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

## 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 Congruence

Reflexive 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 $a \cong c$.

