THINKING SKILLS   **9694/11**

Paper 1 Problem Solving   **May/June 2013**

1 hour 30 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.

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.

[Turn over

1 The hardware superstore is selling the paint I want at "3 tins for the price of 2". This weekend I can get a further 10% off with my loyalty card.

What will be the overall reduction from the full price if I buy three tins of paint this weekend?

A 40%

B 43%

C 55%

D 60%

2 Jane is a student taking her examinations. Her first examination is on Wednesday 16 May and she has one examination each day for 16 days. There are no examinations on Tuesdays, Saturdays or Sundays.
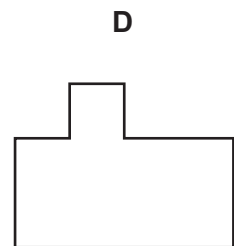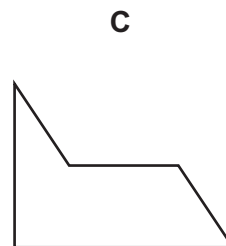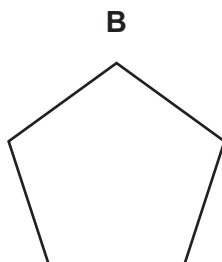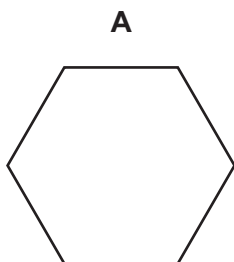
May						
M	T	W	T	F	S	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

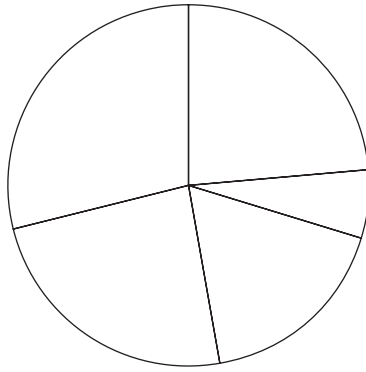| **June**						
M	T	W	T	F	S	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

What is the day and date of her final examination?

A Thursday 31 May

B Tuesday 5 June

C Wednesday 6 June

D Monday 11 June

3 Ying wants to tile his kitchen floor and is trying to decide between his four favourite tiles. However, only three of them are suitable for the job as one of them won't cover the floor without leaving numerous gaps.
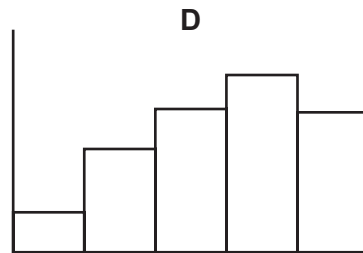
Which one is it?

A   **B**   **C**   **D**

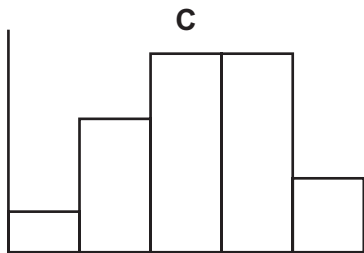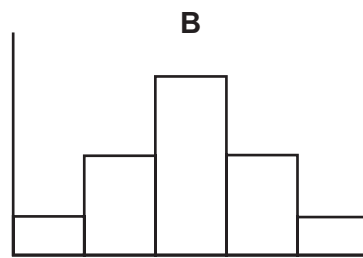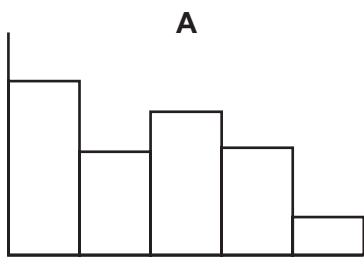**4** Kate was asked to draw a bar chart for her homework, but she drew the pie chart shown below.

Assuming that her pie chart correctly represents the data, which of the following should Kate have drawn?

A

B

C

D

5

CO_2 emissions (g/km)	Tax 2011 ($)	CO_2 emissions (g/km)	Tax 2012 ($)	Tax 2013 ($)
Up to 100	0	Up to 100	0	0
101–120	35	101–110	35	20
121–150	120	111–120	35	35
151–165	145	121–130	120	90
166–185	170	131–140	120	105
186–225	210	141–150	125	125
Over 225	400	151–165	150	155
		166–175	175	180
		176–185	175	200
		186–200	215	235
		201–225	215	245
		Over 225	405	425

In New Ecoland car owners pay a yearly tax on their vehicles that depends on how much carbon dioxide (CO_2) is emitted by the vehicle per kilometre travelled. The first two columns in the table above show how the tax depends upon emissions for 2011. For 2012 and 2013 the authorities are dividing the emission bands into smaller ranges, and the final three columns show the taxes for 2012 and 2013.

Daphne owns two cars, an Adoks Retsmoor (CO_2 emission 125 g/km) and a WMB d525 (CO_2 emission 180 g/km).

Over the three years (2011, 2012 and 2013), how much more tax will Daphne pay on the WMB than the Adoks?

A $150

B $165

C $215

D $330

6 A company offers one of their salespeople the choice of two pay deals.

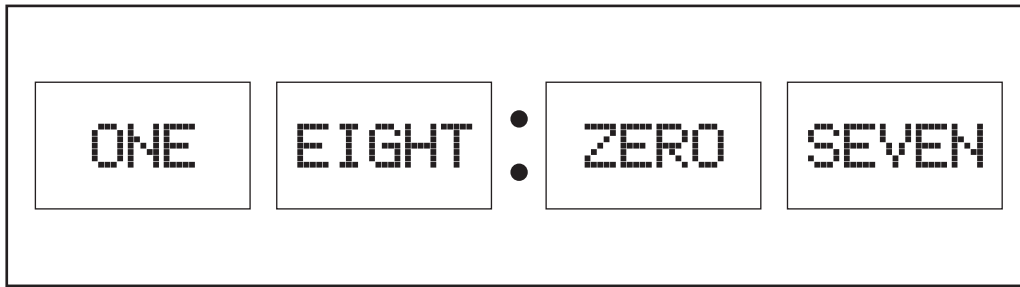Deal 1: 46 hours per week including 9 hours overtime – paid at $5 per hour, with overtime paid at $10 per hour.
Deal 2: Basic weekly pay of $50 plus commission of 1/50 of the weekly sales, but not on the first $5000 of sales.

If the person makes sales of $15 000 in a week, what is the best weekly pay that can be earned?

A $250

B $275

C $320

D $350

7 The individual digits on my digital clock appear as words rather than numerals.

For example, at 18:07 the display is as shown below.

How many times each day does the letter E **not** appear on the display?

A 3

B 6

C 7

D 9

8 An eccentric engraver charges according to the particular letters that she has to engrave.
She puts the lowercase letters of the alphabet into these categories:

Type 1	a, c, e, i, n, o, r, s, u, v, x, z
Type 2	m, w
Type 3	b, d, f, h, k, l, t
Type 4	g, j, p, q, y

She charges as follows:

10 cents for every Type 1 letter that is followed by a Type 1 or Type 2 letter
15 cents for every Type 1 letter that is not followed by a Type 1 or Type 2 letter
20 cents for every Type 2 letter
25 cents for every Type 3 letter that is followed by a Type 1 letter
30 cents for every Type 3 letter that is not followed by a Type 1 letter
35 cents for every Type 4 letter
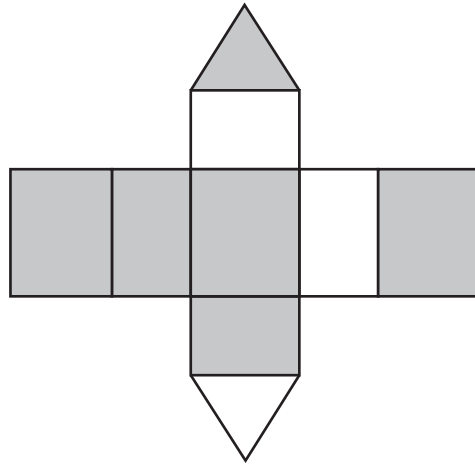40 cents for every capital letter, regardless of its Type
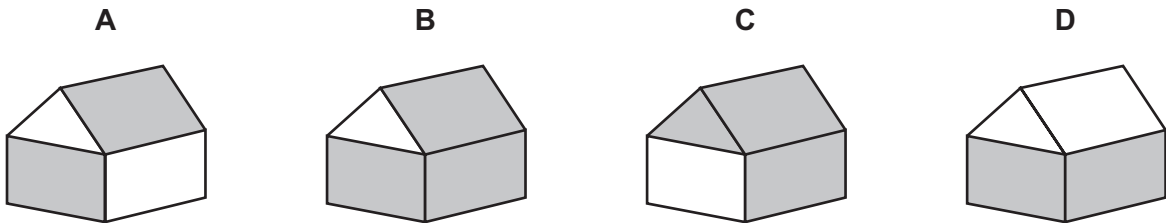
I want to have this word engraved:

Sweetie

How much will this cost?

A 95 cents

B 105 cents

C 120 cents

D 135 cents

9 The piece of cardboard shown below folds to form a house for use with a model railway. The other side of the cardboard is black, which forms the inside of the house.

Which of the illustrations below correctly shows the assembled house?

A	B	C	D

10 In the Erewhon football league there are 24 teams and each team plays every other team twice: once during the first half of the season and once during the second half. In the first half of the season teams are awarded 2 points for a win and 1 point for a draw. In the second half of the season a win earns 3 points while a draw still gives 1 point.

The performances up to the end of the first half of last season by the four teams with the lowest number of points at that stage are given in the table below.
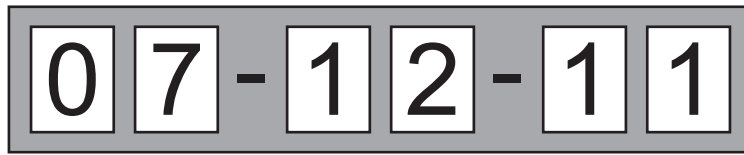
	Won	*Drawn*	*Lost*
Academicals	4	11	8
Ballplayers	5	8	10
Cornerkickers	6	5	12
Deadballspecs	7	2	14

Surprisingly, the results in the second half of the season for all four of these teams were exactly the same as in the first half.

Which of these teams had the fewest points at the end of the whole season?

A Academicals

B Ballplayers

C Cornerkickers

D Deadballspecs

11 A 'perpetual calendar' consists of 6 slots in a holder into which numbered cards are placed.

$$\boxed{0}\boxed{7}-\boxed{1}\boxed{2}-\boxed{1}\boxed{1}$$

The year is shown by two digits (e.g. 2013 would be shown as "13"). If the day or month has just one digit, it is shown, for example, as "07".

If this is to be genuinely perpetual (i.e. to work for any future date), which row of the following table correctly shows the minimum number of each card needed?

						Card					
		0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
A		3	5	5	5	5	5	5	5	5	5
B		3	5	5	4	4	4	4	4	4	4
C		4	6	5	4	4	4	4	4	4	4
D		4	6	4	4	4	4	4	4	4	4

12 A water company is laying a new water pipeline between two towns, Salia and Potania, which are 10 kilometres apart. The company decides to start laying the pipes from both ends so that the two teams will meet up somewhere in between.

Team A is made up of five workers and two diggers, laying pipes at the rate of 500 metres a day, and will start from Salia.

Team B is made up of three workers and one digger, laying pipes at the rate of 200 metres a day, and will start from Potania.

What distance from Salia and on which day will both teams meet?

A 7.14 km, 14th day

B 7.14 km, 15th day

C 7.34 km, 14th day

D 7.34 km, 15th day

13 Harry visits his mother every Sunday. He catches a train from Newtown Station to Oldtown Station which is a 10-minute bus ride from his mother's house. There are two trains an hour. One is a stopping train taking 35 minutes and the other is a direct train taking 20 minutes. Both buses and trains run every half hour. He finds that whichever train he catches, his journey time from catching the train to arriving at his mother's (including any wait for the bus) is always 55 minutes.

Assuming the trains and buses run on time, which of the following would account for the above?

A Both trains and buses leave on the hour and half past the hour.

B Buses leave Oldtown 15 minutes after trains leave Newtown.

C The direct train arrives at Oldtown 20 minutes before a bus leaves and the stopping train arrives 5 minutes before a bus leaves.

D Trains leave Newtown 20 minutes before buses leave Oldtown.

14 Mary works in a top secret research laboratory. In order to gain access to the building, she must use a secret four-digit code. All codes from 0000 to 9999 are possible. As a security feature, Mary is required to get exactly one digit wrong each time, and not to enter the same four-digit number as she did last time.

The security guard can see the numbers that she enters into the keypad.

What is the maximum number of different four-digit numbers Mary can enter without the security guard being able to be certain of the secret code?

A 2

B 8

C 32

D 4096

15 Geoffrey's mobile phone provider offers a choice of four plans. In each case there is a fixed price per month and a number of free minutes included in the price. There is then a fixed price for any further minutes used. The options are listed in the table below.

Plan	Price per month ($)	Number of free minutes	Price per additional minute (¢)
Cat	30	300	10
Dog	30	450	20
Horse	50	300	5
Llama	50	450	15

It has now been announced that all of the prices per month will increase by $5 and all of the prices for additional minutes will increase by 5¢. Geoffrey's last bill was $70, but it would have been $85 with the new prices.
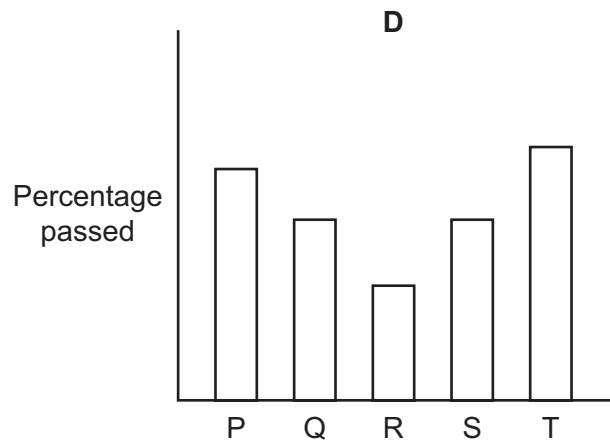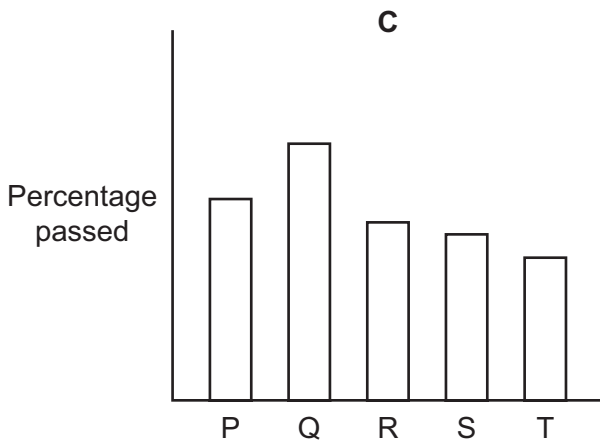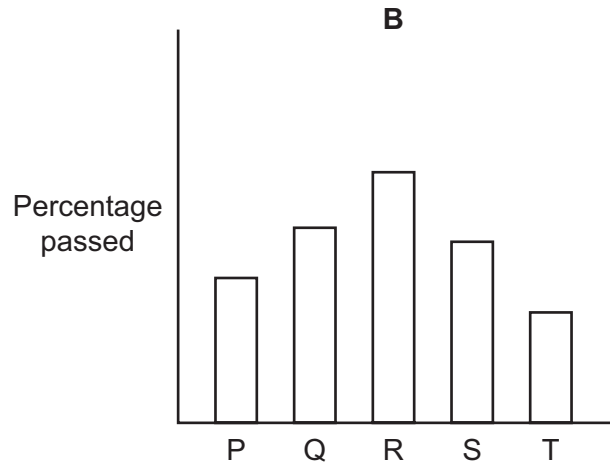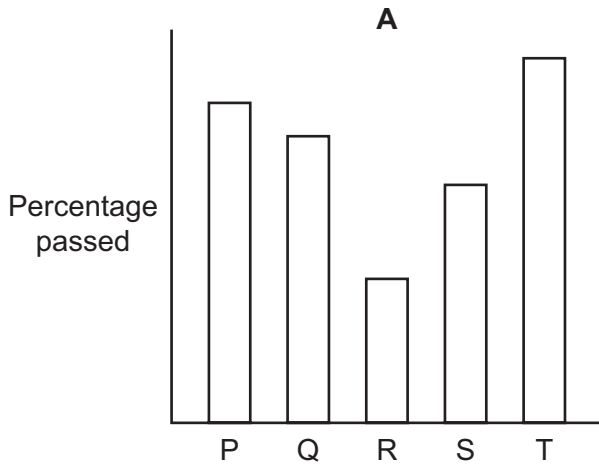
Which plan is Geoffrey currently using?

A   Cat

B   Dog

C   Horse

D   Llama

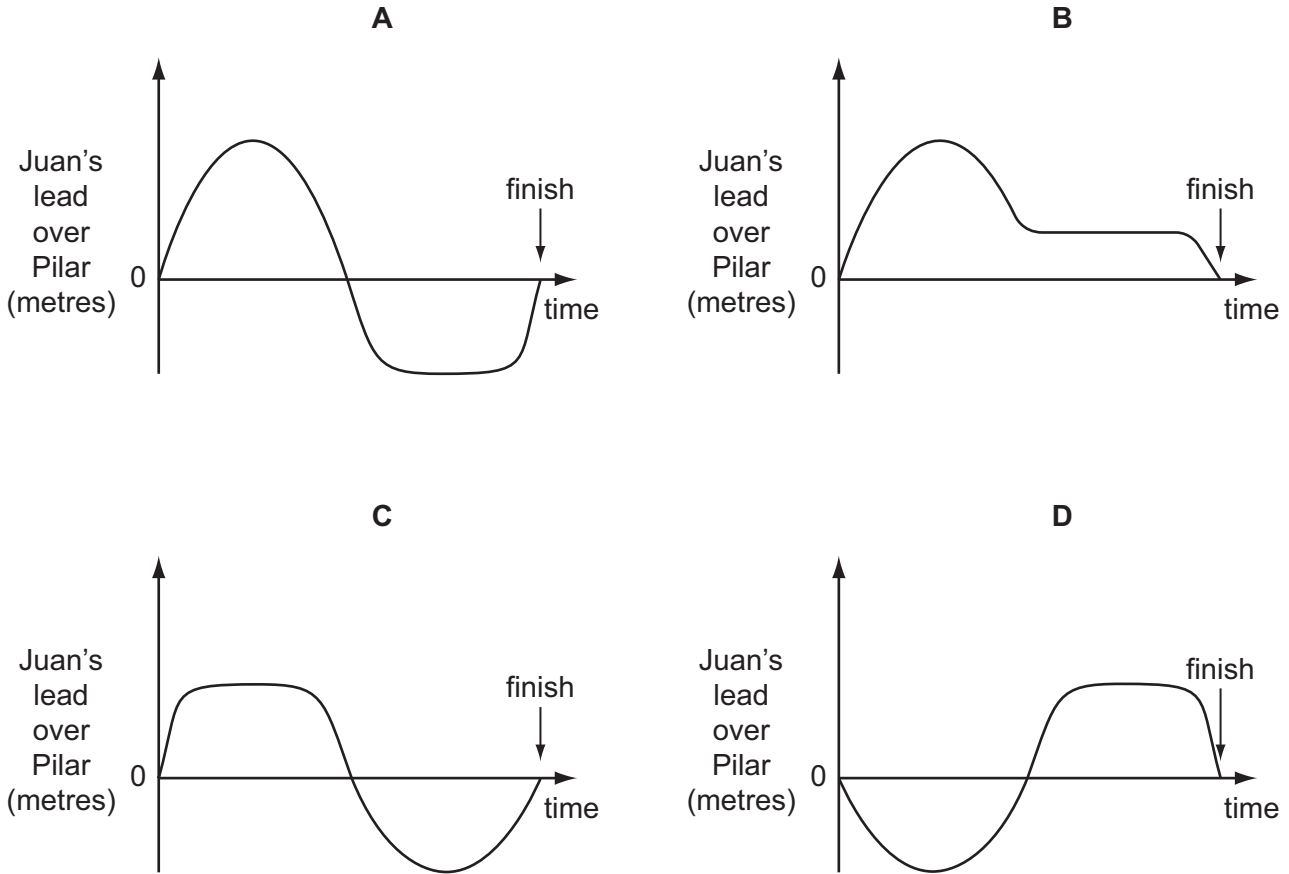**16** The table shows the numbers of people taking driving tests and the number failing.

Area	P	Q	R	S	T
Number Entered	1200	1100	650	900	1250
Number Failed	720	495	195	450	875

Which of the following charts represents the percentage of passes in each area?

A

Percentage passed

P Q R S T

B

Percentage passed

P Q R S T

C

Percentage passed

P Q R S T

D

Percentage passed

P Q R S T

17 Juan and Pilar have a cycle race. The course consists of a flat stretch followed by an uphill, then a downhill and finally another flat road. Juan goes faster than Pilar on the flat but Pilar goes uphill quicker than Juan. Downhill they go at approximately the same speed as each other. The result of the race is that they cross the finishing line at exactly the same time.

Which one of the following graphs best represents Juan's lead over Pilar from the start of the race to the finish?

A

Juan's lead over Pilar (metres)   0   finish   time

B

Juan's lead over Pilar (metres)   0   finish   time

C

Juan's lead over Pilar (metres)   0   finish   time

D

Juan's lead over Pilar (metres)   0   finish   time

18 I have a 24-hour digital clock beside my bed which shows times from 00:00 to 23:59. When I woke up during the night, I noticed, to my surprise, that the product of the two hours digits was the same as the product of the two minutes digits. None of them was a zero.

Not counting times which include a zero, or where the hours and minutes use exactly the same digits (e.g. 12:21), how many times does this happen during a 24-hour period?

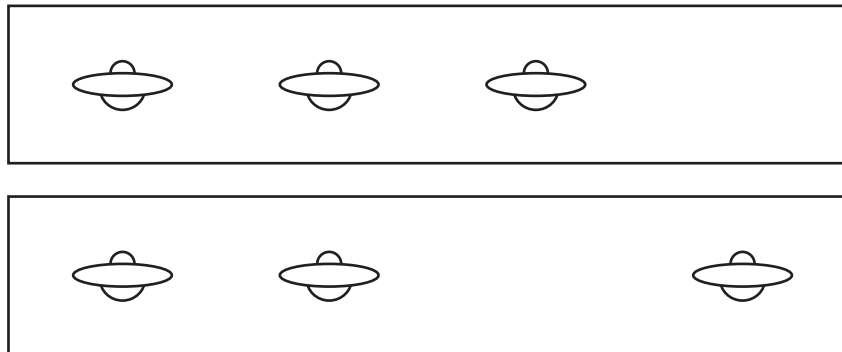**A** 6

B 7

C 9

D 10

       [Turn over

19 Giles works at his local shop in his spare time. He always works for a whole number of hours, but receives a different rate of pay for working at weekends than in the week (both pay rates are a whole number of dollars per hour). Giles has worked for the same number of hours in each of the last two weeks, but his pay was $67 in the first week and $79 in the second week.

Which of the following could **not** explain Giles's pay in the last two weeks?

A   Giles worked for 3 extra hours at the weekend in the second week.

B   Giles is paid $4 per hour more for working at the weekend.

C   Giles worked for 5 extra hours at the weekend in the second week.

D   Giles is paid $6 per hour more for working at the weekend.

20 Colin said to Bill that the sum of the digits in his 3-figure house number was 12, and each digit was bigger than the one to the left of it. Bill said that was not enough information for him to work out the number.

Which one of the following additional pieces of information, on its own, would enable Bill to work out Colin's house number?
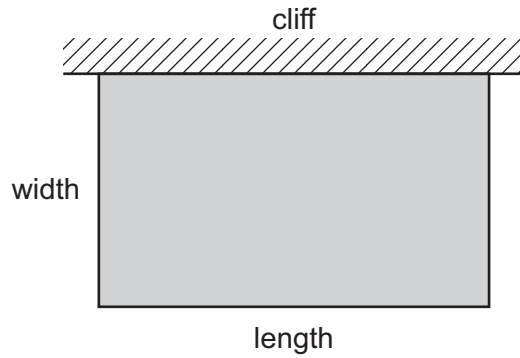
A   One digit is equal to the difference of the other two.

B   Colin's house number is even.

C   Two of the digits multiply to 12.

D   The product of the digits is not a multiple of 6.

21 A fleet of UFOs was observed, and pictures taken of them at the same time from different places: one looking from the north and the other looking from the west.
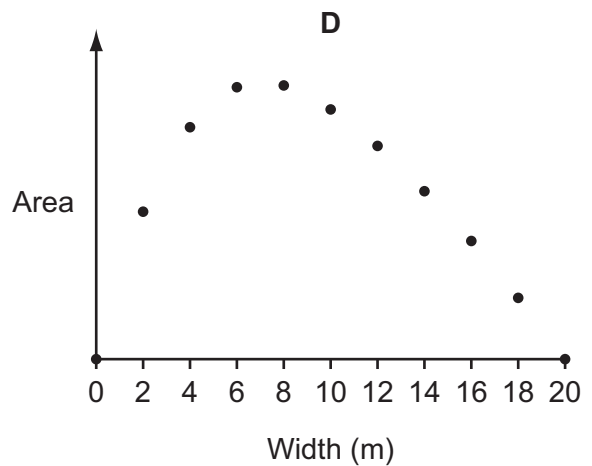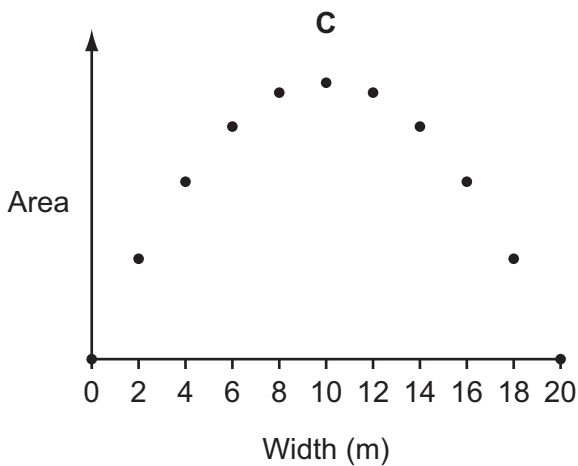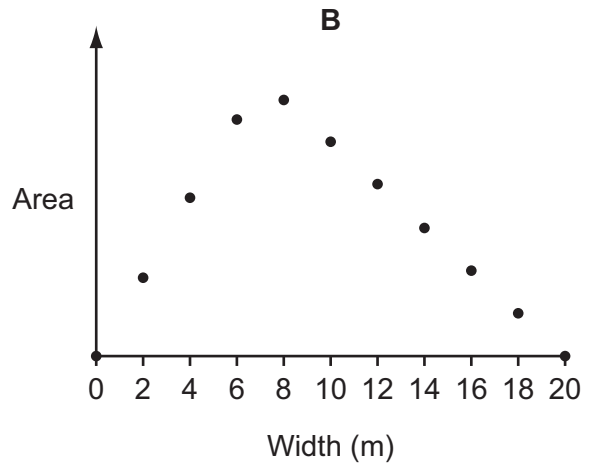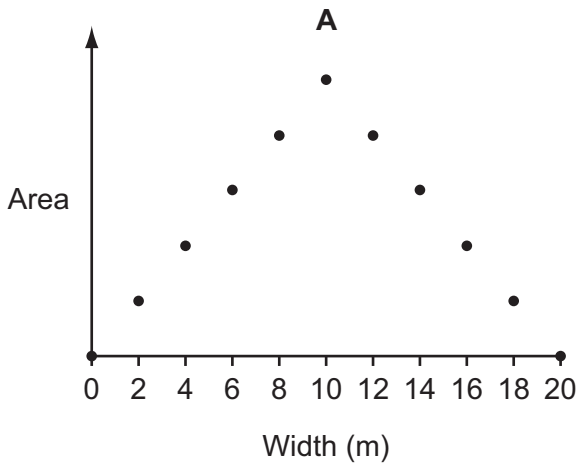

What is the largest number of UFOs that could be in the fleet?

A   3

B   5

C   6

D   9

22 A farmer has a field, one straight edge of which is against a vertical upward cliff. He wants to fence off a rectangular area for some cattle. He has twenty 2 m fencing panels.

cliff

width

length

Which of the following graphs, if suitably labelled, correctly shows the relationship of the width of the fenced off portion of the field to the area?

A

Area

Width (m)

0 2 4 6 8 10 12 14 16 18 20

B

Area

Width (m)

0 2 4 6 8 10 12 14 16 18 20

C

Area

Width (m)

0 2 4 6 8 10 12 14 16 18 20

D

Area

Width (m)

0 2 4 6 8 10 12 14 16 18 20

23 When I picked up a bottle of washing up liquid at the supermarket yesterday, I noticed that the label on the shelf had been changed from 45 cents per 100 ml to 60 cents per 100 ml since my last purchase. On closer inspection, I realised that not only had the price increased, but also the volume of the bottle had been reduced.

Which one of the following **could** explain the increase of the cost of the washing up liquid per 100 ml from 45 cents to 60 cents?

A A price increase of 5% and a volume reduction of 25%.

B A price increase of 10% and a volume reduction of 20%.

C A price increase of 20% and a volume reduction of 10%.

D A price increase of 25% and a volume reduction of 5%.

24 Statistics for the Bolandian steam tram system are shown below (figures are for the year 2010):

Total track length: 180 km
Number of stops: 48
Individual passenger journeys: 420 000
Total tram km: 1.2 million
Total water consumption: 20 000 cubic metres
Average time between stops: 8 minutes

Which of the following additional pieces of information would make it possible to calculate the average length of an individual journey?

A The water consumption per passenger kilometre.

B The number of different people using the network in the year.

C The number of trams in service.

D The average speed of a tram.

25 Tony makes ornaments which he sells in boxes that are cuboid in shape. The dimensions are either 5 cm × 5 cm × 12 cm or 5 cm × 6 cm × 10 cm. He needs to package them in larger boxes to send out to the shops that sell the ornaments for him and he wants to buy just one size of box. The box needs to hold exactly 6 ornaments of the same type (regardless of which type it is).

The price of a box in cents is calculated by multiplying together the shortest two dimensions and then adding on the third. For example, a 2 cm × 3 cm × 4 cm box would cost 2 × 3 + 4 = 10 ¢. Tony wants to get the cheapest box possible.

What will be the price of one box?

A $0.86

B $0.90

C $0.97

D $1.35

26 In the drivers' championship, points are awarded for each race as given in the table below.

Place	Points
1st	6
2nd	4
3rd	2
4th	1

With 5 races remaining the top 3 drivers are Lewis, Michael and Jenson.

Driver	Championship points
Lewis	27
Michael	25
Jenson	24

Assume that Jenson continues to finish in the top three for every race. What is the smallest number of the remaining races that Jenson needs to win to **guarantee** winning the championship?

A 2

B 3

C 4

D 5

27 When Mary won $3360 on a TV quiz programme she decided to give it to her two grandchildren, Susan and Luke, to be shared between them in the ratio of their ages.

5-year-old Luke complained that it wasn't fair that his older sister should get more than him. His mother sympathised, but told him to be thankful that his grandmother hadn't won the money next month (after Susan's birthday) when he would have received $70 less, or last month (before his birthday) when he would have received $160 less.

How much of Mary's $3360 did Luke receive?

A $ 1050

B $ 1120

C $ 1200

D $ 1400

28 The hotel reception is staffed for 24 hours a day, 7 days a week, by one of the four receptionists. Whenever a receptionist comes to work he will work for 8 hours before the next receptionist takes over. The manager has a chart in her office which shows the availabilities for the receptionists, upon which they mark with a cross each shift for which they are unavailable. Wherever the manager has a choice of receptionist, she will assign the one whose previous shift was the longest time ago.

Karl is one of the receptionists and he worked on the first shift of the week both last Monday and this Monday. Karl was available for every shift last week, and all of the receptionists were available for the first shift this Monday.

What is the smallest number of crosses that there could be on the manager's chart for last week?

A   0

B   1

C   2

D   3

29 Oliver is a frequent visitor to More!, his favourite restaurant. Since its introduction, Oliver has ordered from the special offer 'More! For Less' menu every time.

More! For Less
3 Courses
ONLY $12

Starter
Choose from
Melon Balls
Salmon Mousse
Egg Mayonnaise

Main Course
Choose from
Chicken & Mushroom Pie
Lasagne
Tuna Bake
Cheese & Onion Pie

Dessert
Choose from
Apple Pie
Chocolate Mousse
Ice Cream

He has now ordered from this menu 11 times without ever repeating his combination of choices for the three courses.

Note that 'mousse' and 'pie' appear more than once on this menu. In the same meal he doesn't want to choose pie twice or mousse twice.

How many more times can Oliver order from the 'More! For Less' menu before he must have a combination he has already eaten?

A 15

B 18

C 21

D 26

30 On a television game show, four contestants compete in four rounds. Each round is worth a number of points between 1 and 10, and each contestant scores either 0 or the full amount available in each round. No two rounds are worth the same amount. The winner gets a prize of $100 for each point that could have been scored. At the end of the competition, the contestants have scores of 27, 25, 24 and 14.

What was the total prize money for this game?

A $2700

B $3000

C $3300

D $3600

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