

THINK AND DISCUSS

- Which step in a proof should match the Prove statement?
- Why is it important to include every logical step in a proof?
- List four things you can use to justify a step in a proof.
- GET ORGANIZED** Copy and complete the graphic organizer. In each box, describe the steps of the proof process.

Know It!
Note



2-3 Exercises



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Homework Help

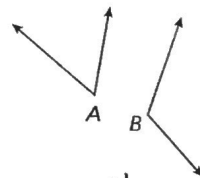
GUIDED PRACTICE

Vocabulary Apply the vocabulary from this lesson to answer each question.

- In a *two-column proof*, you list the ? in the left column and the ? in the right column. (*statements* or *reasons*) **Statement; reasons**
- A ? is a statement you can prove. (*postulate* or *theorem*) **Theorem**
- Write a justification for each step, given that $m\angle A = 60^\circ$ and $m\angle B = 2m\angle A$.

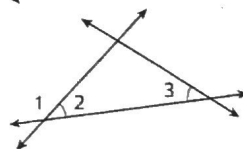
SEE EXAMPLE 1

- $m\angle A = 60^\circ, m\angle B = 2m\angle A$ **Given**
- $m\angle B = 2(60^\circ)$ **Substitution prop.**
- $m\angle B = 120^\circ$ **Simplify**
- $m\angle A + m\angle B = 60^\circ + 120^\circ$ **Add. POE**
- $m\angle A + m\angle B = 180^\circ$ **Simplify**
- $\angle A$ and $\angle B$ are supplementary. **Def. of supp. \angle 's**



SEE EXAMPLE 2

- Fill in the blanks to complete the two-column proof.
Given: $\angle 2 \cong \angle 3$
Prove: $\angle 1$ and $\angle 3$ are supplementary.
Proof:



Statements	Reasons
1. $\angle 2 \cong \angle 3$	1. Given
2. $m\angle 2 = m\angle 3$	2. a. <u>?</u>
3. b. <u>?</u>	3. Lin. Pair Thm.
4. $m\angle 1 + m\angle 2 = 180^\circ$	4. Def. of supp. \angle
5. $m\angle 1 + m\angle 3 = 180^\circ$	5. c. <u>?</u> Steps 2, 4
6. d. <u>?</u>	6. Def. of supp. \angle

- Def. of \cong \angle 's
- $\angle 1$ and $\angle 2$ are supp.
- Substitution prop.
- $\angle 1$ and $\angle 3$ are supp.

SEE EXAMPLE 3

- Use the given plan to write a two-column proof.
Given: X is the midpoint of \overline{AY} , and Y is the midpoint of \overline{XB} .
Prove: $\overline{AX} \cong \overline{YB}$
Plan: By the definition of midpoint, $\overline{AX} \cong \overline{XY}$, and $\overline{XY} \cong \overline{YB}$.
 Use the Transitive Property to conclude that $\overline{AX} \cong \overline{YB}$.



- X is the mdpt. of \overline{AY} . Y is the mdpt. of \overline{XB} . (**Given**)
- $\overline{AX} \cong \overline{XY}, \overline{XY} \cong \overline{YB}$. (**Def. of mdpt.**)
- $\overline{AX} \cong \overline{YB}$ (**Transitive Prop. of \cong**)

PRACTICE AND PROBLEM SOLVING

Independent Practice

For Exercises	See Example
6	1
7-8	2
9-10	3

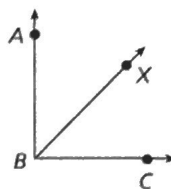
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Online Extra Practice

6. Write a justification for each step, given that \overrightarrow{BX} bisects $\angle ABC$ and $m\angle XBC = 45^\circ$.

- \overrightarrow{BX} bisects $\angle ABC$.
- $\angle ABX \cong \angle XBC$
- $m\angle ABX = m\angle XBC$
- $m\angle XBC = 45^\circ$
- $m\angle ABX = 45^\circ$
- $m\angle ABX + m\angle XBC = m\angle ABC$
- $45^\circ + 45^\circ = m\angle ABC$
- $90^\circ = m\angle ABC$
- $\angle ABC$ is a right angle.



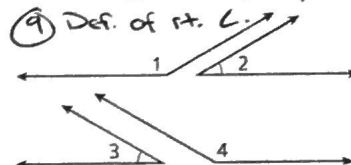
- Given
- Def. of a bisector.
- Def of \cong \angle 's.
- Given
- Substitution Prop
- \angle Addition Post.
- Substitution Prop
- Simplify

Fill in the blanks to complete each two-column proof.

7. Given: $\angle 1$ and $\angle 2$ are supplementary, and $\angle 3$ and $\angle 4$ are supplementary.
 $\angle 2 \cong \angle 3$

Prove: $\angle 1 \cong \angle 4$

Proof:



Statements	Reasons
1. $\angle 1$ and $\angle 2$ are supplementary. $\angle 3$ and $\angle 4$ are supplementary.	1. Given
2. a. ?	2. Def. of supp. \angle
3. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 4$	3. b. ?
4. $\angle 2 \cong \angle 3$	4. Given
5. $m\angle 2 = m\angle 3$	5. Def. of \cong \angle
6. c. ?	6. Subtr. Prop. of = Steps 3, 5
7. $\angle 1 \cong \angle 4$	7. d. ?

a) $m\angle 1 + m\angle 2 = 180^\circ$
 $m\angle 3 + m\angle 4 = 180^\circ$

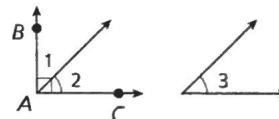
b) Substitution Prop

c) $m\angle 1 = m\angle 4$

d) Def of \cong \angle 's.

8. Given: $\angle BAC$ is a right angle. $\angle 2 \cong \angle 3$
Prove: $\angle 1$ and $\angle 3$ are complementary.

Proof:



Statements	Reasons
1. $\angle BAC$ is a right angle.	1. Given
2. $m\angle BAC = 90^\circ$	2. a. ?
3. b. ?	3. \angle Add. Post.
4. $m\angle 1 + m\angle 2 = 90^\circ$	4. Subst. Steps 2, 3
5. $\angle 2 \cong \angle 3$	5. Given
6. c. ?	6. Def. of \cong \angle
7. $m\angle 1 + m\angle 3 = 90^\circ$	7. d. ? Steps 4, 6
8. e. ?	8. Def. of comp. \angle

- Def. of a rt. \angle
- $m\angle 1 + m\angle 2 = m\angle BAC$
- $m\angle 2 = m\angle 3$
- Substitution Prop.
- $\angle 1$ & $\angle 3$ are comp.

Use the given plan to write a two-column proof.

9. Given: $\overline{BE} \cong \overline{CE}$, $\overline{DE} \cong \overline{AE}$
Prove: $\overline{AB} \cong \overline{CD}$

Plan: Use the definition of congruent segments to write the given information in terms of lengths. Then use the Segment Addition Postulate to show that $AB = CD$ and thus $\overline{AB} \cong \overline{CD}$.

