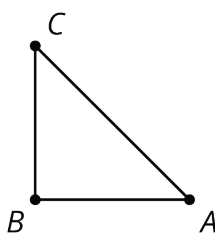


## Lesson 8: Rotation Patterns

Let's rotate figures in a plane.

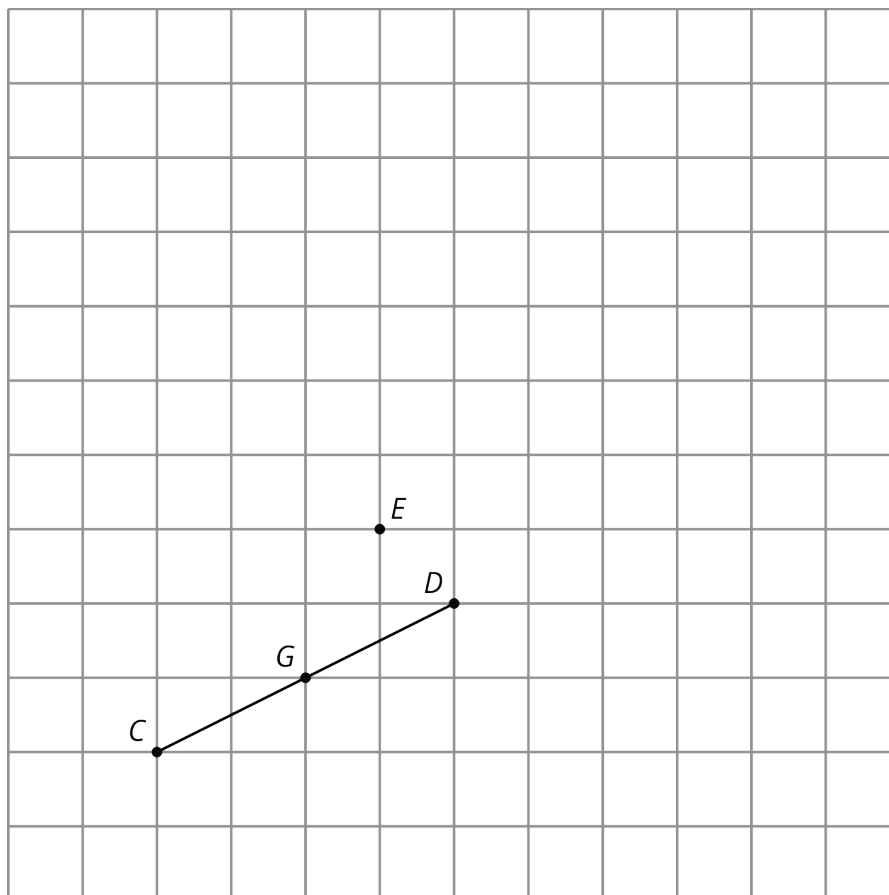
### 8.1: Building a Quadrilateral

Here is a right isosceles triangle:



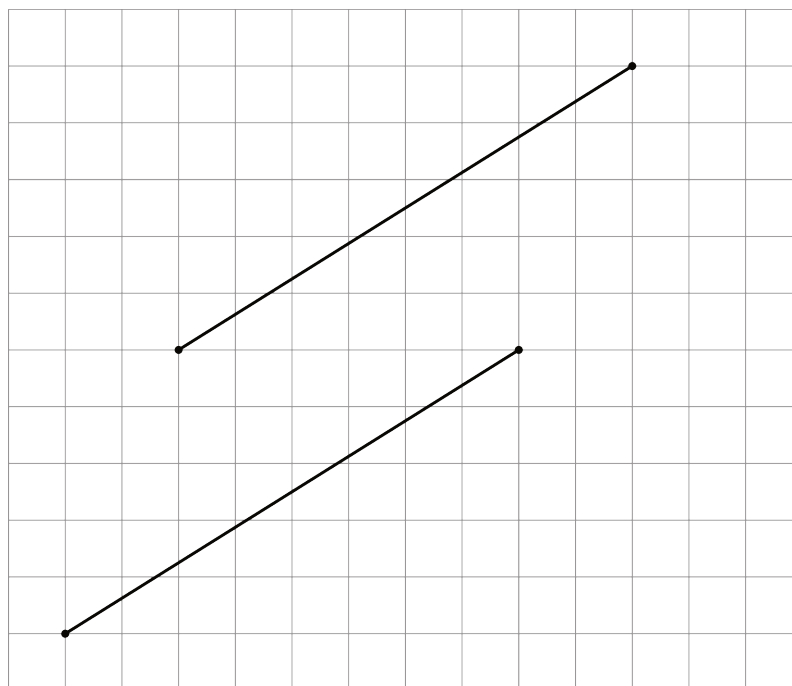
1. Rotate triangle  $ABC$  90 degrees clockwise around  $B$ .
2. Rotate triangle  $ABC$  180 degrees clockwise round  $B$ .
3. Rotate triangle  $ABC$  270 degrees clockwise around  $B$ .
4. What would it look like when you rotate the four triangles 90 degrees clockwise around  $B$ ? 180 degrees? 270 degrees clockwise?

## 8.2: Rotating a Segment



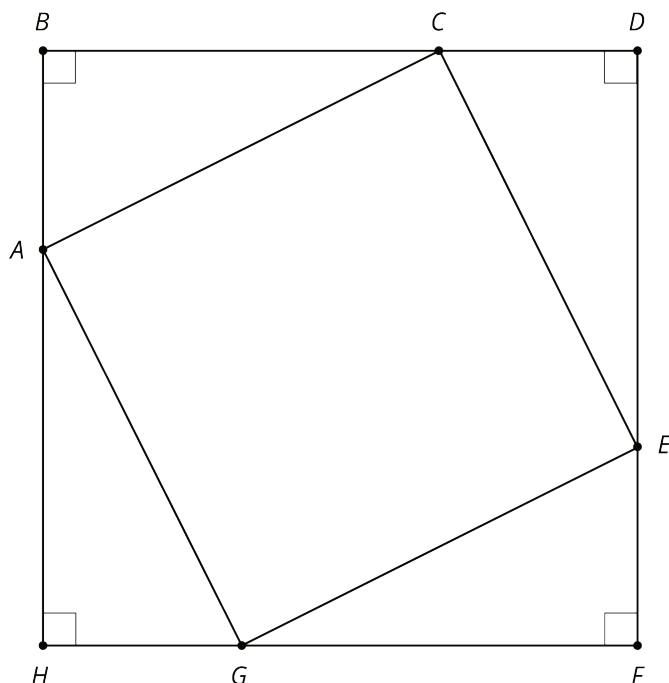
1. Rotate segment  $CD$  180 degrees around point  $D$ . Draw its image and label the image of  $C$  as  $A$ .
2. Rotate segment  $CD$  180 degrees around point  $E$ . Draw its image and label the image of  $C$  as  $B$  and the image of  $D$  as  $F$ .
3. Rotate segment  $CD$  180 degrees around its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

### 8.3: 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 8 Summary

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

- The segment maps to itself (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 (if the center of rotation is *not* on the segment).

We can also build patterns by rotating a shape. For example, triangle  $ABC$  shown here has  $m(\angle A) = 60$ . If we rotate triangle  $ABC$  60 degrees, 120 degrees, 180 degrees, 240 degrees, and 300 degrees clockwise, we can build a hexagon.

