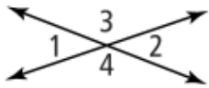


Vertical Angles Theorem

Vertical angles are congruent.

If...



Then... $\angle 1 \cong \angle 2$ and $\angle 3 \cong \angle 4$.

Vertical \angle 's

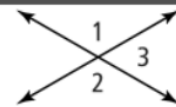
Non-Adjacent \angle 's
formed by intersecting
lines.

Write a Two-Column Proof

🔊 A theorem is a conjecture that is proven.
Prove the Vertical Angles Theorem.

① Given: $\angle 1$ and $\angle 2$ are vertical angles.
Prove: $\angle 1 \cong \angle 2$

COMMON ERROR

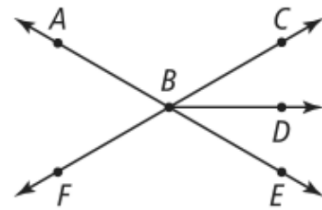


Statement	Reason
1) $\angle 1$ & $\angle 2$ are vertical \angle 's	1) Given
2) $\angle 1$ & $\angle 3$ are Linear Pair $\angle 2$ & $\angle 3$ are Linear Pair	2) Definition of Linear Pair
3) $m\angle 1 + m\angle 3 = 180^\circ$ $m\angle 2 + m\angle 3 = 180^\circ$	3) Linear Pair Post.
4) $m\angle 1 + m\angle 3 = m\angle 2 + m\angle 3$ $-m\angle 3$ $-m\angle 3$	4) Substitution property
5) $m\angle 1 = m\angle 2$	5) Subtraction prop.
6) $\angle 1 \cong \angle 2$	6) Definition of $\cong \angle$.

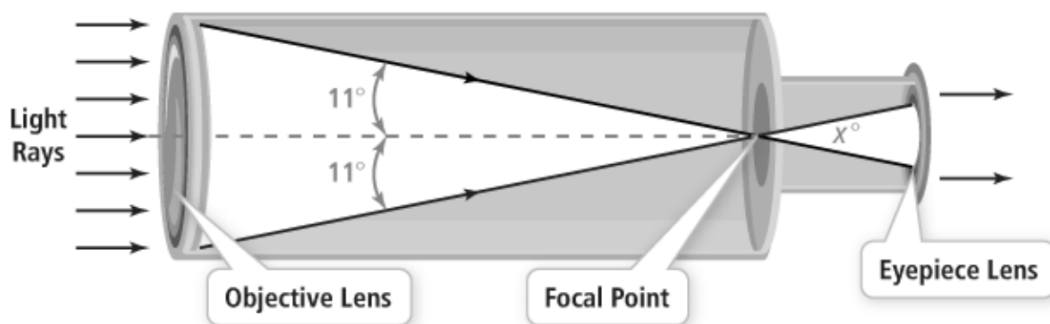
1. Write a two-column proof.

Given: \overrightarrow{BD} bisects $\angle CBE$.

Prove: $\angle ABD \cong \angle FBD$



The diagram shows how glass lenses change the direction of light rays passing through a telescope. What is the value of x , the angle formed by the crossed outermost light rays through the focal point?

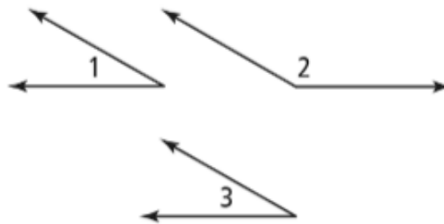


Congruent Supplements Theorem

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

PROOF: SEE EXAMPLE 3.

If... $m\angle 1 + m\angle 2 = 180^\circ$ and
 $m\angle 3 + m\angle 2 = 180^\circ$



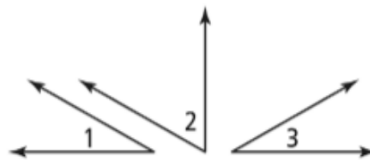
Then... $\angle 1 \cong \angle 3$

Congruent Complements Theorem

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

PROOF: SEE EXAMPLE 3 TRY IT.

If... $m\angle 1 + m\angle 2 = 90^\circ$ and
 $m\angle 3 + m\angle 2 = 90^\circ$



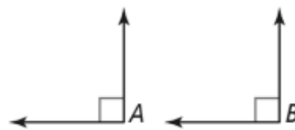
Then... $\angle 1 \cong \angle 3$

THEOREM 1-4

All right angles are congruent.

PROOF: SEE EXERCISE 9.

If...



Then... $\angle A \cong \angle B$

THEOREM 1-5

If two angles are congruent and supplementary, then each is a right angle.

PROOF: SEE EXERCISE 11.

If... $\angle 1 \cong \angle 2$ and $m\angle 1 + m\angle 2 = 180^\circ$

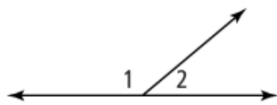


Then... $\angle 1$ and $\angle 2$ are right angles

Linear Pair Posulate

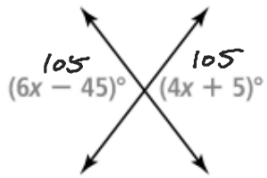
The sum of the measures of a linear pair is 180.

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



Then... $m\angle 1 + m\angle 2 = 180$.

2. a. Find the value of x and the measure of each labeled angle.



$$6x - 45 = 4x + 5$$

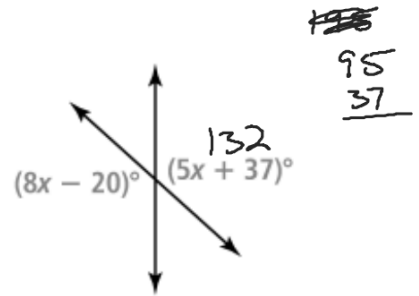
$$\begin{array}{r} -4x \quad -4x \\ \hline \end{array}$$

$$2x - 45 = 5$$

$$\begin{array}{r} +45 \quad +45 \\ \hline \end{array}$$

$$2x = 50$$

$$x = 25$$



$$8x - 20 = 5x + 37$$

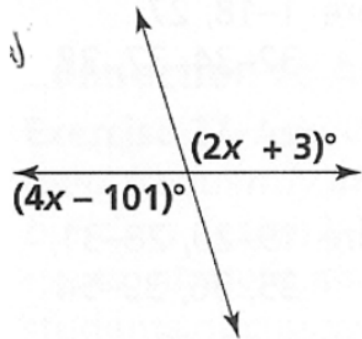
$$3x - 20 = 37$$

$$3x = 20 + 37$$

$$3x = 57$$

$$x = 19$$

Find the value of the variable.

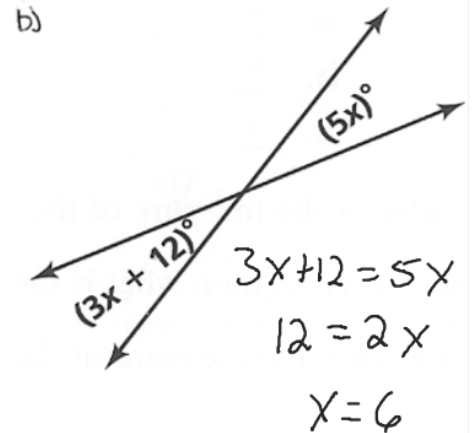


$$4x - 101 = 2x + 3$$

$$2x - 104 = 3$$

$$2x = 104$$

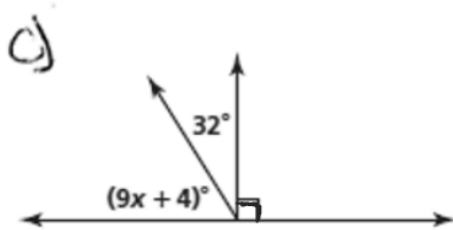
$$x = 52$$



$$3x + 12 = 5x$$

$$12 = 2x$$

$$x = 6$$

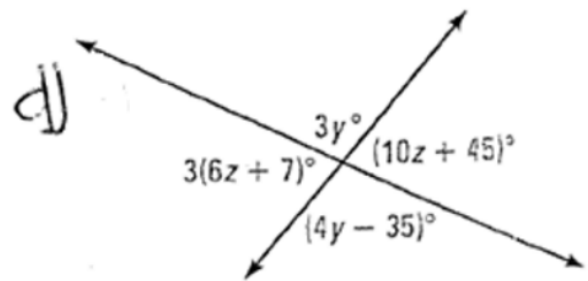


$$9x + 4 + 32 = 90$$

$$9x + 36 = 90$$

$$9x = 54$$

$$x = 6$$



$$3y + 10z + 45 = 180$$

$$3y = 4y - 35$$

$$3(6z + 7) + 4y - 35 = 180$$

$$-y = -35$$

$$3(6z + 7) = 10z + 45$$

$$y = 35$$

$$18z + 21 = 10z + 45$$

$$8z + 21 = 45$$

$$8z = 24$$

$$z = 3$$