

# Angle Reference

To create the angle reference, they will need:

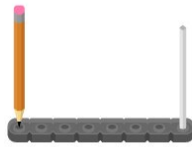
- 1- 1x8 beam
- 2- 1 x 12 beams
- 1 -8x pitch shaft
- 1-1x1 connector pin
- a pencil
- a piece of paper

## Steps

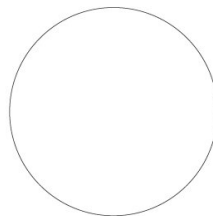
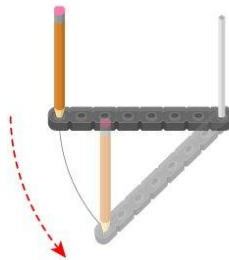
1. Put the 8x pitch shaft in the 1 x 8 beam as shown. The 8x pitch shaft should be in the center of your paper.



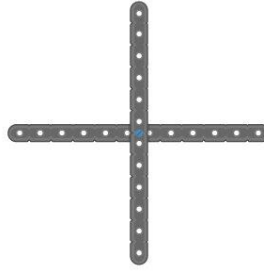
2. Place your pencil in the farthest opposite hole.



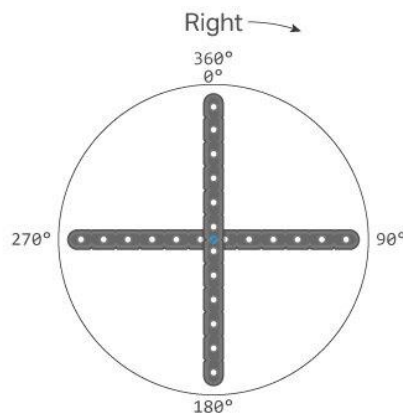
3. While holding the 8x pitch shaft with one hand, spin the beam around drawing a circle on a piece of paper.



4. Connect the 1 x 12 beams together in the center with the 1x1 connector pin.



5. Place the beams in the center of the circle and label the diagram as shown.



You can repeat the steps on the other side of the paper and create the same design, but reverse the numbers and turn direction for turning left.

Tips for creating and Angle Reference:

- Step 2 - A mechanical pencil works best.
- Step 3 - Explain the students that we can have the Autopilot turn in a complete circle. A full rotation is 360 degrees. Why 360 degrees? Most likely because ancient mathematicians watched the stars revolve around the North Star 1 degree each night throughout the year. The Persian Calendar used 360 days in a year.
- Step 4 - Explain that many times we need to turn the Autopilot at a smaller angle. We can divide the circle into parts using the VEX pieces. The blue connector pin represents the Autopilot.

- Step 5 - Explain that if a full circle is 360 degrees, three quarters of a circle is 270 degrees, half of a circle is 180 degrees, and a quarter of a circle is 90 degrees. We can use these measurements to help us determine how many degrees we will need to program the Autopilot when we are programming it turn.