

1.5 Describe Angle Pair Relationships

CC.9-12.G.CO.1: Know precise definitions of angle circle, perpendicular line, parallel line, and the line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.

CC.9-12.G.CO.9: Prove theorems about lines and angles.

Before

You used angle postulates to measure and classify angles.

Now

You will use special angle relationships to find angle measures.

Why?

So you can use angle relationships in applications.

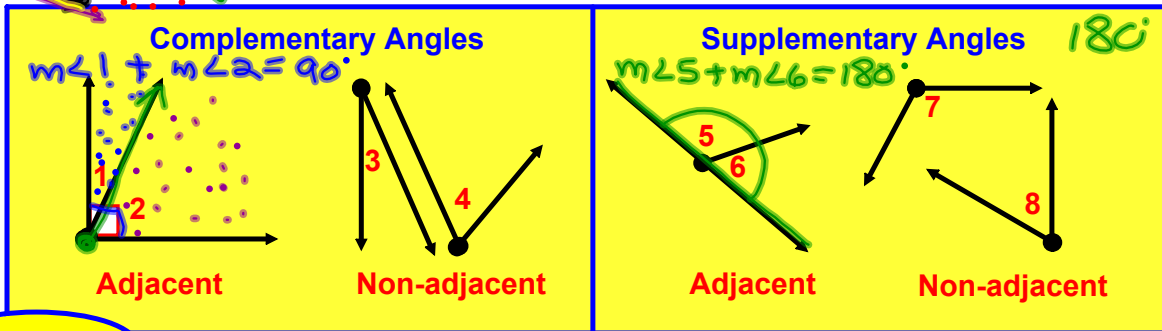
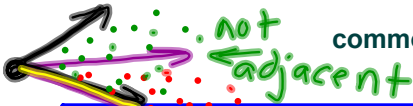
Big Idea: How to identify complementary and supplementary angles.

Vocabulary:  "Corner"

Complementary Angles - Two angles whose measures have a sum of 90°.

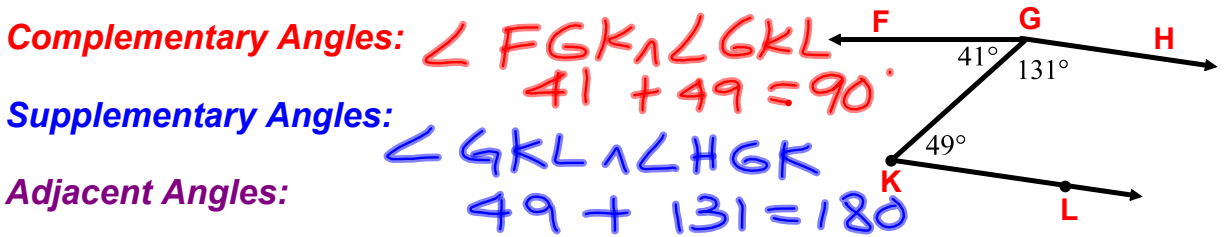
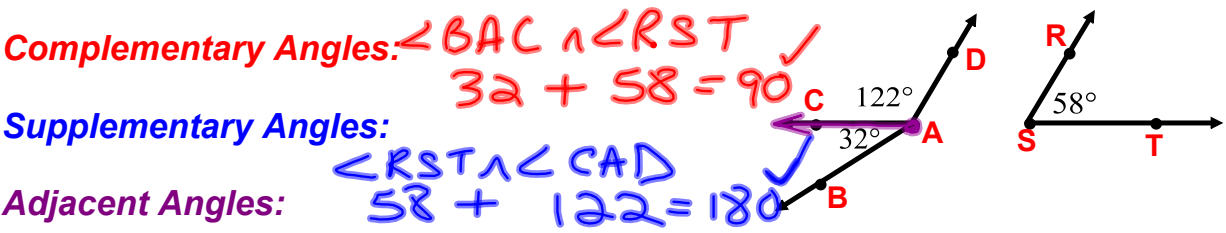
Supplementary Angles - Two angles whose measure have a sum of 180°.

Adjacent Angles - Two angles in a plane that share a common vertex and a common side but have NO interior points in common.



EXAMPLE 1

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



EXAMPLE 2 Find measures of a complement and a supplement

a. Given that $\angle 1$ is a complement of $\angle 2$ and $m\angle 1 = 68$, find $m\angle 2$.



$$90 - 68 = 22$$

b. Given that $\angle 3$ is a supplement of $\angle 4$ and $m\angle 4 = 56$, find $m\angle 3$.

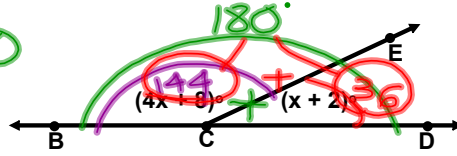
$$180 - 56 = 124$$



EXAMPLE 3 Find angle measures

Find the $m\angle BCE$ and $m\angle ECD$.

$$\begin{aligned} 4x + 8 + x + 2 &= 180 \\ 5x + 10 &= 180 \\ 5x &= 170 \\ x &= 34 \end{aligned}$$



Linear Pair - Two adjacent angles with noncommon sides that are opposite rays.

Angles in a linear pair are Supplementary Angles.



Vertical Angles - Two angles with sides that form two pairs of opposite rays.



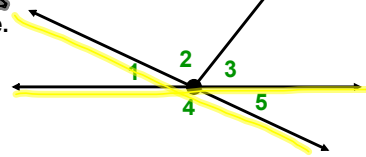
$\angle 1$ and $\angle 2$ are vert. \angle
 $\angle 3$ and $\angle 4$ " " " "

EXAMPLE 4 Identify angle pairs

Identify all the **Linear Pairs** and the **Vertical Angles** in the figure.

Linear Pairs: $\angle 1$ and $\angle 4$, $\angle 4$ and $\angle 5$

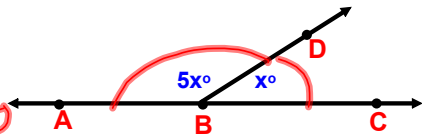
Vertical Angles: $\angle 1$ and $\angle 5$



EXAMPLE 5 Find angle measures in a linear pair

Find the measure of each angle.

$$\begin{aligned} m\angle ABC &= 180^\circ & 5x + x &= 180 \\ m\angle ABD &= 5x = 5 \cdot 30 = 150 & 6x &= 180 \\ m\angle DBC &= x = 30 & x &= 30 \end{aligned}$$

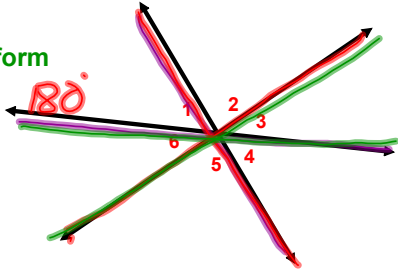


Do any of the numbered angles in the diagram at the right form a Linear Pair? Explain.

No 2 \angle s + up to 180

Which angles are Vertical Angles? Explain.

$\angle 1$ and $\angle 4$, $\angle 2$ and $\angle 5$
 $\angle 6$ and $\angle 3$



EXAMPLE 6

The measure of an angle is twice the measure of its complement. Find the measure of each angle.

$$\begin{aligned} 90 &= x + 2x & m\angle 1 &= 30 \\ 90 &= 3x & m\angle 2 &= 2 \cdot 30 = 60 \\ 30 &= x & & \end{aligned}$$