

Two-Column Proof

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What is a Proof?

Proof: a form of logical reasoning in which each statement is organized and backed up by given information, definitions, axioms, postulates, or theorems

What is a Direct Proof?

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- ▶ is a sequence of statements which are either givens or deductions from previous statements, and whose last statement is the conclusion to be proved

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- ▶ can be done in three ways: paragraph form, flowchart form, and two column form

How to Write a Direct Proof?

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2. Assume that the hypothesis is true, and show that the conclusion is true.

How to Write a Two-Column Proof?

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1. Write all the series of statements in the first column of the table in a logical order starting with the given statements and ends it with the statement that needs to be proven.

How to Write a Two-Column Proof?

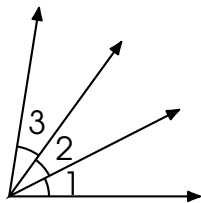
1. Write all the series of statements in the first column of the table in a logical order starting with the given statements and ends it with the statement that needs to be proven.
2. In a step-by-step manner, write all the reasons for each statement.

Example 1

Given: $m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3$

Prove: $m\angle 1 = m\angle 3$

Proof:



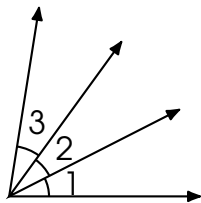
Statements	Reasons
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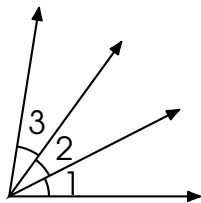
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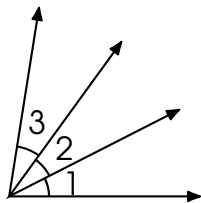
Statements	Reasons
1. $m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3$	1. Given
2. $m\angle 1 + m\angle 2 - m\angle 2 = m\angle 2 - m\angle 2 + m\angle 3$	2. Subtraction Property

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2. $m\angle 1 + m\angle 2 - m\angle 2 = m\angle 2 - m\angle 2 + m\angle 3$	2. Subtraction Property
3. $m\angle 1 = m\angle 3$	3. Simplification

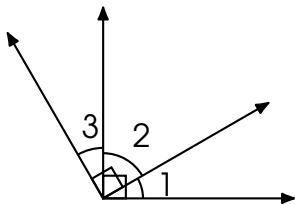
Example 2

Given: $m\angle 1 + m\angle 2 = 90^\circ$

$$m\angle 3 + m\angle 2 = 90^\circ$$

Prove: $m\angle 1 = m\angle 3$

Proof:



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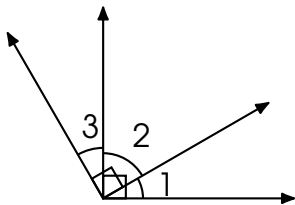
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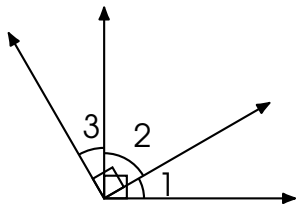
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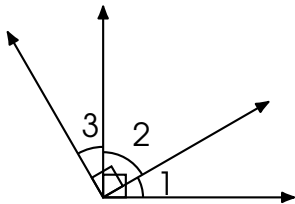
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3. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 2$	3. Transitive Property

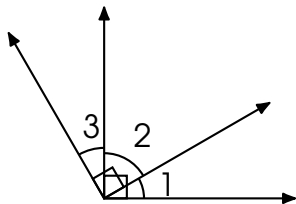
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2. $m\angle 3 + m\angle 2 = 90^\circ$	2. Given
3. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 2$	3. Transitive Property
4. $m\angle 1 + m\angle 2 - m\angle 2 = m\angle 3 + m\angle 2 - m\angle 2$	4. Subtraction Property

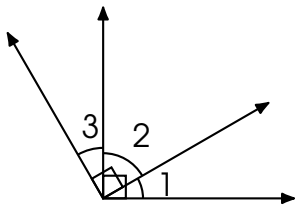
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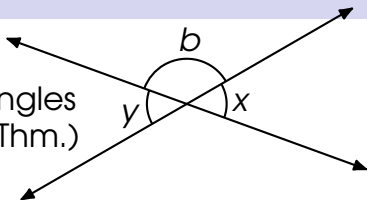
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4. $m\angle 1 + m\angle 2 - m\angle 2 = m\angle 3 + m\angle 2 - m\angle 2$	4. Subtraction Property
5. $m\angle 1 = m\angle 3$	5. Simplification

Example 3

Given: $\angle x$ and $\angle y$ are vertical angles

Prove: $\angle x \cong \angle y$ (Vertical Angles Thm.)

Proof:



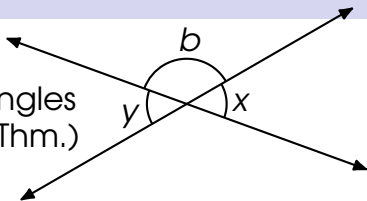
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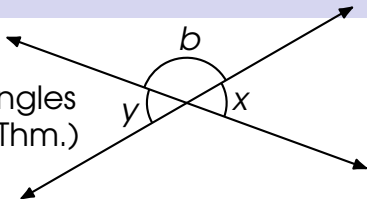
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1. $m\angle x + m\angle b = 180^\circ$	1. Linear Pair Post.

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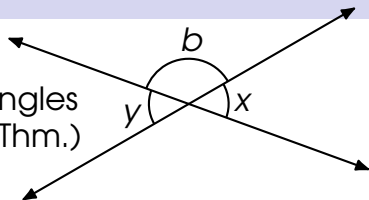
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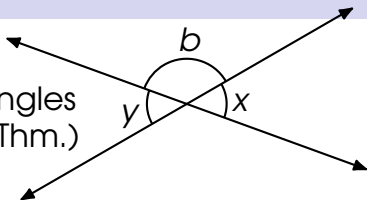
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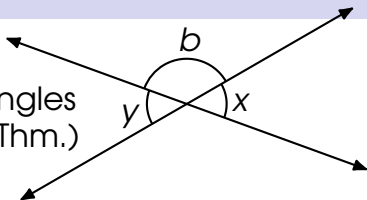
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4. $m\angle x + m\angle b - m\angle b =$ $m\angle y + m\angle b - m\angle b$	4. Subtraction Property

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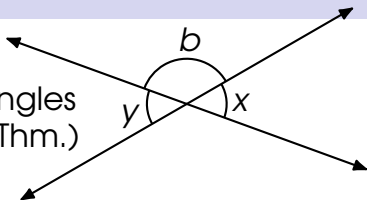
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4. $m\angle x + m\angle b - m\angle b = m\angle y + m\angle b - m\angle b$	4. Subtraction Property
5. $m\angle x = m\angle y$	5. Simplification
6. $\angle x \cong \angle y$	6. Definition of Congruent Angles

Thank you for watching.