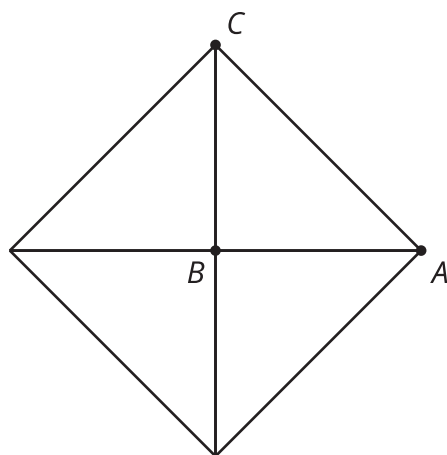
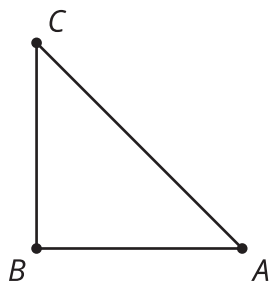


# Rotation Patterns

Let's rotate figures in a plane.

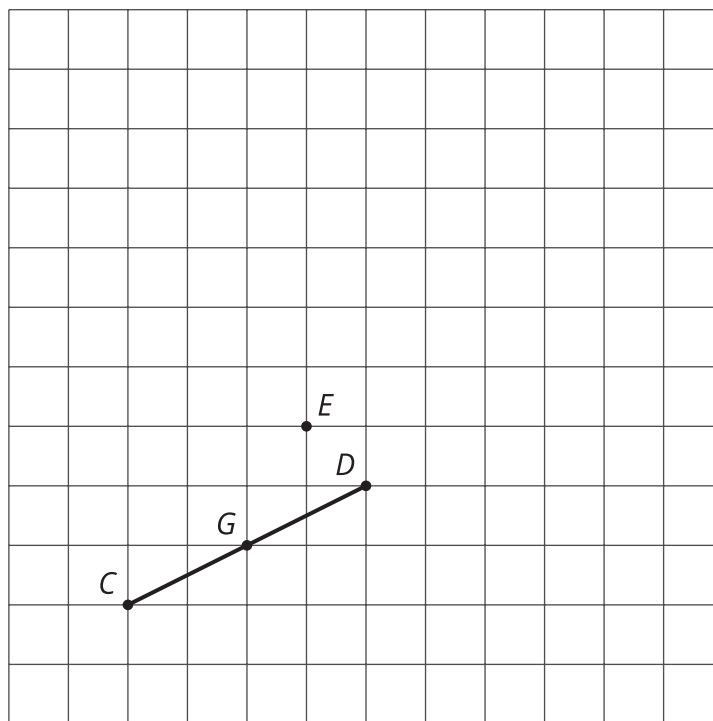
## 7.1 Notice and Wonder: Building a Quadrilateral

What do you notice? What do you wonder?





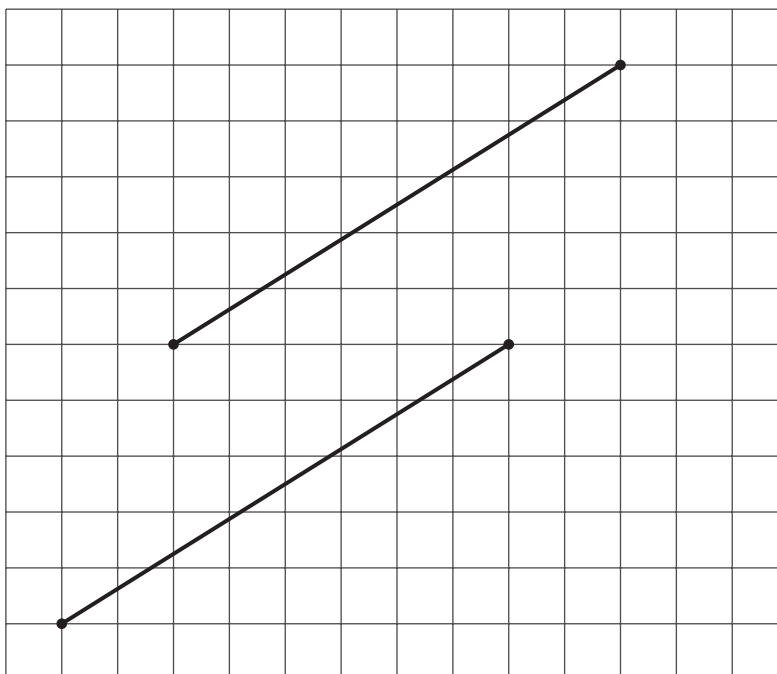
## 7.2 Rotating a Segment



1. Rotate segment  $CD$   $180^\circ$  around point  $D$ . Draw its image and label the image of  $C$  as  $A$ .
2. Rotate segment  $CD$   $180^\circ$  around point  $E$ . Draw its image and label the image of  $C$  as  $B$  and the image of  $D$  as  $F$ .
3. Rotate segment  $CD$   $180^\circ$  around its midpoint,  $G$ . What is the image of  $C$ ?
4. What happens when you rotate a segment  $180^\circ$  around a point?



💡 Are you ready for more?



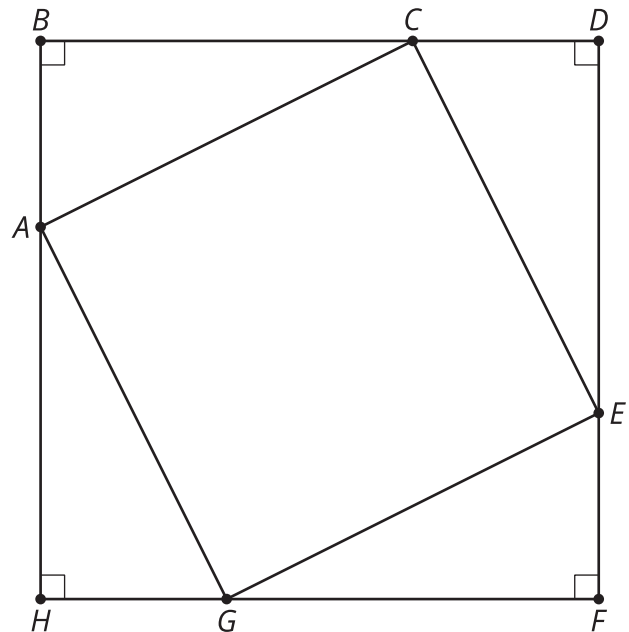
Here are two line segments. Is it possible to rotate one line segment to the other? If so, find the center of such a rotation. If not, explain why not.



## 7.3

## A Pattern of Four Triangles

You can use rigid transformations of a figure to make patterns. Here is a diagram built with three different transformations of triangle  $ABC$ .



1. Describe a rigid transformation that takes triangle  $ABC$  to triangle  $CDE$ .
2. Describe a rigid transformation that takes triangle  $ABC$  to triangle  $EFG$ .
3. Describe a rigid transformation that takes triangle  $ABC$  to triangle  $GHA$ .
4. Do segments  $AC$ ,  $CE$ ,  $EG$ , and  $GA$  all have the same length? Explain your reasoning.



## Lesson 7 Summary

When we apply a 180-degree rotation to a line segment, there are several possible outcomes:

- The image of the segment maps is the same as the original (if the center of rotation is the midpoint of the segment).
- The image of the segment overlaps with the segment and lies on the same line (if the center of rotation is a point on the segment).
- The image of the segment does not overlap with the segment and is parallel to the original segment (if the center of rotation is *not* on the segment).

This can also tell us important information about a figure that has been rotated. In this example, triangle  $ABC$  has been rotated 180 degrees with point  $C$  as the center of rotation. If we think of side  $AB$  as a line segment, then we know that its image  $A'B'$  must be parallel to it. If we think of side  $BC$  as a line segment, then we know that its image  $B'C$  must be along the same line.

