UNIT 3 - LESSON 5

Proving Angle Pair Relationships

ACTIVITY

STEP 1: Go to http://www.geogebra.org/m/78975

STEP 2: Drag the points A, B, C, and D around.

1. Name the two sets of angle pairs that are opposite one another.

2. What do you notice about angles that are opposite one another?

3. Name the four sets of angle pairs that are adjacent (next) to one another?

4. What do you notice about angles that are adjacent (next) to one another?

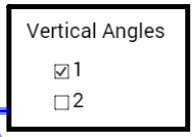
STEP 3: Go to http://tube.geogebra.org/m/10861

STEP 4: Click the box beside Vertical Angle Pair 1 or Vertical Angle Pair 2.

5. Based on your the observations recorded above (Questions 1-4), which types of angles (opposite or adjacent) have the same properties as vertical angles?

6. Therefore, what conjecture can you make about vertical angles?

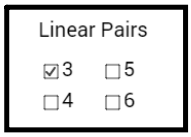
Vertical angles are congruent



STEP 5: Click the box beside either Linear Pair 3, 4, 5, or 6.

7. Based on your the observations recorded above (Questions 1-4) and the diagram here, what conjecture can you make about the angles that make up linear pairs?

Linear Pairs add to 180°



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VOCABULARY

Vertical Angles: Two angles opposite of eachother when two lines intersect.

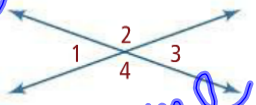
Linear Pair: Two angles that form a line or adjacent to eachother when two lines intersect.

take note

Vertical Angles Theorem

Vertical angles are congruent.

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



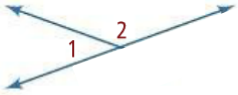
needs to be proven

take note

Linear Pair Postulate

If two angles form a linear pair, then they are supplementary.

$\angle 1 + \angle 2 = 180$



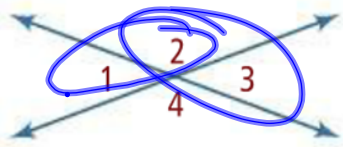
assume

+180°

What is the difference between a postulate and a theorem?

PROBLEM #1

Prove the vertical angles are congruent.



Given $\angle 1$ and $\angle 3$ are vertical angles

Prove: $\angle 1 \cong \angle 3$

Statements	Reasons
$\angle 1$ and $\angle 3$ are vertical angles	Given
$\angle 1 + \angle 2 = 180$	Linear Pair P.
$\angle 2 + \angle 3 = 180$	Linear Pair P.
$\angle 1 + \angle 2 = \angle 2 + \angle 3$	Transitive P.
$\angle 1 = \angle 3$	Subtraction POE
$\angle 1 \cong \angle 3$	Def. of cong. $\angle$s

PROBLEM #2

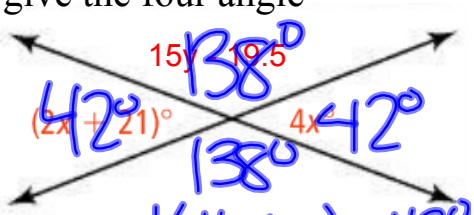
Determine the value of x in the given diagram. Then give the four angle measures.

$2x+21+15x-19.5=180$

$2x+21=4x$

$-2x \quad -2x$

$\frac{21}{2}=\frac{2x}{2}$ $x=10.5$



138° 42° 138°

$4(10.5)=42°$

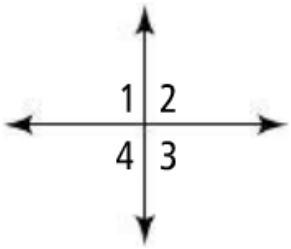
$180-42=138°$

PROBLEM #3

Write a proof for the following.

Given: $\angle 1 \cong \angle 4$

Prove: $\angle 2 \cong \angle 3$



Statements	Reasons

PROBLEM #4

If angle 1 = 63° and angle 5 = 22°
then find angles 2, 3, 4, and 6.