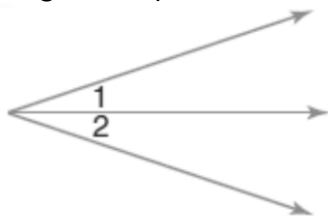# Adjacent Angles and Pairs of Angles

When you bisect an angle, you create two angles of equal measures. The two angles are called adjacent angles.

Angles 1 and 2 are examples of adjacent angles. They share a common ray and have the same vertex.
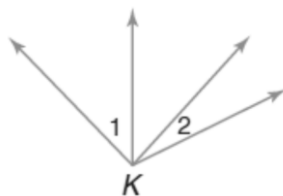

Definition 1: Adjacent Angles

Adjacent angles are angles that share a common side and have the same vertex, but have no interior points in common
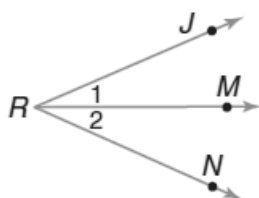
$\angle$ 1 and $\angle$ 2 are adjacent with the same vertex R and common side $\overrightarrow{RM}$
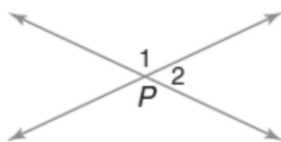

Example 1: Determine whether $\angle$ 1 and $\angle$ 2 are adjacent angles.
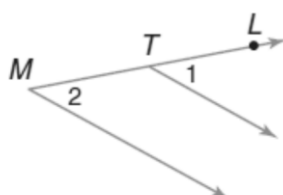
a)

Angles 1 and 2 have the same vertex K but they do not have a common side
$\Rightarrow \angle 1$ and $\angle 2$ are not adjacent angles

b)

Angles 1 and 2 have the same vertex P and they have a common side
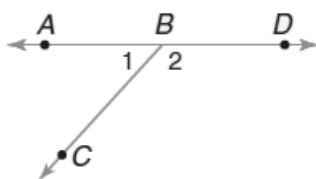$\Rightarrow \angle 1$ and $\angle 2$ are adjacent angles

c)

Angles 1 and 2 do not have the same vertex and they do not have a common side
$\Rightarrow \angle 1$ and $\angle 2$ are not adjacent angles

Grade 7

Definition 2: Linear Pair

Two angles form a linear pair if and only if they are adjacent and their non common sides are opposite rays
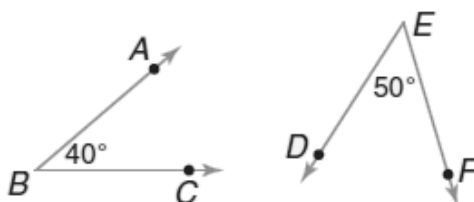

$\angle 1$ and $\angle 2$ are a linear pair

Angles are all around us, even in nature. Pairs of angles who have a sum equals to $90°$ or $180°$ have special names.

Definition 3: Complementary Angles

Two angles are complementary if and only if the sum of their degree measures is $90°$

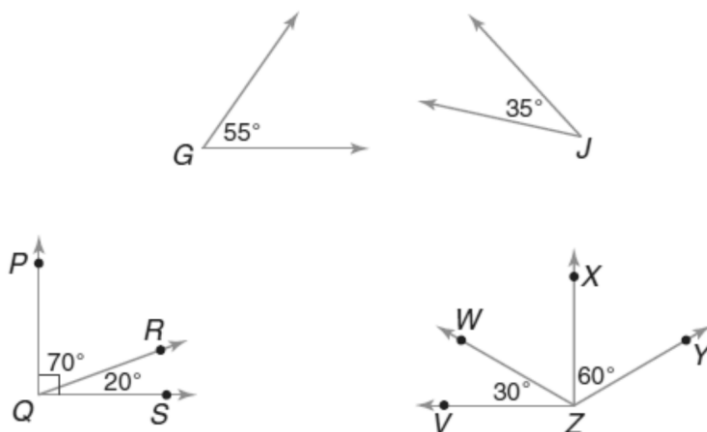$$m\angle ABC + m\angle DEF = 90°$$

If two angles are complementary, each angle is a *complement* of the other. For example, $\angle ABC$ is the complement of $\angle DEF$ and $\angle DEF$ is the complement of $\angle ABC$.

Complementary angles do not need to have a common side or even the same vertex.

Some examples of complementary angles are shown.

If the sum of the measures of two angles is 180, they form a special pair of angles called supplementary angles.

Definition 4: Supplementary Angles

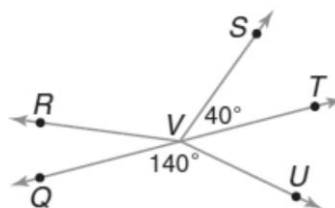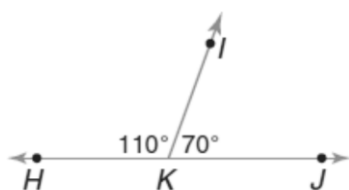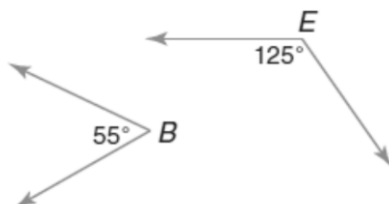Two angles are supplementary if and only if the sum of their degree measures is $180°$

$$m\angle MNP + m\angle RST = 180°$$

If two angles are supplementary, each angle is a *supplement* of the other. For example, $\angle MNP$ is the supplement of $\angle RST$ and $\angle RST$ is the supplement of $\angle MNP$.
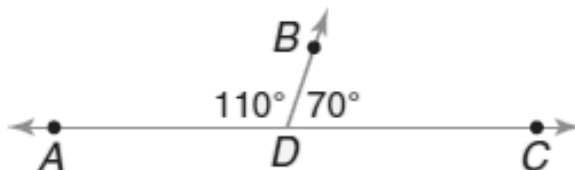
Like complementary angles, supplementary angles do not need to have a common side or the same vertex.

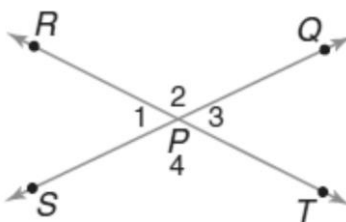The figures below are examples of supplementary angles.

Postulate 1: Supplementary Postulate

If two angles form a linear pair, then they are supplementary
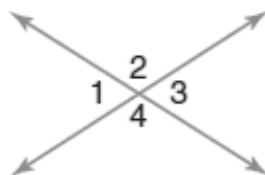

$$m\angle ADB + m\angle BDC = 180°$$

In the figure, $\overrightarrow{SQ}$ and $\overrightarrow{RT}$ intersect.

When two lines intersect, four angles are formed. There are two pairs of nonadjacent angles. These pairs are called vertical angles.
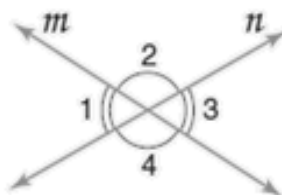
Definition 5: Vertically Opposite Angles

Two angles are vertical if and only if they are two nonadjacent angles formed by a pair of intersecting lines

Vertical Angles: $\angle 1 \;\; and \;\; \angle 3$
$\angle 2 \;\; and \;\; \angle 4$

Theorem 1: Vertical Angle Theorem

Vertical Angles are congruent

$\angle 1 \;\cong\; \angle 3$
$\angle 2 \;\cong\; \angle 4$