RI Masterclass 3rd February 2024

Symmetries Workshop

Triangles

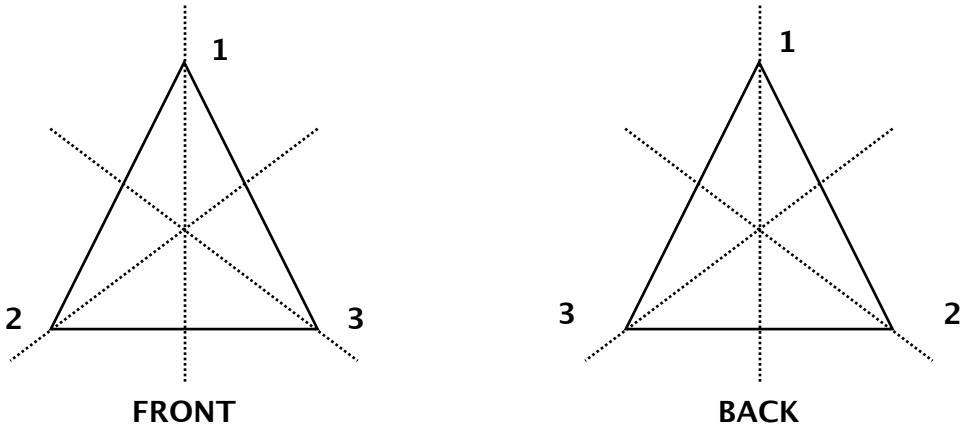
The triangle has 6 symmetries.

1. Doing nothing (same as rotating by 360 degrees) denoted I
2. Rotating anticlockwise by 120 degrees, denoted θ(120)
3. Rotating anticlockwise by 240 degrees, denoted θ(240)
4. Reflection in the line passing through point 1, denoted R1
5. Reflection in the line passing through point 2, denoted R2
6. Reflection in the line passing through point 3, denoted R3

WORKED EXAMPLE.

Here is a worked example. We will work out what R1 θ(120) looks like so that we can fill it into out table.

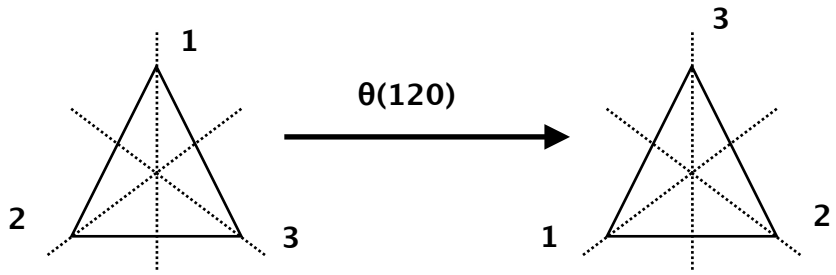
First label your triangle like this.



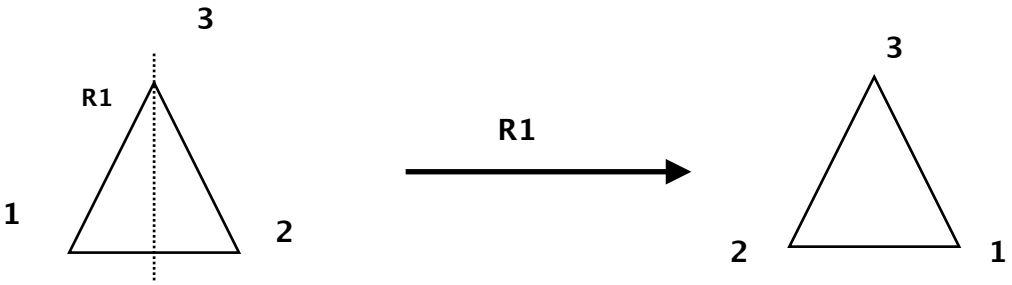
Now when you reflect and rotate you just need to look where the vertices are and it will show you what your symmetry has done.

Let's see what R1 θ(120) looks like. This means we first do θ(120) first and then we do R1.

θ(120) means rotating 120 degrees anticlockwise. You should see that we get this.

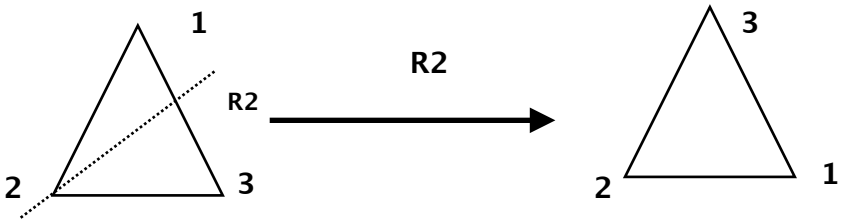


R1 means reflecting in the line of symmetry **passing through where the point 1 was ORIGINALLY.**



A good sanity check when doing a reflection (e.g R1) is that the point which the line of symmetry is passing through should remain fixed. In this case we saw that 3 remained fixed!

Do we notice anything about the symmetry we've got? It turns out it's the same as reflecting the original shape about the line of symmetry R2.



So it turns out that R1 θ(120) **is the same as** R2. So in our table, where the entry for R1 θ(120) should go, we will put R2.

TASK. Fill in the table of symmetries in your worksheet.

	θ(120)
R1	R1 θ(120) = R2

When filling an entry in your table, it should look like this. If θ(120) is on the side row and R1 is on the top row, the entry will be R1 θ(120).

We worked out that this was the same as R2 so we put R2.

CAREFUL! This means 'do θ(120) first, then do R1'.

Square

The square has 8 symmetries.

1. Doing nothing (same as rotating by 360 degrees) denoted I
2. Rotating anticlockwise by 90 degrees, denoted θ(90)
3. Rotating anticlockwise by 180 degrees, denoted θ(180)
4. Rotating anticlockwise by 270 degrees, denoted θ(270)
5. Reflection in the line passing through point 1 and 3, denoted R1
6. Reflection in the line passing through point 2 and 4, denoted R2
7. Reflection in the line separating 1 and 2 **from** 3 and 4, denoted RV
8. Reflection in the line separating 1 and 4 **from** 2 and 3, denoted RH.

For the square these are depicted below.

If you have time, try to fill in the table for the square.