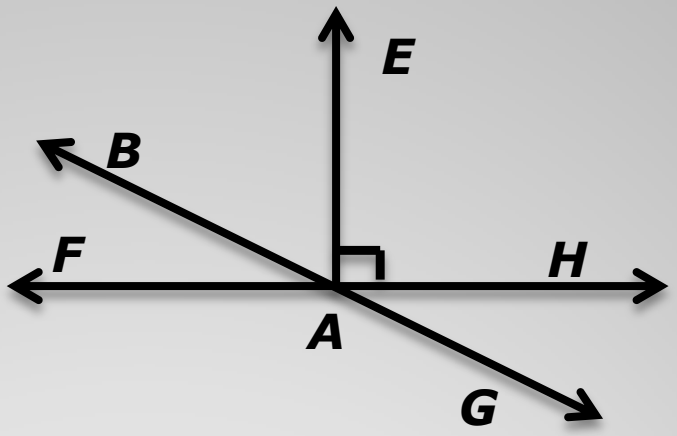
Geometry: Unit 2

Special Pairs of Angles

Warmup

- Refer to the diagram and complete the statement and solve the problem.



- 1. If $\overrightarrow{AB}$ was the angle_____ of $< EAF$, then $< EAB$ and $< BAF$ would be the _____ angles.

- 2. Using the above statement, Find the values of $m < EAB$ and $m < BAF$ if $< EAF$ was a right angle.

Special Pairs of Angles

- **Content Objective:** Students will be able to identify and solve problems involving Complementary, Supplementary, and Vertical Angles.

- **Language Objective**: Students will be able to use definitions of special pairs of angles to complete statements.

Different Types of Angles

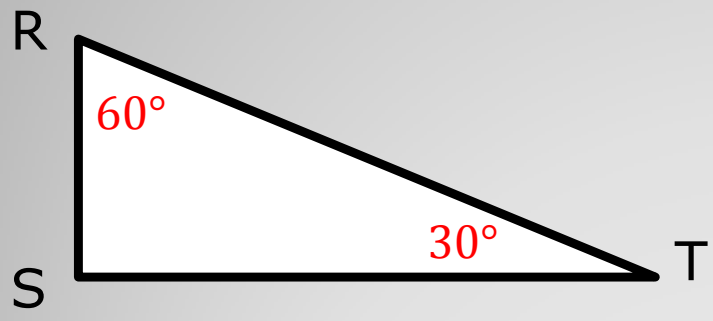
- Angles are classified according to their measures (in degrees for us).

- **Acute Angle:** Measures less than $90°$
- **Right Angle:** Measure of exactly $90°$
- **Obtuse Angle:** Measures larger then $90°$**,** but less than $180°$
- **Straight Angle:** Measure of exactly $180°$

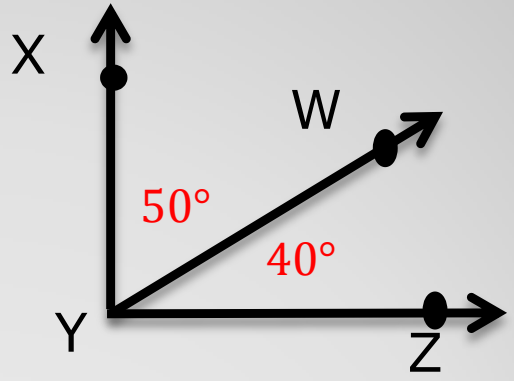
Complementary Angles

- **Complementary Angles** are two angles whose measures have a sum of $90°$.

- Examples of Complementary Angles:



$< R$ and $< T$ are complementary

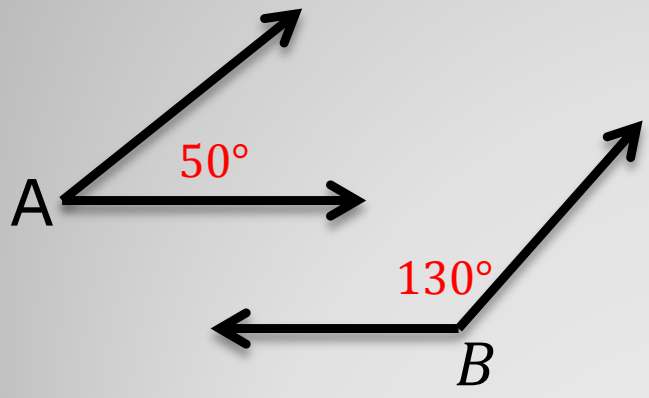


$< XYW$ and $< WYZ$ are complementary

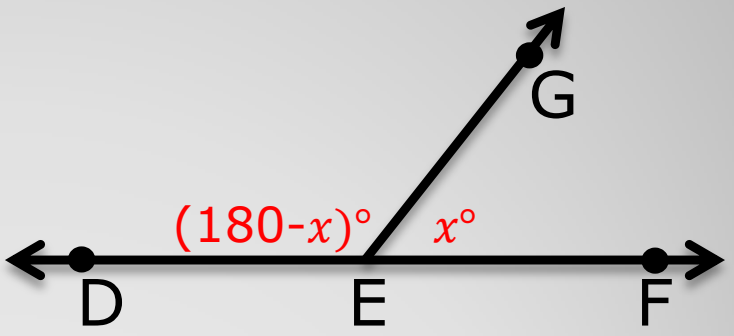
Supplementary Angles

- **Supplementary Angles** are two angles whose measures have a sum of $180°$.

- Examples of Supplementary Angles:



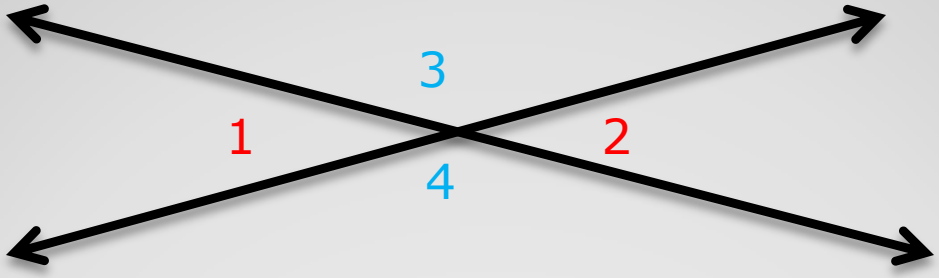
$< A$ and $< B$ are supplementary



$< DEG$ and $< GEF$ are supplementary

Vertical Angles

- **Vertical Angles** are two angles that are opposite each other when two or more lines intersect.
- An Example of vertical angles:

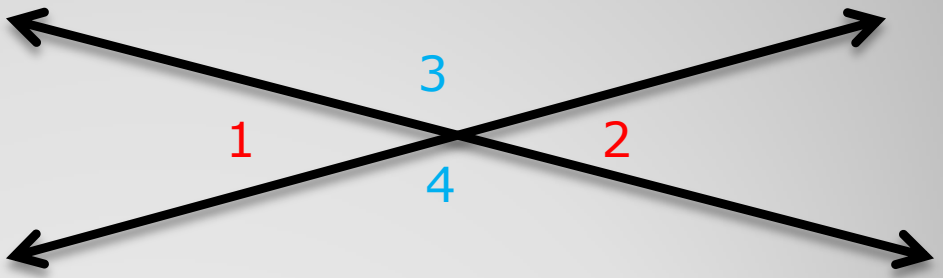


The pairs of < 1 and < 2 along with < 3 and < 4 are vertical angles.

Vertical Angle Theorem

- **Theorem 2-3** (Pg. 51 of your textbook): Vertical Angles are Congruent.

- Proof: In Textbook (Pg. 51). *We will work out this proof later.*

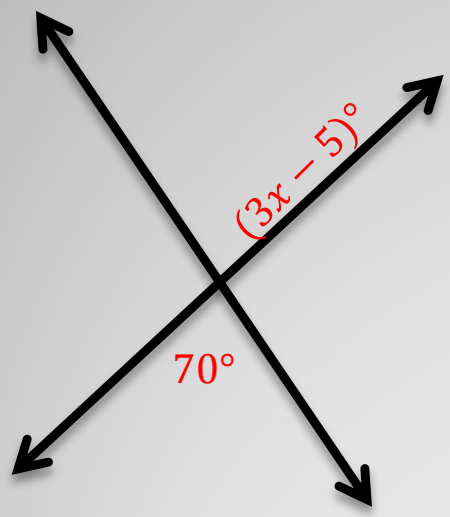


Thus, from the diagram, we can say that

$\angle 1 \cong \angle 2$ and $\angle 3 \cong \angle 4$

Examples

- Find the value of x. (Hint: You will need the angle relationships to make equations)
- 1.



Notice that this is an example of Vertical Angles…
And Vertical Angles are Congruent

Thus, we can write

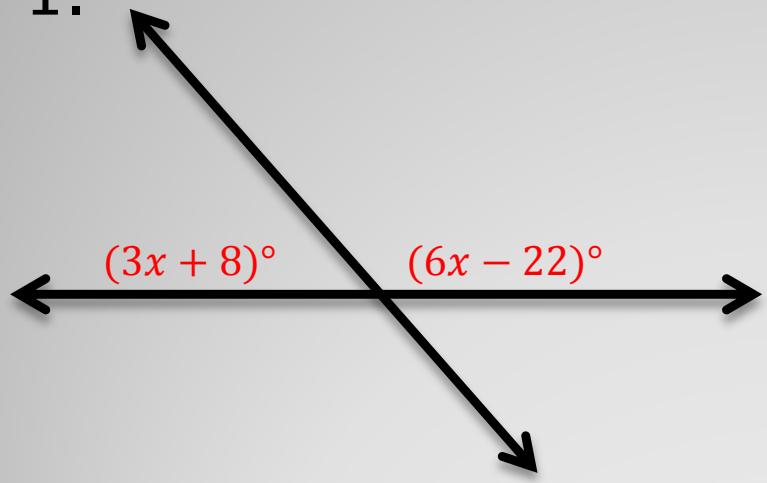
$$3x - 5 = 70$$

$$3x = 75$$

$$x = 25$$

Examples

- Find the value of x. (Hint: You will need the angle relationships to make equations)
- 1.



Notice that this is an example of Supplementary Angles… And Supplementary Angles add up to $180°$

Thus, we can write

$$3x + 8 + 6x - 26 = 180$$

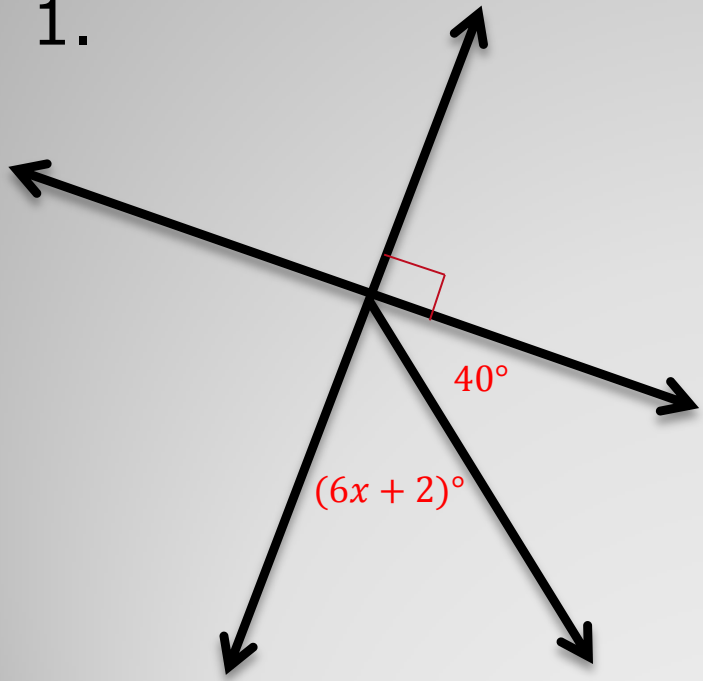
$$9x - 18 = 180$$

$$9x = 198$$

$$x = 22$$

Examples

- Find the value of x. (Hint: You will need the angle relationships to make equations)
- 1.



Notice that this is an example of Complementary Angles… And Complementary Angles add up to $90°$

Thus, we can write

$$6x + 2 + 40 = 90$$

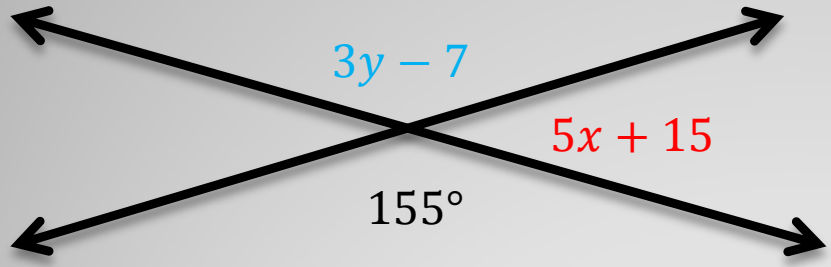
$$6x + 42 = 90$$

$$6x = 48$$

$$x = 8$$

Examples

- Find the values of x and y. (Hint: You will need the angle relationships to make equations)
- 1.



Notice that $155°$ and 5x+15 are supplementary Angles

Thus, to solve for x we can write

$$5x + 15 + 155 = 180$$

$$5x + 170 = 180$$

$$5x = 10$$

$$x = 2$$

Also, Notice that $155°$ and 3y-7 are Vertical Angles

Thus, to solve for x we can write

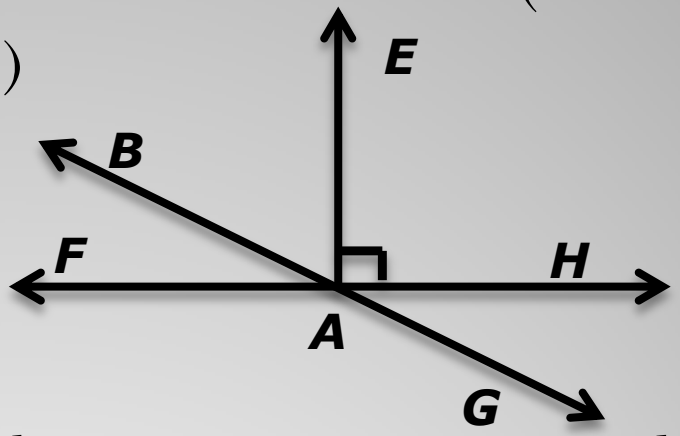
$$3y - 7 = 155$$

$$3y = 162$$

$$y = 54$$

Exit Ticket

- Refer to the diagram and complete the statements. *(Don't forget about our previous terms)



- 1. $< BAF \cong$ _____ because they are _____ angles.
- 2. $BA + AG =$ _____ by the _____ Postulate.
- 3. $< BAF$ and $< BAH$ are _____ angles because they add up to _____.
- 4. $m < EAH +$ _____ $= m < EAG$ by the _____ Postulate.