

# 1.6 - Angles

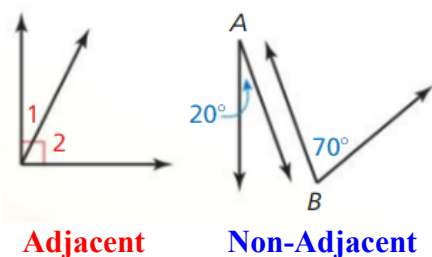
## Lesson Objectives

- Identify complementary and supplementary angles
- Identify linear pairs and vertical angles

### Complementary Angles

Two positive angles whose measures have a sum of  $90^\circ$

Each angle is the complement of the other.



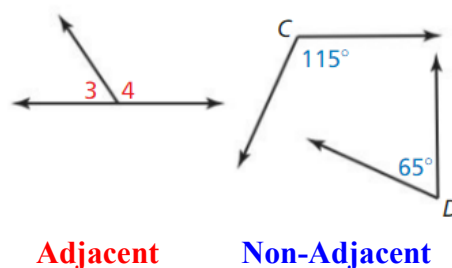
Angles that share same side



### Supplementary Angles

Two positive angles whose measures have a sum of  $180^\circ$

Each angle is the supplement of the other.



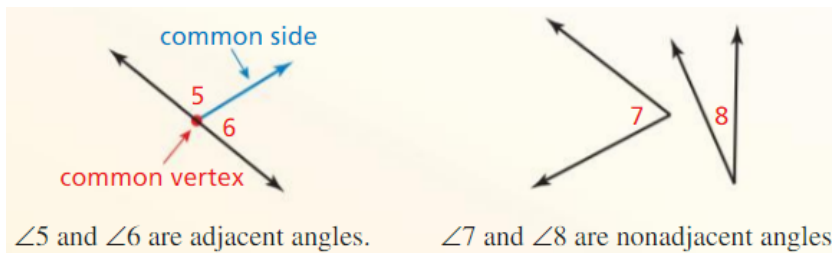
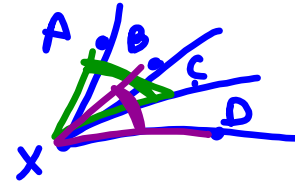
Adjacent

Non-Adjacent

Complementary angles and supplementary angles can be either adjacent angles or nonadjacent angles.

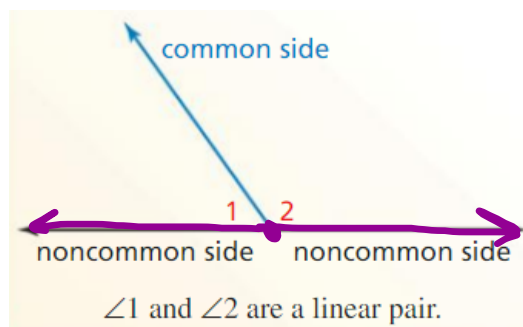
### Adjacent Angles

- Share a common vertex
- Share a common side (shared ray)
- No common interior points (no overlap)



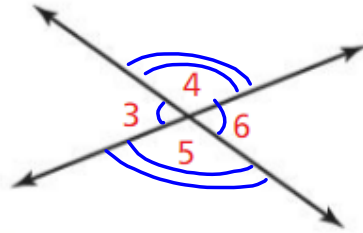
### Linear Pair

- Two adjacent angles whose noncommon sides are opposite rays.
- The angles are supplementary.  $part + part = 180$



### Vertical Angles

- Angles whose sides form two pairs of opposite rays
- Vertical Angles are congruent. (equal)



Note: angles  
formed by  
X

$\angle 3$  and  $\angle 6$  are vertical angles.  $\angle 3 \cong \angle 6$   
 $\angle 4$  and  $\angle 5$  are vertical angles.  $\angle 4 \cong \angle 5$

### Quick Definitions

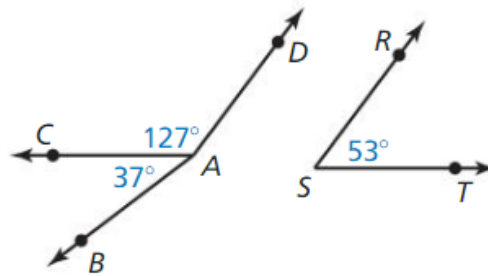
- Complementary = 2 angles that add up to  $90^\circ$
- Supplementary = 2 angles that add up to  $180^\circ$
- Linear Pair = 2 angles that form a straight angle
- Vertical Angles = 2 angles across from each other when 2 lines intersect.

Week of Oct 4-8

- Mon 10/4 - Angle Classifications
  - 1.6 p.52 #3-10,12,14,36-39,42,43,46
- Tues 10/5 - Word Problems
  - Comp/Supp Word Problems (#1-7)
- Wed 10/6 - Logic Statements Part 1
  - Logic HW #2,3
- Thu 10/7 - Logic Statements Part 2
  - Logic HW #5,9,10
- Fri 10/8 - Work Day
  - Midterm review next Mon/Tue
  - Midterm exam next Thu (Chapter 1 Test)

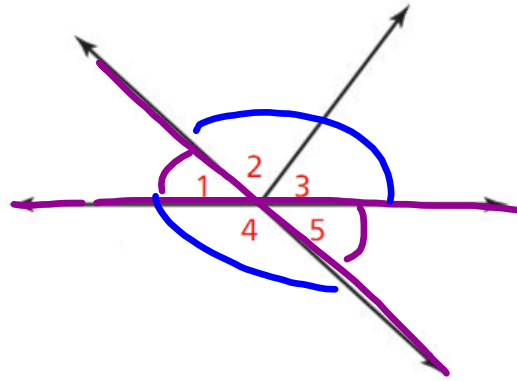
**EXAMPLE 1** Identifying Pairs of Angles

In the figure, name a pair of complementary angles, a pair of supplementary angles, and a pair of adjacent angles.



**EXAMPLE 2** Identifying Angle Pairs

Identify all the linear pairs and all the vertical angles in the figure.



$$\angle 1 \text{ and } \angle 4$$

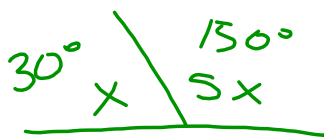
$$\angle 4 \text{ and } \angle 5$$

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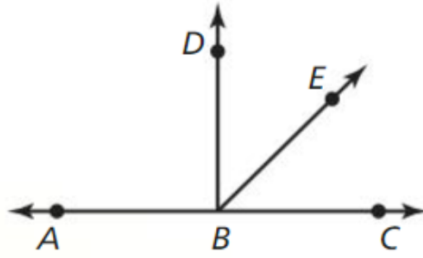

$$m\angle 4 \text{ and } \underbrace{m\angle 2 + m\angle 3}$$

**EXAMPLE 3** Finding Angle Measures in a Linear Pair

Two angles form a linear pair. The measure of one angle is five times the measure of the other angle. Find the measure of each angle.



$$\begin{aligned} x + 5x &= 180 \\ 6x &= 180 \\ x &= 30^\circ \end{aligned}$$



**YOU CAN CONCLUDE**

**CANNOT CONCLUDE**

- All points shown are coplanar
- $\angle ABC$  is a straight angle
- A, B, and C are collinear
- B is between A and C

- Congruent ( $\cong$ ) segments
- Congruent ( $\cong$ ) angles
- Right angles
- Relative size

46. **HOW DO YOU SEE IT?** Tell whether you can conclude that each statement is true based on the figure. Explain your reasoning.

*True* a.  $\overline{CA} \cong \overline{AF}$ . *same tick marks*

*True* b. Points C, A, and F are collinear.

*line CF has point A on it*

*False* c.  $\angle CAD \cong \angle EAF$ . *Not same markings and not vertical angles*

*False* d.  $\overline{BA} \cong \overline{AE}$ . *not same markings*

*True* e.  $\overrightarrow{CF}$ ,  $\overrightarrow{BE}$ , and  $\overrightarrow{AD}$  intersect at point A.

*True* f.  $\angle BAC$  and  $\angle CAD$  are complementary angles. *they are adjacent and make up box  $90^\circ$  angle*

*True* g.  $\angle DAE$  is a right angle.

$$90 + m\angle DAE = 180$$

$$-90 \quad -90$$

$$m\angle DAE = 90$$

*$\angle BAD$  and  $\angle DAE$  are a linear pair and  $\angle BAD$  is  $90^\circ$  so  $\angle DAE$  must be  $90^\circ$  to add to  $180^\circ$*



14)

12)

$$m\angle EFG + m\angle LMN = 180$$

$$\underline{3x + 12} + \underline{\frac{1}{2}x - 5} = 180$$

$$3\frac{1}{2}x + 12 = 180$$

$$\frac{2}{2}(\frac{7}{2}x) = (168) \frac{2}{7}$$

$$x = 48$$

$$m\angle EFG = 3(48) + 12 = 161^\circ$$

$$m\angle LMN = \frac{1}{2}(48) - 5 = 19^\circ$$



$$m\angle BAC + m\angle DAC = 90$$

$$\underline{15x - 2} + \underline{7x + 4} = 90$$

$$22x + 2 = 90$$

$$22x = 88$$

$$x = 4$$

$$m\angle BAC = 15(4) - 2 = 58^\circ$$

$$m\angle DAC = 7(4) + 4 = 32^\circ$$

Geometry (5) Name: \_\_\_\_\_ Period: \_\_\_\_\_  
Complementary and Supplementary Angles Word Problems

1.) The measure of the complement of an angle is 20 more than the measure of the angle. Find the measure of the angle.



$$(x) + (x + 20) = 90$$

$$2x + 20 = 90$$

$$2x = 70$$

$$x = 35^\circ$$

$35^\circ$   
 $55^\circ$

2.) The measure of the supplement of an angle is 60 more than measure of the angle. Find the measure of both the angle and its complement.

$$x + 60 = 120$$

$$x = 60^\circ$$

$$x + x + 60 = 180$$

$$2x + 60 = 180$$

$$2x = 120$$

$$x = 60^\circ$$

Complement of  $60^\circ$  is  $30^\circ$

3.) The complement of an angle is five times the measure of the angle. Find the measure of the supplement of the angle.



$$5x + x = 90$$

$$6x = 90$$

$$x = 15^\circ$$

Supplement to  $15^\circ$  is  $165^\circ$

4.) The measure of the supplement of an angle is twenty more than three times the measure of the angle. Find the complement and supplement of the angle.

$$x + 20 = 3x + 20$$

$$4x = 160$$

$$x = 40^\circ$$

Complement angle to  $40^\circ = 50^\circ$   
Supplement to  $40^\circ = 140^\circ$

5.)  $\angle 3$  is supplementary to  $\angle 4$ . If  $\angle 3$  and  $\angle 4$  are in a ratio of 3:2, find the complement of the smaller angle.

$$2x + 3x = 180$$

$$2x + 3x = 180$$

$$5x = 180$$

$$x = 36$$

$\angle 3 = 2(36) = 72^\circ$   
Complement to  $\angle 3 = 18^\circ$   
 $\angle 4 = 3(36) = 108^\circ$

6.)  $\angle 1 = (4w - 10)^\circ$  and  $\angle 2 = (129 - 8w)^\circ$ . If  $\angle 1$  is complementary to  $\angle 2$ , find the measure of  $\angle 1$ .

$$4w - 10 + 129 - 8w = 90$$

$$-4w + 119 = 90$$

$$-4w = -29$$

$$w = 7.25$$

$$\angle 1 + \angle 2 = 90$$

$$4w - 10 + 129 - 8w = 90$$

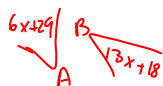
$$-4w + 119 = 90$$

$$-4w = -29$$

$$w = 7.25$$

$w = 7.25$   
 $\angle 1 = 4(7.25) - 10 = 19^\circ$

7.)  $\angle A = (6x + 29)^\circ$  and  $\angle B = (13x + 18)^\circ$ . If  $\angle A$  is supplementary to  $\angle B$ , find the measure of both angles.



$$\angle A + \angle B = 180$$

$$6x + 29 + 13x + 18 = 180$$

$$19x + 47 = 180$$

$$19x = 133$$

$$x = 7$$

$m\angle A = 6(7) + 29 = 71^\circ$   
 $m\angle B = 13(7) + 18 = 109^\circ$