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Unit 8.1, Family Resource

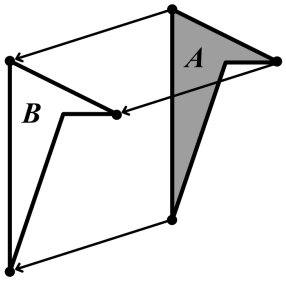
Unit 1 Summary

Prior Learning	Grade 8, Unit 1	Later in Grade 8	High School
Grades 3–6 • Measuring angles • Parallel lines • Graphing points Grade 7 • Sketching geometric shapes • Angle relationships	• Rigid transformations (translations, rotations, reflections) • Congruent figures • Angle relationships on parallel lines	Unit 2 • Non-rigid transformations (dilations) • Similarity Unit 3 • Linear relationships	• Transformations as functions • Prove shortcuts for triangle congruence

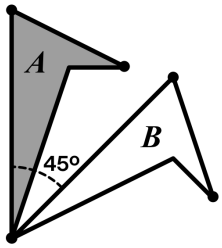
Transformations

There are three types of rigid transformations: translations, rotations, and reflections.

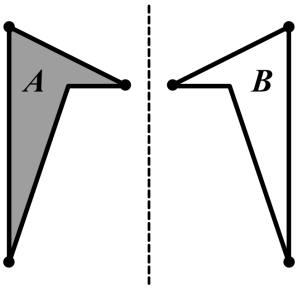
Translation



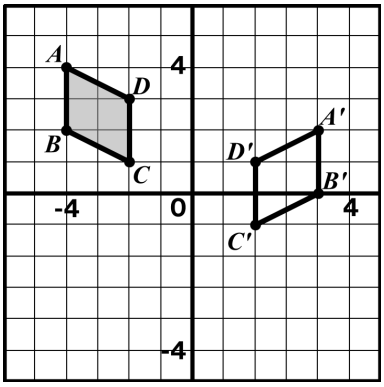
Rotation



Reflection



To take the pre-image $ABCD$ to the image $A'B'C'D'$, **reflect** the polygon over the y-axis and then **translate** 2 units down, or translate first and then reflect.



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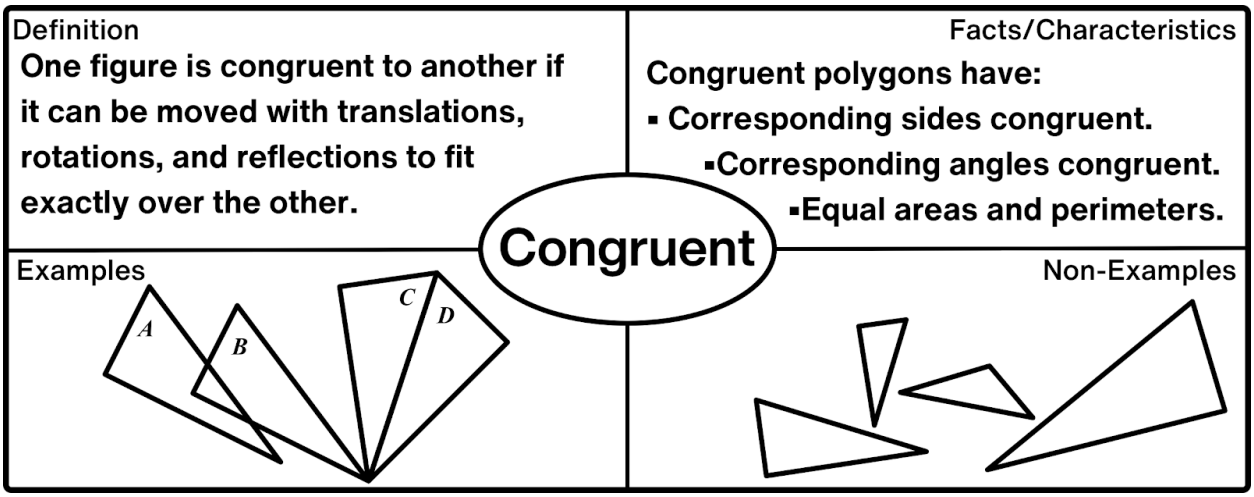
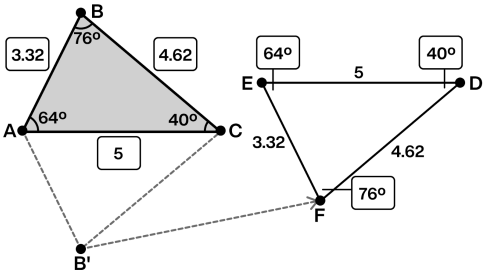
Defining Congruence



Triangle EFD is congruent to triangle ABC because you can reflect ABC across a horizontal line and then translate to fit it on top of EFD.



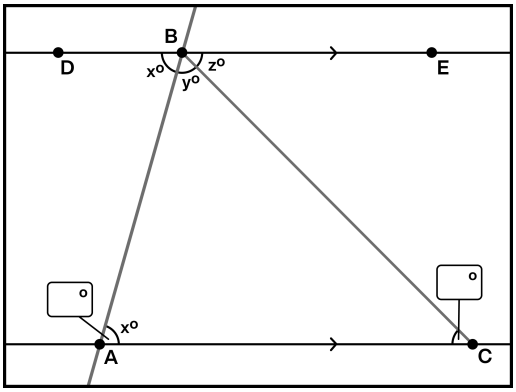
Applying Congruence

We can use what we know about congruence and transformations to understand other relationships, particularly relationships between angles in triangles and on parallel lines.

Lines that cross parallel lines are called *transversals*.

We can translate and rotate the line DE to see that both the angles marked x are congruent.

We can use this strategy to see that the sum of all of the angles in a triangle is equal to a half-circle or $180º$.



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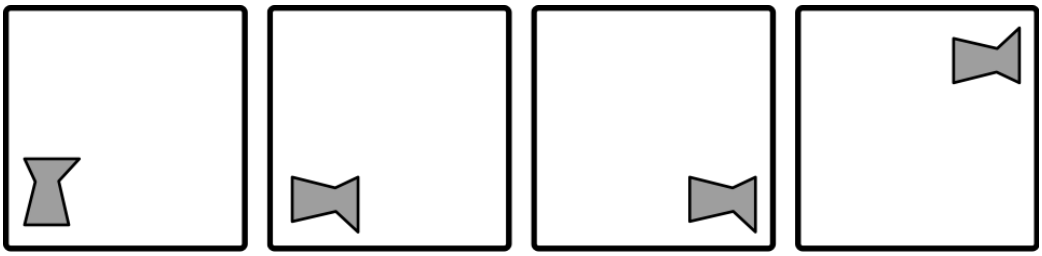
Try This at Home

Transformations



1.1 Use the language of transformations (translation, rotation, reflection) to describe how the figure changes from one panel to the next.

1.2 Draw a fifth panel that shows the last figure rotated $180°$ counterclockwise around the middle of the panel.

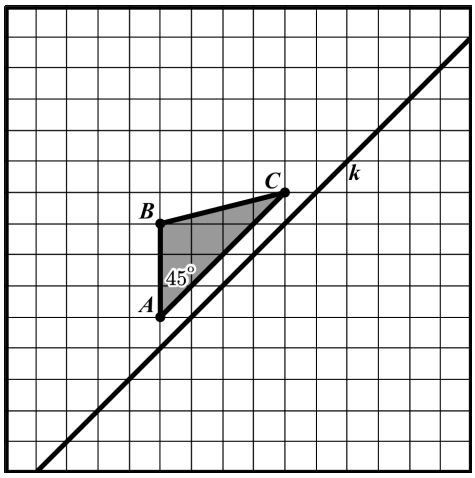
Defining Congruence

2.1 Reflect triangle ABC across line k to form a new triangle, DEF.

2.2 Is triangle DEF congruent to triangle ABC? Explain your thinking.

2.3 What is the measure of angle D?

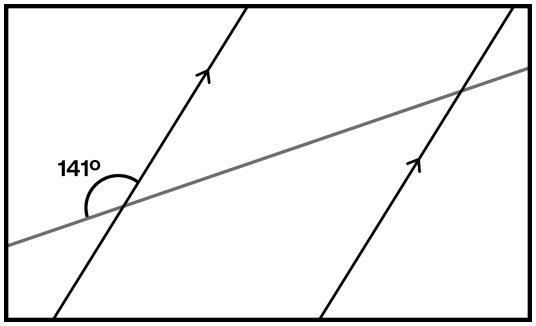
2.4 Name at least one pair of sides that have the same length.



Applying Congruence

Here is a pair of parallel lines and a transversal.

3. Use what you know about angle relationships to determine the measurements of all of the other angles in the diagram.



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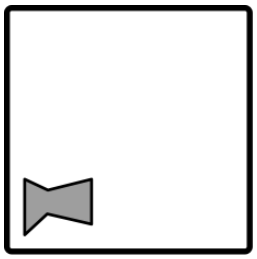
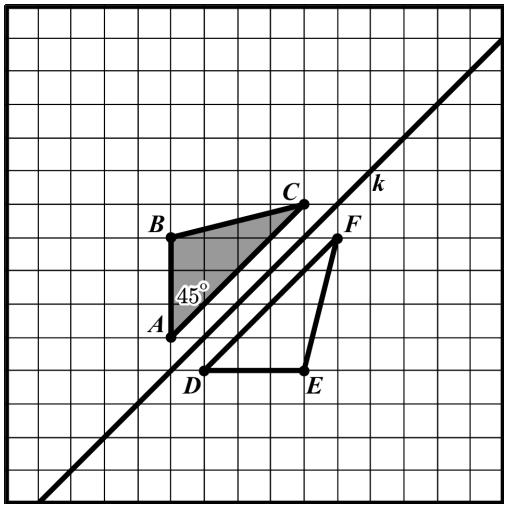
Solutions:

1.1 **Panel 1 → 2:** Rotate $90°$ degrees clockwise around the center of the shape.
Panel 2 → 3: Translate to the right.
Panel 3 → 4: Reflect across a horizontal line in the middle of the panel.

1.2



2.1 See image on the right.



2.2 Yes.

Explanations vary. I created triangle DEF using a rigid transformation (a reflection), so it must be congruent.

2.3 45 degrees

2.4 Pairs of sides that are the same length:

- AB and DE
- BC and EF
- AC and DF

3. Use what you know about angle relationships to determine the measurements of all of the other angles in the diagram.