

A trip to Shapeland

Get creative, and travel through the world of shapes and symmetry

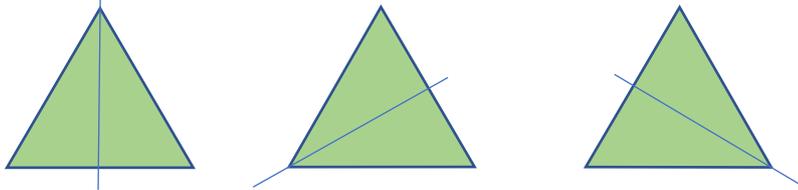
What you will need: You can use some dough for cookies, and something to draw lines with (chocolate sprinkles, “Hundreds and Thousands”, or something colourful). Alternatively, you can use *play-doh*. Otherwise, you can even just draw the shapes on paper.

Share a pie with a friend

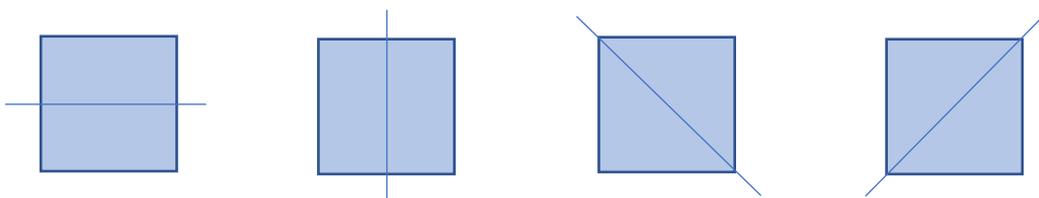
1. Get creative and make your own shapes. Draw or make all the shapes you know (for example a triangle, a rectangle, a square, a circle...)



2. Now try and split the shapes into two equal parts (suppose they are pies and you want to share them with a friend). How many ways to split can you find? For example, for this triangle there are three ways:



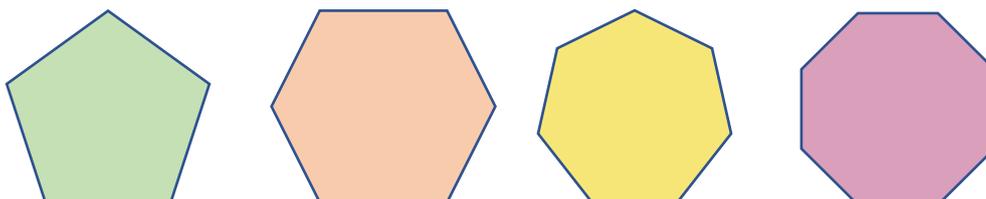
For the square there are four ways:



What about other shapes, such as irregular triangles or circles?

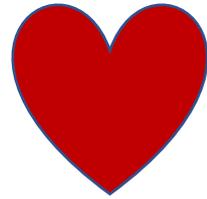


3. Now, try these shapes: (Bonus: can you name them?)

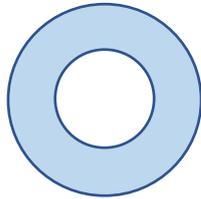




4. Now you can get creative, and make any shape you like, like a heart, or a star... or any shape you want. Again, try and split them into two equal pieces.



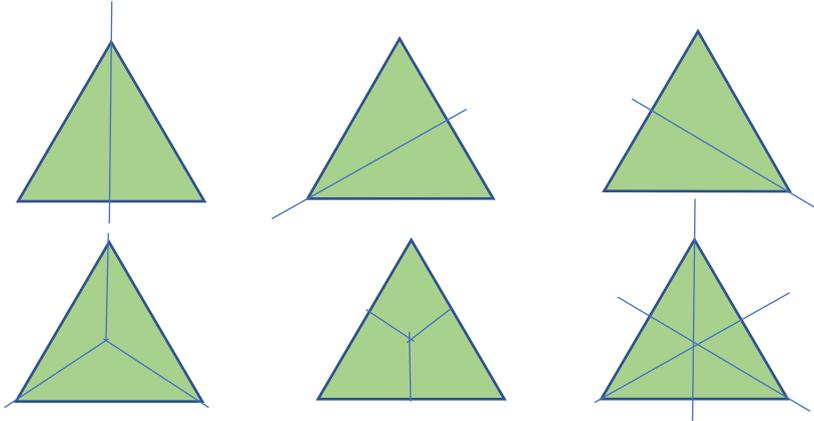
5. Are there any shapes for which you found more ways to split? What is special about the circle?
6. What is special about this other shape below?



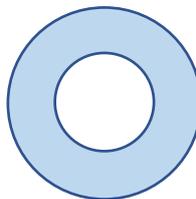
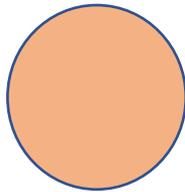
Share your pie with many friends

Now suppose you have more than one friend you want to share your pies with (remember, the edge is less yummy, so you want equal pieces). How can we do this fairly?

For example, from this triangle, you can get either two pieces, three pieces, or six pieces.



1. With the square, you can get either two pieces, four pieces, or eight pieces. Can you draw them all?
2. Now try splitting all the shapes you made. Which shapes can be split with more people?
3. What is special about the circle? What is special about the other shape below?



...and for cake bakers...

This is an open-ended question for those of you who like baking cakes, and especially cakes which are supposed to rise (i.e. they contain self-rising flour or baking powder).

You will have noticed that a round (circular) cake cooks much more evenly than a square cake, or a rectangular cake. The reason is that a cake raises better in the centre, hence a round cake would raise more evenly.

Now look at my favourite cake shape.



Image reproduced from <https://www.gnamgnam.it/2018/02/19/ciambella-al-limone.htm>

Italian bakers call this shape a **Ciambella**. Mathematicians call this shape a torus.



Image reproduced from: https://en.wiktionary.org/wiki/solid_torus

There is something very special about this shape, that makes the cake cook even better. Can you think why?

For any questions, you can contact Francesca.iezzi@ed.ac.uk