1.4 Angles and Their Measures
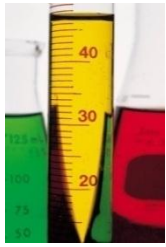
Geometry

Mrs. Lutz

Mrs. Sant

Mrs. Berrett
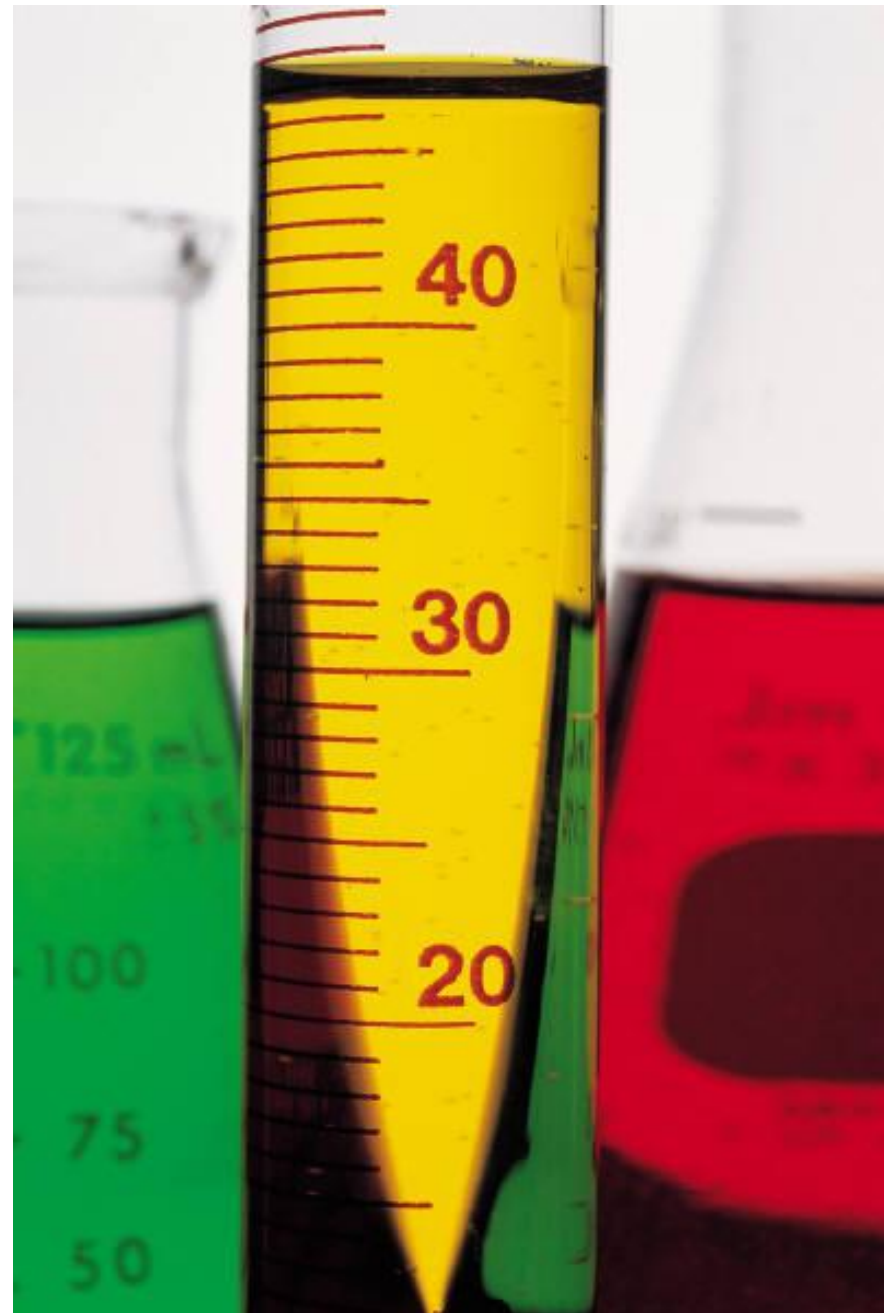
Standard/Objectives:

Objectives:

Name, classify and measure angles.

Vocabulary

- **Angle**
- **Vertex**
- **Interior of angle**
- **Exterior of angle**
- **Measure**
- **Degree**
- **Angle bisector**

- **Acute angle**
- **Right angle**
- **Obtuse angle**
- **Straight angle**
- **Congruent angles**
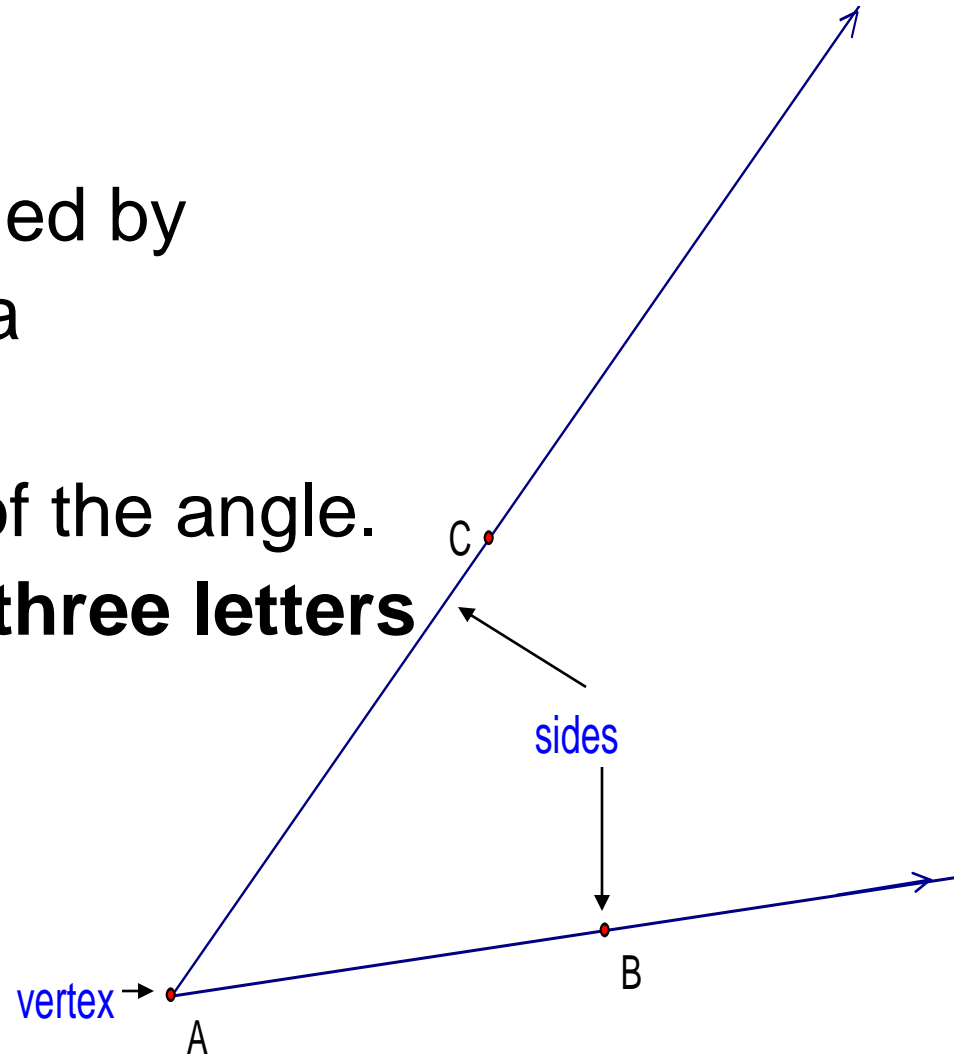- **Angle Addition Postulate**

Angles

- An angle is a figure formed by **two different** rays with a **common** endpoint.
- The **rays** are the sides of the angle.
- An angle is named with **three letters** *(the vertex letter in the middle)* OR with just the **vertex**.
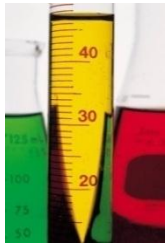
sides

C

vertex → A

B

Name the sides:

$$\overrightarrow{AC} \qquad \overrightarrow{AB}$$

Name the angle:

$$\angle CAB \qquad \angle BAC \qquad \angle A$$
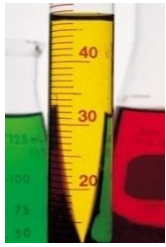
Vertex

The vertex the **common** point of **two rays**

C

sides

B
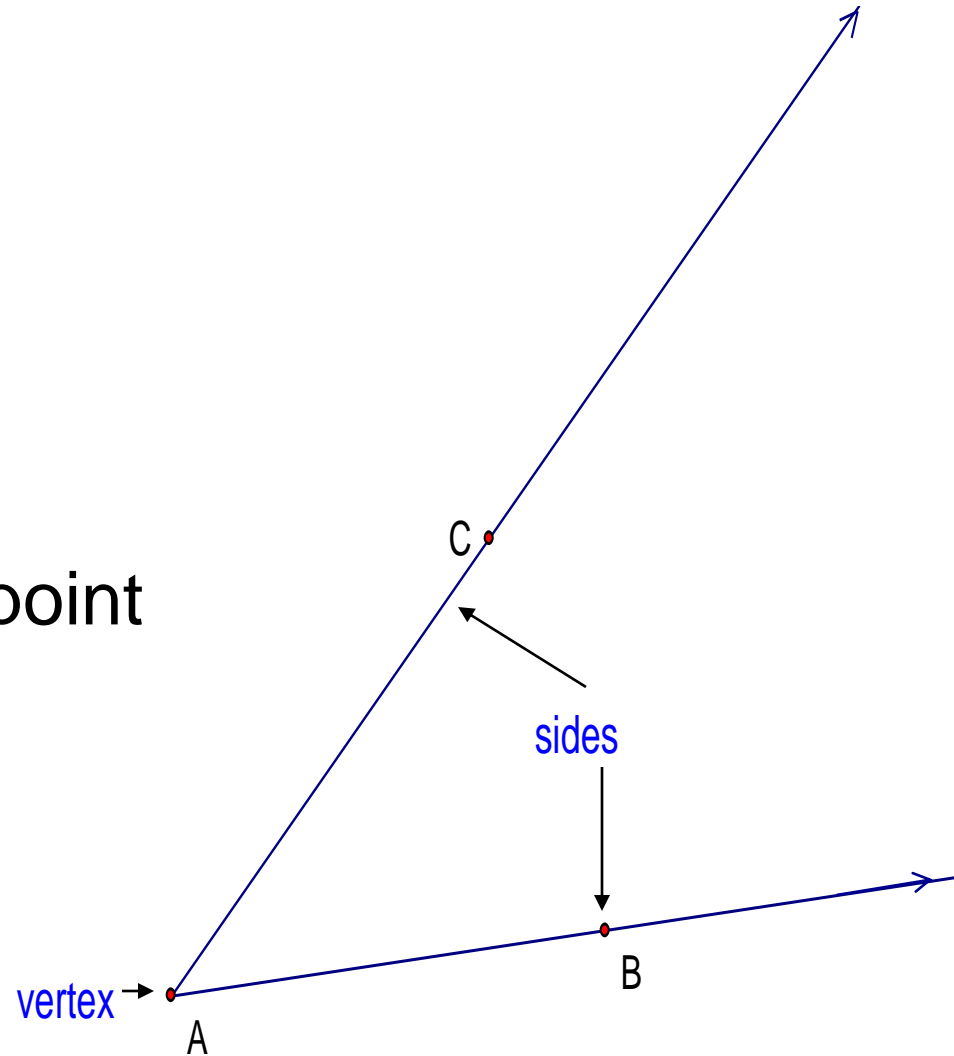
vertex → A

Ex.1: Naming Angles

- **Name the angles in the figure:**
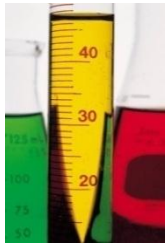
P

S

Q

R

SOLUTION:

There are three different angles.

- $\angle PQS$ **or** $\angle SQP$
- $\angle SQR$ **or** $\angle RQS$
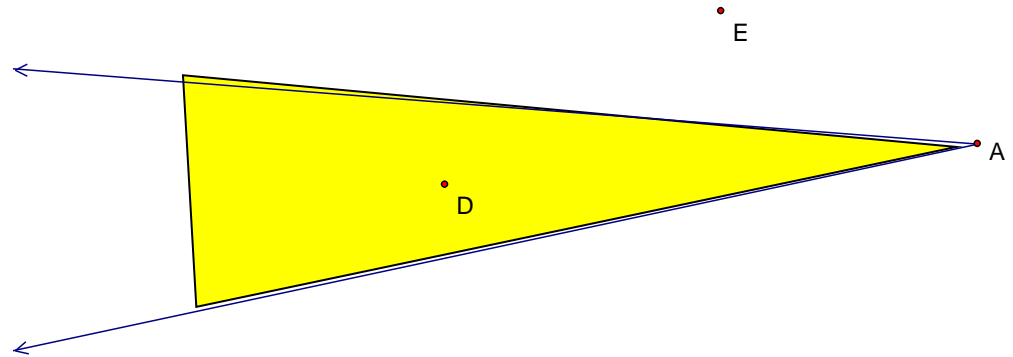- $\angle PQR$ **or** $\angle RQP$
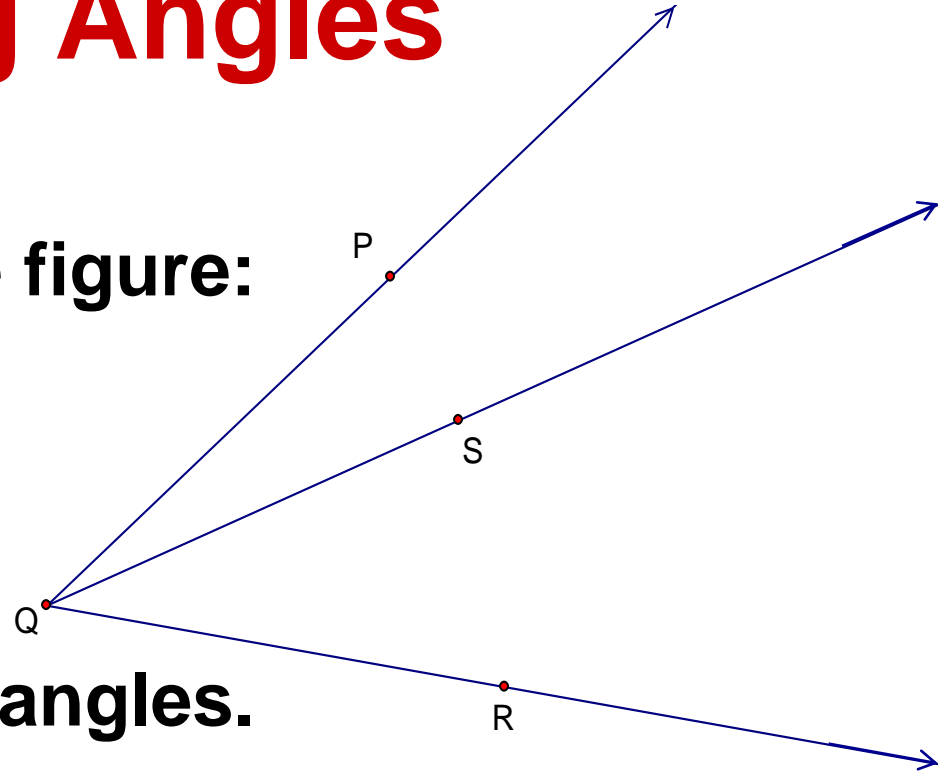
You should not name any of these angles as $\angle Q$ because all three angles have Q as their vertex.

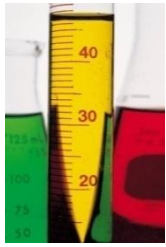The name $\angle Q$ would not distinguish one angle from the others.

Interior/Exterior of Angles

- The interior of an angle is **all** the points **inside** an angle and between its **sides**.
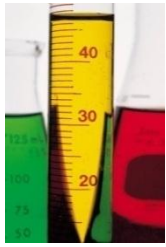
E

A

D

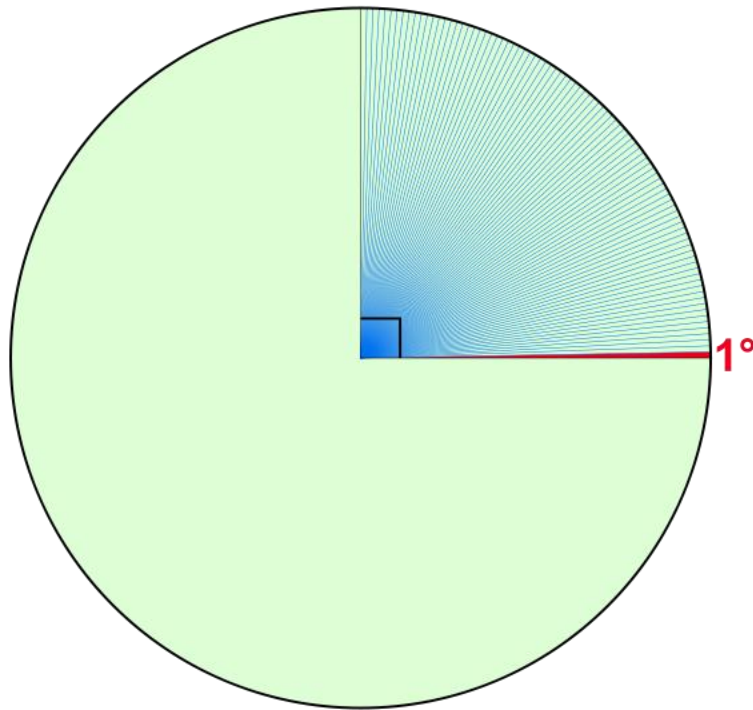- The exterior of an angle is **all** the points **outside** an angle.
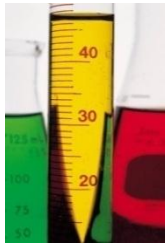
Measure of Angles

- The measure of $\angle A$ is denoted by $m\angle A$.

- The measure of an angle can be approximated using a ***protractor*** with units called ***degrees***(°).
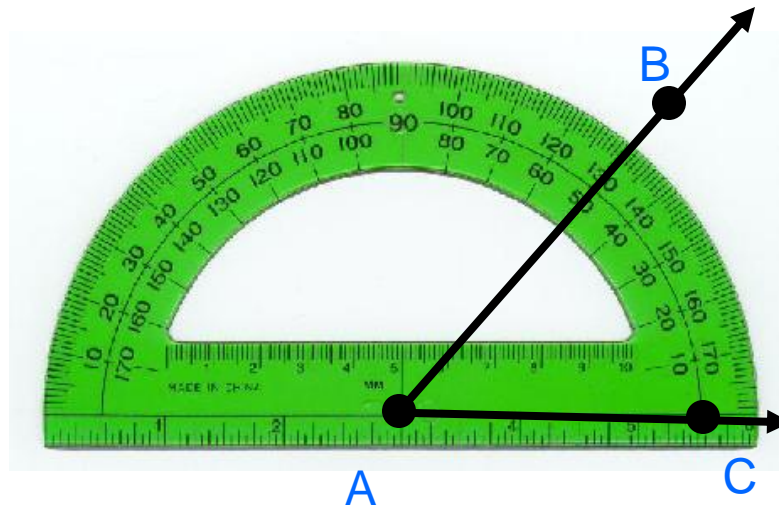
Degree

- **One degree represents $\frac{1}{360}$ of a circle.**

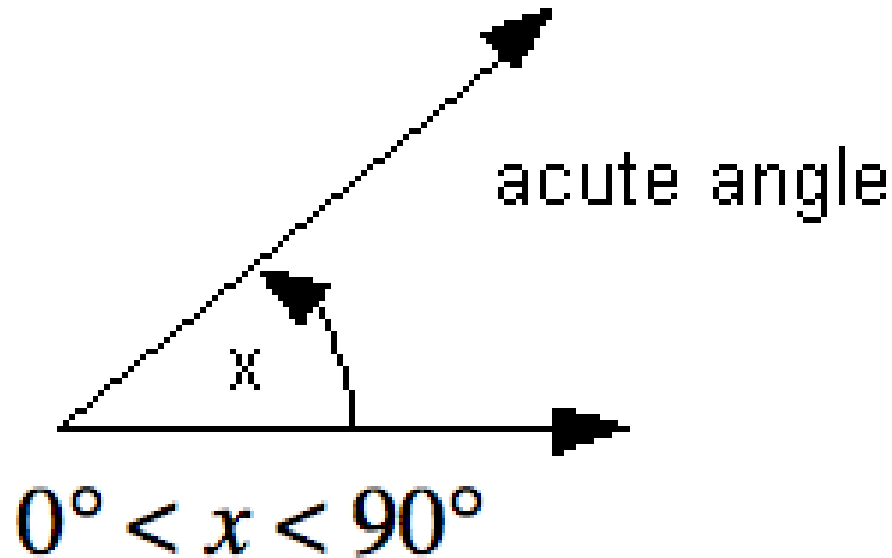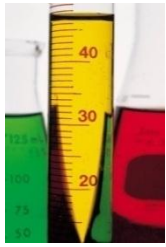# How to Use a Protractor
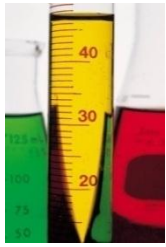
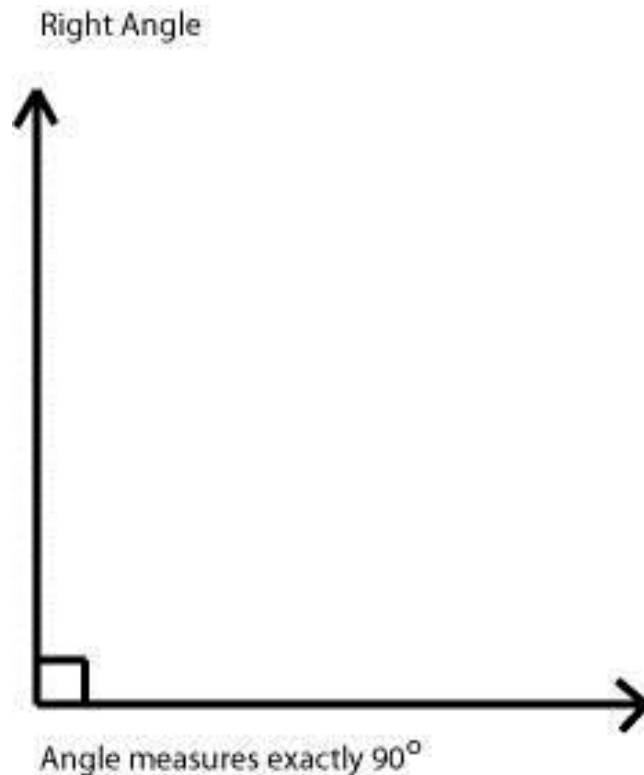Does $\angle BAC$ have a measure of 50˚ or 130˚ ?

Acute Angle

- **Acute angles measure greater than 0º and less than 90º.**

acute angle

x

$0° < x < 90°$

Right Angle

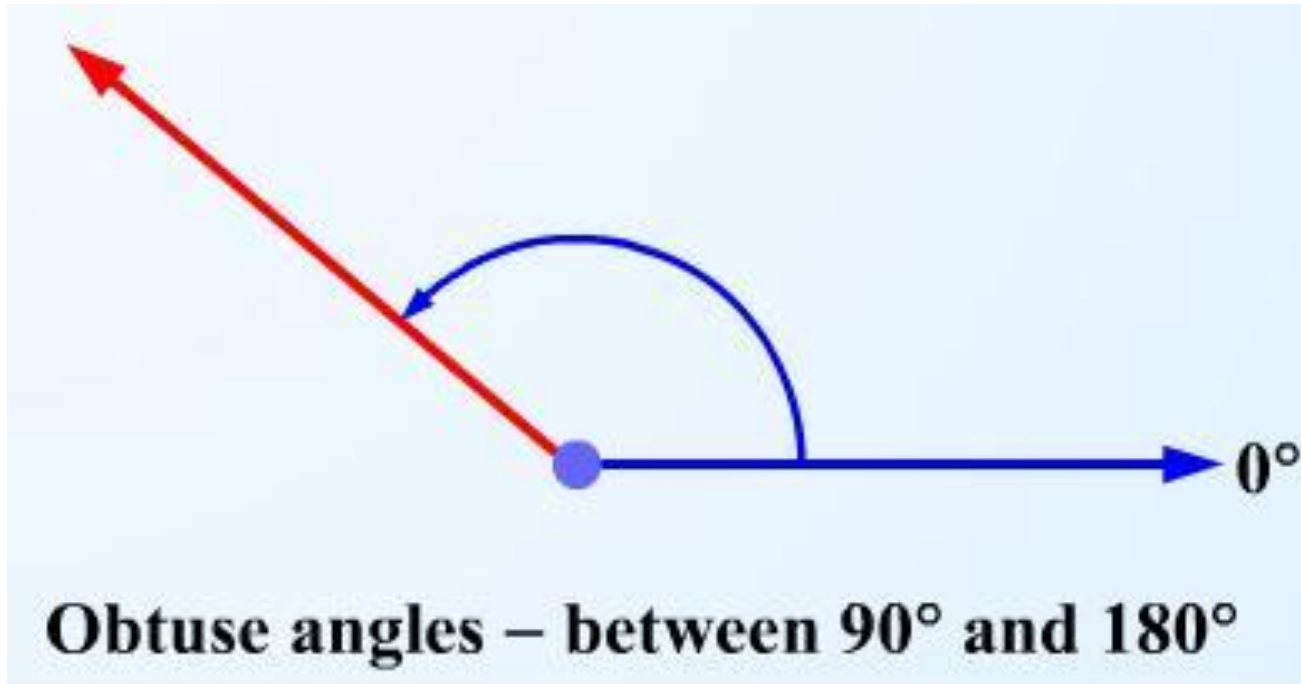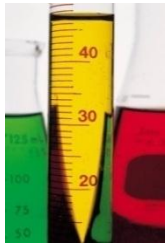- **Right angles measure 90°.**

Right Angle

Angle measures exactly 90°

Obtuse Angle

- **Obtuse angles measure greater than 90° and less than 180^0.**

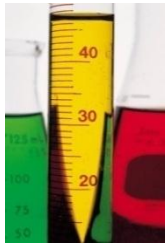Obtuse angles – between 90° and 180°

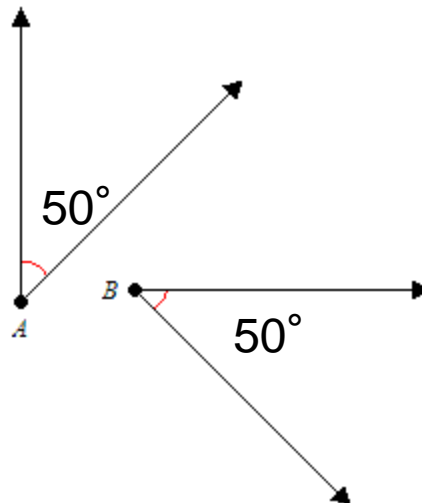MathATube.com

Straight Angle

- **Straight angles measure 180^0.**
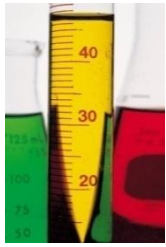- **Straight angles are formed by opposite rays.**

180°
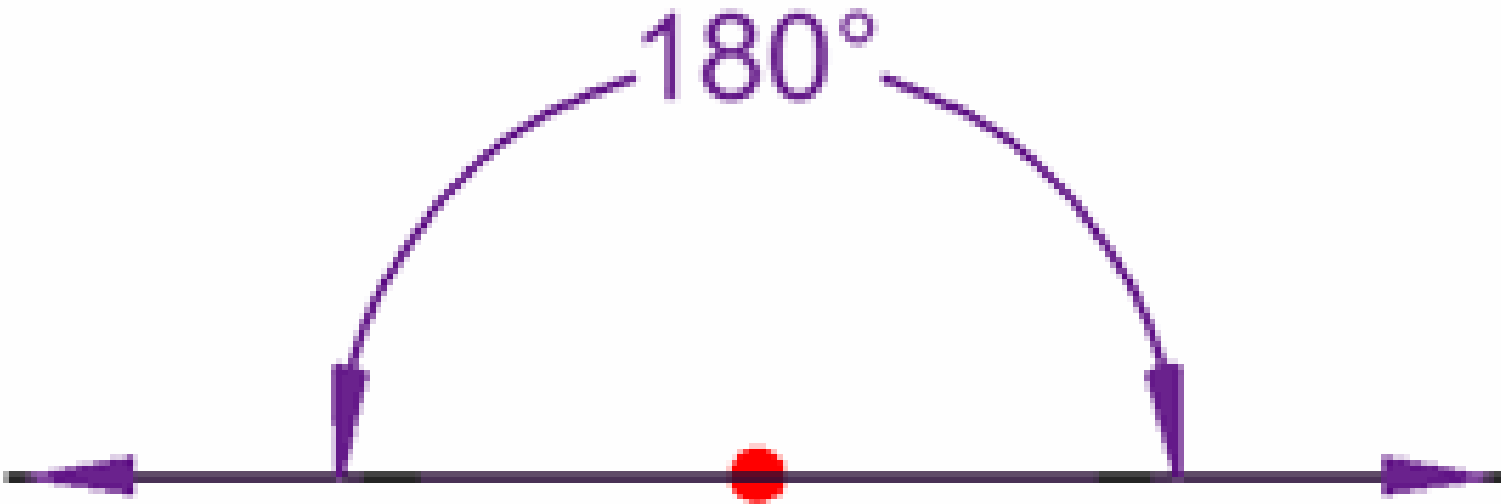
Congruent Angles

- Angles that have the same measure are called **congruent** angles.

- For instance, $\angle A$ and $\angle B$ each have a measure of 50°, so they are **congruent.**

Note – Geometry doesn't use equal signs like Algebra

MEASURES ARE EQUAL	ANGLES ARE CONGRUENT

$$m\angle BAC = m\angle DEF$$

$$\angle BAC \cong \angle DEF$$
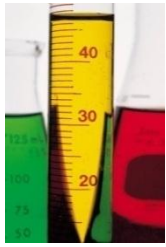
"is equal to"

"is congruent to"

Note: there is an *m* in front when you say, **"equal to"**

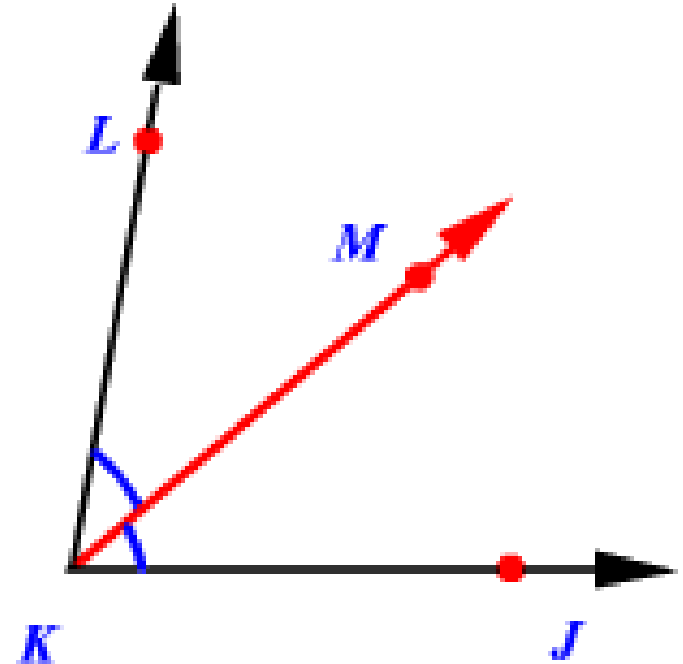But, with the congruency symbol $\cong$

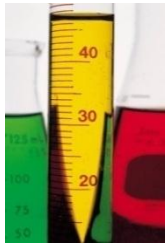You say, "congruent to"   *(no **m** in front of the angle symbols).*

Angle *Bi*sector

- A **ray** that divides an angle into two **equal** angles

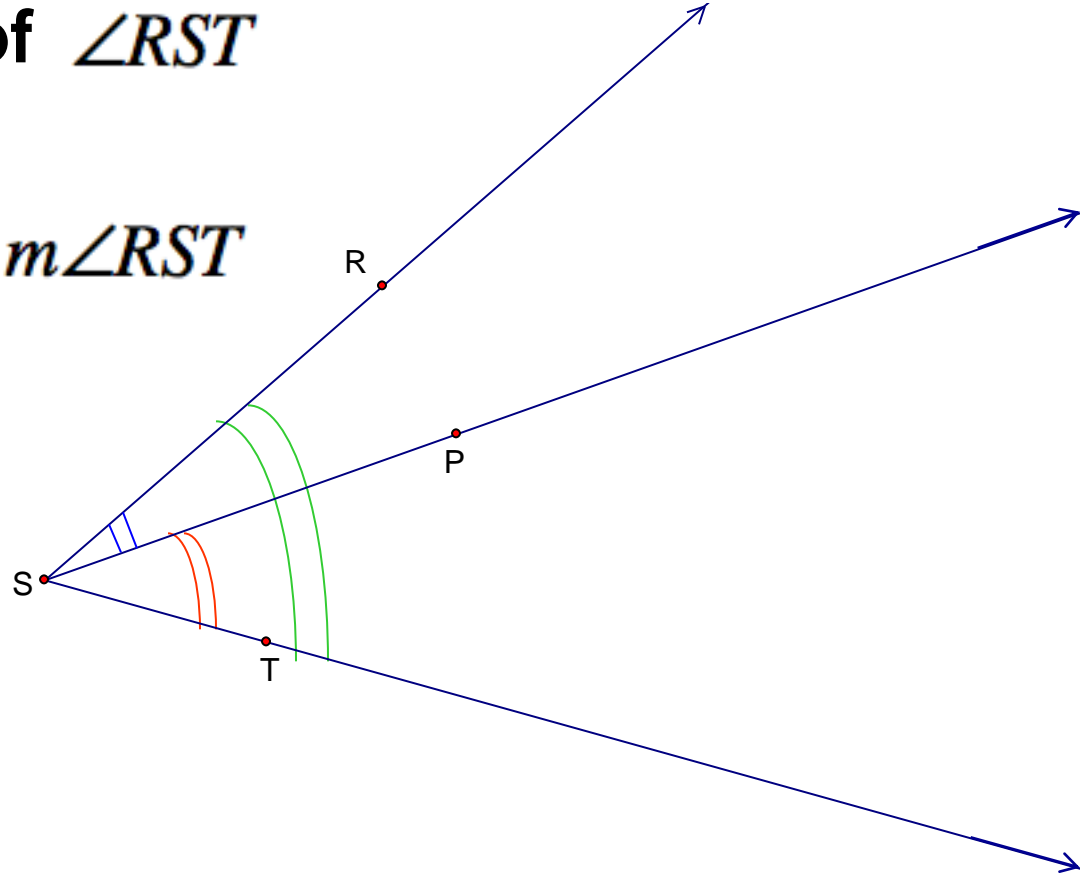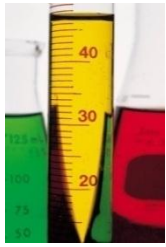$$m\angle LKM \quad = \quad m\angle MKL$$

Angle Addition Postulate

If P is in the interior of $\angle RST$

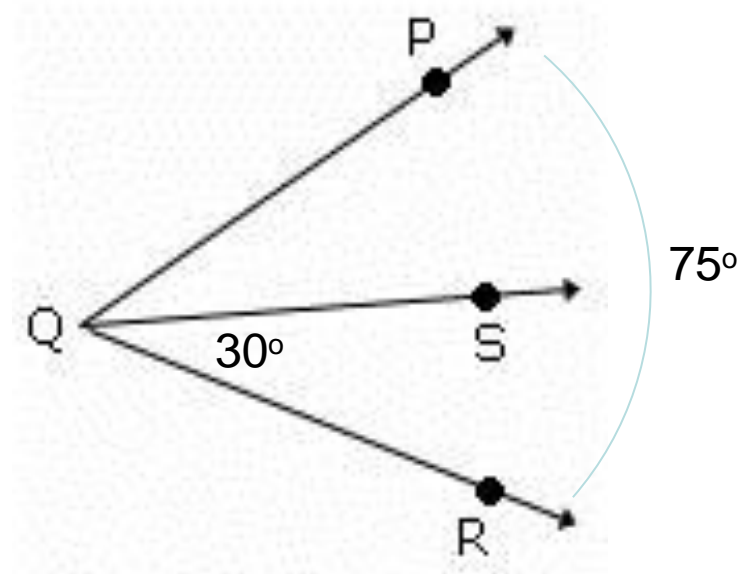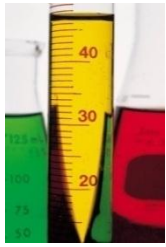$$m\angle RSP + m\angle PST = m\angle RST$$

Ex #2: Angle Addition Postulate

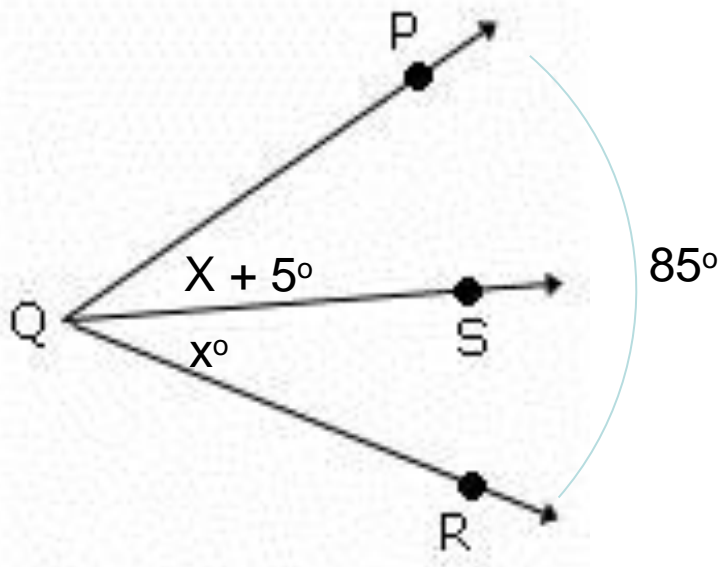**Step #1: Write the Angle Addition Equation.**

Step #2: Substitute.
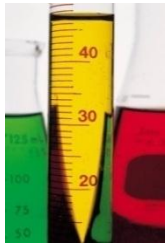
Step #3: Solve.

Ex #3: Angle Addition Postulate

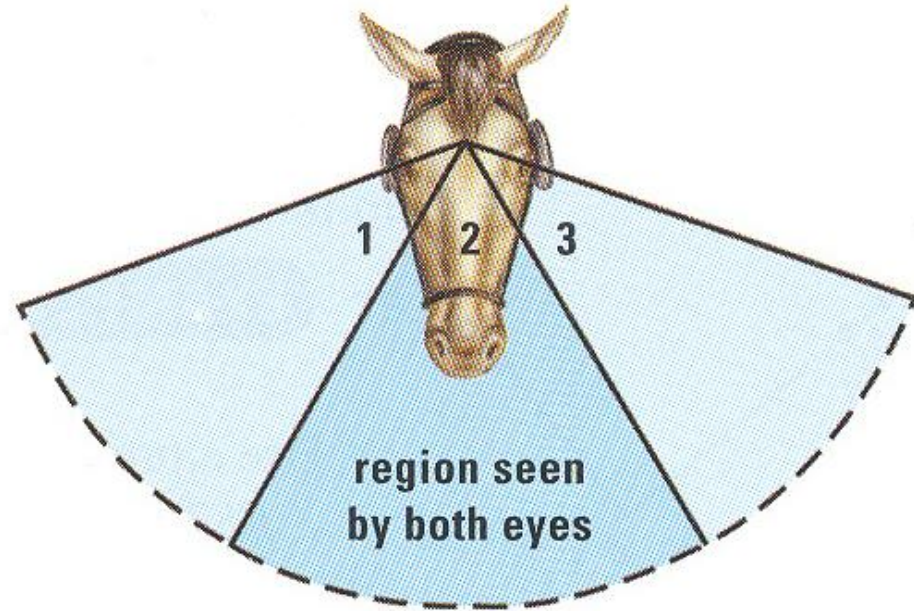**Step #1: Write the Angle Addition Equation.**

Step #2: Substitute.

Step #3: Solve.

Ex. 4: Angle Addition Postulate

- **VISION. Each eye of a horse wearing blinkers has an angle of vision that measures 100°.**
- **The angle of vision that is seen by both eyes measures 60°.**
- **Find the angle of vision seen by the left eye alone.**

1 2 3

region seen by both eyes

Solution:

You can use the Angle Addition Postulate.

$m\angle 2 + m\angle 3 = 100°$ Total vision for left eye is 100°.

$m\angle 3 = 100° - m\angle 2$ Subtract $m\angle 2$ from each side.

$m\angle 3 = 100° - 60°$ Substitute 60° for $m\angle 2$.

$m\angle 3 = 40°$ Subtract.

▶ So, the vision for the left eye alone measures 40°.

Summary:

- **Describe how angles are classified.**