GEOMETRY HONORS CLASS NOTES	Name: _____ Section: 2.4 Period: _____ Date: _____ Key Question: _____ _____
Questions/ Main Ideas:	**Warm-up**: a. Does the symbol $\overline{AB}$ refer to the segment itself or its measure? b. What is another way to write $m\overline{AB} = 5$ units? **Notes**: Refer to the following properties for today's lesson.

Algebraic Properties of Equality

Let a, b, and c be real numbers or expressions representing real numbers.

Addition Property	If $a = b$, then $a + c = b + c$.	**2.4.1**
Subtraction Property	If $a = b$, then $a - c = b - c$.	**2.4.2**
Multiplication Property	If $a = b$, then $ac = bc$.	**2.4.3**
Division Property	If $a = b$ and $c \neq 0$, then $\frac{a}{c} = \frac{b}{c}$.	**2.4.4**
Substitution Property	If $a = b$, you may replace a with b in any true equation containing a and the resulting equation will still be true.	**2.4.5**

Equivalence Properties of Equality

Reflexive Property	For any real number a, $a = a$.	**2.4.7**
Symmetric Property	For all real numbers a and b, if $a = b$, then $b = a$.	**2.4.8**
Transitive Property	For all real numbers a, b, and c, if $a = b$ and $b = c$, then $a = c$.	**2.4.9**

There are similar Congruence Properties like the three above. See page 110 in your textbook.

<u>Example 1</u>

Use the properties of equality to justify the indicated steps.

a. $x + 6 = 14$ *Given*

$x + 6 - 6 = 14 - 6$ _____

$x = 8$

b.

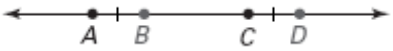
$AB + CD = XY$	*Given*
$CD + DE = XY$	*Given*
$XY = CD + DE$	
$AB + CD = CD + DE$	

- The example done above is using _____ reasoning to show things are true.
- You will be asked in geometry to link together information in the form of a _____.
- Very often, a proof will result in a _____, which is a statement that has been proved deductively.

Example 2

Create a two-column proof to discover a theorem. *You may need to use postulates you've previously learned.*

In the figure $AB = CD$
Prove that $AC = BD$



Statements	Reasons
1. $AB = CD$	
2. $AB + BC = BC + CD$	
3. $AB + BC = AC$	
4. $BC + CD = BD$	
5. $AC = BD$	

- This proof leads to our first theorem…

Overlapping Segments Theorem

Given a segment with points A, B, C, and D arranged as shown, the following statements are true:

1. If $AB = CD$, then $AC = BD$.
2. If $AC = BD$, then $AB = CD$.

- An alternate to a two-column proof is a _____proof.

Example 3

Fill in the blanks below prove the Overlapping Segments Theorem with a paragraph proof.

You are given _____. Add _____ to both sides of the equation, resulting in _____. In the figure, $AB + BC = AC$ and $BC + CD = BD$ by the _____. The expression on the left of these equations matches the expressions in the previous equations, so you can _____ the equivalent expressions, *AC* and *BD*. The result is _____.

Summary: _____

_____

_____

_____