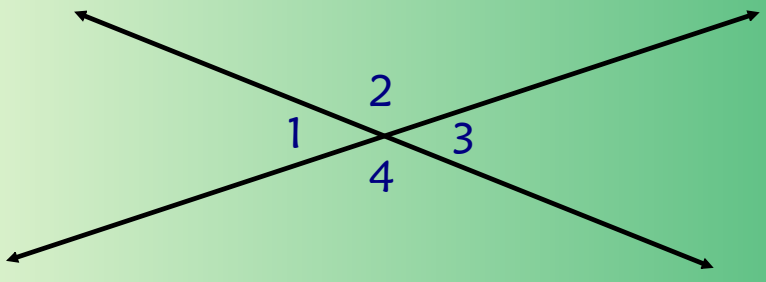
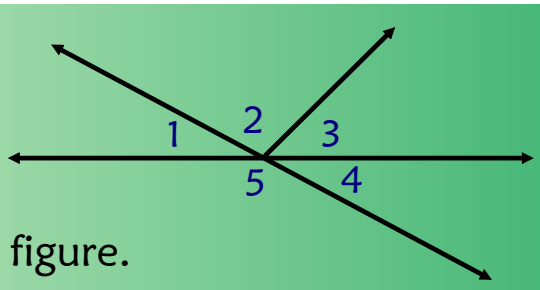
1.5 DESCRIBE ANGLE PAIR RELATIONSHIPS

Special Types of Angles	Definition	Example
adjacent angles	angles in the same plane that have a common vertex and a common side, but no common interior points	∠1 & ∠2 ∠3 & ∠4 ∠2 & ∠3 ∠1 & ∠4
vertical angles	two nonadjacent angles formed by two intersecting lines	∠1 & ∠3 ∠2 & ∠4
linear pair	adjacent angles whose noncommon sides are opposite rays	∠1 & ∠2 ∠2 & ∠3 ∠3 & ∠4 ∠1 & ∠4



Example 1



a) Identify all linear pairs in the figure.

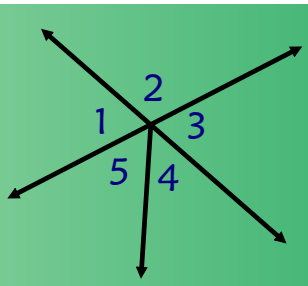
side by side make a line

∠5 & ∠1 ∠5 & ∠4

b) Identify all pairs of vertical angles in the figure.

∠1 & ∠4 not side-by-side formed by 2 intersecting lines

Example 2



a) Identify all linear pairs in the figure.

∠2 & ∠3 ∠2 & ∠1

b) Identify all pairs of vertical angles in the figure.

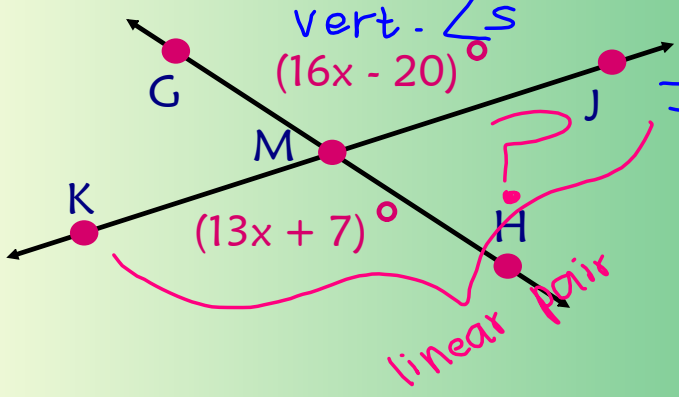
∠1 & ∠3

Vertical angles are congruent.

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

Example 3

In the figure, $\overleftrightarrow{GH}$ and $\overleftrightarrow{JK}$ intersect at M. Find the value of x and the measure of $\angle JMH$.



$(13x+7) + m\angle JMH = 180$

$13\cdot 9+7$

$124 + m\angle JMH = 180$

$-124 \quad -124$

$m\angle JMH = 56°$

$16x - 20 = 13x + 7$

$-13x \quad -13x$

$3x - 20 = 7$

$+20 \quad +20$

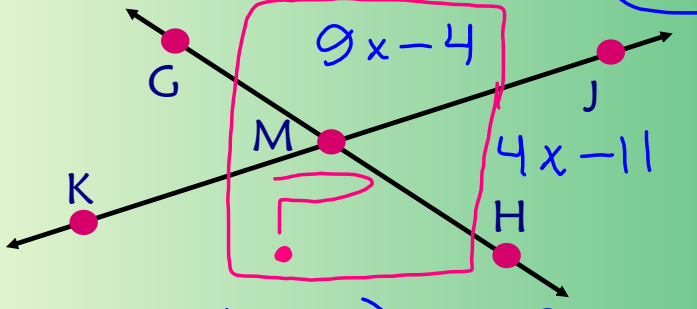
$\frac{3x}{3} = \frac{27}{3}$

$x = 9$

Example 4

Suppose m $\angle GMJ$ = 9x - 4 and m $\angle JMH$ = 4x - 11.

Find the value of x and m $\angle KMH$.



$(9x-4) + (4x-11) = 180$

$13x - 15 = 180$

$+15 \quad +15$

$\frac{13x}{13} = \frac{195}{13}$

$x = 15$

$9(15) - 4$

$135 - 4$

$m\angle KMH = 131°$

Two angles whose measures have a sum of 180 are called supplementary angles. If the sum of their measures is 90, they are called complementary angles.

Since we have learned that the sum of the measures of a linear pair is 180, we can now say that any two angles that form a linear pair must be supplementary angles .

Example 5

a) Name a pair of complementary angles. 2 ∠s = 90°

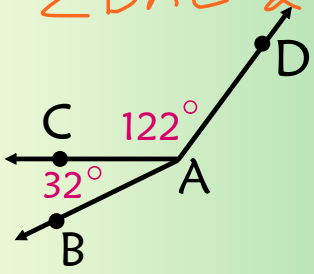
∠RST & ∠BAC 58+32=90°

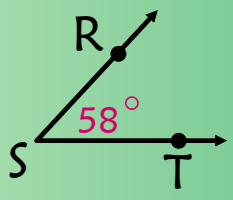
b) Name a pair of supplementary angles. 2 ∠s = 180°

∠RST & ∠DAC 58+122=180°

c) Name a pair of adjacent angles. side by side

∠DAC & ∠BAC





Example 6

a) Given that $\angle 1$ is a complement of $\angle 2$ and $m\angle 1 = 62^\circ$, find m $\angle 2$.

$\angle 1$ & $\angle 2$ → complementary $\angle$s

$62 + m\angle 2 = 90$

$m\angle 2 = 28^\circ$

b) Given that $\angle 3$ is a supplement of $\angle 4$ and $m\angle 4 = 114^\circ$, find m $\angle 3$.

$\angle 3$ & $\angle 4$ → supplementary $\angle$s

$\angle 3 + \angle 4 = 180$

$m\angle 3 + 114^\circ = 180^\circ$

$m\angle 3 = 66^\circ$

Example 7

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

$(4x-2) + (9x+1) = 90$

$13x - 1 = 90$

$+1 \quad +1$

$\frac{13x}{13} = \frac{91}{13}$

$x = 7$

$m\angle LMN = 4(7) - 2 = 26^\circ$

$m\angle PQR = 9(7) + 1 = 64^\circ$

Example 8

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.

$\angle 1 + \angle 2 = 180$

$x + 5x = 180$

$6x = 180$

$x = 30$

30° & 150°

Example 9

Two angles are complementary. One angle is six less than twice the other angle. Find the measure of each angle.

$\angle 1 + \angle 2 = 90$

$x + (2x-6) = 90$

$3x - 6 = 90$

$+6 \quad +6$

$\frac{3x}{3} = \frac{96}{3}$

$x = 32$

32° & 58°