2-6

PROVING ANGLES CONGRUENT

OBJECTIVES

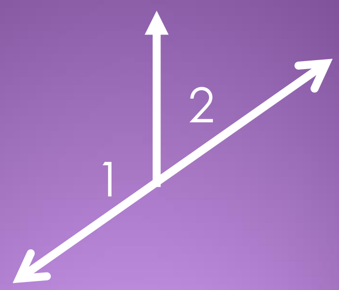
- to write two-column proofs
- to prove geometric theorems using deductive reasoning

2-6-1

Linear Pair

Theorem.

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



$\angle 1$ and $\angle 2$ form a linear pair.

$\angle 1$ and $\angle 2$ are supplementary.

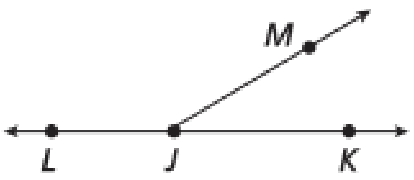
G-CO.3.9

1 PROOF Linear Pair Theorem

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

Given: $\angle MJK$ and $\angle MJL$ are a linear pair of angles.

Prove: $\angle MJK$ and $\angle MJL$ are supplementary.



Complete the proof by writing the missing reasons. Choose from the following reasons.

Angle Addition Postulate | Definition of opposite rays | Substitution Property of Equality | Given

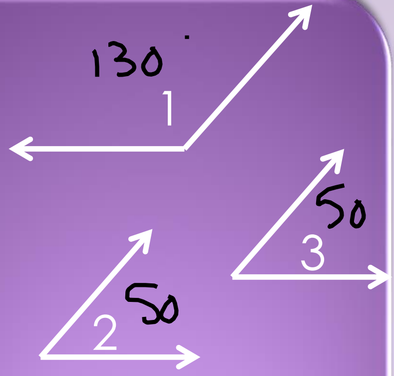
Statements	Reasons
1. $\angle MJK$ and $\angle MJL$ are a linear pair.	1. Given
2. $\overrightarrow{JL}$ and $\overrightarrow{JK}$ are opposite rays.	2. Definition of linear pair
3. $\overrightarrow{JL}$ and $\overrightarrow{JK}$ form a straight line.	3. Def. of opposite rays
4. $m\angle LJK = 180°$	4. Definition of straight angle
5. $m\angle MJK + m\angle MJL = m\angle LJK$	5. $\angle$ addition postulate
6. $m\angle MJK + m\angle MJL = 180°$	6. Substitution prop of =
7. $\angle MJK$ and $\angle MJL$ are supplementary.	7. Definition of supplementary angles

PROOF OF LINEAR PAIR THEOREM

2-6-2

Congruent Supplements Theorem.

If two angles are supplements of the same angle, (or congruent angles), then they are congruent.



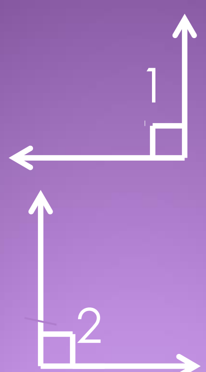
∠1 and ∠2 are supplementary, and ∠1 and ∠3 are supplementary.

∠2 ≅ ∠3.

2-6-3

Right Angle Congruence Theorem

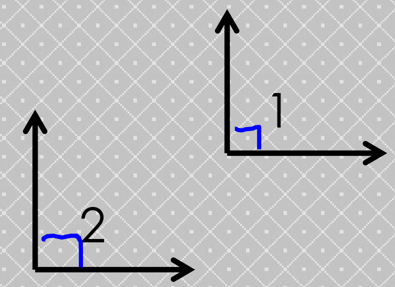
All right angles are congruent.



$If\ \angle 1\ and\ \angle 2\ are\ right\ angles, then\ \angle 1 \cong \angle 2.$

Given: $\angle 1$ and $\angle 2$ are right angles

Prove: $\angle 1 \cong \angle 2$



Statements	Reasons
$\angle 1$ and $\angle 2$ are right angles	Given
$m\angle 1 = 90$; $m\angle 2 = 90$	Def. of right $\angle$s
$m\angle 1 = m\angle 2$	Transitive Prop. of =
$\angle 1 \cong \angle 2$	Def. of $\cong$ $\angle$s

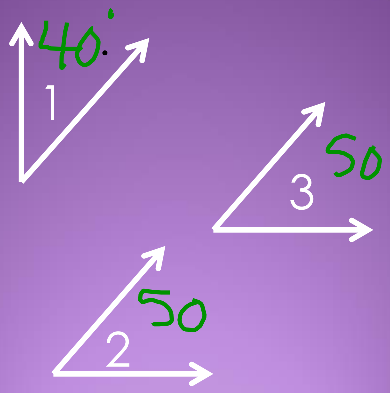
PROOF OF RIGHT ANGLE CONGRUENCE THEOREM

2-6-4

Congruent Complements

Theorem.

If two angles are complements of the same angle, (or congruent angles), then they are congruent.



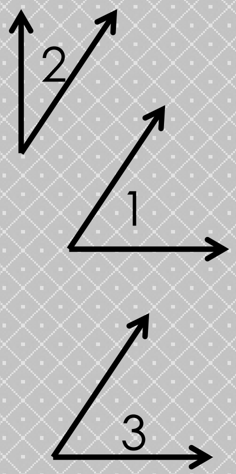
∠1 and ∠2 are complementary, and ∠1 and ∠3 are complementary.

∠2 ≅ ∠3.

Given: $\angle 1$ and $\angle 2$ are complementary

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

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

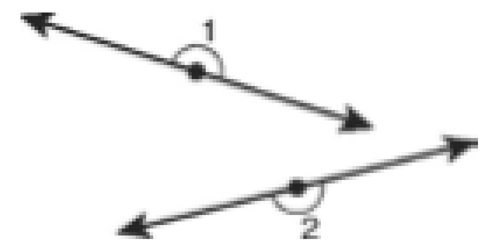


Statements	Reasons
$\angle 1$ and $\angle 2$ are complementary $\angle 3$ and $\angle 2$ are complementary	Given
$m\angle 1 + m\angle 2 = 90$ $m\angle 3 + m\angle 2 = 90$	Definition of complementary angles.
$m\angle 1 + m\angle 2 = m\angle 3 + m\angle 2$	Transitive Property of =
$m\angle 1 = m\angle 3$	Subtraction Property of =
$\angle 1 \cong \angle 3$	Angles with the same measure are congruent.

PROOF OF CONGRUENT COMPLEMENTS THEOREM

Given: $\angle 1$ and $\angle 2$ are straight angles.

Prove: $\angle 1 \cong \angle 2$



Statements	Reasons
1. a. ∠1 and ∠2 are straight ∠s	1. Given
2. $m\angle 1 = 180°$, $m\angle 2 = 180°$	2. b. Def. of Str. ∠s
3. $m\angle 1 = m\angle 2$	3. Subst. Prop. of =
4. c. $\angle 1 \cong \angle 2$	4. Def. of ≅ ∡

GENERAL PROOFS

Angles can be proven congruent in several different ways.
The 4 Theorems suggest ways to do this.

SUMMARY

HOMEWORK

Pages 113-116:

4, 6, 8, 12, 16, 18, 20, 24, 26