

LEARNING GOALS FOR LESSON 2-6

2.6.1 Be able to write two-column proofs.

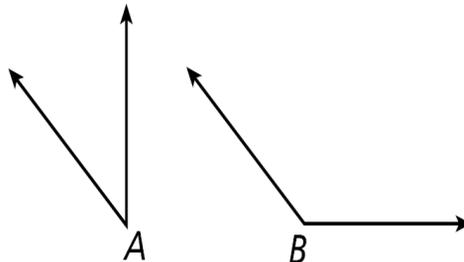
2.6.2 Prove geometric theorems by using deductive reasoning.

When writing a proof, it is important to _____ each logical step with a reason.

Example 1a: Writing Justifications

Write a justification for each step,

GIVEN: that $\angle A$ and $\angle B$ are supplementary and $m\angle A = 45^\circ$.



Statements	Reasons
1. $\angle A$ and $\angle B$ are supplementary	1.
2. $m\angle A = 45^\circ$	2.
3. $m\angle A + m\angle B = 180^\circ$	3.
4. $45^\circ + m\angle B = 180^\circ$	4.
5. -45° -45°	5.
6. $m\angle B = 135^\circ$	6.

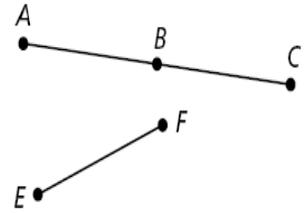
Helpful Hint

When a justification is based on more than the previous step, you can note this after the reason, as in Example 1 Step 3.

2-6 Geometric Proof

Check It Out! Example 1b.

Write a justification for each step, given that B is the midpoint of AC and $AB \cong EF$.



Statements	Reasons
1. B is the midpoint of AC	1.
2. $AB \cong BC$	2.
3. $AB \cong EF$	3.
4. $BC \cong EF$	4.

A _____ is any statement that you can prove.

Once you have proven one, you can use it as a reason in later proofs.

Theorem

THEOREM

HYPOTHESIS

CONCLUSION

2-6-1 Linear Pair Theorem

If two angles form a linear pair, then they are supplementary.

$\angle A$ and $\angle B$ form a linear pair.

$\angle A$ and $\angle B$ are supplementary.

“What it’s used for”

2-6 Geometric Proof

A geometric proof begins with _____ and _____ statements, which restate the _____ and _____ of the conjecture.

In a _____, you list the steps of the proof in the left column. You write the matching reason for each step in the right column.

Example 1c: Completing a Two-Column Proof

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

Given: XY



Prove: $XY \cong XY$

Statements	Reasons
1. _____	1. Given
2. $XY = XY$	2. _____
3. _____	3. Def. of \cong segments

Theorems

THEOREM	HYPOTHESIS	CONCLUSION
2-6-3 Right Angle Congruence Theorem All right angles are congruent.	$\angle A$ and $\angle B$ are right angles.	$\angle A \cong \angle B$

“What it’s used for”:

2-6 Geometric Proof

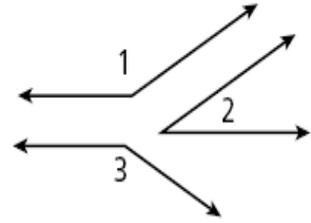
Example 2a: Proving a Theorem

Fill in the blanks to complete a two-column proof of one case of the Congruent Supplements Theorem.

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

Prove: $\angle 1 \cong \angle 3$

Proof:



Statements	Reasons
1. a. _____?	1. Given
2. $m\angle 1 + m\angle 2 = 180^\circ$ $m\angle 2 + m\angle 3 = 180^\circ$	2. Def. of supp. \angle s
3. b. _____?	3. Subst.
4. $m\angle 2 = m\angle 2$	4. Reflex. Prop. of =
5. $m\angle 1 = m\angle 3$	5. c. _____?
6. d. _____?	6. Def. of \cong \angle s

Theorem

THEOREM	HYPOTHESIS	CONCLUSION
<p>2-6-2 Congruent Supplements Theorem If two angles are supplementary to the same angle (or to two congruent angles), then the two angles are congruent.</p>	<p>$\angle 1$ and $\angle 2$ are supplementary. $\angle 2$ and $\angle 3$ are supplementary.</p>	<p>$\angle 1 \cong \angle 3$</p>

“What it’s used for”

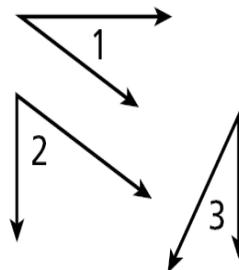
2-6 Geometric Proof

Example 2b: Proving a Theorem

Use the given plan to write a two-column proof of one case of Congruent Complements Theorem.

Given: $\angle 1$ and $\angle 2$ are complementary, and
 $\angle 2$ and $\angle 3$ are complementary.

Prove: $\angle 1 \cong \angle 3$



Plan: The measures of complementary angles add definition. Use substitution to show that the sums of both pairs are equal. Use the Subtraction Property and the definition of congruent angles to conclude that $\angle 1 \cong \angle 3$.

Statements	Reasons
1. a. _____ ?	1. Given
2. $m\angle 1 + m\angle 2 = \cdot$ $m\angle 2 + m\angle 3 = \cdot$	2.
3. b. _____ ?	3.
4. $m\angle 2 = m\angle 2$	4.
5. $m\angle 1 = m\angle 3$	5.
6. d. _____ ?	6.

2-6-4 Congruent Complements Theorem

If two angles are complementary to the same angle (or to two congruent angles), then the two angles are congruent.

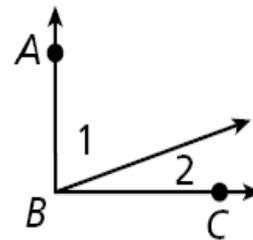
$\angle 1$ and $\angle 2$ are complementary.
 $\angle 2$ and $\angle 3$ are complementary.

$$\angle 1 \cong \angle 3$$

“What it’s used for”:

LESSON QUIZ – 2.6 (if time)

1. Write a justification for each step, given that $m\angle ABC = 90^\circ$ and $m\angle 1 = 4m\angle 2$.



Statements	Reasons
1. $m\angle ABC = 90^\circ$ and $m\angle 1 = 4m\angle 2$	1.
2. $m\angle 1 + m\angle 2 = m\angle ABC$	2.
3. $4m\angle 2 + m\angle 2 = 90^\circ$	3.
4. $5m\angle 2 = 90^\circ$	4.
5. $m\angle 2 = 18^\circ$	5.

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

Given: $\angle 1, \angle 2, \angle 3, \angle 4$

Prove: $m\angle 1 + m\angle 2 = m\angle 1 + m\angle 4$

Plan: Use the linear Pair Theorem to show that the angle pairs are supplementary. Then use the definition of supplementary and substitution.

