

# DIY Holiday Math Ornaments

Materials: Cardboard paper, compass, scissors

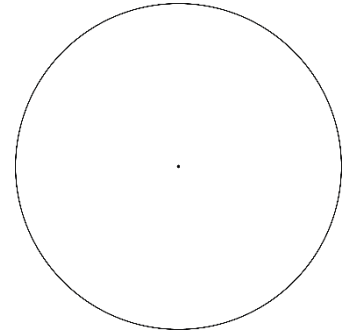
Optional materials: Yarn, ruler, beads, hole-puncher

## Step 1

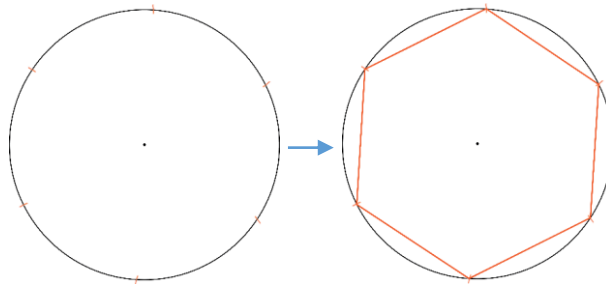
Using your compass, draw a circle large enough to be an ornament.

### Questions for Students

- What is a circle?
- Name all the properties of a circle.
- Where do you see circles in the real world?
- How many sides does a snowflake have?



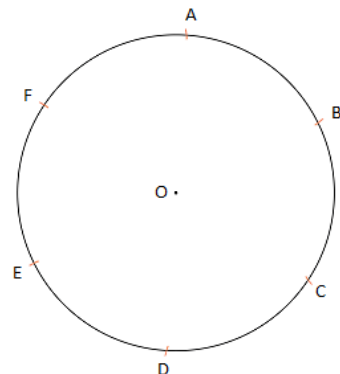
## Step 2



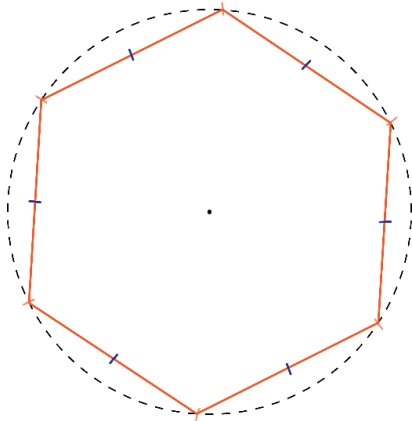
Using the radius of the circle, mark 6 equidistant points on the circumference. This will inscribe a regular hexagon in the circle.

### Question for Students

Construct a formal proof, or explain how this method creates a regular hexagon (use figure on right).



### Step 3



Find the midpoints of the sides of the regular hexagon.

Afterwards, cut out the hexagon. If you plan on using yarn, cut slits where the midpoints are. This will later help the yarn grab onto the side of the polygon.

*Question for Students*

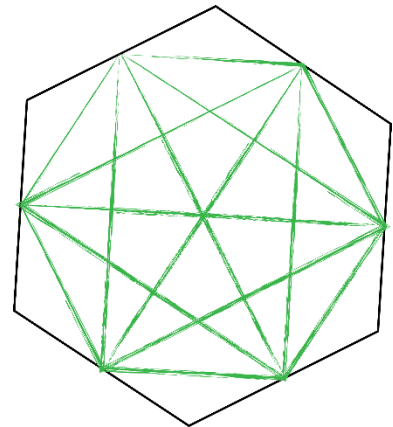
How do you find the midpoint of a segment?

### Step 4

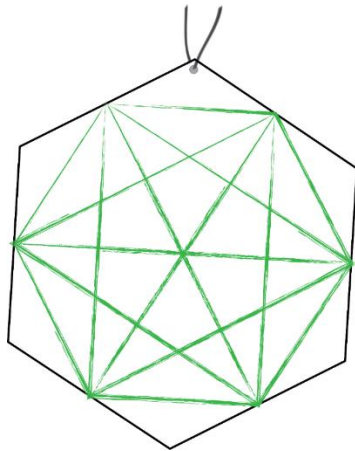
Using yarn or a writing utensil, connect all the midpoints together in as many ways as possible. If using a writing utensil, you should draw on both sides. If using yarn, you may want to further decorate your ornament using beads as well.

*Questions for Students*

- The ornament shows all the possible ways to connect the midpoints of a regular hexagon. Explain how you know this is either an example of a permutation or a combination.
- Create a problem whose solution could be found using the ornament.
- How many lines of symmetry exist in a regular hexagon?



### Step 5 (optional)



Using a hole-puncher, punch a hole near one of the vertices. String a piece of yarn through to hang your ornament.