

Flipping & Rotating Circles

This activity follows on from other activities you have completed where you had to remember shapes. Now you have to imagine how shapes would look when they are turned over or turned around.

Step 1. Working with circles

Sit at a table or desk with your helper sitting next to you.

Your helper makes a pattern with three different coloured plastic circles, or poker chips, where the three circles will be in a row, either sideways or up and down (as in level 1 below) using Blu-tac to stick the blocks to a clear plastic sheet.



You are now going to have to imagine that the pattern you see is transformed, flipped or rotated in some way. Your helper can flip or rotate a blank card to show you the direction of the flip or rotation.

Flip top to bottom

Imagine the pattern your helper has made is **flipped over so the top goes to the bottom**. Imagine how it would look after it was flipped top to bottom. Try to "see it in your head". You are now going to build it using circles that will be given to you by your helper.

Use your circles to make the pattern, imagining your helper's pattern is flipped top to bottom.

Check

When you are satisfied with your pattern, your helper picks up the plastic sheet, slowly begins to flip it over top to bottom. You have to watch the pattern of blocks as it moves, so you can see the transformation of the pattern.

As the pattern is slowly flipped you can say '**stop**' at any time if you see something that makes you want to change your pattern.

If you say '**stop**', your helper returns the plastic sheet to its original position while you make your change. This can be repeated several times if necessary,

until you are sure your pattern is right. After this, the plastic sheet is again slowly flipped and placed over the top of your circles to see if they match.

Notes for helpers:

The most difficult part of this procedure is the overlap of the chips. The fact that the overlap is different when the pattern of circles is flipped top to bottom may only become obvious as you begin to turn over your pattern. When turned over top to bottom the pattern above looks like this:



Flip Sideways

Now you must imagine that your helper's pattern is **flipped sideways** left to right. Go through the same procedure as you did above. Also try sideways flips right to left.

Notes for helpers:

Flipping a pattern from left to right, or right to left, is really doing the same thing, i.e. the pattern will end up the same no matter whether it is flipped left to right or right to left. Eventually they will realise this - but don't tell them - let them discover this for themselves.

Rotate one quarter turn or half turn

Now you must imagine that your helper's pattern is rotated **1/4 turn clockwise**. Then try **1/4 turn anti-clockwise**.

Finally try rotating **1/2 turn**. Remember to always follow the same procedure so that you imagine the change in your mind and make it. Putting a spot in the middle of the top edge of the clear plastic sheet will make it easier for your helper to describe how the pattern is to be rotated.

Reverse roles

Exchange roles with your helper. Now your helper makes the pattern of circles how they think it would look when flipped or rotated. You must now say whether your helper's pattern is correct, or not, before the original pattern is flipped or rotated to verify the result.

If you disagree with your helper, you must tell them how you think it should look.

Flip and rotate other patterns at the same level

Continue working with patterns at the same level until your flips or rotations are always correct.

Proceed to the next level



