

KEY CONCEPT OVERVIEW

In Topic C, students discover and apply a precise definition for **congruence**. They examine the angles formed when a **transversal** crosses **parallel lines**; they also examine the angles inside and outside of a triangle. To pull all of these relationships together, students begin examining diagrams in which two or more transversals cross parallel lines, creating triangles.

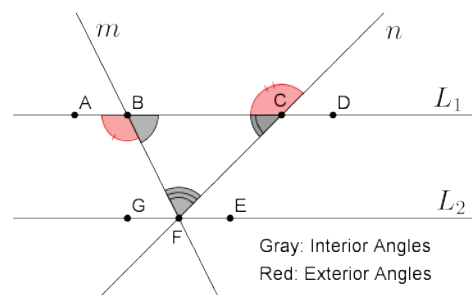
You can expect to see homework that asks your child to do the following:

- Use sequences of transformations to determine whether two figures are congruent.
- Use precise language to describe the congruence by describing the sequence of transformations that was performed.
- Determine the relationships between angles and missing angle measurements in a diagram in which parallel lines are cut by a transversal. Describe these relationships using precise language with transformations.
- Determine the measures of missing angles in diagrams with triangles.
- Determine whether two lines are parallel given the measure of the angles in the diagram.

SAMPLE PROBLEM *(From Lesson 13)*

The figure below shows parallel lines L_1 and L_2 . Let m and n be transversals that intersect L_1 at points B and C , respectively, and L_2 at point F , as shown. Let A be a point on L_1 to the left of B , D be a point on L_1 to the right of C , G be a point on L_2 to the left of F , and E be a point on L_2 to the right of F .

- Name a triangle in the figure. $\triangle BCF$
- Name a straight angle that will be useful in proving that the sum of the measures of the interior angles of the triangle is 180° . $\angle GFE$
- Our goal is to show that the sum of the measures of the interior angles of the triangle is equal to the measure of the straight angle. Show that the measures of the interior angles of a triangle have a sum of 180° . Write your proof below.



The straight angle $\angle GFE$ comprises $\angle GFB$, $\angle BFC$, and $\angle EFC$.

Alternate interior angles of parallel lines are equal in measure.

For that reason, $m\angle BCF = m\angle EFC$ and $m\angle CBF = m\angle GFB$.

Since $\angle GFE$ is a straight angle, its measure is equal to 180° .

Then, $m\angle GFE = m\angle GFB + m\angle BFC + m\angle EFC = 180^\circ$.

By substitution, $m\angle GFE = m\angle CBF + m\angle BFC + m\angle BCF = 180^\circ$.

Therefore, the sum of the measures of the interior angles of a triangle is 180° (angle sum of triangles).

Additional sample problems with detailed answer steps are found in the *Eureka Math Homework Helpers* books. Learn more at GreatMinds.org.

HOW YOU CAN HELP AT HOME

You can help at home in many ways. Here are some tips to help you get started.

- Review the topic vocabulary with your child. An Internet search for *vocabulary review games* will generate many fun options. Using index cards or small pieces of paper to make flashcards could also be helpful.
- Some students may become distracted or confused when there are multiple angles in a diagram. Here are two ways you can help.
 - Use sticky notes to cover the parts of the diagram that your child is not currently using so he can focus on the angles in front of him.
 - Use colored pencils to outline the angles named in the diagram. After connecting the vertices (dots) referenced in the name of the angle, you may want to shade the inside of the angle so your child can see the entire angle.
- Help your child draw upon knowledge and skills from prior topics in this module. Encourage her to use the transparency from Topic A to outline the angle she is working with in the current diagram. Guide her to use the basic rigid motions (translate, rotate, reflect) to map the angle onto another angle in the diagram. Then, work with your child to determine the appropriate word (congruent, **corresponding**, **alternate interior**, etc.) to describe the relationship between the two angles.

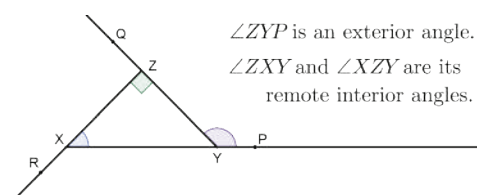
TERMS

Congruent/Congruence: Objects are congruent if one object can be mapped onto (fit exactly on top of) the other after a sequence of transformations has been performed. $\triangle ABC \cong \triangle A'B'C'$ is read as, “Triangle ABC is congruent to Triangle A prime B prime C prime.”

Exterior angle: An angle formed when one side of a triangle is extended.

Remote interior angles: The two angles inside the triangle that do not touch the exterior angle.

Triangle angle sum: The measures of three angles of any triangle add up to 180 degrees.



Parallel lines: Two lines that will never touch. If line W is parallel to line Y , we can write $W \parallel Y$.

Corresponding angles: Two angles that are on the same side of the transversal in corresponding positions (e.g., angles 2 and 4 in the picture).

Alternate interior angles: Two angles on different sides of the transversal and between the parallel lines (e.g., angles 2 and 6 in the picture).

Alternate exterior angles: Two angles on different sides of the transversal and outside the parallel lines (e.g., angles 4 and 8 in the picture).

Supplementary angles: Two angles whose measures add up to 180 degrees (e.g., angles 1 and 8 in the picture).

Transversal: Any line that intersects two or more (usually parallel) lines. In the picture, line m is the transversal.

