

WE NEED MATHS!

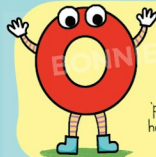
Just imagine if maths didn't exist. We couldn't count or measure things. We wouldn't know how far away places are, or how long it takes to get there. We couldn't build cars, roads, houses or machines. You couldn't even read this book, because it was made on a computer – and computers use numbers!



Maths helps us to understand the world around us. It also helps us to solve problems and work out how to do things – from how to share a pizza, to how to make and fly an aeroplane!

WHAT ARE NUMBERS?

Numbers are the symbols we use to count and measure things. A set of symbols we use to write numbers is called a number system.



Zero is special!

Zero has an important job. When it is part of a bigger number, such as 202, it is a 'placeholder'. This means that it holds the place when there is no other number to sit there.

DIFFERENT NUMBER SYSTEMS

Not everyone uses the same number symbols or counts in the same way. Many different systems have been invented to count and write numbers.

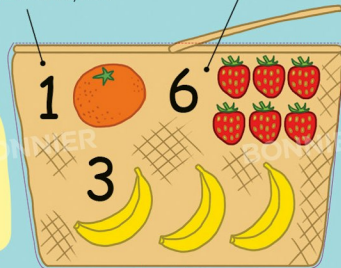


Roman numerals

The ancient Romans used seven letters in their number system. The letters are put together in different combinations to write different numbers.

The number system we use is called the Hindu-Arabic system.

Number symbols are also called digits or numerals.



Tally marks

For thousands of years, people have used tally marks to count things.



Chinese numerals

Chinese writing uses symbols, called characters, to write numbers.



ALL KINDS OF NUMBERS!

Numbers are amazing! We only have 10 number symbols, but they can be used to write any size of number that we want and can do all sorts of clever things.

Odd and even numbers

Even numbers are whole numbers that can be divided exactly into pairs. Odd numbers are whole numbers that cannot be divided exactly into pairs – there is always one left over. Can you spot all the odd house numbers on this street? Now point to all the even numbers.

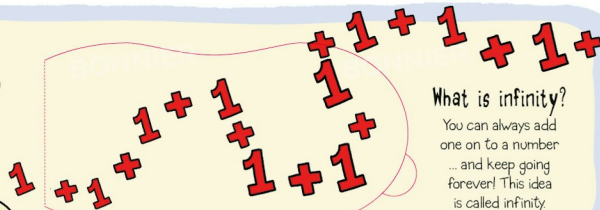


Big numbers

Look at these numbers. Can you point to the biggest one?

We can tell how big a number is by how many zeros there are on the end of it. The more zeros there are, the bigger the number. Each time you add a zero to the end, the number gets 10 times bigger.

10 100 1,000



What is infinity?

You can always add one on to a number ... and keep going forever! This idea is called infinity.



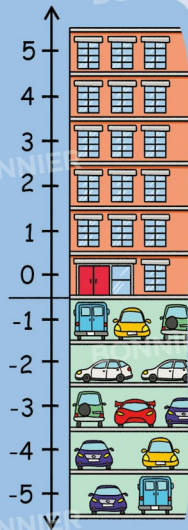
Prime numbers

Some numbers, such as 2, 3, 5, 7 and 11, can only be evenly divided by themselves, or by the number 1. These are called prime numbers.



Positive and negative numbers

Look at the floor numbers for this building. The numbers that are bigger than zero are positive numbers. The numbers that are below zero are called negative numbers. Negative numbers have a minus sign (-) in front of them.



WHAT CAN NUMBERS DO?

When you start looking, you'll notice that numbers are everywhere! Let's see how numbers can help people in this busy café.

This boy wants to buy a carton of juice and a bun. How can he find out how much it will cost?

How can the boy find out if he has enough money to buy a slice of cake for his friend, too?

This lady wants to buy two sausages for each of her dogs. How can she find out how many sausages she needs to buy?

Mental maths

Sometimes, it's very useful to work out sums without having to write anything down – like when you are in a café. This is called mental maths. You just use your brainpower! Learning the times tables off by heart is a great way to help with mental maths.

$$3 \times 2 = 6$$

$$4 \times 5 = 20$$

$$3 \times 7 = 21$$

$$5 \times 8 = 40$$

$$6 \times 3 = 18$$

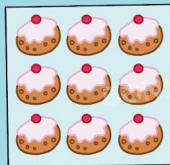
$$7 \times 7 = 49$$

Square numbers and square roots

If you multiply a number by itself, this is called squaring.

$$3 \times 3 = 9$$

Square numbers can be arranged in a square shape.



Finding the square root of a number is the opposite of squaring a number. The square root of 9 is 3 because $3 \times 3 = 9$.

SHAPES AND PATTERNS

The world is full of shapes! Each shape has a set number of sides and corners. They can all be made using either straight or curved lines.

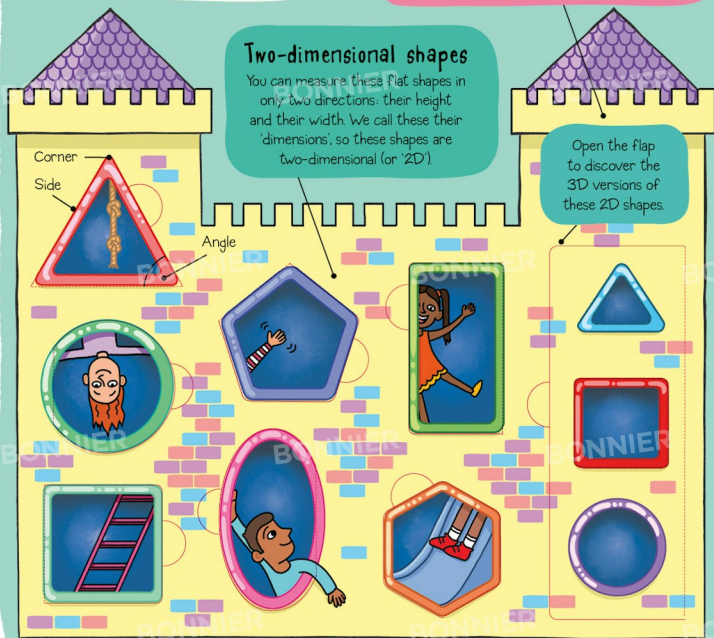
Three-dimensional shapes

Some shapes are solid, so you can hold them. You can measure them in three directions (or dimensions) – length, width and height. These are called three-dimensional (or '3D') shapes.

Two-dimensional shapes

You can measure these flat shapes in only two directions: their height and their width. We call these their 'dimensions', so these shapes are two-dimensional (or '2D').

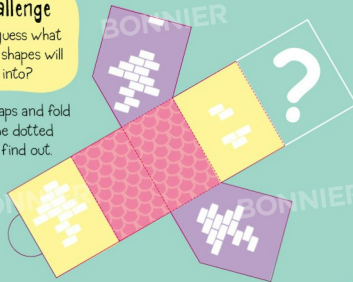
Open the flap to discover the 3D versions of these 2D shapes.



3D challenge

Can you guess what these 2D shapes will turn into?

Lift the flaps and fold along the dotted lines to find out.



Regular shapes

All the sides are the same length,
and the angles are all the same.



Irregular shapes

Not all the sides are the same length,
nor all the angles the same size.

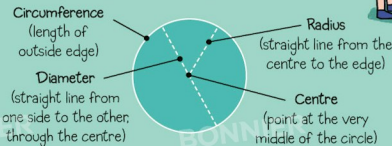


Super circles

The distance from the centre of a circle to its outside edge is always the same, no matter where you measure.



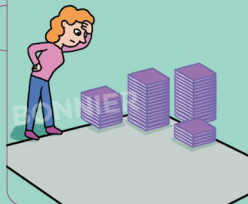
You can't use a ruler to measure the circumference of a circle. You could lay a piece of string around the edge, then measure how much string you used. If the circle was big enough you could walk around the edge and count your steps. But there is another way. Lift the flap to find out how.



What is geometry?

Geometry is maths that uses shapes, lines, angles, space and patterns. It helps us work out how to build or make things, such as bridges or buildings.

Geometry can help us to solve tricky problems, like how many tiles we need to cover this floor. Lift the flap to help this person work out the answer.



MEASURING UP!

We use measurements every day to tell us how big, small, hot, cold, light and heavy things are. We can also measure time and speed, too. Measuring tells us lots of useful things, such as how far it is to school, how long it takes to get there, how hot the weather is, and how heavy our bag is.



How long?

Length is the distance between two points. It can measure tiny things, such as an ant, or huge things, such as the distance around planet Earth.



The right tool for the job

We have lots of different tools to help us measure things.

What do these tools measure?



Whole numbers and fractions

We know how to divide whole numbers by whole numbers, but what if we want to divide just one thing into smaller parts?

If we split one whole cake into four equal parts, we get four smaller pieces, all the same size. We can split whole numbers like this, too.



How long?

We use clocks and calendars to measure time passing. There are other ways we can see time passing, like watching a flower grow, or seeing the seasons change.

How heavy?

We use scales to measure how heavy something is.

Which is heavier? The jam jar or the balloon?



How fast?

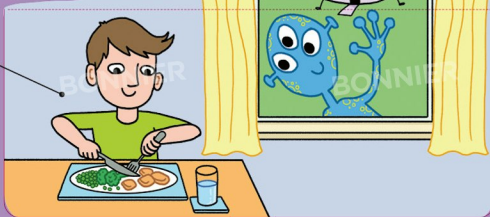
We measure speed by working out how far something travels in a set amount of time. If you walk 4 kilometres to school in one hour, your speed is 4 kilometres in an hour, or kilometres per hour, or 4km/h.

WHAT'S THE CHANCE OF THAT?

We can use maths to help us work out how likely, or probable, it is that something will happen. This kind of maths is known as 'probability'.

Is it likely?

Some things are very likely to happen, such as having dinner. Other things are very unlikely, such as meeting an alien!



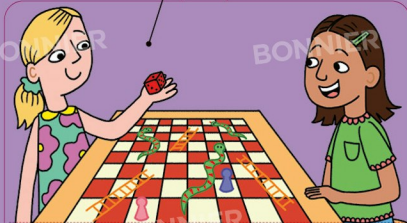
Flip a coin

When you flip a coin in the air there are only two possible results.



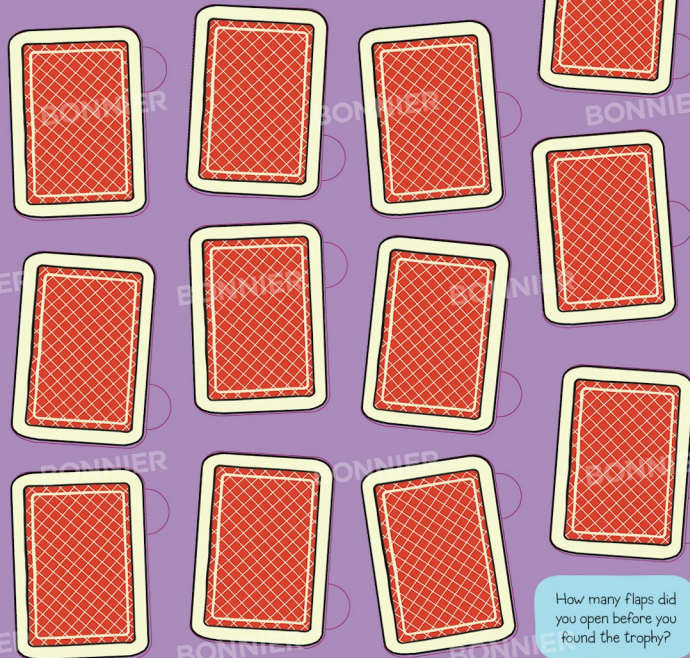
Roll the dice

When you roll dice in a board game, can you be sure if you will roll a number six? No! But you know there is a reasonable chance because you know that dice only have six numbers on them.



Card Challenge

One of these 12 cards has a picture of a trophy on it. You have a 1 in 12 chance of finding the trophy behind the first flap you open!



How many flaps did you open before you found the trophy?

A WHOLE WORLD OF MATHS!

We use maths every day in lots of different ways. Often, we don't even realise that we are using it. How many different kinds of maths can you spot in this scene?

Maths helps us to be on time.



We can tell the time using the clock.

Today it is a sunny 25 °C

Numbers can tell us how hot (or cold) it is.

Maths helps to keep us safe.



Which queue is the best one to pick?

Maths helps us to buy the right amount of things.

Maths can help with stacking these boxes, so they don't topple over!

Whenever we use money, we use maths.

Signs with numbers on give information to help us make choices.

50% off!

2 for 1!

1 kilogram of apples, please!

MAXIMUM 3 BOXES HIGH

MAXIMUM 3 BOXES HIGH

MAXIMUM 3 BOXES HIGH

PIRATE GOLD!

Welcome aboard, Captain! Can you help your crew to solve the maths puzzles, in order to reach Number Island safely and find the buried treasure? Board your ship at the top of the right-hand page to start your adventure!

Oh no! There's a hole in the side of the ship! Choose a plug to fill it.

Storm

The sea monsters won't let the ship pass until you give them 3 fish each. How many fish do you need to feed them?

The ship is too low in the water. It needs to lose some weight! How many barrels should you throw overboard to get rid of 500kg? Each barrel weighs 100kg.

START!

The ship can't leave until the tide turns at 12 o'clock. How long must you wait?



It's time to set sail, but are the rest of the crew safely on board? Can you spot all 9 of them?

Pieces of eight!

Jagged rocks

Sea fog

You need to build a raft to row ashore, using nine empty barrels. How many more barrels do you need?

Use the code on the treasure map to work out where the treasure is buried.
5 2 8 9 3 10 4 1 7 6

Pirate Code

- 1 = T
- 2 = E
- 3 = N
- 4 = S
- 5 = B
- 6 = R
- 7 = A
- 8 = H
- 9 = I
- 10 = D

There are 100 gold coins in the chest. You need to share them out. How many coins will each member of the crew get? Don't forget to include yourself!