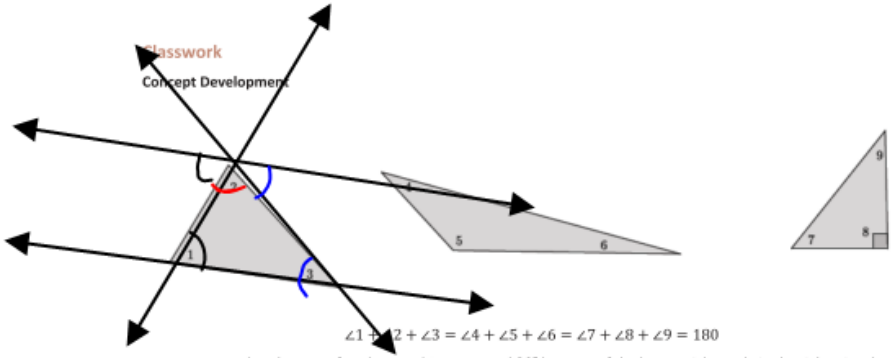
Lesson 13: Angle Sum of a Triangle

Classwork

Concept Development



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

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

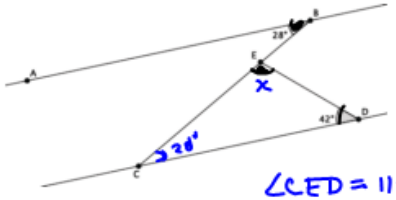
Lesson Summary

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

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

Problem Set

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



∠ECD ≅ ∠ABC Alt. Int. Angles

28 + 42 + x = 180

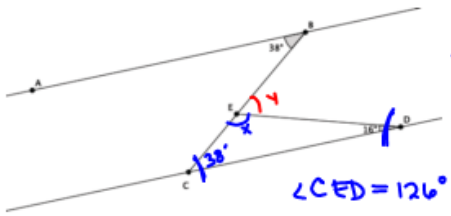
70 + x = 180

−70 −70

x = 110

∠CED = 110°

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



∠ECD ≅ ∠ABC Alt. Int. Angles

38 + 16 + x = 180°

54 + x = 180

x = 126°

∠CED = 126°

∠BED = 54°

126 + y = 180

y = 54°

3. In the diagram below, line AB is parallel to line CD, i.e., $L_{AB} \parallel L_{CD}$. The measure of angle $\angle ABE = 56°$, and the measure of angle $\angle EDC = 22°$. Find the measure of angle $\angle BED$. 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.)

∠EFD ≅ ∠ABE Alt. Int Angls

56 + 22 + x = 180

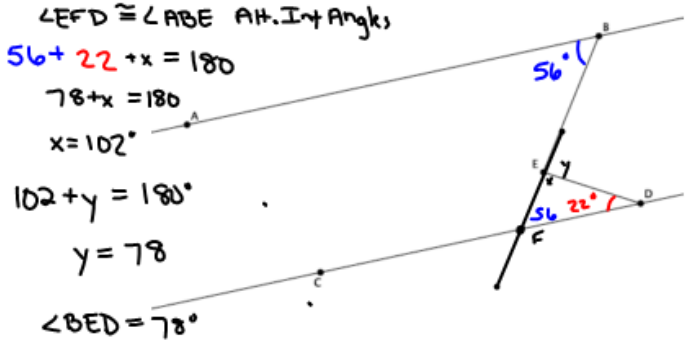
78 + x = 180

x = 102°

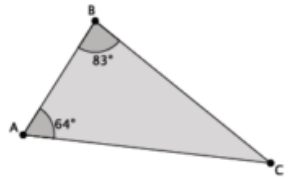
102 + y = 180°

y = 78

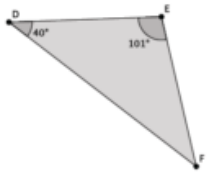
∠BED = 78°



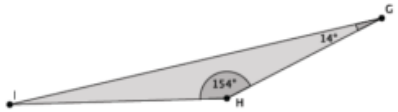
4. What is the measure of $\angle ACB$?



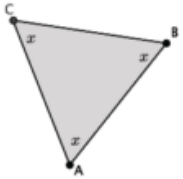
5. What is the measure of $\angle EFD$?



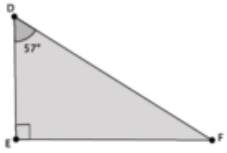
6. What is the measure of $\angle HIG$?



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.