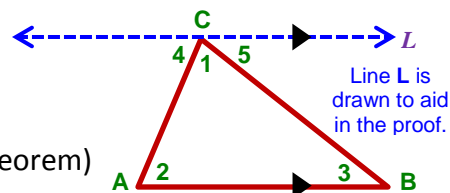


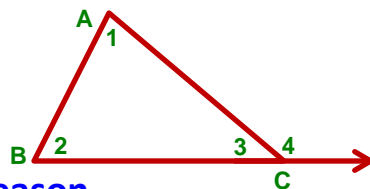
Geometric Proofs #4 – Triangle Sums



Given: $\triangle ABC$ **Prove:** $m\angle 1 + m\angle 2 + m\angle 3 = 180^\circ$ (Triangle Sum Theorem)

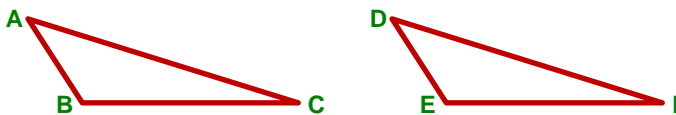
Step	Statement	Step	Reason
1)	$\triangle ABC$	1)	Given
2)	$L \parallel \overline{AB}$	2)	Drawn to assist with proof
3)	$\angle 2 \cong \angle 4, \angle 3 \cong \angle 5$	3)	Transversal with \parallel lines $\rightarrow \cong$ alternate interior \angle s
4)	$m\angle 2 = m\angle 4, m\angle 3 = m\angle 5$	4)	Two congruent angles have equal measures
5)	$m\angle 1 + m\angle 4 + m\angle 5 = 180^\circ$	5)	Multiple adjacent \angle s forming a line \rightarrow sum of \angle s = 180°
6)	$m\angle 1 + m\angle 2 + m\angle 3 = 180^\circ$	6)	Substitution Property (from steps 4 and 5)

Given: $\triangle ABC$ **Prove:** $m\angle 4 = m\angle 1 + m\angle 2$ (Exterior Angle Theorem)



Step	Statement	Step	Reason
1)	$\triangle ABC$	1)	Given
2)	$\angle 3$ and $\angle 4$ are supplementary	2)	Two angles forming a linear pair are supplementary
3)	$m\angle 3 + m\angle 4 = 180^\circ$	3)	Definition of Supplementary Angles
4)	$m\angle 1 + m\angle 2 + m\angle 3 = 180^\circ$	4)	Sum of three interior $\Delta \angle$ s = 180°
5)	$m\angle 3 + m\angle 4 = m\angle 1 + m\angle 2 + m\angle 3$	5)	Substitution Property (from steps 3 and 4)
6)	$m\angle 4 = m\angle 1 + m\angle 2$	6)	Subtraction Property

Given: $\triangle ABC, \triangle DEF, \angle A \cong \angle D, \angle B \cong \angle E$
Prove: $\angle C \cong \angle F$ (Third Angle Theorem)



Step	Statement	Step	Reason
1)	$\triangle ABC, \triangle DEF$	1)	Given
2)	$\angle A \cong \angle D, \angle B \cong \angle E$	2)	Given
3)	$m\angle A + m\angle B + m\angle C = 180^\circ$	3)	Sum of three interior $\Delta \angle$ s = 180° (from $\triangle ABC$)
4)	$m\angle D + m\angle E + m\angle C = 180^\circ$	4)	Substitution Property (from steps 2 and 3)
5)	$m\angle D + m\angle E + m\angle F = 180^\circ$	5)	Sum of three interior $\Delta \angle$ s = 180° (from $\triangle DEF$)
6)	$m\angle D + m\angle E + m\angle C = m\angle D + m\angle E + m\angle F$	6)	Substitution Property (from steps 4 and 5)
7)	$m\angle C = m\angle F$	7)	Subtraction Property
8)	$\angle C \cong \angle F$	8)	Two angles with equal measures are congruent