

Geometry Notes 2-6
Geometric Proof

Oct 7

To write a geometric proof, start with the hypothesis of a conditional.

Hypothesis (given)

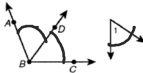
Apply deductive reasoning.

Deductive Reasoning
• Definitions • Properties
• Postulates • Theorems

Prove that the conclusion of the conditional is true.

Conclusion (Prove)

Given: \overrightarrow{BD} is the angle bisector of $\angle ABC$, and $\angle ABD \cong \angle 1$.
Prove: $\angle DBC \cong \angle 1$



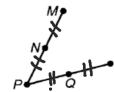
Proof:

1. \overrightarrow{BD} is the angle bisector of $\angle ABC$.
2. $\angle ABD \cong \angle DBC$
3. $\angle ABD \cong \angle 1$
4. $\angle DBC \cong \angle 1$

1. Given
2. defn of \angle bisector
3. Given
4. transitive

Given: N is the midpoint of \overline{MP} , Q is the midpoint of \overline{RP} , and $\overline{PQ} \cong \overline{NM}$.

Prove: $\overline{PN} \cong \overline{QR}$



Proof:

1. N is the midpoint of \overline{MP} .
2. Q is the midpoint of \overline{RP} .
3. $\overline{PN} \cong \overline{NM}$
4. $\overline{PQ} \cong \overline{NM}$
5. $\overline{PN} \cong \overline{PQ}$
6. $\overline{PQ} \cong \overline{QR}$
7. $\overline{PN} \cong \overline{QR}$

1. Given
2. Given
3. defn of midpt.
4. Given
5. Transitive
6. defn of midpt
7. transitive

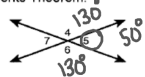
A **theorem** is any statement that you can prove. You can use **two-column proofs** and deductive reasoning to prove theorems.

Here is a two-column proof of one case of the Congruent Supplements Theorem.

Given: $\angle 4$ and $\angle 5$ are supplementary and $\angle 5$ and $\angle 6$ are supplementary.

Prove: $\angle 4 \cong \angle 6$

Proof:



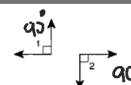
Statements	Reasons
1. $\angle 4$ and $\angle 5$ are supplementary.	1. Given
2. $\angle 5$ and $\angle 6$ are supplementary.	2. Given
3. $m\angle 4 + m\angle 5 = 180^\circ$	3. defn supp. \angle s
4. $m\angle 5 + m\angle 6 = 180^\circ$	4. defn. supp. \angle s
5. $m\angle 4 + m\angle 5 = m\angle 5 + m\angle 6$	5. transitive prop
6. $m\angle 4 = m\angle 6$	6. Subtraction prop. of equality

Fill in the blanks to complete the two-column proof of the Right Angle Congruence Theorem.

Given: $\angle 1$ and $\angle 2$ are right angles.

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

Proof:



Statements	Reasons
1. $\angle 1$ and $\angle 2$ are right \angle s	1. Given
2. $m\angle 1 = 90^\circ$	2. defn of right \angle
3. $m\angle 2 = 90^\circ$	3. defn of right \angle
4. $m\angle 1 = m\angle 2$	4. Transitive (or Substitution)
5. $\angle 1 \cong \angle 2$	5. Defn of $\cong \angle$ s