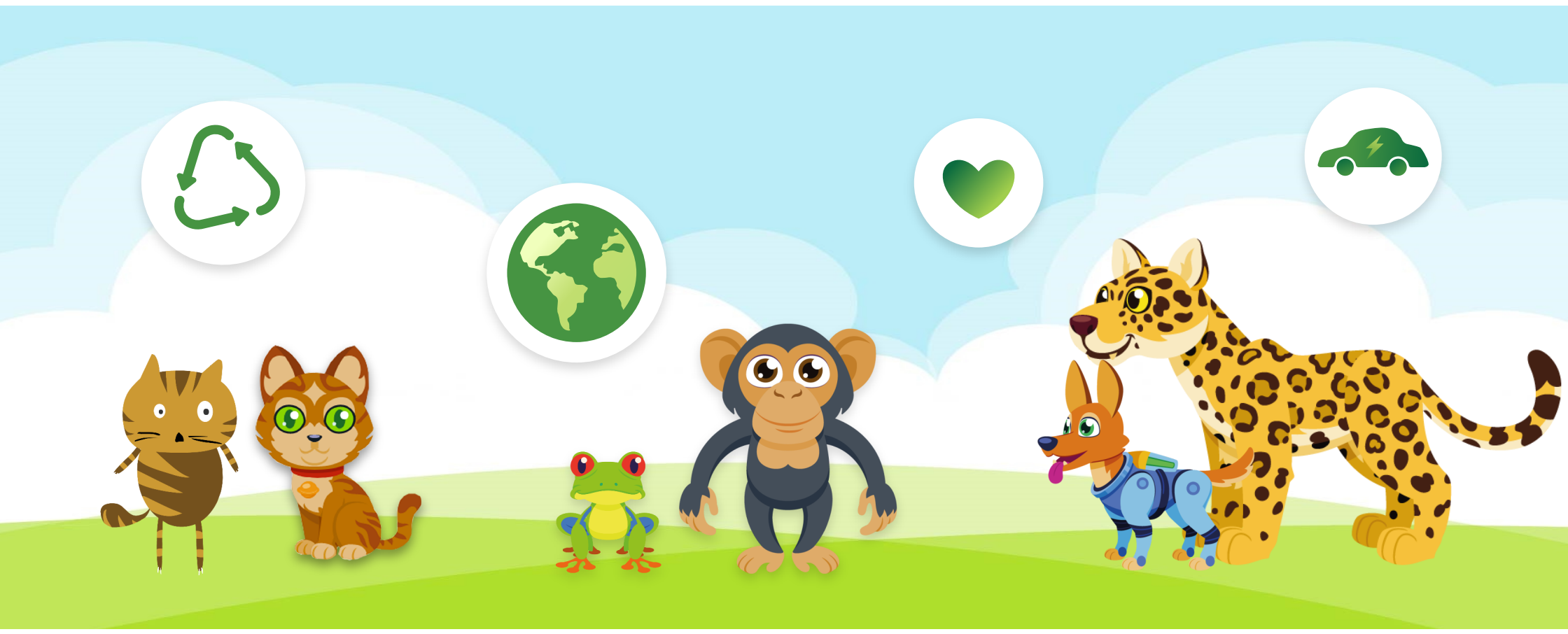
Whizz Online Maths Extravaganza Puzzle Sheet 2

Post-Event Handout

We hope you had a blast attending the maths extravaganza!

We introduced the theme for this summer **'Building for a greener future'**. There are challenges to get you thinking and problem solving about your environment and making positive changes towards a sustainable world. All you need to do is register your interest and you will then have access to lots of mini projects and challenges to do.



The fun isn't over just yet, though!

Here are some questions to ponder, based on the activities we did in the session.

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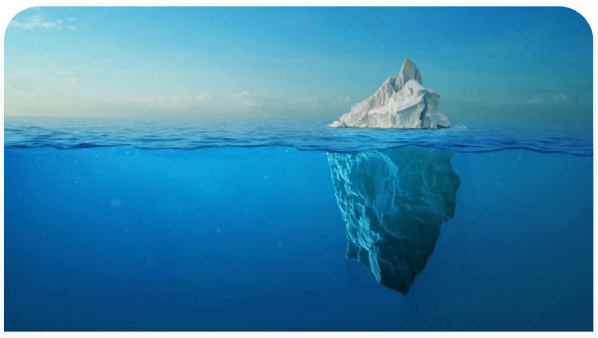
Estimation time!

Estimate how many...



...years old icebergs are?

.....

...leaves on a tree?

.....

...feathers on an African parrot?

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...eggs do the female turtles lay?

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...polar bears left in the world?

.....

...times per second do bees flap their wings?

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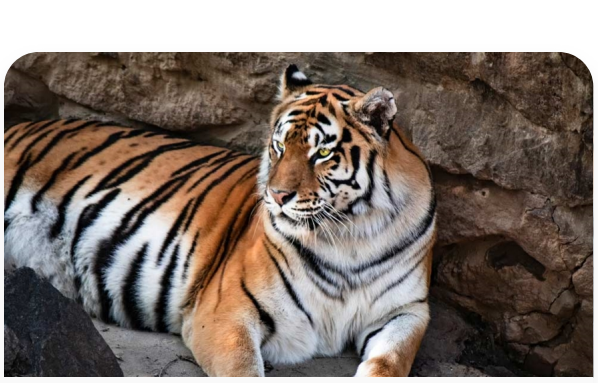

...stripes on a tiger?

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What do all these pictures have in common?

Shapes appear everywhere in nature

Have you ever stopped to look around and notice all the amazing shapes and patterns we see in the world around us? Mathematics forms the building blocks of the natural world and can be seen in stunning ways. Here are a few of our favourite examples of maths in nature, but there are many other examples as well.

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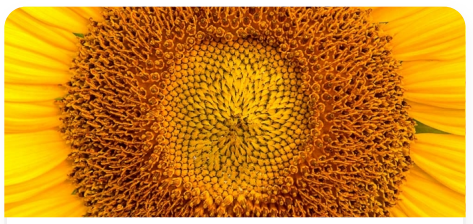

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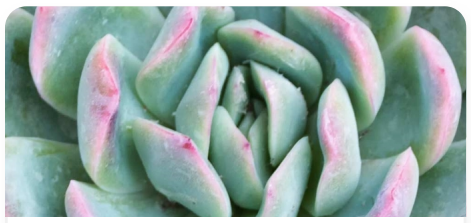

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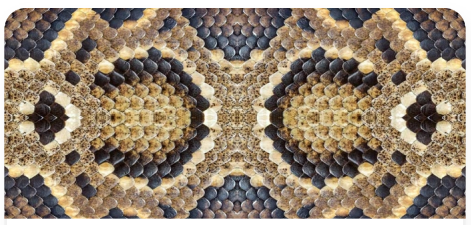

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Name the shape and can you work out what these shapes are part of?

Odd one out

Look at these four shapes. Which is the odd one out? Why?

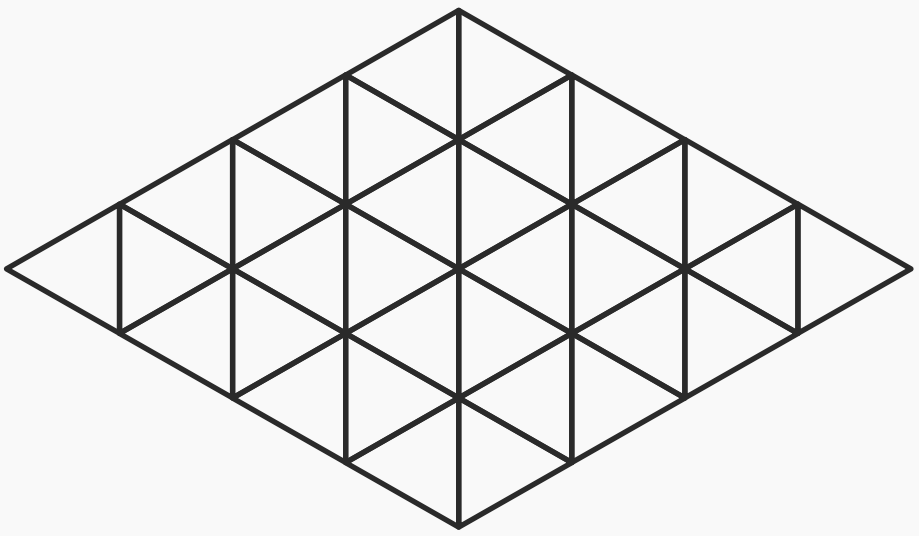
You can find these shapes on this online manipulatives resource called **Coolmath4kids Pattern Blocks** that we used in the session.

Some shapes fit well together. Tessellation (or tiling) is when a pattern of shapes that fit perfectly together. It is when you cover a surface with a pattern of flat shapes so that there are no overlaps or gaps. These shapes that you have been looking at - do they tessellate?

Last shape wins

Game for 2 players. Take turns placing one pattern block at a time on a large rhombus shaped game board (see resources), using the guidelines on the board to position the pieces. You may use any of the 4 shapes. Each new shape needs to touch one of the shapes already on the board. You must take your turn every time, down to the very end. The player who places the piece that completes the rhombus wins.

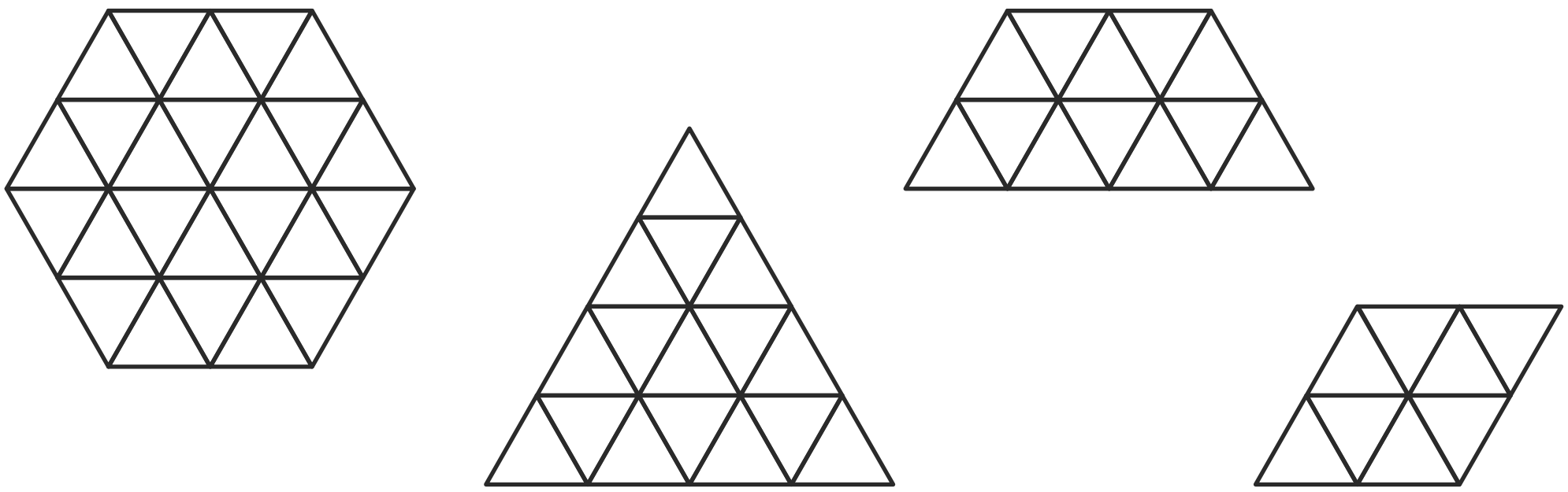
The strategizing that may go on in the last few moves of this game is similar to chess in that a player needs to envision several different possibilities, imagining what will happen if they place a trapezium on the board instead of a hexagon.



What shapes can you make? Build for less!

Use the 4 shapes to figure out how to build shapes shown below sheet using the fewest shapes possible (see resources sheet).

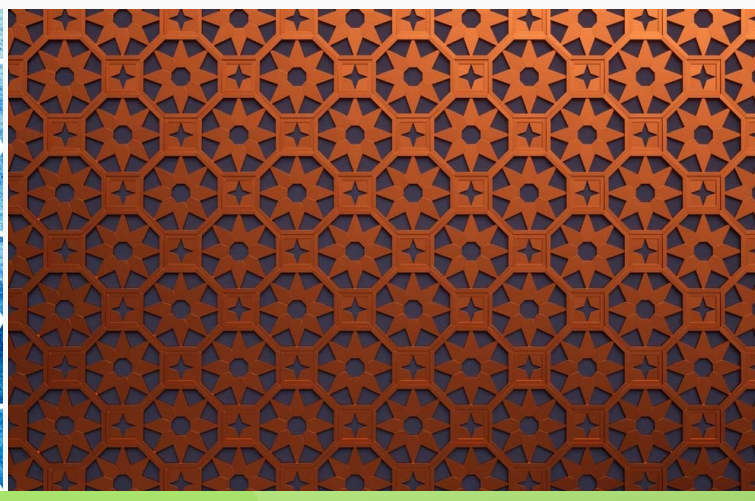
How many different ways can you fill the shape templates?
When you have found a way to make the shape with the fewest shapes, think about how to record your solution.



Tessellations all around us

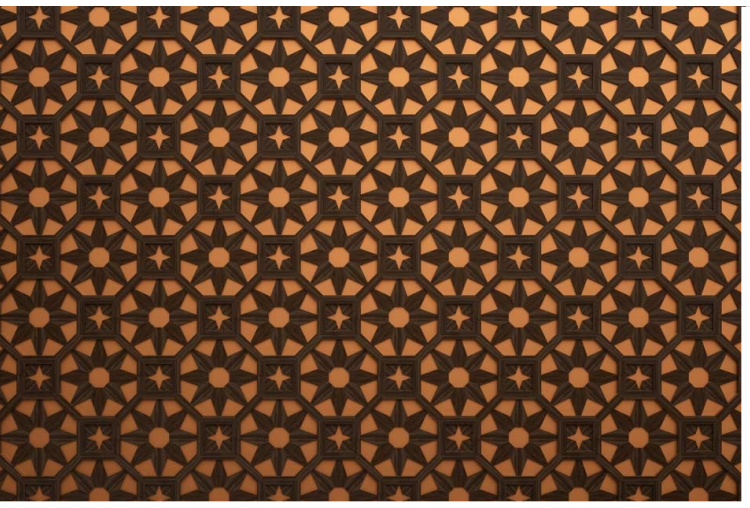
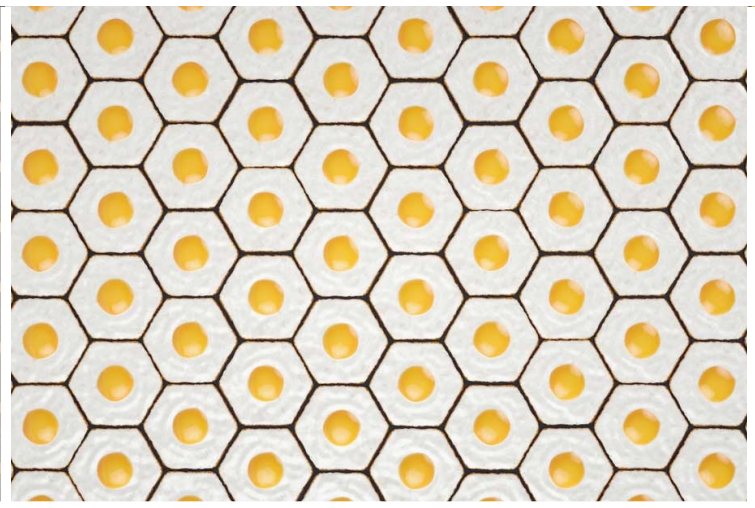
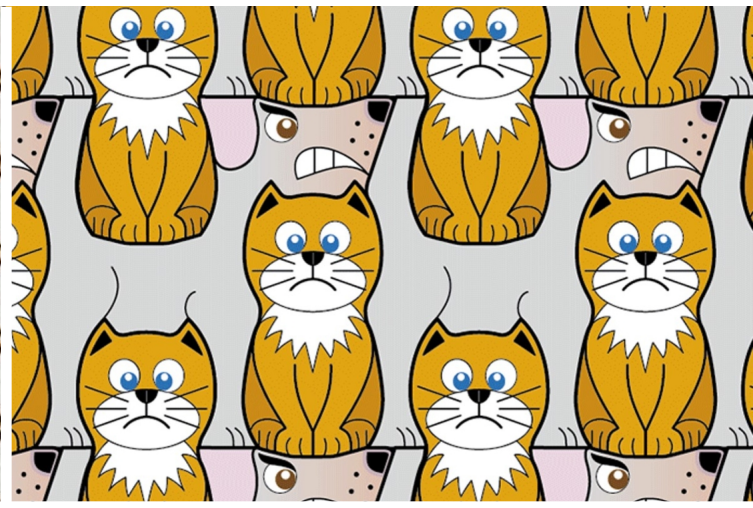
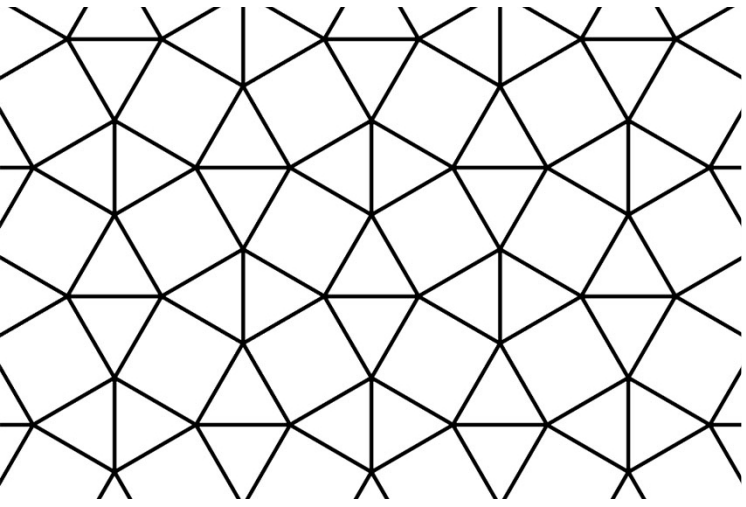
Tessellations can be found in many areas of life. They are all around us. They are something we often see in quilts, carpets, floors, and more. Can you name where you have seen tessellations?





A tessellation is a never-ending pattern on a flat 2-D surface where all of the shapes fit together perfectly like puzzle pieces, and the pattern can go on forever.

Now that we know what a tessellation is, how do we make one?
The shape that is repeated, or tessellated, is called a **motif**. Can you spot the motif in the examples below? Some are trickier than others!

We could just fit lots of shapes together, however, we have been looking at some of Escher's artwork and we are going to take the next step into more complex tessellation making.

A non-regular tessellation is a tessellation that is composed of other shapes that may or may not be polygons. It is a group of shapes that have the sum of all interior angles equaling 360 degrees. There are again, no overlaps or gaps, and non-regular tessellations are formed many times using polygons or other shapes that are not regular. You can see examples of this in the tessellations above.

You can have a go at making non-regular tessellations now.

Let's tessellate!

1

Take a small square piece of paper (about 4" x 4") and cut a shape out of one side of the square.

2

Tape your cut-out shape to the opposite side of the square, maintaining its orientation and lining up the long flat edges.

3

Pick one of the two remaining untouched sides of the square and cut another odd shape out of that side.

4

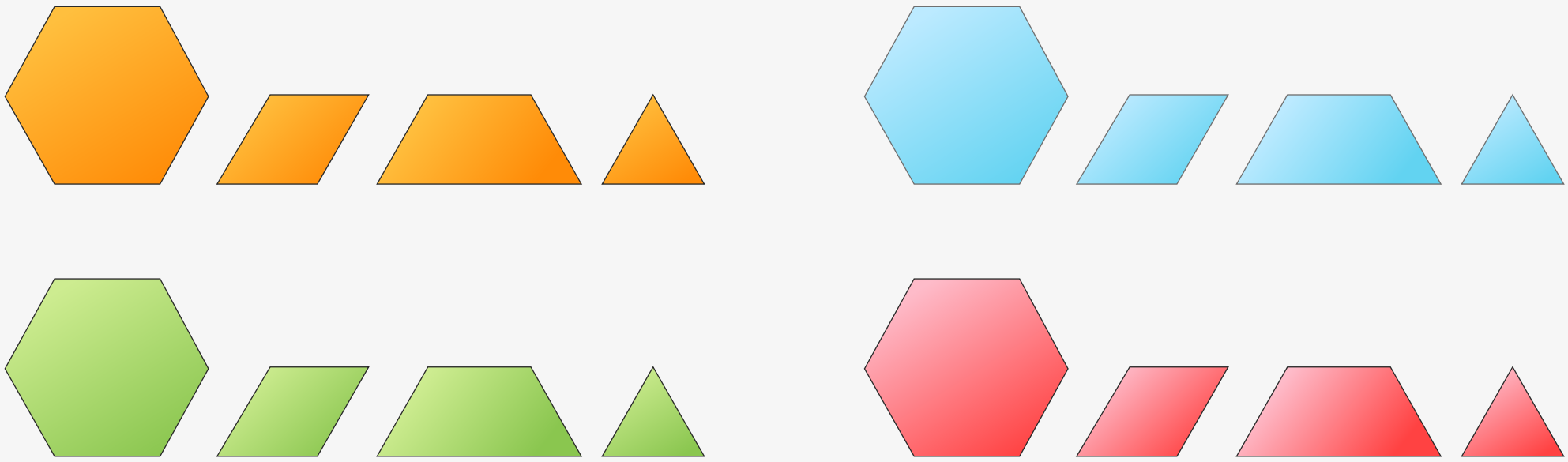
Repeat Step 2: Tape your new odd shape to the opposite side, maintaining orientation and lining up the long edges. You should now have a unique shape that no longer has any flat long sides.

5

Trace your tessellation shape onto a piece of paper over and over again, fitting the shapes together.

Resource Sheet

Hexagon, rhombus, trapezium, triangle



Shape templates