## **Geometry Info Sheet #13**

Properties of Numbers, Equality, and Congruence

For all of the properties listed below, unless stated otherwise, a, b, and c can represent any real numbers or expressions containing variables that represent real numbers.

## **Basic Properties of Numbers**

Commutative Property of Addition:	a+b=b+a
Commutative Property of Multiplication:	$a \bullet b = b \bullet a$
Associative Property of Addition:	a + (b + c) = (a + b) + c
Associative Property of Multiplication:	$a \cdot (b \cdot c) = (a \cdot b) \cdot c$
Distributive Property of Multiplication Over Addition:	$a \bullet (b + c) = (a \bullet b) + (a \bullet c)$

## **Algebraic Properties of Equality**

Addition Property:	If $a = b$ , then $a + c = b + c$ .
Subtraction Property:	If $a = b$ , then $a - c = b - c$ .
Multiplication Property:	If $a = b$ , then $a \cdot c = b \cdot c$ .
Division Property:	If $a = b$ and $c \neq 0$ , then $\frac{a}{c} = \frac{b}{c}$ .
Substitution Property:	If $a = b$ , then $b$ can replace $a$ in any expression.

For the following properties, *a*, *b*, and *c* can also represent geometric figures.

## Equivalence Properties of Equality and CongruenceReflexive Property:a = a or $a \cong a$ Symmetric Property:If a = b, then b = a. or If $a \cong b$ , then $b \cong a$ .Transitive Property:If a = b and b = c, then a = c. or If $a \cong b$ and $b \cong c$ , then $a \cong c$ .