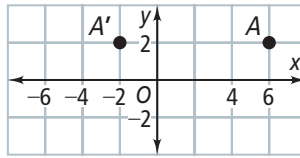




Vocabulary

Review

- The diagram at the right shows the reflection of point A across a *line of reflection*. Draw the *line of reflection*.
- Circle the equation of the *line of reflection* in the diagram above.



$x = 1$ $y = 1$ $x = 2$ $y = 2$

Vocabulary Builder

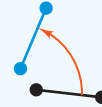
rotation (noun) roh TAY shun

Definition: A **rotation** is a spinning motion that turns a figure about a point or a line.

Related Words: center of **rotation**, axis of **rotation**

Math Usage: A **rotation** about a point is a transformation that turns a figure clockwise or counterclockwise a given number of degrees.

rotation



Use Your Vocabulary

Complete each statement with *always*, *sometimes*, or *never*.

- The *rotation* of the moon about Earth ? takes a year.
- A *rotation* image ? has the same orientation as the preimage.
- A transformation is ? a *rotation*.
- A *rotation* is ? a transformation.
- A 110° counterclockwise *rotation* is the same as a 250° clockwise *rotation* about the same point.

Key Concept Rotation About a Point

A **rotation** of x° about a point R , called the **center of rotation**, is a transformation with these two properties:

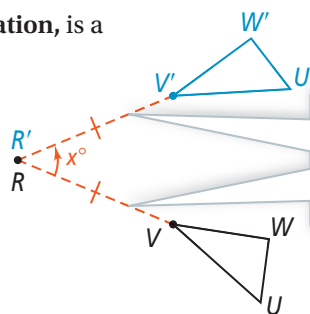
- The image of R is itself (that is, $R' = R$).
- For any other point V , $RV' = RV$ and $m\angle VRV' = x$.

The positive number of degrees a figure rotates is the **angle of rotation**.

A **rotation** about a point is an isometry.

Use the diagram above for Exercises 8–10.

- The preimage is $\triangle VWU$ and the image is $\triangle V'W'U'$.
- $RV' = RV$ and $m\angle VRV' = x$.
- $RU' = RU$ and $m\angle URU' = x$.

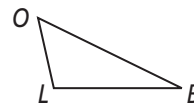


The preimage V and its image V' are equidistant from the center of rotation.



Problem 1 Drawing a Rotation Image

Got It? What is the image of $\triangle LOB$ for a 50° rotation about B ?



- Describe the image of B .

- Follow the steps below to draw a rotation image.

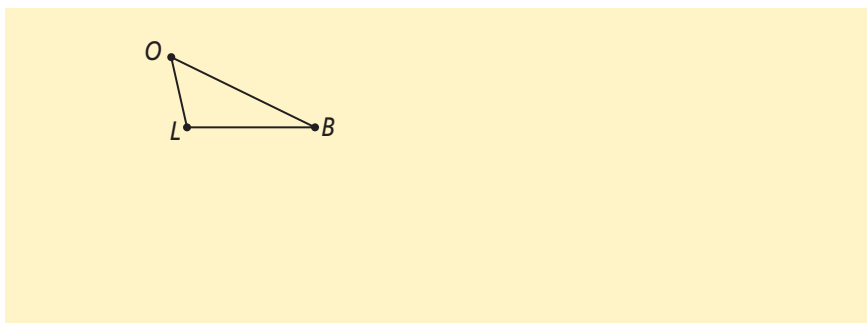
Step 1 Use a protractor to draw a 50° counterclockwise angle with vertex B and side \overline{BO} .

Step 2 Use a compass to construct $\overline{BO'} \cong \overline{BO}$.

Step 3 Use a protractor to draw a 50° angle with vertex B and side \overline{BL} .

Step 4 Use a compass to construct $\overline{BL'} \cong \overline{BL}$.

Step 5 Draw $\triangle L'O'B'$.

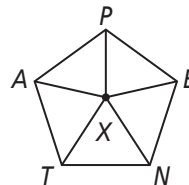


The **center of a regular polygon** is the point that is equidistant from its vertices. The center and the vertices of a regular n -gon determine n congruent triangles.

13. The center and the vertices of a square determine congruent triangles.

Problem 2 Identifying a Rotation Image

Got It? Point X is the center of regular pentagon $PENTA$. What is the image of E for a 144° rotation about X ?



14. The center and vertices divide $PENTA$ into congruent triangles.

15. Divide 360° by to find the measure of each central angle.

16. Each central angle measures $^\circ$.

Underline the correct word to complete each sentence.

17. A 144° rotation is one / two / three times the rotation of the measure in Exercise 16.

18. A 144° rotation moves each vertex counterclockwise two / three vertices.

19. Circle the image of E for a 144° rotation about X .

P E N T A

Problem 3 Finding an Angle of Rotation

Got It? Hubcaps of car wheels often have interesting designs that involve rotations. What is the angle of rotation about C that maps M to Q ?



20. The hubcap design has spokes that divide the circle into congruent parts.

21. The angle at the center of each part is $360^\circ \div$ = $^\circ$.

22. As M rotates counterclockwise about C to Q , M touches spokes.

23. As M rotates counterclockwise about C to Q , M rotates through \cdot $^\circ$, or $^\circ$.

24. The angle of rotation about C that maps M to Q is $^\circ$.



Problem 4 Finding a Composition of Rotations

Got It? What are the coordinates of the image of point $A(-2, 3)$ for a composition of two 90° rotations about the origin?

25. The composition of two 90° rotations is one $^\circ$ + $^\circ$, or $^\circ$ rotation.

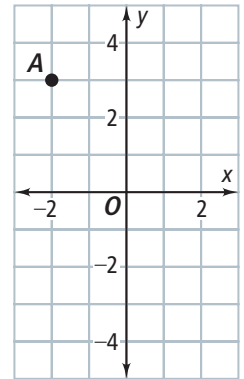
26. Complete each step to locate point A' on the diagram at the right.

Step 1 Draw \overline{AO} .

Step 2 Use a protractor to draw a 180° angle with the vertex at O and side \overline{OA} .

Step 3 Use a compass to construct $\overline{OA'} \cong \overline{OA}$. Graph point A' .

27. The coordinates of A' are (,).

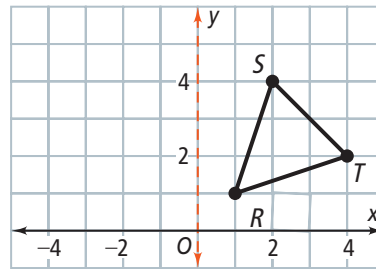
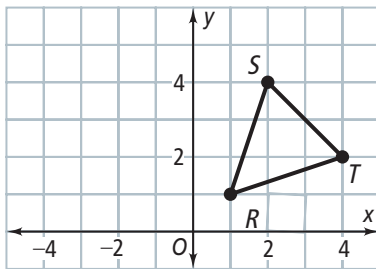


Lesson Check • Do you UNDERSTAND?

Compare and Contrast Compare rotating a figure about a point to reflecting the figure across a line. How are the transformations alike? How are they different?

28. Rotate $\triangle RST$ 90° about the origin.

29. Reflect $\triangle RST$ across the y -axis.



30. Circle the transformation(s) that preserve the size and shape of the preimage. Underline the transformation(s) that preserve the orientation of the preimage.

reflection across a line

rotation about a point

31. How are rotating and reflecting a figure alike? How are they different?



Math Success

Check off the vocabulary words that you understand.

rotation

center of rotation

angle of rotation

center of a regular polygon

Rate how well you can *draw and identify rotation images*.

