

Labeling Sides (S) and Angles (A)
Marking Similarity

You've learned how to mark **congruent sides (S) and angles (A)** on two triangles to determine if they're congruent. Now, you have to learn how to mark **similar sides (S~)**, as well. Similar and congruent are not the same thing.

Congruent means that all of the parts—**sides and angles**—are the same.

Similar means that, while the **angles are the same**, the **sides have proportional relationships**.

Basically, if the sides are similar, then you can set up equal fractions for them.

Setting up the fractions correctly is the most important part. The easiest way that I've found to do that is to organize the information by triangle size first, and then by side size. For example:

	<p>Small Triangle:</p> <table border="1"> <tr> <td>Small Side (SΔ Small)</td> <td>6</td> </tr> <tr> <td>Medium Side (SΔ Medium)</td> <td>10</td> </tr> <tr> <td>Large Side (SΔ Large)</td> <td>12</td> </tr> </table>	Small Side (SΔ Small)	6	Medium Side (SΔ Medium)	10	Large Side (SΔ Large)	12	<p>Large Triangle:</p> <table border="1"> <tr> <td>Small Side (LΔ Small)</td> <td>9</td> </tr> <tr> <td>Medium Side (LΔ Medium)</td> <td>15</td> </tr> <tr> <td>Large Side (LΔ Large)</td> <td>18</td> </tr> </table>	Small Side (LΔ Small)	9	Medium Side (LΔ Medium)	15	Large Side (LΔ Large)	18
Small Side (SΔ Small)	6													
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Large Side (LΔ Large)	18													

Now, you'll use this organizational system to set up fractions for each given side. If the **fractions are equal**, then the **sides you used** to make them are **Similar**. Plus, if all three side fractions are equal, then you've also found the **scale!**

<p>To create fractions using <u>Small Sides</u></p> <table border="1"> <tr> <td>$\frac{S \Delta \text{ Small}}{L \Delta \text{ Small}}$</td> </tr> </table> <p><i>In its reduced form, this fraction, if they're all equal, is called the scale.</i></p>	$\frac{S \Delta \text{ Small}}{L \Delta \text{ Small}}$	<p>To create fractions using <u>Medium Sides</u></p> <table border="1"> <tr> <td>$\frac{S \Delta \text{ Medium}}{L \Delta \text{ Medium}}$</td> </tr> </table> <p><i>In its reduced form, this fraction, if they're all equal, is called the scale.</i></p>	$\frac{S \Delta \text{ Medium}}{L \Delta \text{ Medium}}$	<p>To create fractions using <u>Large Sides</u></p> <p>Use:</p> <table border="1"> <tr> <td>$\frac{S \Delta \text{ Large}}{L \Delta \text{ Large}}$</td> </tr> </table> <p><i>In its reduced form, this fraction, if they're all equal, is called the scale.</i></p>	$\frac{S \Delta \text{ Large}}{L \Delta \text{ Large}}$
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$\frac{S \Delta \text{ Medium}}{L \Delta \text{ Medium}}$					
$\frac{S \Delta \text{ Large}}{L \Delta \text{ Large}}$					

	<p>Small Sides:</p> $\frac{S \Delta \text{ Small}}{L \Delta \text{ Small}} = \frac{6}{9}$ <p><i>Reduce, if you can...</i></p> $\frac{2}{3}$	<p>Medium Sides:</p> $\frac{S \Delta \text{ Medium}}{L \Delta \text{ Medium}} = \frac{10}{15}$ <p><i>Reduce, if you can...</i></p> $\frac{2}{3}$	<p>Large Sides:</p> $\frac{S \Delta \text{ Large}}{L \Delta \text{ Large}} = \frac{12}{18}$ <p><i>Reduce, if you can...</i></p> $\frac{2}{3}$												
<table border="1"> <tr> <td>SΔ Small</td> <td>6</td> <td>LΔ Small</td> <td>9</td> </tr> <tr> <td>SΔ Medium</td> <td>10</td> <td>LΔ Medium</td> <td>15</td> </tr> <tr> <td>SΔ Large</td> <td>12</td> <td>LΔ Large</td> <td>18</td> </tr> </table> <p><i>If the fractions are equal when you reduce them, then the sides you used are similar.</i></p>	SΔ Small	6	LΔ Small	9	SΔ Medium	10	LΔ Medium	15	SΔ Large	12	LΔ Large	18	<p><i>All three reduced fractions are the same! All three sides are similar!</i></p> <p>This means that you also found the SCALE (fractional relationship between the triangles), because the fractions are equal!</p> <p>SCALE: $\frac{2}{3}$</p>		
SΔ Small	6	LΔ Small	9												
SΔ Medium	10	LΔ Medium	15												
SΔ Large	12	LΔ Large	18												
<p><i>Now, label the matching sides!</i></p> <p><i>(I label them as ~S, so I don't confuse them with congruent sides)</i></p>	<p>(SSS)</p>														

If even **one** of the three fractions, when reduced, **does not match**, then **none of the sides are similar!**

Determine if the given sides are similar. Label Congruent angles (A) and Similar sides (~S).
 Then (if possible), identify the name of the triangle relationship: **SSS, SAS, AA, SSA, ASA, or AAS.**

EXAMPLE

SΔ Small	3	LΔ Small	6
SΔ Medium		LΔ Medium	
SΔ Large	5	LΔ Large	10

Small Sides: $\frac{S \Delta \text{ Small}}{L \Delta \text{ Small}} = \frac{3}{6} = \frac{1}{2}$
Large Sides: $\frac{S \Delta \text{ Large}}{L \Delta \text{ Large}} = \frac{5}{10} = \frac{1}{2}$

The fractions the same! Scale = $\frac{1}{2}$
 Sides: Similar!

SAS

1.

SΔ Small		LΔ Small	
SΔ Medium		LΔ Medium	
SΔ Large		LΔ Large	

2.

EXAMPLE

SΔ Small	2	LΔ Small	6
SΔ Medium	4	LΔ Medium	8
SΔ Large	5	LΔ Large	10

Small Sides: $\frac{S \Delta \text{ Small}}{L \Delta \text{ Small}} = \frac{2}{6} = \frac{1}{3}$
Medium Sides: $\frac{S \Delta \text{ Medium}}{L \Delta \text{ Medium}} = \frac{4}{8} = \frac{1}{2}$
Large Sides: $\frac{S \Delta \text{ Large}}{L \Delta \text{ Large}} = \frac{5}{10} = \frac{1}{2}$

The small sides fraction doesn't match!
None are similar!

3.

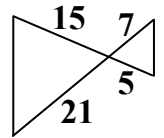
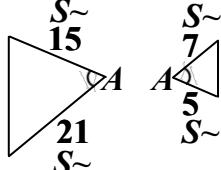
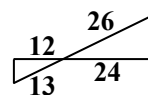
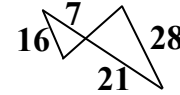
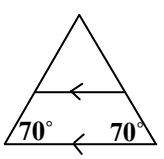
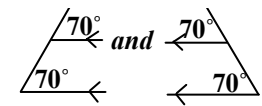
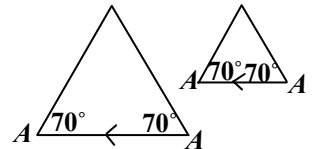
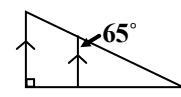
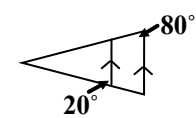
4.

5.

6.

7. Tip: If the sides are the same, any side can be called the "small" side.

The same rules apply for connected triangles. It sometimes helps if you re-draw the triangles separately.

<p>EXAMPLE</p>  <p>Vertical Angles are congruent</p> <table border="1" data-bbox="349 294 568 483"> <tr> <td>Small Sides:</td> <td>Large Sides:</td> </tr> <tr> <td>$\frac{5}{15}$</td> <td>$\frac{7}{21}$</td> </tr> <tr> <td>$\frac{1}{3}$</td> <td>$\frac{1}{3}$</td> </tr> </table> <p>Equal fractions → similar sides! Scale: $\frac{1}{3}$</p>  <p>SAS</p>	Small Sides:	Large Sides:	$\frac{5}{15}$	$\frac{7}{21}$	$\frac{1}{3}$	$\frac{1}{3}$	<p>8.</p> 	<p>9.</p> 
Small Sides:	Large Sides:							
$\frac{5}{15}$	$\frac{7}{21}$							
$\frac{1}{3}$	$\frac{1}{3}$							
<p>EXAMPLE</p>  <p>There are no marked sides, so I've got no fractions to worry about. I just need to know if the angles are \cong.</p> <p>Parallel lines:</p>   <p>AA</p>	<p>10.</p> 	<p>11.</p> 						

Now that you've successfully labeled Similar Sides (S~) and Congruent Angles (A), you'll need the list of relationships that work to show that triangles are similar: **SSS, SAS, & AA** are the properties that **show similarity**.

Take a look at the problems from above. Which of them had SIMILAR TRIANGLES (SSS, SAS, or AA relationships)?

<p>EXAMPLE: Relationship: SAS Similar (Circle one)? YES or NO</p>	<p>1. Relationship: _____ Similar (Circle one)? YES or NO</p>	<p>2. Relationship: _____ Similar (Circle one)? YES or NO</p>
<p>EXAMPLE: Relationship: None Similar (Circle one)? YES or NO</p>	<p>3. Relationship: _____ Similar (Circle one)? YES or NO</p>	<p>4. Relationship: _____ Similar (Circle one)? YES or NO</p>
<p>6. Relationship: _____ Similar (Circle one)? YES or NO</p>	<p>7. Relationship: _____ Similar (Circle one)? YES or NO</p>	<p>8. Relationship: _____ Similar (Circle one)? YES or NO</p>
<p>EXAMPLE: Relationship: SAS Similar (Circle one)? YES or NO</p>	<p>8. Relationship: _____ Similar (Circle one)? YES or NO</p>	<p>9. Relationship: _____ Similar (Circle one)? YES or NO</p>
<p>EXAMPLE: Relationship: AA Similar (Circle one)? YES or NO</p>	<p>10. Relationship: _____ Similar (Circle one)? YES or NO</p>	<p>11. Relationship: _____ Similar (Circle one)? YES or NO</p>