

THINKING SKILLS

9694/12

Paper 1 Problem Solving

October/November 2019

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 **20** printed pages.

- 1 The price for hiring a car is determined by the number of days for which it is to be hired and the number of people who will be using it. The table below shows the prices for groups of up to 5 people hiring cars for up to 7 days.

<i>Number</i>	<i>1 day</i>	<i>2 days</i>	<i>3 days</i>	<i>4 days</i>	<i>5 days</i>	<i>6 days</i>	<i>7 days</i>
1 person	\$3	\$5	\$7	\$9	\$10	\$12	\$13
2 people	\$3	\$5	\$7	\$9	\$12	\$13	\$15
3 people	\$4	\$6	\$8	\$10	\$12	\$13	\$15
4 people	\$5	\$7	\$9	\$10	\$13	\$14	\$16
5 people	\$6	\$8	\$10	\$12	\$14	\$16	\$18

Patrick is part of a group of 5 people on a holiday for 5 days. They will be going on outings each day, and had planned to hire one car for all of them for all 5 days. However, two of the group will only be there for the first 3 days, so an alternative is to hire one car for this period and another for the final two days.

What will be the difference if they choose this alternative?

- A** It will be \$5 cheaper
B It will be \$2 cheaper
C It will be \$2 more expensive
D It will be \$5 more expensive
- 2 A newsagent sells four different puzzle magazines. Information about these magazines is given in the following table.

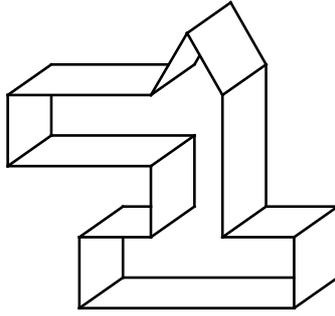
<i>Title</i>	<i>Number of puzzles per edition</i>	<i>Cost per edition</i>	<i>Frequency of publication</i>
Puzzlemania	64	\$3.20	Every 2 weeks
Thinking Today	30	\$2.40	Every week
Number Crunch	30	\$1.80	Every 4 weeks
Mathematical Genius	40	\$3.40	Every week

Jemina went into the newsagent yesterday to buy one of these magazines. She chose the one that offered her the least cost per puzzle.

Which magazine did Jemina choose?

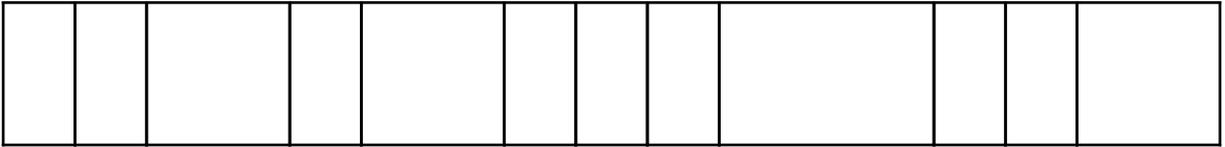
- A** Puzzlemania
B Thinking Today
C Number Crunch
D Mathematical Genius

3 A rectangular strip of card is folded to make the following shape.



Which one of the following cards, if folded along the lines indicated, could result in this shape?

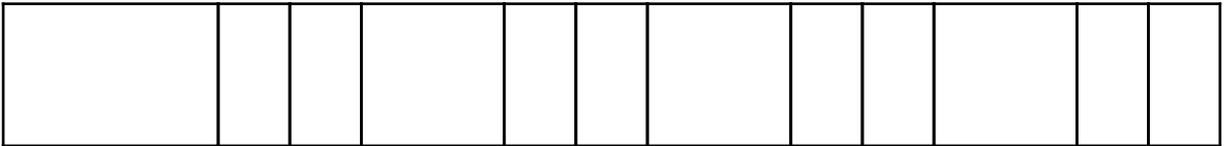
A



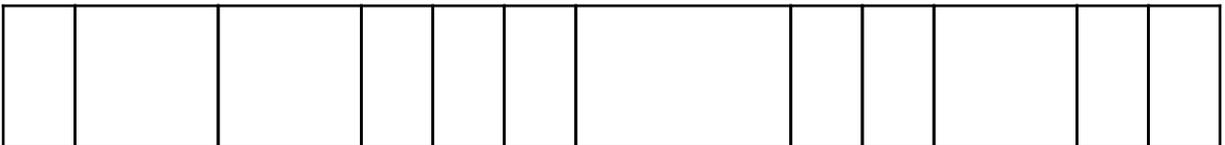
B



C



D



- 4 Mrs Jones has recently sought quotes to build a fence from five companies. The companies charge similar prices for each item. Unfortunately, her young son cut four of the quotes in half while playing with scissors. She has one complete quote, shown below.

Varnish	82.00
Wood	410.00
Nails	25.00
Posts	250.00
Cement	50.00
Labour	200.00

The 8 halves of quotes have been labelled P, Q, R, S and 1, 2, 3, 4.

3	R	1	S
72.00	Labour	62.00	Cement
400.00	Wood	22.50	Posts
28.00	Nails	234.00	Nails
50.00	Posts	412.00	Wood
240.00	Cement	30.00	Varnish
195.00	Varnish	250.00	Labour

2	P	4	Q
175.00	Varnish	60.00	Varnish
390.00	Wood	240.00	Nails
25.00	Nails	30.00	Posts
256.00	Cement	450.00	Wood
55.00	Posts	84.00	Cement
88.00	Labour	225.00	Labour

Which of the following solutions matches the correct halves of the quotes?

- A** P2 Q4 R3 S1
B P4 Q1 R2 S3
C P3 Q1 R2 S4
D P1 Q2 R1 S3

5

ERIC'S TAKEAWAY MENU	
Cod and chips	\$4.20
Plaice and chips	\$5.40
Sausages and chips	\$2.40
Peas (per portion)	\$1.40
Chips (per portion)	\$1.60

TODAY'S SPECIAL
5% discount when 4 meals purchased at the same time

On his way home from work, David stopped at Eric's Takeaway shop to buy an evening meal for his family. David decided to have cod and chips with a portion of peas. He also bought plaice and chips, with peas, for his wife Cindy and sausages and chips for each of his sons, Jamie and Kevin. Since all the family love chips, David also bought two extra portions of chips for them to share.

How much did David have to pay?

- A \$16.32
- B \$17.86
- C \$19.38
- D \$20.40

- 6 I want to cut 10 identical rectangles, each 6 cm x 10 cm, from rectangular plastic boards that are 15 cm x 20 cm. Each of the 10 rectangles must be cut out as one piece – joins are not allowed.

What is the smallest number of plastic boards that I can use?

- A 2
- B 3
- C 4
- D 5

7 In a restaurant recently, I received the following bill:

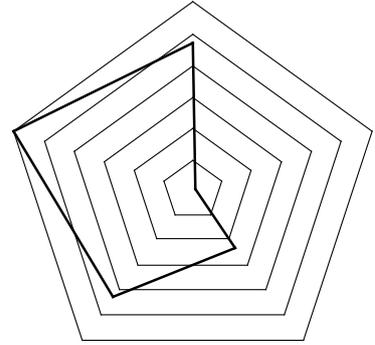
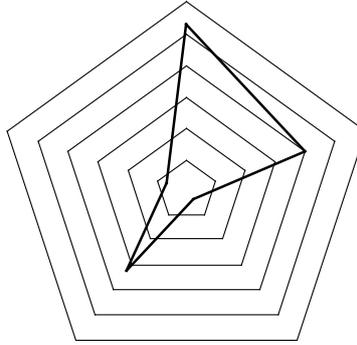
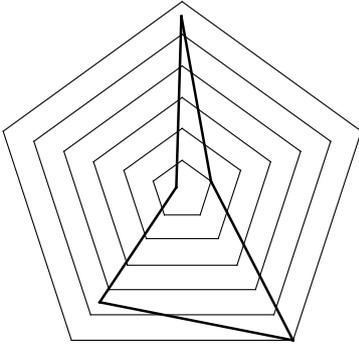
Starter	\$7.00
Main Course	\$20.75
Dessert	\$9.75
Drink	\$4.50
Service Charge	\$5.25
TOTAL	\$47.25

What percentage of the cost of the food and drink had been added to the bill as the service charge?

- A 11.1%
- B 12.5%
- C 14.0%
- D 15.0%

- 8 Ed wants to represent his favourite superheroes using graphs. The data for his favourite superheroes is listed below along with three of the four graphs.

	<i>Fiesto</i>	<i>Carnoror</i>	<i>Sgirk</i>	<i>Powfist</i>
<i>Honour</i>	43	45	32	10
<i>Strength</i>	47	56	53	18
<i>Speed</i>	23	60	4	31
<i>Agility</i>	1	10	39	11
<i>Stealth</i>	60	2	7	3



Which superhero's graph has yet to be drawn?

- A Fiesto
- B Carnoror
- C Sgirk
- D Powfist

9 A recipe for tarte Tatin requires:

- 500 g pastry
- 800 g apples
- 100 g caster sugar
- 100 ml apple juice
- 6 g of vanilla
- 50 g of butter

Amber, Bekim, Cairo and Darcy have the following quantities of each ingredient:

	Amber	Bekim	Cairo	Darcy
Pastry (g)	2000	3000	2000	2500
Apples (g)	3200	3000	3500	4000
Caster sugar (g)	400	400	400	300
Apple juice (ml)	350	500	200	600
Vanilla (g)	24	20	12	24
Butter (g)	200	100	200	800

Who can make the largest tarte Tatin?

- A Amber
 - B Bekim
 - C Cairo
 - D Darcy
- 10 Many people were worried when they found that their photocopiers had been sometimes changing numbers; one photocopier sometimes, although not always, changed 6 into 8.

A list of prices was copied on this photocopier. The first five prices on the copy are shown below.

- \$54.80
- \$60.00
- \$85.40
- \$70.80
- \$78.20

In the original list, the prices had increased by the same amount each time.

What was the next price on the original list?

- A \$81.60
- B \$81.80
- C \$83.60
- D \$85.60

11 A tramway links the towns of Peaford and Yubridge.

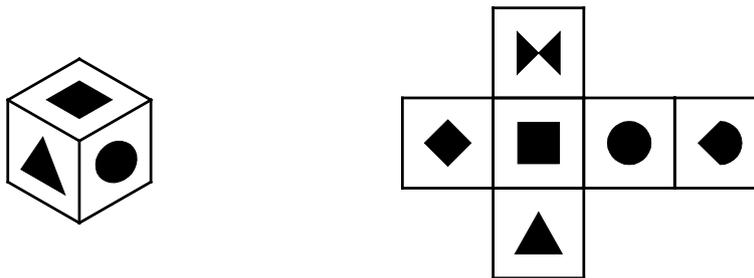
The daily timetable is shown below.

Peaford to Yubridge			
Peaford	08:00	then every 15 minutes until	19:30
Kewham	08:14		19:44
Arcaster	08:26		19:56
Essley	08:40		20:10
Teedon	08:57		20:27
Yubridge	09:09		20:39
Yubridge to Peaford			
Yubridge	08:00	then every 15 minutes until	19:30
Teedon	08:12		19:42
Essley	08:29		19:59
Arcaster	08:43		20:13
Kewham	08:55		20:25
Peaford	09:09		20:39

Which is the only station from which two trams depart in opposite directions at the same time as each other?

- A Kewham
- B Arcaster
- C Essley
- D Teedon

12 A die and its net are shown below.



The die is rotated a half turn about each of the three axes in succession.

Which face is on the top of the die as a result?



- 13** Max comes from Belize, one of the few countries to use the month/day/year form for writing dates rather than day/month/year. His date of birth was written 5/4/1996 but mistaken to be 5th April instead of 4th May.

How many days in a year give a valid but different date when read the wrong way?

- A** 66
 - B** 72
 - C** 132
 - D** 144
- 14** William buys a bus ticket every day, Monday to Friday, for \$2.50. The bus company has just introduced a card which can be bought to get a discount on all bus fares. Each card is valid for 4 weeks. William has worked out that he will pay exactly the same amount if he gets the card as he will if he continues to buy tickets at the normal price.

Which of the following could be the price and discount for the card?

- A** \$5 for the card and a discount of 10% on ticket prices
 - B** \$5 for the card and a discount of 50% on ticket prices
 - C** \$10 for the card and a discount of 50% on ticket prices
 - D** \$10 for the card and a discount of 80% on ticket prices
- 15** Mr and Mrs Porter drove down to see Sweeney. Mr Porter drove the first 20 km on the way there, and Mrs Porter drove the rest of the way. On the return journey, she drove the first 30 km and he drove the rest.

How much farther did Mrs Porter drive than Mr Porter?

- A** No farther
- B** 10 km
- C** 20 km
- D** There is not enough information to work it out

16 Here are three mobile phone tariffs.

Alphacom

\$20/month
100 mins free
20¢/min after

BigTel

30¢/min for the
first 100 min.
Free thereafter

Comwire

No contract!
25¢/min all day,
every day!

For what range of monthly usage times is Alphacom cheapest?

- A 0 to 80 minutes
- B 80 to 150 minutes
- C 100 to 160 minutes
- D more than 150 minutes

17 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 send both my messages to?

- A** 122 000 000
- B** 205 000 000
- C** 223 000 000
- D** 320 000 000

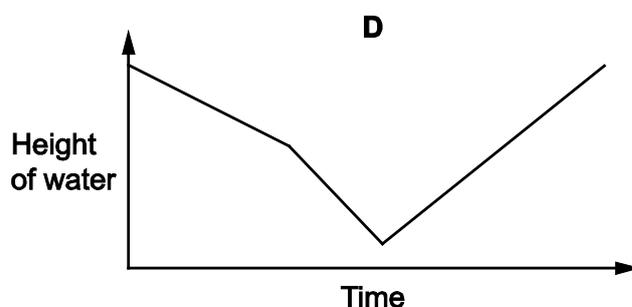
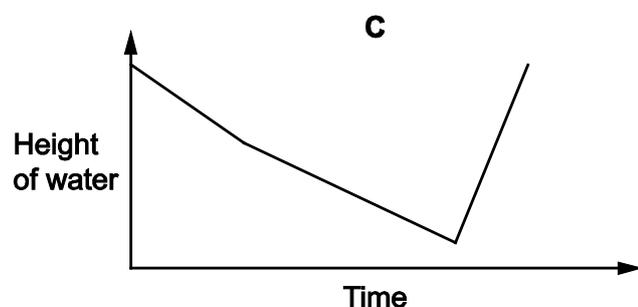
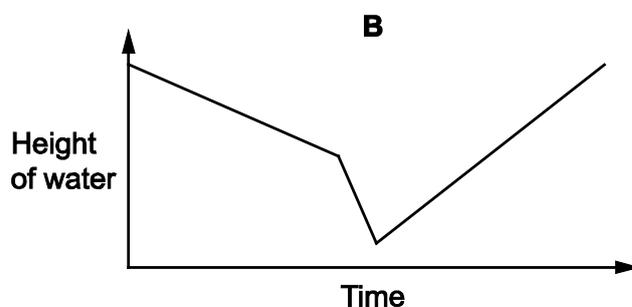
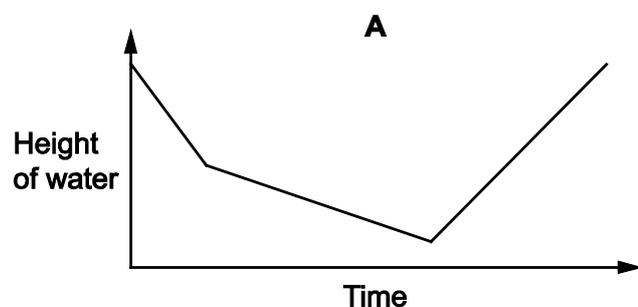
- 18 There are two identical hills with a road between them. Bill lives at the foot of one of the hills and Ben lives at the foot of the other. They compete with each other to see who can run from one house to the other in the shorter time. They both take twice as long to run up a hill as they do to run down one and can run the distance between the hills in 6 minutes. Bill can make the journey 3 minutes quicker than Ben.



Given Ben can run to Bill's house in 30 min, how long does it take Bill to run up a hill?

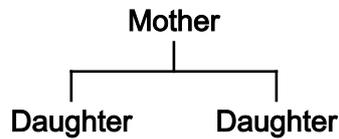
- A 3.5 minutes
 B 7 minutes
 C 10.5 minutes
 D 14 minutes
- 19 A container is in the form of a cylinder. On the base of the container there is a tap and initially the container is full of water. Jenny opens the tap and water begins to leave the container at a constant rate. When the cylinder is half full, Jenny begins to pour water in at the top of the container at a constant rate that is 0.75 times the rate at which water is leaving via the tap. When the cylinder is nearly empty, Jenny closes the tap, but continues to pour water in at the same constant rate as before, until the container is full again.

Which of the following graphs best represents the height of the water in the container over time?

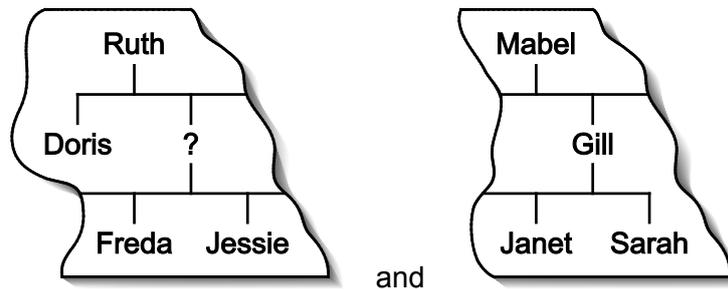


- 20 Sonya's research on her family tree has only been partially successful. Inheritance in her tribe follows the female line, so only the females were recorded; but there were no dates. She has found two fragments of documents from long ago. The information is far from complete and there may be some daughters missing, but she is confident that no two people would have had the same name.

These family trees use the standard convention that the parent appears above her children:



The two fragments which Sonya has found are:



Which of the following extra pieces of information, if true, would enable Sonya to know the name of Gill's grandmother?

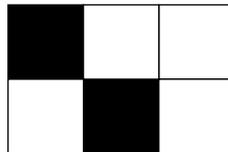
- A Ruth was Janet's grandmother's grandmother
- B Mabel and Jessie were sisters
- C Sarah and Ruth were sisters
- D Gill and Freda were sisters

- 21 Colin likes to support local artists, but also likes to think he can pick artists whose work will increase in value. He has up to \$8000 to spend on paintings and is limiting his choice to the paintings in the table below. The table gives the price he would have to pay for the painting, and the amount Colin thinks its value will increase by before his planned sale of paintings in three years' time. He will buy paintings so as to make his expected increase in value as large as possible.

<i>Title</i>	<i>Artist</i>	<i>Price (\$)</i>	<i>Expected increase in value (\$)</i>
Artichokes	Alban Ache	1000	500
Blue Boil	Betty Blue	1500	700
Calm Chaos	Curly Collar	2500	1000
Dirt on Dog	Deidre Den	3000	1400
Eels	Edna Elastic	4000	2100
Foolsmate	Fiona Fresh	5000	2400

By how much in total does Colin think that the paintings he intends to buy will increase in value?

- A \$3800
 B \$3900
 C \$4000
 D \$4200
- 22 A company makes wall tiles. They have a new range of rectangular tiles, each 24 x 16 cm. Each tile is divided into 6 squares and two of the squares are coloured black, the rest being white. One is shown below.



The tiles may be rotated through 180 degrees to use.

How many different tiles are there?

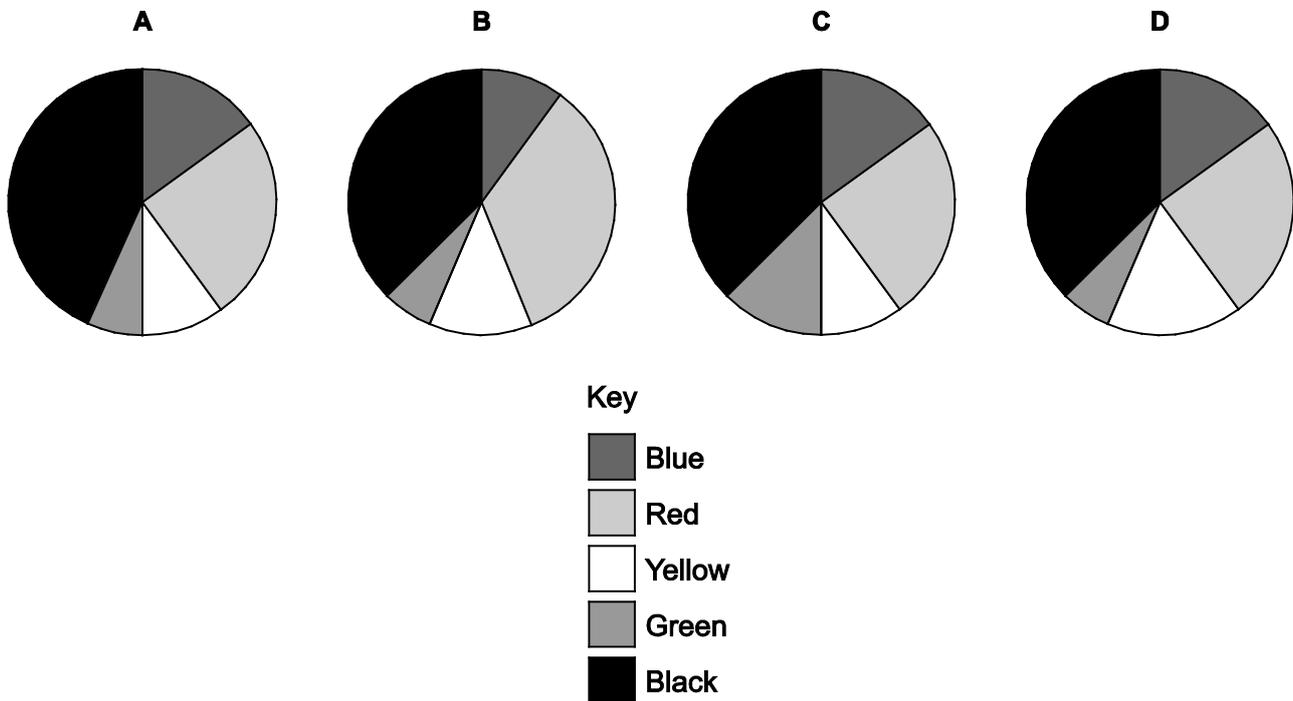
- A 6
 B 9
 C 15
 D 17

23 The results of the recent election were as shown in the table below.

Blue	Red	Yellow	Green	Black
12	20	8	5	30

After the results were announced, a further 5 votes were found.

Which of the following charts could **not** correctly show the results of the election when the extra 5 votes were included?



24 Amy, Bess and Curly were the three candidates for election to President of the Gumley Players. The voting system is a little unusual. A voter can choose either to give 5 points to one candidate and 0 to the other two, or to give 4 points to one candidate, 2 points to another and 0 to the third. Twenty people voted and the total points scored by each candidate were as follows:

<i>Candidate</i>	<i>Total points</i>
Amy	60
Bess	36
Curly	7

Amy was elected and it turned out that 13 of the voters gave her points.

How many voters gave 5 points to Bess?

- A** 2
- B** 4
- C** 6
- D** 7

- 25** At a café, 2 cakes, 3 biscuits and 4 cups of tea cost a total of \$16.60.

Which of the following pieces of additional information, by itself, would allow you to calculate the cost of a biscuit?

- A** The total cost of 1 cake and 2 biscuits
 - B** The total cost of 1 biscuit and 2 cups of tea
 - C** The total cost of 1 cake and 2 cups of tea
 - D** The total cost of 2 biscuits and 1 cup of tea
- 26** Each day I eat lunch at my own house, my aunt's house or my sister's house. During the last 11 days I ate lunch at least once at each person's house. I ate lunch twice as many times at my aunt's house as at my own house.

Which piece of information, by itself, would enable you to work out how many days I ate lunch at my sister's house?

- A** I ate lunch at my sister's house more times than at my own house
 - B** I ate lunch at my sister's house an odd number of times
 - C** I ate lunch at my aunt's house an even number of times
 - D** I ate lunch at my sister's house more times than at my aunt's house
- 27** Gemma is hosting a party for 12 children. She wants to give each child a bag of marbles containing 2 silver marbles and 10 blue marbles. A retailer, Ahmed, mixes together silver and blue marbles and sells them in jars. Each jar contains at least 28 and at most 30 marbles. Ahmed also makes sure that, of the marbles in each jar, at least 6 and at most 8 are silver.

How many jars of marbles does Gemma need to buy to ensure she has enough for her party?

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

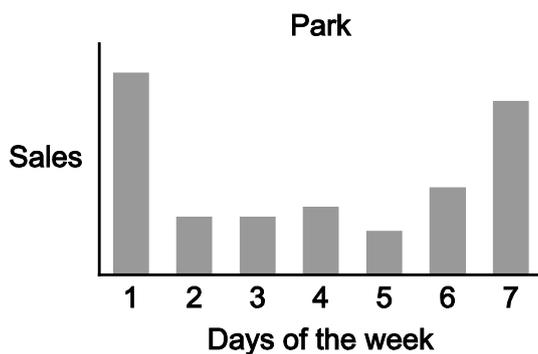
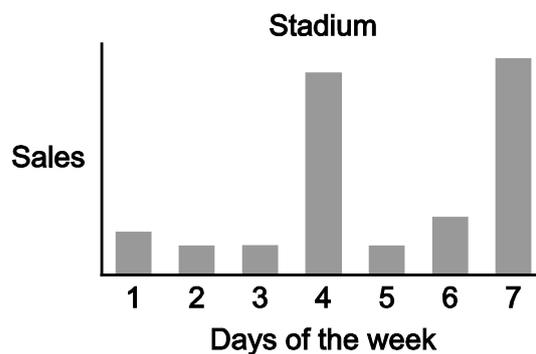
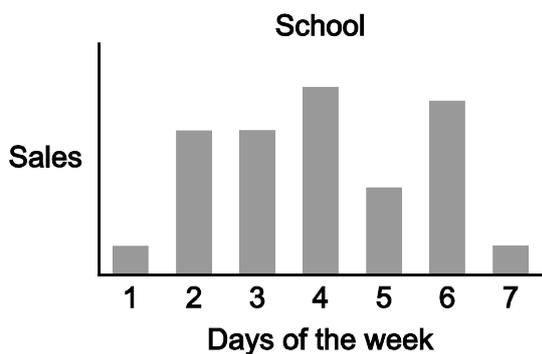
- 28** Peter has forgotten the code that he needs to release the electronic lock on his safe. The code contains four digits and Peter knows that it is one of 3854, 5426, 8541, 8524 and 4138. The safe will unlock as soon as the correct 4 digits are entered in order, consecutively, even if other incorrect digits have previously been entered.

Peter writes down a sequence of digits which is guaranteed to release the lock.

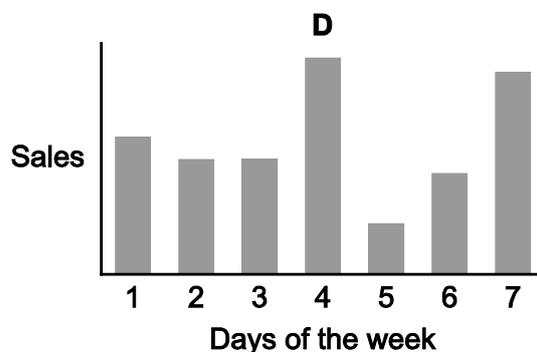
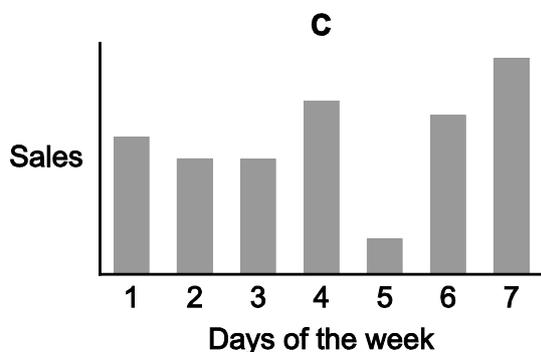
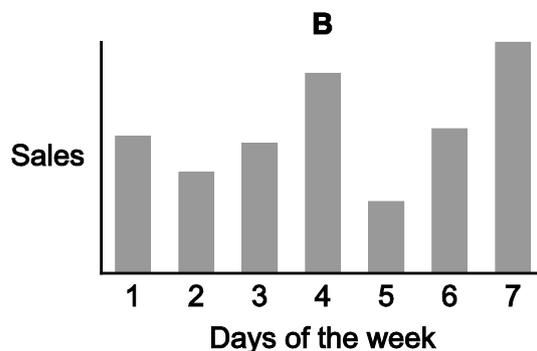
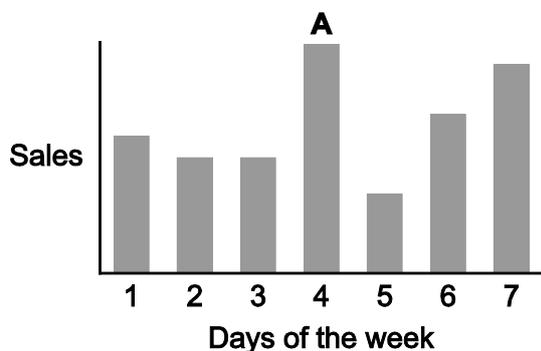
What is the smallest number of digits there could be in Peter's sequence?

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

29 *Freddo's Ices* has three outlets where ice cream is sold. One is near a school, another in a park, and the third outside a football stadium. Sales at each outlet for every day last week are shown in the charts below. The charts were not necessarily drawn to the same scale.



Which one of the following could represent the total of sales at all three outlets?



- 30** A road has two sets of traffic lights, which alternate between red and green. The first set is red for 15 seconds and green for 40 seconds. The second set is red for 35 seconds and green for 15 seconds. It takes a car 60 seconds to travel between the first and second set.

A pedestrian sees both sets of lights change to red at the same time. How long does he have to wait until he sees a car that is just stopped by the first set turning red which will go on to be just stopped by the second set turning red?

- A** 235 seconds
- B** 275 seconds
- C** 290 seconds
- D** 385 seconds

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