Candidate number:_____

Group Number:_____

ST PAUL'S
GIRLS' SCHOOL

FIRST YEAR ENTRANCE EXAMINATION

MATHEMATICS

50 minutes

PLEASE READ THESE INSTRUCTIONS VERY CAREFULLY

Use a pencil. No calculators, protractors or rulers are allowed.

There are two sections. You should spend 20 minutes on Section A.
The invigilator will tell you when you should begin Section B.

Show all your workings and write your answers on the lines provided.

Please do not rub out your workings.

If you cannot do a question, leave it and go on to the next one. Try again later.

You cannot ask a teacher for explanations.

If you finish before the end of 50 minutes go back and check your answers.
Try to complete any questions you have left out.

Section A

1. a) Billie bought a 1.5 kg leg of lamb for dinner.

However, she had not cooked a leg of lamb before so she looked it up in her recipe book.

It said that the cooking time (in minutes) for the leg of lamb is

"50 times the weight (in kg) plus an additional 32".

For how long, in hours and minutes, should Billie cook the lamb?

Answer .....hours.....minutes.....

b) She also needs to roast some potatoes to accompany the lamb. She knows this will take 55 minutes.

Steaming some greens will take 8 minutes. If she wants to serve lamb, potatoes and greens together at 6pm, at what time should she start cooking each of these?

Lamb: .....pm

Potatoes: .....pm

Greens: .....pm

2. (a) A train leaves London Waterloo for Exeter St David's at 11:35.

It calls at Clapham Junction, Salisbury and Yeovil Junction but at ***each*** of these stations the train is delayed by 5 minutes. According to the timetable the journey should take 3 hours and 42 minutes if the train is not delayed.

At what time does it arrive?

Answer .....

(b) Another train left London at 22:03 and arrived in Aberdeen at 06:18 the next day.

How long did the journey take?

Answer .....hours.....minutes.....

3. Write down **two** calculations with the same answer using the given numbers and symbols. You may use each number or symbol only **once**.

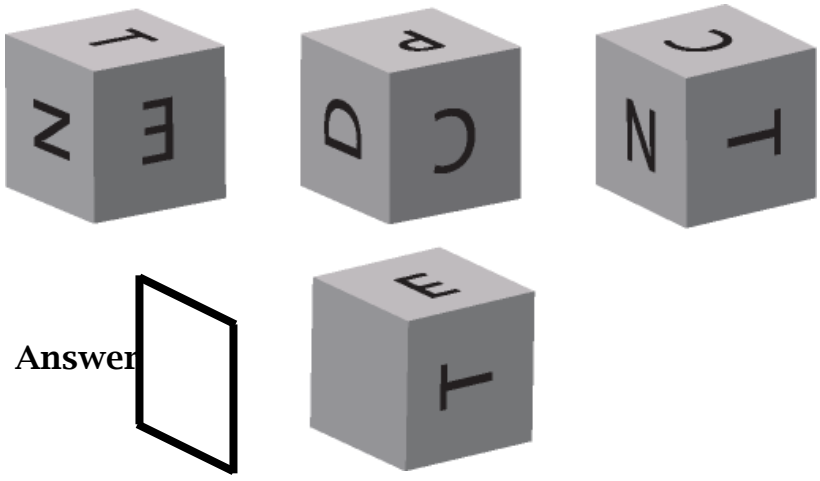
7 7 8 63 – ×

Answer ...Calculation 1.....

Answer ...Calculation 2.....

4. Below are four views of the same die.

Draw the correct missing face of the final view.

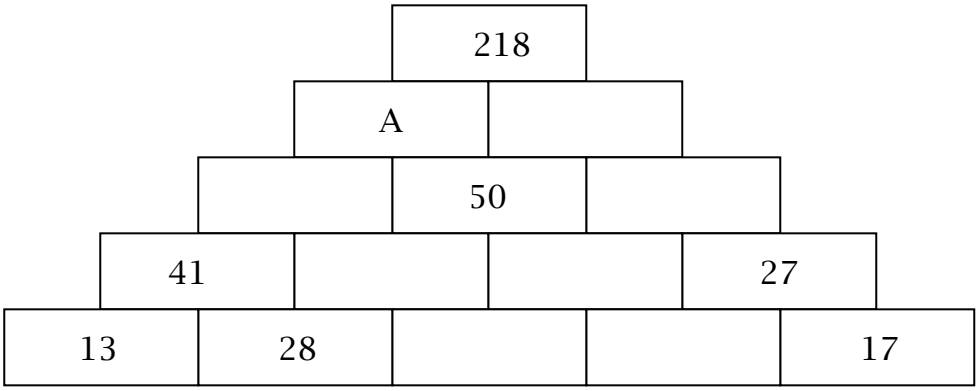


Answer

5. The sum of each two steps which are side by side gives the number above them.

For example, 13 + 28 = 41

What number replaces the A?



Answer .....

6. In a class of 30 pupils, 20 like lemonade, 17 like strawberry milkshake and 11 like both.

How many pupils:

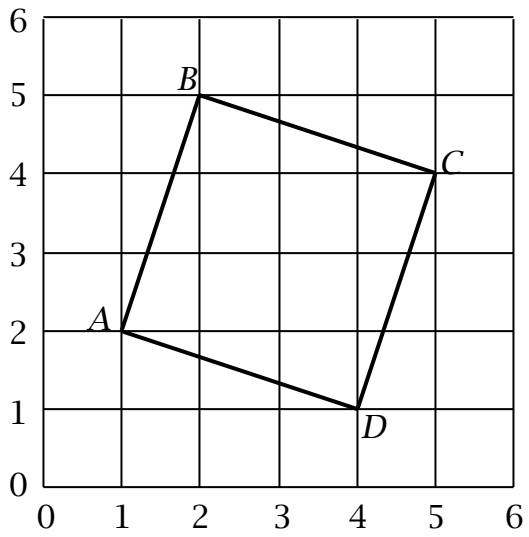
(a) like only lemonade

Answer .....

(b) like neither

Answer .....

7. In the given grid, each unit represents 1cm. Find the area of figure *ABCD*.



Answer .....

8. The average age of Sita, Vina, Aarti and Pooja is 17 years.

Aarti is 11 years old, Sita and Vina are the same age and Pooja is 3 years older than Sita and Vina.

How old is Sita?

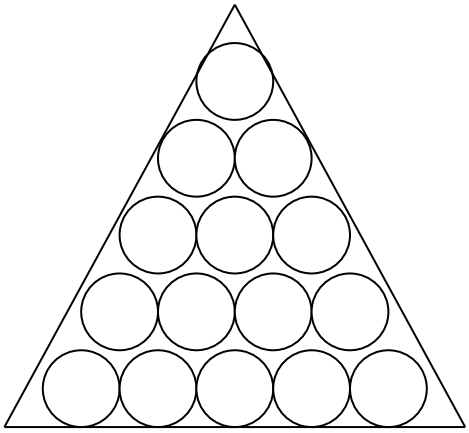
Answer .....

9. The following words have been written in number code where each letter is represented by one digit. Match up the following words with the code numbers.

stops posts strop spots ports sport

Number code	Fill in the word
75386	
68576	
67538	
67586	
75686	
68357	

10. Fifteen red snooker balls are placed in the frame as shown.



A second layer is placed on top of them, so that they rest in the spaces.

This is followed by more layers until there is a single ball at the top.

(a) How many layers are there?

Answer .....

(b) How many balls are needed to make this pyramid?

Answer .....

END OF SECTION A. YOU SHOULD CHECK YOUR ANSWERS.

Section B

1. Using 1s and 2s, there is only one way to represent the value 1.

However, there are two ways of making the value 2:

1 + 1 or 2.

There are three ways of adding up an **ordered** combination of 1s and 2s to make 3:

1+1+1 or 2+1 or 1+2

Notice that order is important here!

a) How many ways can you add up an ordered combination of 1s and 2s to make 4?

Answer .....

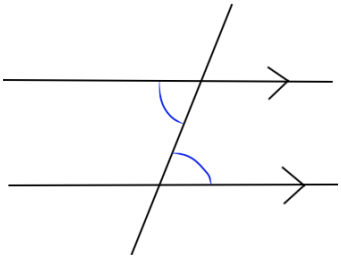
b) How many ways can you add up an ordered combination of 1s and 2s to make 5?

Answer .....

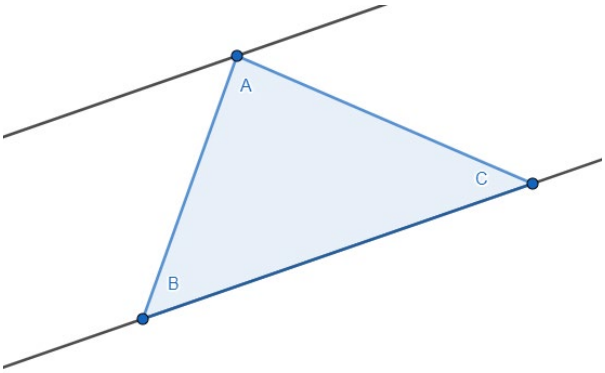
c) By considering these results, prove that there are exactly 21 ways you can add up an ordered combination of 1s and 2s to make 7.

2.

You are given that angles which form a Z-shape within parallel lines are equal.

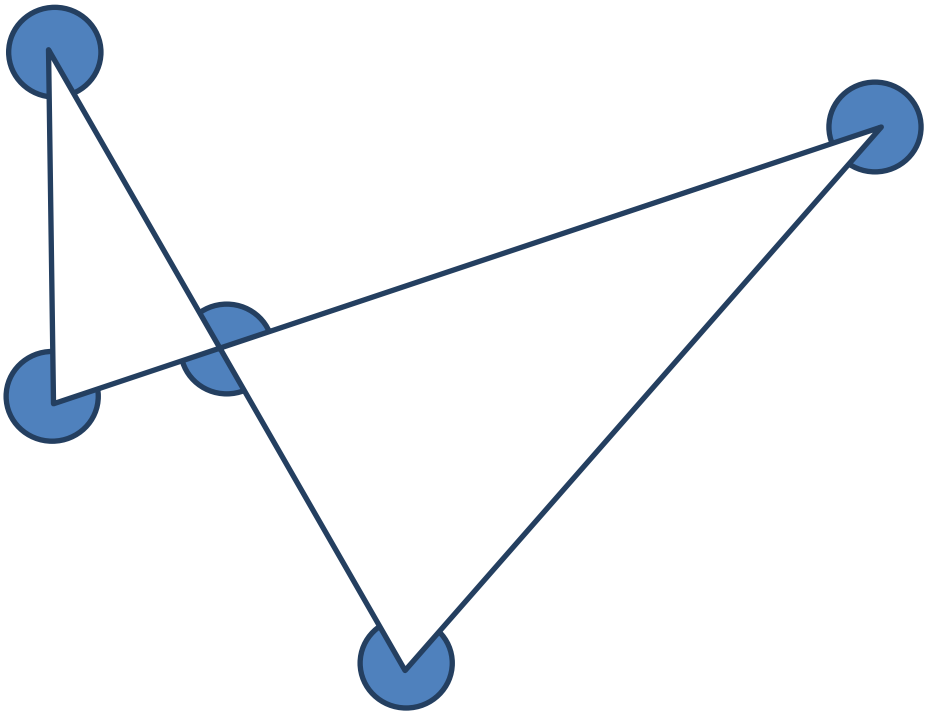


a) Now, using the diagram below, explain how you know the angles in a triangle sum to 180°.



b)

What is the sum of the six shaded angles?



Answer .....

3. You are told that O_n is 'the value of the first n odd numbers multiplied together' and that E_n is 'the value of the first n even numbers multiplied together'. For example,

$$O_3 = 1 \times 3 \times 5 = 15$$

$$O_5 = 1 \times 3 \times 5 \times 7 \times 9 = 945$$

$$E_6 = 2 \times 4 \times 6 \times 8 \times 10 \times 12 = 46{,}080$$

(a) Calculate O_6

Answer .....

(b) What is the remainder when O_{50} is divided by 15?

Answer .....

(c) What is the remainder when O_{100} is divided by 2?

Answer .....

(d) What is the remainder when E_{100} is divided by 3?

Answer .....

You are told that $n!$ is 'the value of the first n counting numbers multiplied together'.

For example,

$$1! = 1$$

$$2! = 1 \times 2 = 2$$

$$3! = 1 \times 2 \times 3 = 6$$

(e) Use your answer to (a) to calculate $12!$

Answer .....

(f) What is the remainder when $1! + 2! + 3! + 4! + 5! + 6! + 7! + 8!$ is divided by 5?

Answer .....

END OF SECTION B. YOU SHOULD CHECK YOUR ANSWERS.

THIS PAGE HAS NO QUESTIONS.

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