

# Notes 2.6 - Geometric Proofs

PROPERTIES USED IN ALGEBRAIC & GEOMETRIC PROOFS	
Reflexive	If $A = A$ , then $A = A$ . * Everything equal to itself.
Symmetric	If $A = B$ , then $B = A$ . * Equal quantities remain equal when reversed.
Substitution	If $A = B$ , then $A$ may be replaced by $B$ in any equation or expression.
Transitive	If $A = B$ and $B = C$ , then $A = C$ . * Squeeze together.

Statements	Reasons
$7 = A$	Given
$7 = B$	Given
$A = B$	Transitive

  

Statements	Reasons
$\angle 1 \cong \angle 2$	Given
$\angle 2 \cong \angle 1$	Symmetric

EXAMPLE 2:  
Given:  $\angle 1 \cong \angle 2$   
Prove:  $\angle 2 \cong \angle 1$

EXAMPLE 3:  
Given:  $\angle 1$  &  $\angle 2$  are right angles  
Prove:  $\angle 1 \cong \angle 2$

Statements	Reasons
$\angle 1$ & $\angle 2$ are right $\angle$ s	Given
$m\angle 1 = 90^\circ$	Def. of right $\angle$
$m\angle 2 = 90^\circ$	Def. of right $\angle$
$m\angle 1 = m\angle 2$	Transitive
$\angle 1 \cong \angle 2$	Def. of $\cong \angle$ s

EXAMPLE 5:  
Given:  $\angle 1$  &  $\angle 2$  are supplementary  
 $\angle 2$  &  $\angle 3$  are supplementary  
Prove:  $\angle 1 \cong \angle 3$

Statements	Reasons
$\angle 1$ & $\angle 2$ are supplementary	Given
$\angle 2$ & $\angle 3$ are supplementary	Given
$m\angle 1 + m\angle 2 = 180^\circ$	Def. of supp $\angle$ s
$m\angle 2 + m\angle 3 = 180^\circ$	Def. of supp $\angle$ s
$m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3$	Transitive
$m\angle 1 = m\angle 3$	Subtraction
$\angle 1 \cong \angle 3$	Def. of $\cong \angle$ s

EXAMPLE 4:  
Given:  $AB = DE$  &  $BC = CD$   
Prove:  $AC \cong CE$

Statements	Reasons
$AB = DE$	Given
$BC = CD$	Given
$AB + BC = AC$	Segment Addition
$DE + CD = CE$	Segment Addition
$AC = CE$	Transitive
$AC \cong CE$	Def. of $\cong$ Segments

EXAMPLE 6:  
Given:  $a(b+2) = 45$ ;  $a = 3$   
Prove:  $b = 13$

Statements	Reasons
$a(b+2) = 45$	Given
$a = 3$	Given
$3(b+2) = 45$	Substitution
$3b + 6 = 45$	Distribution
$3b = 39$	Subtraction
$b = 13$	Division