NAME:________________________ Math 7.1 Period ________

Mr. Rogove Date:_________

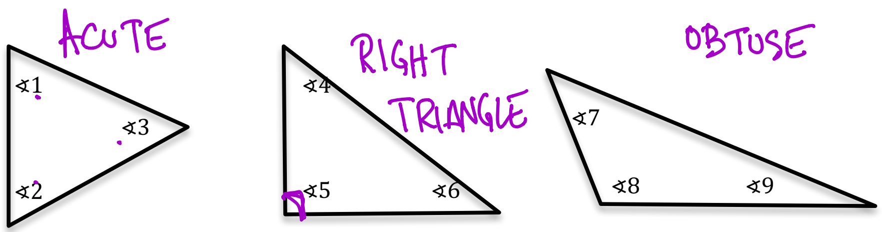
Learning Objective: We will prove the angle sum theorem of a triangle and use that to determine the measures of unknown angles. (G8M2L9)

Concept Development:

PART I

<u>Angle Sum Theorem for Triangles:</u> The sum of the interior angles of a triangle is always 180°.

<u>Examples</u>:



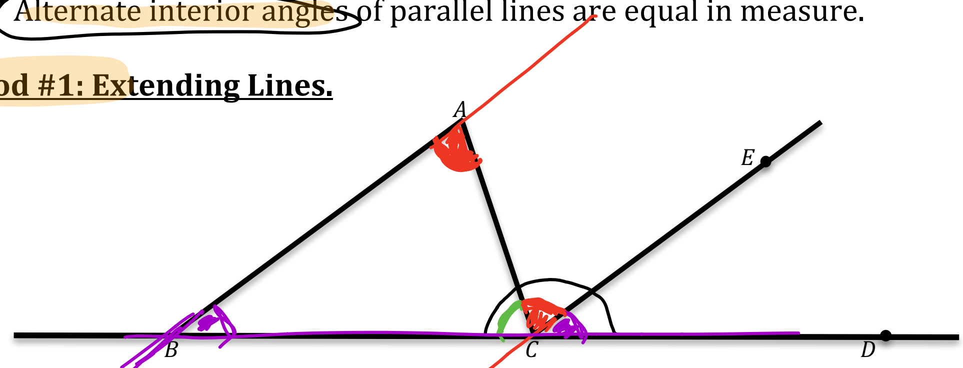
$$\measuredangle 1 + \measuredangle 2 + \measuredangle 3 \quad = \quad \measuredangle 4 + \measuredangle 5 + \measuredangle 6 \quad = \quad \measuredangle 7 + \measuredangle 8 + \measuredangle 9 \quad = \quad 180°$$

<u>Proving that a Triangle has 180 degrees:</u>
1. We need to find a straight angle (straight line). We KNOW these are 180 degrees.
2. We need this straight line to be made up of three individual angles.
3. We need to match up the three angles on the straight line to the three angles in a triangle. When we do this, voila, we have shown that a triangle has 180 degrees.

What we already know that will help us PROVE the theorem:

- A straight angle is 180°. ✓
- Corresponding angles of parallel lines are equal in measure.
- Alternate interior angles of parallel lines are equal in measure.

<u>Method #1: Extending Lines.</u>



1. Create line $\overline{CE}$ such that $\overline{AB} \parallel \overline{CE}$
"is parallel to"

$\measuredangle BCD = 180°$ GIVEN

$\measuredangle BCA + \measuredangle ACE + \measuredangle ECD = 180°$

$\measuredangle BCA \cong \measuredangle BCA$ REFLEXIVE PROPERTY.

$\measuredangle ACE \cong \measuredangle BAC$ ALTERNATE INTERIOR

$\measuredangle ECD \cong \measuredangle ABC$ CORRESPONDING ∡'S

$\measuredangle BCA + \measuredangle ACE + \measuredangle ECD = 180°$

$\boxed{\measuredangle BCA + \measuredangle BAC + \measuredangle ABC = 180°}$

Angles of the triangle add to 180°

PART 2

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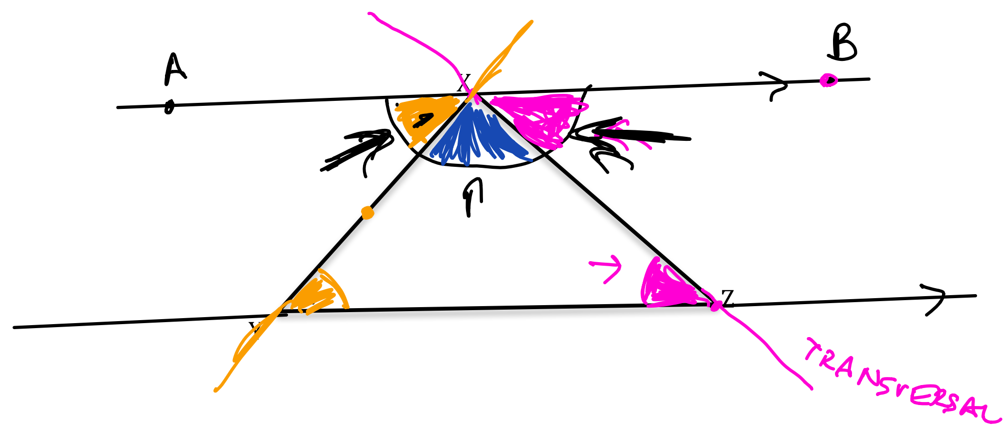
Proving that a Triangle has 180 degrees:
1. We need to find a straight angle (straight line). We KNOW these are 180 degrees.
2. We need this straight line to be made up of three individual angles.
3. We need to match up the three angles on the straight line to the three angles in a triangle. When we do this, voila, we have shown that a triangle has 180 degrees.

Method #2: Drawing a line on top of the triangle



① DRAW $\overline{AB}$ so that $\overline{AB} \parallel \overline{YZ}$

② $\angle AXB = 180^\circ$

$\angle AXY + \angle YXZ + \angle BXZ = 180^\circ$

$\angle YXZ \cong \angle YXZ$ REFLEXIVE.

$\angle AXY \cong \angle XYZ$ ALTERNATE INT. $\angle$'s

$\angle BXZ \cong \angle XZY$ ALTERNATE INT. $\angle$S

$\angle AXY + \angle YXZ + \angle BXZ = 180^\circ$ ← STRAIGHT ANGLES

$\angle XYZ + \angle YXZ + \angle XZY = 180^\circ$ ← TRIANGLE

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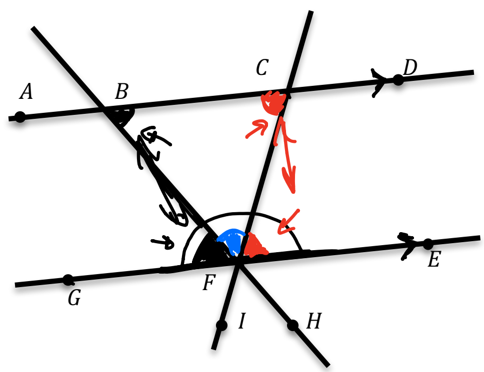
GUIDED PRACTICE:

Steps for Proving that a Triangle has 180°

1. Identify the triangle you're trying to prove is 180°.
2. Name the straight angle that will be helpful in proving the sum of the interior angles of a triangle are 180°.
3. Identify (or draw) parallel lines that will help you prove the Triangle Sum Theorem.
4. Use knowledge about corresponding and alternate interior angles to prove that sum of the measure of the interior angles of a triangle is identical to the measure of a straight angle.



$\measuredangle GFB + \measuredangle BFC + \measuredangle CFE = 180°$

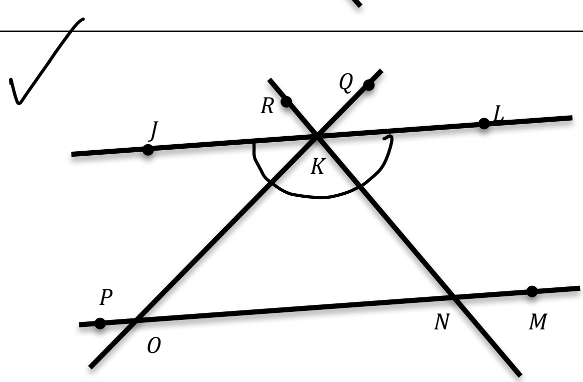
$\measuredangle BFC \cong \measuredangle BFC$ REFLEXIVE

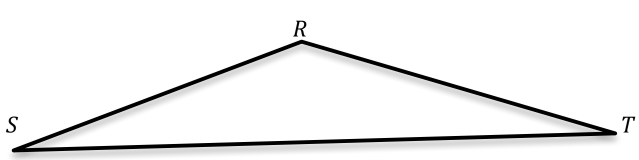
$\measuredangle GFB \cong \measuredangle CBF$ ALTERNATE INT.

$\measuredangle CFE \cong \measuredangle BCF$ ALTERNATE INT.

$\measuredangle GFB + \measuredangle BFC + \measuredangle CFE = 180°$

$\measuredangle CBF + \measuredangle BFC + \measuredangle BCF = 180°$





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Independent Practice:
Maybe have students work on the problem set as independent practice?

Activating Prior Knowledge:
If we know that $5 + 8 + 14 = 27$, what does $14 + 5 + 8$ equal? How do we know?

If $x + y + z = 180$, what can make the following equation true: $x + z + ??? = 180$? How do we know?

Closure:
Exit Ticket for Lesson 13.

Teacher Notes:
Use the Problem of the Week 3231 as HW?
HW is problem set from lesson 13