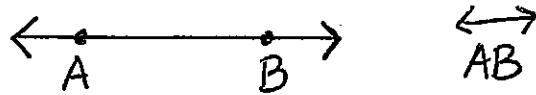


Math 8 Angles Unit

~Study Guide~

Name : _____

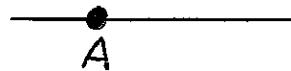
- Line



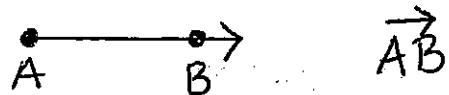
- Line Segment



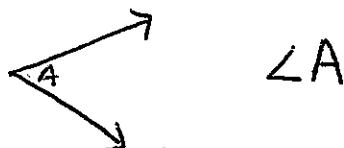
- Point



- Ray

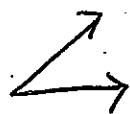


- Angle



Topic: Classifying Angles

Acute



less than
 90°

Right



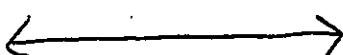
Exactly 90°

Obtuse



More than 90°
Less than 180°

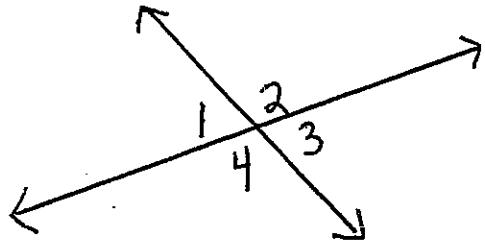
Straight



Exactly 180°

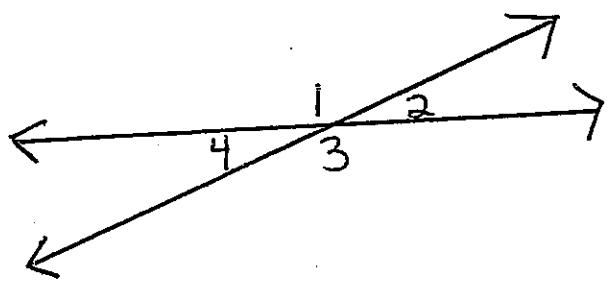
Topic: Adjacent and Vertical Angles

- Adjacent Angles (Next to one another)



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

- Vertical Angles (Opposite one another)

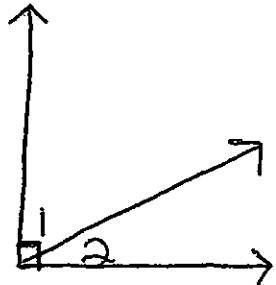


$\angle 1$ and $\angle 3$
are vertical.

* Vertical angles
are congruent.

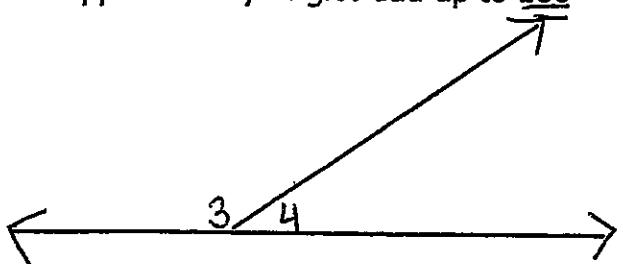
Topic: Complementary and Supplementary Angles

- Complementary Angles add up to 90°



$\angle 1$ and $\angle 2$ are
complementary.

- Supplementary Angles add up to 180°



$\angle 3$ and $\angle 4$
are supplementary.

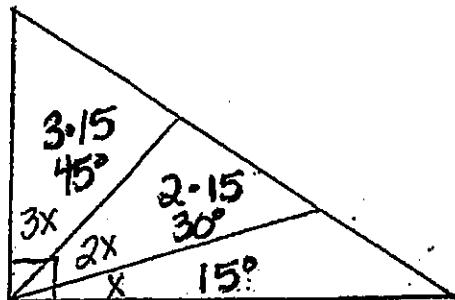
Adjacent: two angles that are next to each other.

Complementary: two or more angles that add up to 90° .

Right Angle: 90° angle

Complementary Angles \rightarrow Add up to 90°

A. Find the missing angle.

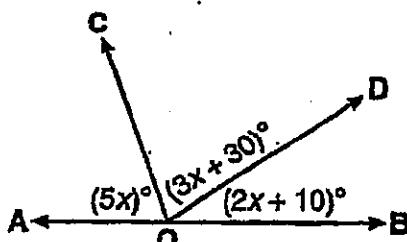


$$3x + 2x + x = 90^\circ$$

$$\begin{aligned} 6x &= 90 \\ 6 &\quad 6 \\ x &= 15 \end{aligned}$$

Supplementary Angles \rightarrow Add up to 180°

In the accompanying diagram, \overline{AOB} is a straight line, $m\angle AOC = 5x^\circ$, $m\angle COD = (3x + 30)^\circ$, and $m\angle DOB = (2x + 10)^\circ$.



$$5x + 3x + 30 + 2x + 10 = 180$$

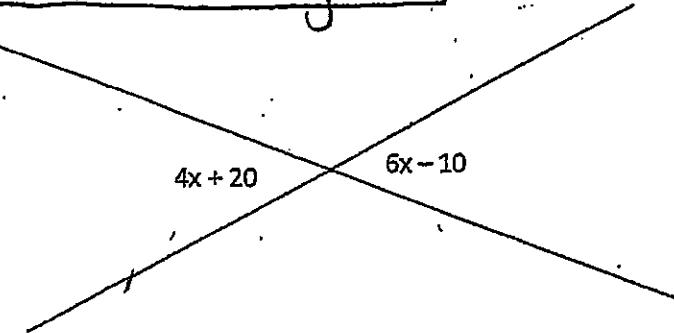
$$\begin{array}{r} 10x + 40 = 180 \\ -40 \quad -40 \\ \hline 10x = 140 \end{array}$$

$$\begin{array}{r} 10 \\ \hline x = 14 \end{array}$$

* Set up an equation that adds up all the angles and set it equal to 180°

* Plug into each angle if it tells you to find the angle measures.

Vertical Angles



*These are vertical angles and should be set equal to one another.

$$4x + 20 = 6x - 10$$

$$\begin{array}{r} -4x \\ \hline 20 = 2x - 10 \\ +10 \quad \quad \quad +10 \\ \hline \frac{30}{2} = \frac{2x}{2} \end{array}$$

$$\underline{15 = X}$$

*Plug in to find angle measurements.

$$4x + 20$$

$$4 \cdot 15 + 20$$

$$60 + 20$$

$$80^\circ$$

$$6x - 10$$

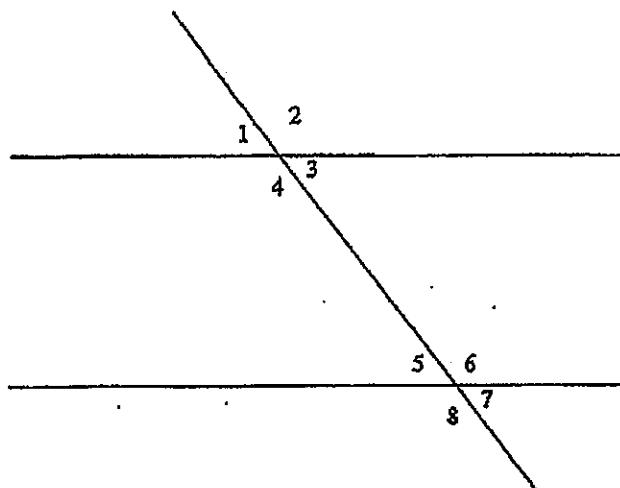
$$6 \cdot 15 - 10$$

$$75 - 10$$

$$65$$

Angle Relationships

II. Defining angle relationships:



1. Alternate Interior: $\angle 3$ and $\angle 5$, $\angle 4$ and $\angle 6$

2. Alternate Exterior: $\angle 1$ and $\angle 7$, $\angle 2$ and $\angle 8$

3. Corresponding: $\angle 1$ and $\angle 5$, $\angle 2$ and $\angle 6$

4. Vertical: $\angle 2$ and $\angle 4$, $\angle 5$ and $\angle 7$

5. Same Side Interior: $\angle 4$ and $\angle 5$, $\angle 3$ and $\angle 6$

6. Same Side Exterior: $\angle 1$ and $\angle 8$, $\angle 2$ and $\angle 7$

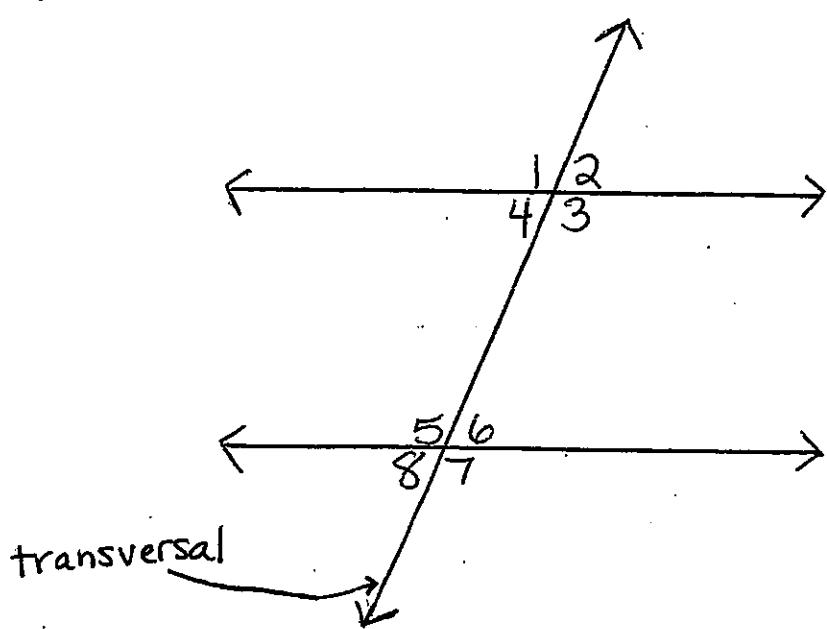
7. Supplementary: $\angle 1$ and $\angle 2$, $\angle 6$ and $\angle 7$, $\angle 3$ and $\angle 2$

Congruent
(equal)

Supplementary
(Add up to 180°)

You must know the names of the angle relationships.

Topic: Parallel Lines and Transversals



Vertical Angles

$\angle 1$ and $\angle 3$

$\angle 2$ and $\angle 4$

$\angle 5$ and $\angle 7$

$\angle 6$ and $\angle 8$

Adjacent and Supplementary

$\angle 1$ and $\angle 2$

$\angle 2$ and $\angle 3$

$\angle 5$ and $\angle 8$

(and others as well)

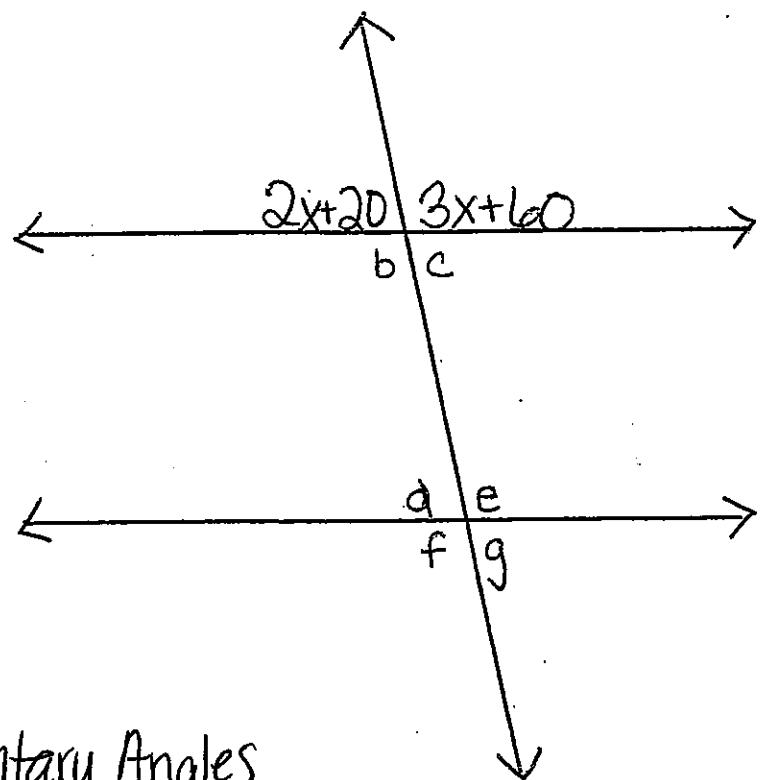
If $\angle 1 = 120^\circ$, what is the measure of $\angle 2$?

$$180^\circ - 120^\circ = 60^\circ$$

If $\angle 6 = 60^\circ$, what is the measure of $\angle 8$?

$\angle 6 = \angle 8$ (b/c they are vertical)

$$\angle 8 = 60^\circ$$



Supplementary Angles

1) Find x.

$$2x + 20 + 3x + 60 = 180^\circ$$

$$\begin{array}{r} 5x + 80^\circ = 180^\circ \\ -80 \quad -80 \\ \hline 5x = 100 \\ \frac{5x}{5} = \frac{100}{5} \\ x = 20 \end{array}$$

3) Find the measure of $\angle b$.

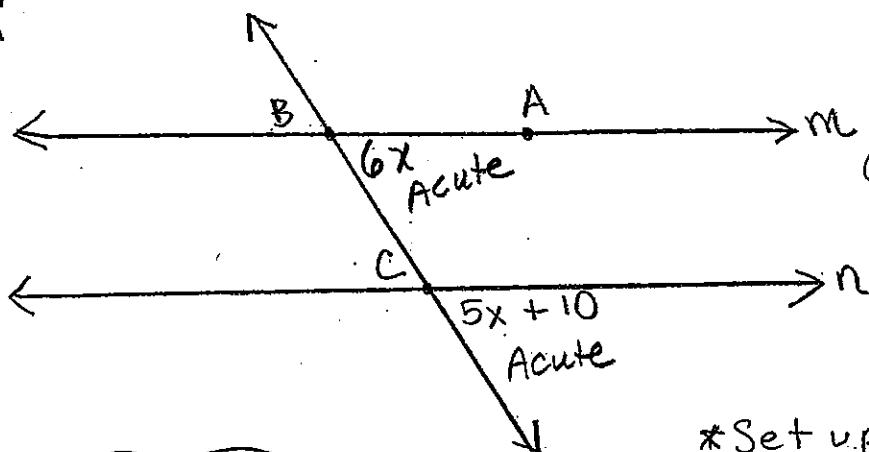
$$\begin{aligned} & 3x + 60 \\ & 3(20) + 60 \\ & 60 + 60 \\ & 120^\circ \end{aligned}$$

2) Find the measure of $\angle c$.

$$\begin{aligned} & 2x + 20 \\ & 2(20) + 20 \\ & 40 + 20 \\ & \textcircled{60^\circ} \end{aligned}$$

Corresponding Angles

(line m is parallel to line n)
 $m \parallel n$



Acute = Acute

Obtuse = Obtuse

Obtuse + Acute = 180

Set up equation

$$6x = 5x + 10$$

$$\begin{array}{r} -5x \\ \hline \end{array}$$

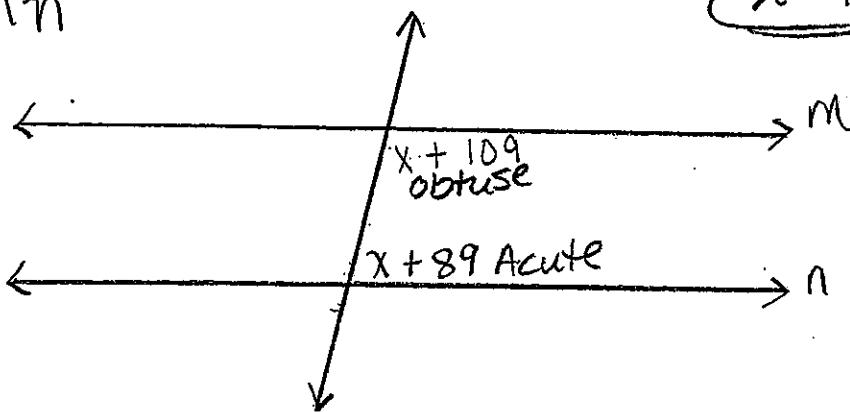
Find $m\angle ABC \rightarrow 6x$
 $6 \cdot 10$
 60°

$$\frac{1x}{1} = \frac{10}{1}$$

$$x = 10$$

Same Side Interior

$m \parallel n$



Find x .

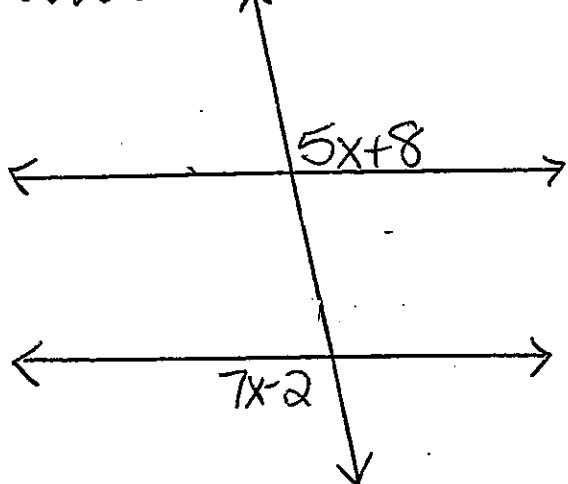
$$x + 109 + x + 89 = 180$$

$$\begin{array}{r} 2x + 198 = 180 \\ -198 \quad -198 \\ \hline \end{array}$$

$$\begin{array}{r} 2x = -18 \\ \hline 2 \end{array}$$

$$x = -9$$

Alternate Exterior



① Find x.

$$\begin{array}{r}
 5x + 8 = 7x - 2 \\
 -7x \quad -7x \\
 \hline
 -2x + 8 = -2 \\
 -8 \quad -8 \\
 \hline
 -2x = -10 \\
 -2 \quad -2 \\
 \hline
 x = 5
 \end{array}$$

② Find each angle.

$$5x + 8$$

$$5(5) + 8$$

$$25 + 8$$

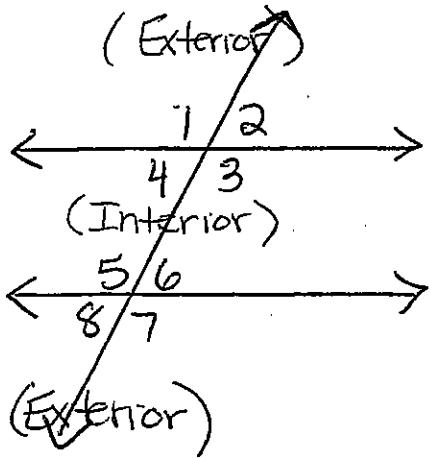
$$\textcircled{33}$$

$$7x - 2$$

$$7(5) - 2$$

$$35 - 2$$

$$\textcircled{33}$$



Alternate Exterior Angles

$\angle 1$ and $\angle 7$

$\angle 2$ and $\angle 8$

* These angles are congruent.

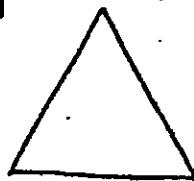
Alternate Interior Angles

$\angle 4$ and $\angle 6$

$\angle 3$ and $\angle 5$

* These angles are congruent

Triangles and Algebra



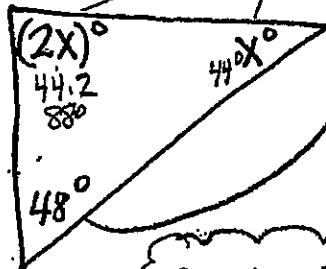
The sum of the interior angles of a triangle add up to 180° .

Therefore, your equation should look like this:

$$\frac{2x}{\text{1st angle}} + \frac{x}{\text{2nd angle}} + \frac{48}{\text{3rd angle}} = 180^\circ$$

Examples:

(1)



SOLVE

$$2x + x + 48 = 180$$

✓

$$3x + 48 = 180$$

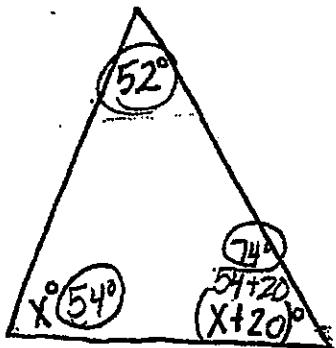
$$\underline{-48 \quad -48}$$

$$\frac{3x}{3} = \frac{132}{3}$$

$$x = 44$$

Check: $88^\circ + 44^\circ + 48^\circ = 180^\circ \checkmark$

(2)



$$x + (x+20) + 52 = 180$$

$$2x + 72 = 180$$

$$\underline{-72 \quad -72}$$

$$\frac{2x}{2} = \frac{108}{2}$$

$$x = 54$$

Check: $54^\circ + 52^\circ + 74^\circ$

$180^\circ \checkmark$

Triangles and Word Problems

The measures of the three angles of ΔABC are described. Find all three measures.

The measure of $\angle B$ is three times the measure of $\angle A$. The measure of $\angle C$ is five times the measure of $\angle A$.

1st: Write let statements.

Let $x = m \angle A$ (measure of angle A)

Let $3x = m \angle B$

Let $5x = m \angle C$

2nd: Set up an equation.

$$x + 3x + 5x = 180$$

**The three angles in a triangle add up to 180° .

3rd: Combine like terms.

$$9x = 180$$

4th: Solve for x.

$$\frac{9x}{9} = \frac{180}{9}$$

$$x = 20$$

5th: Plug $x = 20$ into each let statement to find the three angles of the triangle.

$$m \angle A$$

$$20^\circ$$

$$m \angle B$$

$$3(20)$$

$$60^\circ$$

$$m \angle C$$

$$5(20)$$

$$100^\circ$$

6th: Check

$$20 + 60 + 100 = 180$$

Exterior Angles (Triangle)

Relationship between Exterior and Remote
Interior Angles in a Triangle

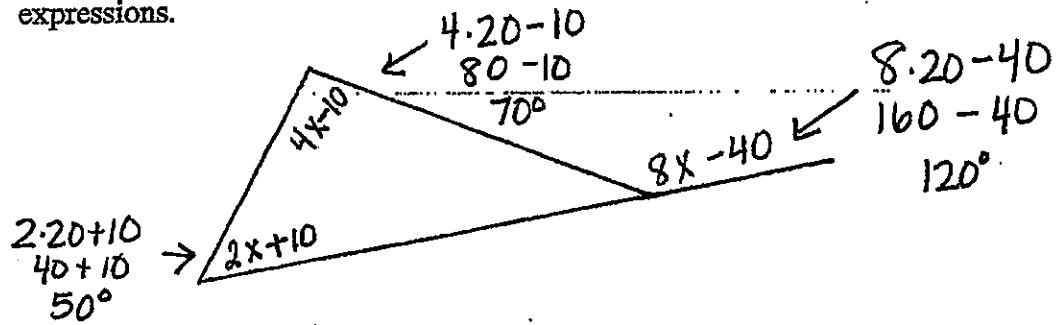


$\angle A$ = exterior angle
 $\angle C$ = remote interior angle
 $\angle D$ = remote interior angle

exterior angle = sum of the remote interior angles

$$\angle A = \angle C + \angle D$$

Find x. Then find the angle measures represented by the given algebraic expressions.



* Add the two opposite angles and set them equal to the exterior angle (outside).

$$2x+10 + 4x-10 = 8x-40$$

$$\begin{array}{rcl} 6x + 0 & = & 8x - 40 \\ -6x & & -6x \\ \hline \end{array}$$

$$\begin{array}{rcl} 0 & = & 2x - 40 \\ +40 & & +40 \\ \hline 40 & = & 2x \end{array}$$

$$\frac{40}{2} = \frac{2x}{2}$$

$$(x=20)$$

