each of these is subdivided into positive or negative (Rh+ or Rh-) so there are 8 types.

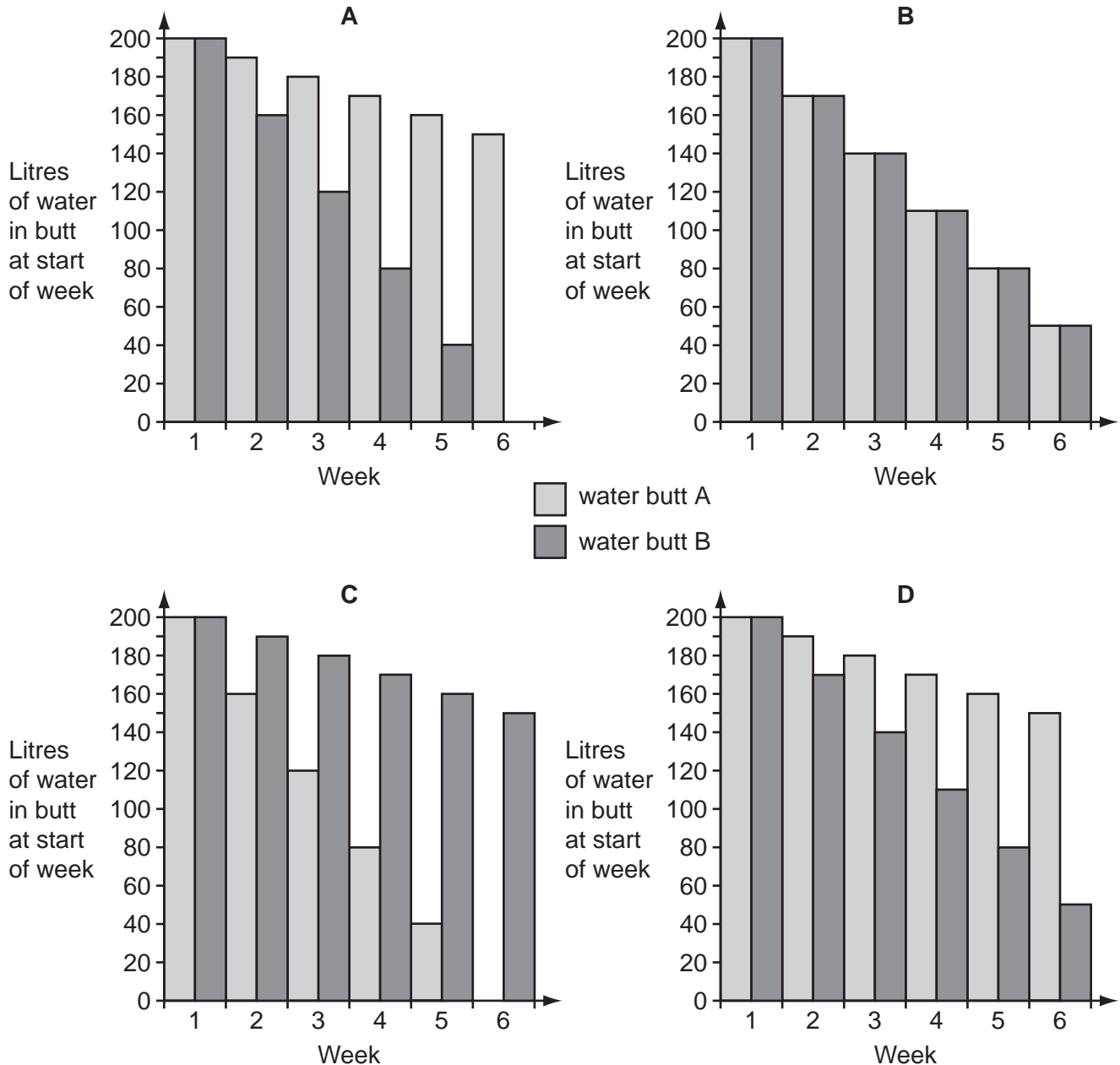
It is not permitted to go from any positive type to any negative type, but otherwise blood transfusions can be made from one person to another if they have the same group. O can also donate to any other group, and AB can receive from any other group. No other combinations are permitted.

How many different permitted combinations of types of donor and recipient are there?

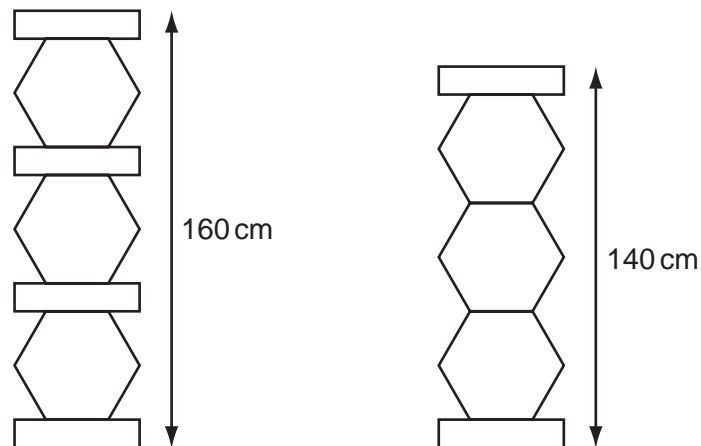
- A 8
 B 9
 C 27
 D 64

- 6 In the spring Julie uses rainwater to water her plants. She collects this in two 200-litre water butts. She collects the water from the roofs of her two greenhouses. She uses twice as much from the greenhouse at the bottom of the garden (butt B) than from the one at the top of the garden (butt A). She uses an average of 90 litres of water per week and both water butts are full at the beginning of spring. The rainfall in her area in early spring is enough to replenish each butt by 20 litres each week.

Which of these graphs represents the volume of water in Julie's two water butts at the beginning of each of the first six weeks of spring?



- 7 A toy for children comprises two different kinds of blocks that can be placed on top of each other, a hexagon and a rectangle shape.



What is the height of the hexagon shape?

- A 10 cm
 B 25 cm
 C 28 cm
 D 40 cm
- 8 Stanley and Walter are two old friends who have recently discovered the art of texting. They can't cope with text language, but, when communicating with each other, they use a code that they invented many years ago.

The code is a substitution code with a twist. When a particular letter appears for the first time in a message it is encoded as the next letter in the alphabet (A becomes B, Z becomes A). On each subsequent appearance it becomes the next letter again (A becomes C, Z becomes B).

For example:

ARE YOU AT HOME TODAY?

encodes as

BSF ZPV CU IQNG VREDA?

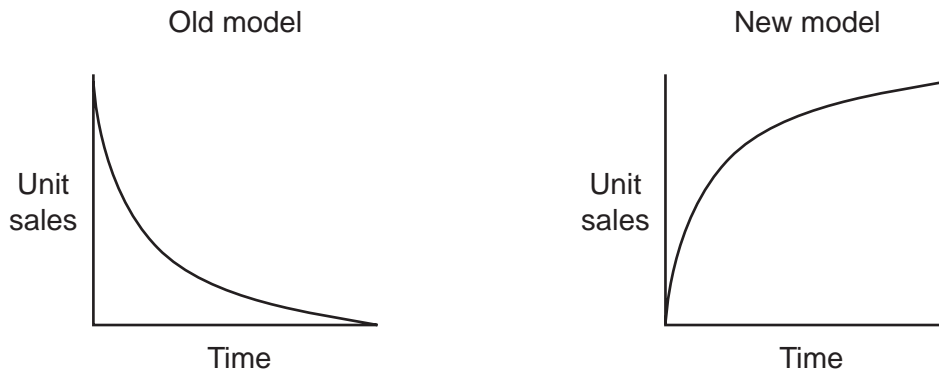
Stanley is about to text Walter with the following message.

THE CONCERT TONIGHT STARTS AT HALF PAST SEVEN

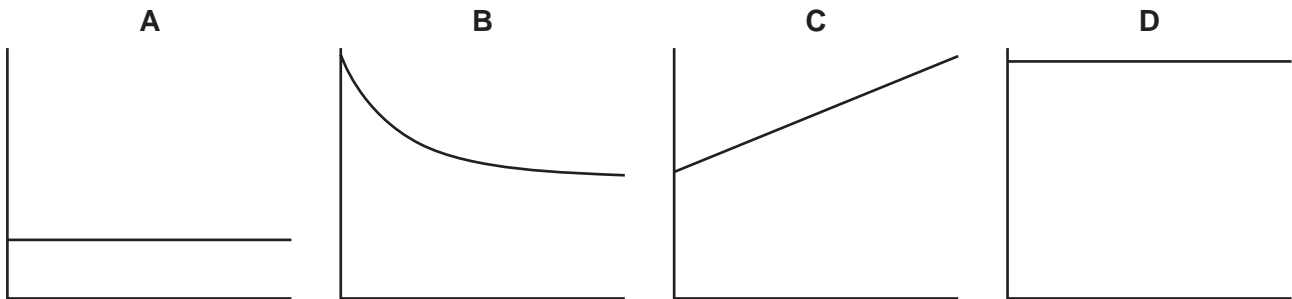
How will Stanley encode the word SEVEN?

- A WHWHQ
 B WHWIQ
 C WHXHQ
 D WHXIQ

- 9 Pantech is introducing a new generation of televisions. Its projected unit sales for the old model to be phased out and the new model to be phased in are shown for the next three years.



Which one of the graphs below could represent the total unit sales of televisions over this period?
(All graphs are drawn to the same scale.)



- 10 I am growing 12 herb plants in a small area of my garden. I have more coriander than basil and more dill than coriander.

Which one of the following single pieces of information would enable you to know exactly how many of each type of herb there are?

- A There are 2 basil plants.
- B There are 5 coriander plants.
- C There are 7 dill plants.
- D There are 2 more coriander plants than basil plants.

- 11 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 ($5+4+23+1+4 = \text{EDWAD}$) and 423184 ($4+23+18+4 = \text{DWRD}$).

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
- 12 A railway station platform is 150 metres long. A train passing through the station is 100 metres long including the locomotive. The front of the train passes one end of the platform at 10 o'clock exactly and the rear of the train passes the other end of the platform 15 seconds later.

What is the speed of the train in kilometres per hour?

- A 24 km/h
 - B 36 km/h
 - C 48 km/h
 - D 60 km/h
- 13 In a cross-country race there is a team competition as well as an individual one. Every individual runner is in a team. Each team has three runners and scores points according to the finishing positions of all three runners. For example, if Team Tiger's runners finished 10th, 50th and 100th, Team Tiger would receive $10 + 50 + 100 = 160$ points. The team with the lowest number of points wins. In one particular race Team Alba won with 12 points, Team Bear was second with 15 points and Team Crow was third with 19 points.

In what position did the highest-finishing runner from a team outside the top three teams finish?

- A Seventh
- B Eighth
- C Ninth
- D Tenth

- 14** A truck driver makes regular journeys from England to France every week on Fridays. It takes 45 minutes to travel by road to Dover for boarding the ferry. His journey starts at 12:00, 12:15 or 12:30. The driver notices that the time he has to wait for the ferry is either 10, 25 or 40 minutes.

Which one of the following explains the times the driver has to wait?

- A** The ferry runs once an hour at 10 minutes past the hour.
B The ferry runs once an hour at 25 minutes past the hour.
C The ferry runs once an hour at 40 minutes past the hour.
D The ferry runs once an hour at 55 minutes past the hour.
- 15** In the first section of the TV Quiz Show “Guess If You Dare”, three contestants are all asked the same 12 general knowledge questions. For every question, each contestant in turn chooses from the 3 options given, or elects to pass. The order in which they answer is rotated from question to question. When a contestant gives an answer, it is heard by the other two.

Points are awarded as follows:

| | | |
|------------------|---|-----------|
| correct answer | = | +3 points |
| incorrect answer | = | −4 points |
| pass | = | −1 point |

The contestant with the lowest score from the 12 questions is then eliminated.

After 11 questions in the first section of today’s show the scores are:

| | |
|-------|-----------|
| Peter | 19 points |
| Paul | 18 points |
| Mary | 17 points |

It is Paul’s turn to be last to choose his answer to the 12th question. Peter and Mary have already chosen different options, and Paul has no idea at all what the correct answer is.

What should Paul do to ensure that he does not finish last?

- A** Choose the third option
B Give the same answer as Mary
C Give the same answer as Peter
D Pass

- 16 The table below shows the price (in dollars) per person of travelling on a ferry boat from Revod to Olamst or the reverse journey from Olamst to Revod. The price depends upon the accommodation chosen and the time of year the journey is made.

| <i>Accommodation type</i> | <i>October to April</i> | <i>May and September</i> | <i>June, July and August</i> |
|--|-------------------------|--------------------------|------------------------------|
| 2-berth outside cabin | 105 | 119 | 140 |
| 2-berth inside cabin | 95 | 108 | 125 |
| 3-berth outside cabin | 98 | 116 | 129 |
| 3-berth inside cabin | 86 | 104 | 117 |
| 2-berth inside cabin (no shower or w.c.) | 76 | 86 | 103 |
| No cabin – reclining seats | 45 | 55 | 65 |
| Simple passage | 35 | 45 | 56 |

A family of five plan to go by ferry from Revod to Olamst in May returning in June. The parents wish to travel both ways in a 2-berth outside cabin, and are willing to pay for the children to enjoy a 3-berth inside cabin on both journeys. The three children think all members of the family should take the cheapest (even if most uncomfortable) fare available, and use the savings made as compared to the parents' plan for special holiday treats.

How much would the family save in total on the ferry crossing if the children's plan was adopted compared to the parents' plan?

- A \$379
 B \$650
 C \$676
 D \$1181
- 17 Four women (Ada, Babs, Cath and Dee) and four men (Mac, Nick, Oscar and Pete) are sitting evenly spaced around a circular table. No woman sits next to another woman. Pete is opposite Nick, who is sitting next to Ada, and she is opposite Babs, who sits next to Mac. Oscar is next to Dee.

Who is Cath between?

- A Mac and Pete
 B Nick and Mac
 C Oscar and Nick
 D Pete and Oscar

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

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

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

- A 110¢
 B 111¢
 C 112¢
 D 115¢
- 19 Sealand Books currently has the following offer.

3 FOR THE PRICE OF 2
Buy 2 books and get 1 free
 (the lowest-priced book of the three is free)

The following books are available:

| | | |
|---------------------------------|----------------------------|-----------------------|
| The Michaelangelo Cypher \$7.49 | Moondance \$8.49 | The Green Lion \$6.99 |
| Revenge \$6.49 | Maze \$7.99 | Dr. Odd \$5.99 |
| Major Dante's Cello \$5.49 | The Crystal Mansion \$8.99 | Barbados Hotel \$9.49 |

I have only \$15 to spend and I want to make the most of the offer by buying the greatest value of three different books for my money.

Which one of the following will be included in my selection?

- A Dr. Odd
 B Maze
 C Moondance
 D The Michaelangelo Cypher

- 20 In the annual Aycerve Tennis Tournament 28 players are divided into 4 groups of 7. In each group everyone plays every other player once, then the winner of the group progresses to the knockout semi-finals.

Normally this means that a total of 87 matches are played during the tournament. This year, however, due to the withdrawal of 2 injured players, only 80 matches were played.

Which one of the following could explain why only 80 matches were played?

- A The injured players were in different groups. Both withdrew after playing 2 matches.
- B The injured players were in different groups. One withdrew before the tournament began, the other played 4 matches.
- C The injured players were in the same group. Both withdrew after playing each other and one further match.
- D The injured players were in the same group. One withdrew before the tournament began, the other played 4 matches.
- 21 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.

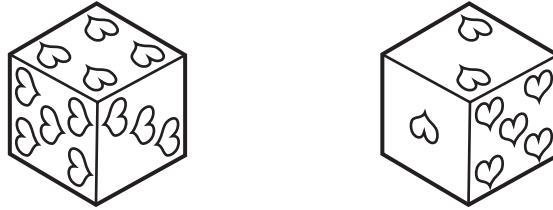
Which one of the following pieces of information would **not** be sufficient to work out the time that the first train left Oldcastle?

- 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 arrived back at Newport.

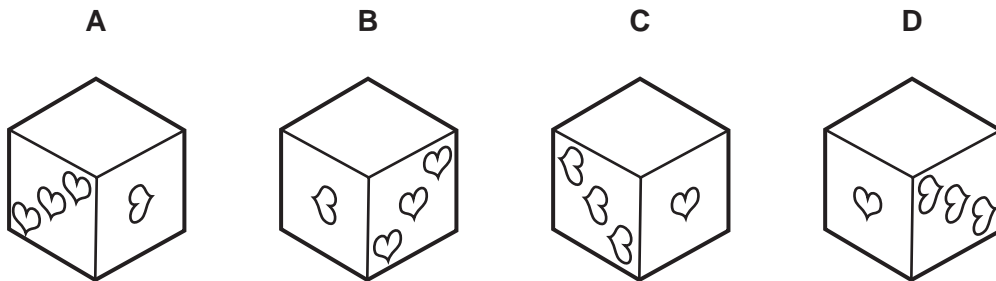
22 The two identical dice that come with the board game “Romance” differ from conventional dice in two ways:

- the numbers on the faces run from 0 (a blank face) to 5, with opposite faces always adding up to 5;
- the spots are in the shape of hearts.

This is how the dice appear at present, following the last player’s throw.



Which one of the following could be the appearance of one of the dice after the next player’s throw?



- 23** Vauxhall Street Car Park in Hondaford is open every day from 8 am to 8 pm. Parking costs \$10 for cars that arrive between 8 am and 11 am, \$7 for cars that arrive between 11 am and 5 pm, and \$2 for cars that arrive after 5 pm. Cars that leave before 2 pm are given a \$4 refund at the exit.

The attendant is required to keep a daily record of the number of cars that enter and leave the car park during each 3-hour period.

This is yesterday's record:

| | <i>Arrivals</i> | <i>Departures</i> |
|--------------|-----------------|-------------------|
| 8 am – 11 am | 108 | 3 |
| 11 am – 2 pm | 80 | 44 |
| 2 pm – 5 pm | 65 | 99 |
| 5 pm – 8 pm | 31 | 138 |

What was the final figure for yesterday's takings at Vauxhall Street Car Park?

- A** \$1573
- B** \$1969
- C** \$2157
- D** \$2345

24 This is the squad that will represent Habitalia at this year's Swingball World Cup:

| <i>Name</i> | <i>Date of Birth</i> |
|--------------|----------------------|
| Buddy Aviary | 21/10/1984 |
| Jack Burrow | 07/01/1978 |
| Leo Den | 18/02/1979 |
| Cyril Drey | 26/04/1981 |
| Ed Eyrie | 04/09/1987 |
| Harry Form | 17/06/1982 |
| Archie Hive | 07/01/1985 |
| Otto Holt | 24/12/1980 |
| Todd Lair | 04/09/1982 |
| Caspar Lodge | 21/08/1976 |
| Robin Nest | 13/09/1981 |
| Melvin Sett | 24/11/1986 |
| Greg Stable | 30/11/1989 |
| Peter Warren | 19/10/1987 |

Clearly two pairs of squad members share the same birthdays (Burrow and Hive – 7th January, and Eyrie and Lair – 4th September). Less obvious, however, is the fact that two pairs have dates of birth that are numerical anagrams of each other (the same digits in a different order).

Nest and Stable form one of these pairs. Which two squad members make up the other pair?

- A** Aviary and Holt
- B** Den and Warren
- C** Drey and Sett
- D** Form and Lodge

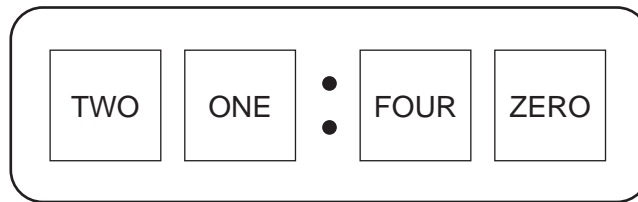
- 25 Each day at summer camp swimming lessons we have had three triplets in the group, and we made sure that each one had a different coloured 'noodle'. Each noodle also has a letter painted on it in case the swimmer or instructor is colour-blind. The letters used are B, X, T, S, C, W and Z.

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

How many days have now passed?

- A 4
 B 15
 C 17
 D 35
- 26 I have an unusual digital clock that displays the digits as words, not figures.

At 9:40 pm, for example, its appearance is:



How many times each day does my clock show four different words in alphabetical order from left to right?

- A 2
 B 4
 C 7
 D 10
- 27 An ice cream seller, in a park, consistently sells between 500 and 600 ice creams in an evening. He has five different ice creams on offer. They vary in popularity. He estimates that any evening between 25% and 35% of customers ask for strawberry, between 20% and 30% chocolate, 15% and 25% vanilla, 10% and 20% raspberry, and 5% and 15% pistachio.

If the ice cream seller's estimates are correct, what is the minimum stock of ice creams that he should carry every evening to ensure that all his customers get the flavour they ask for?

- A 600
 B 625
 C 700
 D 750

28 There are two taxi services from Newtown to the airport and it costs the same by both.

Alpha Cabs charges \$4 hire fee, \$3 for the first km driven and \$2 for each extra km.

Beta Limousines charges \$30 for up to 8 km then \$1 for each extra km.

How far is it from Newtown to the airport?

- A 8 km
- B 13 km
- C 17 km
- D 23 km

29 Four of my friends just got back from the local café having had a long break to sit and talk. They each paid for their own food and drinks and they know that there were no special offers.

They can each remember the total cost of their purchases but not the individual costs for the items.

Bill had 1 cup of tea, 2 slices of cake and a cup of hot chocolate.

John had 2 cups of tea and 1 slice of cake.

Karen had 2 cups of tea, 1 slice of cake and a cup of hot chocolate.

Sue had 3 slices of cake and 2 cups of hot chocolate.

I want to work out the individual price of the items, and I have realised that I only need to know the totals of three of the orders as long as one particular order is included in the three.

Which one of the totals must be included in the three that I choose for me to be able to work out the individual prices?

- A Bill's order
- B John's order
- C Karen's order
- D Sue's order

- 30** In a cycle time trial, the riders set off at two-minute intervals over a fixed 50 km route and are timed individually. The winner is the rider who completes the course in the shortest time. In one time trial of 64 riders, one cyclist managed to overtake three of the riders who had set out before her, four cyclists overtook two riders, and seven overtook one rider. No cyclist suffered the humiliation of being overtaken by more than one rider, and all riders completed the course.

How many riders, in this time trial, started and finished the course with the same number of riders in front of them?

- A** 30
- B** 34
- C** 46
- D** 52

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