
THINKING SKILLS

9694/12

Paper 1 Problem Solving

May/June 2017

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.

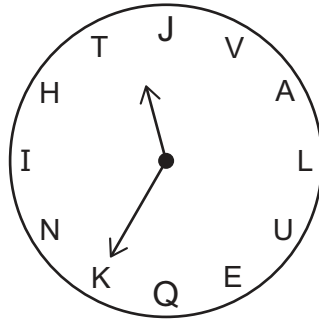
DO **NOT** WRITE IN ANY BARCODES.

INFORMATION FOR CANDIDATES

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

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

- 1 The advertising slogan of J Q Consultancy is “Think Value! Think J Q”. This is a clock on the wall of the consultancy’s office.



Although it started as a joke when the clock was first installed, it has become customary in the office to use the letters when referring to the time. For example, the time shown above is K to J.

Yesterday afternoon, Morgan left the office at V past A to visit a client, returning at N to U.

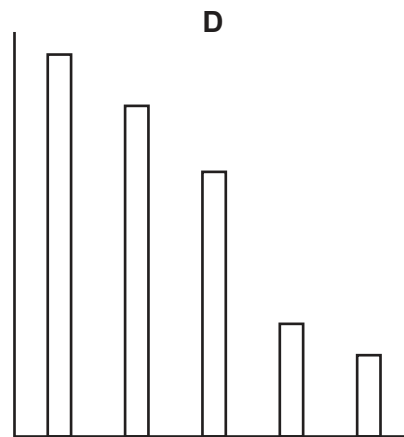
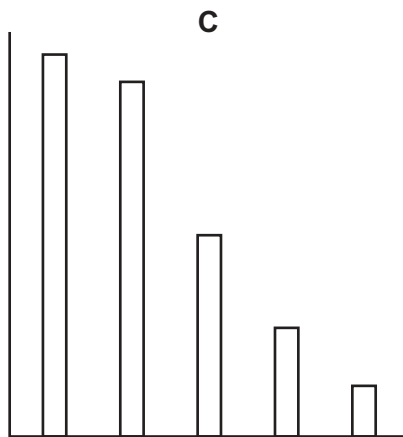
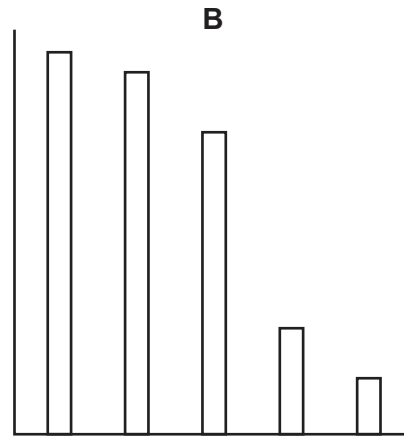
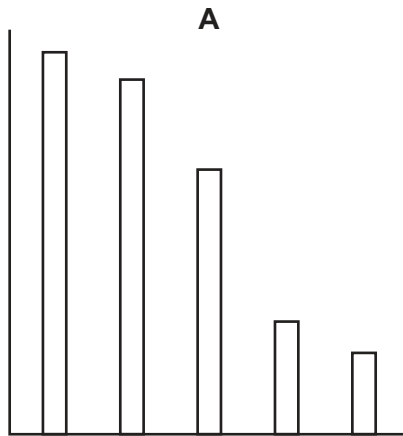
For how long was Morgan away from the office yesterday afternoon?

- A 1 hour 35 minutes
- B 2 hours 15 minutes
- C 2 hours 30 minutes
- D 3 hours 10 minutes

2 The votes cast for five candidates in an election were as follows.

Michael Jones	379
Jean MacAusland	101
Mick Johnson	78
Nilufer Develioglu	350
Myla Hecquet	260

If the candidates are arranged in descending order of votes, which one of these charts best represents the results?



- 3 David has a large number of passwords he needs to remember from the many internet accounts he has. Thinking it will be more secure, he uses an alternative alphabet to create the passwords required to access the different accounts.

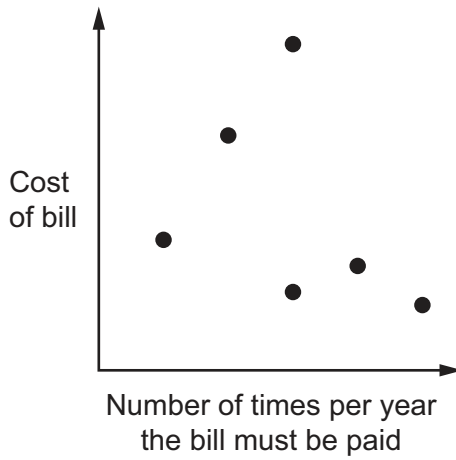
He uses a version of the Leet alphabet, shown in the table below, to create these passwords. So, for example, LEET could be translated as 1337. To access his electricity account online, he makes the password by translating his hint word EDISON using the Leet alphabet.

A	/\ or ^ or 4 or @	N	\\ or /V or \\ or / /
B	3 or 8 or o	O	0 or () or [] or {}
C	(or < or K or S	P	2 or D
D) or o or > or <	Q	(,) or kw
E	3	R	2 or Z or ?
F	= or ph	S	5 or 2 or \$
G	(or 9 or 6	T	+ or '[' or 7
H	_ or]_ or }_ or (-) or)_ or #	U	_
I	1 or or ! or][V	/ or \\\ or V or /
J	_	W	W or \\ or // or \\\ or \^/ or //
K	< or /< or \< or {	X	>< or }{
L	_ or or 1	Y	`/ or ' / or j
M	V or /^ or ' or (V) or ^ or / or /^	Z	2 or ()

If the word EDISON is translated and the numbers are added up, which one of the following totals is **not** a possibility?

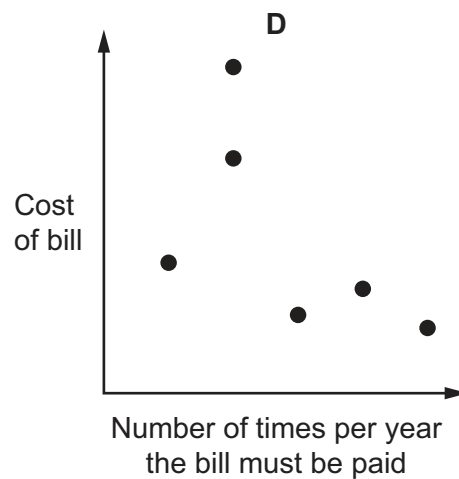
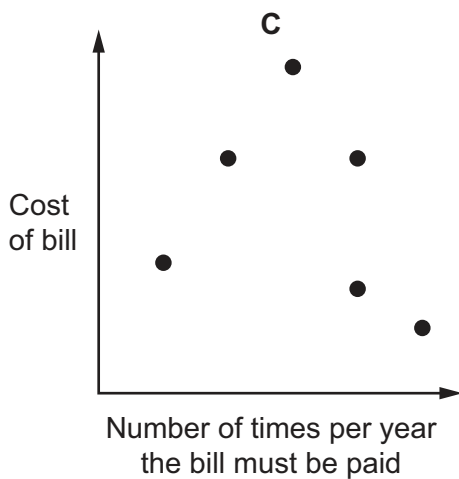
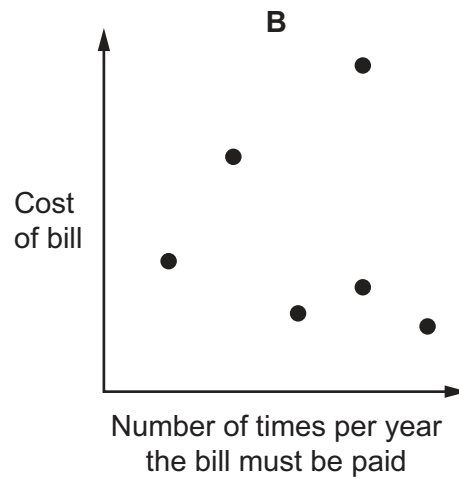
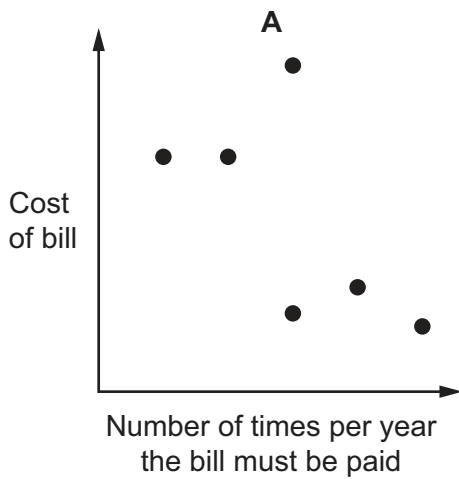
- A** 3
B 5
C 7
D 9

- 4 Fred has to pay regular bills for six services that are supplied to his house. He has drawn the following graph to show the cost of each bill and the number of times per year that he must pay that amount.



Unfortunately, one of the points on Fred's graph is in the wrong place. This means that Fred's graph suggests a higher total annual cost than is actually the case.

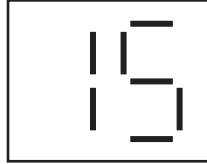
Which of these graphs could be the correct graph?



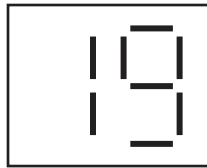
5 In the sport of Mizzeraball there are three ways of scoring points, as follows:

- a *loh* scores 2 points
- a *bayce* scores 4 points
- a *flawn* scores 5 points

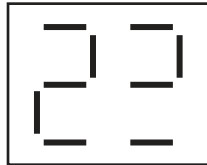
I went to watch the Royals play against the Jays yesterday, but I was late arriving. As I took my seat the digital scoreboard showed the Royals' score as



I was puzzled when they scored a *loh* and the board changed to



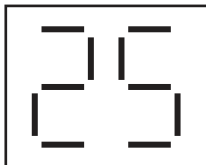
But when they followed this with a *bayce* and the board changed to



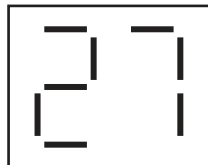
I realised that one of the elements was not working.

The Royals' next score was a *flawn*. What did the board show as a result of this?

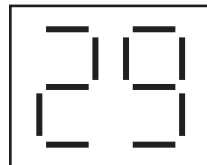
A



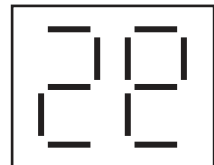
B



C



D



- 6 The Green Road car park has a capacity of 150 cars. It is open from 8 am to 6 pm and cars are not allowed to stay overnight. It is mainly used by commuters and shoppers. The table below shows the number of cars arriving and leaving in each one-hour period on a certain day.

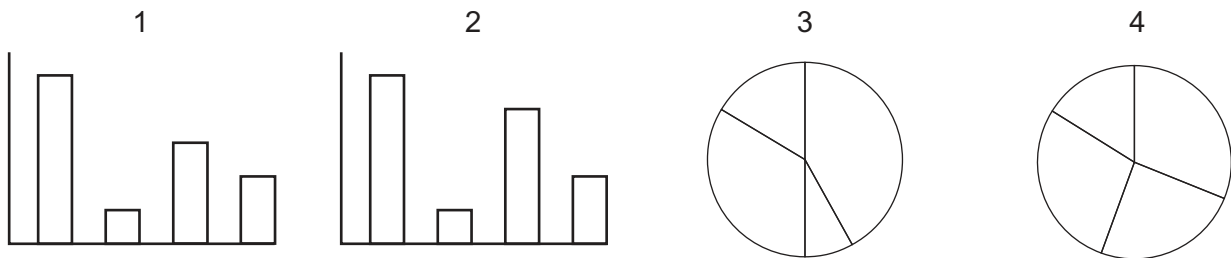
	<i>In</i>	<i>Out</i>
8 – 9 am	63	2
9 – 10 am	48	19
10 – 11 am	25	24
11 am – 12 noon	13	24
12 noon – 1 pm	7	15
1 – 2 pm	44	6
2 – 3 pm	23	11
3 – 4 pm	15	37
4 – 5 pm	9	52
5 – 6 pm	2	59

How many spaces were there in the car park at 1 pm?

- A 70
 B 72
 C 78
 D 80
- 7 Four businesses in a street receive the following number of letters on Monday:

30, 6, 24 and 12

Which of the following diagrams, suitably labelled, could represent this information?

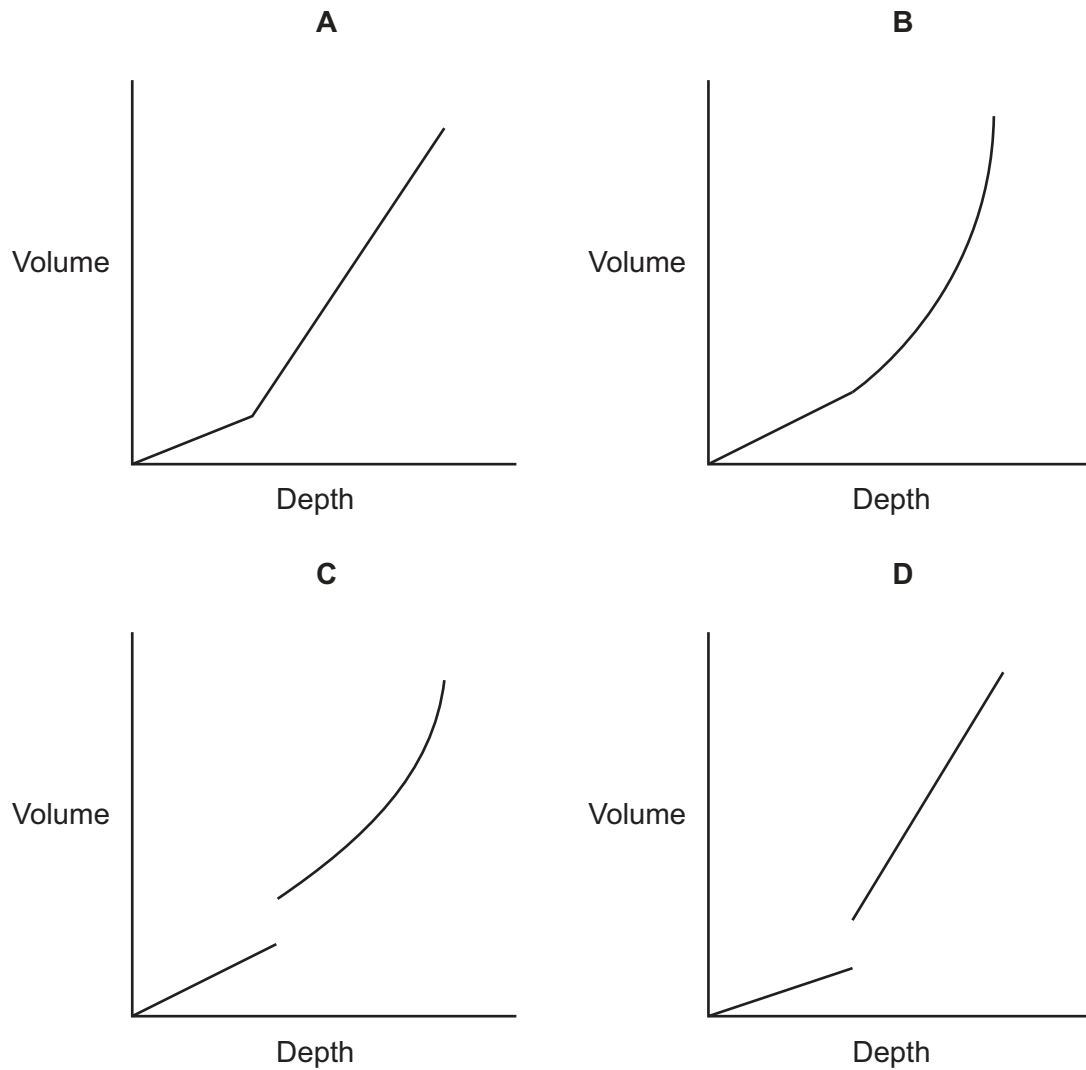


- A 1 and 3
 B 1 and 4
 C 2 and 3
 D 2 and 4

- 8 The new coffee cups we have are designed to be a better fit in the cup-holders in the car. They are circular, and look like this from the side:



How does the volume of coffee vary with the depth when the cups are upright?

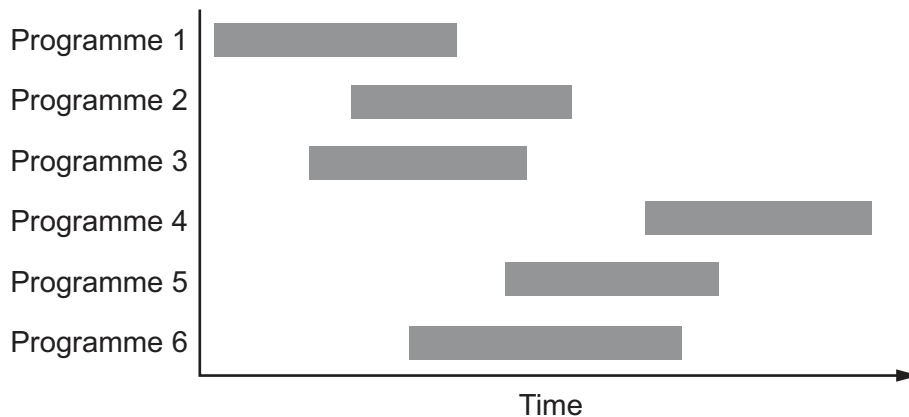


- 9 Eight consultants are available for a meeting on the days that are shown ticked in the table below. Their daily charges are also shown.

<i>Consultant</i>	<i>Cost per day</i>	<i>Monday</i>	<i>Tuesday</i>	<i>Wednesday</i>	<i>Thursday</i>
Alice	\$110	✓			✓
Barbara	\$140	✓	✓	✓	
Geoff	\$150	✓		✓	✓
Hugh	\$90		✓	✓	
Keiichi	\$100	✓			✓
Malcolm	\$180	✓	✓	✓	✓
Quentin	\$250	✓	✓	✓	
Sachi	\$130		✓		✓

I need any three consultants to attend the meeting. Which day can I arrange for the least cost?

- A Monday
 B Tuesday
 C Wednesday
 D Thursday
- 10 The diagram below shows when six TV programmes are broadcast during one evening.



Bill would like to record the whole of as many of these programmes as he can, but his video recorder can record only a maximum of two programmes at any one time.

What is the maximum number of these programmes that Bill can record in total?

- A 2
 B 3
 C 4
 D 5

- 11 I only go fishing when my grandson comes to visit me. We always use hook baits. They are expensive and come in packs containing 9, 10 or 11 hook baits. Whenever we go fishing, I always use exactly 4 hook baits. My grandson uses at least 6, but I will not let him use more than 9. We go fishing once or twice a week.

I only have 5 hook baits left, so I am going to the angling shop to get supplies.

What is the smallest number of packs I need to buy to make sure that I do not run out over the next four weeks?

- A 8
- B 9
- C 11
- D 12

- 12 Rowan, Sylvia, Tim and Ursula share an office. After last night's office party, some of them are not speaking to others of them.

Rowan will not speak to Sylvia but Sylvia will speak to Rowan.
Sylvia will not speak to Tim or to anyone else who will speak to Tim.
Ursula will speak to Tim but not to anyone else.

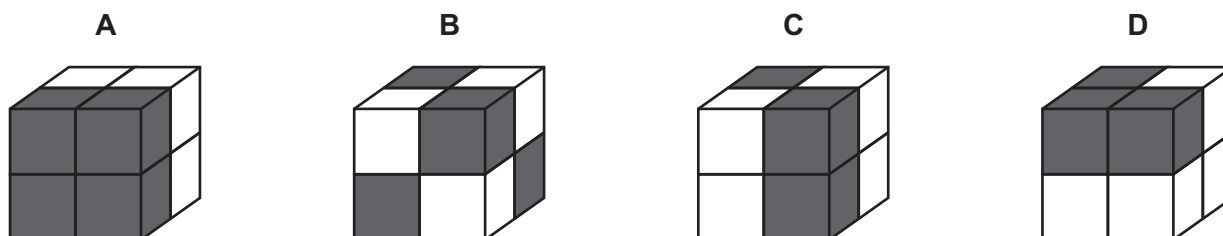
How many people will Sylvia speak to?

- A 0
- B 1
- C 2
- D 3

- 13 A large cube can be built out of these four bricks. Each brick consists of two small cubes bonded together; each small cube is either all white or all black.



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



- 14** When it was completed the Lötschberg Base Tunnel was the world's longest railway tunnel. The original plan was to have two tracks for the entire 48 km of the structure. However, to save money, only part of the tunnel was laid with two tracks. The tunnel now has a two-track section of 18 km; the rest of the tunnel has a single track only.

Trains travel through the tunnel at a speed of 180 km/h. Whenever the front of a train reaches the end of the single-track section there is a 5-minute delay before the next train can enter the single-track section.

What is the maximum number of times a train can pass through the tunnel in 24 hours?

- A** 68
 - B** 90
 - C** 96
 - D** 144
- 15** Mark and Gary work in the same office. Mark cycles to work at an average speed of 15 km/h. Gary walks to work at an average speed of 6 km/h. Mark lives 3 km further away from the office than Gary, but both of their journeys to work take exactly the same time.

How long does it take both Mark and Gary to get from their homes to work?

- A** 12 minutes
 - B** 20 minutes
 - C** 30 minutes
 - D** 50 minutes
- 16** A games league consists of 3 divisions, each of 12 teams: Division 1 (top), Division 2 (middle) and Division 3 (bottom). During a season, teams in Division 2 play each other twice. At the end of the season the top 2 teams are automatically promoted to Division 1. The next 4 teams play a knock-out competition. Third place plays sixth twice and fourth plays fifth twice. The winners of these pairs play each other once to find the third team to be promoted. The bottom 2 teams, eleventh and twelfth, play each other twice to decide which team is relegated to Division 3.

What is the total number of games played in a season by Division 2 teams?

- A** 136
- B** 137
- C** 138
- D** 139

- 17 Peter, Quentin and Roger want to weigh themselves, but the only weighing machine that they have access to has a dial which is scratched, so that all weights less than 150 kg are unreadable. They decide to weigh pairs of people, and obtain the three readings 178 kg, 180 kg and 184 kg.

Which of the following is the weight of one of the three people?

- A 89 kg
 - B 90 kg
 - C 91 kg
 - D 92 kg
- 18 My average speed from Berkeley to Denver was 40 kilometres per hour, but that included a 30-minute rest-break, during which the car was stationary.

Which one of the following pieces of information alone would enable calculation of the average speed of my journey **excluding** the rest-break?

- A The average speed before the rest-break and the average speed after the rest-break
 - B The distance travelled before the rest-break and the time taken after the rest-break
 - C The time up to the rest-break and the average speed after the rest-break
 - D The total time taken including the rest-break
- 19 Part of training for an assault course involves repeatedly running between two points 10 metres apart. One cycle involves running from the start point to the other point and back again. Five cycles make up one set, and each set must be completed within a specified time limit. The next set begins immediately after the time allowed for the previous set has elapsed. The time limit is reduced by 1 second from one set to the next. There are five sets, and the time limit for the last set is 18 seconds.

What is the overall average speed for a runner who completes all five sets exactly to their time limits?

- A 2.5 m/s
- B 3.6 m/s
- C 5.0 m/s
- D 5.6 m/s

- 20** The best way to travel from the Swiss town of Thun to the Loeschental Valley by car is to drive to the village of Kandersteg and take the car-train to Goppenstein. Each train carries 70 cars and the service runs every 12 minutes in each direction. The first trains leave at 05:00. Each train takes 4 minutes to unload and 4 minutes to load. As many as 600 cars queue for these trains at weekends. The train journey to Goppenstein takes 20 minutes.

Arriving at the Kandersteg queue at 16:55, John is told that there will be 420 cars queuing ahead of him once the next train has left. The service continues to run without any delays.

At what time will he arrive at Goppenstein station?

- A** 18:24
 - B** 18:32
 - C** 18:44
 - D** 18:56
- 21** I have a lawn at the front of my house and one at the back. Both lawns are rectangular, with all edges a whole number of metres, and each has an area of 120m^2 , so it takes me the same amount of time to mow both of them.

However, the perimeter of the back lawn is 12 m greater than the perimeter of the front lawn, so it takes me longer to trim the edges of the back lawn than the front lawn.

What is the difference between the length and the width of the back lawn?

- A** 7 m
 - B** 9 m
 - C** 14 m
 - D** 19 m
- 22** Pat and Sam live next door to each other and both work at the same factory, 6 km from their homes. Pat leaves each morning 10 minutes before Sam and cycles to work. Sam drives to work by the same route at twice the speed and arrives 5 minutes before Pat.

How far from the factory is Pat when Sam arrives at work?

- A** 1 km
- B** $1\frac{1}{3}$ km
- C** $1\frac{1}{2}$ km
- D** 2 km

- 23 Small and large rowing boats can be hired out for different lengths of time at different rates (cost per hour). Each person is required to wear a life jacket, so one life jacket must be hired for each person. Extra charges are made for oars and cushions, as shown in the table below.

	<i>Cost per hour</i>		
	<i>0 – 3 hours</i>	<i>3 – 6 hours</i>	<i>6 – 9 hours</i>
<i>Small rowing boat</i>	\$4.00	\$3.50	\$3.00
<i>Large rowing boat</i>	\$6.50	\$6.00	\$5.50
<i>One life jacket</i>	\$0.50	\$1.00	\$1.50
<i>One oar</i>	\$1.00	\$0.50	\$0.50
<i>One cushion</i>	\$1.00	\$1.00	\$0.50

Sally and six friends take a large rowing boat with four oars for five hours. Each person has a cushion.

What is the total cost?

- A** \$22.00
- B** \$42.50
- C** \$100.00
- D** \$110.00

- 24 Dionysius has invented a new remote control vehicle that he uses to carry small essential items between two places 50 km apart. The vehicle has four modes with different speeds and different fuel usage. Dionysius can switch the vehicle from one mode to another at any time on any trip. These modes are summarised in the table below.

<i>Mode</i>	<i>Speed (km/h)</i>	<i>Fuel cost (\$ per km)</i>
1	20	0.5
2	40	1.0
3	60	1.5
4	80	2.0

Dionysius wants the journeys never to take more than an hour, but wants to keep fuel costs as low as possible.

What is the lowest possible fuel cost for any trip taking no more than an hour and using only two modes?

- A \$62.50
 B \$65.00
 C \$67.50
 D \$70.00
- 25 Frankie took a multiple-choice test in which there were 10 questions. He gave an answer to each of the 10 questions. His total score was 10 marks.

Which of the following could **not** be the scoring system for this test?

- A Award 3 marks for a correct answer, deduct 1 mark for an incorrect answer
 B Award 3 marks for a correct answer, deduct 2 marks for an incorrect answer
 C Award 4 marks for a correct answer, deduct 2 marks for an incorrect answer
 D Award 4 marks for a correct answer, deduct 3 marks for an incorrect answer

- 26** A non-stop train service connects Parlour and Scullery, the two largest towns in Roomania. The journey distance is 57 kilometres.

Trains depart from the stations at Parlour and Scullery simultaneously, once an hour. Their speed is restricted to 30 kilometres per hour while they are within 3 kilometres of Parlour station, and 45 kilometres per hour while they are within 3 kilometres of Scullery station; otherwise they travel at 90 kilometres per hour.

How far from Parlour station are the two trains when they pass each other?

- A** 22 kilometres
 - B** 24 kilometres
 - C** 27 kilometres
 - D** 28 kilometres
- 27** The holiday resort of Goldensand has a beach that is 1000 metres long and runs from north to south. Holidaymakers are always spread out evenly along the full length of the beach. The sun is so hot that when a sunbather buys an ice cream they always buy from the ice cream seller situated nearest to them.

Joe, an ice cream seller, is deciding where to put his stall. There are currently two other sellers on the beach. *Nicest Ices* is situated 300 metres from the northernmost end of the beach, and *Classy Cones* is 200 metres from the southernmost end. Joe wants to position his stall so that he sells as many ice creams as possible.

Where should he place his stall?

- A** At the very northernmost point of the beach
- B** Just to the north of *Nicest Ices*
- C** Either just to the south of *Nicest Ices* or just to the north of *Classy Cones*
- D** 450 metres from the south end of the beach

- 28 When applying for a new job, in April 2013, 47-year-old Philippa had to give her date of birth in the form DD/MM/YYYY and state her current age. In doing so, she found herself using all ten different digits.

In which month of the year is Philippa's birthday?

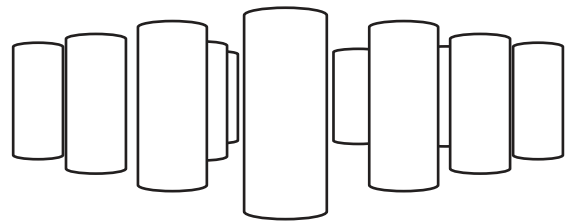
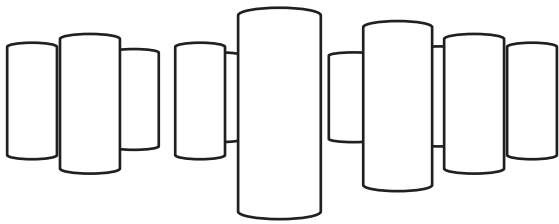
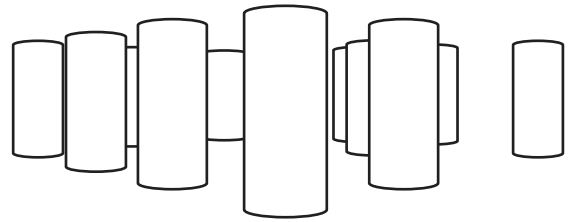
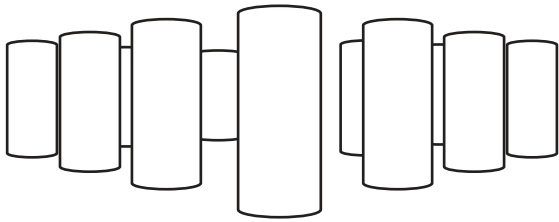
- A March
 - B May
 - C June
 - D August
- 29 James owns a business making furniture. Whenever he sells any piece of furniture he calculates the total cost of the materials, adds the amount that he had to pay an employee to make the piece of furniture, and then increases this total by \$5. He has three employees: two of them are each paid at a rate of \$4 per hour and the third is paid at \$6 per hour.

Last week he had two identical pieces of furniture made, but because of the way he calculates the price, one of them was \$1 more expensive, even though the materials cost the same. The one that was sold at the cheaper price was made in exactly 1 hour.

Which of the following could **not** be the amount of time taken to make the more expensive piece?

- A 50 minutes
- B 70 minutes
- C 75 minutes
- D 105 minutes

- 30 16 Cylinders are placed on a table, equally spaced and arranged in a 4×4 square. A number of cylinders are removed and the resulting view from each of the four corners of the arrangement is shown below.



How many cylinders remain on the table?

- A 12
- B 13
- C 14
- D 15

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