# 1-5 Angle Relationships

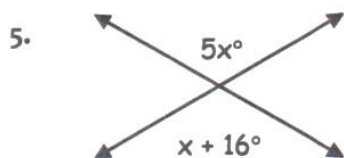| Angle Pairs | Definition | Example/Notation |
|---|---|---|
| Adjacent angles | 2 angles that are __coplanar__, have a common __side__ and a common vertex, but no common __interior__ points. | |
| Linear pair | a pair of adjacent angles whose __noncommon__ sides form __opposite__ rays. | |
| Vertical angles | 2 __nonadjacent__ angles formed by 2 __intersecting__ lines ☺ Vertical angles are always __≅__ (congruent) | $\angle 1 \& \angle 3$  $\angle 2 \& \angle 4$ |
| Complementary angles | 2 angles with measures that have a __sum__ of __90__ degrees. | |
| Supplementary angles | 2 angles with measures that have a __sum__ of __180__ degrees. ☺ Angles in a linear pair are always __supplementary__ | $m\angle 1 + m\angle 2 = 180$ |
| Perpendicular Lines | Lines, __segments__, or __rays__ that intersect to form __4__ __right__ angles. The right angle symbol __⌐__ indicates that the lines are perpendicular. The perpendicular symbol is __⊥__. | $\ell \perp m$ |

**1-4: Identify each pair of angles as adjacent, vertical, complementary, supplementary, and/or as a linear pair.**

1. ∠1 and ∠2 adjacent

2. ∠1 and ∠4 vertical

3. ∠3 and ∠4 adjacent & complementary

4. ∠1 and ∠5 adjacent, linear pr. & supp.
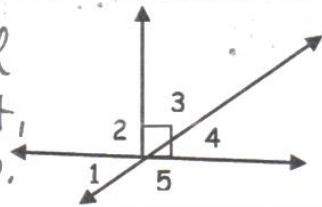
**5-8: Find the value of x.**

5.  $5x°$  $x + 16°$

$5x = x + 16$
$4x = 16$
$\boxed{x = 4}$
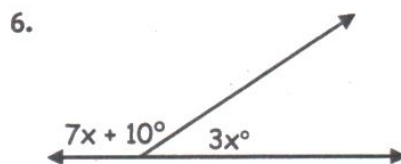
6.  $7x + 10°$  $3x°$

$7x + 10 + 3x = 180$
$10x + 10 = 180$
$10x = 170$
$\boxed{x = 17}$
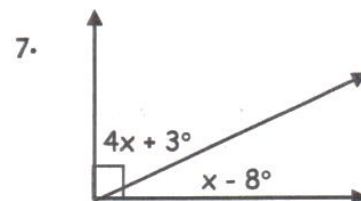
7.  $4x + 3°$  $x - 8°$

$4x + 3 + x - 8 = 90$
$5x - 5 = 90$
$5x = 95$
$\boxed{x = 19}$

8. The measure of ∠2 is four more than 3 times the measure of ∠1. If ∠1 and ∠2 are supplementary angles, what are the measures of ∠1 and ∠2?

$$\frac{3x+4}{\angle 2} \bigg/ \frac{x}{\angle 1}$$

$$3x+4+x=180$$
$$4x+4=180$$
$$4x=176$$
$$x=44$$

$$m\angle 1 = 44$$
$$m\angle 2 = 3(44)+4 = 136$$

**More Practice:**

**For Exercises 1–6, use the figure at the right and a protractor.**
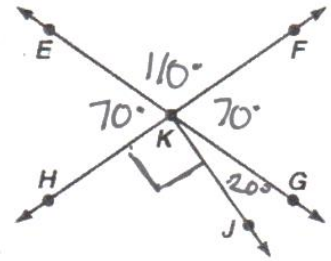


1. Name two acute vertical angles. ∠EKH & ∠FKG

2. Name two obtuse vertical angles. ∠EKF & ∠GKH

3. Name a linear pair. ∠EKF & ∠FKG (more ex!)

4. Name two acute adjacent angles. ∠FKG & ∠GKJ

5. Name an angle complementary to ∠EKH. since m∠EKH = 70, ∠GKJ is comp.

6. Name an angle supplementary to ∠FKG. since ∠FKG = 70, ∠EKF is supp.
   or ∠GKH

7. Find the measures of an angle and its complement if one angle measures 18 degrees more than the other.
$$x + x + 18 = 90 \rightarrow 2x = 72$$
$$2x + 18 = 90 \quad \boxed{x = 36}$$
$$36 + 18 = \boxed{54}$$

8. The measure of the supplement of an angle is 36 less than the measure of the angle. Find the measures of the angles.
$$x + x - 36 = 180 \rightarrow 2x = 216$$
$$2x - 36 = 180 \quad \boxed{x = 108}$$
$$108 - 36 = \boxed{72}$$

**ALGEBRA For Exercises 9–10, use the figure at the right.**

9. If $m\angle RTS = 8x + 18$, find $x$ so that $\overline{TR} \perp \overline{TS}$.
$$8x + 18 = 90$$
$$8x = 72$$
$$\boxed{x = 9}$$

10. If $m\angle PTQ = 3y - 10$ and $m\angle QTR = y$, find $y$ so that ∠PTR is a right angle.
$$\frac{y}{3y-10}$$
$$3y - 10 + y = 90 \rightarrow 4y = 100$$
$$4y - 10 = 90 \quad \boxed{y = 25}$$
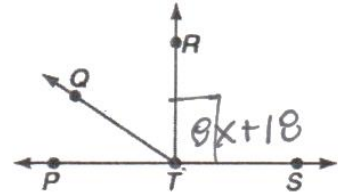


**Determine whether each statement can be assumed from the figure. Explain.**

11. ∠WZU is a right angle. Yes, b/c $\overline{WZ} \perp \overline{ZU}$



12. ∠YZU and ∠UZV are supplementary. Yes, b/c they are a linear pair

13. ∠VZU is adjacent to ∠YZX. No, b/c they are vertical angles and vertical angles can never be adjacent!