Lesson 2.02 Rotations

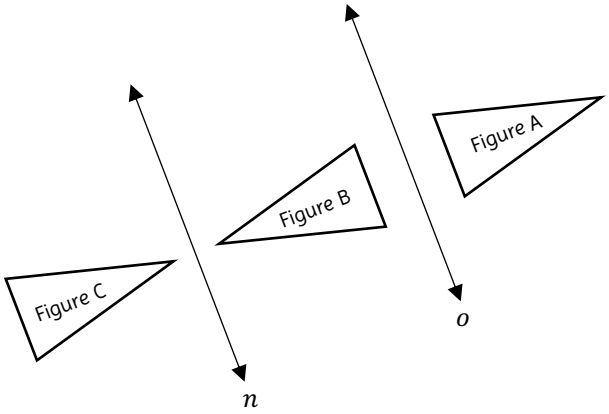
Students will be able to:

- Content Objective: Define rotation more closely and construct rotations using a protractor.
- Language Objective: Discover that the image of a segment rotated 180° about a point will be parallel to the pre-image.

Warm Up

In the diagram below, line n is parallel to line o. Figure B is the image of Figure A after a reflection over line o. Figure C is the image of Figure B after a reflection over line n. Which single transformation would carry Figure A onto Figure C?

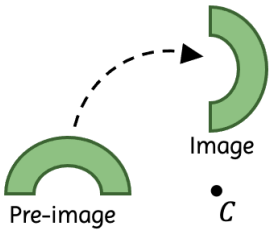
1) Dilation
2) Reflection
3) Translation
4) Rotation



Vocabulary Review

Identify whether each of the following represents a **clockwise** rotation or **counterclockwise** rotation.

a.



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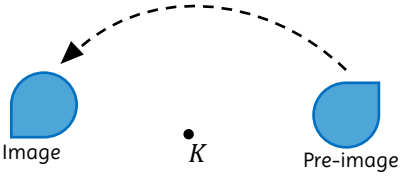
b.



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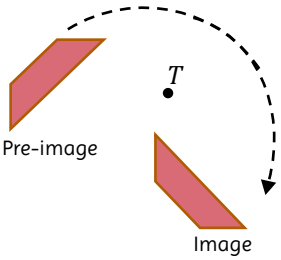
c.



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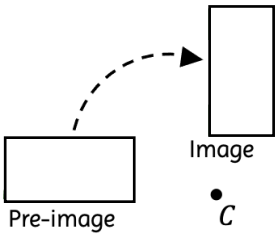
Graphic Organizer

Rotation		
A transformation that turns every point of a pre-image a specific angle and direction about a fixed point.		
Center of Rotation	**Angle of Rotation**	**Notation**
A fixed point in which a figure is rotated about. **Center of rotation**: C	The degree (angle) through which the pre-image is rotated to produce the image. **Rotation:** 90° clockwise	We use a capital R to denote a rotation. $R_{C,-90°}$ **Clockwise rotation:** negative **Counterclockwise rotation:** positive



Skill 1: Rotation Notation

Identify the angle of rotation and the direction based on the rotation notations shown below.

a. $R_{270°}$ b. $R_{-30°}$ c. $R_{45°}$

Exercise 1: Rotation Notation

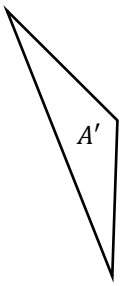
Identify the angle of rotation and the direction based on the rotation notations shown below.

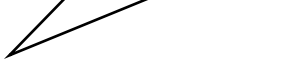
a. $R_{-180°}$ b. $R_{90°}$ c. $R_{135°}$

Constructing Center of Rotation	Measuring Angle of Rotation
Step 1: Connect two pairs of corresponding vertices using line segments. **Step 2:** Construct the perpendicular bisector of each segment. **Step 3:** Mark the point where the perpendicular bisectors intersect. This is the center of rotation!	**Step 1:** Identify the center of rotation point. **Step 2:** Measure the angle formed by connecting corresponding vertices to the center point of rotation. **Step 3:** Check your answer by completing steps 1 and 2 with other corresponding vertices.

Skill 2: Center and Degree of Rotation

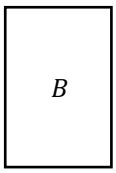
Figure A is rotated to produce figure A'. Construct the center of rotation, the degree of rotation, and direction.

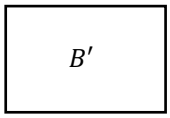




Exercise 2: Center and Degree of Rotation

Figure B is rotated to produce Figure B'. Construct the center of rotation, the degree of rotation, and direction.

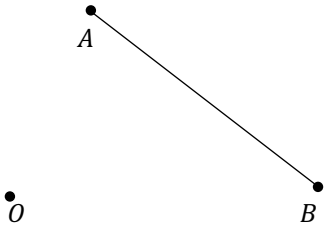




Skill 3: Constructing Rotations

Line segment AB shown below has a length of 1.5 inches.

a. Draw its image, $\overline{A'B'}$, after a rotation of 45° counterclockwise about point O.



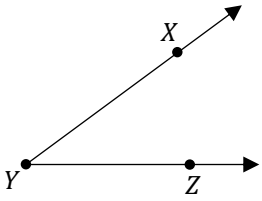
b. Do rotations preserve length? Measure $\overline{A'B'}$ to support your answer.

Exercise 3: Constructing Rotations

$\angle XYZ$ is shown below with point O.

a. Using a compass and straightedge construct $\angle X'Y'Z'$ given the rotation notation shown below.

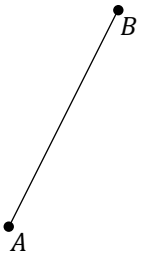
$R_{O,90°}(X) \rightarrow X'$
$R_{O,90°}(Y) \rightarrow Y'$
$R_{O,90°}(Z) \rightarrow Z'$



b. Do rotations preserve angle measure? Measure $\angle X'Y'Z'$ to support your answer.

Write It Out

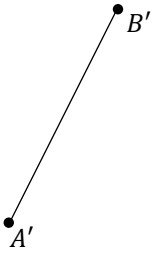
$\overline{AB}$ was rotated about point C counterclockwise by 180° to get $\overline{A'B'}$.



a. Are $\overline{AB}$ and $\overline{A'B'}$ congruent? Explain.

b. Construct $\overline{A'B}$. What is true about $\angle ABA'$ and $\angle B'A'B$? What type of angles are these called?

c. What is true about $\overline{AB}$ and $\overline{A'B'}$?



Check Point

Fill in the blanks using your knowledge of rotations.

The notation $R_{K,-270°}(\Delta ABC)$ says to rotate ΔABC _____ degrees in the_____ direction about point ___.

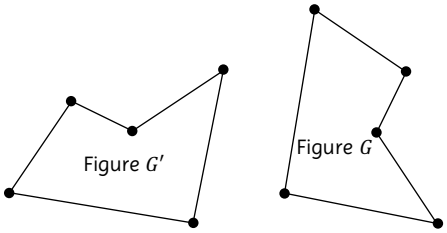
2.02- Problem Set

Name: _____

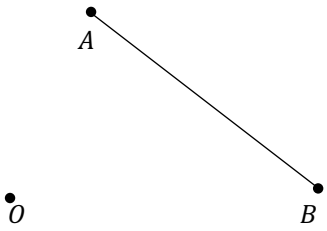
1. Identify the angle of rotation and the direction based on the rotation notations shown below.

   a. $R_{180°}$ b. $R_{-90°}$ c. $R_{270°}$

2. Figure G is rotated to produce figure G'. Construct the center of rotation, the degree of rotation, and direction.



3. Line segment AB shown below. Draw its image, $\overline{A'B'}$, after a rotation of $90°$ counterclockwise about point O. Use a compass and straightedge.



4. The Ain Dubai located on Blue Waters Island is the tallest Ferris wheel in the world, standing over 250 meters tall. With 48 cabins, this attraction can hold a maximum of 1750 people and takes 38 minutes to make a full rotation.

   a. Based on the information above, how many minutes does it take one cabin to rotate $180°$.

   b. How many minutes does it take one cabin to rotate $60°$? Round to the nearest tenth of a minute.

Ain Dubai. (3AD). photograph, Dubai.