Defining Rotations

Illustrative Mathematics®

Learning Goal

- I can describe a rotation by stating the center and angle of rotation.
- I can draw rotations

14.1 Math Talk: Comparing Angles

For each figure, which pair of angles appears congruent?

How could you check?

Figure 1

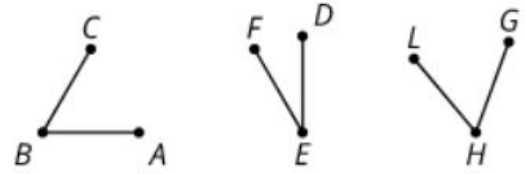


Figure 3

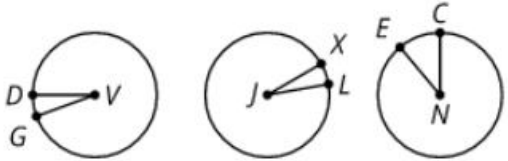


Figure 2

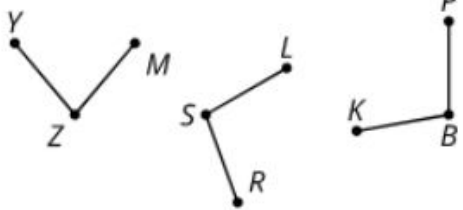
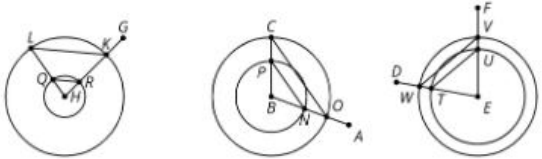
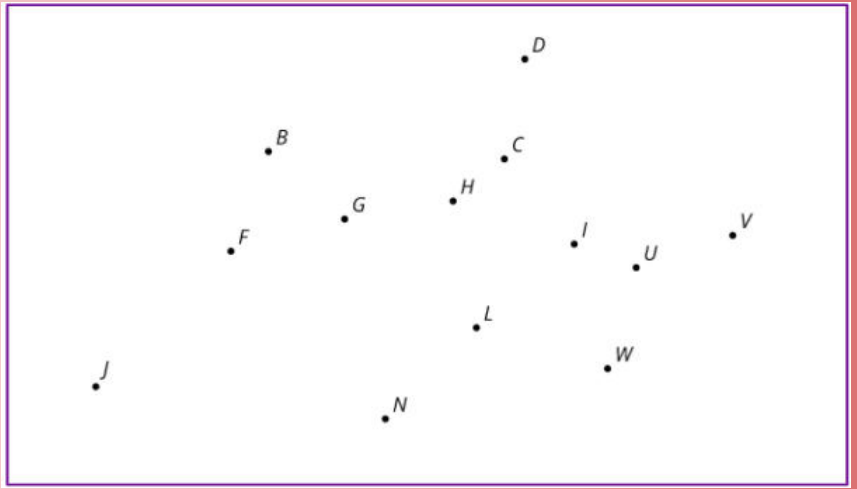


Figure 4



14.2 Info Gap: What's the Point: Rotations

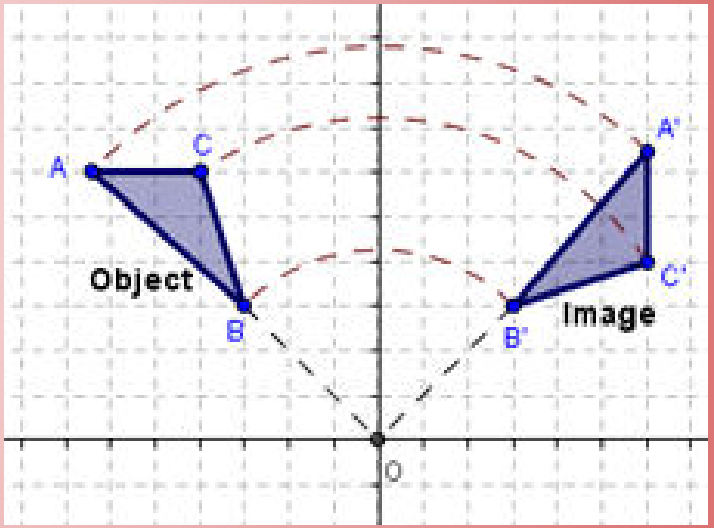
Data Card Student	Problem Card Student
Silently read the data card.	Silently read the problem card.
What specific information do you need?	Can you tell me... (a piece of information I need)?
Why do you need to know... (that piece of information)?	I need that piece of information because...
Listen to your partner's reasoning and ask clarifying questions.	
Read the problem card, and solve the problem independently.	Share the problem card with your partner, and solve the problem independently.
Share the data card with your partner, and discuss your reasoning with your partner.	Read the data card, and discuss your reasoning with your partner.
After both rounds, discuss differences in the problems and strategies.	



Work with your partner to complete the Info Gap.

Activity Synthesis

- With a rotation you must be precise with the following:
  - Angle
  - Direction
  - Center of rotation

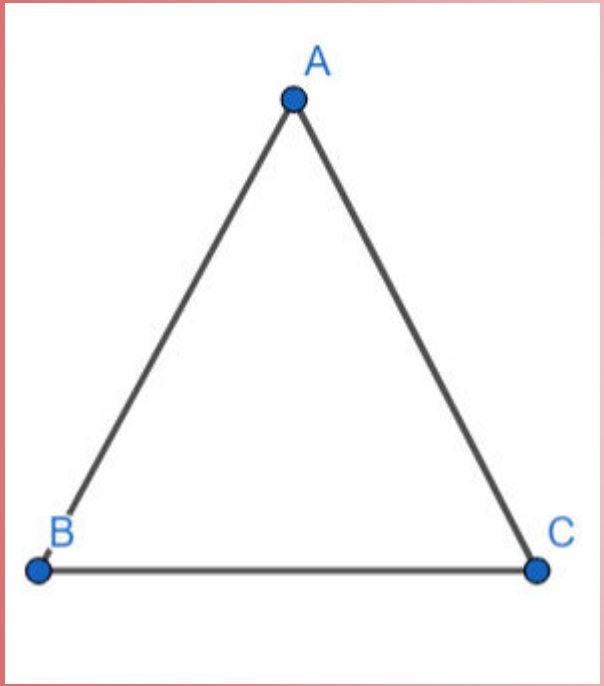


14.3 Turning into Triangles

1. Draw a segment. Label the endpoints A and B.
   a. Rotate segment AB clockwise around center B by 90 degrees. Label the new endpoint A'.
   b. Use the Polygon tool to draw triangle ABA'.
   c. What kind of triangle did you draw? What other properties do you notice in the figure? Explain your reasoning.
2. Draw a segment. Label the endpoints C and D.
   a. Rotate segment CD counterclockwise around center D by 30 degrees. Label the new endpoint C'.
   b. Rotate segment $C'D$ counterclockwise around center D by 30 degrees. Label the new endpoint C''.
   c. Use the Polygon tool to draw triangle CDC''.
   d. What kind of triangle did you draw? What other properties do you notice in the figure? Explain your reasoning.

Work quietly, then compare with your partner.

Activity Synthesis



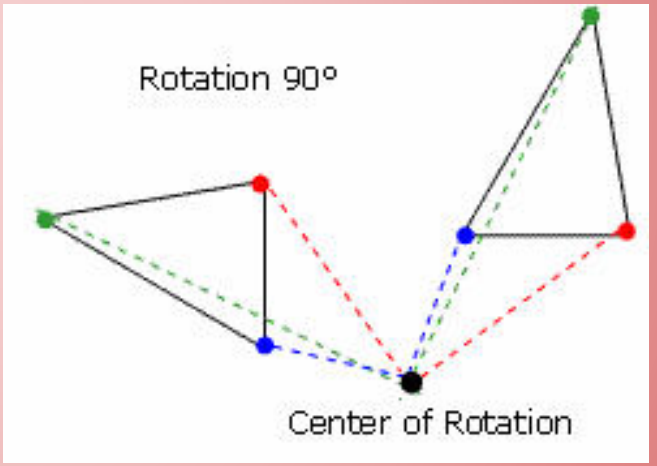
Key Conjectures and Observations:

- Rotations preserve the distance to the center of rotation.
- The angle bisector of angle A is also the perpendicular bisector of the base (BC) of an isosceles triangle.
- The two base angles (angle B and angle C) of an isosceles triangle are congruent.
- An isosceles triangle where angle A is 60 degrees is also equilateral.

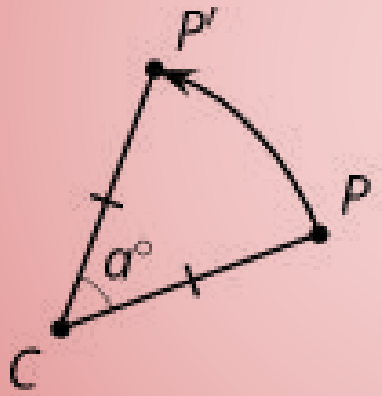
Lesson Synthesis

To describe a rotation you must specify:

- A center
- An angle
- A direction



Rotation is a rigid transformation that takes a point to another point on the circle through the original point with the given center. The two radii to the original point and the image make the given angle.



Rotate *P* counterclockwise by a^o using center *C*.