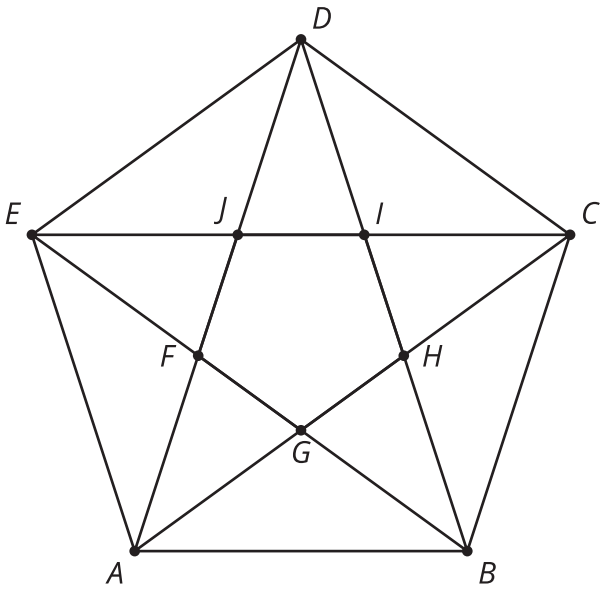
Unit 2, Lesson 13

# Similar Triangles

Let's look at similar triangles.

## 13.1 A Star and a Pentagon



# 13.2 Making Pasta Angles and Triangles

Your teacher will give you dried pasta, a set of 3 angles labeled $A$, $B$, and $C$, blank paper, and tape.

1. Create a triangle using 3 pieces of pasta and angle $A$. Your triangle *must* include the angle you were given, but you are otherwise free to make any triangle you like. Tape your pasta triangle to a sheet of paper so it won't move.
   a. After you have created your triangle, measure each side length with a ruler and record the length on the paper next to the side. Then measure the angles to the nearest $5^\circ$ using a protractor and record these measurements on your paper.
   b. Find 2 others in the room who have the same angle $A$ and compare your triangles. What is the same? What is different?

   c. Are the triangles congruent? Are the triangles similar? Explain your reasoning.

2. Now use more pasta and all 3 angles $A$, $B$, and $C$ to create 1 new triangle. Tape this pasta triangle on a separate blank sheet of paper.
   a. After you have created your triangle, measure each side length with a ruler and record the length on the paper next to the side. Then measure the angles to the nearest $5^\circ$ using a protractor and record these measurements on your paper.
   b. Find 2 others in the room who used your same 3 angles and compare your triangles. What is the same? What is different?

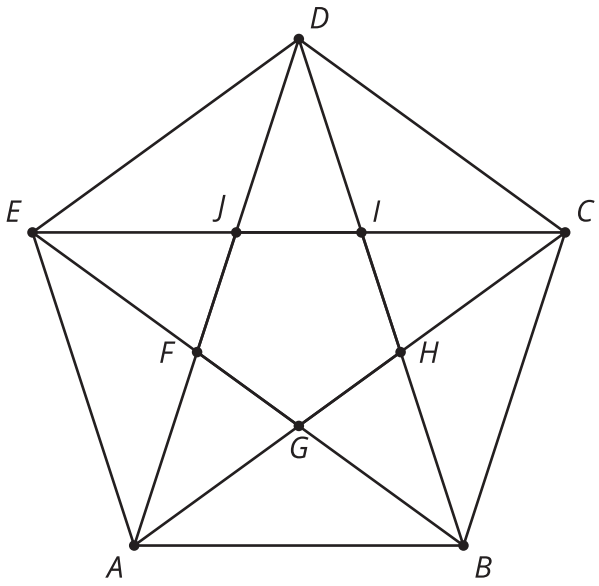
   c. Are the triangles congruent? Are the triangles similar? Explain your reasoning.

### Are you ready for more?

Quadrilaterals $ABCD$ and $EFGH$ have 4 angles with measures of $240^\circ$, $40^\circ$, $40^\circ$, and $40^\circ$. Do $ABCD$ and $EFGH$ have to be similar?

## 13.3 Similar Figures in a Regular Pentagon

1. This diagram has several triangles that are similar to triangle $DJI$.




   a. Three different scale factors were used to make triangles similar to $DJI$. In the diagram, find at least 1 triangle of each size that is similar to $DJI$.

   b. Explain how you know each of these 3 triangles is similar to $DJI$.

2. Find a triangle in the diagram that is not similar to $DJI$.

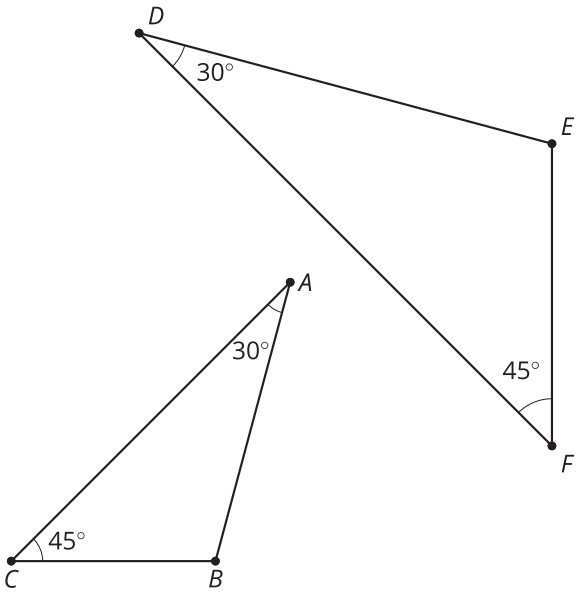
### Are you ready for more?

How can you draw more lines to create additional triangles similar to triangle $DJI$?

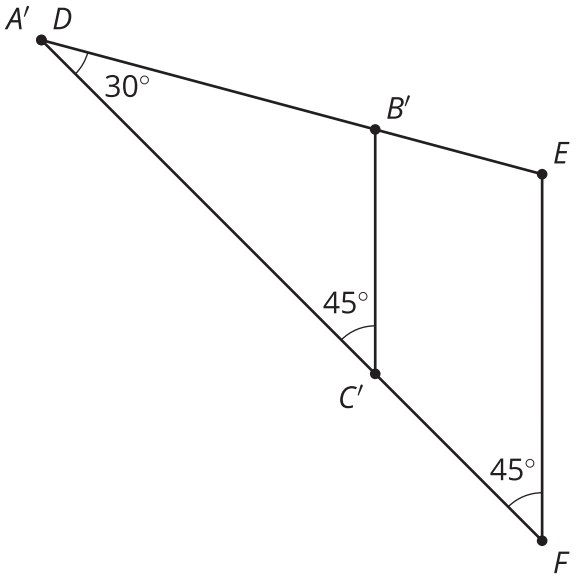
## Lesson 13 Summary

Two polygons are similar when there is a sequence of translations, rotations, reflections, and dilations taking one polygon to the other. When the polygons are triangles, we only need to check that both triangles have two corresponding angles to show they are similar.

For example, triangle $ABC$ and triangle $DEF$ both have a 30-degree angle and a 45-degree angle.




We can translate $A$ to $D$ and then rotate around point $D$ so that the two 30-degree angles are aligned, giving this picture:




Then a dilation with center $D$ and appropriate scale factor will move $C'$ to $F$. This dilation also moves $B'$ to $E$, showing that triangles $ABC$ and $DEF$ are similar.