

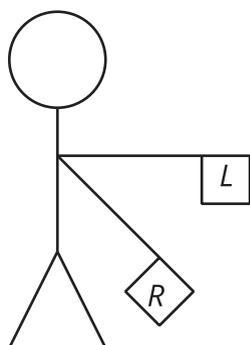
# Lesson 13: Incorporating Rotations

Let's draw some transformations.

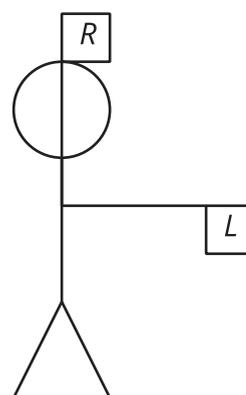
## 13.1: Left to Right

The semaphore alphabet is a way to use flags to signal messages. Here's how to signal the letters Z and J. For each, precisely describe a rotation that would take the left hand flag to the right hand flag.

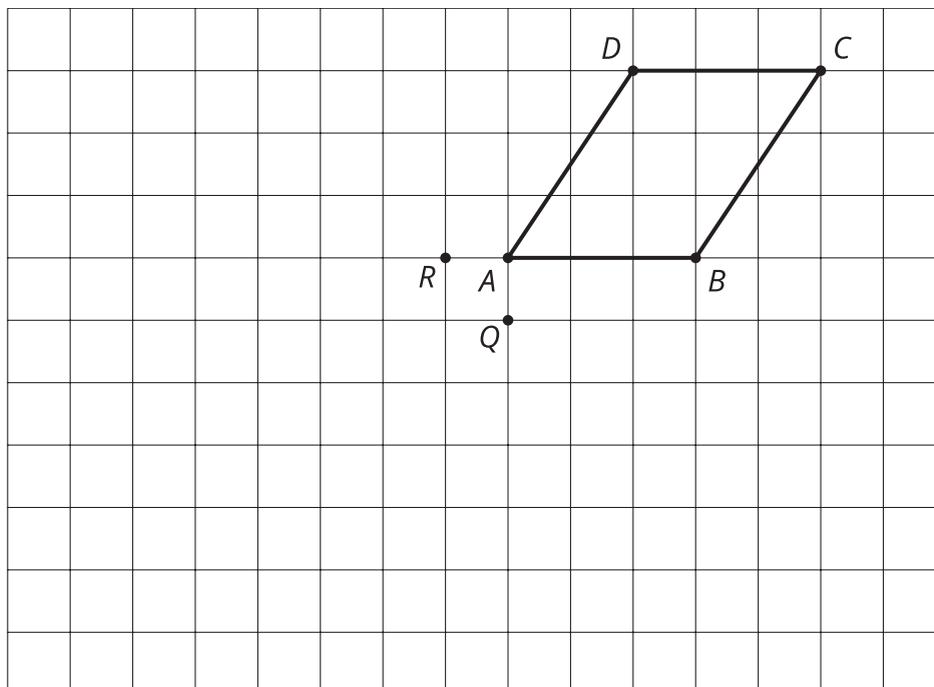
**z**



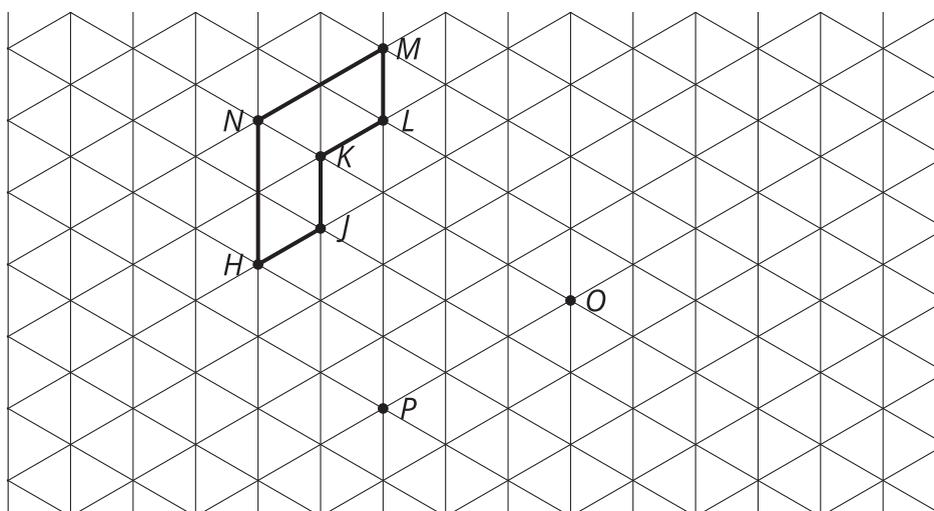
**J**



## 13.2: Turning on a Grid



1. Rotate  $ABCD$  90 degrees clockwise around  $Q$ .
2. Rotate  $ABCD$  180 degrees around  $R$ .
3. Rotate  $HJKLMN$  120 degrees clockwise around  $O$ .
4. Rotate  $HJKLMN$  60 degrees counterclockwise around  $P$ .

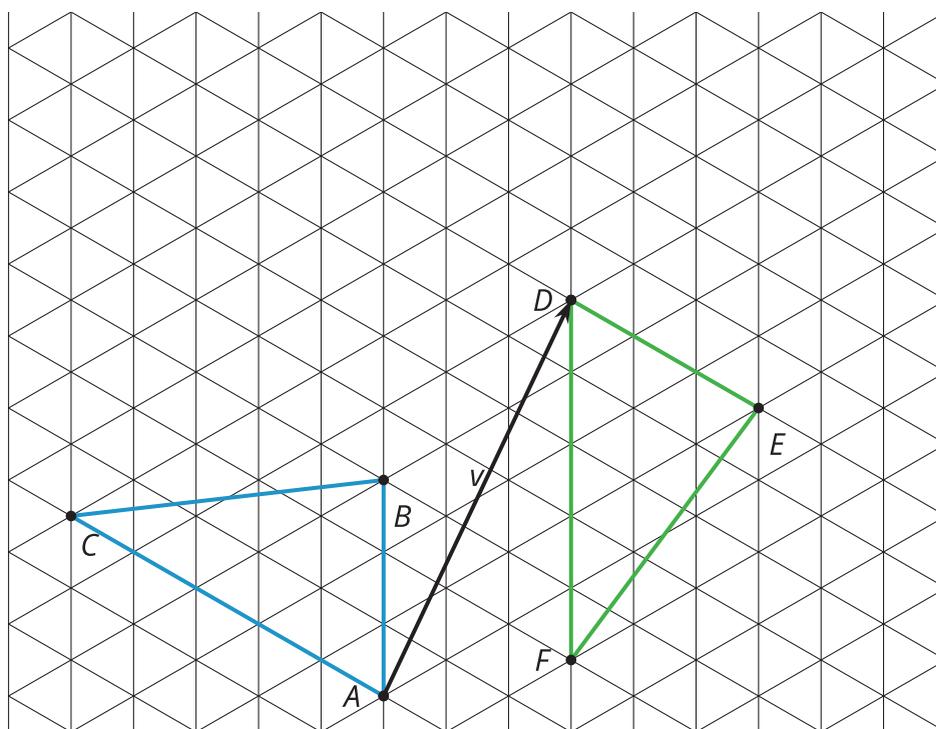


### 13.3: Translate, Rotate, Reflect

Mai suspects triangle  $ABC$  is congruent to triangle  $DEF$ . She thinks these steps will work to show there is a rigid transformation from  $ABC$  to  $DEF$ .

- Translate by directed line segment  $v$ .
- Rotate the image \_\_\_ degrees clockwise around point  $D$ .
- Reflect that image over line  $DE$ .

Draw each image and determine the angle of rotation needed for these steps to take  $ABC$  to  $DEF$ .



#### Are you ready for more?

Mai's first 2 steps could be combined into a single rotation.

1. Find the center and angle of this rotation.

2. Describe a general procedure for finding a center of rotation.

### Lesson 13 Summary

The 3 rigid motions are reflect, translate, and rotate. Each of these rigid motions can be applied to any figure to create an image that is congruent. To do a rotation, we need to know 3 things: the center, the direction, and the angle.

Rotate  $ABCD$  90 degrees clockwise around point  $P$ .

Rotate  $EFG$  120 degrees counterclockwise around point  $C$ .

