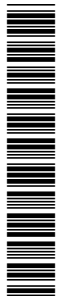**THINKING SKILLS** **9694/11**

Paper 1 Problem Solving **May/June 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.

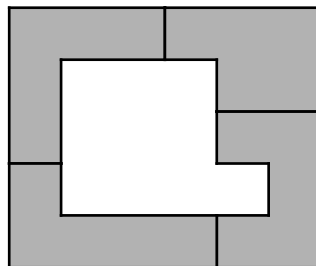This document consists of **22** printed pages and **2** blank pages.

[Turn over

1 Different types of watches lose accuracy at different rates, as shown in the table below.

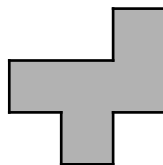| Type of watch	Seconds gained/lost per 24 hours		
	Worst	Typical	Best
Vintage mechanical	±60	±15	±5
Modern mechanical	±10	±5	±2
Modern quartz	±2	±1	±0.1

Marcello has one watch of each type. He synchronises them so that they all show exactly the same time.

What is the biggest difference there could be between the times shown on two of the watches after 24 hours?
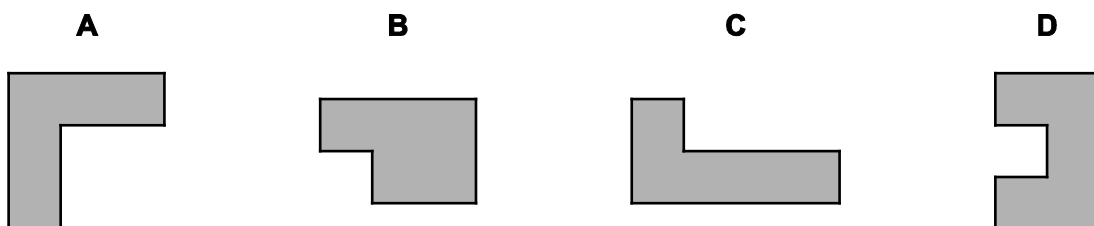
A 10 seconds

B 20 seconds

C 50 seconds

D 70 seconds

2 A pentomino is a tile made up of 5 squares which are joined along their edges. Four pentominoes have been placed together in the pattern shown below.

Two more pentominoes are to be placed to fill the gap. One of them is a new shape, while the other is a repeat of one of the pentominoes already positioned. The new shape is shown below.

Which is the other pentomino that is to be placed in the gap?

A	B	C	D

3 Lucy lives in Lowtown. On Saturday she will visit her friend Martha who lives in Midtown, and she will arrive in time for lunch at 12:30.

Her journey will consist of a 10-minute walk to Lowtown station, then a train ride to Midtown station and finally a bus ride to Martha's house.
Trains leave Lowtown at 06:45 and then every 30 minutes until 21:15, taking 1 hour 20 minutes to reach Midtown.
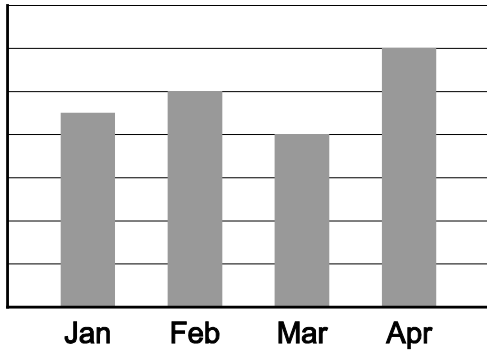Buses leave Midtown at 08:00 and then every 20 minutes until 21:00, arriving at Martha's house 12 minutes later.

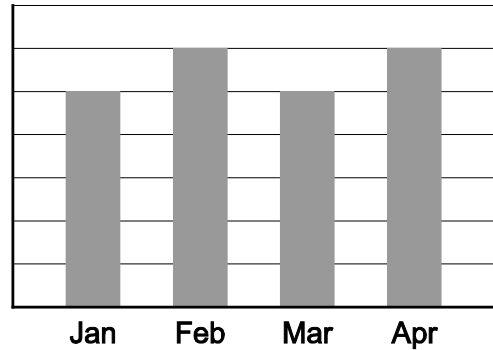What is the latest time that Lucy can leave home so that she arrives at Martha's house in time for lunch?

A 10:05

B 10:15

C 10:35

D 10:45

4   The price I pay for one unit of electricity is set for each month on the first day of that month. The charts below show, for the first four months of last year, the number of units of electricity I used each month and the price per unit of electricity that I had to pay for all the electricity I used in that month.
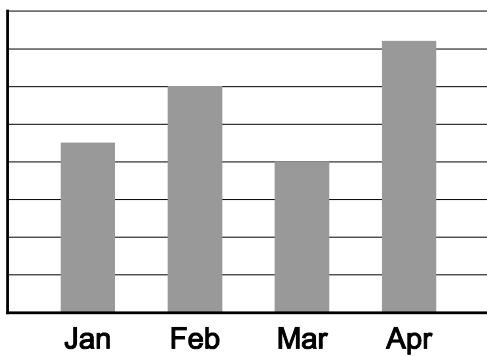
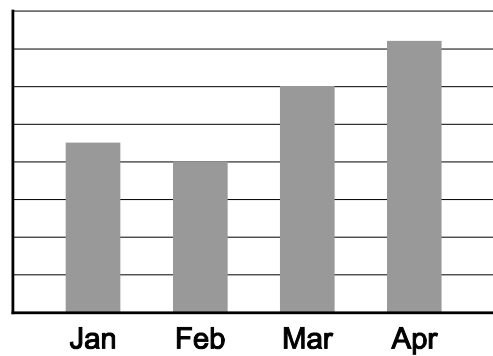

Electricity units used

Price per unit of electricity

Which one of the following graphs, if suitably labelled, could represent the amount of money I paid for electricity during those months?
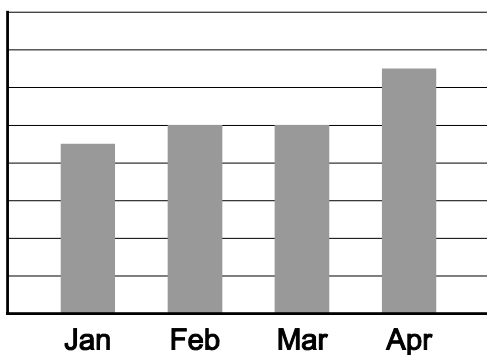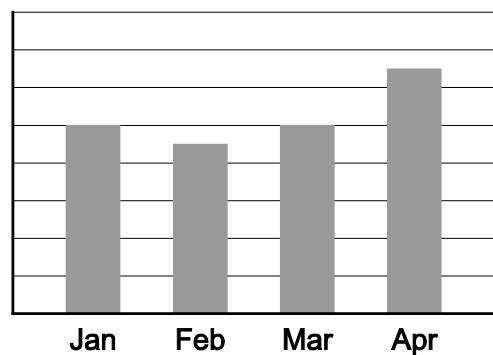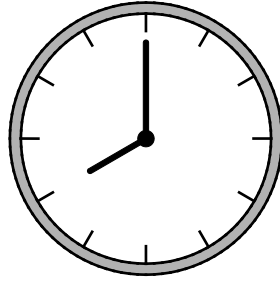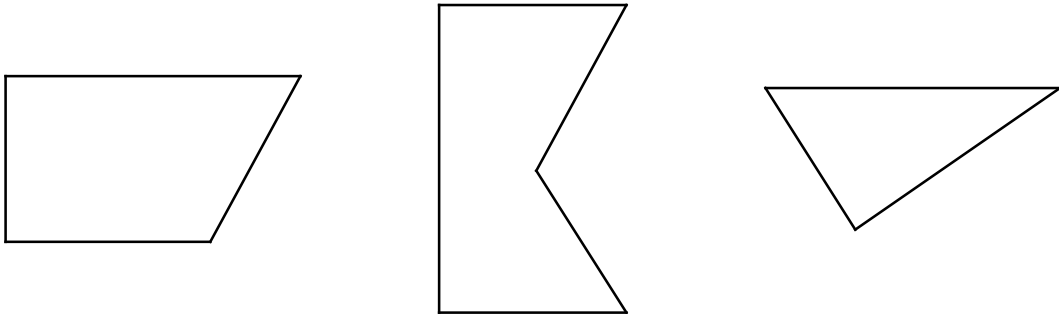
A

B

C

D

5 Fred was sponsored to stay awake for 24 hours, starting from 8 am. A friend advised him to focus on a single task to keep himself awake. He decided to focus on a clock to see how many times the hour and minute hands crossed.

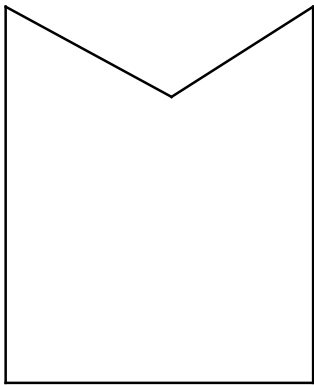How many times did the hour and minute hands cross during the 24-hour period?

A 22

B 23

C 24

D 25

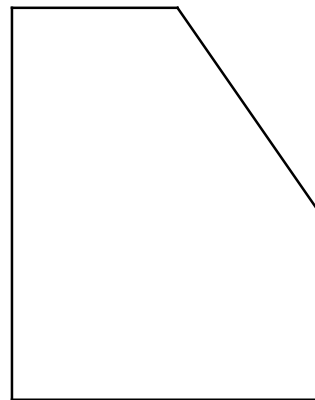**6** Daphne puts together the three pieces of card pictured below to make a shape.

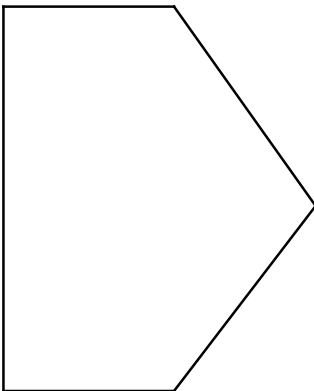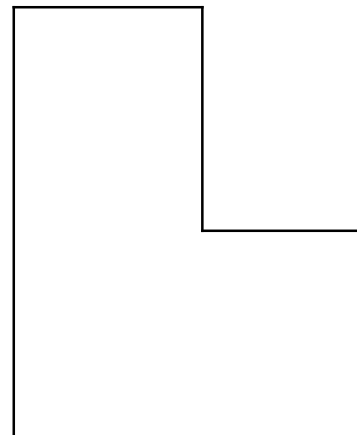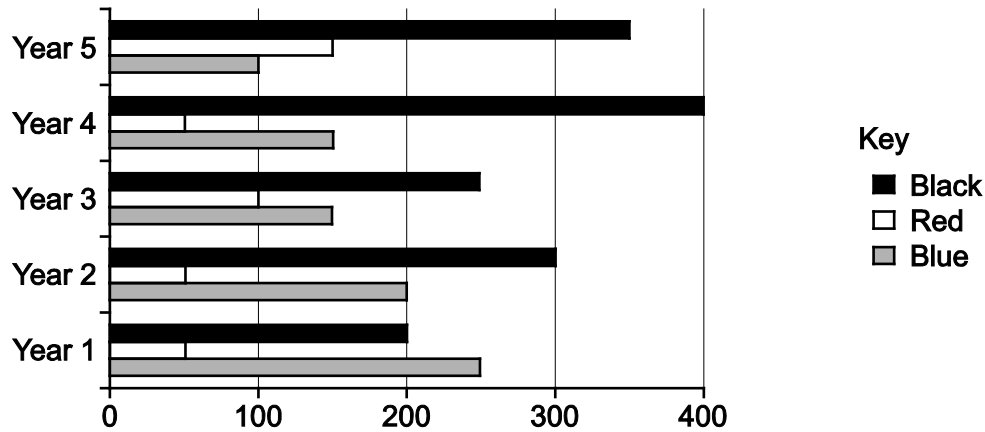Which one of the following shapes could she make?

A

B

C

D

7 A large department store sells a particular type of shoe in three different colours: blue, red and black. The following graph shows the number of each colour of shoe sold in each of the last five years.

From this data for the last five years, which one of the following statements is **not** true?

A 50% of the shoes sold in Year 1 were blue

B Over half of all the shoes sold were black

C The same number of shoes were sold in Year 1 as in Year 3

D Exactly twice as many blue shoes as red shoes were sold

8 For a children's activity holiday, all groups must have a minimum ratio of adults to children of 1:4. (More adults than this is acceptable, but not fewer.) The ratio of boys to girls must be between 1:2 and 2:1.

Four groups are currently composed as follows:

Group	Number of adults	Number of boys	Number of girls
1	3	5	6
2	4	9	4
3	5	8	13
4	6	13	7

Which single change would result in all four groups being acceptable?

A Two boys move from group 2 to group 3

B Two boys move from group 3 to group 2

C Two girls move from group 2 to group 3

D Two girls move from group 3 to group 2

9 An ancient text mentions a circular pool as being 10 cubits in diameter and 30 cubits in circumference.

It has been suggested that this meant that at that time they thought that the ratio of the length of the circumference of a circle to its diameter was 3, but this may not be the reason.

The figures above are rounded to the nearest whole number, and we know that the circumference is always about 3.1416 times the diameter.

Which one of the following is the range of all values that the circumference could in fact have been?

A 29.500 – 30.500 cubits

B 29.500 – 31.416 cubits

C 29.845 – 30.500 cubits

D 29.845 – 31.416 cubits

10 Jasmine's method of constructing computer passwords is to take a word of the required length and replace some or all of the letters in the word with numbers or symbols that she thinks resemble the letter. She is careful to distinguish between upper and lower case letters. The only letters she replaces are:

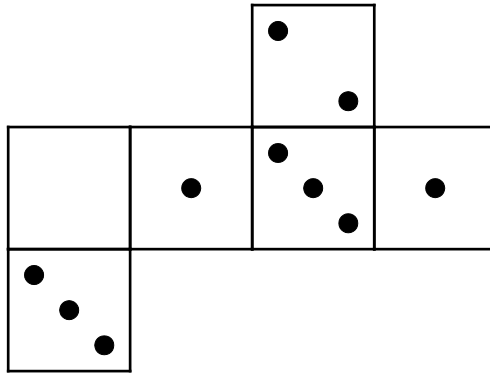| a	b	B	E	g	o	s	S	T	u	X	z
@	6	8	£	9	0	5	$	7	"	%	2

Two of the passwords she could make from Jasmine are Ja5mine and J@5mine.

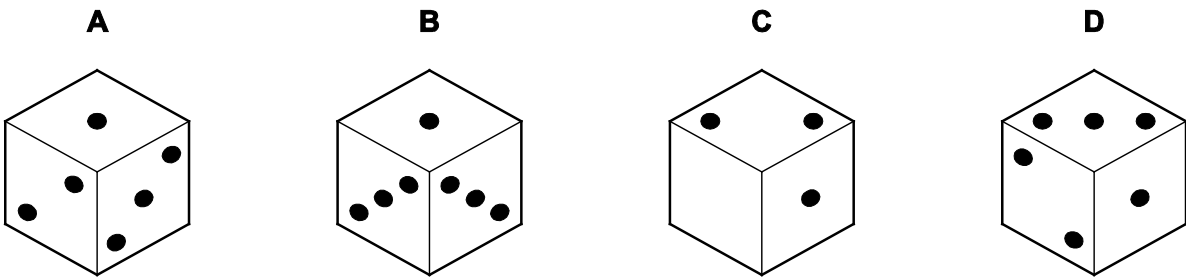How many different passwords can she construct from the word Biogas?

A 5

B 6

C 31

D 71

11 The diagram shows the net of a cube.

Which one of the following could be a view of the cube?

A	B	C	D

12 Abdul, Beckie, Cynthia and Douglas are making pancakes according to the recipe below.

To make 12 pancakes:

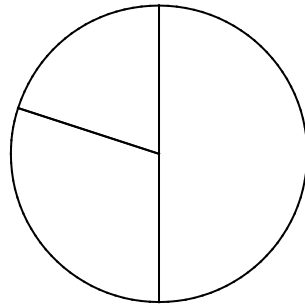100 g flour
2 eggs
300 ml milk

This table shows the amount of each ingredient that each person has.

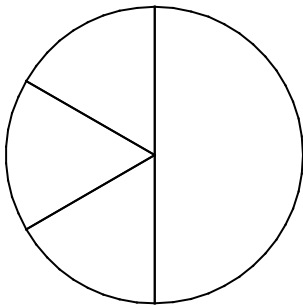|	Abdul	Beckie	Cynthia	Douglas
Flour (g)	175	150	150	175
Eggs	4	3	4	3
Milk (ml)	500	400	600	550

Which person can make the most pancakes?

A Abdul

B Beckie

C Cynthia

D Douglas

13 The number of times a website was visited for each of four periods of the day was recorded and a pie chart made of the data. Unfortunately, the figure for one of the periods was missing from the pie chart. The pie chart appeared as shown below.
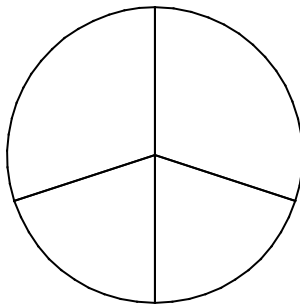

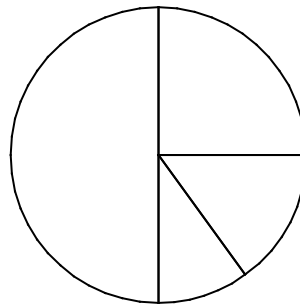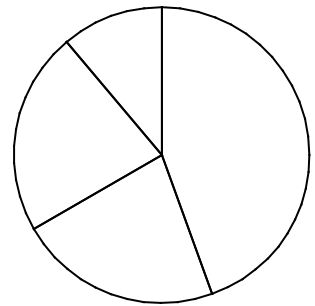Which of the following could represent the data for all four periods of the day?

A	B	C	D

14 A long distance runner is in training for a 10 km race and is gradually getting closer to his target speed. His recent times over 10 km have consistently decreased each week. His times for the last five weeks have been 58 m 20 s, 56 m 40 s, 55 m 00 s, 53 m 20 s and 51 m 40 s. It is assumed that his improvement will continue at the same rate.

With two more weeks of training remaining, how fast will he be likely to run in the actual race?

A 4 m 50 s per km

B 5 m 00 s per km

C 5 m 10 s per km

D 6 m 10 s per km

15 There is a regular bus service between Hometown and Jobtown; the fares are given in the table below.

Type of journey	Fare
Day return: Monday to Friday	$5.00
Day return: Saturday and Sunday	$4.00
Single: any day	$2.80
5-Day Special: any number of journeys on 5 consecutive days starting on a Monday	$22.60
28-Day Special: any number of journeys on any 28 consecutive days	$115.00

Joanna lives in Hometown and works and shops in Jobtown. She works Monday to Friday and shops every Saturday. She travels by bus, except that a colleague gives her a lift home from work every Friday. Joanna also travels on the bus to visit a friend in Jobtown on every other Sunday. Joanna wants to keep her travel costs as low as possible.

How much will Joanna spend on bus fares during a period of four weeks?

A $112.00

B $114.40

C $115.00

D $115.20

16 Bill and Daphne are going on holiday to Prapest. When on holiday they always stay in different hotels, and always look, in advance of booking, at a website that gives customers' ratings of the possible hotels. The table below shows these ratings, and the price of a single room, for hotels in Prapest that have rooms available.

Hotel	Situation	Comfort	Service	Food	Amenities	Price per night ($)
Albany	4.0	3.0	4.0	3.0	5.0	90
Belle Vue	4.5	3.5	3.5	5.0	3.5	95
Charles	4.0	4.0	4.0	4.0	4.0	100
Dumbarton	4.0	4.0	4.0	3.5	4.5	105
Eagle	4.0	5.0	2.5	4.0	4.0	110
Fitzroy	5.0	4.0	4.0	3.5	3.5	115
Grace	3.5	4.5	4.5	4.5	4.5	120
Highlife	5.0	3.5	5.0	2.5	5.0	125

Daphne will only stay in hotels that score at least 4 in three different aspect ratings including "situation", and with a total score from the five aspects of at least 20. Bill simply demands that his hotel should be rated at least 4 in "comfort", "food" and "amenities".

What is lowest price per night that Bill and Daphne could pay in total, and stay in different hotels that satisfy their individual requirements?
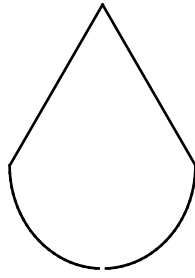
A $195

B $200

C $205

D $210

17 A group of friends plans to make a round trip using a boat service along a river, so that they can see the city from the waterfront. The sightseeing journey will start from Chelsea Harbour and take the boat service to both ends, finishing back at Chelsea Harbour. The friends are ready to take their first boat at 07:50. They want as little time as possible waiting for a boat, so they will always get the next available boat.

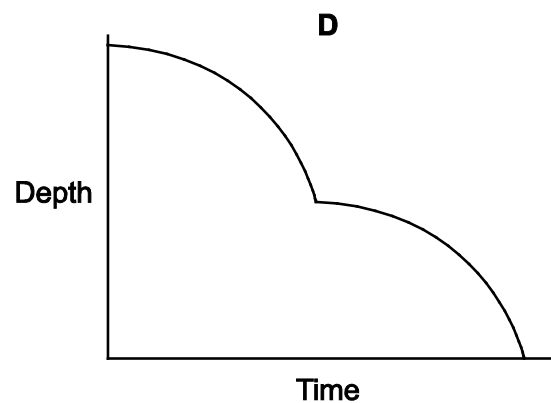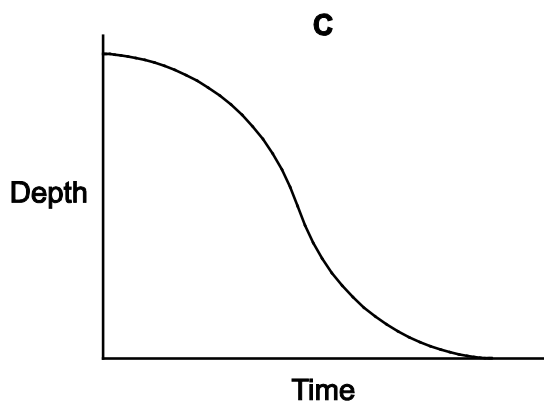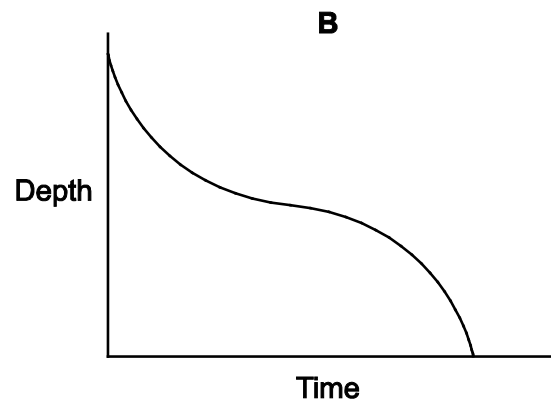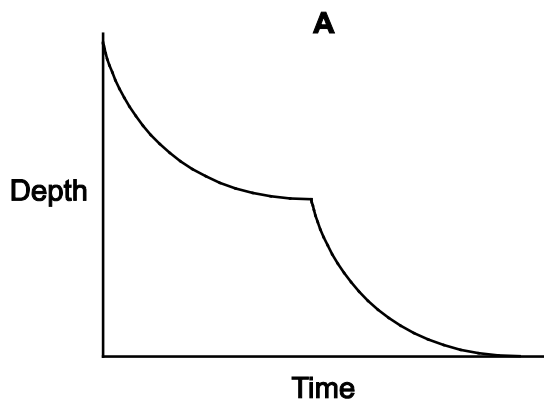| Eastbound					
Putney	07:25	08:00	08:40	09:25	10:10
Wandsworth	07:35	08:10	08:50	09:35	10:20
Chelsea Harbour	07:45	08:20	09:00	09:45	10:30
Cadogan	07:50	08:25	09:05	09:50	10:35
Embankment	08:10	08:45	09:25	10:10	10:55
Blackfriars	08:20	08:55	09:35	10:20	11:05
Westbound					
Blackfriars	07:20	08:25	09:10	09:50	
Embankment	07:30	08:35	09:20	10:00	
Cadogan	07:50	08:55	09:40	10:20	
Chelsea Harbour	07:55	09:00	09:45	10:25	
Wandsworth	08:05	09:10	09:55	10:35	
Putney	08:15	09:20	10:05	10:45	

At what time will they return to Chelsea Harbour?

A   09:40

B   09:45

C   10:25

D   10:30

18

The drawing shows the cross-section of a container which is used to water plants. The container is filled with water and is suspended above a houseplant. There is a small hole at the lowest point of the container, through which the water escapes at a constant rate. An observer draws a graph to show how the depth of water in the container changes with time, from when it is completely full of water.

Which of the following graphs best represents the given information?

A

B

C

D

19 Mr Red, Mrs White, Dr Blue and Miss Green each own one of the four companies: Almond, Berry, Cherry and Damson.

The following relationships between the monthly share prices of these people's companies have been observed:

when Mr Red's go up, Mrs White's go down;
when Mrs White's go up, Dr Blue's go down;
when Dr Blue's go up, Mr Red's go down.

The table below shows the monthly share prices of these companies for the first five months of last year.

Company	January	February	March	April	May
Almond	$10	$11	$11	$12	$10
Berry	$7	$7	$11	$10	$11
Cherry	$4	$5	$4	$4	$3
Damson	$6	$5	$5	$7	$7

Which company is owned by Miss Green?

A Almond
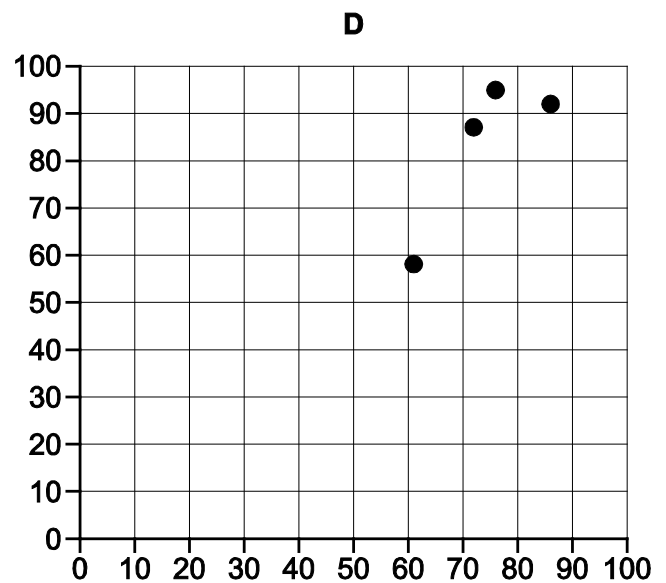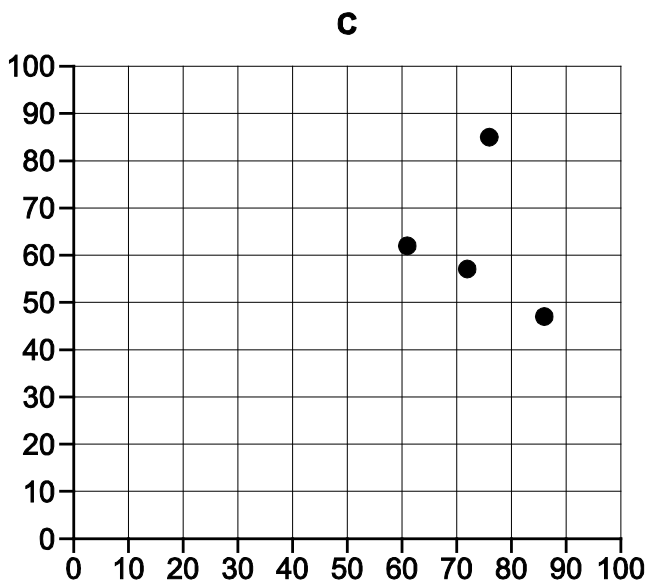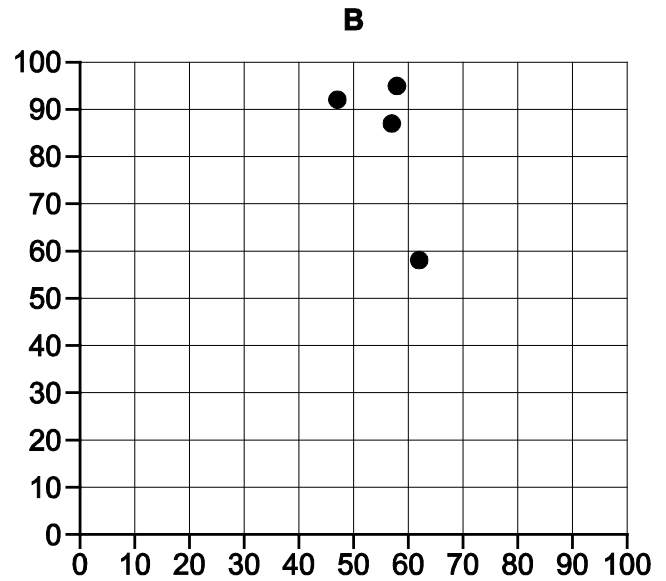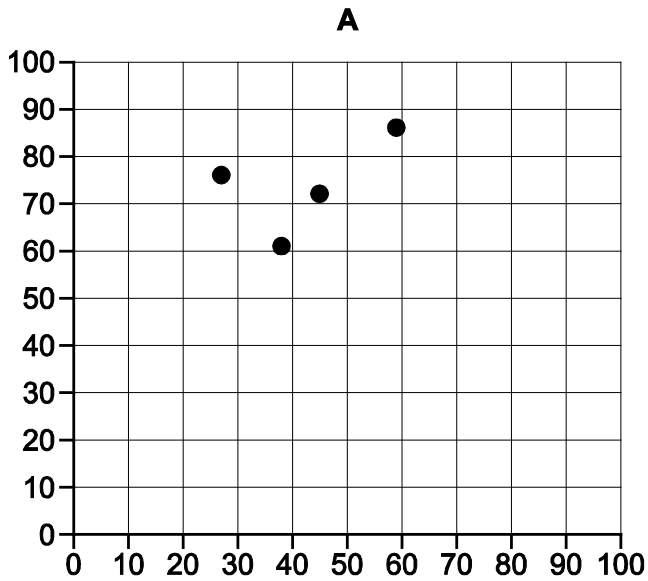
B Berry

C Cherry

D Damson

 [Turn over

20 Four students' marks in four different subjects are given in the table below.

	Mathematics	English	Science	History
Peter	45	72	57	87
Qayla	59	86	47	92
Ronald	27	76	58	95
Sean	38	61	62	58

Six scatterplots were made, showing the scores in every possible pair of subjects.

Which one of the following could **not** be one of these scatterplots?

A

B

C

D

21

HOCKNEY WATERPARK

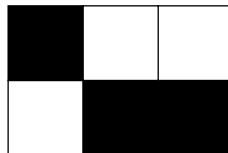| Adults	Children
$15	$9

Three adults and eight children have arrived at Hockney Waterpark. They have the following two special offer vouchers cut out of the local newspaper:

HOCKNEY WATERPARK

$5 OFF ALL TICKETS
(MAXIMUM 12)

HOCKNEY WATERPARK

2 CHILDREN ENTER FREE
WHEN 1 ADULT PAYS FULL PRICE
(VALID FOR UP TO 4 ADULTS)

What is the maximum amount that this group can save on normal prices using either or both of these vouchers?

A $53

B $55

C $58

D $64

22 A board game uses tiles, each made up of 6 squares in a 3 x 2 arrangement. On each tile half of the squares are coloured black, and half white; an example is shown below.

The tiles can be rotated but not flipped over (they are plain on the back). No two tiles are the same.

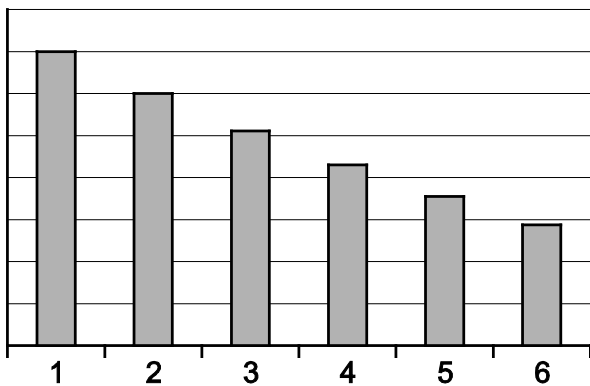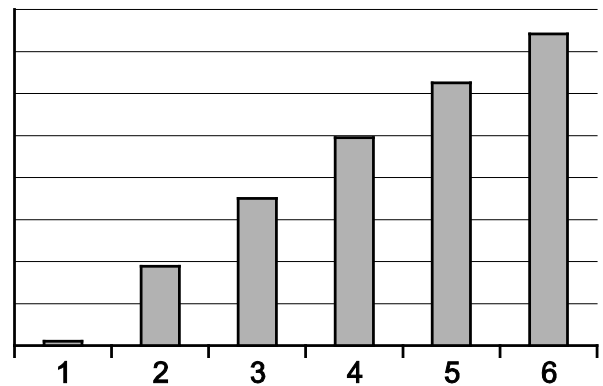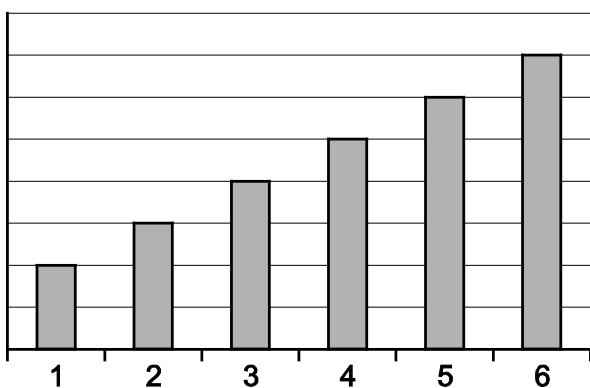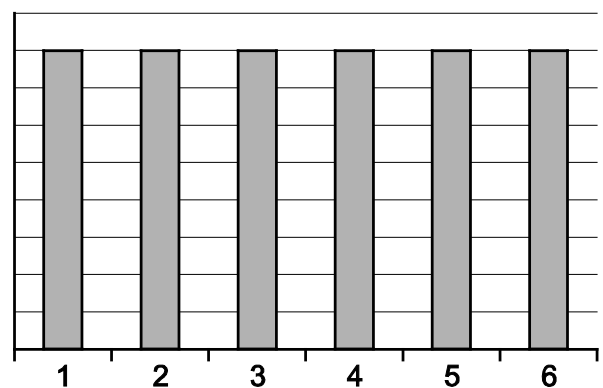What is the maximum number of different tiles there could be?

A 6

B 10

C 15

D 20

[Turn over

23 A competition in the local newspaper requires a code of four digits to be deduced from a series of clues which are printed on successive days. I have already deduced that the four digits are 1, 5, 7 and 9. The other clue that I have at the moment is that no two adjacent digits add up to a multiple of 3.

Which of the following pieces of information will allow me to deduce the correct code?

A The position of the digit 1

B The position of the digit 9

C The value of the first digit

D The value of the second digit

24 On the first day of every month I transfer $100 into my savings account and then give 10% of the total amount of money in the account to charity. No other money goes in or out of the account (my interest is paid into a different account).

Which of the graphs below, if suitably labelled, could **not** show the amount of money in the account at the end of each month, during a six-month period?

A

1 2 3 4 5 6

B

1 2 3 4 5 6

C

1 2 3 4 5 6

D

1 2 3 4 5 6

25 There are 20 students taking an examination. The exam paper is divided into Section A and Section B and there are three questions in each section. Students are required to answer 3 questions in total, with at least one question from each section. The examiner knows that different questions will take different times to mark. Her estimates of the time each question takes to mark are given below.

Section A Question 1	5 minutes
Section A Question 2	10 minutes
Section A Question 3	15 minutes
Section B Question 4	10 minutes
Section B Question 5	15 minutes
Section B Question 6	20 minutes

The examiner knows the students well, and is confident that no more than 10 will attempt Question 3 and no more than 5 will attempt Question 6, but at least 15 will attempt Question 4. The examiner wishes to make sure that she sets aside enough time to make sure she can complete the marking.

How much time should the examiner leave free for marking?

A 10 hours

B 10 hours 50 minutes

C 13 hours 20 minutes

D 16 hours 40 minutes

26 The Stuart sextuplets are four boys, Charles, Henry, James and Robert, and two girls, Anne and Mary. I was introduced to Anne, Henry, James and Robert recently.

Anne said that two of her brothers were born earlier than her and the other two were born later than her.

Henry said that one of his sisters was born earlier than him and the other one was born later than him.

James said that both of his sisters were born earlier than him.

Robert said that Anne and Henry were both born earlier than him and James was born later than him.

From the information I was given, which one of the following statements can I **not** confirm?
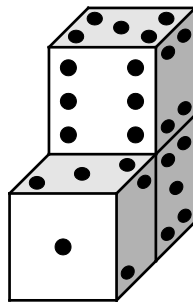
A Charles was born earlier than Henry

B Charles was born earlier than Robert

C Mary was born earlier than Henry

D Mary was born earlier than Robert

27 Carla runs a shop which sells bridal accessories. She currently has orders for 27 wedding dresses. She employs two dressmakers, one of whom takes 4 days to make a dress and the other takes 7 days. They never share work on one dress.

What is the shortest time it can take until all the current orders are fulfilled?

A 36 days

B 70 days

C 76 days

D 98 days

28 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

29 Byron, Jane, Katriona and Ron went to Delhi. Between them they had $700, in the proportions shown in Fig. 1.
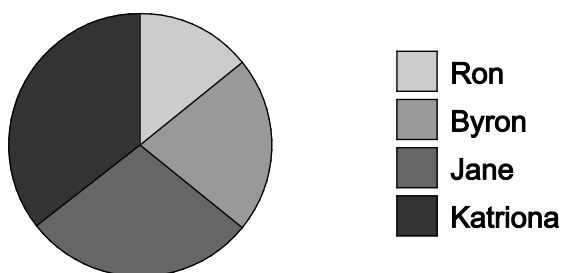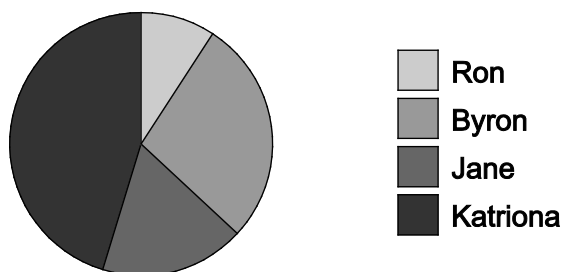

Fig. 1

Fig. 2 shows the proportions at some later time.

Fig. 2

Which of the following best describes the single event that happened between the first and second chart?

A Jane and Ron each lost half of their money

B Ron and Byron changed their money at the airport at a rate of 90 rupees per dollar while Jane and Katriona changed theirs in Delhi at a rate of 110 rupees

C They each paid a $5 commission charge and received an exchange rate of 100 rupees per dollar

D Ron received $70 from Byron, Jane and Katriona to cover a hotel room he paid for before they left

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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