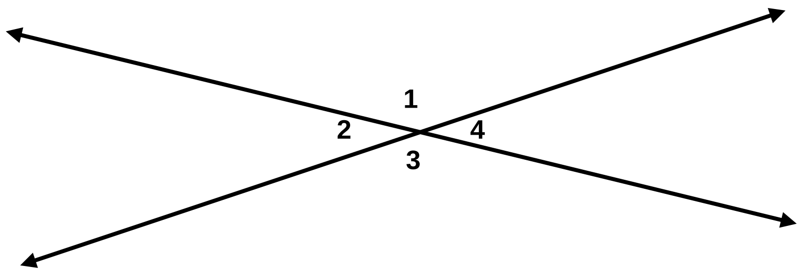
Notes: **PROOF OF ANGLE RELATIONSHIPS**

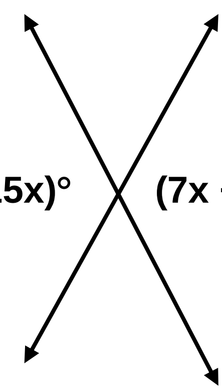
Content Objective: ***I will be able to apply angle relationships to proofs and solve problems with angles.***

VERTICAL ANGLE THEOREM:
Vertical angles are congruent.



Vertical angles: $\angle$___ $\cong$ $\angle$___ and
$\angle$___ $\cong$ $\angle$___.

EXAMPLE 1:

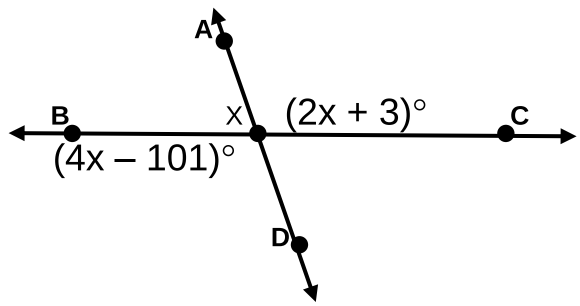


Since vertical angles are congruent, set the two angles equal to each other:
_________ = ________

Vertical angles: 15(___) = 7(___) + 88 = _____°

Supplementary angles: 180 – ______ = _____°

QUICK CHECK: Find the value of x. Find the vertical angles and supplementary angles.



x = ________________

m∠AXC = _______________ m∠BXD = __________

m∠AXB = _______________ m∠CXD = __________

What is the sum of the angles AXB and AXC? ______________

∠AXB and ∠AXC form a ________________ pair.

What is the sum of the angles BXD and CXD? __________________

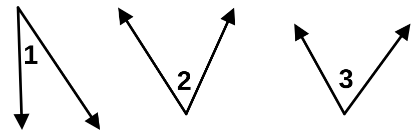
∠BXD and ∠CXD form a ________________ pair.

<u>CONGRUENT SUPPLEMENTS THEOREM</u>:
If two angles are supplementary to the same angle (or to congruent angles), then they are congruent.

<u>CONGRUENT COMPLEMENTS THEOREM:</u>
If two angles are congruent to the same angle (or to congruent angles), then they are congruent.

QUICK CHECK. Fill in the blank rectangles.

<u>Proof</u> of the Congruent Complements Theorem:

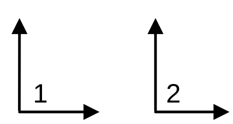


Given: $\angle 1$ and $\angle 2$ are complementary
$\angle 1$ and $\angle 3$ are complementary
Prove: $\angle 2 \cong \angle 3$

Statements	Reasons
1) $\angle 1$ and $\angle 2$are complementary $\angle 1$ and $\angle 3$ are complementary	1)
2) $m\angle 1 + m\angle 2 = 90°$ $m\angle 1 + m\angle 3 = 90°$	2)
3)	3) Transitive Property of Equality
4)	4) Subtraction Property of Equality
5) $\angle 2 \cong \angle 3$	5)

<u>RIGHT ANGLES CONGRUENCE THEOREM</u>
All right angles are congruent.

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

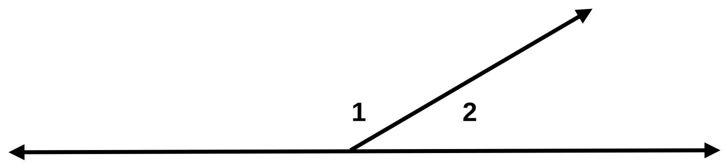


$\boxed{m\angle 1 = 90,\ m\angle 2 = 90}$ Definition of Right angles

$\boxed{m\angle 1 = m\angle 2}$ Transitive Property of Equality

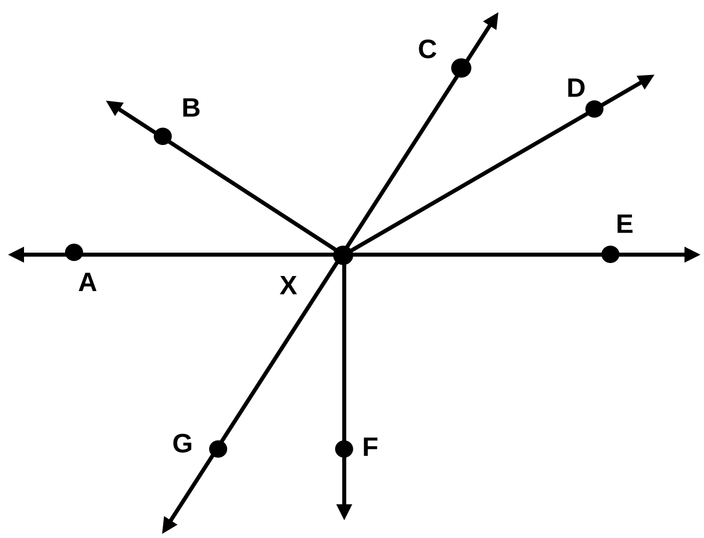
$\boxed{\angle 1 \cong \angle 2}$ Definition of Congruent Angles

<u>LINEAR PAIR POSTULATE</u>
If two angles form a linear pair, then the angles are supplementary.



If $\angle 1$ and $\angle 2$ form a linear pair, then $\angle 1$ and $\angle 2$ are supplementary.

QUICK CHECK: *Fill in the blanks below.* $\overrightarrow{XB} \perp \overleftrightarrow{GC}$ and $\overrightarrow{XF} \perp \overleftrightarrow{AE}$.



$m\angle GXB = m\angle BXC = m\angle FXA = m\angle FXE$

a) If $m\angle AXG = 52°$ and $m\angle CXD = 33°$, then $m\angle DXE$ = ____________.

b) If $m\angle AXB = 28°$, then $m\angle AXG$ = ______________.

c) If $m\angle GXF = 33°$, then $m\angle GXE$ = ______________.

d) If $m\angle CXE = 78°$, then $m\angle CXA$ = ______________.