

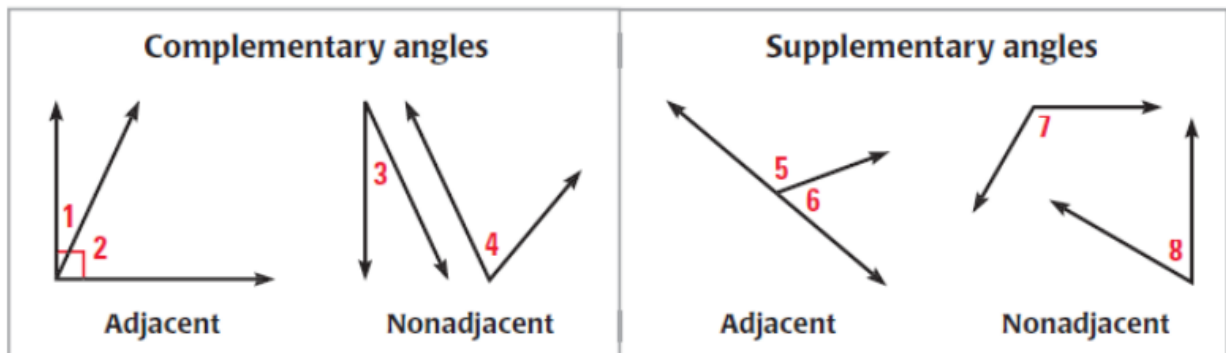
Geometry

4.1 Angles Formed by Intersecting Lines

complementary angles: 2 angles whose measures add to 90°

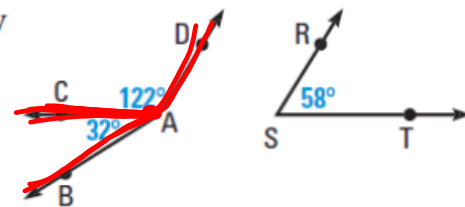
supplementary angles: 2 angles whose measures add to 180°

adjacent angles: 2 angles that share a common vertex and side but have no common interior points.



EXAMPLE 1 Identify complements and supplements

In the figure, name a pair of complementary angles, a pair of supplementary angles, and a pair of adjacent angles.



Comp: $\angle BAC$ & $\angle CAD$

Supp: $\angle DAC$ & $\angle RST$

Adj: $\angle BAC$ & $\angle CAD$

EXAMPLE 2 Find measures of a complement and a supplement

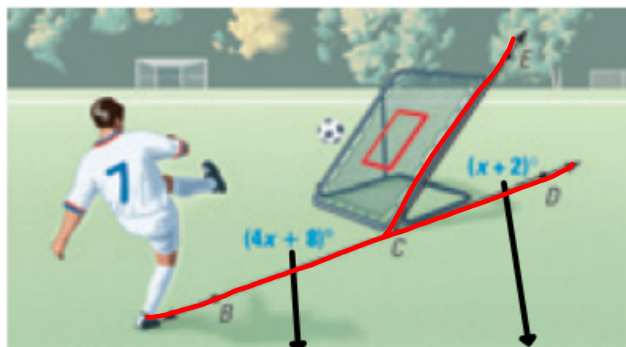
- a. Given that $\angle 1$ is a complement of $\angle 2$ and $m\angle 1 = 68^\circ$, find $m\angle 2$. $\overset{=90}{90-68} m\angle 2 = 22^\circ$
- b. Given that $\angle 3$ is a supplement of $\angle 4$ and $m\angle 4 = 56^\circ$, find $m\angle 3$. $\overset{=180}{180-56} m\angle 3 = 124^\circ$

EXAMPLE 3 Find angle measures

SPORTS When viewed from the side, the frame of a ball-return net forms a pair of supplementary angles with the ground. Find $m\angle BCE$ and $m\angle ECD$.

$$m\angle BCE = 144^\circ$$

$$m\angle ECD = 36^\circ$$



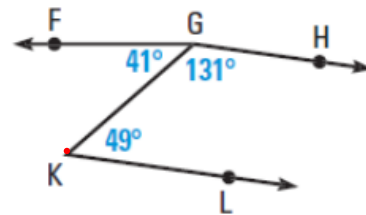
$$4x + 8 + x + 2 = 180$$

$$5x + 10 = 180$$

$$x = 34 \quad \frac{170}{5}$$

Try this:

2. In the figure, name a pair of complementary angles, a pair of supplementary angles, and a pair of adjacent angles.



Comp: $\angle FGK + \angle KGH$
 Supp: $\angle HGL + \angle LK$
 Adj: $\angle FGK + \angle HGL$

3. Given that $\angle 1$ is a complement of $\angle 2$ and $m\angle 2 = 8^\circ$, find $m\angle 1 = 82^\circ$

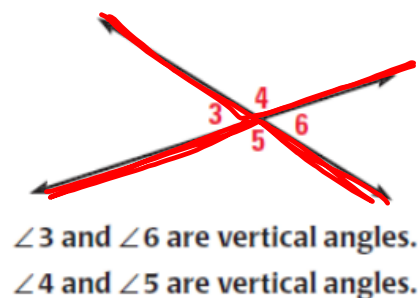
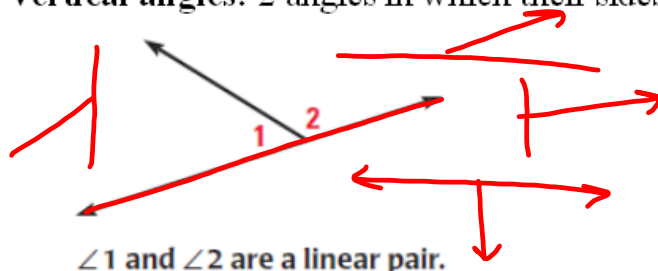
4. Given that $\angle 3$ is a supplement of $\angle 4$ and $m\angle 3 = 117^\circ$, find $m\angle 4 = 63^\circ$

5. $\angle LMN$ and $\angle PQR$ are complementary angles. Find the measures of the angles if $m\angle LMN = (4x - 2)^\circ$ and $m\angle PQR = (9x + 1)^\circ$.

$4x - 2 + 9x + 1 = 90$
 $13x - 1 = 90$
 $13x = 91$
 $x = 7$
 $m\angle LMN = 26^\circ$
 $m\angle PQR = 64^\circ$

linear pair: 2 adjacent angles that have opposite rays for their noncommon sides.

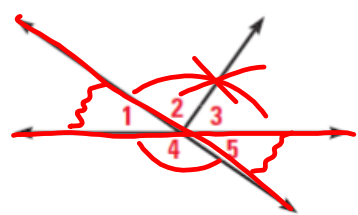
vertical angles: 2 angles in which their sides form 2 pairs of opposite rays. (X)



EXAMPLE 4 Identify angle pairs

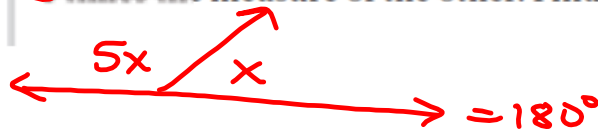
Identify all of the linear pairs and all of the vertical angles in the figure at the right.

Lin Pairs: $\angle 4 + \angle 5$, $\angle 1 + \angle 4$
 Vert \angle 's: $\angle 1 + \angle 5$



EXAMPLE 5 Find angle measures in a linear pair

ALGEBRA Two angles form a linear pair. The measure of one angle is 5 times the measure of the other. Find the measure of each angle.



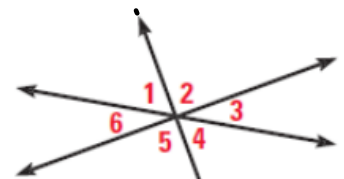
$30^\circ, 150^\circ$
5 · 30

$$\begin{aligned} 5x + x &= 180 \\ 6x &= 180 \\ x &= 30 \end{aligned}$$

Try this:

GUIDED PRACTICE for Examples 4 and 5

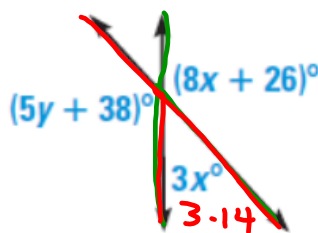
- Do any of the numbered angles in the diagram at the right form a linear pair? *NO*
Which angles are vertical angles? *Explain.*
∠2, ∠5 + ∠6, ∠3 + ∠1, ∠4
- The measure of an angle is twice the measure of its complement. Find the measure of each angle.
- Find the values of x and y .



x
 $2x$
 $30^\circ, 60^\circ$

$$\begin{aligned} x + 2x &= 90 \\ 3x &= 90 \\ x &= 30 \end{aligned}$$

$$\begin{aligned} 8x + 26 + 3x &= 180 \\ 11x + 26 &= 180 \\ 11x &= 154 \\ x &= 14 \end{aligned}$$



$$\begin{aligned} 5y + 38 + 42 &= 180 \\ 5y + 80 &= 180 \\ y &= 20 \end{aligned}$$

Homework

Worksheet