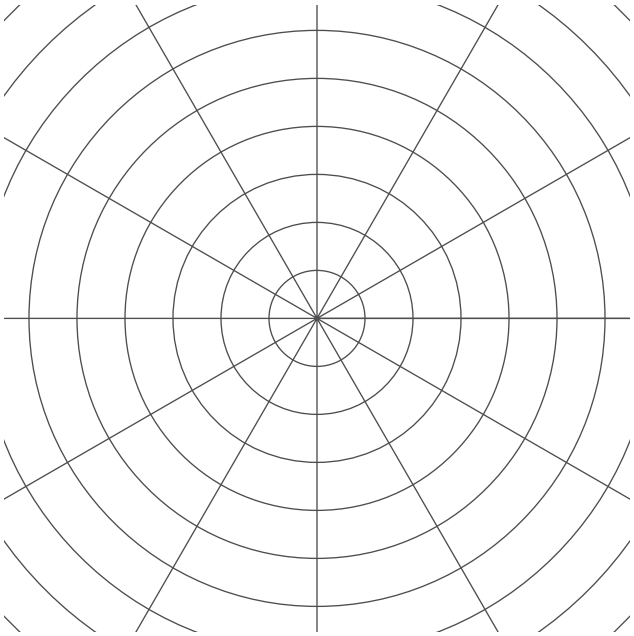
Unit 2, Lesson 2

Circular Grid

Let's dilate figures on circular grids.

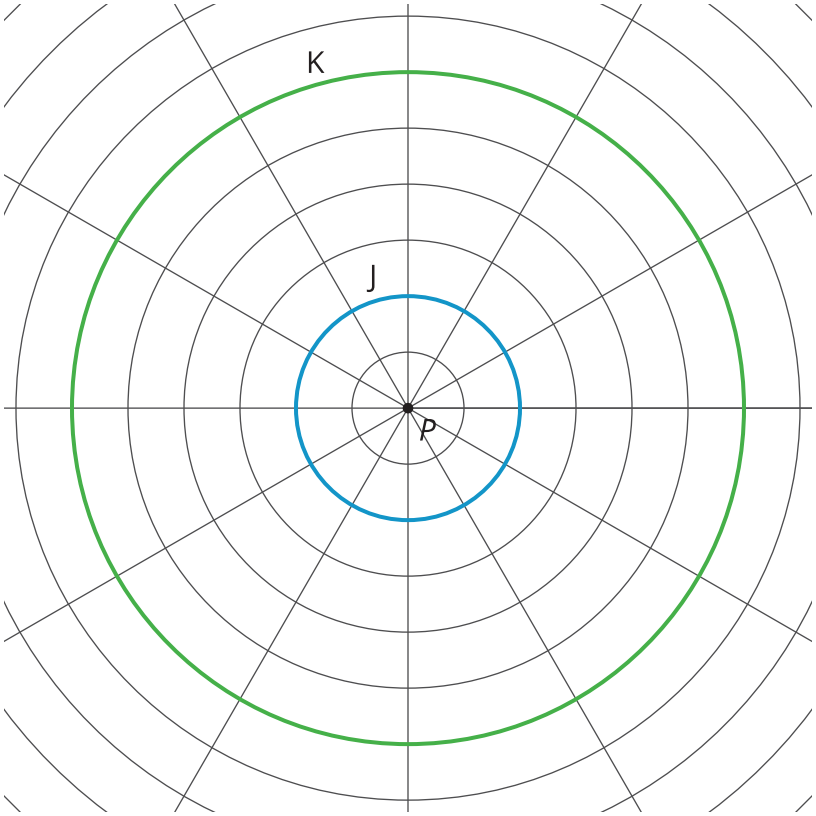
2.1 Notice and Wonder: Concentric Circles

What do you notice? What do you wonder?



2.2 A Droplet on the Surface

Here are two circles drawn on a circular grid with point P at the center.



1. Draw four points on Circle J (not inside the circle), and label them A, B, C, and D.
2. Draw a ray from P through each of your four points.
3. Mark the points where the rays intersect Circle K, and label them as E, F, G, and H.
4. In the first table, write the distance between point P and each point on the smaller circle. In the second table, write the distance between point P and each point on the larger circle.

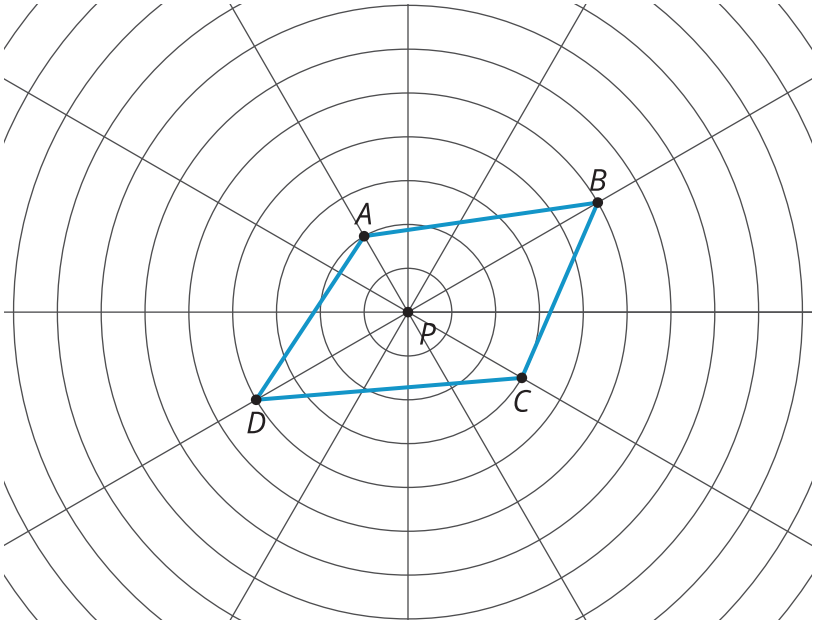
	A	B	C	D
P				

	E	F	G	H
P				

5. What is the scale factor that takes smaller Circle J to larger Circle K? Explain your reasoning.

2.3 Quadrilateral on a Circular Grid

Here is a polygon $ABCD$.



1. **Dilate** each vertex of polygon $ABCD$ using P as the center of dilation and a scale factor of 2. Label the image of A as E, the image of B as F, the image of C as G, and the image of D as H. Draw segments between the dilated points to create polygon $EFGH$.
2. What are some things you notice about the new polygon?

3. Choose a few more points on the sides of the original polygon and transform them using the same dilation. What do you notice?

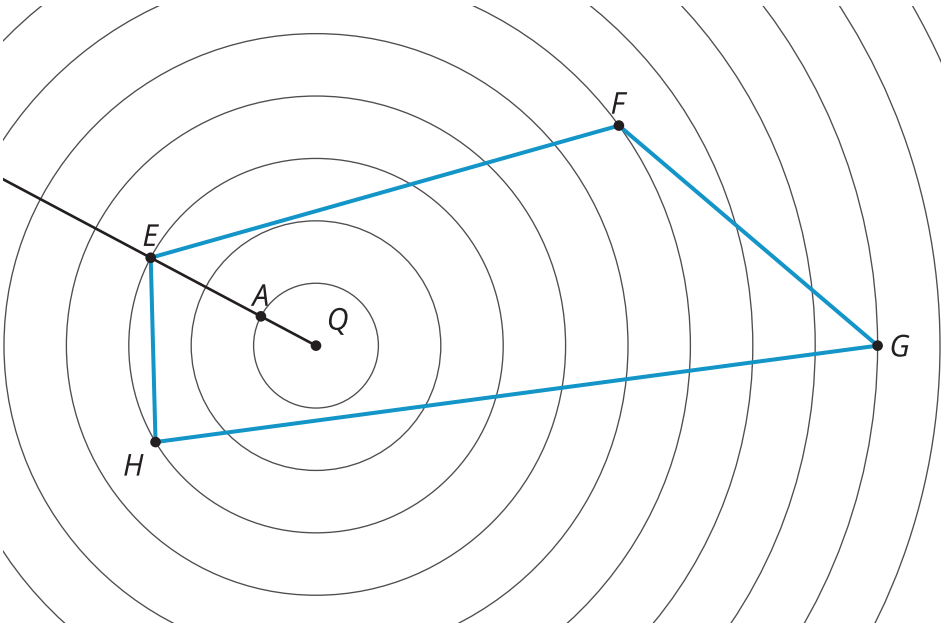
4. Dilate each vertex of polygon $ABCD$ using P as the center of dilation and a scale factor of $\frac{1}{2}$. Label the image of A as I, the image of B as J, the image of C as K, and the image of D as L. Draw segments between the dilated points to create polygon $IJKL$.
5. What do you notice about polygon $IJKL$?

Are you ready for more?

Suppose P is a point that is not on line segment WX. Let line segment YZ be the dilation of line segment WX using P as the center with a scale factor of 2. Experiment using a circular grid to make predictions about whether each of the following statements is always true, sometimes true, or never true.

1. Line segment YZ is twice as long as line segment WX.
2. Line segment YZ is 5 units longer than line segment WX.
3. The point P is on line segment YZ.
4. Line segments YZ and WX intersect.

2.4 A Quadrilateral and Concentric Circles



Dilate polygon $EFGH$ using Q as the center of dilation and a scale factor of $\frac{1}{3}$. A, the image of E, is already shown on the diagram. (You may need to use a straightedge to draw more rays from Q in order to find the images of other points.)

Lesson 2 Summary

A **dilation** is a transformation in which each point on a figure moves along a line and changes its distance from a fixed point, called the center of dilation.

All of the original distances are multiplied by the same scale factor.

In this diagram, P is the center of dilation and the scale factor is 2.

Each point of triangle ABC stays on the same ray from P, but its distance from P doubles.

Since the circles on a circular grid are the same distance apart, we can simply count units from the center to a given point and use the scale factor to determine where the new point should be located, making the circular grid useful for performing dilations.