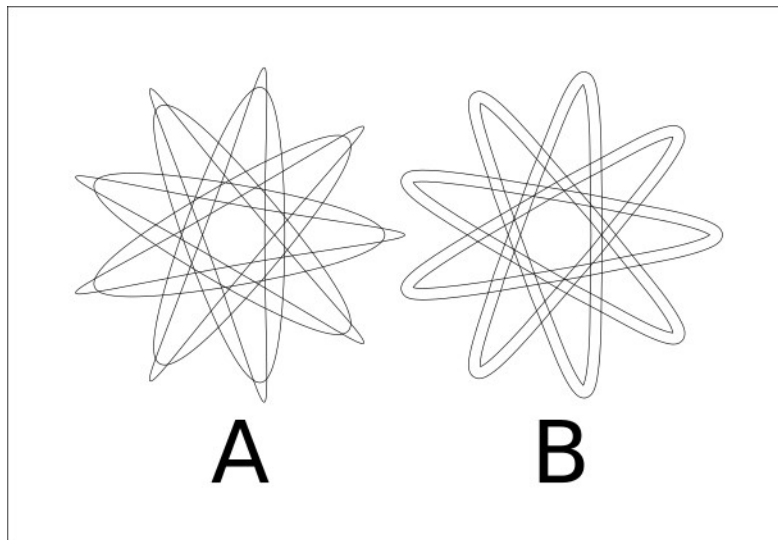**Doughnut Pieces:**

Your gear set comes with little plastic doughnuts; they come in 4 colours to help you tell the different sizes apart. These are useful for making designs with parallel lines.

If you use one pen hole and then the next pen hole in a gear you will get a design like illustration A. If you use a medium or large pen hole on the gear and make the design and then put one of the doughnut pieces into that pen hole and make the design again you'll get something that looks like illustration B. The lines are parallel looking and don't cross as much as in A.

You can use the different sized holes in the doughnut pieces to make the parallel lines closer together or farther apart; a big hole in the doughnut will give you close together lines and a small pen hole will give you far apart lines. Not all pens are pointy enough to work in all the doughnut pieces.

Prediction Math:

You can predict how many points or petals your gears will make before you use them. If you are wanting to make a 5 pointed design you can know what gears to try.

Put the larger number (usually the hoop or ring that is stationary) on the top of a fraction with the smaller number (usually the gear that you are using) on the bottom of the fraction. For example if I was using an 80 ring with a 48 gear it would look like 80/48. Swap the numbers (80 and 48) for their prime factors (the smaller numbers engraved on the gears beside or below the tooth count) which in this example is 2^4*5 for 80 and 2^4*3 for 48. This gives $(2^4*5)/(2^4*3)$. remove any factors that are on the top and the bottom to simplify the fraction. In this example that is 2^4 which leaves 5/3. The top number (5) tells you that this combination of gears will have 5 petals. The bottom number (3) tells you that the gear (48) will roll around the ring (80) three times to complete the design.

A simple rule of thumb is if you just look at the prime factors on two gears and they share a lot of common numbers then it'll make a design with fewer petals whereas if the two gears don't share many or any prime factors then it'll make a design with very many petals.