THINKING SKILLS **9694/11**

Paper 1 Problem Solving **May/June 2016**

1 hour 45 minutes

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

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 Tins of the brand of cat food that I always buy are usually 90 cents each. Last week, however, they had been reduced to 70 cents each, so I took advantage of this and bought 36 tins.

This week they are back to 90 cents each, but, to my annoyance, there is a "buy 2 tins, get another one free" offer in place.

How much more did I pay for the tins I bought last week than if I had bought them this week instead?

A $3.60

B $7.20

C $8.40

D $10.80

2 Two identical pieces of card are lying on top of each other, giving a shape with the outline shown below.
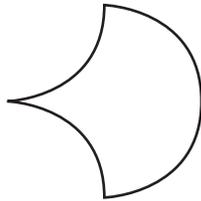
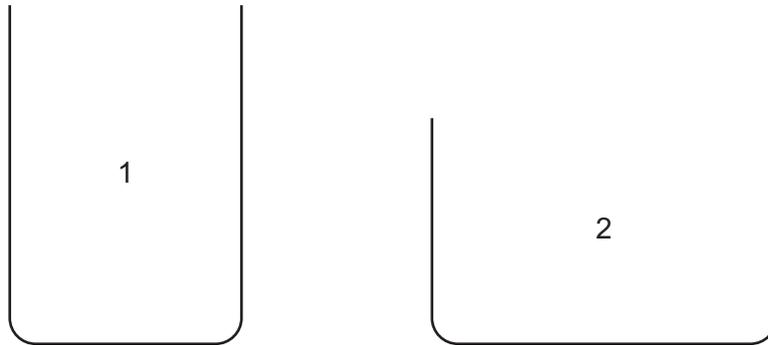Which of the following could be the shape of one of the pieces of card?

| A | B | C | D |
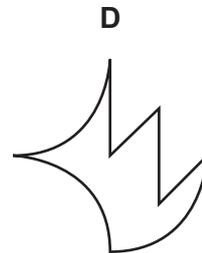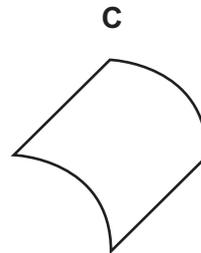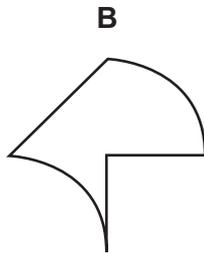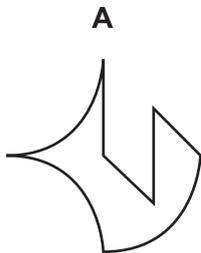
3 Elizabeth's recent holiday involved her flying around the world from London. She stopped in Tokyo, Auckland, San Francisco and finally returned to London. The schedule for her journey is set out below.

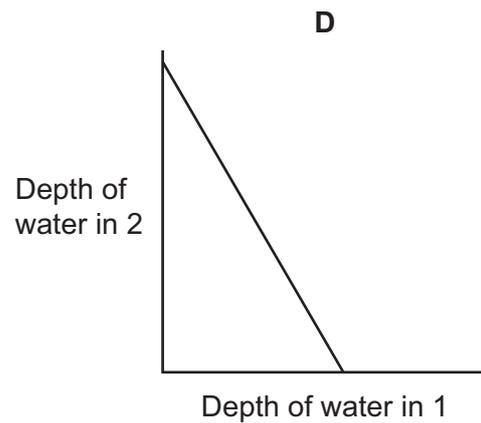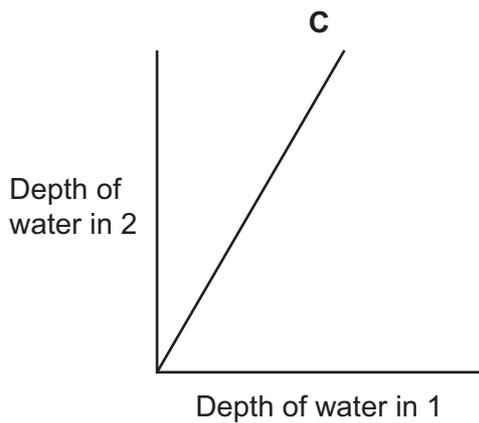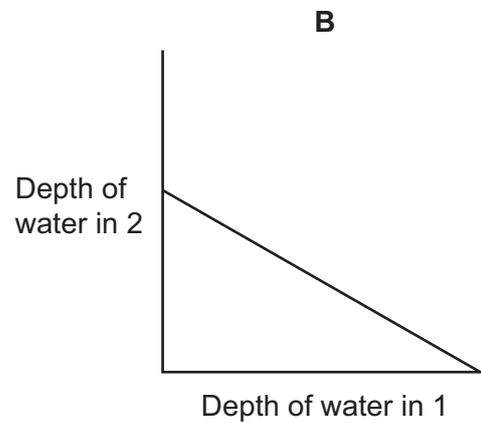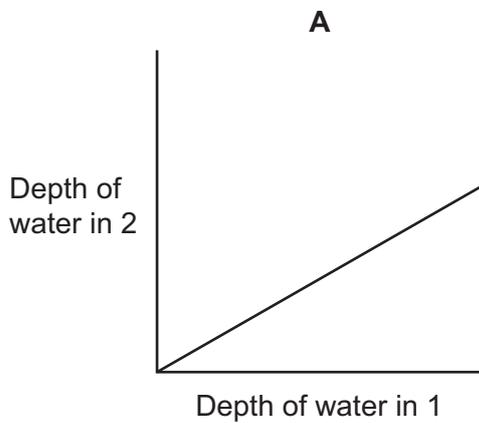| Journey	Departure time	Time at destination at departure time	Local arrival time
London – Tokyo	Sun 13:00	Sun 21:00	Mon 08:30
Tokyo – Auckland	Tue 16:00	Tue 19:00	Wed 04:00
Auckland – San Francisco	Thu 12:00	Wed 17:00	Thu 07:00
San Francisco – London	Sat 06:00	Fri 22:00	Sat 10:00

How much time did Elizabeth spend flying?

A 32 hours 00 minutes

B 46 hours 30 minutes

C 54 hours 30 minutes

D 62 hours 30 minutes

4 The drawing below shows a cross-section of two beakers, labelled 1 and 2, used in a laboratory. Beaker 1 is full of water and beaker 2 is empty before pouring commences. Water is poured from beaker 1 into beaker 2 and the depth of water in each beaker is recorded at regular intervals. A graph recording these results, using the same scale on both axes, is drawn.

Which of the following graphs could be the one drawn to represent the depths of water in the beakers?

A

Depth of water in 2

Depth of water in 1

B

Depth of water in 2

Depth of water in 1

C

Depth of water in 2

Depth of water in 1

D

Depth of water in 2

Depth of water in 1

5 Jack is in the supermarket, having been sent to buy 30 litres of lemonade for a children's party.

There are 4 brands on the shelf, all of which normally cost $2.75 for a 2-litre bottle. This week, however, each of the brands has a different special offer, as follows:

Fordowne	$2 off when three 2-litre bottles are purchased
Imp	20% off all 2-litre bottles
Swish	buy four 2-litre bottles, get another one free
Tiara	2.5 litres for the normal price of 2 litres

Which brand of lemonade should Jack buy to keep the cost as low as possible?

A Fordowne

B Imp

C Swish

D Tiara

6 A typical domestic solar power system, using 6 panels, needs to be able to produce at least 4 kilowatts in order to be cost effective. Each panel can produce a maximum of 0.75 kilowatts.

The table below shows the percentage of this maximum that panels will produce if placed on roofs of different angles and facing different directions.

Roof Angle	West	South West	South	South East	East
90°	56	67	71	69	58
80°	63	75	80	77	65
70°	69	82	87	84	70
60°	74	87	93	89	76
50°	78	92	97	93	80
40°	82	95	100	96	84
30°	86	96	100	96	86
20°	88	96	98	96	88
10°	89	94	96	94	90
0°	90	90	90	90	90

Which of the following roof directions and angles **cannot** produce the necessary 4 kilowatts?

A East facing and 10° roof angle

B South facing and 50° roof angle

C South West facing and 50° roof angle

D West facing and 40° roof angle

7 Sam has seven cubic bricks. Each brick has a different letter on each face. The letters on each brick are:

Brick 1	ABCHIJ
Brick 2	BCDKLM
Brick 3	CDENOP
Brick 4	DEFQRS
Brick 5	EFGTUV
Brick 6	FGAWXY
Brick 7	GABZHI

Which one of the following can Sam **not** spell out with his bricks?

A BAGGAGE

B CABBAGE

C CAGE EGG

D DEFACED

8 A new residential development is being planned on the outskirts of a city. The plans are for 5 high-rise blocks each containing 20 residential units (apartments), with an average occupancy of 4 persons per unit. The 5 buildings will cover a total ground space of 0.6 hectares (ha), which is equivalent to $6000\,m^2$. Government regulations require that any new development must allow $80\,m^2$ of open space (e.g. play areas) per resident in addition to that covered by buildings.

How many hectares of land will be needed for the whole development?

A 1.4 ha

B 3.2 ha

C 3.8 ha

D 14.0 ha

9 I like to wait as long as I can before having my hair cut, but my wife insists that it is cut at least every 26 days. The hairdresser's shop that I use is open only on Tuesdays, Wednesdays, Thursdays and Fridays each week. I have just had my hair cut today, Thursday.

On the tenth time after today (not including today) that I have my hair cut, what day will it be?

A Tuesday

B Wednesday

C Thursday

D Friday

10 Karen is about to employ a new worker in her office. To make her decision she has decided to give each of the candidates a score based on the tests that she will have them do before the interview. The tests are both scored out of 5, but Karen will work out the overall score by doubling the first score and adding the second. Those candidates that get a total score of 11 or above will be interviewed.

In which one of the grids below do the shaded squares represent the test scores that would lead to an interview?

A

B

C

D

[Turn over

11 The diagram shows seven tiles, patterned on one side, arranged so that wherever they touch each other the patterns match.
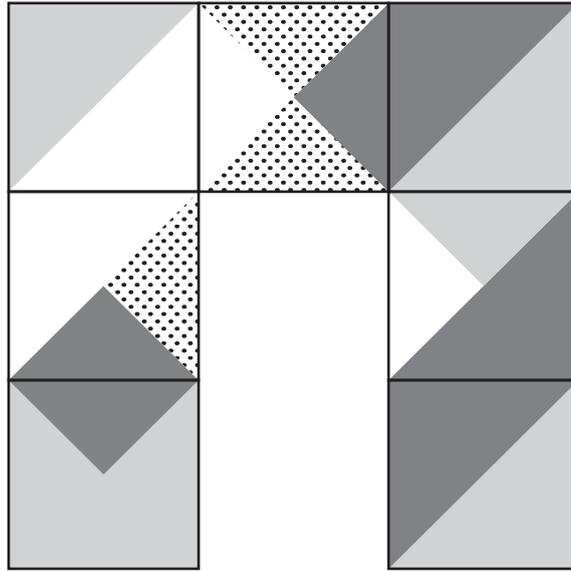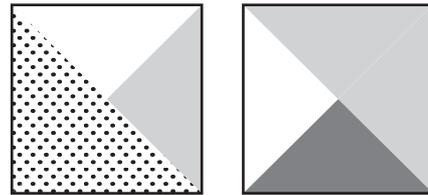

Which one of the following sets of two tiles could fill the gap and enable a three-by-three square of tiles to be completed with the matching preserved?
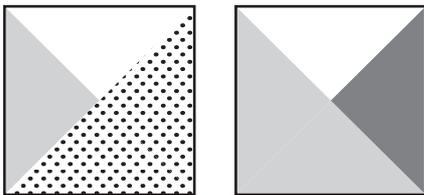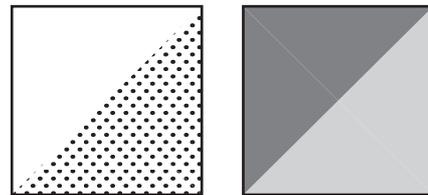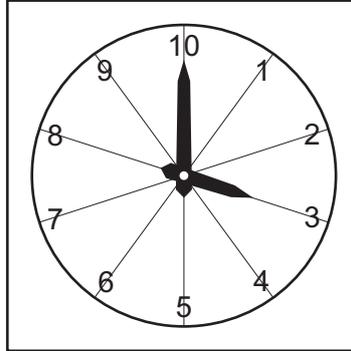
A
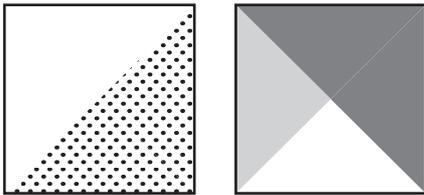
B

C

D

12 A large international company is experimenting with a system called New Decimal Time (NDT). All its offices are being fitted with clocks which divide a 24-hour day into 10 'D-hours'. Each D-hour is divided in turn into 100 'D-minutes'. So, for example, 12 o'clock midday becomes 05:00 NDT.

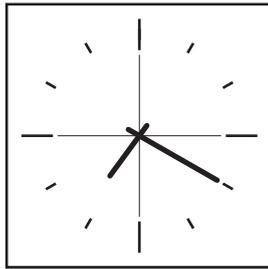One morning the new clock on the boss's wall correctly shows:

Various old clocks around the building still show ordinary time, but only one of them is reliable. Which one is it?
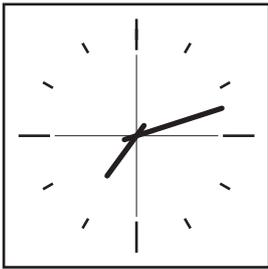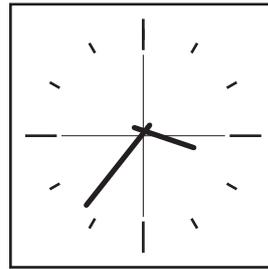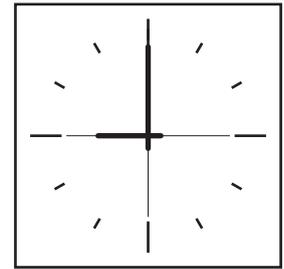
A	B	C	D

13 2 men and 2 women escaped from a yacht just before it sank. The life raft only has space for 3 people. The longest time a man can survive in the water is 3 hours but a woman can survive for 4 hours. After being in the water they need 10 hours out of the water to recover or they will die immediately. Each time they go back into the water the time they can survive is reduced by 1 hour.

How long can all 4 people stay alive?

    A   14 hours

    B   17 hours

    C   19 hours

    D   20 hours

14 George's consultancy firm has a large number of employees who use their own cars when travelling to customers. The company pays 10¢ per kilometre travelled towards the cost of the journey, plus an additional 25¢ for each visit made. Because many employees have complained that this is not enough to cover the cost, George has decided to change the policy.

He can only afford to increase the total cost for an average week (40 visits covering a total of 300 kilometres) by 10%. The new policy will still offer a rate per kilometre, plus an amount per visit (both of which will be a whole number of cents), and George wants the rate per kilometre to be as high as possible.

What will be the amount paid for a visit involving travel of 20 kilometres?

    A $2.80

    B $2.85

    C $3.00

    D $3.05

15 A ferry service operates between the mainland and the island of Deltar, carrying vehicles and people. There is a scale of charges for the crossing by car and minibus.

Car: $50 for a car and driver, plus a charge of $12 for each additional person. The maximum number of people allowed in a car is four. There is a 10% discount on the total cost for cars carrying at least three people (including the driver).

Minibus: $242 for a minibus. The maximum number of people allowed in a minibus is 10 people including the driver. There is a $30 discount for a minibus carrying exactly 10 people.

A bowling club with 17 members wishes to travel to Deltar for a tournament. Each of the members is able to drive a car and each is able to drive a minibus.

What is the lowest cost for the bowling club members to make the crossing on the ferry?

A $344.00

B $354.60

C $356.00

D $359.60

16 Borgonia was badly served for roads, without any motorways in 2000. The following bar graph shows the number of kilometres of new motorway built in Borgonia in each of the subsequent ten years. Motorways are expected to last at least 20 years.
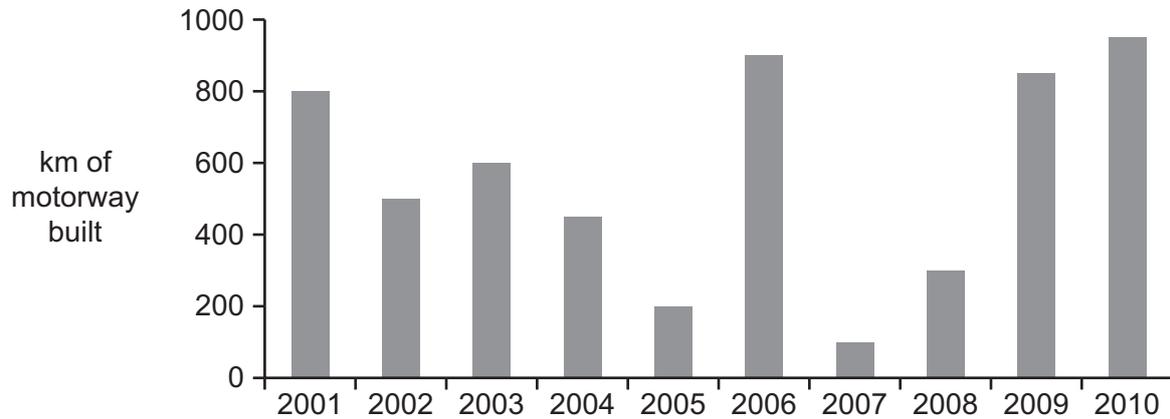

Which column in the following table could represent the total number of kilometres of motorway in Borgonia at the end of each year?

Year	Total length of motorways (km)			
	A	**B**	**C**	**D**
2001	800	800	800	800
2002	1300	1300	1300	1300
2003	1900	1900	1900	1900
2004	2350	2350	2350	2350
2005	2550	2550	2550	2550
2006	3450	3450	3450	3450
2007	3550	3350	3550	4550
2008	3850	3550	3850	4850
2009	4700	4200	4700	5200
2010	5650	4750	4900	5650

17 At Brava Coffee Shop, customers buy an empty cup for $2.80. They can fill their cup twice without any further payment, following which they can refill the cup as many times as they wish for 50¢ per refill.

Which of the following bar charts shows how the cost per cupful varies with the number of times the cup is filled?
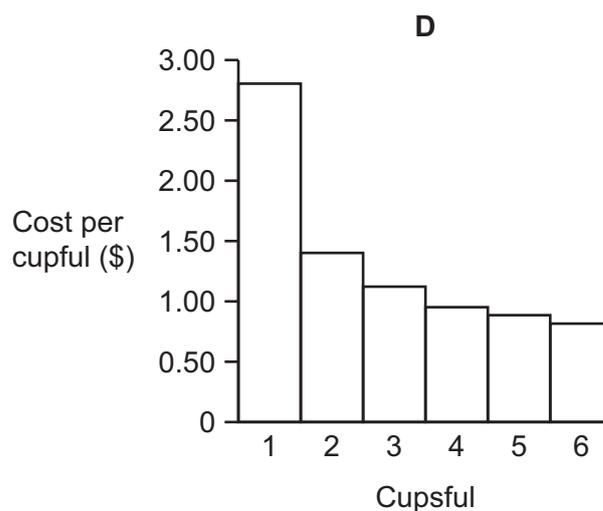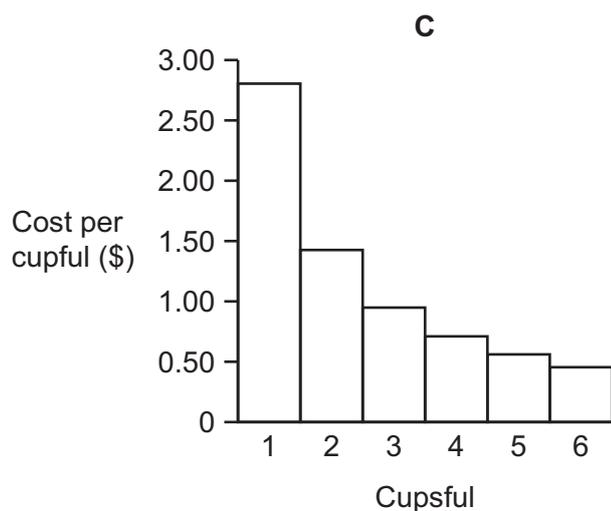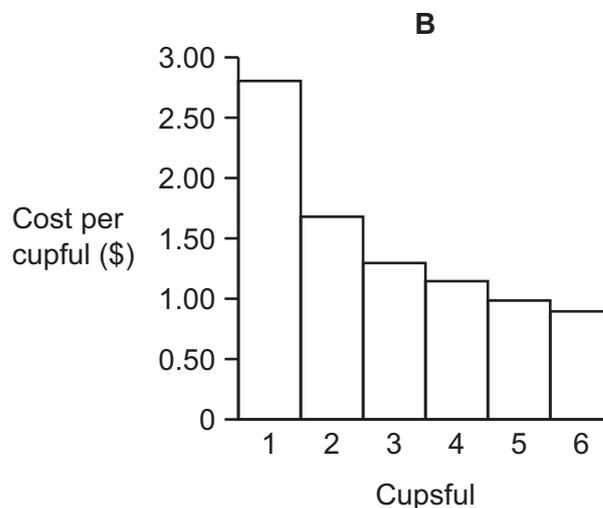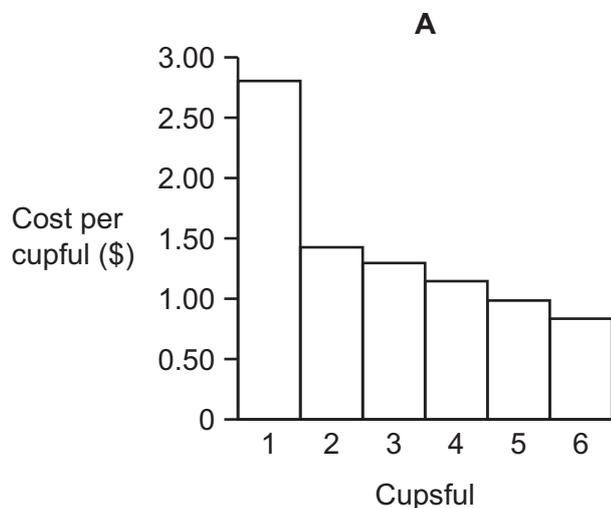
18 The car I now have requires a service after every 10 000 km.

I bought it from Agnes, who bought it from Jim, who bought it from Louise, who bought it from the original owner, Barry.

I'm told that each of the previous four owners had at least one service, and the log book shows that the services were all promptly done after the multiples of 10 000 km were reached. I've just bought it and it will need the 100 000 km service very soon.

What will the odometer read when I can be sure that at most one of the other drivers has driven it further than I have driven it?

A About 130 000 km

B About 140 000 km

C About 150 000 km

D About 160 000 km

19 Richard is going to travel by train to meet his friend, Frank, this weekend. He will have to change trains at Midtown. The trains from Richard's village to Midtown leave at quarter past and quarter to each hour and take between 45 and 55 minutes to reach Midtown. The trains from Midtown leave at 25 past each hour and take between 30 and 40 minutes to reach Frank's village. Richard needs to arrive at Frank's village by 1 pm.

What is the latest that Richard could leave to be sure to arrive on time at Frank's village?

A 10.15 am

B 10.45 am

C 11.15 am

D 11.45 am

20 This label on a coat in a clothes store caught my attention.

25% OFF
WAS $60   NOW $48
SAVE $16

Three of the four figures were correct, while one of them was a mistake.

Which one of the four figures on the label was the mistake?

A 16

B 25

C 48

D 60

21 A motoring journalist was writing an article on car colours. He had the results of a survey, but the percentages did not add to 100. However, the data were also shown as a pie chart with no labels.

Colour	Percent
Silver/grey	29
White	22
Black	21
Red	18
Blue	13
Other	7
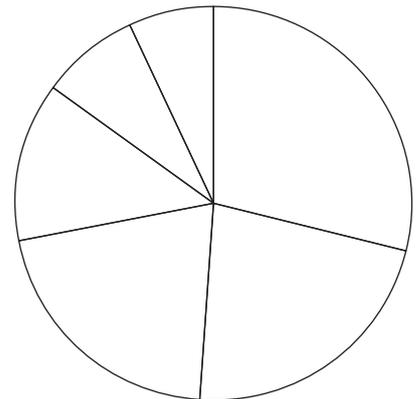
The pie chart is correct, but one of the values in the table is wrong. Which one?

A Black

B Blue

C Red

D White

22 Ruaridh sells T-shirts in Earls Court. He knows that any person from Australia or New Zealand is as likely as any other to be a customer, but he cannot distinguish between them from their accents. There are 20 million Australians and 4 million New Zealanders. One of his T-shirts gets a laugh from every New Zealander, but only one Australian in ten.

A customer who he can tell is from one of the two countries laughs at the T-shirt. What is the chance they are from New Zealand?

A 2/3

B 1/2

C 10/11

D 1/6

23 Ann, Beth, Chet, and Den took a test, but the teacher, in an attempt to get them to do some more thinking, did not give them their individual scores in the test but gave them the following pieces of information.

The combined score of Ann and Beth was 127.
The combined score of Beth and Chet was 145.
The combined score of Chet and Den was 134.

Which one of the following additional pieces of information would be sufficient to enable the students to deduce their individual marks?

A The combined score of Ann and Den was 116

B Beth scored 11 more than Den

C The total score of all four students was 261

D The combined score of Ann and Chet was 108

24 Aristotle drove his car at a constant speed from Metropolis to Supercity. He observed that every 30 minutes he overtook a bus travelling the same route. He knows that all buses travel at the same constant speed as each other.

Which one of the following could explain Aristotle's observation?

A There is a bus every 15 minutes and Aristotle travels at a speed that is 50% higher than the speed of the buses

B There is a bus every 15 minutes and Aristotle travels at twice the speed of the buses

C There is a bus every 20 minutes and Aristotle travels at a speed that is 50% higher than the speed of buses

**D** There is a bus every 20 minutes and Aristotle travels at twice the speed of the buses

25 I want to buy a box of chocolates as a gift for a friend. There are 5 different types of chocolate that I can choose. The prices are 2¢, 4¢, 8¢, 10¢ and 16¢ per chocolate. The box will hold 24 chocolates in total and I am allowed to select any combination of chocolates to fill the box. I will not necessarily buy all 5 types of chocolate, but I want to make sure that, for each type of chocolate I buy, there are at least 4 chocolates and no more than 6. I want the price of the box to be as close as possible to $1.50.

How far from $1.50 will the price of my box be?

A   0¢

B   4¢

C   6¢

D   10¢

26 Tom and Gerry had a painting job to do. They had to paint both sides of three doors. One door had to be green on both sides, another red on one side and yellow on the other, and the third had to be red on one side and blue on the other. Tom and Gerry each painted a side in twenty minutes. However, they could not both paint the same door at the same time, nor could they use the same colour paint at the same time. They managed to complete the whole job in an hour.

Which one of the following pieces of information about their painting must necessarily be true?

A   One red side was painted in the first twenty minutes

B   One green side was painted in the second twenty minutes

C   In at least one twenty-minute period, one green side and one red side were painted

D   The blue side and the yellow side were not painted at the same time

27 Three ordinary dice are placed on a wooden table, arranged as shown below. The numbers on the opposite faces of each die add up to 7.
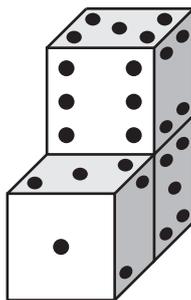
Which of the following could **not** be the total of the numbers on all of the faces visible from all directions (except below)?

A   38

B   39

C   40

D   41

28 The object of the sport of archball is to kick the ball towards a circular target that has a hole in its centre.

Two types of goal can be scored:

- A touch goal, worth 2 points, is scored when the ball makes contact with the target.
- A through goal, worth 5 points, is scored if the ball passes through the central hole.

Archball's Bowdance Cup has been won this year by Cambersly, beating Spandome 23 – 14 in last Saturday's final.

Which one of the following additional pieces of information is sufficient, by itself, for the total number of goals scored during last Saturday's match to be deduced?

A Cambersly scored more goals than Spandome

B Cambersly scored more touch goals than Spandome

C More touch goals than through goals were scored during the match

D Spandome scored more through goals than Cambersly

29
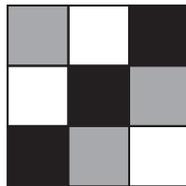
The diagram shows the tops of nine cubes placed together on a glass table. Each cube has two black, two white and two grey faces. Opposite faces are not of the same colour as each other.

Which one of the following diagrams is **not** a view of the bottoms of the cubes, as seen from anywhere under the glass table?

A	B	C	D

30 John and Robert planned to play tennis yesterday afternoon. John intended to leave home at 14:00 and walk to the tennis court. Robert left his home at 14:30 and cycled to the court. Robert cycles at twice John's walking speed.

Robert arrived at the tennis court at the time that John was expected to get there. However, John did not leave home until 14:30 but still walked at his usual speed. Robert waited for 15 minutes and then cycled home. When John reached the tennis court he phoned Robert, who had just arrived back at his home.

Which of the following statements about the distances that John and Robert live from the tennis court is correct?

A They live the same distance from the tennis court as each other

B John lives 1.5 times as far away from the tennis court as Robert

C John lives 2 times as far away from the tennis court as Robert

D John lives 3 times as far away from the tennis court as Robert

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