



# Angles and Similarity

## Student Activity

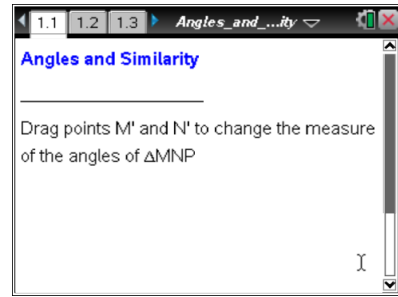


Name \_\_\_\_\_

Class \_\_\_\_\_

Open the TI-Nspire document *Angles\_and\_Similarity.tns*.

In this activity,  $\triangle ABC$  and  $\triangle MNP$  have been constructed.  $\triangle ABC$  will not change during this exploration.  $\triangle MNP$  has been constructed so that moving points  $M'$  and  $N'$  will change the measures of  $\angle M$ ,  $\angle N$ , and  $\angle P$ . You will investigate the relationship between  $\triangle ABC$  and  $\triangle MNP$ .



Move to page 1.2.

1. Drag points  $M'$  and  $N'$  until  $m\angle M = m\angle A$  and  $m\angle N = m\angle B$ . What changes when you move these points?

2. Drag points  $M'$  and  $N'$  until  $m\angle M = m\angle A$  and  $m\angle N = m\angle B$ .

a. Record the angle measures for each of the angles below:

$$m\angle M = \underline{\hspace{1cm}} \quad m\angle N = \underline{\hspace{1cm}} \quad m\angle P = \underline{\hspace{1cm}}$$

b. What do you notice about the relationship of  $m\angle P$  and  $m\angle C$ ?

3. a. Drag points  $M'$  and  $N'$  until  $\angle M$  and  $\angle N$  are congruent to two corresponding angles in  $\triangle ABC$  that are different than the angles identified in question 2a. Record the angle congruence for each of the angles below:

$$m\angle M = \underline{\hspace{1cm}} \quad m\angle N = \underline{\hspace{1cm}} \quad m\angle P = \underline{\hspace{1cm}}$$

b. How many different ways can this be done? List any other possibilities and justify your answer.

4. Keep in mind that two angles are **congruent** if and only if they have the same measure.

If two triangles have two pairs of angles that are congruent, what can you conclude about the third pair of angles? Give a mathematical argument for your conclusion.

5. Why would your triangles in question 3 be described as similar, but not congruent?

**Move to page 1.3.**

6. Drag points  $M'$  and  $N'$  until  $\angle M \cong \angle A$  and  $\angle N \cong \angle B$ .
- What additional information is given when the corresponding angle measures are equal to each other?
  - What is significant about this information?
  - After completing questions 6a and 6b, Frank concludes that  $\triangle ABC \sim \triangle NPM$ . Is his reasoning correct? Explain why or why not.
7. Knowing two pairs of corresponding angles are congruent leads to proportional sides. When you know the ratio of similarity and a side in one triangle, you can use it to find the measure of the corresponding side in the other triangle.
- Drag  $M'$  and  $N'$  until  $m\angle M = 35^\circ$  and  $m\angle N = 60^\circ$ .  
What is the ratio of similarity shown on the sketch? '  
Which side of  $\triangle ABC$  corresponds to  $\overline{MN}$ ?  
If  $\overline{MN} = 8$ , find the length of the corresponding side. Show your work.
  - Drag  $M'$  and  $N'$  until  $m\angle M = 35^\circ$  and  $m\angle N = 85^\circ$ .  
What is the ratio of similarity shown on the sketch?  
Which side of  $\triangle MNP$  corresponds to  $\overline{BC}$ ?  
If  $BC = 2$ , find the length of the corresponding side. Show your work.



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8. Terry and Jessica created three right triangles shown on the screen on the right. Terry claims that all the right triangles are similar because they all have a right angle.

Jessica says that you also need to know that the measures of a pair of corresponding acute angles are congruent before you can conclude that any two of the right triangles are similar.

Who is right? Explain your answer.

