THINKING SKILLS **9694/13**

Paper 1 Problem Solving **October/November 2018**

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 **19** printed pages and **1** blank page.

[Turn over

1 Toula arranged to meet her friend outside Pesda railway station yesterday. As she arrived at the station the departures board was displaying the following:

Departures			
Time	Destination	Status	Due in
11:29	Fenik	On time	3 mins
11:37	Delnee	On time	11 mins
11:41	Hilsec	On time	15 mins
11:47	Rowtel	On time	21 mins
11:54	Lespir	On time	28 mins
12:05	Fenik	On time	39 mins
12:11	Tamell	On time	45 mins
12:18	Delnee	On time	52 mins

When her friend eventually turned up, this was the display on the departures board:

Departures			
Time	Destination	Status	Due in
12:05	Fenik	On time	8 mins
12:11	Tamell	On time	14 mins
12:18	Delnee	On time	21 mins
12:25	Washack	On time	28 mins
12:30	Hilsec	On time	33 mins
12:39	Lespir	On time	42 mins
12:44	Fenik	On time	47 mins
12:52	Rowtel	On time	55 mins

How long did Toula have to wait for her friend outside Pesda railway station yesterday?

A 29 minutes

B 31 minutes

C 37 minutes

D 39 minutes

2 A patch of mould appeared on a wall in my basement three weeks ago. It was square and had an area of 1 cm^2. Since then, it has grown at a consistent rate of 3 cm^2 per day and has retained its square shape.

Modelling the patch of mould as a perfect square throughout, which one of the following graphs shows how its width has increased during the last three weeks?
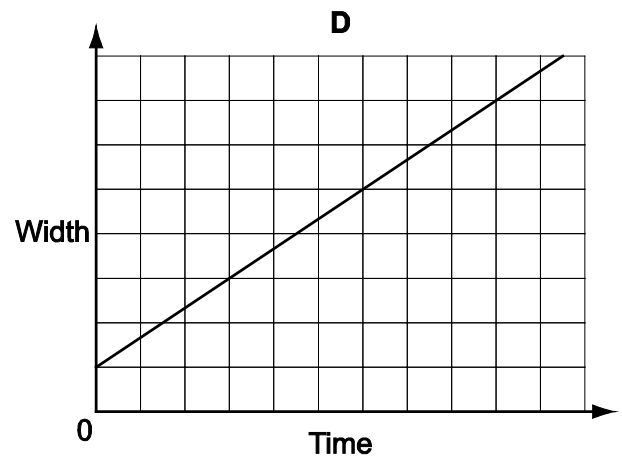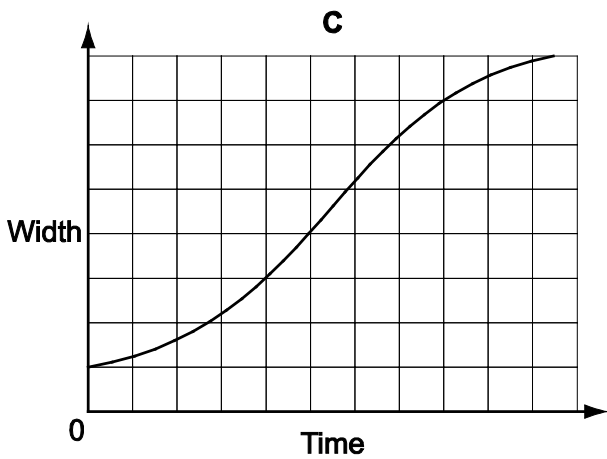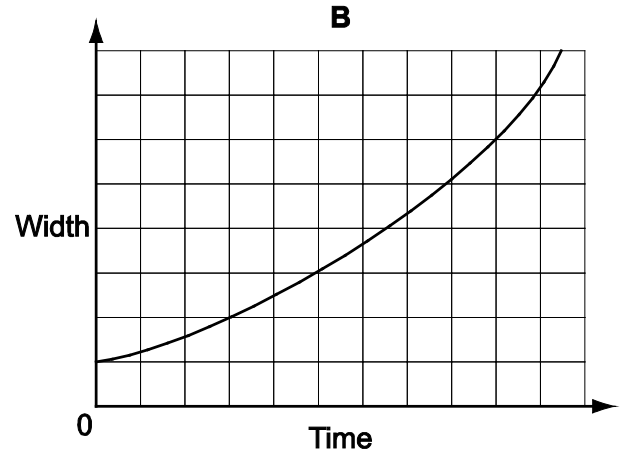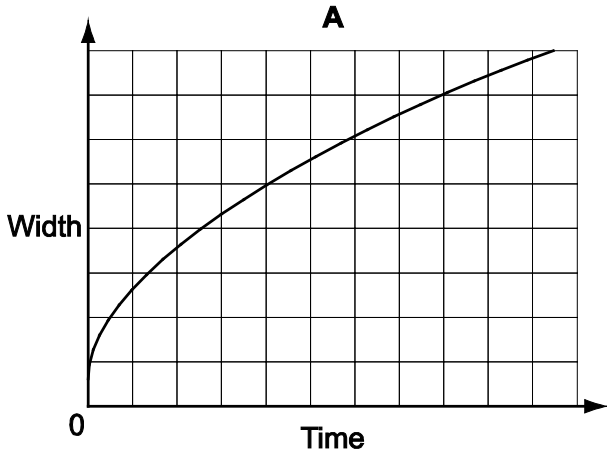
3 The following table reports the results of a survey into sport participation in Scotland.

Participation in Sport in last 4 weeks by Gender and Age (percentage)									
	Male	Female	16–24	25–34	35–44	45–59	60–74	75+	All
2007									
Any sport (excluding walking)	60	44	70	67	61	44	43	22	51
Any sport (including walking)	79	70	89	86	79	72	69	48	74
Walking (at least 30 min for recreational purposes)	64	60	73	69	64	62	57	41	62
2008									
Any sport (excluding walking)	54	43	77	63	55	45	37	16	48
Any sport (including walking)	76	70	91	86	80	72	67	38	73
Walking (at least 30 min for recreational purposes)	62	60	69	70	67	62	59	42	61
Number surveyed 2007	1436	1952	280	440	617	832	780	439	3388
Number surveyed 2008	1486	1901	253	417	608	818	845	446	3387

Which age group has shown the largest percentage reduction between the two years in participation in any sport (including walking)?

A 16–24

B 35–44

C 45–59

D 75+

4   A single bus delivers the return J88 service between Gooshayes Centre and Heatherfield Station. The bus starts at Gooshayes Centre at 06:15 and stops for a 10-minute break at the end of each outward and inward journey.

Today the bus broke down at Rowdean Corner at 12:36. It was unable to continue its journey and a replacement was ordered, but has only just left Rowdean Corner at 13:20.

Timetable of journeys on route J88 to and from Heatherfield Station						
Gooshayes Centre	06:15	08:11	10:07	12:03	13:59	15:55
Albert Street	06:26	08:22	10:18	12:14	14:10	16:06
Rowdean Corner	06:48	08:44	10:40	12:36	14:32	16:28
Heatherfield Station	07:03	08:59	10:55	12:51	14:47	16:43
Heatherfield Station	07:13	09:09	11:05	13:01	14:57	16:53
Rowdean Corner	07:28	09:24	11:20	13:16	15:12	17:08
Albert Street	07:50	09:46	11:42	13:38	15:34	17:30
Gooshayes Centre	08:01	09:57	11:53	13:49	15:45	17:41

The bus driver continues to drive at his normal speed and takes no breaks until he catches up with the timetable.

When will the bus next depart on time from either Gooshayes Centre or Heatherfield Station?

A   13:59

B   14:57

C   15:55

D   16:53

5   A town council intends to plant a large flower bed in the town square with red, blue, yellow and white flowers. There will be twice as many red flowers as blue flowers, three times as many blue flowers as yellow flowers and half as many white flowers as yellow flowers.
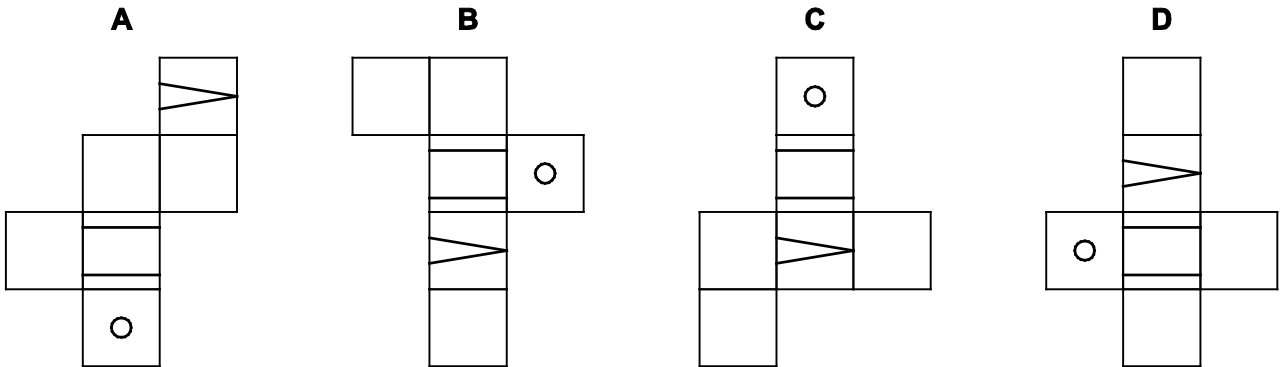
Which one of the following pie charts could represent the number of each colour of flower?

A   B   C   D

9694/13/O/N/18   **[Turn over**
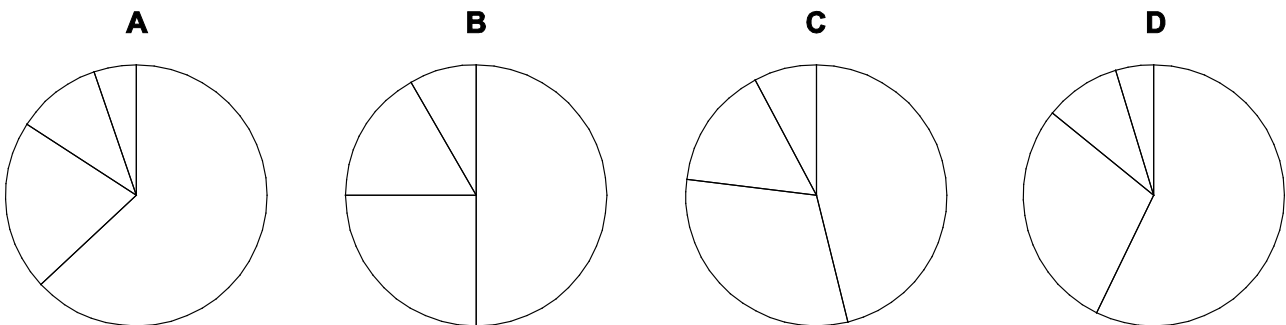
6 Anna draws some lines and circles on four nets of cubes, cuts them out and folds them together.
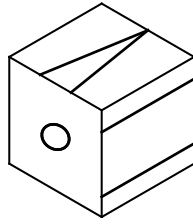
Which of the following nets can be folded to make the cube shown above?

7 Anne needs to produce some invitation cards for a party next weekend. She is making all of the cards by hand and each one will take 20 minutes to make. The materials cost $1 per card. She is able to work between 13:00 and 17:00 on each day from Monday to Friday. Any cards which she is unable to make over the 5 days will need to be bought at a cost of $2 each. A total of 100 cards are needed.

What will be the total cost for the cards?

A $80

B $140

C $160

D $180

8 A set of cards is used to display numbers on a scoreboard. Each card has two different digits from 0 to 9 on it, one on each side. The cards can then be suspended from hooks to show whatever number is required. Unfortunately, the person who puts the cards on to the hooks can only see the opposite side to the one being displayed and so will see a different number to the one that is being displayed. There are only 5 different types of card, each with a different pair of the numbers from 0 to 9 written on them.

When the number 254 is displayed it appears as 925 from the other side and when the number 981 is displayed it appears as 364 from the other side.

If the number 103 were displayed, what number would appear from the other side?

A 173

B 371

C 479

D 974

9 A child's toy has a square base. The toy is placed on a horizontal table. Nine vertical thin poles are attached to the base: one at the centre, one at each corner and one at the mid-point of each edge of the base. The positions of the poles are labelled as on the following diagram.
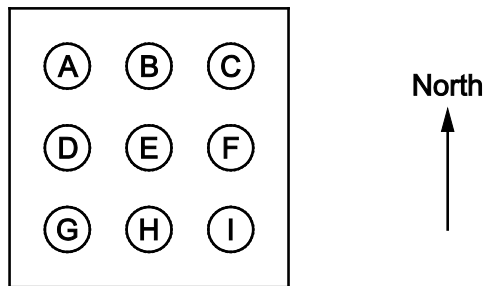
Freddie slots rings onto the poles. The number of rings on each pole is given in the following table.

Pole	A	B	C	D	E	F	G	H	I
Number of rings	8	7	4	5	6	3	2	3	5

When Freddie looks at the toy, at the level of the table, he sees three stacks of rings, with 5 rings in the left hand stack, 7 rings in the middle stack and 8 rings in the right hand stack.

In which direction is Freddie facing as he looks at the toy?

A Towards the East

B Towards the North

C Towards the South

D Towards the West

     [Turn over

10 Mary supports Everwed football team. She decides to knit a scarf in the team's colours of blue and white. She works out that she will need 300 grams of blue wool and 225 grams of white wool. Wool can only be bought in whole balls. She will buy all the wool from only one supplier and she wants the cost to be as low as possible. The cost of balls of wool from four different suppliers is shown in the following table:

| Supplier	Quantity per ball in grams	Cost per ball
Craftie	25	$2.20
	50	$3.60
Homemake	50	$3.40
Knitty	50	$3.50
	100	$6.85
Woolstar	25	$1.80

Which supplier should Mary choose?

A Craftie

B Homemake

C Knitty

D Woolstar

11 Frank has decided that he will offer private tuition to a student who lives near to his house. Lessons will be 1 hour long and he will spend up to 3 hours preparing the resources for each lesson that he teaches. It will cost him $5 to print out the resources once he has created them, regardless of the amount of time that it took him to create them.

The student is willing to pay $100 for each lesson. Frank wishes to earn at a rate of $30 per hour.

What is the maximum amount of time that Frank could set aside for preparing resources for each lesson?

A 130 minutes

B 140 minutes

C 180 minutes

D 190 minutes

12 Zurich Airport has recently introduced a new, high-speed, unmanned railway system to move passengers between two different areas of the airport. The service operates on a loop as shown below.
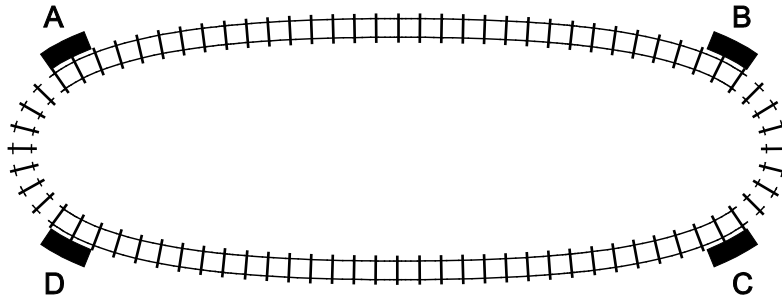
Passengers who are flying from Zurich board a train at platform A and leave it at platform B, while passengers arriving in Zurich board a train at platform C and leave it at platform D.

The service runs every 3 minutes throughout the day. The journey time between A and B, or C and D, is 3 minutes. 1½ minutes are allowed for passengers to get off and it takes 1½ minutes for the trains to move from platform B to C or from platform D to A. 1½ minutes are allowed for passengers to board the train.

How many trains are required to make this system work?

A 3

B 4

C 5

D 6

13 At a recent charity event there was a range of admission charges:

Family (2 Adults + 2 Children)	$44
Adult	$14
Senior	$12
Child (5 to 16 years)	$10
Child under-5	Free

In addition it was possible to buy Family tickets before the event at the reduced cost of $40 per family.

At the gate tickets to the value of $40 000 were purchased, and prepaid tickets added a further $10 000 to the total income. For every Family ticket sold on the day, 1 Adult, 1 Senior, and 3 Child tickets were sold and 2 under-5 children were admitted free of charge.

How many people attended?

A   4400

B   4600

C   4650

D   5400

14 The board below shows the times of the next five trains from Thysside to Utherend.

Trains to Utherend	
Departure	Arrival
18:38	19:22
19:02	19:46
19:24	20:08
19:45	20:37
20:07	20:51

All trains take the same time to travel from Thysside to Utherend.

Clearly there is a problem with the last digit of the departure time and the last digit of the arrival time of the fourth train on the board. Some of the elements used to display the digits are broken and will not switch on.

What is the minimum number of elements that could be broken?

A 2

B 3

C 4

D 5

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15 Larry went to a party last week at which the host had arranged a number of games for each guest to play. For each game the people who took part were awarded a number of silver or gold tokens. At the end of the party these tokens were exchanged for prizes. The prizes that were available are shown in the table below.

Prize	Number of tokens
Book	15 gold and 45 silver
Computer game	50 gold and 25 silver
Jigsaw puzzle	20 gold and 50 silver
Soft toy	30 gold and 10 silver
Set of building blocks	40 gold and 30 silver
Sweet	1 (either gold or silver)

Larry had 50 gold and 80 silver tokens to exchange. He exchanged all of the tokens.

What is the smallest number of sweets that Larry could have received?

A 0

B 10

C 15

D 20

16 Nigel creates a patterned tile by painting a black design on a while tile.
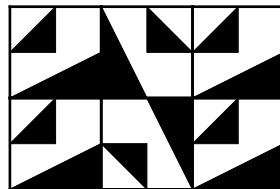

He creates some designs using identical copies of this tile.

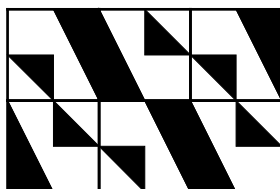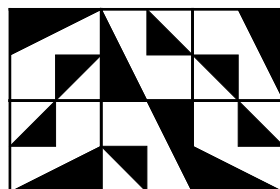Which of the following designs can he **not** make?

A
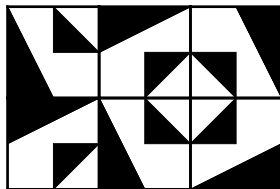
B

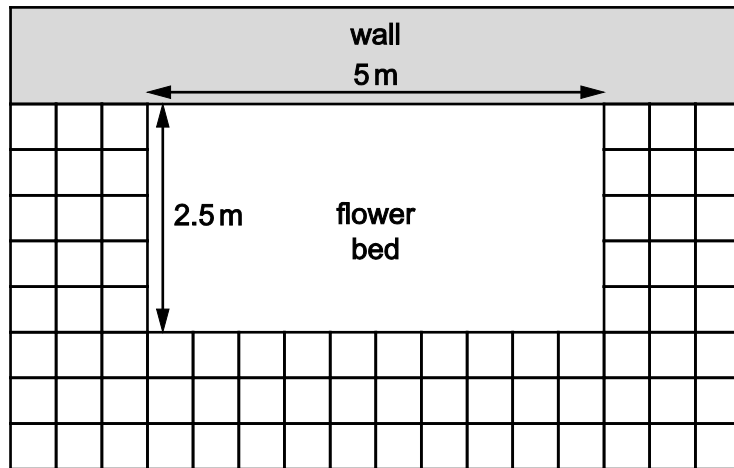

C

D

17

The diagram shows part of my garden, where a 5 m × 2.5 m rectangular flower bed is bordered on one side by a wall and on the other three sides by paving slabs, each 50 cm × 50 cm.

I have decided to remove one row of slabs from each of the three sides in order to create a larger rectangle.

By what percentage do I intend to increase the area of the flower bed?

A   32%

B   40%

C   44%

D   68%

[Turn over

18 The combination lock for my bike has four reels each with the numbers 0 to 4. The correct combination is 3413.

If a thief tries to open it by starting with 0000 and continuing in ascending numerical order, 0001, 0002 etc., on which attempt will he get it right?

A 264

B 359

C 484

D 4524

19 Bolandian Airlines award frequent flier 'Air Kilometres' (Airkos) that can be used as part of the payment for a flight.

The only options for flights to Playa del Sol for which Airkos can be used are:

```
40 000 Airkos plus $209.50
36 000 Airkos plus $249.50
32 000 Airkos plus $289.50
28 000 Airkos plus $309.50
24 000 Airkos plus $349.50
20 000 Airkos plus $369.50
```

All figures are per person.

Icarus has 128 000 Airkos that he can use, and wants to book flights to Playa del Sol for 4 people.

How much does he need to pay?

A $1098

B $1118

C $1138

D $1158

20 Roman numerals for numbers 1 to 89 can be chiselled into stone using straight lines. The letters **L**, **X** and **V** each need two lines and **I** only one.

10	**X**	1	**I**
20	**XX**	2	**II**
30	**XXX**	3	**III**
40	**XL**	4	**IV**
50	**L**	5	**V**
60	**LX**	6	**VI**
70	**LXX**	7	**VII**
80	**LXXX**	8	**VIII**
		9	**IX**

Two-digit numbers are written by placing the units after the tens, e.g. 74 is **LXXIV** .

What is the greatest change in the number of strokes from one number to the next?

A 2

B 3

C 4

D 5

21 Alisha, Benny, Cynthia, Derek, Estelle and Fred share an office and are the only people there. Each pair of people is either friendly, in which case they talk with each other, or unfriendly, in which case they do not.

Alisha talks with everyone except Estelle.
Benny does not talk with Cynthia.
Cynthia does not talk with Derek.
Derek talks with everyone that Benny talks with.
Estelle talks with Benny.
Fred does not talk with anyone who talks with Estelle.

How many people in the office does Derek talk with?

A 1

B 2

C 3

D Impossible to determine from the information given

**22** James has made the following three claims about the sales in his store over the past year:

The greatest profit was made in the third quarter.
The store made a profit overall for the year.
The quarter with the highest total income was not the one with the highest profit.

James has made a bar chart showing the total income and the total costs of his store for each of the four quarters of last year.

Which one of the following bar charts is consistent with all three of James's claims?

A

B
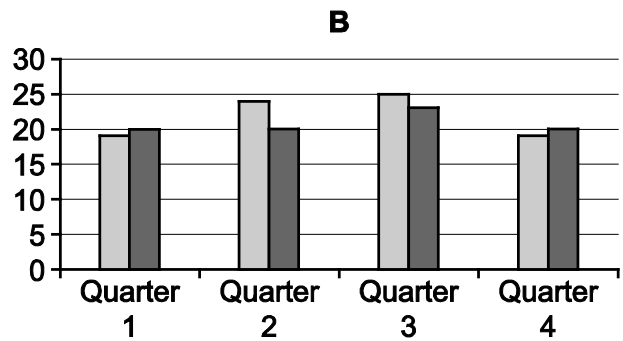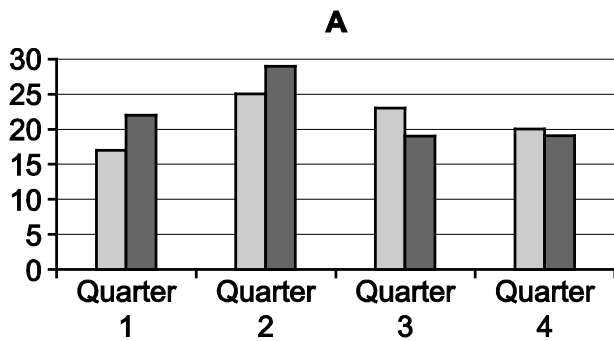
Key ☐ Total income   ■ Total costs

C

D
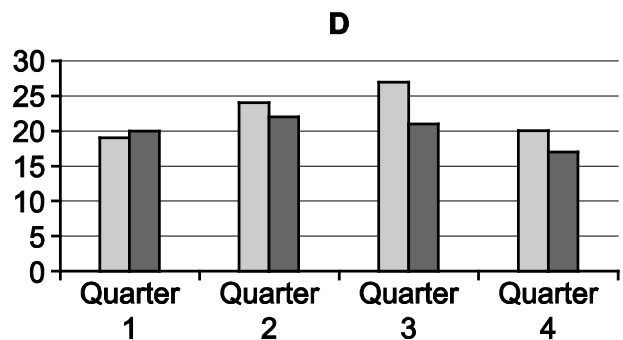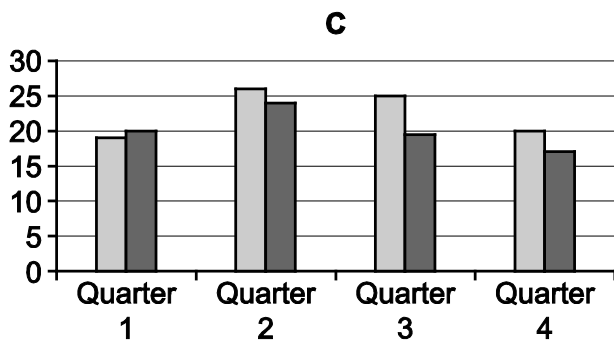
23 Two friends are practising their tennis serve. Adam can serve 6 balls per minute while Mark can serve 4 balls per minute. Adam brings a bag of balls which he serves at Mark. Once Mark has 18 balls on his side of the court he begins serving. Adam continues to serve until his bag is empty and then must wait 11 minutes for Mark to return all the balls.

Assuming no additional time is spent gathering balls, how many balls were in Adam's bag?

A 44

B 45

C 62

D 96

24 The prices for journeys on a bus route are calculated by taking a fixed charge for the journey and adding an extra amount for each stop visited on the journey. Next week the fixed charge will be increased by 20¢, which will mean that the price of a journey visiting 5 stops will increase by 20% and the price of a journey visiting 15 stops will increase by 10%.

What is the current fixed charge for a journey (before the increase)?

A $0.50

B $0.70

C $0.80

D $1.00

25 At a party attended by four people, Alice, Bernard, Cynthia and Douglas, each person pretends to be a different one of the other three.

Bernard does not pretend to be Douglas and Douglas does not pretend to be Alice.
The person pretending to be Bernard is not Cynthia.

Given this information, which one of the following statements **cannot** be true?

A Alice pretends to be Cynthia and Cynthia pretends to be Douglas

B Alice pretends to be Douglas and Douglas pretends to be Cynthia

C Bernard pretends to be Cynthia and Cynthia pretends to be Alice

D Bernard pretends to be Alice and Alice pretends to be Bernard

26 Joe and a group of his friends took part in a quiz last week. The quiz consisted of 5 rounds of 10 questions each and each question was worth 1 point. The team was also allowed to play a 'Joker' card on one of the rounds, doubling the score for that round. Joe insisted that they play the Joker card on the Music round, but unfortunately they did not do very well in that round and ended the quiz with a total score of 36.

If the Joker had been played on the Science round the team would have scored a total of 44 points.

What is the smallest number of questions that the team could have got correct in the quiz?

A 30

B 32

C 34

D 36

27 Terry needs to buy enough eggs to prepare the meals for a party for 50 people being held at his restaurant this evening. There are three different options available, but only two require eggs: 4 eggs will be needed for each omelette, and 2 eggs for each serving of steak and eggs.

20 guests have already confirmed that they would like the steak and eggs for their meal.

Which of the following pieces of information about the remaining 30 orders would enable Terry to work out the number of eggs that he needs to buy?

A   None of the orders will be for steak and eggs

B   None of the orders will be for the option requiring no eggs

C   There will be as many orders for omelette as for steak and eggs

D   There will be as many orders for omelette as for meals requiring no eggs

28 Bathroom tiles are manufactured in three sizes: 60 cm x 60 cm, 60 cm x 30 cm and 30 cm x 30 cm. Ada would like to tile a space measuring 150 cm by 90 cm in a pattern such that tiles of the same size never share an edge.

Which of the following statements is true?

A   Ada's pattern must contain an even number of tiles

B   Ada's pattern may contain three of the largest tiles

C   Ada's pattern must contain an odd number of the smallest tiles

D   Ada's pattern may contain exactly one of the largest tiles

29 The charges for the postal service are calculated by taking a fixed charge per letter or parcel and then adding a variable extra charge based on the weight.

The first 50 g is covered in the fixed charge; after this there is an extra charge for every extra 50 g (or part of 50 g). For example, a parcel weighing 130 g would be charged at the fixed rate, plus two times the extra 50 g charge.
Anything over 500 g is classified as 'bulky' and is charged a fee in addition to the ones described above.

The initial item charge is always a multiple of 10¢.
The charge per 50 g is always a multiple of 1¢.
The 'bulky item' fee is always a multiple of 15¢.

Every week I post a parcel weighing 130 g and a parcel weighing 540 g. This week some of the charges were increased (none were reduced) and my postage cost increased by 32¢.

Which of the charges must have increased to explain this increase in my postage cost?

A The fixed charge and the charge for every 50¢

B The fixed charge and the 'bulky item' charge

C The charge for every 50 g and the 'bulky item' charge

D All three charges

30 70 students were asked about which countries they had visited in Europe. Every student had been to at least one of Germany, France and Spain. 16 students had been only to France, 24 had been only to Spain, and 10 had been to both France and Spain but not Germany.

Which of the following options provides sufficient information to calculate the number of students who had been to all three countries?

A The number of students who have been to Germany and the number of students who have been only to Germany

B The number of students who have been to exactly two of the countries and the number of students who have been to Germany

C The number of students who have been to exactly two of the countries and the number of students who have been only to Germany

D The number of students who have been to two or more of the countries and the number of students who have been to both Germany and Spain, but not France

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