

Transformations and Congruence

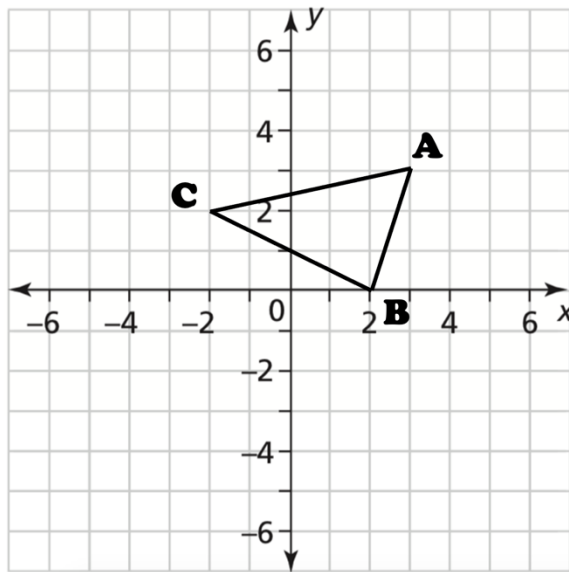
We will be using $\triangle ABC$ as our Preimage for all of the following problems.

1. Using the Pythagorean Theorem, calculate the lengths of each side of $\triangle ABC$. Round your answers to the nearest tenth.
Show work below.

AB = 3.2 u. $1^2 + 3^2 = c^2$
 $1 + 9 = c^2$
 $10 = c^2$
 $\sqrt{10} = c$

BC = 4.5 u. $2^2 + 4^2 = c^2$
 $4 + 16 = c^2$
 $20 = c^2$
 $\sqrt{20} = c$

AC = 5.1 u. $1^2 + 5^2 = c^2$
 $1 + 25 = c^2$
 $26 = c^2$
 $\sqrt{26} = c$



AB = 3.2 units

BC = 4.5 units

AC = 5.1 units

2. Calculate the slope for each side of $\triangle ABC$.

Slope AB = $\frac{3}{1} = 3$

Slope BC = $\frac{-2}{4} = -\frac{1}{2}$

Slope AC = $\frac{1}{5}$

For each of the following questions, graph the transformation and then answer the questions.

3. **Translate** $\triangle ABC$ following the rule $(x, y) \rightarrow (x - 2, y - 3)$

Using the Pythagorean Theorem, calculate the length of side $A'B'$. Round your answer to the nearest tenth.

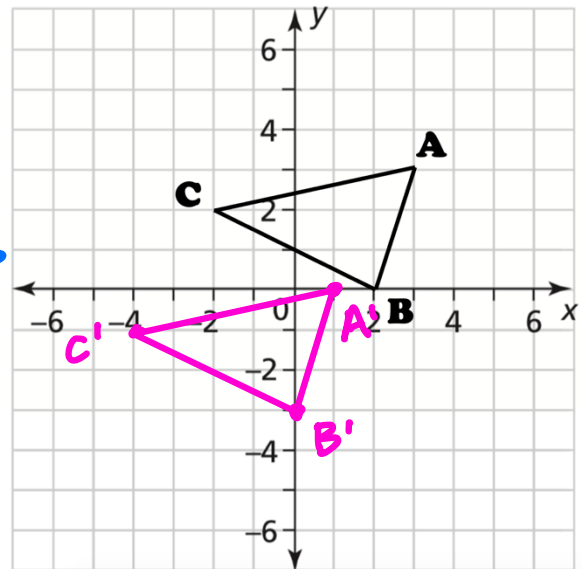
$$a^2 + b^2 = c^2$$

$$1^2 + 3^2 = c^2$$

$$10 = c^2$$

$$\sqrt{10} = c$$

$$\overline{A'B'} = 3.2 \text{ units}$$



Calculate the slope for each side of $\triangle A'B'C'$.

Slope $A'B' = \frac{3}{1} = 3$

Slope $B'C' = \frac{-2}{4} = -\frac{1}{2}$

Slope $A'C' = \frac{1}{5}$

How do the length of $A'B'$ and the slopes of the sides compare to those of $\triangle ABC$?

- The length of $A'B'$ is the same as the length of AB .
- The slopes of the sides of $\triangle A'B'C'$ are equal to the slopes of the corresponding sides of $\triangle ABC$.

4. **Reflect** $\triangle ABC$ across the line $y = -1$.

Using the Pythagorean Theorem, calculate the length of side $A'B'$. Round your answer to the nearest tenth.

$$a^2 + b^2 = c^2$$

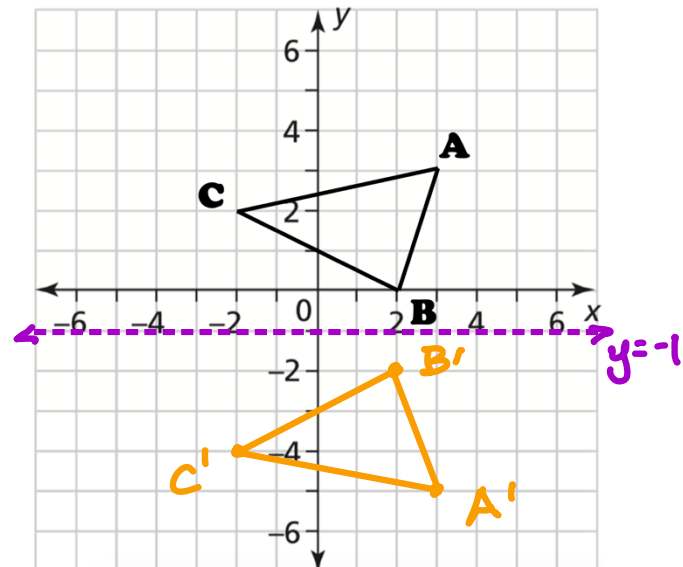
$$1^2 + 3^2 = c^2$$

$$1 + 9 = c^2$$

$$10 = c^2$$

$$\sqrt{10} = c$$

$$\overline{A'B'} = 3.2 \text{ units}$$



Calculate the slope for each side of $\triangle A'B'C'$.

Slope $A'B' = \frac{-3}{1}$

Slope $B'C' = \frac{2}{4} = \frac{1}{2}$

Slope $A'C' = -\frac{1}{5}$

How do the length of $A'B'$ and the slopes of the sides compare to those of $\triangle ABC$?

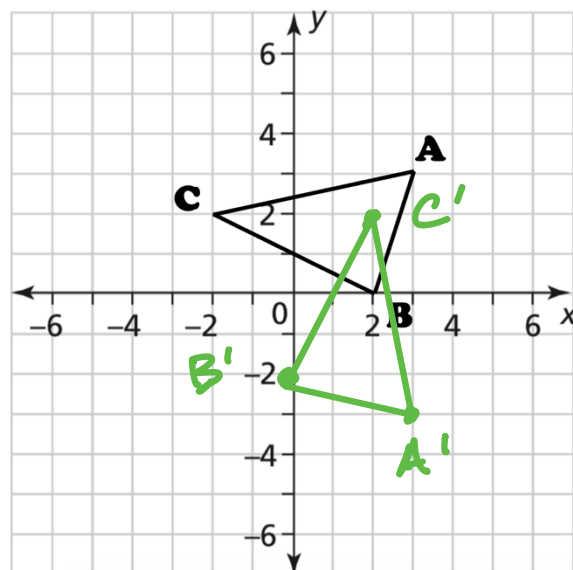
- The length of $A'B'$ is the same as the length of AB .
- The slopes of the sides of $\triangle A'B'C'$ are not equal to the slopes of the corresponding sides of $\triangle ABC$, BUT the absolute values of corresponding sides ARE equal.

5. **Rotate** $\triangle ABC$ 90° clockwise around the point $(0, 0)$.

Using the Pythagorean Theorem, calculate the length of side $A'B'$. Round your answer to the nearest tenth.

$$\begin{aligned} a^2 + b^2 &= c^2 \\ 1^2 + 3^2 &= c^2 \\ 1 + 9 &= c^2 \\ 10 &= c^2 \\ \sqrt{10} &= c \end{aligned}$$

$$\overline{A'B'} = 3.2 \text{ units}$$



Calculate the slope for each side of $\triangle A'B'C'$.

$$\text{Slope } A'B' = -\frac{1}{3}$$

$$\text{Slope } B'C' = \frac{4}{2} = 2$$

$$\text{Slope } A'C' = -5$$

How do the length of $A'B'$ and the slopes of the sides compare to those of $\triangle ABC$?

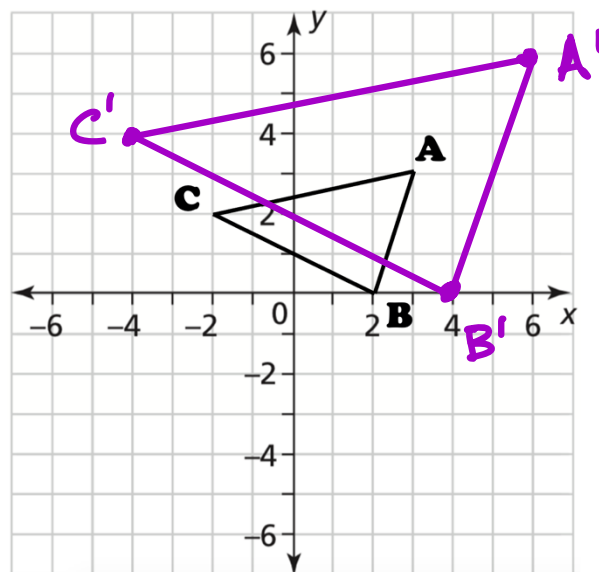
- The length of $A'B'$ is the same as the length of AB .
- The slopes of the sides of $\triangle A'B'C'$ are not equal to the slopes of the corresponding sides of $\triangle ABC$. They are the negative reciprocal of slopes on $\triangle ABC$.

6. **Dilate** $\triangle ABC$ by a factor of two from the origin $(0, 0)$.

Using the Pythagorean Theorem, calculate the length of side $A'B'$. Round your answer to the nearest tenth.

$$\begin{aligned} a^2 + b^2 &= c^2 \\ 2^2 + 6^2 &= c^2 \\ 4 + 36 &= c^2 \\ 40 &= c^2 \\ \sqrt{40} &= c \end{aligned}$$

$$\overline{A'B'} = 6.3 \text{ units}$$



Calculate the slope for each side of $\triangle A'B'C'$.

$$\text{Slope } A'B' = \frac{6}{2} = 3$$

$$\text{Slope } B'C' = \frac{-4}{8} = -\frac{1}{2}$$

$$\text{Slope } A'C' = \frac{2}{6} = \frac{1}{3}$$

How do the length of $A'B'$ and the slopes of the sides compare to those of $\triangle ABC$?

- The length of $A'B'$ is not the same as the length of AB . It is twice as long! (Rounding makes it look less.)
- The slopes of all corresponding sides are equal.

7. For which transformations are the following statements true? Check the appropriate boxes.

	Translation	Reflection	Rotation	Dilation
Corresponding sides of the Preimage and Image are parallel .	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Corresponding sides of the Preimage and Image are the same size .	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Corresponding angle measures of the Preimage and Image are the same size .	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
The image and preimage are congruent .	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>