

Lesson 1-6 - Pairs of Angles

Agenda

- Check and Review Homework 1-5
- Warm Up Quiz *Need Pouch
- Lesson 1-6 Notes

Homework - Day 6

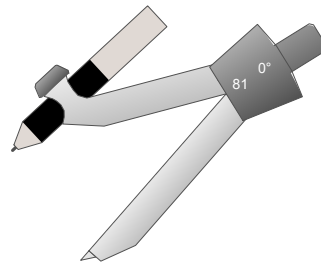
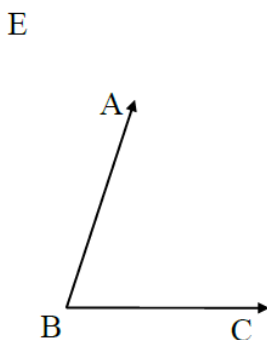
Textbook p. 32 # 14-22,32,33,36,37(Extra Credit - p. 33 #44)

Quiz - Next Class Lessons 1-6

Complete Lesson Summaries to prepare for Quiz

1) Copy $\angle ABC$ onto the given ray

2) Construct the angle bisector \overrightarrow{AD} of $\angle A'B'C'$



180°

$3x-8$, $5x+10$, $4x-2$

$0 < 5x+12 < 90$

$0^\circ < 5x+12 < 90^\circ$

$-12 \quad -12$

$-\frac{12}{5} < \frac{5x}{5} < \frac{78}{5}$

$-\frac{12}{5} < x < 15.6$

$0 < x < 15.6$

Geometry + LAB Name _____ Class _____ Due _____

Worksheet 1-5R and 1-6L: Measuring & Constructing Angles

HALVES OF \cong ANGLES ARE \cong

1. Follow the steps and answer the questions:

a. Copy $\angle ABC$ onto M . Label the new angle $\angle LMN$.

b. Bisect $\angle ABC$. Label the angle bisector \overline{BD} .

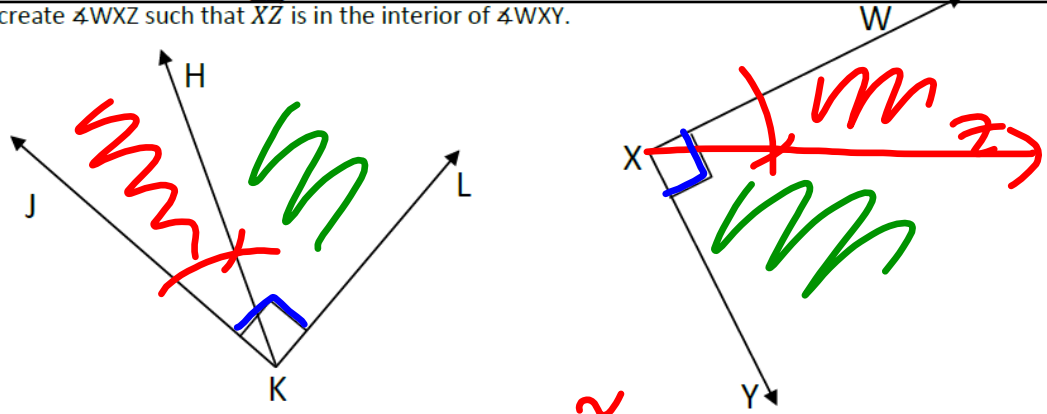
c. Bisect $\angle LMN$. Label the angle bisector \overline{MP} .

d. What is the relationship between $\angle ABC$ and $\angle LMN$? _____
Why? _____

e. Measure the following: $m\angle ABC$ _____ $m\angle LMN$ _____ $m\angle DBC$ _____

f. What do you predict is the relationship between $\angle ABD$ and $\angle PMN$? _____
Why? _____

2. Copy $\angle JKH$ to create $\angle WXZ$ such that XZ is in the interior of $\angle WXY$.

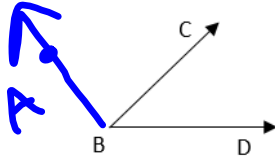


- a. What is the relationship between $\angle JKH$ and $\angle WXZ$? _____ 112
 Why? _____
- b. What is the relationship between $\angle JKL$ and $\angle WXY$? _____ 112
 Why? _____
- c. What do you predict is the relationship between $\angle HKL$ and $\angle ZXY$? _____
 Why? _____

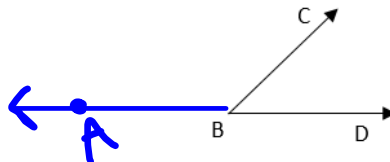
Geometry + LAB Name: _____ Date: _____ Class: _____
 Lesson 1-6R & 1-7L Note Sheet: Pairs of Angles

Definitions:

- **Adjacent Angles:** Two angles which share a common RAY and VERTEX but no interior points. The angles must be coplanar. Draw $\angle ABC$ adjacent to $\angle CBD$:



- **Linear Pair:** Two adjacent angles whose non-common sides are OPPOSITE RAYS (form a straight line). Draw $\angle ABC$ as a linear pair angle to $\angle CBD$:



EXAMPLE 1 Identifying Angle Pairs

Tell whether the angles are only adjacent, adjacent and form a linear pair, or not adjacent.

A $\angle 1$ and $\angle 2$ **ADJACENT**

B $\angle 2$ and $\angle 4$ **NOT ADJACENT**

C $\angle 1$ and $\angle 3$ **ADJACENT LINEAR PAIR**

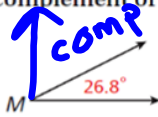
Angle Pairs:

- Complementary Angles:** Two angles whose measures sum to 90° . Note: the angles do not have to be adjacent. Examples:
 -
 -
- Supplementary Angles:** Two angles whose measures sum to 180° . Note: the angles do not have to be adjacent.
 - 1) Draw two supplementary non-adjacent angles:
 - 2) Draw two supplementary adjacent angles:
- To use the angle addition postulate and complementary/supplementary pairs with angles A and B:**
 - Equation: $m\angle A + m\angle B = 90^\circ$ Reason: **2 ANGLES THAT SUM TO 90° ARE COMPLEMENTARY**
 - Equation: $m\angle A + m\angle B = 180^\circ$ Reason: **SUPPLEMENTARY \angle 'S SUM TO 180°**
- To relate the two little angles (angle plus its pair)**
 - Equation: $m\angle A + \text{COMP} = 90^\circ$ Reason: Complementary angles add to 90°
 - Equation: $m\angle A + \text{SUPP} = 180^\circ$ Reason: Supplementary angles add to 180°

EXAMPLE 2 Finding the Measures of Complements and Supplements

Find the measure of each of the following.

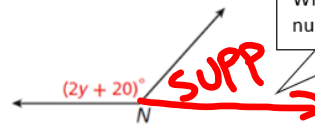
A complement of $\angle M$



Equation: $m\angle M + \text{COMP} = 90^\circ$
 Reason: **COMPLEMENTARY ANGLES SUM TO 90°**

$$\begin{array}{r} 26.8^\circ + \text{COMP} = 90^\circ \\ -26.8^\circ \qquad -26.8^\circ \\ \hline \text{COMP} = 63.2^\circ \end{array}$$

B supplement of $\angle N$



Equation: $m\angle N + \text{SUPP} = 180^\circ$
 Reason: **SUPPLEMENTARY ANGLES SUM TO 180°**

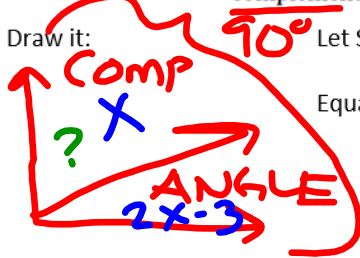
$$\begin{array}{r} (2y + 20) + \text{SUPP} = 180^\circ \\ -20 \qquad -20 \\ \hline 2y + \text{SUPP} = 160 \\ -2y \qquad -2y \\ \hline \text{SUPP} = (160 - 2y) \end{array}$$

Watch who you are solving for and your algebra! Can you use the same variable? Will you get a numerical answer?

EXAMPLE 3A Using Complements and Supplements to Solve Problems

An angle measures 3 degrees less than twice the measure of its complement. Find the measure of its complement.

Draw it:



Let Statements:

$$\begin{array}{l} x = \text{COMP} \\ \text{ANGLE} = 2x - 3 \end{array}$$

Equation:

$$m\angle + \text{COMP} = 90^\circ$$

$$(2x - 3) + x = 90$$

$$3x - 3 = 90$$

$$3x = 93$$

$$x = 31$$

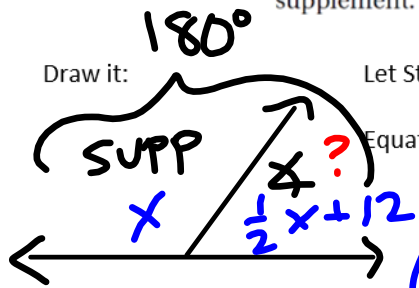
COMPLEMENTARY ANGLES SUM TO 90°

$$\boxed{\text{COMP} = 31^\circ}$$

$$\begin{array}{r} x: 2(31) - 3 = \\ 59 \\ \hline 90^\circ \checkmark \end{array}$$

-Draw a picture and label your angles!
 -Use "let" statements.
 -Check your answers.

EXAMPLE 3B An angle's measure is 12° more than $\frac{1}{2}$ the measure of its supplement. Find the measure of the angle.



Let Statements: $x = \text{SUPP}$
 $x = \frac{1}{2}x + 12$
 Equation: $x + \text{SUPP} = 180^\circ$ Reason: SUPPLEMENTARY ANGLES SUM TO

$$1.5x = 168$$

$$x = \frac{168}{1.5}$$

$$\left(\frac{1}{2}x + 12\right) + (x) = 180^\circ$$

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

$$\frac{3}{2}x = 168$$

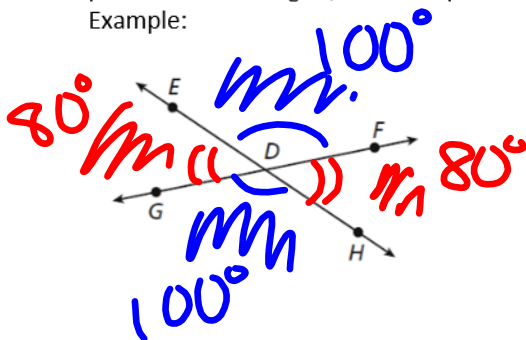
$$x = 112$$

ANGLE $\frac{1}{2}(112) + 12$
 $56 + 12$
 68°
 $112^\circ + 68^\circ = 180^\circ$
 $180 = 180^\circ \checkmark$

Definition:

- Vertical Angles:** 2 non-adjacent angles formed by 2 INTERSECTING LINES. This forms two pairs of vertical angles, and each pair of angles will be congruent.

Example:



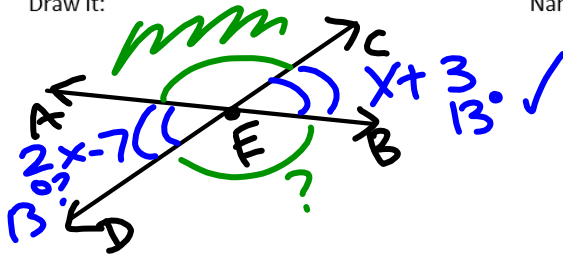
- $\angle EDG$ & $\angle FDH$ are vertical angles
 $\angle GDH$ & $\angle EDF$ are vertical angles

- Therefore $\angle EDG \cong \angle FDH$ and $\angle GDH \cong \angle EDF$ because VERTICAL ANGLES PAIRS ARE \cong

Example 4) \overline{AB} & \overline{CD} intersect at E.

Draw it:

Name the angle vertical to $\angle AEC$: $\angle DEB$



If $m\angle CEB = (x + 3)^\circ$ and $m\angle DEA = (2x - 7)^\circ$, determine the value of x , $m\angle DEA$, and $m\angle DEB$.

Statement: $\angle DEA \cong \angle CEB$ Reason: VERTICAL \angle PAIRS ARE \cong ANGLES

Equation: $m\angle DEA = m\angle CEB$ Reason: HAVE EQUAL MEASURE

$2x - 7 = x + 3$

$x = 10$

$m\angle DEA = 2(10) - 7 = 13^\circ$
 $m\angle DEA$

Statement: $\angle DEA$ SUPP $\angle DEB$ Reason: A linear pair of angles is supplementary

Equation: $m\angle DEA + m\angle DEB = 180^\circ$ Reason: SUPPLEMENTARY \angle 'S SUM TO 180°

$13^\circ + m\angle DEB = 180^\circ$

$m\angle DEB = 167^\circ$

Exit Pass: Identify the following pairs of angles from the given diagram with right angles $\angle CEF$ & $\angle DEF$.

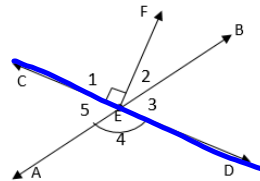
a) The angle adjacent to $\angle 2$: $\angle 1$ OR $\angle 3$

b) The linear pairs angle to $\angle 5$: $\angle 4$
(these angles are also SUPP)

c) The supplement of $\angle 3$: $\angle 4$

d) The vertical angle pair of $\angle 3$: $\angle 5$

e) The complement of $\angle 3$: $\angle 2$



f) Review your knowledge and apply new angle pair relationships:

a. $m\angle DEF = 90^\circ$ because RIGHT \angle MEASURES 90°
 $m\angle 2 + m\angle 3 = m\angle DEF$ because \angle ADDITION POSTULATE
 Therefore, $m\angle 2 + m\angle 3 = 90^\circ$ by substitution making $\angle 2$ & $\angle 3$ complementary because COMP \angle 'S SUM TO 90°

b. $\angle CEB \cong \angle 4$ because VERTICAL \angle 'S ARE \cong
 $m\angle CEB = m\angle 4$ because $\cong \angle \rightarrow$ MEASURE