

Your Name

Mrs. Theo

10/13/21

Notes

1.6 - Angle Relationships

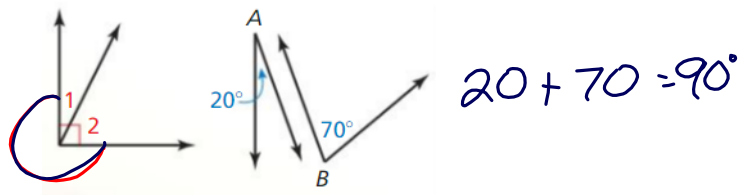
Lesson Objectives

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

Complementary Angles

Two positive angles whose measures have a sum of 90° . $angle + angle = 90$

Each angle is the complement of the other.



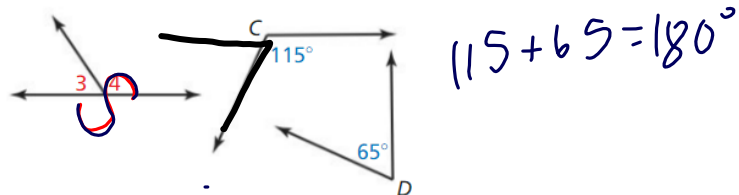
Adjacent

Non-Adjacent

Supplementary Angles

Two positive angles whose measures have a sum of 180° . $angle + angle = 180^\circ$

Each angle is the supplement of the other.



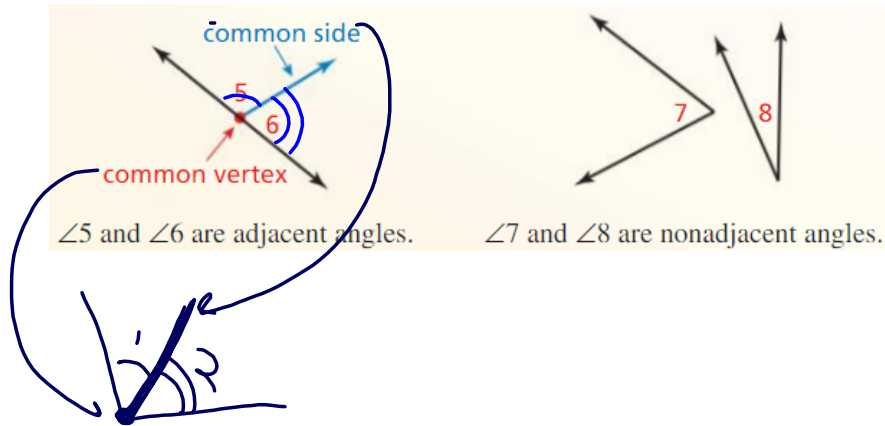
Adjacent

Non-Adjacent

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

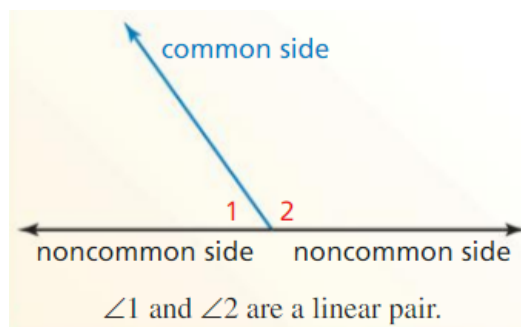
Adjacent Angles

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



Linear Pair

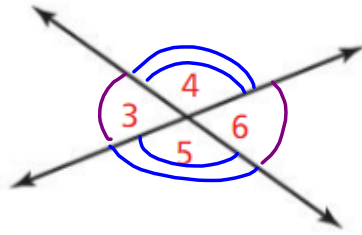
- Two adjacent angles whose noncommon sides are opposite rays.
- The angles are supplementary.
- Part + Part = 180



Vertical Angles

- Angles created by two intersecting lines
- Vertical Angles are congruent. *equal*

angle = angle



∠3 and ∠6 are vertical angles.

∠4 and ∠5 are vertical angles.

Congruent symbol

$\angle 3 \cong \angle 6$

$m\angle 4 = m\angle 5$

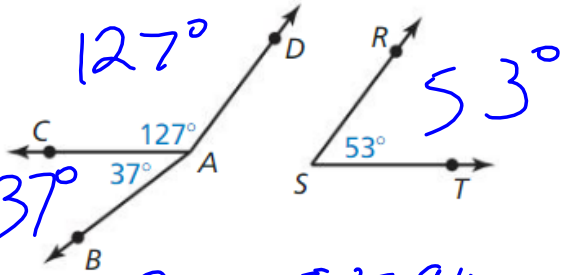
Measure of

Quick Definitions

- Complementary = 2 angles that add up to 90°
- Supplementary = 2 angles that add up to 180°
- Linear Pair = 2 angles that form a straight angle *or line*
- Vertical Angles = 2 angles across from each other when 2 lines intersect.

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.



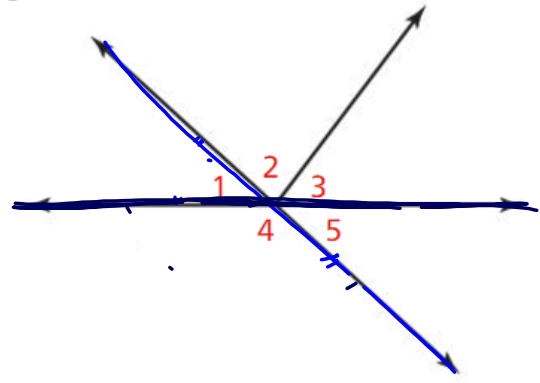
Complimentary: add up to 90 37°
 $\angle CAB$ and $\angle RST$ $37 + 53 = 90$

Supplementary: add up to 180 $127 + 53 = 180$
 $\angle CAD$ and $\angle RST$

Adjacent: Next to each other (share a side)
 $\angle DAC$ and $\angle BAC$

EXAMPLE 2 Identifying Angle Pairs

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



Linear Pairs:
 $\angle 1$ and $\angle 4$
 $\angle 4$ and $\angle 5$
 ~~$\angle 1$ and $\angle 3$~~

Vertical Angles
 $\angle 1$ and $\angle 5$

EXAMPLE 3

Finding Angle Measures in a Linear Pair

Two angles form a linear pair. The measure of one angle is 5 times the measure of the other angle. Find the measure of each angle.

$$30^\circ = x^\circ \quad (5x)^\circ = 150^\circ$$

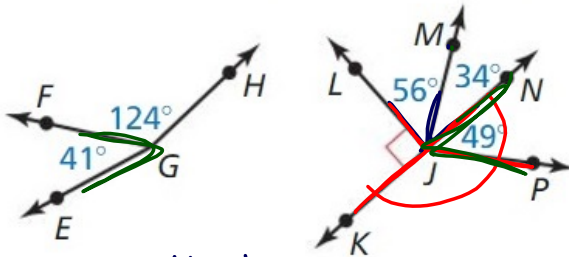
$$\text{Part} + \text{part} = 180$$

$$x + 5x = 180$$

$$\frac{6x}{6} = \frac{180}{6}$$

$$x = 30^\circ$$

In Exercises 3–6, use the figure. (See Example 1.)



3. Name a pair of adjacent complementary angles.
 Next to add to 90 : $\angle LJM$ and $\angle MJN$
 $56 + 34 = 90$
4. Name a pair of adjacent supplementary angles.
 add to 180 $\angle KJL$ and $\angle LJN$
 $90 + (56 + 34) = 180$
5. Name a pair of nonadjacent complementary angles.
 not next to $\angle NJP$ and $\angle PJK$
 $49 + \underline{\quad} = 90$
6. Name a pair of nonadjacent supplementary angles.
 $\angle FGE$ and $\angle NJP$
 $41 + 49 = 90$

$$\angle FGH \text{ and } \angle LJM$$

In Exercises 7–10, find the angle measure.

(See Example 2.)

7. $\angle 1$ is a complement of $\angle 2$, and $m\angle 1 = 23^\circ$.
Find $m\angle 2$.

add up to 90
 $\angle 1 + \angle 2 = 90$
 $23 + \angle 2 = 90$
 $\angle 2 = 67$

8. $\angle 3$ is a complement of $\angle 4$, and $m\angle 3 = 46^\circ$.
Find $m\angle 4$.

$\angle 3 + \angle 4 = 90$
 $46 + m\angle 4 = 90$
 $m\angle 4 = 44$

9. $\angle 5$ is a supplement of $\angle 6$, and $m\angle 5 = 78^\circ$.
Find $m\angle 6$.

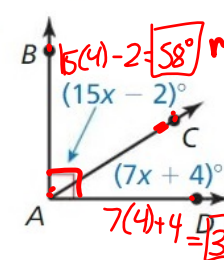
add to 180
 $m\angle 5 + m\angle 6 = 180$
 $78 + m\angle 6 = 180$
 -78
 $m\angle 6 = 102$

10. $\angle 7$ is a supplement of $\angle 8$, and $m\angle 7 = 109^\circ$.
Find $m\angle 8$.


$m\angle 7 + m\angle 8 = 180$
 $109 + m\angle 8 = 180$
 -109
 $m\angle 8 = 71$

In Exercises 11–14, find the measure of each angle.

(See Example 3.)

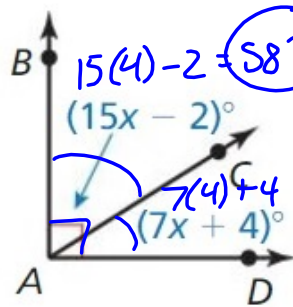
12.  $m\angle BAC + m\angle CAD = 90$
 $15x - 2 + 7x + 4 = 90$
 $22x + 2 = 90$
 $22x = 88$
 $x = 4$
 $7(4) + 4 = 32$

14. $\angle EFG$ and $\angle LMN$ are supplementary angles,
 $m\angle EFG = (3x + 17)^\circ$, and $m\angle LMN = (\frac{1}{2}x - 5)^\circ$.


 $m\angle EFG + m\angle LMN = 180$
 $3x + 17 + \frac{1}{2}x - 5 = 180$
 $3.5x + 12 = 180$
 $3.5x = 168$
 $x = 48$
 $m\angle EFG = 3(48) + 17 = 161$
 $m\angle LMN = \frac{1}{2}(48) - 5 = 19$

In Exercises 11-14, find the measure of each angle.
(See Example 3.)

12.



Complementary

$$\begin{aligned} \text{angle} + \text{angle} &= 90 \\ (15x - 2) + (7x + 4) &= 90 \\ 22x + 2 &= 90 \\ 22x &= 88 \\ x &= 4 \end{aligned}$$

14. $\angle EFG$ and $\angle LMN$ are supplementary angles,
 $m\angle EFG = (3x + 17)^\circ$, and $m\angle LMN = (\frac{1}{2}x - 5)^\circ$.

$$\begin{aligned} m\angle EFG + m\angle LMN &= 180 \\ (3x + 17) + (\frac{1}{2}x - 5) &= 180 \\ 3.5x + 12 &= 180 \end{aligned}$$

14)

12)

$$\begin{aligned} m\angle EFG + m\angle LMN &= 180 \\ 3x + 17 + \frac{1}{2}x - 5 &= 180 \end{aligned}$$

$$\begin{aligned} 3\frac{1}{2}x + 12 &= 180 \\ \frac{7}{2}x &= 168 \\ x &= 48 \end{aligned}$$

$$m\angle EFG = 3(48) + 17 = 161^\circ$$

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



$$\begin{aligned} m\angle BAC + m\angle DAC &= 90 \\ 15x - 2 + 7x + 4 &= 90 \\ 22x + 2 &= 90 \\ 22x &= 88 \\ x &= 4 \end{aligned}$$

$$\begin{aligned} m\angle BAC &= 15(4) - 2 = 58^\circ \\ m\angle DAC &= 7(4) + 4 = 32^\circ \end{aligned}$$

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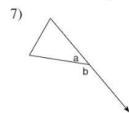
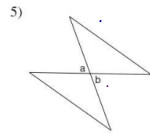
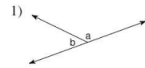
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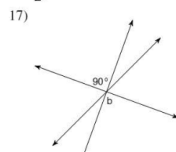
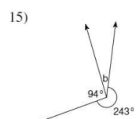
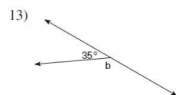
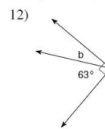
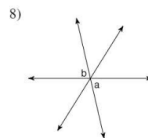
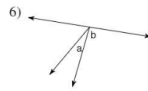
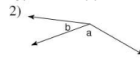
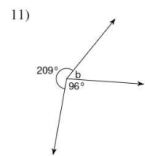
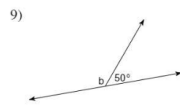
Angle Pair Relationships

Date _____ Period _____

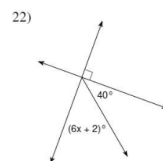
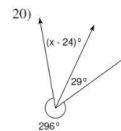
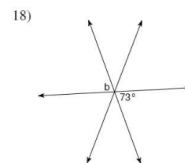
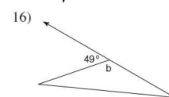
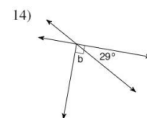
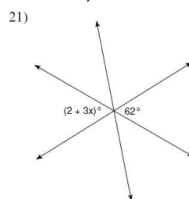
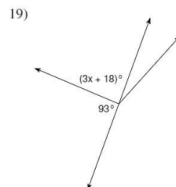
Name the relationship: complementary, linear pair, vertical, or adjacent.
(Supplementary), or supplementary



Find the measure of angle b.



Find the value of x.



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Name _____ Date _____ Period _____

Angle Pair Relationships

Name the relationship: complementary, linear pair, vertical, or adjacent

1) linear pair because $\angle a$ and $\angle b$ form a straight line
 2) linear pair because $\angle a$ and $\angle b$ form a straight line
 3) adjacent
 4) complementary because $\angle a + \angle b + 90^\circ = 180^\circ$ because together all 3 angles form a line. If we subtract 90° from both sides, and you get $\angle a + \angle b = 90^\circ$ def. compl.
 5) vertical
 6) adjacent because $\angle a$ and $\angle b$ share a common side but do not form a line or right angle
 7) linear pair
 8) vertical

Find the measure of angle b.

9) 130°
 Linear Pair
 $m\angle b + 50^\circ = 180^\circ$
 $50 - 50$
 $m\angle b = 130^\circ$
 10) 43°
 Vertical angle = angle
 $m\angle b = 43^\circ$
 11) 55°
 Adjacent
 Part + Part = whole
 $m\angle b + 96^\circ = 151^\circ$
 $-96 -96$
 $m\angle b = 55^\circ$
 12) 27°
 63°

13) 145°
 36°
 14) 61°
 29°
 15) 23°
 $360 - 243 = 117^\circ$
 94°
 243°
 16) 131°
 49°
 17) 90°
 90°
 18) 73°
 73°

Find the value of x.

19) 23
 $(3x + 18)^\circ$
 93°
 20) 59
 $(x - 24)^\circ$
 29°
 296°
 $360 - 296 = 64$
 Adjacent
 Part + Part = whole
 $x - 24 + 29 = 64^\circ$
 $x + 5 = 64^\circ$
 $x = 59$
 21) 20
 Vertical
 $(2 + 3x)^\circ$
 62°
 $2 + 3x = 62$
 22) 8
 40°
 $(8x + 2)^\circ$