

SHAPES, SHAPES EVERYWHERE

Albatros



WHAT'S A SHAPE and in what ways is it important to us?

Take a look around you. A lot of things you see around you are made up of shapes you've been familiar with for a long time – rectangles, squares, circles and triangles. We find them everywhere and in all kinds of forms. Shapes have many properties that make them very effective and lots of things wouldn't work as well without them.

First of all, let's remind ourselves of a few shapes:



The traffic sign is in the shape of a triangle.



The pizza is in the shape of a circle.



The exercise book is in the shape of a rectangle.



The chessboard is in the shape of a square (and is also divided into squares).

Shapes usually have **sides**, and the number of sides is an important criterion for distinguishing between individual shapes. The place where the sides meet is called the **vertex**.

Science that deals with shapes is called **geometry**.

To explain what makes some shapes special, we need to look at two important properties of the sides of geometric shapes – **parallelism** and perpendicularity.

Perpendicular sides

meet at a right angle – it can be easily illustrated with a simple example. The sides of a wardrobe are perpendicular to the room floor. Similarly, most trees grow perpendicular to the ground, which means straight up towards the sun.

And now it's time to look at the basic shapes and their properties...



A **square** has four sides of the same length. The opposite sides are even parallel and the adjacent sides are perpendicular. And that's not all – when we connect the opposite vertices, we create diagonals, and they are also perpendicular to each other!

A **triangle** has three sides and therefore three vertices. The sides can be different lengths and two of them can be perpendicular.

When we talk about **shapes**, we mean simple objects in a plane – that is to say, flat objects that have two dimensions, length and width, and which you can draw on a sheet of paper.



Vertex



Parallel sides are sides that do not intersect. Even if we were able to stretch them to infinity, they would always be straight lines that would never meet or cross each other.

Can you find parallel and perpendicual lines in this room?



A **circle** has only one side, and it has an infinite number of vertices, since every point on a circle is a vertex. Fascinating, isn't it?

A **rectangle** differs from a square in that it has two opposite pairs of sides the same length, but one pair is not the same length the other. They are also parallel and perpendicular to each other, but the diagonals of the rectangle are not perpendicular.

Now, that's enough geometry, let's go and take a look at the world full of shapes!



We've created a rectangular placecard. We protest against pineapple on pizza!

Shapes that make it easier for us TO COMMUNICATE

We may speak a number of different languages, but shapes help us understand what we want to say more easily. Thanks to the rectangular stamp and the round postmark, the postcard that we're impatiently waiting will arrive, and thanks to the message on the fridge we're able to read what we have to buy.



The circular and 3(triangular traffic signs say that we can't go more than 30 km per hour as we approach the school. Smileys in mobile phone messages and elsewhere help us show our emotions. When we see this yellow circles, we 00 can imagine our friends' WHAT'S UP? faces. BAD DAY

Just stick a rectangular stamp on the letter to Grandma and it will get there safely.



Tom can't find the emergency exit! Luckily he noticed this rectangular sign!

BLANKA CÍSAŘOVÁ, KŘEKOV 456, VALAŠSKÉ KLOBOUKY, 76601

Ties I

What have we got now, Victor, maths or PE? Why don't you have a look at the timetable on the notice board?

According to the rectangular station sign, we still have time... it goes in quarter of an hour. And then home at last!

Shapes that create **ORDER**

MATH ENG

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FRI MATH

MATH SCI

PE

SCI

ENG CZ

MATH

CZ ART ART

CZ ENG

CZ

MUS 🛰

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Shapes allow us to find out about timetables, read instructions or directions, and even pay the right price in a shop. Some announce rules we need to avoid chaos around us. They can be flexible, for example, you can switch off your alarm clock and get a bit more sleep, but there are also some very strict shapes. Traffic signs are a good example and it makes sense to obey them at all times. Let's not forget that ignorance is no excuse!

> So, you can go now! That round green light on the traffic light is on!

If drivers spot white rectangles on the road, they should stop and allow people to cross the road safely. Shall we help you cross to the other side?

> Bert wants to know how much cough syrup to take. But how is he ever going to find out from that long long rectangular instruction leaflet?



Goerge cuts the lemon into perfect round slices to make lemonade. Watch out for those fingers!



No one makes blankets from crocheted squares quite like my Grandma Matilda! The rings on the stove are as round as the bottom of pans. I wonder... what's for dinner today

Shapes we can find **AT HOME**

We see them all around us at home... slices of bread, cheese or cucumber have their own specific shapes. Plates and dishes are usually round. And what about the bathroom? The rectangular mirror above the washbasin helps us make ourselves look like we've walked out of a fashion magazine every day. My cousins are using so many tools to put on their make-up! Round powder boxes, rectangular eyeshadows, all the puffs... it's a rocket science

for me!

Mum's prepared triangular sandwiches for the children to take to school. Don't take them all, Tommy! Today, Sammy's shaving for the first time and looking in the rectangular mirror to make sure he doesn't miss the tiniest whisker.

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Shapes as **SYMBOLS**

Some shapes are so closely attached to a particular meaning that they have become established symbols that are used across cultures. So we can use them instead of words. One example is the national flag. If you look at the flag someone is waving in the stadium, you know right away which athlete they're supporting. But shapes can also symbolize important values in life. The rings that the bride and groom exchange at weddings are symbols of their devotion to each other.

The bride and groom are exchanging rings as a sign of their loyalty. Who's got the rings? As you can see in the pie chart, 15 % of viewers watched the last episode, and according to the bar diagram popularity of the series is increasing.

> The circle symbol on the toilet door tells us which is for ladies and which is for gentlemen.

Fans from all over the world come together in the stadium waving national flags to support their favourite athletes. Go on! Arrows in the shape of triangle are the symbol for recycling. Thr waste in this bin will be recycled and used to make new products.

B &

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Harry is drawing the symbol of peace in his notebook. He might not know that the circle with four lines was originally the sign used by the campaign against nuclear weapons.



OTHER FLAT SHAPES

Back to the geometry Squares, rectangles, triangles, and circles – that's not

all. Other shapes can be formed by combining these basic shapes or by modifying them.

What other shapes flat shapes do you know?



A **trapezium** is

a quadrilateral, which means it has four sides. One pair of its opposite sides are parallel, but of different lengths.





A **star**, in this case a five-pointed star, is also a polygon.







are parallel and its diagonals are perpendicular to each other. But unlike square, the diagonals are of different lengths. In addition, the adjacent sides are not perpendicular to each other. An **oval**, like a circle, has no

sides or angles and its outline is formed by an infinite number of vertices. So how is it different from a circle? Thevertices of a circle are all exactly the same distance from its centre, which is not the case with an oval. An oval is more egg-shaped.

Axisymmetry

Certain geometric shapes have the property of being **symmetrical** along one or more **axes**. What does this mean in practice? Imagine that you have a shape that has been cut out of paper. When you fold it down the middle, that is to say, along its axis, it divides into two exact halves that match each other at all points.



in everyday life.

We can also talk about shapes in contexts other than geometry. A detective can catch a criminal by the pattern on his shoe, and a locksmith can copy the shape of a key and create duplicate keys for the whole family. In short, the world really is full of shapes. Where else can we find them?











Some shapes, such as isosceles **triangles**, have only one axis of symmetry.

Other shapes have two axes of symmetry, such as **rectangles** or rhombuses.

A **square** is symmetrical along four axes.

As for a **circle**, it always has to be special in some way. A circle has an infinite number of axes of symmetry.



On the following pages, you'll find examples of everything we have just learned about...



Every map needs a legend. This tells us the meaning of the individual shapes, so we know how to find our way on the map.

> Look, a green cross! They'll surely be able to advise you how to get rid of that cold in this pharmacy.

Robb is always confused: are restrictive traffic signs in the shape of a circle or a triangle?

OPEN

A spider has built a regular hexagonal web in our living room. Hey, get right back out!

Snowflakes are beautifully regular and, at the same time, each one is different. And you can have lots of fun with them!

Shapes in the natural **WORLD**

Bees are excellent natural builders. They are hard-working, skilled, and even know geometry – their honeycombs are composed of hexagons. Geometry is not just the priviledge of humans. On the contrary – many shapes come from nature and we only observed them and learned to copy them. One such example is the honeycomb, which is virtually a work of architecture – one hexagon exactly the same the other... and so regular that it'd be very difficult to draw by hand. Just how is it possible for nature do this?

> Wow, look at that, the diver has found a beautiful starfish! It's amazing what nature can do!





The ladybird is unmistakable – a red shell and seven dots. You know it immediately.

Thomas is learning the different kinds of trees - you can tell them apart by the shape of the leaves. A bolt wouldn't work without a proper hexagonal nut.

Shapes that HELP US

Shapes have unique features that are very important for us. They can can protect us or call for help, and certain shapes can even save lives. Round tablets are easy to swallow and help us recover from illnesses. Every driver is well aware of the warning triangle and so it can help prevent another accident. And let's not forget the lifebelt!

Hello, my car has broken down on the way to work! I've put the warning triangle out. Please come as soon as possible!

> Don't worry, you'll soon feel better after you've taken this round pill.



Harry has learned to fasten his buttons. Sometimes it's a bit fiddly with these tiny cirlcles, but it's better than being cold.





Here, catch the lifering! It's a good thing I was passing by, or you might have drowned. If I don't find the shape of the key that fits in this keyhole, I might never get into the house!

STO

The teacher has stopped the cars with her sign, so the children can cross safely.







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Everything around us is composed of basic shapes. You'll find circles, squares, rectangles and triangles at home and on the street, and they're also part of other much more complex shapes. We use some to help us communicate, and we wear others to make ourselves look more attractive. Believe it or not, some can even save our lives! Do you want to know what other things shapes can do? Look around you and immerse yourself in the fun world of shapes.



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