Ch 1.4 - Beginning Proofs

Objectives:

Write simple **two-column proofs**

Agenda:

1) Check HW... Questions?
2) Algebra Problem -Intro to two-column Proof
3) Explanation of *Theorem*
4) Activity: Piece the Proofs together!

HW: p.26 #1-3, 6-13, 15 & Definitions and Theorems for Section 4 and 5

Math 511 Name________________________________
Introduction to Two-Column Proofs

There are three different reasons given below. Each *reason* describes how to get from one statement to the next. Match each to the appropriate statement by writing them into the reason column.

"given" "multiplication property of equality" "addition property of equality"

Prove: If $\frac{x}{2} + 3 = 5$, then x = 4

Statement (Step)	Reason (Rule)
$\frac{x}{2} + 3 = 5$	
$\frac{x}{2} = 2$	
$x = 4$	

Math 511 Name________________________________
Introduction to Two-Column Proofs

There are three different reasons given below. Each *reason* describes how to get from one statement to the next. Match each to the appropriate statement by writing them into the reason column.

"given" "multiplication property of equality" "addition property of equality"

Prove: If $\frac{x}{2} + 3 = 5$, then x = 4

Statement (Step)	Reason (Rule)
$\frac{x}{2} + 3 = 5$	
$x + 6 = 10$	
$x = 4$	

PROOFS

Two Common types: **Two Column Proofs (statement | reason)** **Paragraph Proof (if...then...therefore...)**

Example: Two Column Proof

PROVE:

If $2x + 1 = 7$, then $x = 3$.

PROOF:

STATEMENTS	REASONS
1. Assume: $2x + 1 = 7$	given
2. $2x = 6$	Addition Property of Equality; subtract 1 from both sides
3. $x = 3$	Multiplication Property of Equality; divide both sides by 2

Theorem: A theorem is a mathematical statement that can be proved.

Theorem Procedure/ What we use theorems for:

1) We present a theorem or theorems.

2) We prove theorems.

3) We use the theorems to help prove problems.

4) Theorems will save you much time if you learn them and use them.

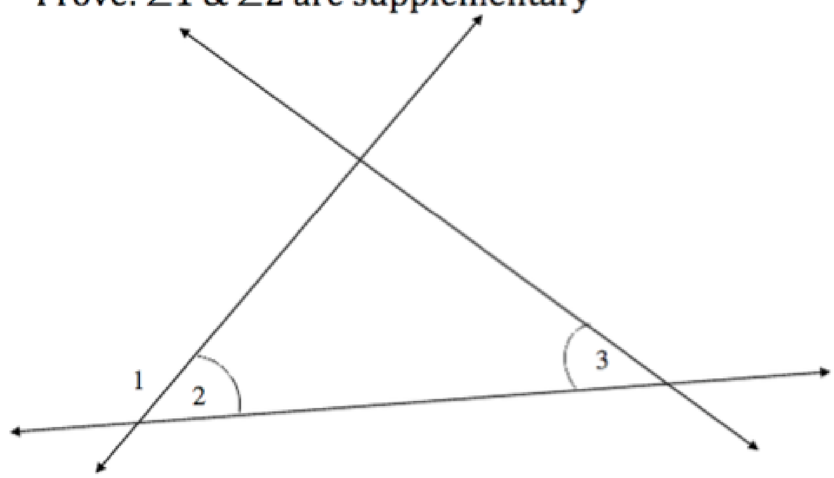
Theorem 1: If two angles are right angles, then they are congruent.

Theorem 2: If two angles are straight lines, then they are congruent.

Group 1

Given: $\angle 2 \cong \angle 3$

Prove: $\angle 1$ & $\angle 2$ are supplementary



STATEMENTS	REASONS
$\angle 2 \cong \angle 3$	Given
$m\angle 2 = m\angle 2$	Definition of $\cong$ $\angle$'s
$\angle 1$ & $\angle 2$ are supplementary	Linear Pair Theorem
$m\angle 1 + m\angle 2 = 180°$	Definition of Supplementary $\angle$'s
$m\angle 1 + m\angle 3 = 180°$	Substitution
$\angle 1$ & $\angle 2$ are supplementary	Definition of Supplementary $\angle$'s

Group 1

STATEMENTS	REASONS
$\angle 2 \cong \angle 3$	Given
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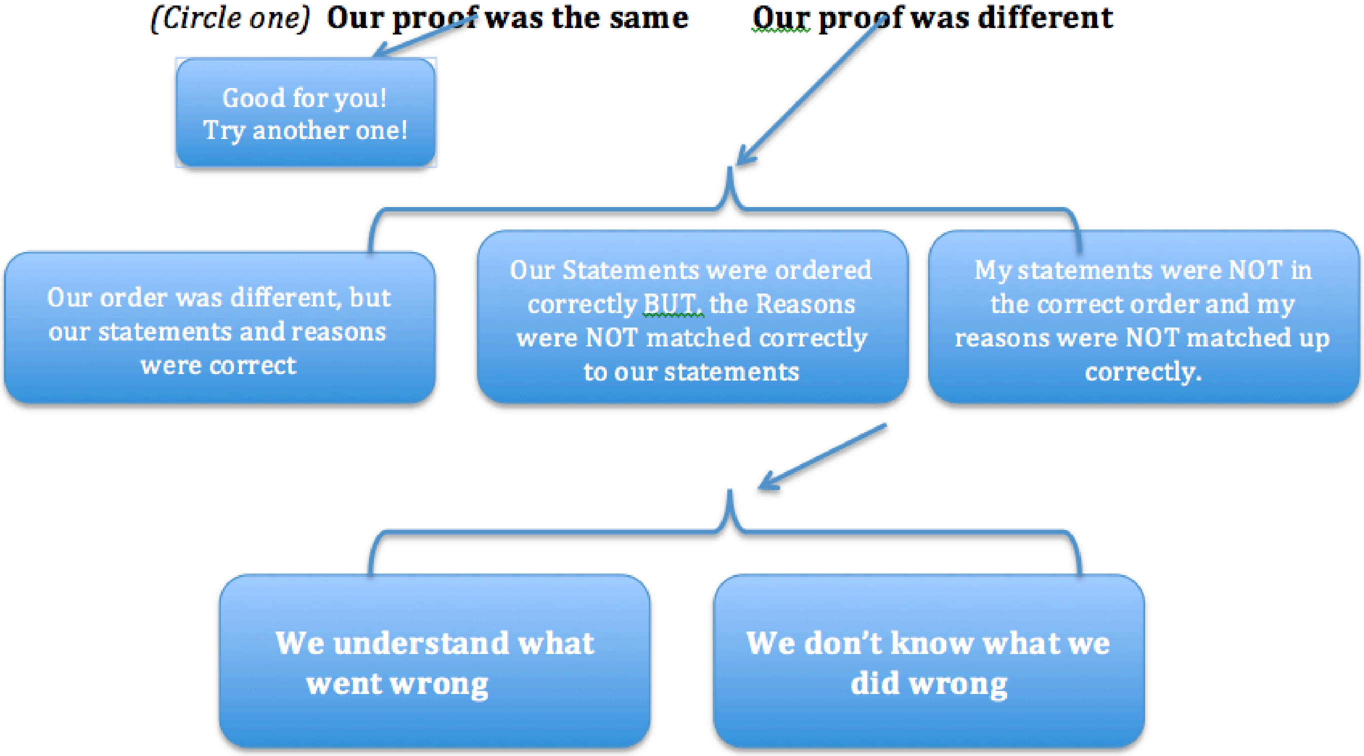
Analysis of our work:

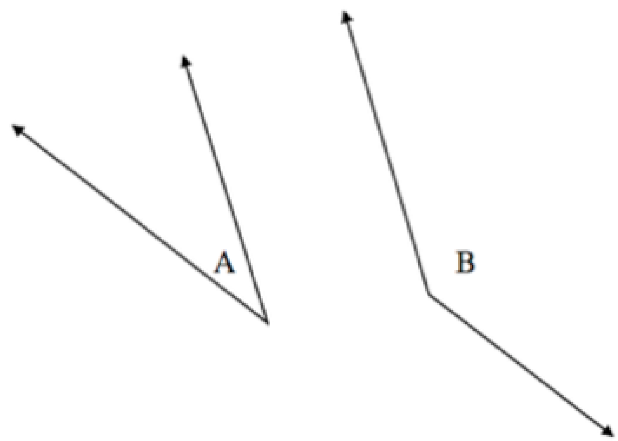
(Circle one) **Our proof was the same** **Our proof was different**



Group 2

Given: m∠A = 60°, m∠B=m2∠A

Prove: ∠A & ∠B are supplementary



STATEMENTS	REASONS
m∠A = 60°, m∠B=m2∠A	Given
m∠B=2(60°)	Substitution
m∠B=120°	Simplify
m∠A + m∠B = 60° + 120°	Addition Property of Equality
m∠A + m∠B = 180°	Simplify
∠A & ∠B are supplementary	Definition of Supplementary ∠'s

Group 2

STATEMENTS	REASONS
$m\angle A = 60°$, $m\angle B = m2\angle A$	Given
$m\angle B = 2(60°)$	Substitution
$m\angle B = 120°$	Simplify
$m\angle A + m\angle B = 60° + 120°$	Addition Property of Equality
$m\angle A + m\angle B = 180°$	Simplify
$\angle A$ & $\angle B$ are supplementary	Definition of Supplementary $\angle$'s

Analysis of our work:

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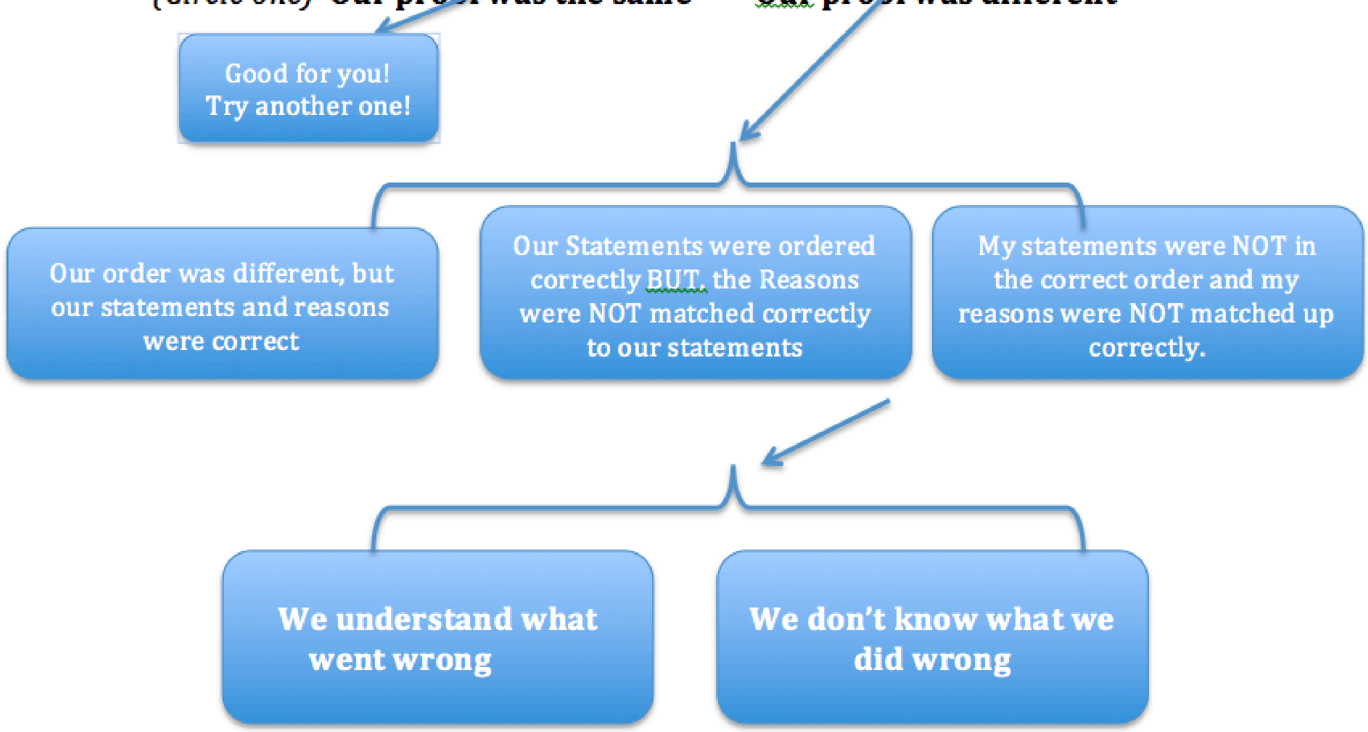
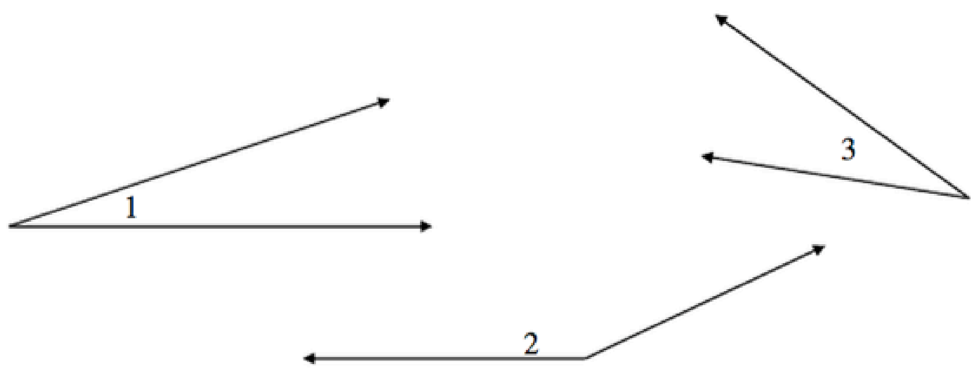


Group 3

Given: $\angle 1$ & $\angle 2$ are supplementary
$\angle 1 \cong \angle 3$

Prove: $\angle 2$ & $\angle 3$ are supplementary



STATEMENTS	REASONS
$\angle 1$ & $\angle 2$ are supplementary	Given
$\angle 1 \cong \angle 3$	Given
$m\angle 1 + m\angle 2 = 180°$	Definition of Supplementary $\angle$'s
$m\angle 1 = m\angle 3$	Definition of $\cong$ $\angle$'s
$m\angle 3 + m\angle 2 = 180°$	Substitution
$\angle 2$ & $\angle 3$ are supplementary	Definition of Supplementary $\angle$'s

Group 3

STATEMENTS	REASONS
∠1 & ∠2 are supplementary	Given
∠1 ≅ ∠3	Given
m∠1 + m∠2 = 180°	Definition of Supplementary ∠'s
m∠1 = m∠3	Definition of ≅ ∠'s
m∠3 + m∠2 = 180°	Substitution
∠2 & ∠3 are supplementary	Definition of Supplementary ∠'s

Analysis of our work:

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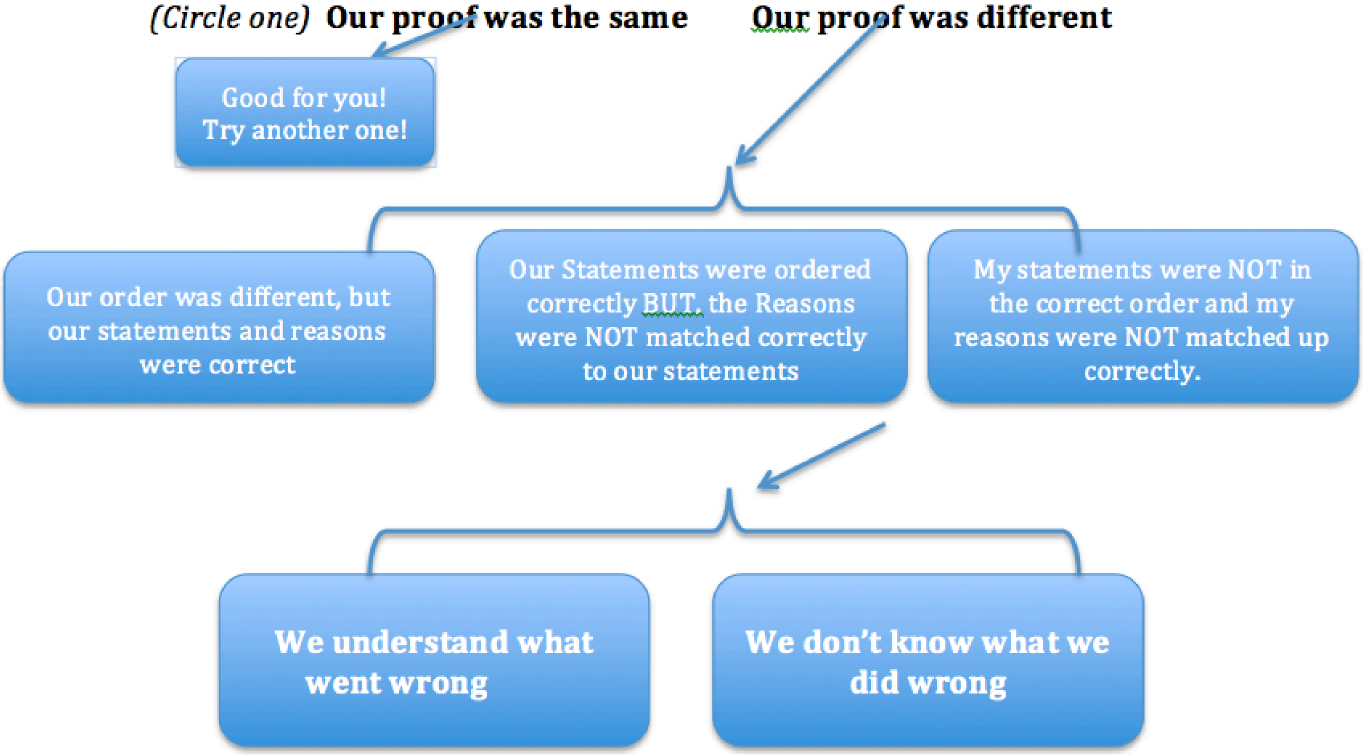
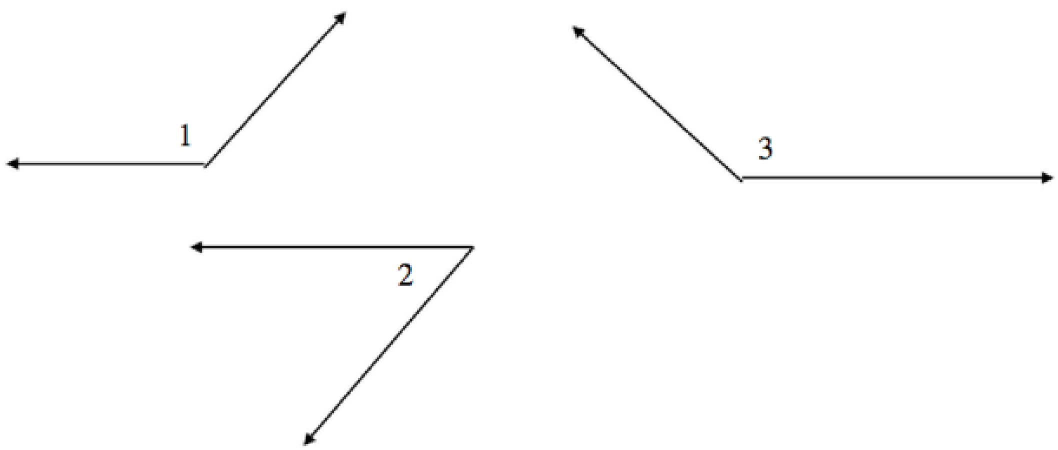


Group 4

Given: $\angle 1$ & $\angle 2$ are supplementary
$\angle 2$ & $\angle 3$ are supplementary

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



STATEMENTS	REASONS
$\angle 1$ & $\angle 2$ are supplementary $\angle 2$ & $\angle 3$ are supplementary	Given
$m\angle 1 + m\angle 2 = 180°$ $m\angle 2 + m\angle 3 = 180°$	Definition of Supplementary $\angle$'s
$m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3$	Substitution
$m\angle 2 = m\angle 2$	Reflexive Property
$m\angle 1 = m\angle 3$	Subtraction Property of Equality
$\angle 1 \cong \angle 3$	Definition of $\cong$ $\angle$'s

Group 4

STATEMENTS	REASONS
$\angle 1$ & $\angle 2$ are supplementary $\angle 2$ & $\angle 3$ are supplementary	Given
$m\angle 1 + m\angle 2 = 180°$ $m\angle 2 + m\angle 3 = 180°$	Definition of Supplementary $\angle$'s
$m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3$	Substitution
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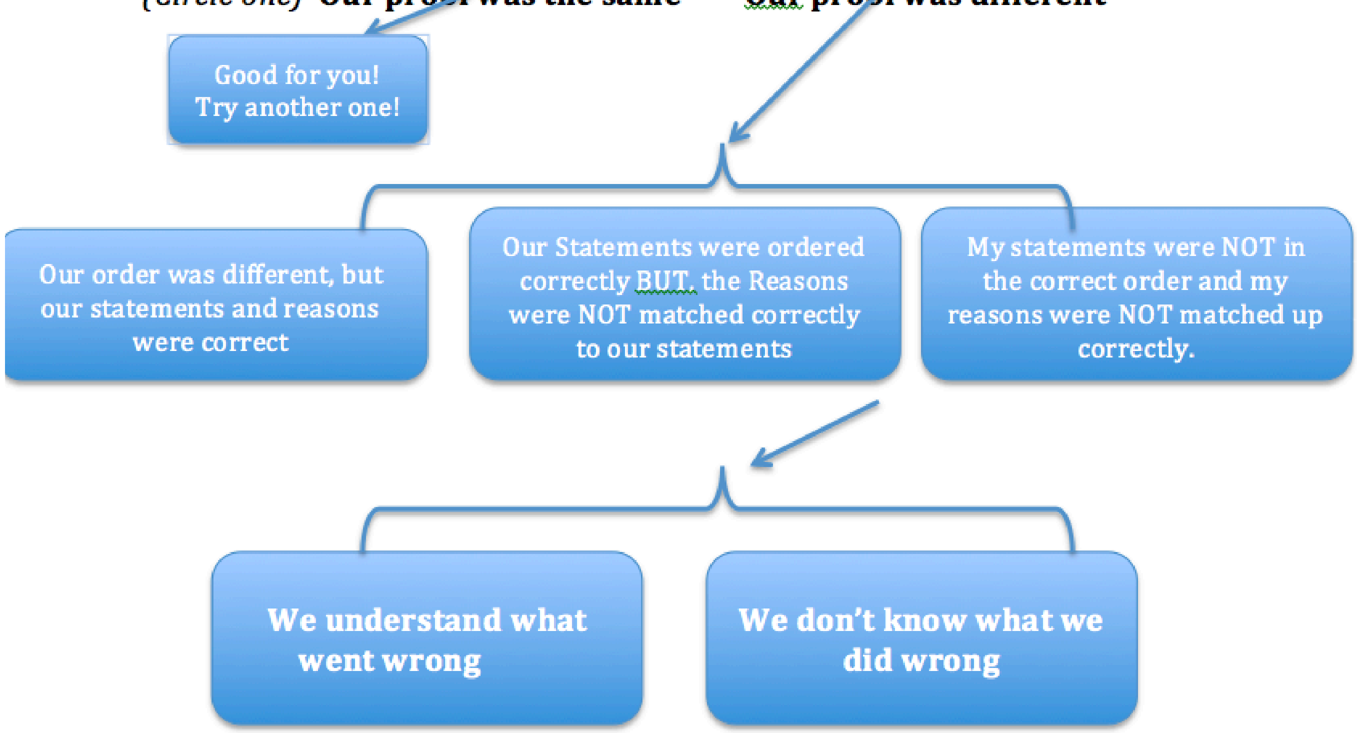
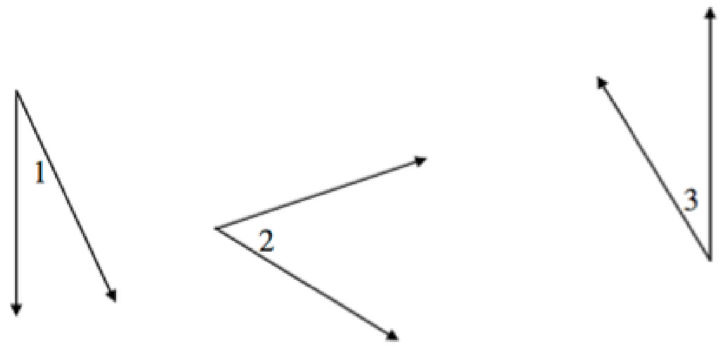


Group 5

Given: ∠1 & ∠2 are complementary
∠2 & ∠3 are complementary

Prove: ∠1 ≅ ∠3



STATEMENTS	REASONS
∠1 & ∠2 are complementary ∠2 & ∠3 are complementary	Given
m∠1 + m∠2 = 90° m∠2 + m∠3 = 90°	Definition of Complementary ∠'s
m∠1 + m∠2 = m∠2 + m∠3	Substitution
m∠2 = m∠2	Reflexive Property
m∠1 = m∠3	Subtraction Property of Equality
∠1 ≅ ∠3	Definition of ≅ ∠'s

Group 5

STATEMENTS	REASONS
$\angle 1$ & $\angle 2$ are complementary $\angle 2$ & $\angle 3$ are complementary	Given
$m\angle 1 + m\angle 2 = 90°$ $m\angle 2 + m\angle 3 = 90°$	Definition of Complementary $\angle$'s
$m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3$	Substitution
$m\angle 2 = m\angle 2$	Reflexive Property
$m\angle 1 = m\angle 3$	Subtraction Property of Equality
$\angle 1 \cong \angle 3$	Definition of $\cong$ $\angle$'s

Analysis of our work:

(Circle one) **Our proof was the same** **Our proof was different**