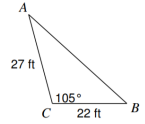Lesson 80 Objective: SWBAT solve force problems using laws of sines and cosines.
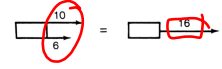
Kickoff- Solve each of the following triangles and round your answers to the nearest tenth.

1)   A
      27 ft
           105°
      C   22 ft   B

2) Triangle ABC where angle A is 70°, c is 26 and a is 25.
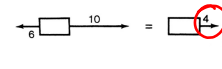

A **force** is a vector quantity. It is a quantity that has both **magnitude** (size) and **direction**.
- The **length** of the vector represents the **magnitude**
- The **arrowhead** indicates the **direction**.

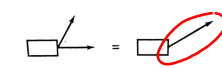--

Scenario 1: If two forces act to push or pull an object in the same direction, the effect is that of a single force equal to the **sum** of the applied forces and in the direction of the two forces.
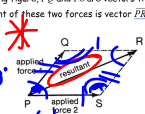
    10   =   16
     6

Scenario 2: If two forces act to push or pull an object in opposite directions, the effect is that of a single force equal to the **difference** of the applied forces and in the direction of the larger force.

           10   =   14
     6

Scenario 3: If two forces pull an object in directions that form an angle other than a straight angle with each other, effect is that of a single force in the direction shown below. This force is called the **resultant force**.
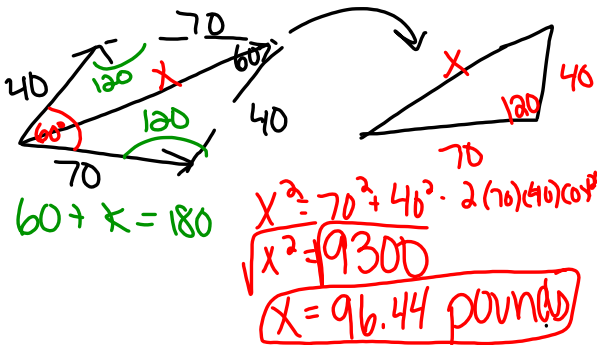
         →   =

Example: In the accompanying figure, $\overline{PQ}$ and $\overline{PS}$ are vectors that represent two forces applied to a body at point P. The resultant of these two forces is vector $\overline{PR}$.
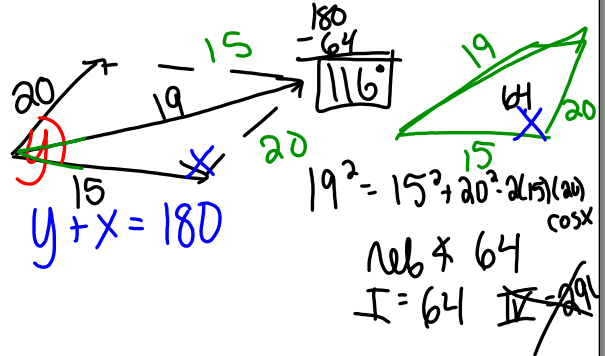
all ∡'s
add to 360°

Base ∡'s add
to 180°

parallelogram

2 Δ'o

                Q   R
     applied
     force
             resultant
     P   applied
             force 2   S

Example #1: Forces of 40 pounds and 70 pounds act on a body at an angle measure 60°. Find the magnitude of the **resultant** of these forces to the *nearest hundredth of a pound*.

           70
40   120   X   60°
   60° 120   40
    70

X   120   40

           70

60 + X = 180

$X^2 = 70^2 + 40^2 - 2(70)(40)\cos x$

$\sqrt{X^2} = \sqrt{9300}$

X = 96.44 pounds

Example #2: One force of 20 pounds and one force of 15 pounds act on a body at the same point so that the resultant force is 19 pounds. Find, to the nearest degree, the **angle** between the two original forces.

20   15   180
                           -64
      19   116°

     15   20

Y + X = 180

                19
           64   20
              15
$19^2 = 15^2 + 20^2 - 2(15)(20)\cos x$

reb ∡ 64

I = 64   IV = 296°

Example #3: Two forces act on a body to produce a resultant force of 70 pounds. One of the forces is 50 pounds and forms an angle of 67° with the resultant force.
   A) Find, to the *nearest pound*, the magnitude of the **other force**.
   B) Find, to the nearest degree, the **angle formed between the two given forces**.