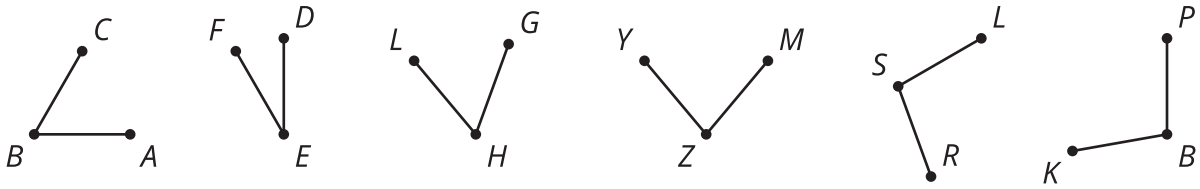
Unit 1, Lesson 14

Defining Rotations

Let's rotate shapes precisely.

14.1 Comparing Angles

Which pairs of angles appear congruent? How could you check?



14.2 Info Gap: What's the Point: Rotations

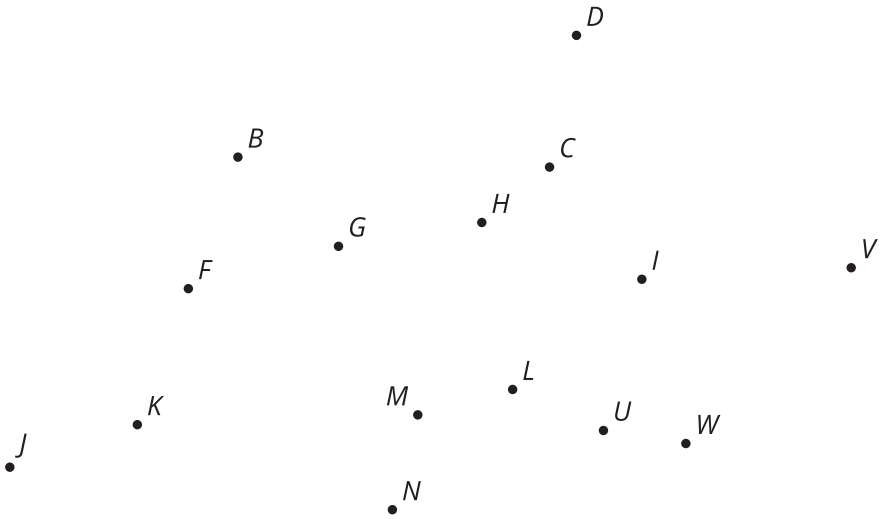
Your teacher will give you either a problem card or a data card. Do not show or read your card to your partner.

If your teacher gives you the problem card:

1. Silently read your card and think about what information you need to answer the question.
2. Ask your partner for the specific information that you need. "Can you tell me _____?"
3. Explain to your partner how you are using the information to solve the problem. "I need to know _____ because . . . ." Continue to ask questions until you have enough information to solve the problem.
4. When you have enough information, share the problem card with your partner, and solve the problem independently.
5. Read the data card, and discuss your reasoning.

If your teacher gives you the data card:

1. Silently read the information on your card. Wait for your partner to ask for information.
2. Before telling your partner any information, ask, "Why do you need to know _____?"
3. Listen to your partner's reasoning and ask clarifying questions. Only give information that is on your card. Do not figure out anything for your partner!
   These steps may be repeated.
4. Once your partner says they have enough information to solve the problem, read the problem card, and solve the problem independently.
5. Share the data card, and discuss your reasoning.



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. Connect A to A', and lightly shade in the resulting triangle.
   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. Connect C to C'', and lightly shade in the resulting triangle.
   d. What kind of triangle did you draw? What other properties do you notice in the figure? Explain your reasoning.

Are you ready for more?

You constructed an equilateral triangle by rotating a given segment around one of its endpoints by a specific angle measure. An equilateral triangle is an example of a *regular polygon*: a polygon with all sides congruent and all interior angles congruent. Try to construct some other regular polygons with this method.

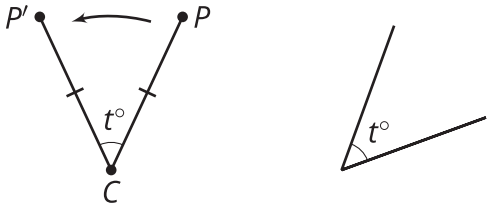
Lesson 14 Summary

A **rotation** is a transformation with a center, an angle, and a direction (clockwise or counterclockwise).

Here is how a rotation with a center point C, an angle that measures $t°$, and a counterclockwise direction transforms a point P:

- The rotation sends point P to a point P' on the circle with a radius of length CP.
- The angle PCP' measures $t°$ and P' is counterclockwise around the circle from P.

$\overline{PC} \cong \overline{P'C}$



If the direction were clockwise instead, then P' would be clockwise around the circle of radius CP. If P and C are in the same place, then the rotation sends P to P' on the circle with a radius of 0 units, so points P, C, and P' are all in the same place.