STUDY GUIDE: ANGLE RELATIONSHIPS

OVERVIEW

This unit has three main concepts which are all included in the 8th Grade Common Core Standard number 8.G.5:

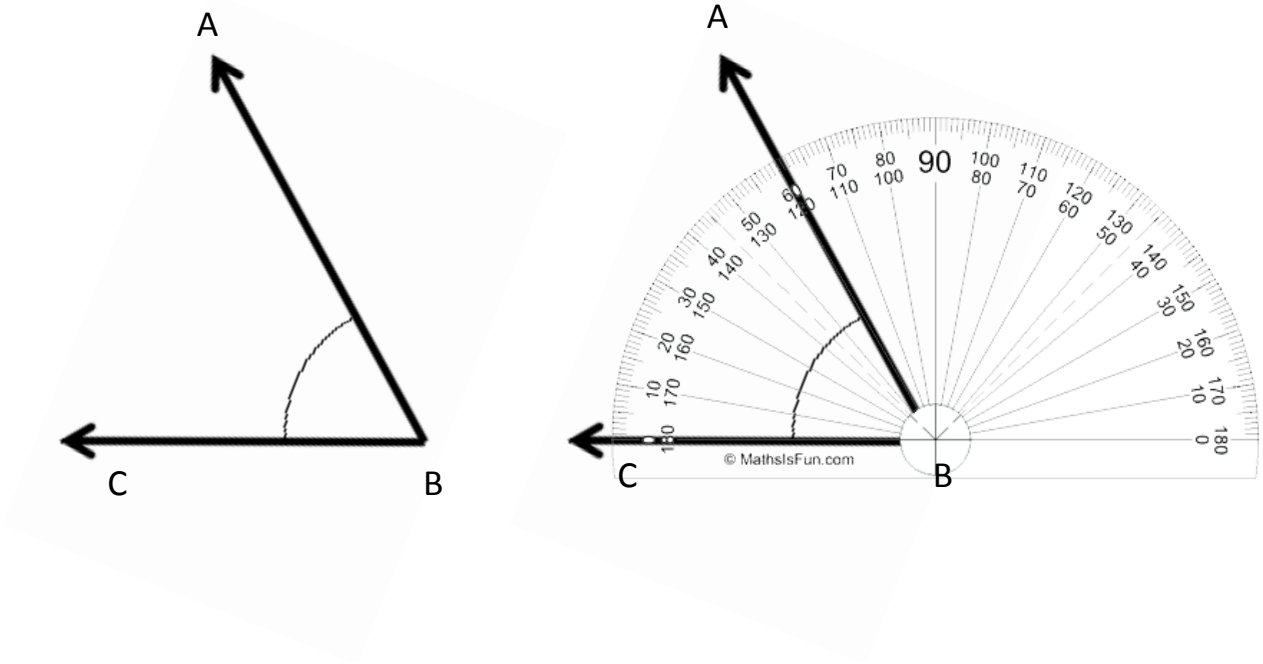
1) **Triangle angles (both interior and exterior angles).**
2) **The angle relationships that are formed when parallel lines are cut by a transversal.**
3) **The angle connection between similar triangles (similar triangles are triangles that have been dilated).**

Before getting into the 8th Grade concepts, let's take a look at some Background Knowledge for this unit.

BACKGROUND KNOWLEDGE

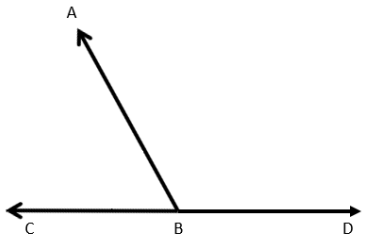
Angle Measurement: When we find an angle measurement, we are measuring the amount of circle degrees that an angle represents.

EXAMPLE: The measure of ∠ABC is 60°



Supplementary Angles: When two angles create a Straight Angle together, they are called Supplementary Angles. Since they create a Straight Angle together, their angle measures will sum to 180° when you add them together.

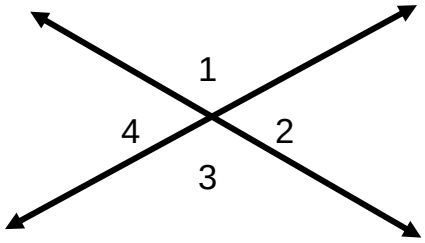
EXAMPLE: ∠ABC and ∠ABD are Supplementary Angles because they create a Straight Angle together (∠CBD).



The measure of ∠ABC = 60°
The measure of ∠ABD = 120°

Together, ∠ABC and ∠ABD create 180° (Straight ∠CBD)

Intersection (two lines): When two lines intersect, 4 angles are created. The point where the lines intersect is called a **Vertex**.

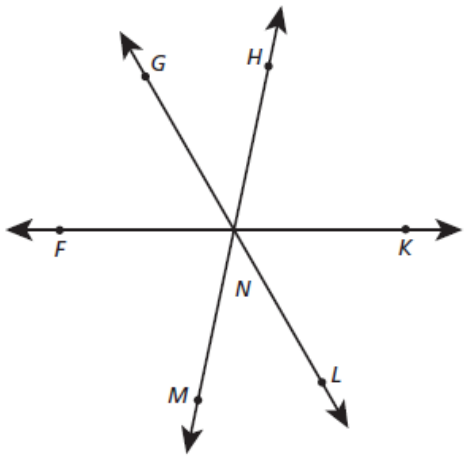


These angles that are across from each other at an intersection are called **Vertical Angles**. Vertical Angles are congruent (they have the same angle measurement).
Example: ∠1 = ∠3
How many other examples of Vertical Angles can you find on your own?

Adjacent Angles are angles that are next to each other (and they share a ray). Adjacent Angles create a Straight Angle or 180° together (Supplementary).

Example: ∠1 + ∠2 = 180°
How many other examples of Supplementary Angles can you find on your own?

Intersection (three lines): If we add another line to the intersection, we create two more angles (for a total of 6 angles). Now, we would need 3 angles to create a Straight Angle.

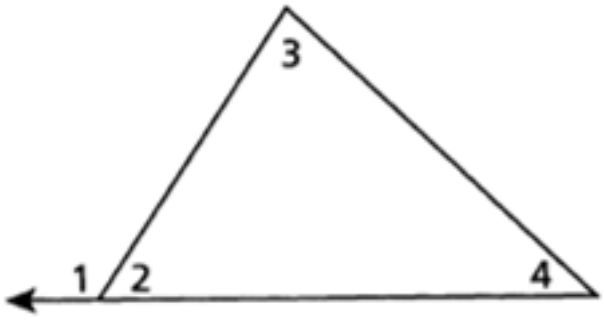


Example: ∠FNG + ∠GNH + ∠HNK= 180°
How many other examples can you find on your own?

TRIANGLE ANGLES

Interior Angles: Remember from our work in class that the three angles of a triangle always add up to 180° (**Triangle Angle Sum**).

Example: ∠2 + ∠3 + ∠4= 180°

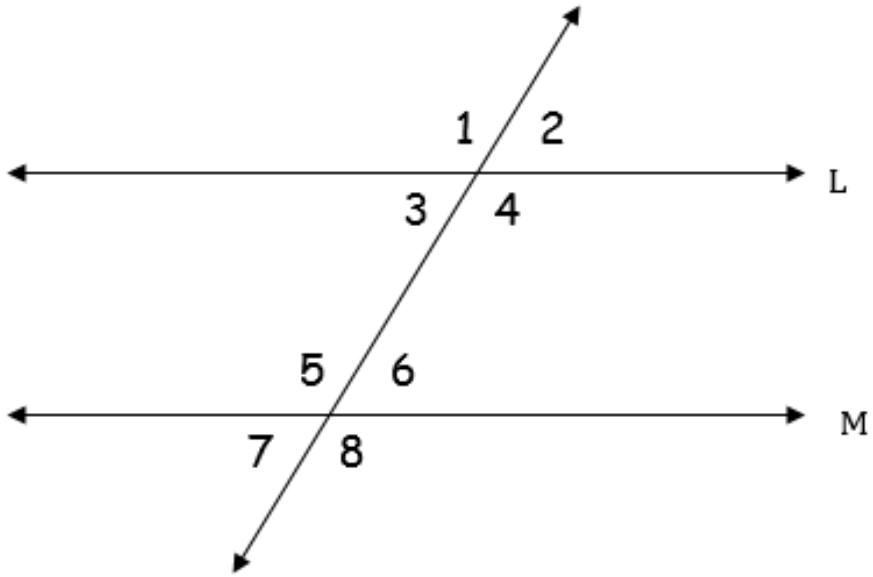


Exterior Angles: angles create a Supplementary relationship with the adjacent Interior Angle of the triangle.

Example (from triangle above): ∠1 + ∠2 = 180°

PARALLEL LINES CUT BY A TRANSVERSAL

In the diagram below, lines L and M are parallel.



When parallel lines are cut by a transversal, the **Corresponding Angles** are **congruent**. Corresponding Angles are the angles that are in the same spot of each intersection along a transversal.

Examples of Corresponding Angles:

$\angle 1$ and $\angle 5$
$\angle 2$ and $\angle 6$

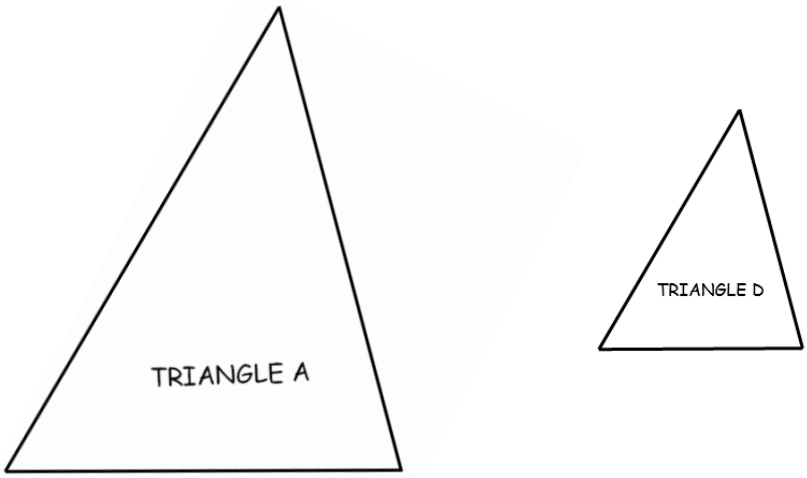
Can you find other examples?

SIMILAR TRIANGLES

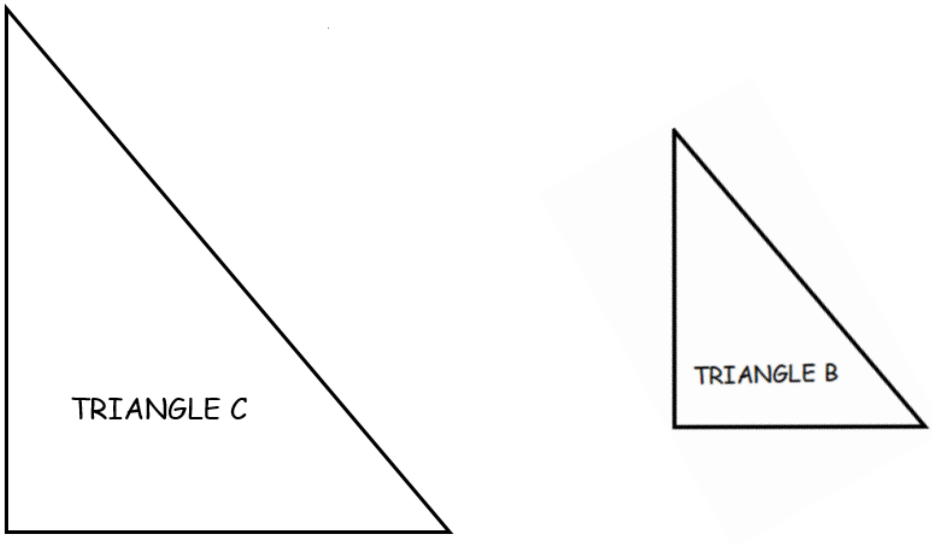
Remember from the work we did in class that Similar Triangles are angles that have the same angle measurements (but the triangle are a different size because they are dilated).

Here are the two examples we did in class:

Triangle A was Dilated to create Triangle D. Triangle A and D are similar because they have the same angle measurements (even though they are different sizes).



Triangle C was Dilated to create Triangle B. Triangle C and B are similar because they have the same angle measurements (even though they are different sizes).

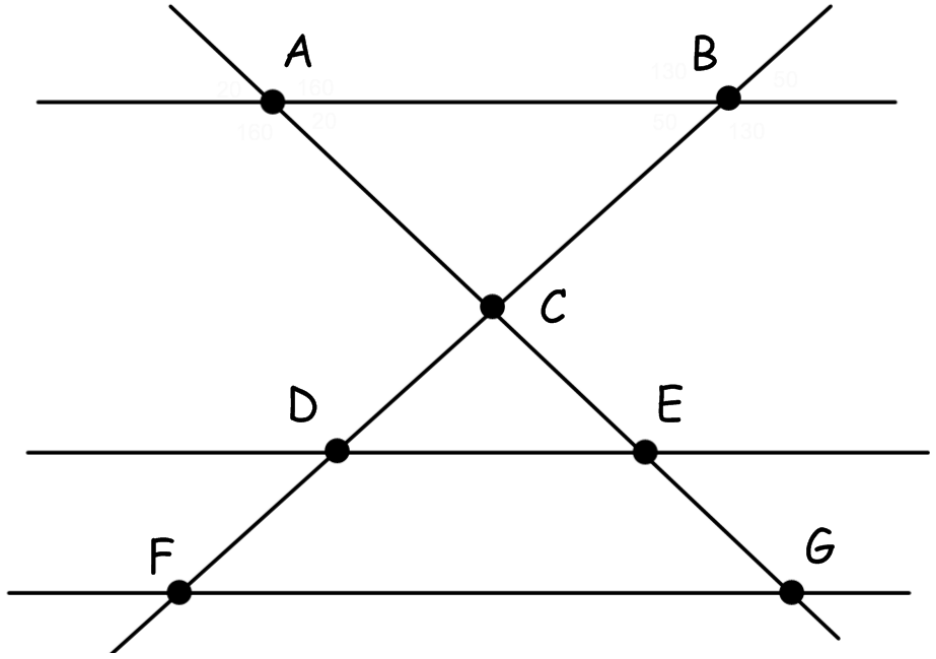


SIMILAR TRIANGLES (CONTINUED)

Remember, in class, we looked at the following diagram.

We noticed:

- 7 vertices (intersections)
- 3 parallel lines
- 2 transversals
- 3 triangles (ABC, DCE and FCG)



We used Corresponding Angle relationships to find all of the angles in the diagram and we found the triangles angle measures:

Triangle ABC: 120°, 50°, 20°
Triangle DCE: 120°, 50°, 20°
Triangle FCG: 120°, 50°, 20°

Based on the fact that the triangles have congruent angle measurements, we know that Triangles ABC, DCE and FCG are **SIMILAR**.