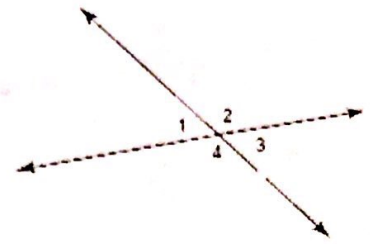
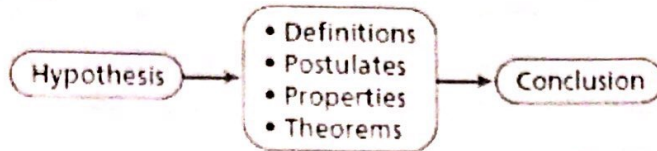


Geometric Proofs: Lines & Angles

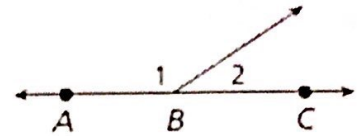
When writing a geometric proof, you use deductive reasoning to create a chain of logical steps that move from the hypothesis to the conclusion of the conjecture you are proving. By proving the conclusion is true, you have proven the original conjecture is true.



When writing a proof, it is important to justify each logical step with a reason. You can use symbols and abbreviations, but they must be clear enough so that anyone who reads your proof will understand them.

We-Do: Fill in the blanks to complete a two column proof of the Linear Pair Theorem.

Given: Angle 1 and 2 form a linear pair.
 Prove: Angle 1 and 2 are supplementary.



Statements

1. $\angle 1$ and $\angle 2$ form a linear pair.
2. BA and BC form a line.
3. $m\angle ABC = 180^\circ$
4. $m\angle 1 + m\angle 2 = m\angle ABC$
5. $m\angle 1 + m\angle 2 = 180^\circ$
6. $\angle 1$ and $\angle 2$ are supplementary

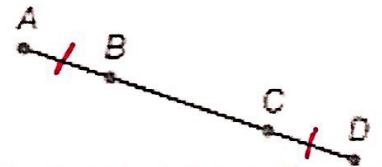
Reasons

1. Given
2. def. of opp. rays
3. def. of linear pair
4. Angle Addition Postulate
5. Substitution
6. def. of supplementary

Prove Segment Addition Postulate:

Given: $\overline{AB} \cong \overline{CD}$

Prove: $\overline{AC} \cong \overline{BD}$



Statements

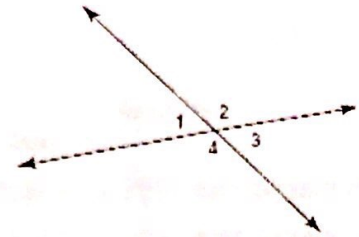
1. $\overline{AB} \cong \overline{CD}$
2. $\overline{AB} = \overline{CD}$
3. $BC = BC$
4. $\overline{AB} + \overline{BC} = \overline{AC}$
5. $\overline{CD} + \overline{BC} = \overline{BD}$
6. $AC = BD$
7. $\overline{AC} \cong \overline{BD}$

Reasons

1. Given
2. def. of congruent
3. reflexive property
4. Segment Addition Postulate
5. Segment Addition Postulate
6. Substitution prop.
7. Definition of Congruent Segments

Prove the Vertical Angles Theorem.

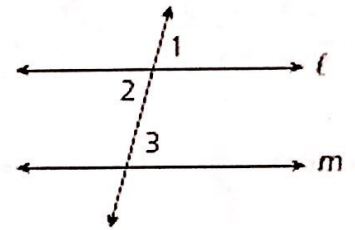
Given: Angle 4 and 1 are a linear pair.
 Angle 1 and 2 are a linear pair.
 Prove: $\angle 2 \cong \angle 4$



Statements	Reasons
1. $\angle 4$ and $\angle 1$ are l.p.	1. Given
2. $\angle 1$ and $\angle 2$ are a l.p.	2. Given
3. $\angle 4, \angle 1$ are sup.	3. Linear Pair Theorem
4. $\angle 1, \angle 2$ are sup.	4. Linear Pair Theorem
5. $m\angle 4 + m\angle 1 = 180$	5. Definition of Supplementary Angles
6. $m\angle 1 + m\angle 2 = 180$	6. Definition of Supplementary Angles
7. $m\angle 4 + m\angle 1 = m\angle 2 + m\angle 1$	7. Substitution
8. $m\angle 4 = m\angle 2$	8. Subtraction Property
9. $\angle 4 \cong \angle 2$	9. Definition of Congruent Angles

Prove the Alternate Interior Angles are Congruent Theorem:

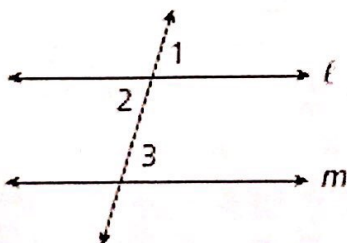
Given: $l \parallel m$
 Prove: $\angle 2 \cong \angle 3$



Statements	Reasons
1. $l \parallel m$	1. Given
2. $\angle 2 \cong \angle 1$	2. Vertical Angles are Congruent
3. $\angle 1 \cong \angle 3$	3. Corresponding Angles Postulate
4. $\angle 2 \cong \angle 3$	4. Transitive Property

Prove that Corresponding Angles are congruent:

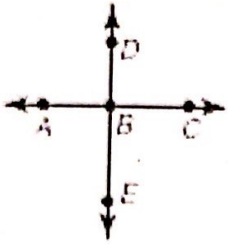
Given: $l \parallel m$
 Prove: $\angle 1 \cong \angle 3$



Statements	Reasons
1. $l \parallel m$	1. Given
2. $\angle 1 \cong \angle 2$	2. Vertical angles theorem
3. $\angle 3 \cong \angle 2$	3. alt. int. \angle 's
4. $\angle 1 \cong \angle 3$	4. transitive prop.

Prove Perpendicular Lines:

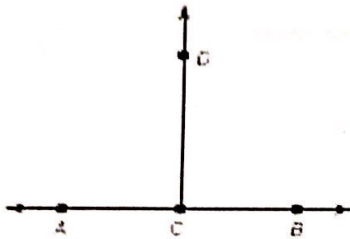
Given: $\overline{AC} \perp \overline{DE}$
 Prove: $\angle ABD \cong \angle CBD$



Statements	Reasons
1. $\overline{AC} \perp \overline{DE}$	1. Given
2. $\angle ABD = 90^\circ$	2. Definition of Perpendicular Lines
3. $\angle CBD = 90^\circ$	3. Definition of Perpendicular Lines
4. $\angle ABD = \angle CBD$	4. Right \angle s are \cong OR Transitive Prop.
5. $\angle ABD \cong \angle CBD$	5. Definition of Congruent Angles

Prove the Right Angle Congruence Theorem using a two column proof.

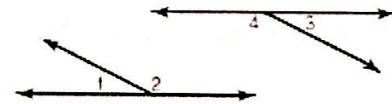
Given: $\angle ACD$ and $\angle BCD$ are right angles
 Prove: $\angle ACD \cong \angle BCD$



Statements	Reasons
1. $\angle ACD, \angle BCD \text{ are } \perp$	1. Given
2. $m\angle BCD = 90^\circ$	2. def. of right \angle 's
3. $m\angle ACD = 90^\circ$	3. def. of right \angle 's
4. $\angle ACD = \angle BCD$	4. Substitution
5. $\angle ACD \cong \angle BCD$	5. def. of congruent

Prove the Congruent Supplement Theorem using a two column proof:

Given: $\angle 2 \cong \angle 4$
 Angle 1 is supplementary to angle 2
 Angle 3 is supplementary to angle 4
 Prove: $\angle 1 \cong \angle 3$



Statements	Reasons
1. $\angle 2 \cong \angle 4$	1. Given
2. $m\angle 2 = m\angle 4$	2. Definition of congruent angles
3. $m\angle 1 + m\angle 2 = 180^\circ$ $m\angle 1 + m\angle 2 = 180^\circ$	3. Given
4. $\angle 3$ is supp. $\angle 4$	4. <u>Given</u>
5. $m\angle 1 + m\angle 2 = 180^\circ$	5. Definition of supplementary angles
6. $m\angle 3 + m\angle 4 = 180^\circ$	6. <u>def. of supp. \angle's</u>
7. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 4$	7. Substitution Property
8. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 2$	8. <u>Substitution prop.</u>
9. $m\angle 1 = m\angle 3$	9. Subtraction Property of Equality
10. $\angle 1 \cong \angle 3$	10. <u>def. of congruent</u>