Section 3 – Topic 3
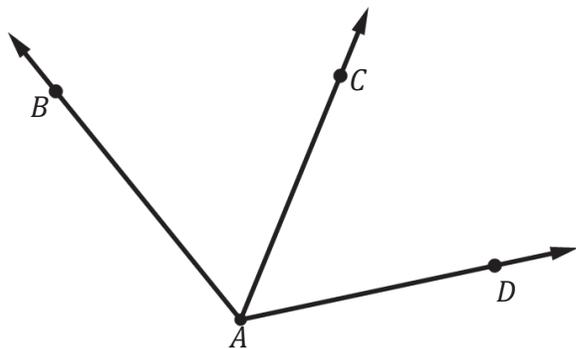## Angle Pairs – Part 1

Consider the following figure that presents an **angle pair**.

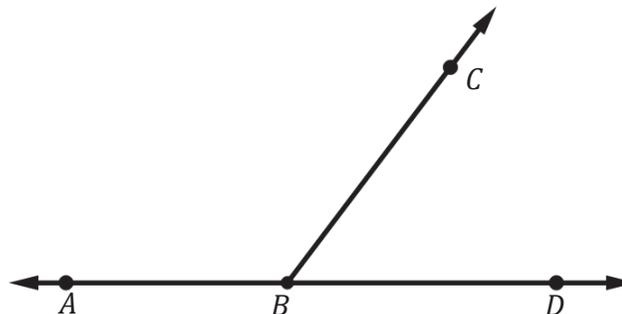What common ray do ∠*BAC* and ∠*CAD* share?

Because these angle pairs share a ray, they are called
_____ angles.

Consider the following figure of **adjacent angles**.

What observations can you make about the figure?

These adjacent angles are called a _____ pair.
Together, the angles form a _____ angle.

What is the measure of a straight angle?
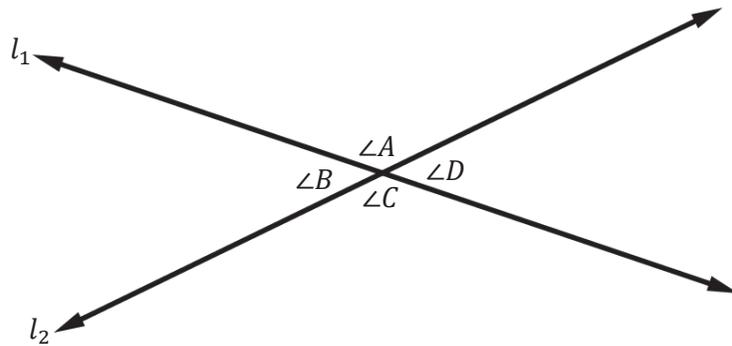
*What is the measure of the sum of a **linear pair**?*

TAKE NOTE! *Postulates & Theorems*	**Linear Pair Postulate**
	If two positive angles form a linear pair, then they are supplementary.

Consider the figure below of angle pairs.

What observations can you make about ∠A and ∠C?

What observations can you make about ∠B and ∠D?

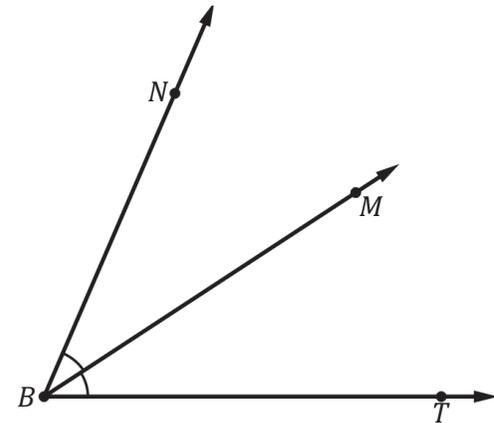∠A and ∠C form what we call a pair of _____ angles.

What angle pairs form a set of **vertical angles**?

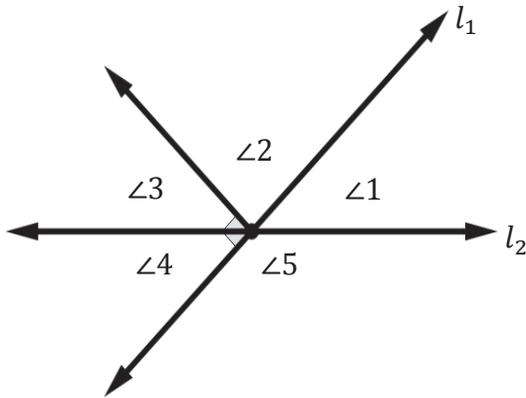| TAKE NOTE! *Postulates &* *Theorems*	**Vertical Angles Theorem** If two angles are vertical angles, then they have equal measures.

Consider the figure below.

What observations can you make about the figure?

We call $\overrightarrow{BM}$ an **angle bisector**.

Make a conjecture as to why $\overrightarrow{BM}$ is called an angle bisector.

Let's Practice!

1. Consider the figure below.

Complete the following statements:

➢ ∠1 and ∠4 are _____ angles.

➢ ∠1 and ∠2 are _____ angles.

➢ ∠3 and ∠4 are _____ angles and

_____ angles.

➢ ∠4 and ∠5 are _____ angles and

_____ angles. They also form a

_____.

2. If ∠ACB and ∠ACE are linear pairs, and $m\angle ACB = 5x + 25$ and $m\angle ACE = 2x + 29$, then

a. Determine $m\angle ACB + m\angle ACE$.

b. Determine the measures of $m\angle ACB$ and $m\angle ACE$.

3. If ∠MFG and ∠EFN are vertical angles, and $m\angle MFG = 7x - 18$ and $m\angle EFN = 5x + 10$, then

a. What can we say about ∠MFG and ∠EFN that will help us determine their measures?

b. Determine the measures of ∠MFG and ∠EFN.

Try It!

4. Consider the figure below.

l_1

$(5y - 11)°$ $(z)°$ $(8x)°$

$(9x - 7)°$ $(13y + 7)°$ l_2
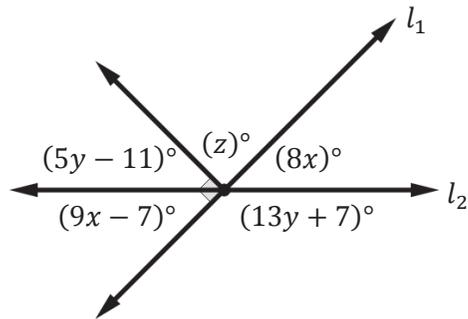
Angle measures are represented by algebraic expressions. Find the value of x, y, and z.

Consider the figure below.

28°   28°

∠A   ∠B

What can you observe about ∠A and ∠B?

TAKE NOTE!	**Congruent Complements Theorem**
Postulates & Theorems	If ∠A and ∠B are complements of the same angle, then ∠A and ∠B are congruent.

Consider the figures below.

135° ∠A   135° ∠B
line m   line n
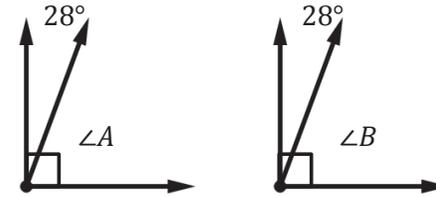
What can you observe about ∠A and ∠B?

> **TAKE NOTE!**
> *Postulates &*
> *Theorems*
>
> **Congruent Supplements Theorem**
> If ∠A and ∠B are supplements of the same angle, then ∠A and ∠B are congruent.

Consider the figure below.

∠B   ∠K
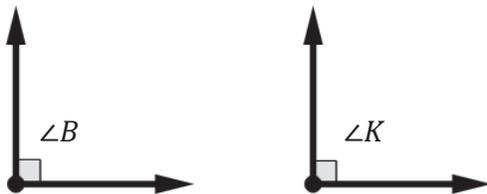
What can you observe about ∠B and ∠K?

> **TAKE NOTE!**
> *Postulates &*
> *Theorems*
>
> **Right Angles Theorem**
> All right angles are congruent.

Let's Practice!
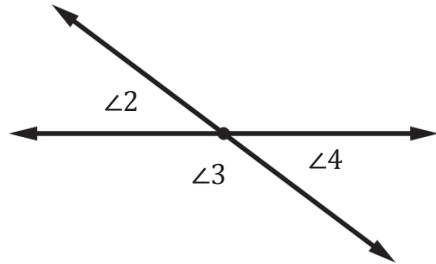
1. The measure of an angle is four times greater than its complement. What is the measure of the larger angle?

Try It!

2. ∠X and ∠Y are supplementary. One angle measures 5 times the other angle. What is the complement of the smaller angle?
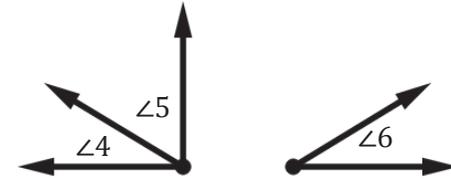
Let's Practice!

3. Consider the figure below.

Given: ∠2 and ∠3 are a linear pair.   **Prove:** ∠2 ≅ ∠4
∠3 and ∠4 are a linear pair.

Complete reasons 2 and 3 in the chart below.

Statements	Reasons
1. ∠2 and ∠3 are a linear pair. ∠3 and ∠4 are a linear pair.	**1.** Given
2. ∠2 and ∠3 are supplementary. ∠3 and ∠4 are supplementary.	**2.**
3. ∠2 ≅ ∠4	**3.**

Try It!

4. Consider the figure below.

Given: ∠5 and ∠6 are complementary.   **Prove:**
$m∠4 + m∠5 = 90°$ ∠6 ≅ ∠4

Complete the chart below.

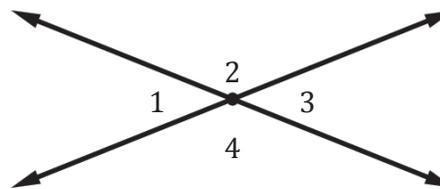| Statements	Reasons
1.	**1.** Given
2.	**2.** Given
3. ∠4 and ∠5 are complementary	**3.**
4. ∠6 ≅ ∠4	**4.**

BEAT THE TEST!

1. $\angle LMN$ and $\angle PML$ are linear pairs, $m\angle LMN = 7x - 3$ and $m\angle PML = 13x + 3$.

   Part A: $m\angle LMN =$

   Part B: $m\angle PML =$

   Part C: If $\angle PMR$ and $\angle LMN$ form a vertical pair and $m\angle PMR = 5y + 4$, find the value of y?

2. Consider the figure below.

   Given: $\angle 1$ and $\angle 2$ form a linear pair.
   $\angle 1$ and $\angle 4$ form a linear pair.

   Prove: The Vertical Angle Theorem

   Use the bank of reasons below to complete the table.

Congruent Supplement Theorem	Right Angles Theorem
Congruent Complement Theorem	Linear Pair Postulate

Statements	Reasons
1. $\angle 1$ and $\angle 2$ are linear pairs. $\angle 1$ and $\angle 4$ are linear pairs.	**1.** Given
2. $\angle 1$ and $\angle 2$ are supplementary. $\angle 1$ and $\angle 4$ are supplementary.	**2.**
3. $\angle 2 \cong \angle 4$	**3.**