

Name \_\_\_\_\_

Date \_\_\_\_\_

## Day 2 – Angles and Angle Addition

### Naming Angles and Lines

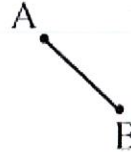
**Point**



A

Points are named with capital letters.

**Line Segment**



Two points are connected with a straight line. This line segment can be named  $\overline{AB}$  or  $\overline{BA}$ .

**Line**



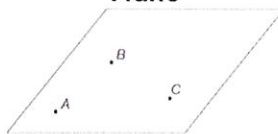
A line does not have a beginning or end point. Lines are named using two points on the line. This line can be named  $\overleftrightarrow{VW}$  or  $\overleftrightarrow{WV}$ .

**Ray**



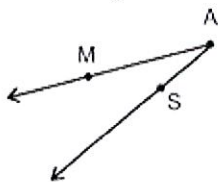
Rays start with a point but continue to infinity in one direction. Rays are named using its starting point and one other point on the ray. The ray can be named  $\overrightarrow{AB}$  but **NOT**  $\overrightarrow{BA}$ .

**Plane**



A plane is a flat, two-dimensional surface that extends indefinitely far.

**Angle**



Angles are made up of two rays that have the same beginning point. The point is called the vertex and the two rays are called the side of the angle. Angles can be name in ways:

One Letter (if the vertex is not shared):  $\angle A$

Number (if given):  $\angle 1$

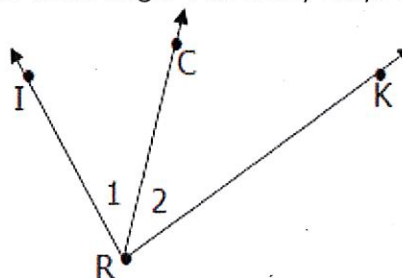
Three Letters (vertex is middle letter):  $\angle MAS$  or  $\angle SAM$

a. Name the angle in four ways:



$\angle 1$   
 $\angle F$   
 $\angle EFG$   
 $\angle GFE$

b. Name angle 1 as many ways as possible:

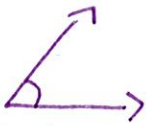


$\angle IRC$   
 $\angle CRI$   
 $\angle 1$

**Types of Angles**

**Acute Angles**

Acute angles have measures between  $0^\circ$  &  $90^\circ$ .



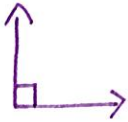
**Obtuse Angles**

Obtuse Angles have measures between  $90^\circ$  &  $180^\circ$



**Right Angles**

Right Angles measure exactly  $90^\circ$ .



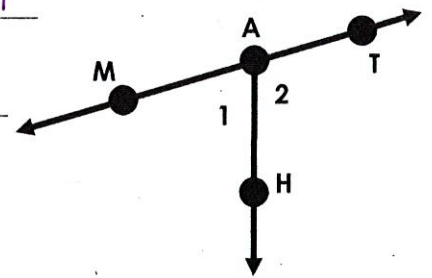
**Straight Angles**

Straight Angles measure exactly  $180^\circ$ .

**Practice**

Complete the following:

1. Give an example of each: A line segment  $\overline{MT}$  A line  $\overleftrightarrow{MT}$  A ray  $\overrightarrow{AH}$  \* not the only options
2. Name the angle represented with the number 1 using 3 letters.  $\angle MAH$
3. Why can't you name it angle A? because the vertex is shared
4. Is this angle an obtuse, acute, or right angle? Acute
5. If angle 1 is 60 degrees, what is the measure of angle 2?  $120^\circ$   
 $180^\circ - 60^\circ = 120^\circ$



**Angle Vocabulary**

**Complementary Angles:** Two or more angles whose sum of measures equals  $90^\circ$ .

$40^\circ$  and  $50^\circ$  angles are complementary angles because  $40^\circ + 50^\circ = 90^\circ$ .

**Example:** A  $30^\circ$  angle is called the complement of the  $60^\circ$  angle.  
Similarly, the  $60^\circ$  angle is the complement of the  $30^\circ$  angle.

**Practice:** Find the **complement** of each angle.

a.  $35^\circ$   
 $90^\circ - 35^\circ = 55^\circ$   $55^\circ$

b.  $\angle 1$  and  $\angle 2$  are complementary. Find the value of x and the measure of both angles.

$\angle 1 = 5x + 2$   
 $\angle 2 = 2x + 4$

$\angle 1 + \angle 2 = 90$   
 $5x + 2 + 2x + 4 = 90$   
 $7x + 6 = 90$   
 $-6 \quad -6$   
 $\hline 7x = 84$

$\frac{7x = 84}{7} \rightarrow$   
 $x = 12$

$\angle 1 = 5x + 2$   
 $\angle 1 = 5(12) + 2$   
 $\angle 1 = 60 + 2$   
 $\angle 1 = 62$

$\angle 2 = 2x + 4$   
 $\angle 2 = 2(12) + 4$   
 $\angle 2 = 24 + 4$   
 $\angle 2 = 28$

c. One of two complementary angles is 16 degrees less than its complement. Find the measure of both angles.

$\angle 1 = x$   
 $\angle 2 = x - 16$

$\angle 1 + \angle 2 = 90$   
 $x + x - 16 = 90$   
 $2x - 16 = 90$   
 $+16 \quad +16$   
 $\hline 2x = 106$   
 $\frac{2x = 106}{2}$   
 $x = 53$

$\angle 1 = x$   
 $\angle 1 = 53$

$\angle 2 = x - 16$   
 $\angle 2 = 53 - 16$   
 $\angle 2 = 37$

**Supplementary Angles:** Two or more angles whose sum of measures equals  $180^\circ$ .

$60^\circ$  and  $120^\circ$  angles are supplementary angles because  $60^\circ + 120^\circ = 180^\circ$ .

**Example:** A  $70^\circ$  angle is called the supplement of the  $110^\circ$  angle.  
Similarly, the  $110^\circ$  angle is the supplement of the  $70^\circ$  angle.

**Practice:** Find the **supplement** of each angle.

a.  $126^\circ$   $180^\circ - 126^\circ = 54^\circ$   $54^\circ$

b.  $\angle 1$  and  $\angle 2$  are supplementary. Find the value of  $x$  and the measure of both angles.

$\angle 1 = 12x + 4$   
 $\angle 2 = 9x + 8$

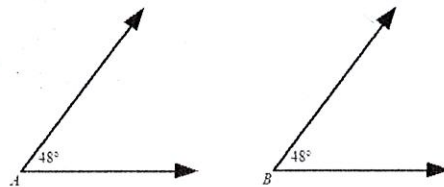
$\angle 1 + \angle 2 = 180$   
 $12x + 4 + 9x + 8 = 180$   
 $21x + 12 = 180$   
 $\quad \quad \quad -12 \quad \quad -12$   

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 $21x = 168$   
 $\quad \quad \quad \div 21 \quad \quad \div 21$   
 $\quad \quad \quad x = 8$

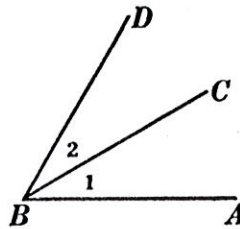
$\angle 1 = 12x + 4$        $\angle 2 = 9x + 8$   
 $\angle 1 = 12(8) + 4$        $\angle 2 = 9(8) + 8$   
 $\angle 1 = 96 + 4$        $\angle 2 = 72 + 8$   
 $\angle 1 = 100$        $\angle 2 = 80$

**Congruent Angles:** Two or more angles with the same measure. The geometric symbol that represents congruency is  $\cong$ .



$\angle A$  and  $\angle B$  are congruent angles.

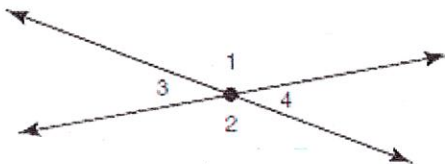
**Adjacent Angles:** Two angles with a common vertex and side but no common interior points.



$\angle 1$  and  $\angle 2$  are adjacent angles.

**Linear Pair:** Two adjacent (next to) angles whose noncommon sides are opposite rays. A linear pair also forms a line. LINEAR PAIRS ARE supplementary

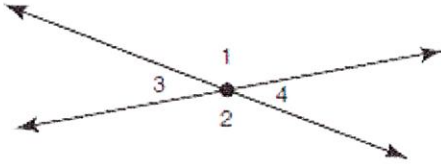
a. Name all the linear pairs in the diagram below:



- $\angle 1$  &  $\angle 4$
- $\angle 1$  &  $\angle 3$
- $\angle 2$  &  $\angle 3$
- $\angle 2$  &  $\angle 4$

**Vertical Angles:** Two nonadjacent angles that are formed by two intersecting lines. Vertical angles are congruent. VERTICAL ANGLES ARE congruent.

a. Name all the vertical angles in the diagram below:



$\angle 1$  and  $\angle 2$

$\angle 3$  and  $\angle 4$

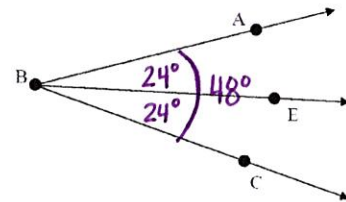
**Angle Bisector:** A ray that divides an angle into two congruent angles (two angles with equal measure).

a.  $\overline{BE}$  is an angle bisector.

6. If  $m\angle ABE = 40^\circ$ , then  $m\angle EBC =$   $40^\circ$ .

7. If  $m\angle ABC = 4x - 12$  &  $m\angle ABE = 24^\circ$ , then  $x =$   $15$ .

$$\begin{array}{r} 4x - 12 = 48 \\ +12 \quad +12 \\ \hline 4x = 60 \\ \frac{4x}{4} = \frac{60}{4} \\ x = 15 \end{array}$$



**Angle Addition Postulate:** If point B lies in the interior of  $\angle AOC$ , then  $m\angle AOB + m\angle BOC = m\angle AOC$ .

$$50^\circ + 65^\circ = 115^\circ$$

