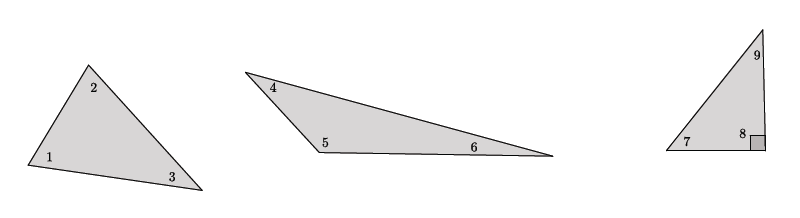
Lesson 13: Angle Sum of a Triangle

Classwork

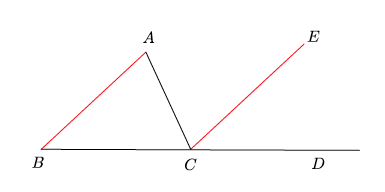
Concept Development



Note that the sum of angles and must equal because of the known right angle in the right triangle.

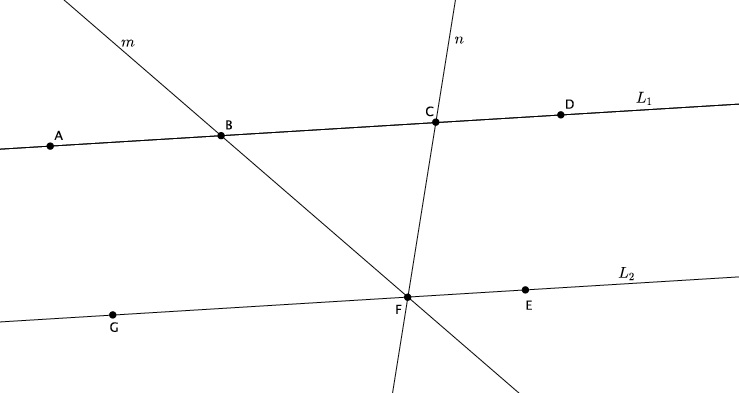
Exploratory Challenge 1

Let triangle be given. On the ray from to , take a point so that is between and . Through point , draw a line parallel to , as shown. Extend the parallel lines and *.* Line is the transversal that intersects the parallel lines.



* 1. Name the three interior angles of triangle .
  2. Name the straight angle.
  3. What kinds of angles are and ? What does that mean about their measures?
  4. What kinds of angles are and ? What does that mean about their measures?
  5. We know that . Use substitution to show that the three interior angles of the triangle have a sum of .

Exploratory Challenge 2

The figure below shows parallel lines and . Let and be transversals that intersect at points and , respectively, and at point , as shown. Let be a point on to the left of , be a point on to the right of , be a point on to the left of and be a point on to the right of .

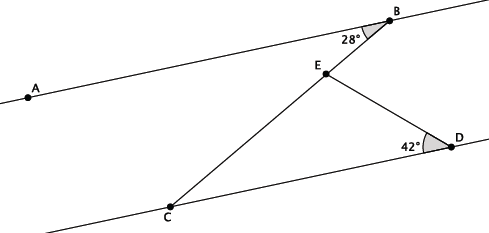
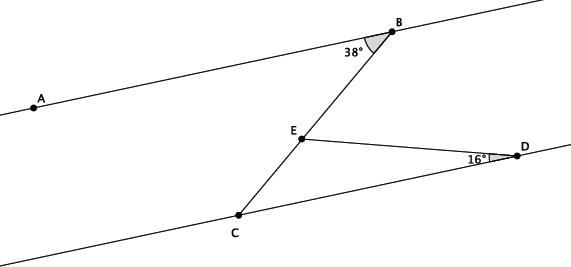
* 1. Name the triangle in the figure.
  2. Name a straight angle that will be useful in proving that the sum of the interior angles of the triangle is .
  3. Write your proof below.

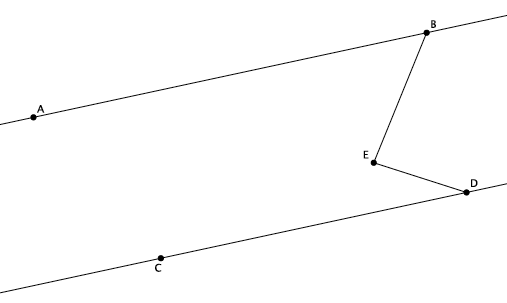
Lesson Summary

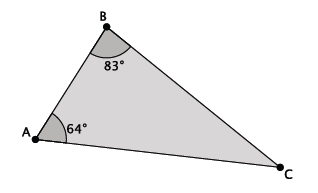
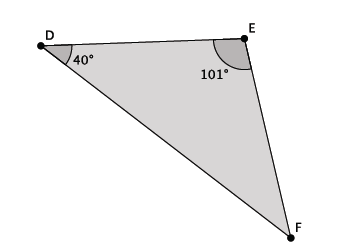
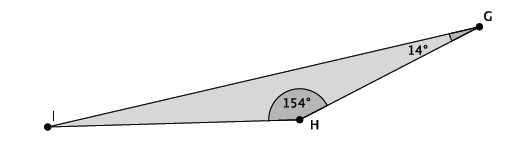
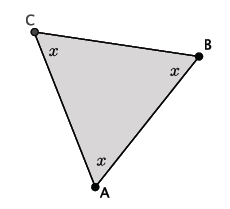
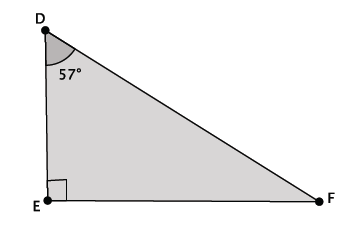
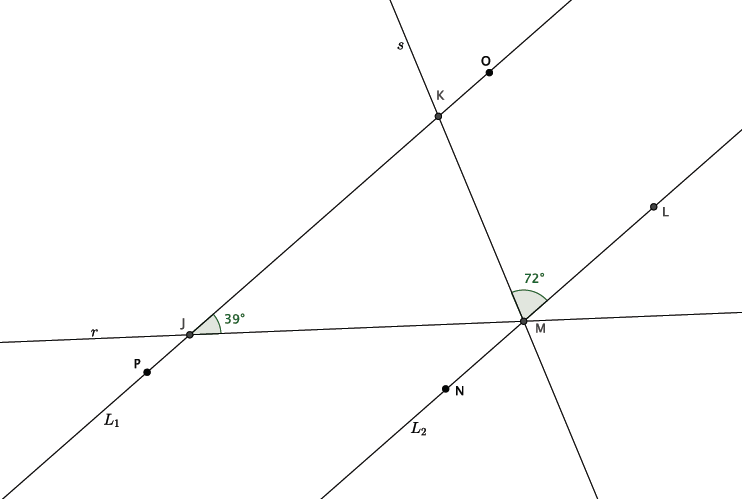
All triangles have a sum of interior angles equal to .

The proof that a triangle has a sum of interior angles equal to is dependent upon the knowledge of straight angles and angle relationships of parallel lines cut by a transversal.

Problem Set

1. In the diagram below, line is parallel to line , i.e., . The measure of angle , and the measure of angle . Find the measure of angle . Explain why you are correct by presenting an informal argument that uses the angle sum of a triangle.
2. In the diagram below, line is parallel to line , i.e., . The measure of angle and the measure of angle . Find the measure of angle . Explain why you are correct by presenting an informal argument that uses the angle sum of a triangle. (Hint: Find the measure of angle first, and then use that measure to find the measure of angle .)
3. In the diagram below, line is parallel to line , i.e., . The measure of angle , and the measure of angle . Find the measure of angle . Explain why you are correct by presenting an informal argument that uses the angle sum of a triangle. (Hint: Extend the segment so that it intersects line *.*)



1. What is the measure of ?
2. What is the measure of ?
3. What is the measure of ?
4. What is the measure of ?
5. Triangle is a right triangle. What is the measure of ?
6. In the diagram below, lines and are parallel. Transversals and intersect both lines at the points shown below. Determine the measure of . Explain how you know you are correct.