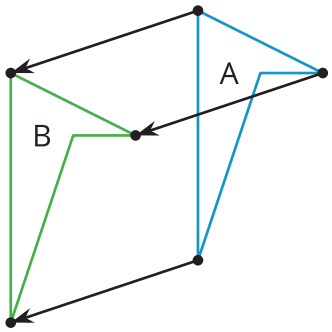
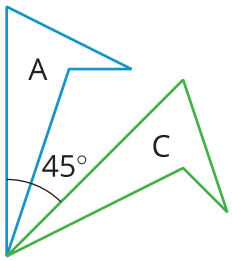
Unit 1 Family Support Materials

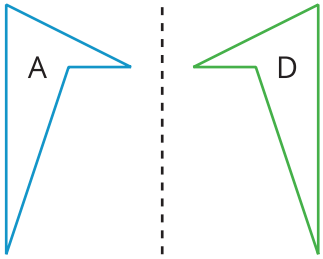
Rigid Transformations and Congruence

Section A: Rigid Transformations

This week your student will learn to describe the movement of two-dimensional shapes with precision. Here are examples of a few of the types of movements they will investigate. In each picture, Shape A is the original, and Shapes B, C, and D show three different types of movement:





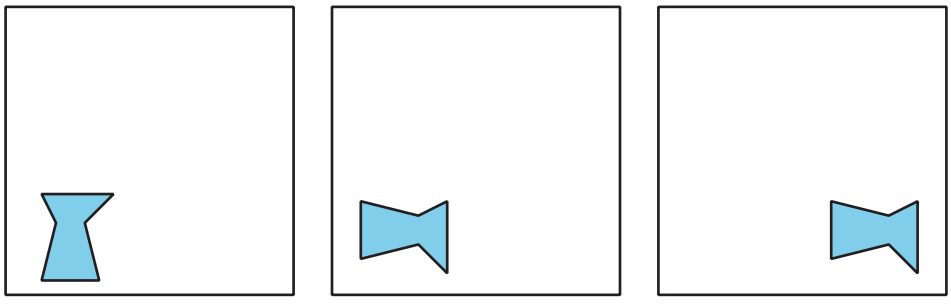


Students will also experiment with shapes and drawings to build their intuition by:

- Cutting shapes out.
- Tracing shapes on tracing paper to compare with other shapes.
- Drawing shapes on grid paper.
- Measuring lengths and angles.
- Folding paper.

Here is a task to try with your student:

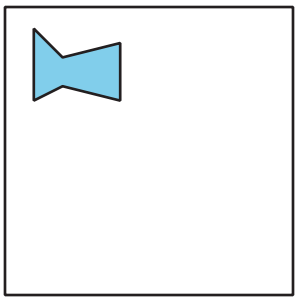
1. Describe how the shape changes from one panel to the next.



2. Draw a fourth panel that shows what the **image** would look like if the shape in the third panel is rotated 180 degrees **counterclockwise** around the middle of the panel.

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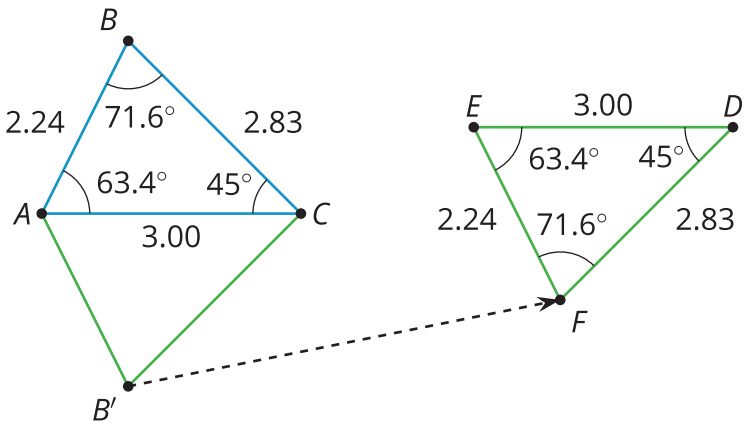
Solution:

1. Turn it 90 degrees **clockwise**, and then move the shape to the right side.
2. 

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Section B: Properties of Rigid Transformations

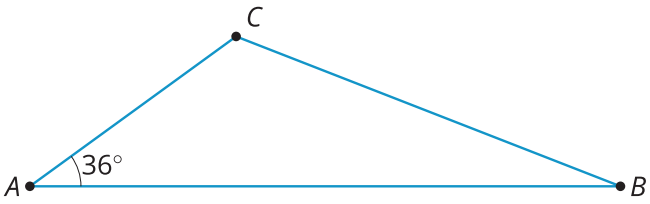
This week your student will investigate **rigid transformations**, which is the name for moves (and sequences of moves) that preserve length and angle measures like translations, rotations, and reflections. For example, in this picture, the triangle ABC was reflected across the line AC and then translated to the right and up slightly.



When we construct figures using rigid transformations, we know that the measures of the segments and angles of the image will be equal to the measures of the segments and angles of the original.

Here is a task to try with your student:

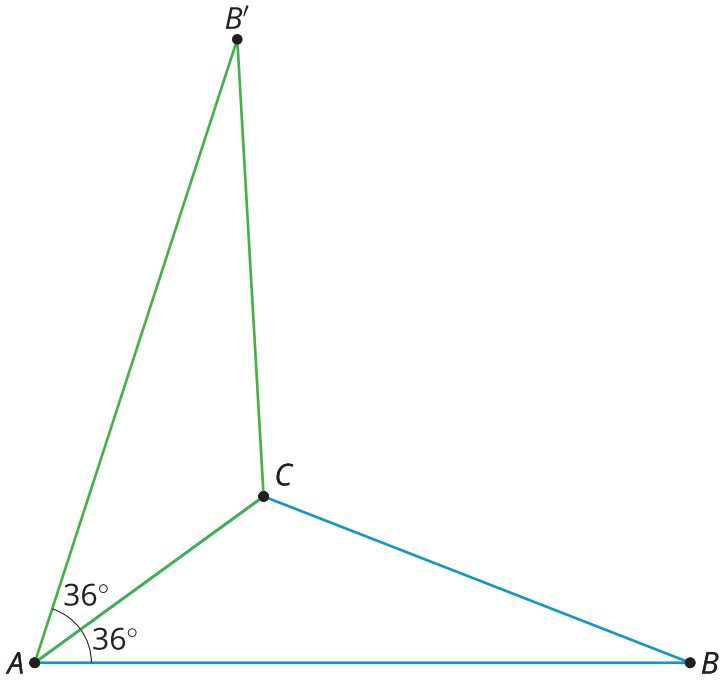
1. Reflect triangle ABC across side AC to form a new triangle $AB'C$.
2. What is the measure of angle $B'AC$?
3. Name two side lengths that have the same measure.



Solution:

1.

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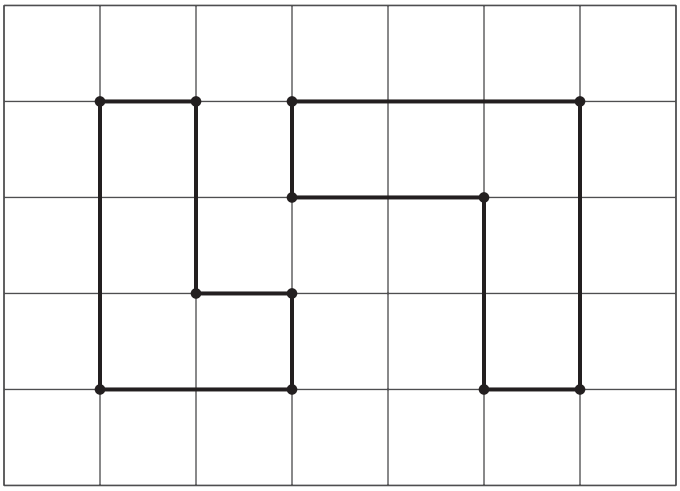


2. 36 degrees. Angle $B'AC$ corresponds to angle BAC.
3. Sides AB' and AB have the same length as do sides $B'C$ and BC.

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Section C: Congruence

This week your student will learn what it means for two figures to be **congruent**. Let's define congruence by first looking at two figures that are not congruent, like the two shown here. What do these figures have in common? What is different about them?

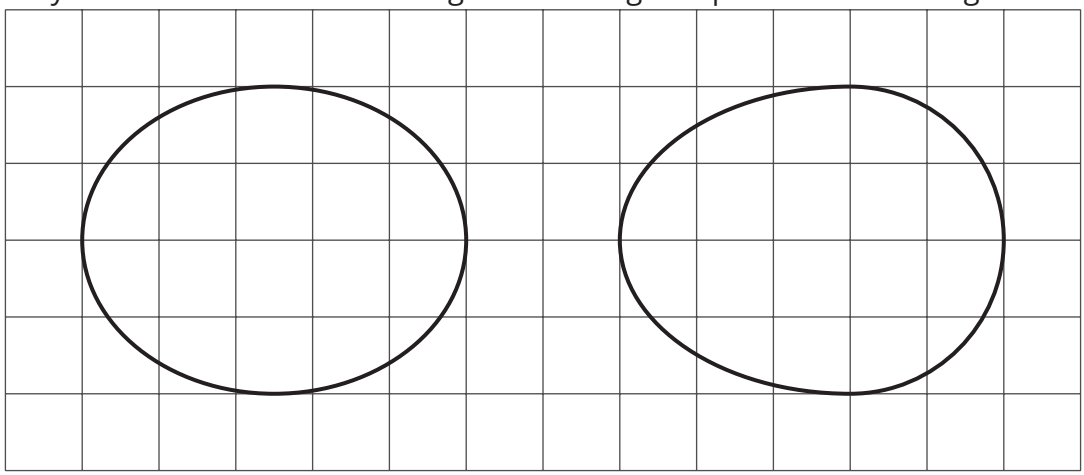


If two figures are congruent, that means there is a sequence of rigid transformations we could describe that would make one of the figures look like the other. Here, that isn't possible. While each has 6 sides and 6 vertices and we can make a list of corresponding angles at the vertices, these figures are not considered congruent because their side lengths do not correspond. The figure on the left has side lengths 3, 2, 1, 1, 2, 1. The figure on the right has side lengths 3, 3, 1, 2, 2, 1.

For the last part of this unit, students will use the congruence to investigate some interesting facts about parallel lines and about the angles in a triangle.

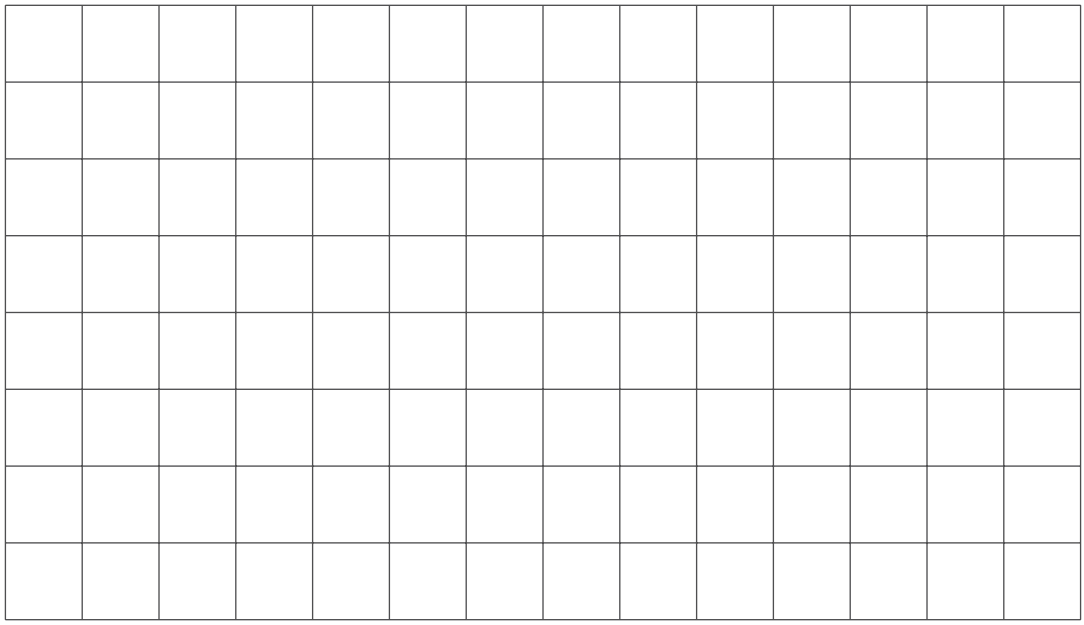
Here is a task to try with your student:

1. Explain why these two ovals are not congruent. Each grid square is 1 unit along a side.



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2. Draw two new ovals congruent to the ones in the image.



Solution:

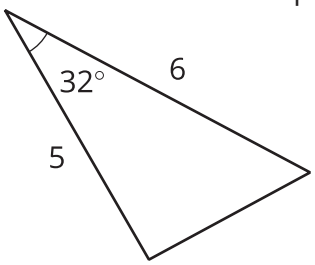
1. While each oval has a horizontal measurement of 5 units and a vertical measurement of 4 units, the oval on the left's "tallest" measurement is halfway between the left and right sides, while the oval on the right's "tallest" measurement is closer to the right side than the left side.
2. There are many possible ways to draw new ovals congruent to the original two. If a tracing of the original oval lines up exactly when placed on top of the new image (possibly after some rotation or flipping of the paper the tracing is on), then the two figures are congruent.

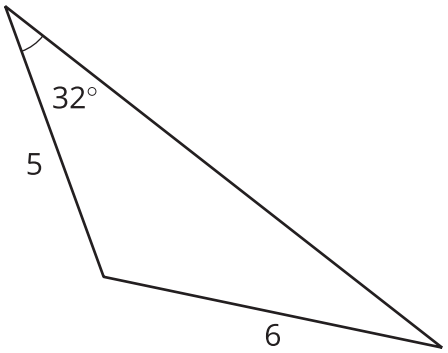
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Section E: Drawing Polygons with Given Conditions

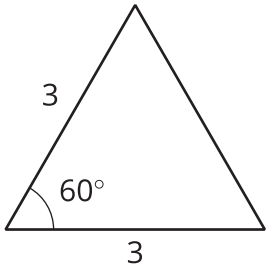
This week your student will be drawing shapes based on a description. What options do we have if we need to draw a triangle, but we only know some of its side lengths and angle measures?

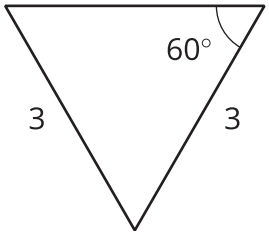
- Sometimes we can draw more than one kind of triangle with the given information. For example, "sides measuring 5 units and 6 units, and an angle measuring $32°$" could describe two triangles that are not identical copies of each other.





- Sometimes there is only one unique triangle based on the description. For example, here are two identical copies of a triangle with two sides of length 3 units and an angle measuring $60°$. There is no way to draw a *different* triangle (a triangle that is not an identical copy) with this description.





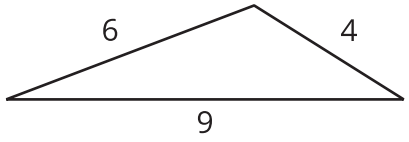
- Sometimes it is not possible to draw a triangle with the given information. For example, there is no triangle with sides measuring 4 inches, 5 inches, and 12 inches. (Try to draw it and see for yourself!)

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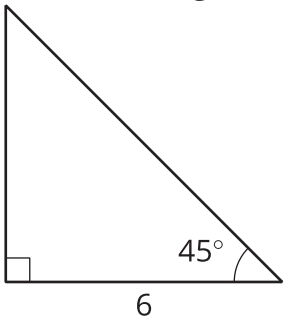
Here is a task to try with your student:

Using each set of conditions, can you draw a triangle that is *not an identical copy* of the one shown?

1. a triangle with sides that measure 4, 6, and 9 units

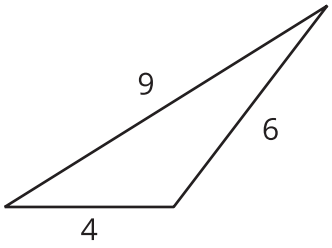


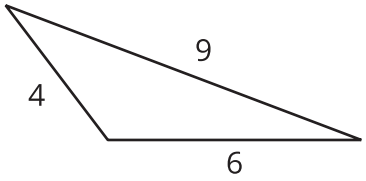
2. a triangle with a side that measures 6 units and angles that measure 45° and 90°



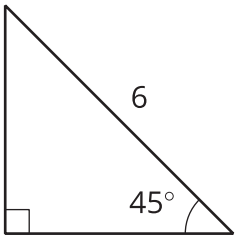
Solution:

1. There is no way to draw a *different* triangle with these side lengths. Every possibility is an identical copy of the given triangle. (We could cut out one of the triangles and match it up exactly to the other.) Here are some examples:





2. You can draw a different triangle by putting the side that is 6 units opposite from the 90° angle instead of next to it. This is not an identical copy of the given triangle, because it is smaller.



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