THINKING SKILLS **9694/12**

Paper 1 Problem Solving **October/November 2017**

1 hour 45 minutes

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.

There are **30** questions on this paper. Answer **all** the questions.

For each question there are four possible answers **A**, **B**, **C** and **D**. Choose the **one** you consider correct and record your choice in pencil on the separate answer sheet.

Read very carefully the instructions on the answer sheet. Ignore responses numbered 31–40 on the answer sheet.

DO **NOT** WRITE IN ANY BARCODES.

INFORMATION FOR CANDIDATES

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

Cambridge
International Examinations

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1   Jimmy is training for a long-distance cycling race. At the end of each week, he records the total distance that he has cycled from the beginning of his training until the end of that week. His results are shown on the following graph.
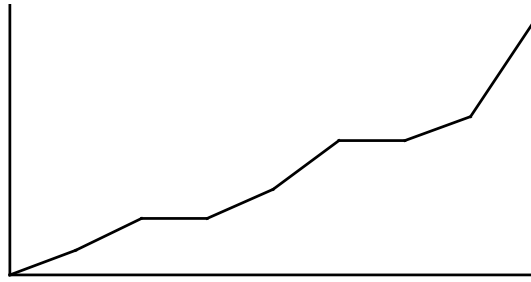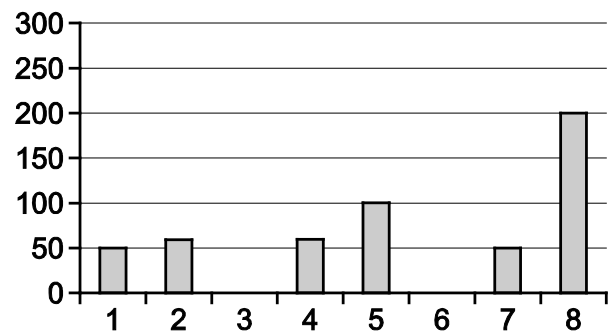

Which one of the following could represent the distance that Jimmy has cycled each week?
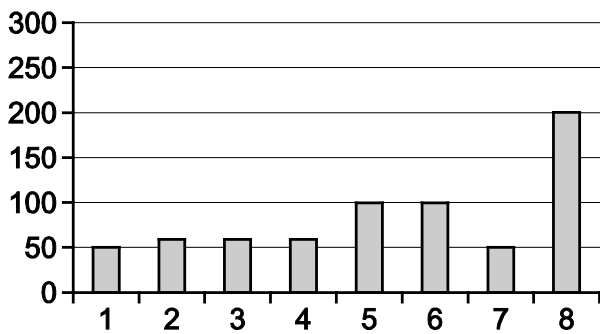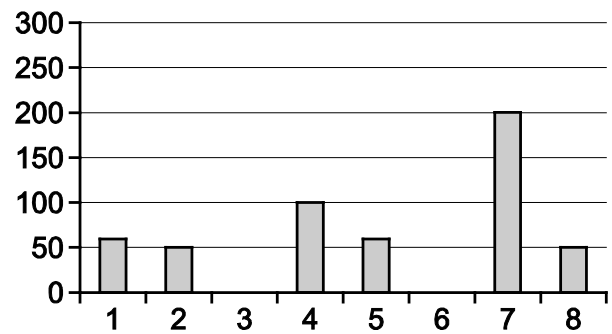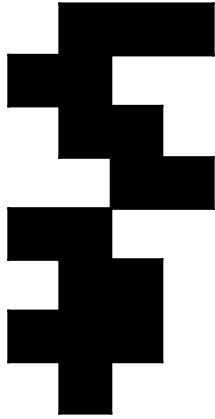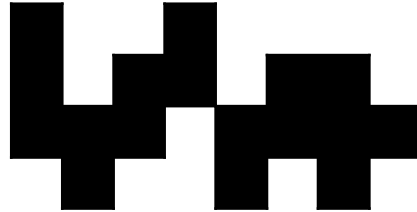
A
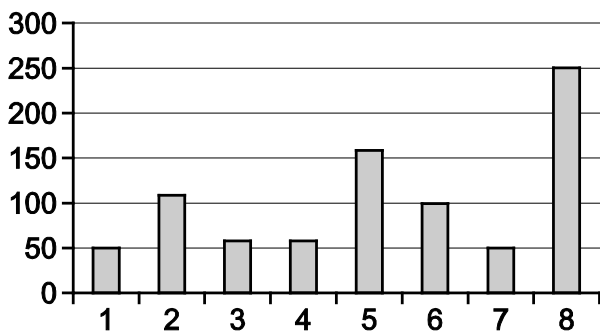
B

C

D

2 The other day I saw an alien spacecraft, which had some strange markings on the underside, hovering overhead. My three friends and I each made a drawing of these markings as the craft rotated slowly above us.

Three of us drew them correctly. Which of the following drawings is wrong?

A

B

C
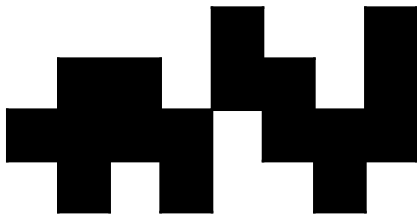
D
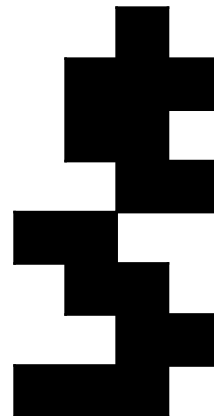
3 A supermarket offers delivery to the customer's house, but makes a charge for the service. The charge is 10% of the cost of the items purchased, plus an extra $1 if any of the items needs to be kept chilled. An additional $3 is added on to the charge if the delivery is over a distance of more than 10 km.

Jeremy has had his shopping delivered to his house. The delivery cost was $6.40.

What is the lowest possible total cost of Jeremy's items?

A $24

B $34

C $60

D $64

4

Winterbottom's Indian Takeaway				
Choose the cooking style you prefer:				

Cooking style	Price per portion
Jalfrezi	$5.00
Biryani	$5.50
Tikka	$6.00
Tandoori	$7.00
Balti	$4.50
Masala	$5.50
Bhona	$6.50

Choose the main ingredient:

Chicken +70¢	Beef +60¢	Vegetarian +30¢	Lamb +80¢	Prawn +$1.20

Add rice:

For 1 +$1.00	For 2 +$1.30	For 3 +$1.60	For 4 +$2.10	Family (6) +$3.00

I am buying an Indian takeaway for myself and three friends. I am vegetarian, one friend wants a prawn biryani and the other two want a chicken dish. We all want rice with our meals.

What is the cheapest price I could pay?

A $23.30

B $23.50

C $24.00

D $25.50

5 Sparks and Denhams both sell similar men's two-piece suits. Sparks only sell them as complete suits for $190, whereas Denhams sell the jackets and trousers separately for $120 and $70 respectively.

This week, the price of men's suits has been reduced by 30% at Sparks.

At Denhams this week, jackets have been reduced by 30%, but trousers only by 20%. However, if a jacket and a pair of trousers are bought together, the combined price is reduced by a further 20%.

Assuming that the jacket and trousers are bought together, how much less does a two-piece suit cost this week at Denhams than at Sparks?

A $21

B $28

C $31

D $40

6 A restaurant can accommodate 120 customers. The restaurant opens at 18:00 and receives a steady flow of customers at a rate of three every two minutes. After 40 minutes customers begin to leave and continue to do so at a rate of one per minute.

At approximately what time does the restaurant become full?

A 19:10

B 19:40

C 20:00

D 20:40

7 John, David, George, Edward and Robert were the five competitors in a race yesterday. Angela wants to know the result of the race, but they will only tell her who won out of any pair that she asks about. So far, Angela has been told the following:

- John beat Edward,
- David beat George,
- Robert beat Edward,
- David beat John.

Which two of the competitors should Angela ask about so that she can deduce who won the race?

A David and Robert

B George and Robert

C John and George

D George and Edward

8 Three families visited the Bolandia Theme Park for a day out. Each family arrived at a different time and paid its own entry charges. The families were:

Mr and Mrs Adams and their 8-year-old son;
Mr and Mrs Brown and their three daughters, aged 8, 12 and 18 years;
Mrs Clancy, her 5-year-old twin sons and her 72-year-old mother.

The entry charges were as follows:

Adults (16–59 years inclusive)	$40 each
Children (3–15 years inclusive)	$22 each
Senior citizens (60+ years)	$25 each
Family ticket (2 adults and up to 2 children)	$110

What was the minimum amount these three families could have paid?

A $343

B $361

C $369

D $375

9 The keys used on a mobile phone for the letters of the alphabet when texting are as follows:

2	3	4	5	6	7	8	9
ABC	DEF	GHI	JKL	MNO	PQRS	TUV	WXYZ

The word HAY, for instance, is formed by pressing 4 twice, 2 once and 9 three times.

Which key is pressed most times in total when forming the word UNRETURNED?

A 3

B 6

C 7

D 8

10 The table shows the number of photographs taken by a photographer on five days during one week.

Day	Monday	Tuesday	Wednesday	Thursday	Friday
Number of photographs taken	128	176	350	103	52

Which one of the following charts could represent this data?

A

B

C

D

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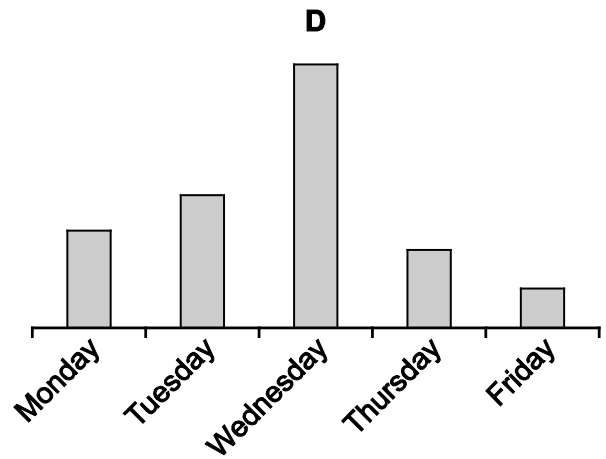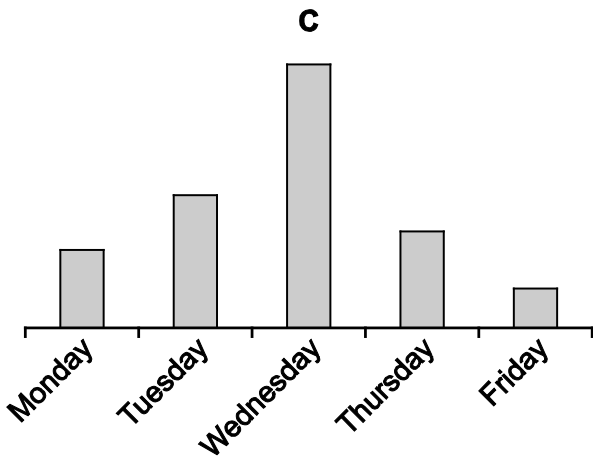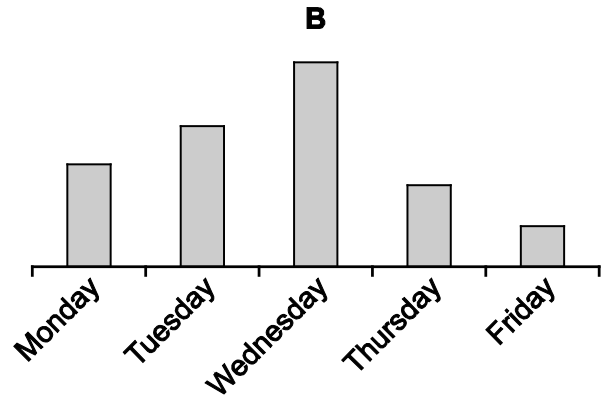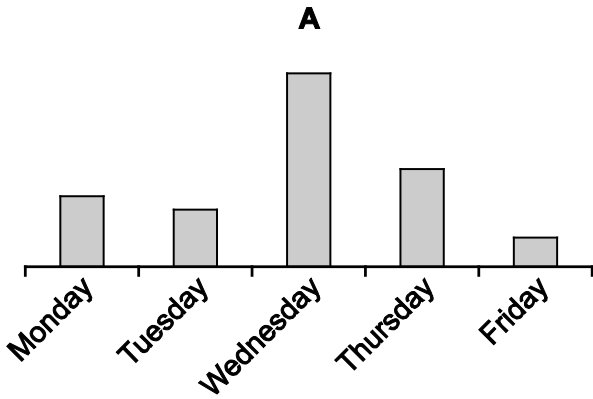
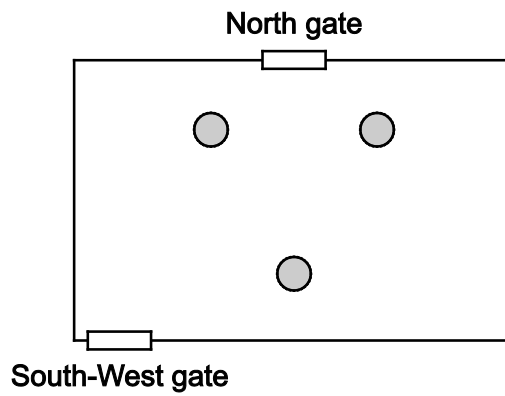**11** A power station has three towers of different heights. On the map they form a triangle.

North gate

South-West gate

Seen from the South-West gate, the towers appear as follows:
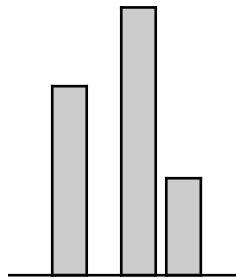
Which of the following best represents the view of the towers from the North gate?

A	B	C	D
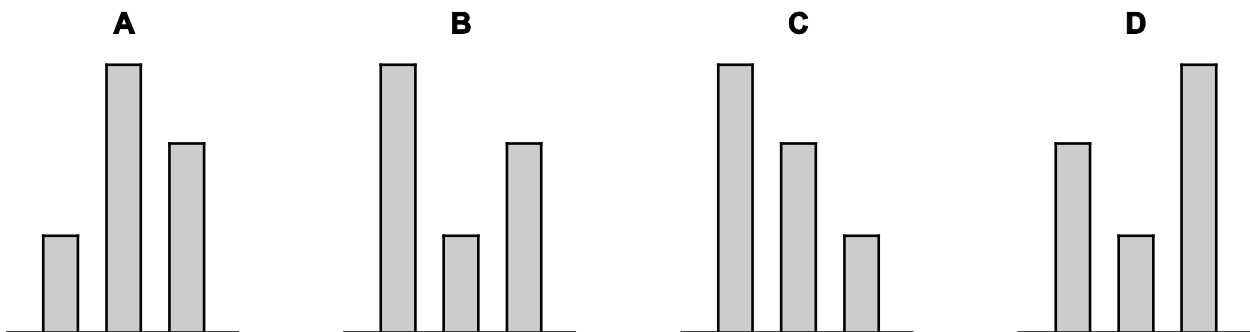
12 The shoe sizes of 60 boys were correctly recorded both in a table and on a chart. Unfortunately, when this information was photocopied some of the numbers in the table and some of the information in the chart could not be read.

Shoe size	Number of boys
7	10
8	
9	15
10	
11	9
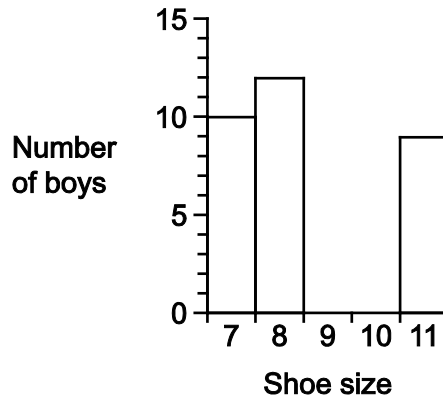
Four people independently tried to draw either a chart or a table based on the photocopied information.

Walter

Shoe size	Number of boys
7	10
8	14
9	15
10	12
11	9

Xavier
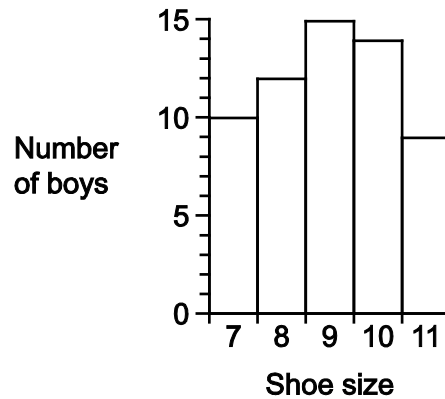
Yuvraj
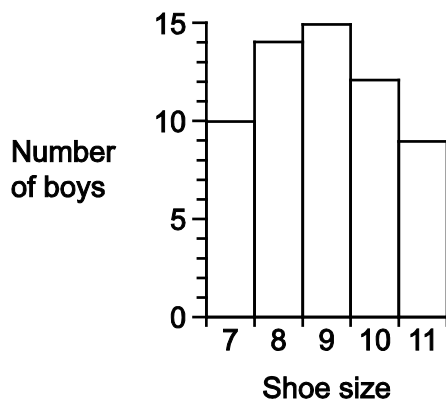
Zaheer

Shoe size	Number of boys
7	10
8	12
9	15
10	14
11	9

Which two people were correct?

A   Xavier and Walter

B   Yuvraj and Zaheer

C   Yuvraj and Walter

D   Xavier and Zaheer

13 Jack and Naomi have an area of lawn at the front and back of their house. The front lawn is square and is 8 m by 8 m; the back lawn is rectangular and is 6 m by 10 m. They wish to buy lawn feed to treat both lawns. They must buy at least enough to cover their entire area but can use a mixture of different types of feed. Their local garden centre has the following available:

Name	Area covered (m^2)	Price ($)
Green Grass Feed (small)	25	3.60
Green Grass Feed (large)	60	8.40
Super Lawn Feed (small)	30	3.90
Super Lawn Feed (large)	70	8.90

What is the minimum cost for Jack and Naomi to treat their lawns?

A $16.40

B $16.70

C $17.80

D $18.00

14 The Bolandia Financial College runs a 3-year course in accountancy. At the end of the first year, 90% of students on the course are allowed to progress to the second year. At the end of the second year, two-thirds of students are allowed to progress to the third year. One in four of these students do not pass the final examinations.

On one occasion, 72 students successfully completed the 3-year course and qualified as accountants.

How many students began this course?

A 150

B 160

C 320

D 480

15 The musical *Colorado!* was performed at the Howkee Theatre each night from Tuesday to Saturday for two weeks recently. Tickets cost $20 for adults and $10 for children.

This is a record of the numbers of tickets sold for each of the performances.

		Tue	*Wed*	*Thu*	*Fri*	*Sat*
Week 1	Adult	283	375	339	436	348
	Child	55	92	81	88	63
Week 2	Adult	341	416	311	482	526
	Child	58	67	118	75	69

Which one of the following charts shows the income from ticket sales for the performances of week 2?
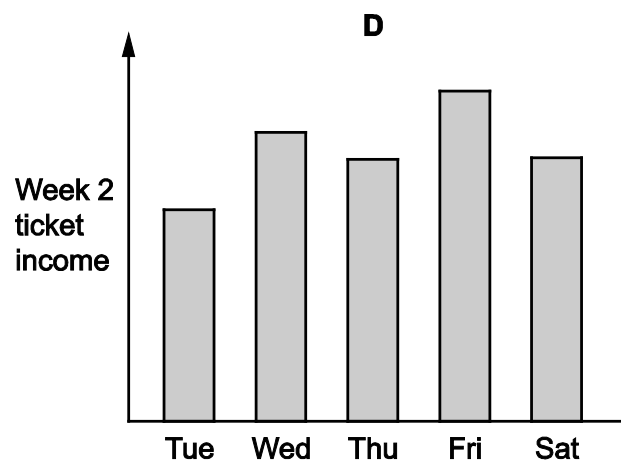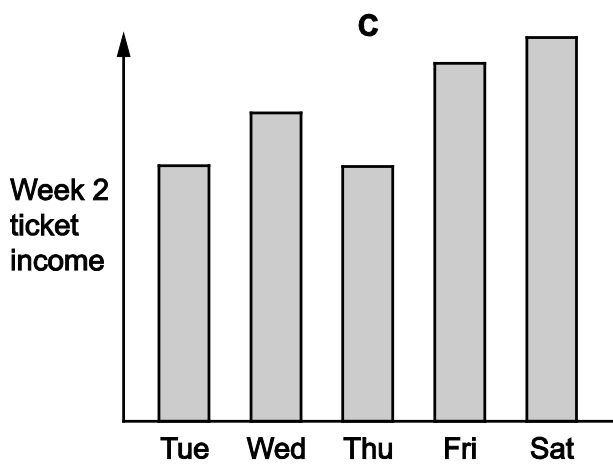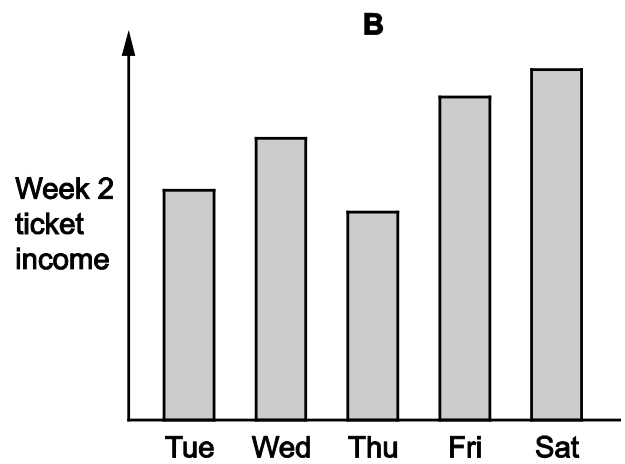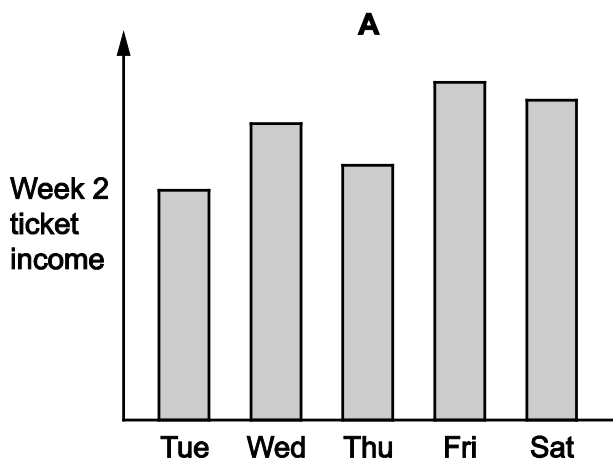
16 A secret society meets in the evening every Monday, Tuesday and Thursday, and every third Wednesday, but never on Friday, Saturday or Sunday. Their first meeting was on a Wednesday.

On which day will they have their 100th meeting?

A Monday

B Tuesday

C Wednesday

D Thursday

17 There is a Frisbee Golf course in the local park. Eight friends compete against each other and there is a 'ladder' to indicate how well they are doing, updated at the end of each day. Any player can challenge any other player to a game, and if the person lower in the ladder wins, then they move up the ladder to the place directly above the person they have beaten.

On Tuesday, Eric was at the bottom of the ladder, but after beating Faith in the only game on Wednesday he moved up to fifth place.

Tuesday	*Wednesday*
Ali	Ali
Beth	Beth
Cass	Cass
Dave	Dave
Faith	Eric
Gus	Faith
Hattie	Gus
Eric	Hattie

On Thursday there were four games. Beth had a bad day and was beaten by both Dave and Eric. Faith beat Dave, and Hattie beat Faith. At the end of Thursday the results were entered into the ladder, with the game that finished first being entered first and so on.

What is the highest possible position in the ladder that Faith could be in after the results were entered?

A Second

B Third

C Fourth

D Fifth

18 The crew of US submarines work on an 18-hour cycle rather than a 24-hour day. They divide into three 'watches', each working for 6 hours, with a meal break for the half hour immediately before and another for the half hour immediately after work. The watches change at 05:30, 11:30, 17:30 and 23:30 Universal Time, no matter where in the world they are.

How much time for meal breaks does a member of the crew get in a 72-hour (3-day) period?

A It depends when the period starts

B 3 hours

C 4 hours

D $4\frac{1}{2}$ hours

19 Three sisters, Kate, Lottie and Miriam, decide to get fit by running. Kate will run on alternate days. Lottie will run on every third day. Miriam will run only on Saturdays and Sundays. The sisters will run together whenever their days for running coincide. Kate and Lottie run together on the last day in April, which is a Friday.

How many times will at least two sisters run together during May?

A 5

B 7

C 11

D 12

20 The stations of Elport and Arstar are 15 km apart. Trains travel between the two at a constant speed of 90 km/h, and they always run on time.

There is a level crossing between the two stations, 6 km from Arstar. The barrier is lowered 1½ minutes before a train is due and raised again ½ minute after it has passed. If, however, another train is due within 3 minutes of the time that the barrier would otherwise have been raised, it remains down until ½ minute after the second train has passed.

There is a train that leaves Elport every afternoon at 14:46 travelling towards Arstar and one that leaves Arstar at 14:49 heading for Elport. No two trains ever pass the crossing in the same direction within 10 minutes of each other.

For how long is the barrier down to allow these two trains to pass?

A 2 minutes

B 3 minutes

C 4 minutes

D 5 minutes

21 Alex has taken a Geography test. It was a multiple-choice test with 30 questions. A correct answer to any of the first 15 questions scored 1 point. 4 points were awarded for correct answers to questions 16 to 25 and 9 points for correct answers to questions 26 to 30. There was no penalty for incorrect answers. Alex achieved a score of 83.

Which of the following pieces of information, on its own, would enable the number of Alex's correct answers to be calculated?

A   11 of the first 15 questions were answered correctly

B   9 of the questions from 16 to 25 were answered correctly

C   4 of the final 5 questions were answered correctly

D   13 of the last 15 questions were answered correctly

22 Gary's grandmother has two old clocks. One of them runs slow and loses 5 minutes each hour, and the other runs fast and gains 10 minutes each hour.

At 23:00 on Monday, both clocks were showing the same time.

How many times on Tuesday did both clocks show the same minutes past the hour?

A   2

B   4

C   6

D   12

23 A club's football field has a playing area of 105 m × 70 m. Outside the playing area there is a surround, 5 metres wide, which is not used for play.

The club uses the playing area for junior games which are played on pitches of 34 m × 24 m but with 2 metres gap between them for safety.

How many junior pitches can be fitted into the playing area?

A   4

B   6

C   8

D   9

24 The SaveMost mini market is open for 7 days a week and employs three part-time assistants who each work for 3 days a week. None of them works for three consecutive days but at least one of them is there each day.

Arif cannot work on Tuesdays, Thursdays or Sundays.
Bjorn cannot work on Saturdays.
Carla cannot work on Thursdays or Sundays.

They all work on Wednesdays.

Which of the following is possible?

A   Arif works Wednesday, Friday, Saturday

B   Bjorn works Monday, Wednesday, Thursday

C   Carla works Monday, Wednesday, Friday

D   Carla works Tuesday, Wednesday, Saturday

25 30 Spanish-speaking students are applying for holiday jobs that involve translating presentations from Spanish into English, French or Italian.

16 of them can translate into French, 16 can translate into Italian and 11 into English.
5 can translate into both French and English, and, of these, 3 can translate into Italian as well.
5 can translate only into English, and 8 can translate only into Italian.

How many can translate only into French?

A   3

B   7

C   8

D   9

26 In a certain family, the father gives out pocket money to his children in the following way.
Every month he chooses a number between 1 and 100, and then shares that amount of money equally between the seven children, giving them whole-number sums of money, and giving anything left over to charity.

For instance, if he chose the number 30, he would give $4 to each child ($4 × 7 = $28) and $2 to charity.

If the father realises after 100 months that every number between 1 and 100 (inclusive) has been used once, how much has he given to charity?

A $276

B $294

C $297

D $300

27 A sprinkler system in my garden, when switched on, sprays water at a constant rate of 4 litres per minute from a 900-litre tank, which in turn is filled from the mains supply.

An automatic control device ensures that as soon as the amount remaining in the tank is only 150 litres, water is supplied to it from the mains at a constant rate of 10 litres per minute. This continues until the tank contains 900 litres, at which point the supply is cut off.

Yesterday the sprinkler system was on for 5½ hours continually. Before I switched it on, the gauge showed that there were 710 litres of water in the tank.

How much water was left in the tank when I switched off the system yesterday?

A   260 litres

B   440 litres

C   640 litres

D   740 litres

28 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

29 Each member of a group of high school students was asked whether they play soccer and whether they play baseball. 100 students said that they play soccer and 60 said that they play baseball. At least 20 students play both soccer and baseball. The number of students who play neither of these sports is no more than the number who play both.

Which one of the following statements is **not** true?

A   At least 40 students play only one of soccer and baseball

B   At most 120 students play only one of soccer and baseball

C   At least twice as many students play only soccer as play only baseball

D   There are more than 160 students in the group

30 Eddie works in a supermarket. He has been told to create a display of soup cans using 24 cans of each of the following varieties (a total of 120 cans):

<div align="center">

Asparagus
Celery
Mushroom
Onion
Tomato

</div>

He has decided to construct a triangular stack, with one can on the top row, two on the second row etc., down to fifteen on the bottom row, as shown below.
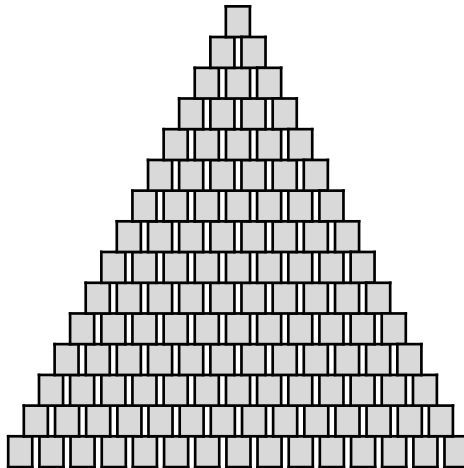
Each row will contain one variety only.

He intends the top five rows to be made up of 1 can of Tomato, 2 cans of Mushroom, 3 cans of Onion, 4 cans of Asparagus and 5 cans of Celery.

He also wants each of the middle five rows to contain a different variety, and likewise each of the bottom five rows. He will also ensure that the fifth and sixth rows contain different varieties and that the tenth and eleventh rows contain different varieties.

He has started by placing a row of 15 cans of Mushroom on the floor.

What variety must Eddie place next, on top of the bottom row?

A Asparagus

B Celery

C Onion

D Tomato

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