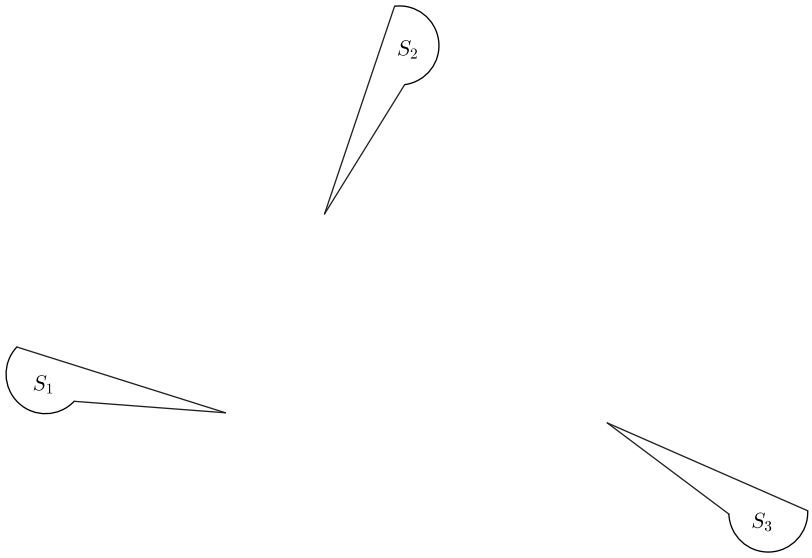
# Lesson 11: Definition of Congruence and Some Basic Properties

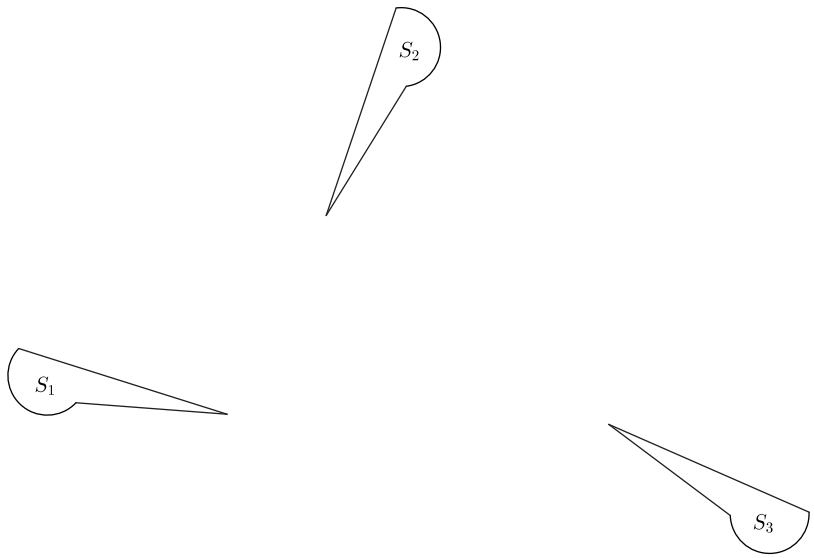
## Classwork

### Exercise 1

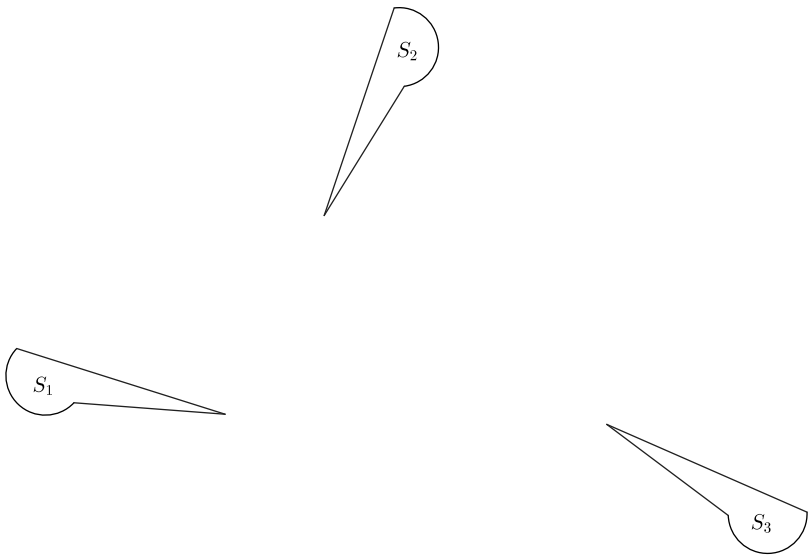
a. Describe the sequence of basic rigid motions that shows $S_1 \cong S_2$.



b. Describe the sequence of basic rigid motions that shows $S_2 \cong S_3$.

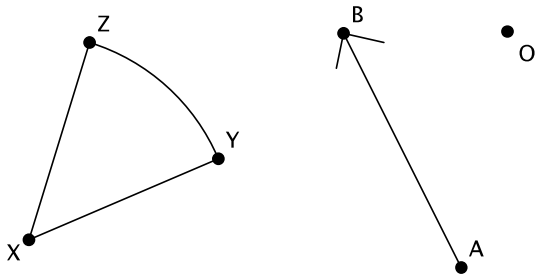


c. Describe a sequence of basic rigid motions that shows $S_1 \cong S_3$.



**Exercise 2**

Perform the sequence of a translation followed by a rotation of Figure $XYZ$, where $T$ is a translation along a vector $\overrightarrow{AB}$, and $R$ is a rotation of $d$ degrees (you choose $d$) around a center $O$. Label the transformed figure $X'Y'Z'$. Will $XYZ \cong X'Y'Z'$?



**Lesson Summary**

Given that sequences enjoy the same basic properties of basic rigid motions, we can state three basic properties of congruences:

(Congruence 1) A congruence maps a line to a line, a ray to a ray, a segment to a segment, and an angle to an angle.

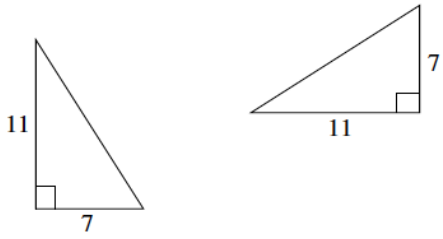
(Congruence 2) A congruence preserves lengths of segments.

(Congruence 3) A congruence preserves measures of angles.

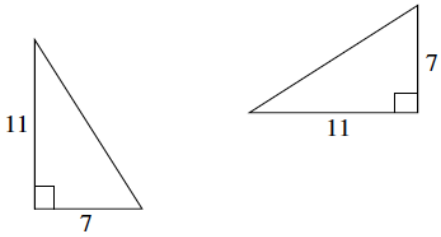
The notation used for congruence is $\cong$.

## Problem Set

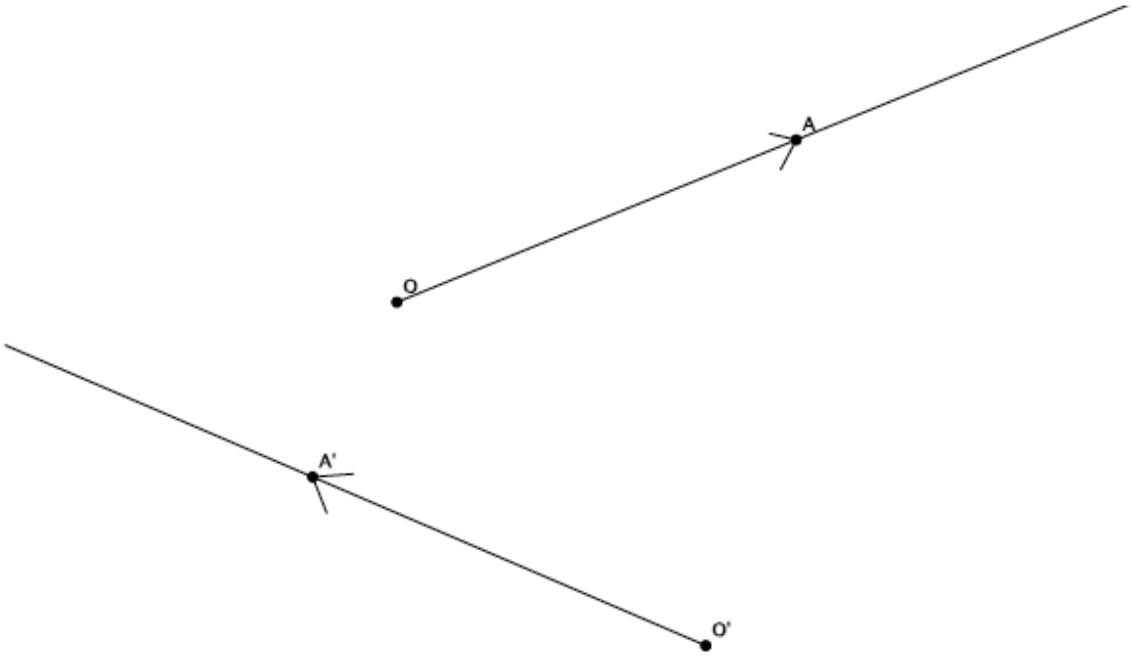
1. Given two right triangles with lengths shown below, is there one basic rigid motion that maps one to the other? Explain.




2. Are the two right triangles shown below congruent? If so, describe a congruence that would map one triangle onto the other.



3. Given two rays, $\overrightarrow{OA}$ and $\overrightarrow{O'A'}$:




a. Describe a congruence that maps $\overrightarrow{OA}$ to $\overrightarrow{O'A'}$.

b. Describe a congruence that maps $\overrightarrow{O'A'}$ to $\overrightarrow{OA}$.