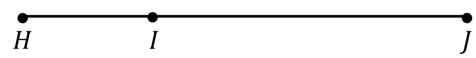
Lesson 3.03 Practice with Axioms of equality

Students will be able to:

- Content Objective: Prove and apply theorems about line segments and angles, specifically alternate exterior angles & same side interior angles.
- Language Objective: Write formal proofs with and without assistance.

Warm Up

Complete the following based on the given diagram.



a. State the whole line segment.

b. State the parts that make up the whole line segment.

c. Write a true statement based on parts a. and b. using equality.

d. What can we conclude about the whole vs. parts of the whole? Fill in the blank.

The **whole** is ________________ than any of its **parts**.

Vocabulary Review

Match each axiom to its correct description.

1. ______Reflexive Axiom
2. ______ Addition Axiom
3. ______ Subtraction Axiom
4. ______ Substitution Axiom

a. When equals are subtracted from equals, their differences are equal.

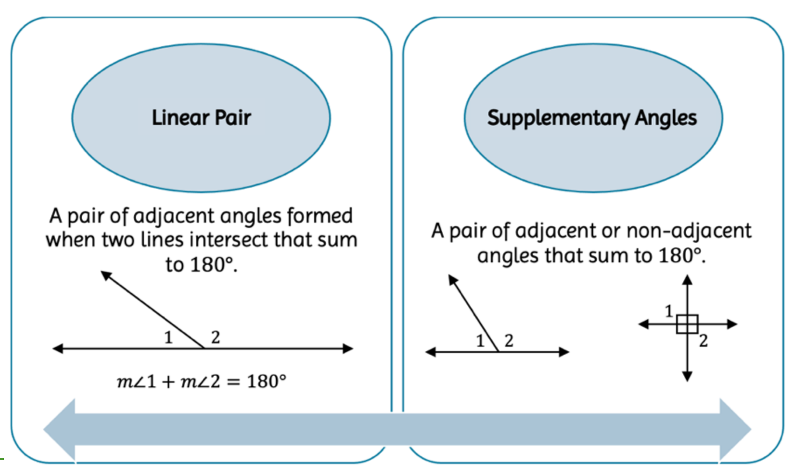
b. If two quantities are equal, then one can be replaced by the other.

c. When equals are added to equals, their sums are equal.

d. A number or figure is always equal/congruent to itself.

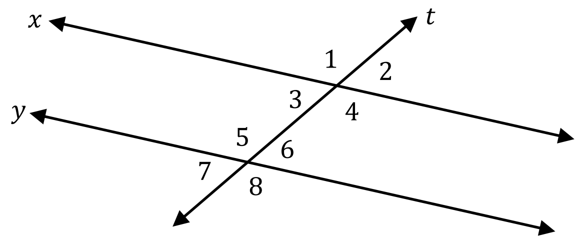
Graphic Organizer

We have learned that angles that share a vertex to form a line sum to 180°, however, there are two important vocabulary terms that are both similar and different in relation to this idea.



Exercise 1: Identifying Congruent Angles

Given the diagram below with $x \parallel y$, t is a transversal that intersects both lines x and y to form the angles shown.



a. List two pairs of **alternate interior** angles.

Alternate Interior angles are ______________________.

b. List two pairs of **corresponding** angles.

Corresponding angles are ______________________.

c. List two pairs of **vertical** angles.

Vertical angles are ______________________.

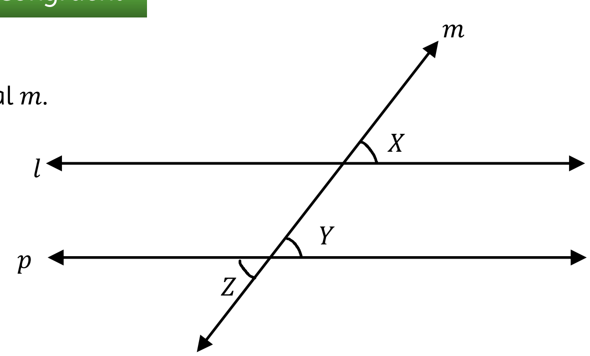
Last unit, we used rigid motions to prove that **corresponding angles** are **congruent.** Let's use this fact to prove that **alternate exterior angles** are **congruent**.

Exercise 2: Proving Alternate Exterior Angles Congruent

Fill in the blank.

Given: The labeled diagram with $l \parallel p$ and transversal m.

Prove: $m\angle X = m\angle Z$

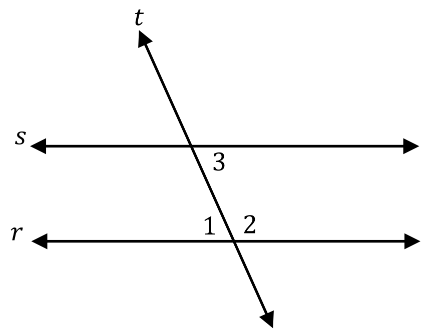


Statement	Reason
(1) ______________________	(1) Given
(2) $\angle X \cong \angle Y$	(2) ______________________ ______________________
(3) ______________________	(3) Vertical angles are congruent
(4) $\angle X \cong \angle Z$	(4)
(5) ______________________	(5) Definition of Congruent

Exercise 3: Proving Same Side Interior Angles Supplementary

Given: Parallel lines s and r cut by transversa t.

Prove: $m\angle 2 + m\angle 3 = 180°$ (same side interior angles sum to $180°$)



Statement	Reason
(1) ______________	(1) ______________
(2) $m\angle 1 = m\angle 3$	(2) ______________ ______________
(3) ______________	(3) Two angles that form a straight-line sum to $180°$.
(4) ______________	(4) ______________
(5) $m\angle 2 + m\angle 3 = 180°$	(5) ______________

Exercise 4: Division Axiom

Given quadrilateral $ABCD$, $\overline{BD}$ is the angle bisector of $\angle ABC$ and $\angle ADC$.

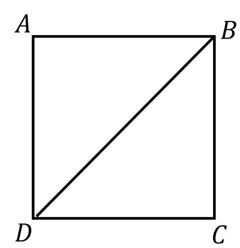
If the $m\angle ABC = m\angle ADC$, which of the following statements is true?

1) $\frac{m\angle ABD}{2} = \frac{m\angle ADC}{2}$

2) $\frac{m\angle ABC}{2} = \frac{m\angle ADC}{2}$

3) $\frac{m\angle CBD}{2} = \frac{m\angle ABC}{2}$

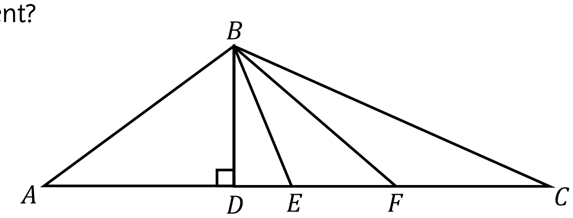
4) $\frac{m\angle ADB}{2} = \frac{m\angle ADC}{2}$



3.03- Problem Set

Name: ______________________________

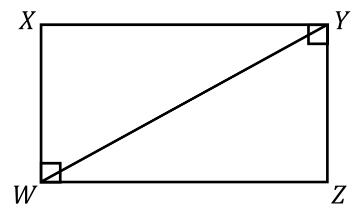
1. Given ΔABC with base $\overline{ADEFC}$, altitude $\overline{BD}$, median $\overline{BF}$ of ΔBDC, and $\overline{BE}$ as the angle bisector of $\angle ABC$, which of the following is *not* a valid statement?



   1) $\overline{DF} \cong \overline{CF}$
   2) $\angle ABE \cong \angle CBE$
   3) $\overline{AD} \cong \overline{FD}$
   4) $\angle ADB \cong \angle CDB$

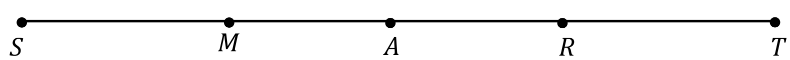
2. Given quadrilateral $WXYZ$ below, $\overline{XY} \perp \overline{YZ}$, $\overline{XW} \perp \overline{WZ}$, and $m\angle XYW = m\angle ZWY$.

   Prove: $m\angle ZYW = m\angle XWY$



Statement	Reason

3. In the diagram below, $SM = RT$ and A is the midpoint of $\overline{MR}$. Prove that $SA = AT$.



Statement	Reason