

Lesson 3.03 Practice with Axioms of equality

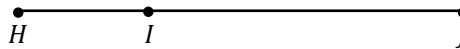
Students will be able to:

- 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.



- State the whole line segment.
- State the parts that make up the whole line segment.
- Write a true statement based on parts a. and b. using equality.
- 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

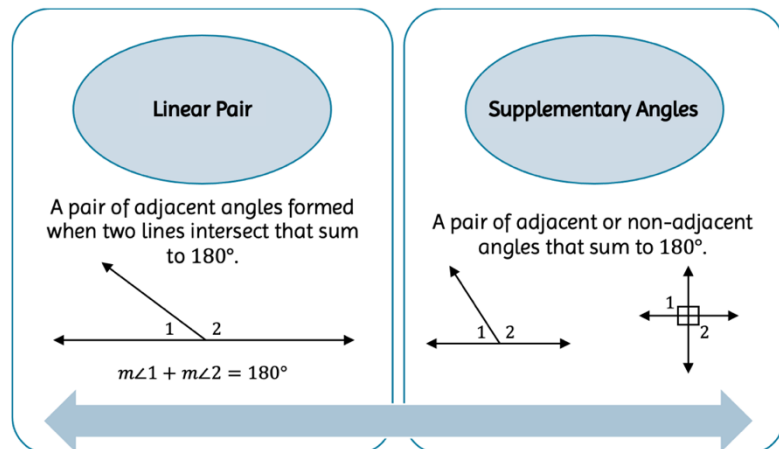
Match each axiom to its correct description.

- _____ Reflexive Axiom
 - _____ Addition Axiom
 - _____ Subtraction Axiom
 - _____ Substitution Axiom
- When equals are subtracted from equals, their differences are equal.
 - If two quantities are equal, then one can be replaced by the other.
 - When equals are added to equals, their sums are equal.
 - A number or figure is always equal/congruent to itself.



Graphic Organizer

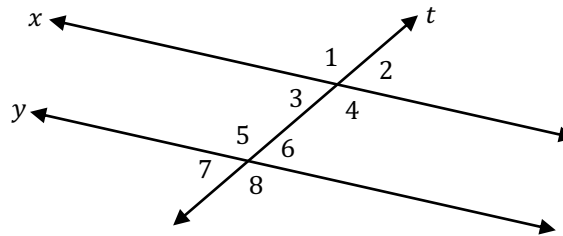
We have learned that angles that share a vertex to form a line sum to 180° , however, there are two important vocabulary terms that are both similar and different in relation to this idea.





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**.

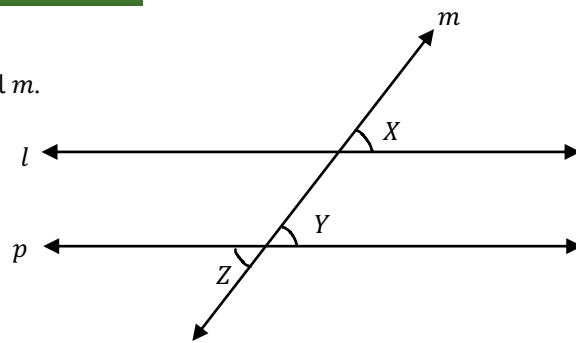


Exercise 2: Proving Alternate Exterior Angles Congruent

Fill in the blank.

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

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



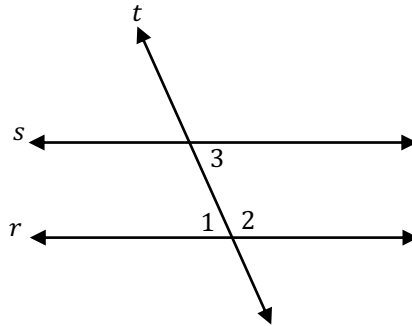
Statement	Reason
(1) _____	(1) Given
(2) $\angle X \cong \angle Y$	(2) _____ _____
(3) _____	(3) Vertical angles are congruent
(4) _____	(4) Definition of Congruent



Exercise 3: Proving Same Side Interior Angles Supplementary

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

Prove: $m\angle 2 + m\angle 3 = 180^\circ$ (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) $m\angle 2 + m\angle 3 = 180^\circ$	(5) _____

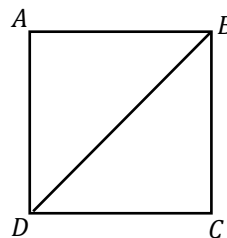


Exercise 4: Division Axiom

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



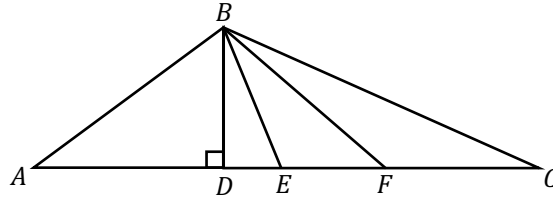


3.03- Problem Set

Name: _____

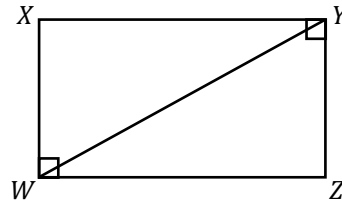
1. Given $\triangle ABC$ with base $\overline{ADEF C}$, altitude \overline{BD} , median \overline{BF} , and \overline{BE} as the angle bisector of $\angle ABC$, which of the following is *not* a valid statement?

- 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