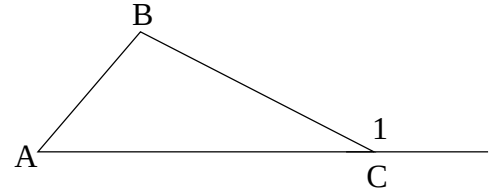


Proofs to Classifying Triangles (continued)

Exterior Angle Theorem

The measure of an exterior angle of a triangle is equal to the sum of the measures of the two nonadjacent interior angles.



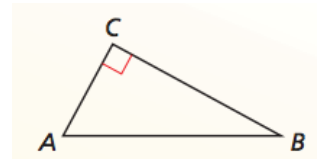
PROOF: **Given:** $\triangle ABC$ with exterior angle at $\angle C$ (called $\angle 1$)

Prove: $m\angle A + m\angle B = m\angle 1$

Statements	Reasons
$m\angle A + m\angle B + m\angle BCA = 180^\circ$	Triangle Sum Theorem
$m\angle BCA + m\angle 1 = 180^\circ$	Linear Pair Postulate
$m\angle A + m\angle B + m\angle BCA = m\angle BCA + m\angle 1$	Transitive Prop. =
$m\angle A + m\angle B = m\angle 1$	Subtraction Prop. =

Corollary to the Triangle Sum Theorem

The acute angles of a right triangle are complementary.



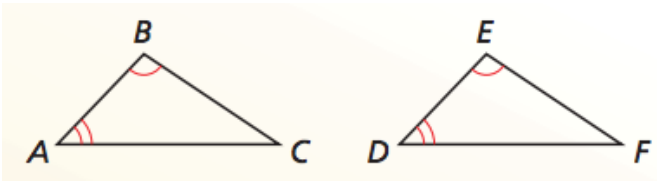
PROOF: **Given:** right $\triangle ABC$ with right angle at $\angle C$

Prove: $\angle A$ and $\angle B$ are complementary

Statements	Reasons
$m\angle A + m\angle B + m\angle C = 180^\circ$	Triangle Sum Theorem
$m\angle C = 90^\circ$	Definition of a right angle
$m\angle A + m\angle B + 90^\circ = 180^\circ$	Substitution Prop. =
$m\angle A + m\angle B = 90^\circ$	Subtraction Prop. =
$\angle A$ and $\angle B$ are complementary	Definition of complementary angles

Third Angles Theorem

If two angles of one triangle are congruent to two angles of another triangle, then the third angles are also congruent.



PROOF: **Given:** $\angle A \cong \angle D$ and $\angle B \cong \angle E$
Prove: $\angle C \cong \angle F$

Statements	Reasons
$m\angle A + m\angle B + m\angle C = 180^\circ$ $m\angle D + m\angle E + m\angle F = 180^\circ$	Triangle Sum Theorem
$\angle A \cong \angle D$ $\angle B \cong \angle E$	Given
$m\angle A = m\angle D$ $m\angle B = m\angle E$	$\cong$ angles are =
$m\angle A + m\angle B + m\angle C = m\angle D + m\angle E + m\angle F$	Transitive Prop. =
$m\angle D + m\angle E + m\angle C = m\angle D + m\angle E + m\angle F$	Substitution Prop. =
$m\angle E + m\angle C = m\angle E + m\angle F$	Subtraction Prop. =
$m\angle C = m\angle F$	Subtraction Prop. =
$\angle C \cong \angle F$	= angles are $\cong$