Blowing up the Picture

Introduction:
The lesson will teach students the idea of similar triangles. The students for the most part will create their own conclusions through many experiments done in class. Also called, inquiry based learning. Students will find characteristics of similar objects, and that the sides have to be in proportion for the object (specifically the triangle) to be similar. This is intended to be done in an Integrated Algebra Class.

Standards:

NYS Standards

G.G.45 Investigate, justify, and apply theorems about similar triangles

G.CN.1 Understand and make connections among multiple representations of the same mathematical idea

G.CN.3 Model situations mathematically, using representations to draw conclusions and formulate new situations

Objectives:

- Conclude that similar triangles have the same angles but not the same lengths.
- Conclude that for two triangles to be similar that the proportions of the side need to be the same.
- Know how to correctly write the order of each side when saying two triangles are similar

Instructional Protocol:

- This lesson is intended to be used in one 40-minute class. If time is left they may start on their homework.
- Have the students start with drawing a 30-60-90 triangle
- Allow students to come up with their own conclusion before you state the point. This allows students to better understand the concepts you are trying to relay to them.
- Reinforce the idea that the angles NEED to be the same for two triangles to be similar through out the lesson
- Materials Needed: Protractor and rulers
**Similar triangles**

Start with an everyday example:

Go to the store to get a traditional 3x5 picture enlarged to a 8x5.

Questions to ask:

- What happened to the larger picture?  
  Everything became larger  

- Is anything distorted?  
  No, everything is still in proportion.

Explain this is what similar shapes are. That the angles do not change but the size of the object does. Can also mention that idea of proportion, or you can wait till later. Reinforce the idea that the angles NEED to be the same for two triangles to be similar through out the lesson.

Have the entire class draw a 30-60-90 triangle. Any size triangle is ok.

Then have each student measure the triangle to the nearest millimeter.

Show one of the triangles on the ELMO. Trace that certain triangle on the whiteboard. Then increase/decrease the size of the triangle through the ELMO and draw that on the whiteboard.

This will allow the students to see that the angles do not change but the actual size of the object does. You could measure using a large blackboard protractor to convince the students if they have any doubts.

After you think the students have understood the concept that the size can change but the angles are still the same, have 3 students draw their triangles on the board along with their measurements of each side.

Write the corresponding sides of the three triangles.

Next, explain the idea of similarity between the three triangles and show them how to write 2 triangles are similar. Example: \( \triangle ABC \sim \triangle DEF \)

Show that the sides have to correspond when talking about similar triangles.

After students understand how to write correctly similar triangles, start the idea of proportionality.

With the measurements written on the board have them set up some proportions with the triangles.
The idea here is to have the proportions be the same. If the proportions are the same then the triangles are similar.

Theorem: Triangles are similar if their corresponding (matching) angles are equal and the ratio of their corresponding sides are in proportion.

Draw a non 30-60-90 triangle. And let the students discover the proportions are not the same.

Next class they will find unknown sides of similar triangles.

Then they will have practice problems.
Listen to the story:

Questions:
   1. What happened to the larger picture?
   2. Is anything distorted?

Characteristics of similar shapes:
   
   
   
   

Draw a 30-60-90 triangle. Any size triangle is ok. Measure each side to the nearest millimeter.

What did you notice about the triangles put on the ELMO?
   
   

Sketch the three triangles that are on the board and their measurements.

List the corresponding sides of the triangles above
What is the symbol used to show objects are similar? _____________
Write using symbols that the three triangles are similar. Example: \( \triangle SRF \sim \triangle MND \)

Let’s look at proportions.

You will notice that I have drawn another triangle that is not a 30-60-90 triangle with the side measures.

I want you to take the corresponding sides of the 30-60-90 triangles first and try to find a proportion. (look at example below) What do you notice? Then I want you to find the proportions of the 30-60-90 triangle with the triangle I just drew on the board. What do you notice?____________________________________________________________

Example:

Show your work here:

\[
\frac{AB}{BC} = \frac{BC}{EF} \quad \rightarrow \quad \frac{10}{20} = \frac{6}{12}
\]
Try to create your own theorem from you just discovered

Similar Triangle Theorem
Theorem:

Practice Problems

1. Can two triangles be similar if their corresponding angles are different?

2. What is the similar triangle theorem?

3. If I change two sides of a triangle is the changed triangle similar to the original triangle?

4. Are these two triangles similar? WHY?
5. Are these two triangles similar? WHY?

6. Are these two triangles similar? WHY?