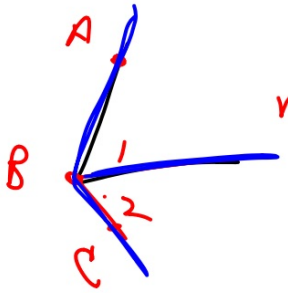
Geometry 2.8 Giv. | pic. Pr.

Write proofs involving complementary and supplementary angles
Write proofs involving congruent and right angles

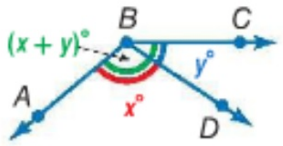
complementary = 90
supplementary = 180
linear pair
adjacent angles
protractor postulate
angle addition postulate
activity: whiteboards
scrambled proofs



$m\angle 1 + m\angle 2 = m\angle ABC$

Postulate 2.11 Angle Addition Postulate

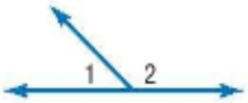
D is in the interior of $\angle ABC$ if and only if $m\angle ABD + m\angle DBC = m\angle ABC$.



$x^\circ + y^\circ = ABC$

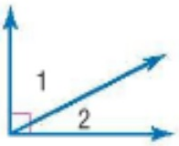
Theorems

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



Example $m\angle 1 + m\angle 2 = 180$

2.4 Complement Theorem If the noncommon sides of two adjacent angles form a right angle, then the angles are complementary angles.



Example $m\angle 1 + m\angle 2 = 90$

You will prove Theorems 2.3 and 2.4 in Exercises 16 and 17, respectively.

ReadingMath

Abbreviations and Symbols

The notation ∡ means *angles*.

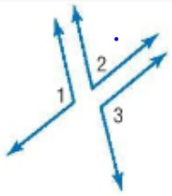
Theorems

2.6 Congruent Supplements Theorem

Angles supplementary to the same angle or to congruent angles are congruent.

Abbreviation ∡ *suppl. to same* ∠ *or* ≅ ∡ *are* ≅.

Example If $m\angle 1 + m\angle 2 = 180$ and $m\angle 2 + m\angle 3 = 180$, then $\angle 1 \cong \angle 3$.

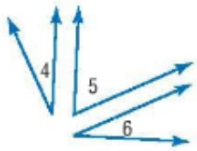


2.7 Congruent Complements Theorem

Angles complementary to the same angle or to congruent angles are congruent.

Abbreviation ∡ *compl. to same* ∠ *or* ≅ ∡ *are* ≅.

Example If $m\angle 4 + m\angle 5 = 90$ and $m\angle 5 + m\angle 6 = 90$, then $\angle 4 \cong \angle 6$.



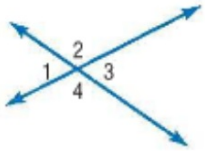
You will prove one case of Theorem 2.6 in Exercise 6.

Theorem 2.8 Vertical Angles Theorem

If two angles are vertical angles, then they are congruent.

Abbreviation *Vert. ∠s are ≅.*

Example $\angle 1 \cong \angle 3$ and $\angle 2 \cong \angle 4$

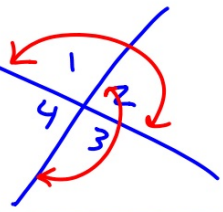


You will prove Theorem 2.8 in Exercise 28.

Proof:

Given $\angle 1$ & $\angle 3$ are VA

Prove $\angle 1 \cong \angle 3$

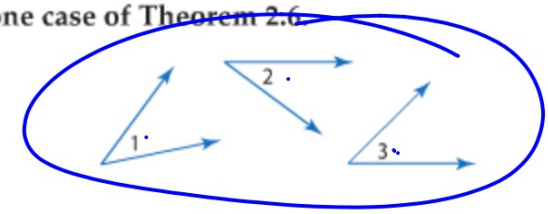


1. $\angle 1$ & $\angle 3$ are VA	1. given
2. $m\angle 1 + m\angle 2 = 180$ $m\angle 2 + m\angle 3 = 180$	2. $\angle$ P
3. $m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3$ $-m\angle 2 \quad -m\angle 2$	3. Subs.
4. $m\angle 1 = m\angle 3$	4. Subtr.
5. $\angle 1 \cong \angle 3$	5. def $\cong$

6. PROOF Copy and complete the proof of one case of ~~Theorem 2.6~~.

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

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



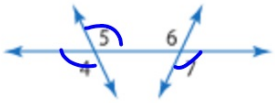
Proof:

Statements	Reasons
a. $\angle 1$ and $\angle 3$ are complementary. $\angle 2$ and $\angle 3$ are complementary.	a. given
b. $m\angle 1 + m\angle 3 = 90$; $m\angle 2 + m\angle 3 = 90$	b. def comp
c. $m\angle 1 + m\angle 3 = m\angle 2 + m\angle 3$	c. Subs.
d. $m\angle 3 = m\angle 3$	d. Reflexive Property
e. $m\angle 1 = m\angle 2$	e. Subtr
f. $\angle 1 \cong \angle 2$	f. def $\cong$

7. CCSS **ARGUMENTS** Write a two-column proof.

Given: $\angle 4 \cong \angle 7$

Prove: $\angle 5 \cong \angle 6$



1. $\angle 4 \cong \angle 7$	1. given
2. $\angle 4 \cong \angle 5$, $\angle 6 \cong \angle 7$	2 VA
3. $\angle 5 \cong \angle 6$	3 Subs

Find the measure of each numbered angle and name the theorems used that justify your work.

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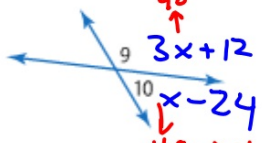
11. $m\angle 9 = 3x + 12$

$m\angle 10 = x - 24$



48

$3x+12$

$x-24$

$48-24$

$3x+12 + x-24 = 180$

$4x-12 = 180$

$m\angle 9 = 156$ $x = 48$

$m\angle 10 = 24$

12. $m\angle 3 = 2x + 2$

$m\angle 4 = 5x - 112$

$2x+2 = 5x-112$

$-5x \quad -2 \quad -5x \quad -2$

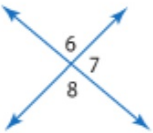
$-3x = -114$

$m\angle 3 = 78$ $x = 38$

$m\angle 4 = 78$

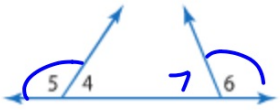
13. $m\angle 6 = 2x - 21$

$m\angle 7 = 3x - 34$



15. Given: $\angle 5 \cong \angle 6$

Prove: $\angle 4$ and $\angle 6$ are supplementary.



1. $\angle 5 \cong \angle 6$	1. given
2. $\angle 4 + \angle 5 = 180$	2. Lin pr.
3. $\angle 4 + \angle 6 = 180$	3. subs
4. $\angle 4$ & $\angle 6$ are supp	4. def sup