2 - 6
Algebraic Proofs

Properties of Real Numbers

The following properties are true for any numbers a, b, and c.

Reflexive Property	$a = a$
Symmetric Property	If $a = b$, then $b = a$.
Transitive Property	If $a = b$ and $b = c$, then $a = c$.
Addition and Subtraction Properties	If $a = b$, then $a + c = b + c$ and $a - c = b - c$.
Multiplication and Division Properties	If $a = b$, then $a \cdot c = b \cdot c$ and if $c \neq 0$, $\frac{a}{c} = \frac{b}{c}$.
Substitution Property	If $a = b$, then a may be replaced by b in any equation or expression.
Distributive Property	$a(b + c) = ab + ac$

Geometric Proof Properties

These properties are not only algebraic but can be applied to segments and angles throughout Geometric Proofs

Property	Segments	Angles
Reflexive	$AB = AB$	$m\angle 1 = m\angle 1$
Symmetric	If $AB = CD$, then $CD = AB$.	If $m\angle 1 = m\angle 2$, then $m\angle 2 = m\angle 1$.
Transitive	If $AB = CD$ and $CD = EF$, then $AB = EF$.	If $m\angle 1 = m\angle 2$ and $m\angle 2 = m\angle 3$, then $m\angle 1 = m\angle 3$.

Two - Column Proofs

All proofs in this class will be completed using two columns

A two-column proof contains "Statements" in the first column and "Reasons" in the second

"Statements" - is the column where you show your work and manipulate equations

"Reasons" - is the column where you justify your work using definitions, postulates or theorems

STATEMENTS	REASONS
1) Restate Given in First Step	1) The reason is "Given"

EXAMPLE

Given: $3\left(x - \frac{5}{3}\right) = 1$

Prove: $x = 2$.

STATEMENTS	REASONS