

# Section 2.2: Properties from Algebra Notes

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Addition Property: If  $a = b$  and  $c = d$ ,  
then  $a + c = b + d$ .

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Subtraction Property: If  $a = b$  and  $c = d$ ,  
then  $a - c = b - d$ .

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Multiplication Property: If  $a = b$ , then  $ca = cb$ .

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Division Property:

If  $a = b$  and  $c \neq 0$ , then  $\frac{a}{c} = \frac{b}{c}$

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**Substitution Property:** if  $a = b$ , then either  $a$  or  $b$  may be substituted for the other in any equation or inequality.

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**Reflexive Property:**  $a = a$ .

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**Symmetric Property:** if  $a = b$ , then  $b = a$ .

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

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**Combining Like Terms:** combining like terms using addition, subtraction, multiplication, and division

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**Distributive Property:**  $a(b + c) = ab + ac$ .

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# Properties of Congruence

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**Reflexive Property:**  $\overline{DE} \cong \overline{DE}$  ;  $\angle D \cong \angle D$

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**Symmetric Property:**

-If  $\overline{DE} \cong \overline{FG}$ , then  $\overline{FG} \cong \overline{DE}$ ;

-If  $\angle D \cong \angle B$ , then  $\angle B \cong \angle D$ .

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**Transitive Property:**

-If  $\overline{DE} \cong \overline{FG}$  and  $\overline{FG} \cong \overline{JK}$ , then  $\overline{DE} \cong \overline{JK}$ ;

-If  $\angle D \cong \angle B$  and  $\angle B \cong \angle C$ , then  $\angle D \cong \angle C$ .

# Introduction to Two Column Proofs

Given:

Prove:

Statements

Reasons

All reasons must be:

1. Given
2. Postulates
3. Theorems
4. Definitions
5. Properties

Algebra Connection: Given:  $3x - 10 = 20$   
Prove:  $x = 10$ .

Statements

Reasons

1.  $3x - 10 = 20$

1. Given

2.  $3x = 30$

2. Addition Property

3.  $x = 10$

3. Division Property

Algebra Connection: Given:  $2x + y = 31$ ;  $y = 5$   
Prove:  $x = 13$

Statements

Reasons

1.  $2x + y = 31$ ;  $y = 5$

1. Given

2.  $2x + 5 = 31$

2. Substitution

3.  $2x = 26$

3. Subtraction Property

4.  $x = 13$

4. Division Property