8.2 Proving Triangle Similarity by AA
For use with Exploration 8.2

Essential Question: What can you conclude about two triangles when you know that two pairs of corresponding angles are congruent?

1 EXPLORATION: Comparing Triangles

Go to BigIdeasMath.com for an interactive tool to investigate this exploration.

Work with a partner. Use dynamic geometry software.

a. Construct $\triangle ABC$ and $\triangle DEF$ so that $m\angle A = m\angle D = 106^\circ$, $m\angle B = m\angle E = 31^\circ$, and $\triangle DEF$ is not congruent to $\triangle ABC$.

b. Find the third angle measure and the side lengths of each triangle. Record your results in column 1 of the table below.

<table>
<thead>
<tr>
<th></th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
<th>6.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$m\angle A, m\angle D$</td>
<td>106°</td>
<td>88°</td>
<td>40°</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$m\angle B, m\angle E$</td>
<td>31°</td>
<td>42°</td>
<td>65°</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$m\angle C$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$m\angle F$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$AB$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$DE$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$BC$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$EF$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$AC$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$DF$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
8.2 Proving Triangle Similarity by AA (continued)

1 EXPLORATION: Comparing Triangles (continued)

c. Are the two triangles similar? Explain.

d. Repeat parts (a)–(c) to complete columns 2 and 3 of the table for the given angle measures.

e. Complete each remaining column of the table using your own choice of two pairs of equal corresponding angle measures. Can you construct two triangles in this way that are not similar?

f. Make a conjecture about any two triangles with two pairs of congruent corresponding angles.

Communicate Your Answer

2. What can you conclude about two triangles when you know that two pairs of corresponding angles are congruent?

3. Find $RS$ in the figure at the right.
8.2 Notetaking with Vocabulary
For use after Lesson 8.2

In your own words, write the meaning of each vocabulary term.

similar figures

similarity transformation

Theorems

Theorem 8.3  Angle-Angle (AA) Similarity Theorem

If two angles of one triangle are congruent to two angles of another triangle, then the two triangles are similar.

If $\angle A \cong \angle D$ and $\angle B \cong \angle E$, then $\triangle ABC \sim \triangle DEF$.

Notes:
Extra Practice

In Exercises 1 and 2, determine whether the triangles are similar. If they are, write a similarity statement. Explain your reasoning.

1. $\triangle ABC$ and $\triangle DEF$

2. $\triangle ADE$ and $\triangle BCF$

In Exercises 3 and 4, show that the two triangles are similar.

3. $\triangle ABC$ and $\triangle DEF$

4. $\triangle PQR$ and $\triangle STU$
In Exercises 5–13, use the diagram to complete the statement.

5. \( m\angle AGB = \) \_
6. \( m\angle EGD = \) \_
7. \( m\angle BCG = \) \_

8. \( AG = \) \_
9. \( AB = \) \_
10. \( FE = \) \_

11. \( ED = \) \_
12. \( GF = \) \_
13. \( \Delta AGC \sim \) \_

14. Using the diagram for Exercises 5–13, write similarity statements for each triangle similar to \( \Delta EFG \).

15. Determine if it is possible for \( \Delta HJK \) and \( \Delta PQR \) to be similar. Explain your reasoning.

\[ m\angle H = 100^\circ, m\angle K = 46^\circ, m\angle P = 44^\circ, \text{ and } m\angle Q = 46^\circ \]