Acc Geometry
4.6 Isosceles & Equilateral Proof Notes

Name Key
Date

Isosceles Triangle Theorems

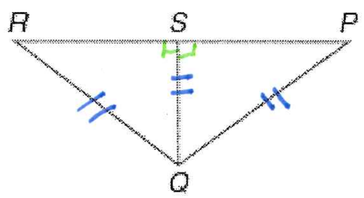
- If two sides of a triangle are congruent, then the angles opposite those sides are congruent. (**Isosceles Triangle Theorem**)
- If two angles of a triangle are congruent, then the sides opposite those angles are congruent.

If $\overline{AB} \cong \overline{CB}$, then $\angle A \cong \angle C$.
If $\angle A \cong \angle C$, then $\overline{AB} \cong \overline{CB}$.

Prove the Isosceles Triangle Theorem: Base <s of isosceles Δs are ≅

Given: $PQ \cong RQ$ and $SQ \perp RP$

Prove: $\angle P \cong \angle R$



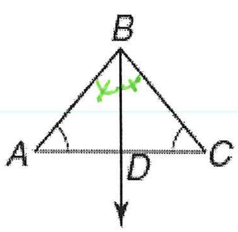
1. $PQ \cong RQ$, $SQ \perp RP$	1. given
2. $SQ \cong SQ$	2. reflexive
3. $\angle QSR = 90°$, $\angle QSP = 90°$	3. def of ⊥
4. $\angle QSR \cong \angle QSP$	4. substitution
5. $\triangle QSR \cong \triangle QSP$	5. HL
6. $\angle R \cong \angle P$	6. CPCTC

Prove:

The Converse of the Isosceles Triangle Theorem states: If base <s ≅ then opposite sides are ≅ or legs

Given: $\triangle ABC$ $\overrightarrow{BD}$ Bisects <ABC
$\angle A \cong \angle C$

Prove: $\overline{AB} \cong \overline{CB}$

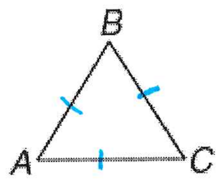


1. $\triangle ABC$, $\angle A \cong \angle C$, $\overrightarrow{BD}$ bisects $\angle ABC$	1. given
2. $\angle ABD \cong \angle CBD$	2. def of < bisector
3. $BD \cong BD$	3. Reflexive
4. $\triangle DBA \cong \triangle DBC$	4. AAS
5. $AB \cong CB$	5. cpctc

Equilateral Triangle Theorems

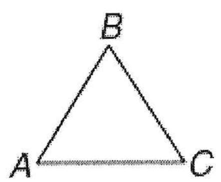
1. A triangle is equilateral if and only if it is equiangular.
2. Each angle of an equilateral triangle measures 60°.

1. **Given:** $\triangle ABC$ is an equilateral triangle.
Prove: $\triangle ABC$ is an equiangular triangle.



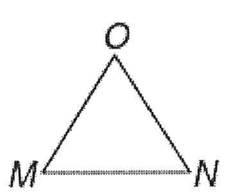
1. ΔABC is equilateral	1. given
2. $\angle A \cong \angle B$ $\angle B \cong \angle C$ $\angle A \cong \angle C$	2. Base $\angle$s of isosceles Δs are $\cong$
3. ΔABC is equiangular	3. def of equiangular

2. **Given:** $\triangle ABC$ is an equiangular triangle.
Prove: $\triangle ABC$ is an equilateral triangle.



1. ΔABC is equiangular	1. given
2. $AB \cong BC$ $BC \cong AC$ $AC \cong AB$	2. If base $\angle$s are $\cong$ then legs are $\cong$
3. ΔABC is an equilateral Δ	3. def of equilateral

3. **Given:** $\triangle MNO$ is an equilateral triangle.
Prove: $m\angle M = m\angle N = m\angle O = 60$



1. ΔMNO is equilateral Δ	1. given
2. $\angle M \cong \angle N$ $\angle N \cong \angle O$ $\angle O \cong \angle M$	2. base $\angle$s of isosceles Δs are $\cong$
3. $\angle M + \angle N + \angle O = 180$	3. Δ sum
4. $\angle M + \angle M + \angle M = 180$	4. substitution
5. $3\angle M = 180$	5. CLT
6. $\angle M = 60$	6. division
7. $\angle M = \angle N = \angle O = 60°$	7. substitution