

Geometry CC – Unit 5

LESSON 2: Geometry Postulates and Properties

M1 L22-27

Nov 3-10:43 AM

Geometry Postulates and Properties

**Reflexive Property:** A quantity is equal to itself. ( $m \overline{AB} = m \overline{AB}$ )  
A quantity is congruent to itself. ( $\overline{AB} \cong \overline{AB}$ )

**Substitution Property:** A quantity may be substituted for its equal in any expression.

**Transitive Property:** If  $a = b$ , and  $b = c$ , then  $a = c$ .

**Partition Postulate:** The whole is equal to the sum of its parts.

**Addition Postulate:** If equal quantities are added to equal quantities, the sums are equal.  
( $a = b$  and  $c = d$ , then  $a + c = b + d$ )

If congruent segments/angles are added to congruent segments/  
angles, the sums are congruent.

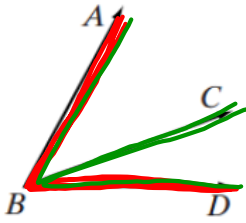
**Subtraction Postulate:** If equal quantities are subtracted from equal quantities, the sums are equal. (If  $a = b$  and  $c = d$ , then  $a - c = b - d$ )

If congruent segments/angles are subtracted from congruent  
segments/angles, the differences are congruent.

Nov 3-10:44 AM

Practice using the Addition/Subtraction Postulates with segments and angles:

1.



$$\angle ABD \cong \underline{\sphericalangle ABC} + \underline{\sphericalangle CBD}$$

or

$$m\angle ABD = \underline{m\angle ABC} + \underline{m\angle CBD}$$

2.



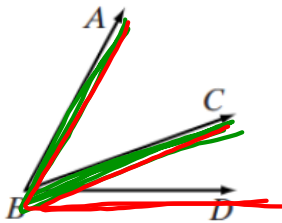
$$\overline{DF} \cong \underline{\overline{DE}} + \underline{\overline{EF}}$$

or

$$mDF = \underline{mDE} + \underline{mEF}$$

Nov 3-10:44 AM

3.



$$\angle ABC \cong \underline{\sphericalangle ABD} - \underline{\sphericalangle CBD}$$

or

$$m\angle ABC = \underline{m\angle ABD} - \underline{m\angle CBD}$$

4.



$$\overline{DE} \cong \underline{\overline{DF}} - \underline{\overline{EF}}$$

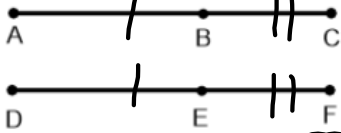
or

$$mDE = \underline{mDF} - \underline{mEF}$$

Nov 3-10:44 AM

For each question, draw a conclusion using a property or postulate from the table above.

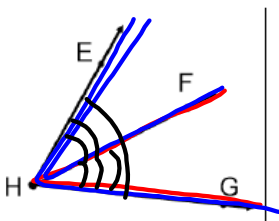
5. Given:  $\overline{AB} \cong \overline{DE}$ ,  $\overline{BC} \cong \overline{EF}$   
 Prove:  $\overline{AC} \cong \overline{DF}$



S	R
$\textcircled{1} \overline{AB} \cong \overline{DE},$ $\overline{BC} \cong \overline{EF}$	$\textcircled{1} \text{ Given}$
$\textcircled{2} \overline{AB} + \overline{BC} \cong \overline{DE} + \overline{EF}$ $\overline{AC} \cong \overline{DF}$	$\textcircled{2} \text{ Addition Postulate}$

Nov 3-10:45 AM

6. Given:  $\angle EHG \cong \angle ADC$   
 $\angle EHF \cong \angle ADB$   
 Prove:  $\angle FHG \cong \angle BDC$



S	R
$\textcircled{1} \angle EHG \cong \angle ADC,$ $\angle EHF \cong \angle ADB$	$\textcircled{1} \text{ Given}$
$\textcircled{2} \angle EHG - \angle EHF \cong$ $\angle ADC - \angle ADB;$ $\angle FHG \cong \angle BDC$	$\textcircled{2} \text{ Subtraction Postulate}$

Nov 3-10:45 AM

7. Given:  $\angle TFI$  is a right angle.  
 $\angle 1 \cong \angle 2$   
 Prove:  $\angle 2$  is complementary to  $\angle 3$

S	R
① $\angle TFI$ is a right angle. $\angle 1 \cong \angle 2$	① Given
② $\angle 1$ & $\angle 3$ are compl.	② if 2 $\angle$ 's sum to $90^\circ$ they are compl.
③ $\angle 2$ is compl. to $\angle 3$	③ Subst. Property

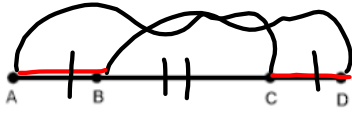
Nov 3-10:45 AM

8. Given:  $X$  is the midpoint of  $\overline{MS}$  and  $\overline{OI}$   
 $\overline{SX} \cong \overline{IX}$   
 Prove:  $\overline{MX} \cong \overline{OX}$

S	R
① $X$ is the midpoint of $\overline{MS}$ and $\overline{OI}$ $\overline{SX} \cong \overline{IX}$	① Given
② $\overline{SX} \cong \overline{MX}$ , $\overline{OX} \cong \overline{IX}$	② A mdpt $\div$ 's a seg into 2 $\cong$ segments.
③ $\overline{MX} \cong \overline{OX}$	③ Transitive Prop.

Nov 3-10:45 AM

9. Given:  $\overline{AC} \cong \overline{BD}$   
 Prove:  $\overline{AB} \cong \overline{CD}$



Statements	Reasons
1. $\overline{AC} \cong \overline{BD}$	1. Given
2. $\overline{AB} + \overline{BC} \cong \overline{AC}$ $\overline{BC} + \overline{CD} \cong \overline{BD}$	2. Add. postulate
3. $\overline{AB} + \overline{BC} \cong \overline{BC} + \overline{CD}$	3. Substitution prop.
4. $\overline{BC} \cong \overline{BC}$	4. Reflexive prop.
5. $\overline{AC} - \overline{BC} \cong \overline{BD} - \overline{BC}$	5. Subtraction post.
6. $\overline{AB} \cong \overline{CD}$	

Nov 3-10:46 AM