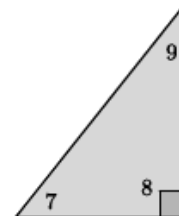
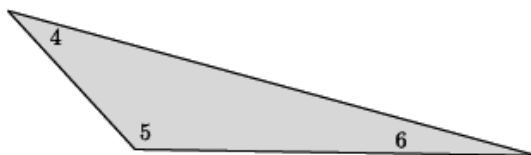
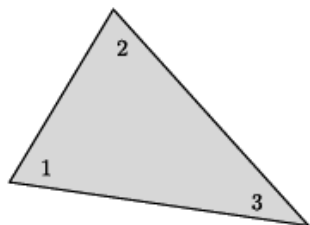


Lesson 13: Angle Sum of a Triangle

Classwork

Concept Development

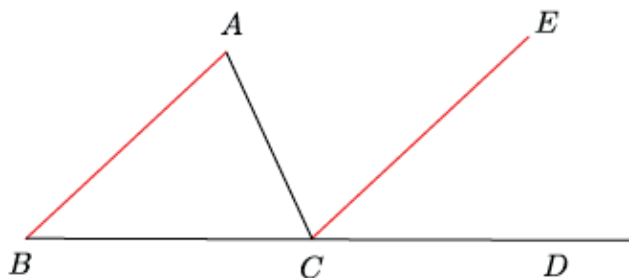


$$m\angle 1 + m\angle 2 + m\angle 3 = m\angle 4 + m\angle 5 + m\angle 6 = m\angle 7 + m\angle 8 + m\angle 9 = 180^\circ$$

Note that the sum of the measures of angles 7 and 9 must equal 90° because of the known right angle in the right triangle.

Exploratory Challenge 1

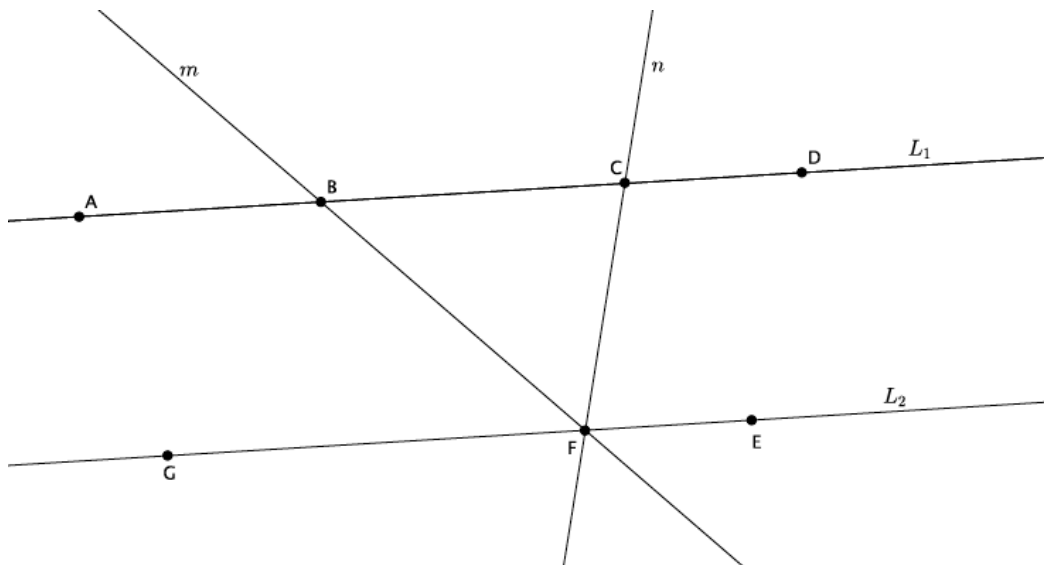
Let triangle ABC be given. On the ray from B to C , take a point D so that C is between B and D . Through point C , draw a segment parallel to \overline{AB} , as shown. Extend the segments AB and CE . Line AC is the transversal that intersects the parallel lines.



- Name the three interior angles of triangle ABC .
- Name the straight angle.
- What kinds of angles are $\angle ABC$ and $\angle ECD$? What does that mean about their measures?
- What kinds of angles are $\angle BAC$ and $\angle ECA$? What does that mean about their measures?
- We know that $m\angle BCD = m\angle BCA + m\angle ECA + m\angle ECD = 180^\circ$. Use substitution to show that the measures of the three interior angles of the triangle have a sum of 180° .

Exploratory Challenge 2

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 the triangle in the figure.
- 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° .
- Write your proof below.

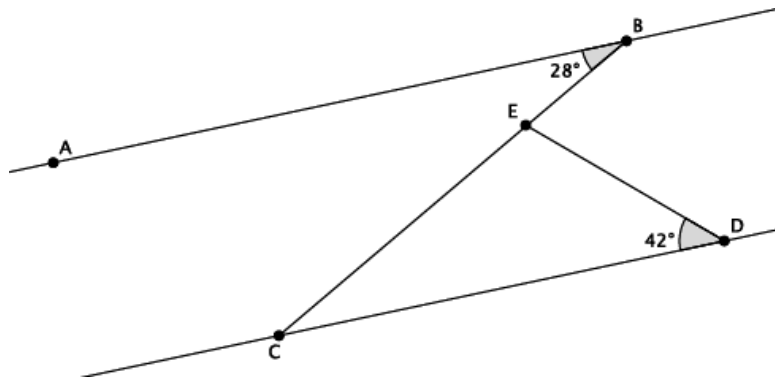
Lesson Summary

All triangles have a sum of measures of the interior angles equal to 180° .

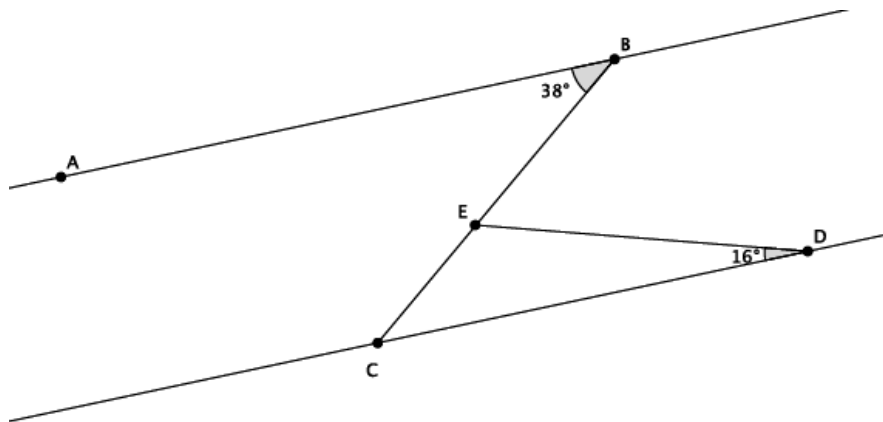
The proof that a triangle has a sum of measures of the interior angles equal to 180° is dependent upon the knowledge of straight angles and angle relationships of parallel lines cut by a transversal.

Problem Set

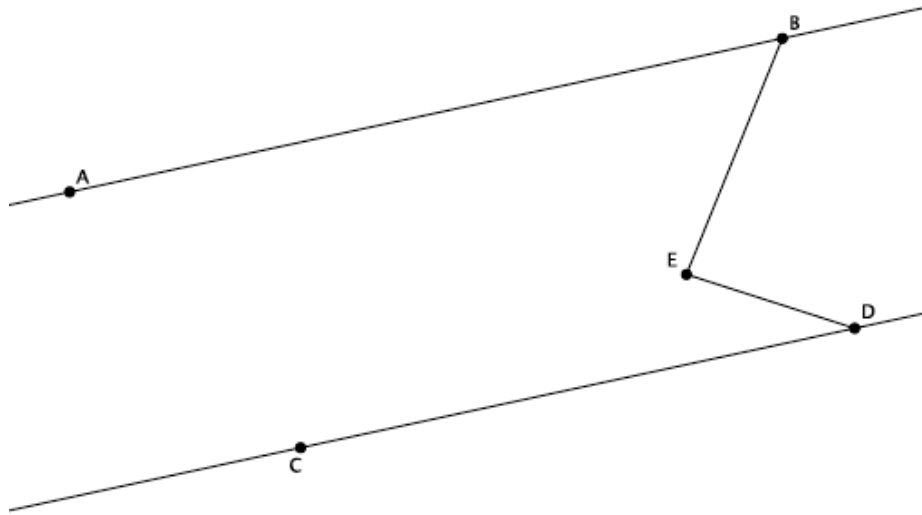
- In the diagram below, line AB is parallel to line CD , that is, $L_{AB} \parallel L_{CD}$. The measure of $\angle ABC$ is 28° , and the measure of $\angle EDC$ is 42° . Find the measure of $\angle CED$. Explain why you are correct by presenting an informal argument that uses the angle sum of a triangle.



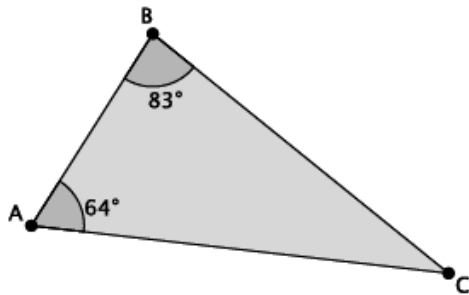
- In the diagram below, line AB is parallel to line CD , that is, $L_{AB} \parallel L_{CD}$. The measure of $\angle ABE$ is 38° , and the measure of $\angle EDC$ is 16° . Find the measure of $\angle BED$. Explain why you are correct by presenting an informal argument that uses the angle sum of a triangle. (Hint: Find the measure of $\angle CED$ first, and then use that measure to find the measure of $\angle BED$.)



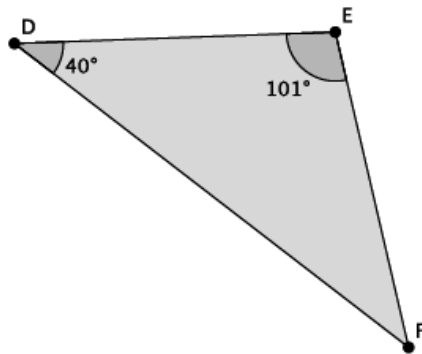
3. In the diagram below, line AB is parallel to line CD , that is, $L_{AB} \parallel L_{CD}$. The measure of $\angle ABE$ is 56° , and the measure of $\angle EDC$ is 22° . Find the measure of $\angle BED$. Explain why you are correct by presenting an informal argument that uses the angle sum of a triangle. (Hint: Extend the segment BE so that it intersects line CD .)



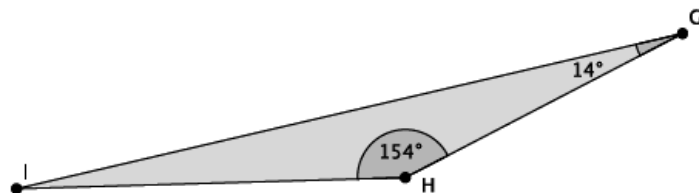
4. What is the measure of $\angle ACB$?



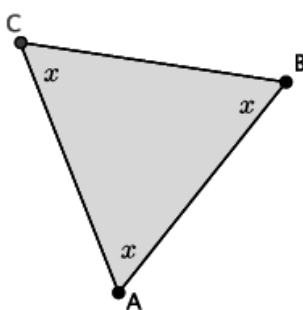
5. What is the measure of $\angle EFD$?



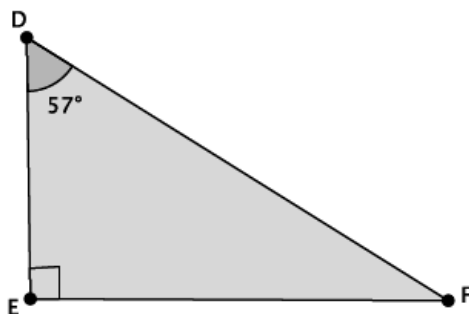
6. What is the measure of $\angle HIG$?



7. What is the measure of $\angle ABC$?



8. Triangle DEF is a right triangle. What is the measure of $\angle EFD$?



9. In the diagram below, Lines L_1 and L_2 are parallel. Transversals r and s intersect both lines at the points shown below. Determine the measure of $\angle JMK$. Explain how you know you are correct.

