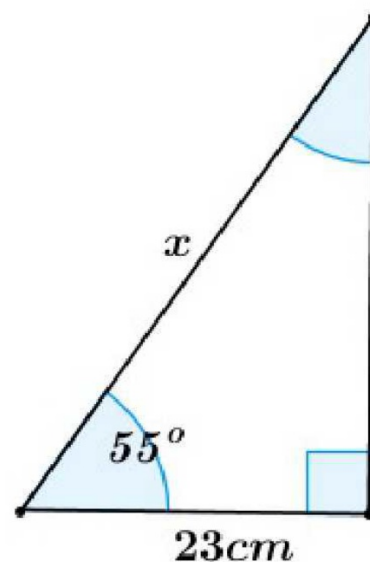


Good Morning!!

- Do Now: Solve for x and the other angle (not 90) on a whiteboard. Make sure that your calculator is in degrees.



Today

- Vector addition
- Trigonometry (p)review
- Applied trig and vector problems
- Tonight: First page of vector worksheet

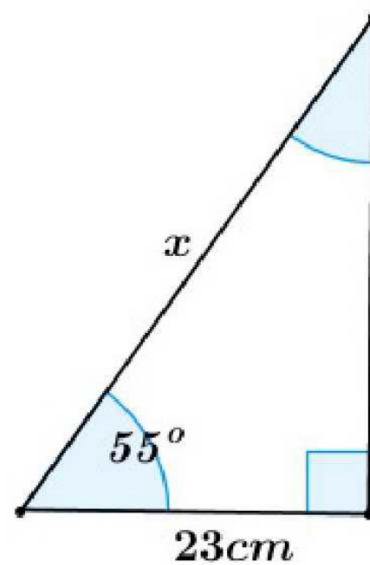
Tomorrow

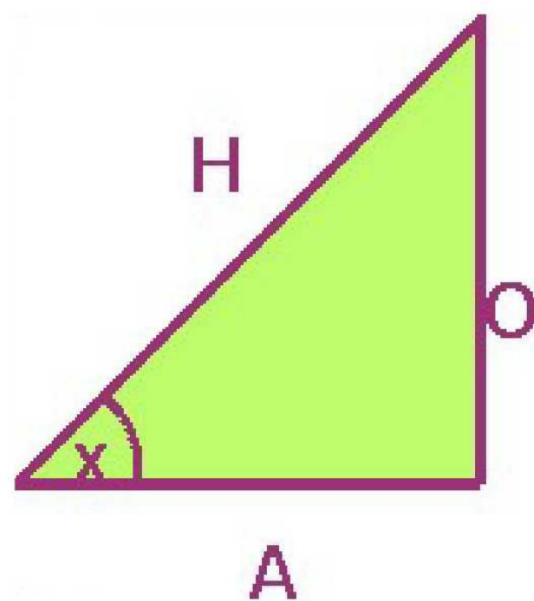
- Quest trig problem set.
- You will have a problem set that will take you most (if not all) of the period.
- It closes at the end of class.
- Finish the vector worksheet for homework Wednesday night.

Good Morning!!

- x :

- other angles:





$$\text{SIN}(x) = \frac{O}{H}$$

$$\text{COS}(x) = \frac{A}{H}$$

$$\text{TAN}(x) = \frac{O}{A}$$

SOH CAH TOA

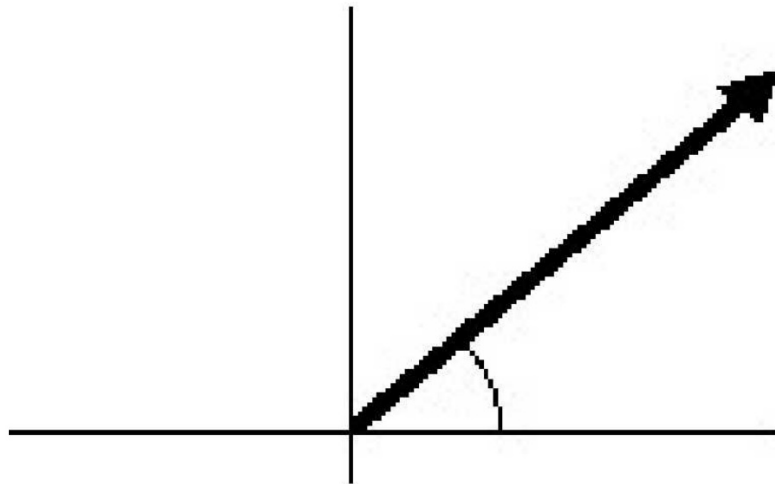
Components of Vectors

- Treat each vector like the hypotenuse of a triangle.
- Theta (θ) is the angle of the vector.
- The horizontal component of the vector can be found using _____
- The vertical component of the vector can be found using _____

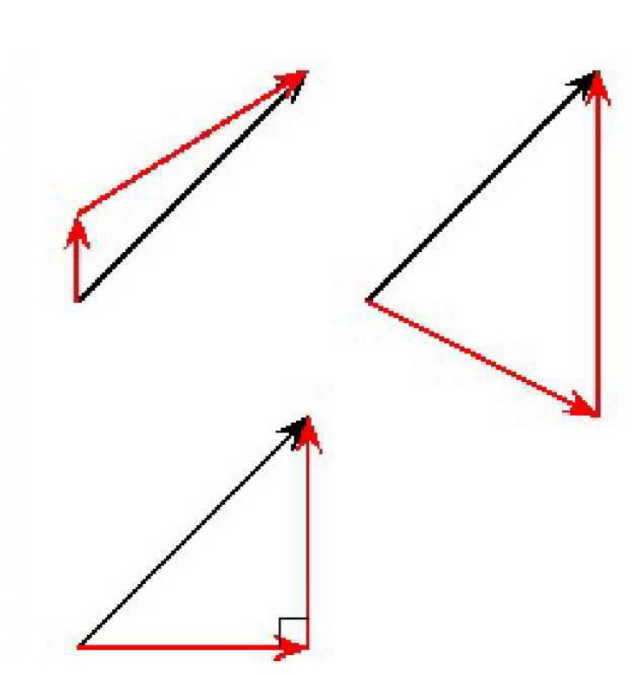
Angle Direction Matters

- Angles are always measured counter clockwise from due east.
- If an angle is measure clockwise, it is in the negative direction.
- The math works out the same.

**40° counter-clockwise
rotation from East**



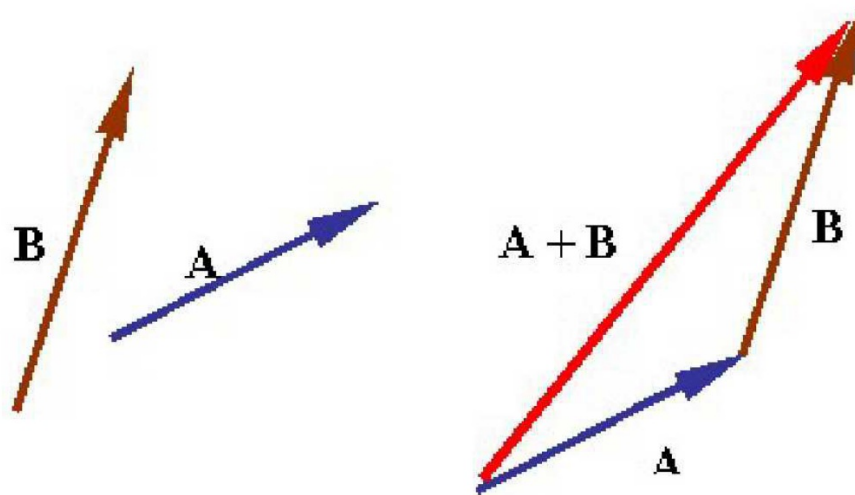
**Find the vertical and horizontal
components of the vector.**



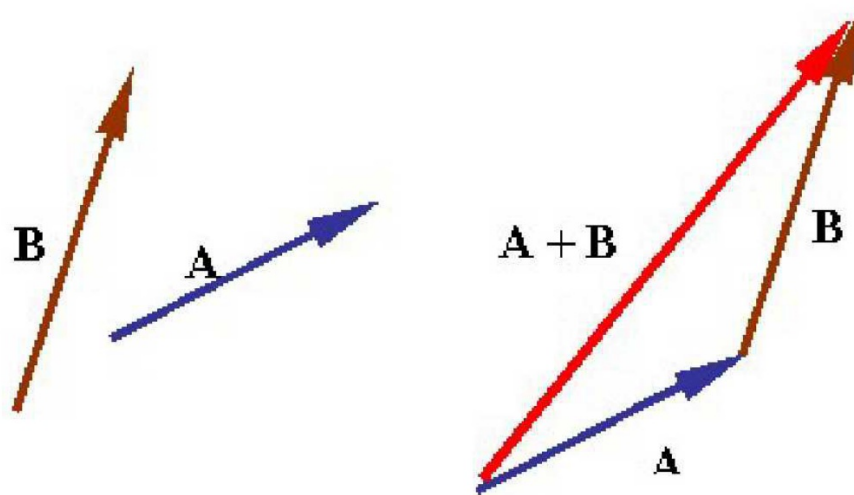
Vector Addition

Adding Vectors

- Draw the vectors “tail to head”.
- Start each vector where the previous ended.
- When all of the vectors are drawn, create a “resultant” vector by drawing a vector from the tail of the beginning vector to the head of the last vector.



Example



Draw $\vec{A} - \vec{B}$ on a whiteboard

$$10\text{ N} \nearrow + \nwarrow 10\text{ N} =$$

$$10\text{ N} \nearrow + \leftarrow 10\text{ N} =$$

$$10\text{ N} \nearrow + \rightarrow 5\text{ N} =$$

Find the magnitude and direction of the resultant vector.

$$10\text{ N} \nearrow + \nwarrow 10\text{ N} =$$

$$10\text{ N} \nearrow + \leftarrow 10\text{ N} =$$

$$10\text{ N} \nearrow + \rightarrow 5\text{ N} =$$

Find the magnitude and direction of the resultant vector.

A football player runs 5m north. He then turns and runs 3m at an angle of 60° north of west. How far is he from where he started?

Do Now:

Check the answers to the homework.

Write down the number of the problem that you would like to see solved in class.

Requested Problems:

Today

-Finish vector algebra.

Tonight:

-Finish the Vector Worksheet.

Do Now: Set up the following problem:
A football player runs 5m north. He then turns and runs 3m at an angle of 60° north of west. At what angle is the football player from where he started?



How Does A Sailboat Actually Work?



Batman slides down a zip line that has an angle of 20° below ^{horizontal} vertical. He accelerates at 2.3 m/s^2 . Assuming he starts from rest, how fast is he going in the **vertical direction** after 7.0 seconds?

$$K: V_{iy} = 0 \text{ m/s} \quad a_y = 0.787 \text{ m/s}^2$$

$$t = 7 \text{ s}$$

$$U: V_{fy} = ? \quad \text{Eqn: } V_{fy} = V_{iy} + a_y t$$

$$V_{fy} = -5.5 \text{ m/s}$$

Batman slides down a zip line that has an angle of 20° below vertical. He accelerates at 2.3 m/s^2 . Assuming he starts from rest, what is his **vertical** displacement after 4.5 seconds?

$$K: a_y = -0.787 \text{ m/s}^2 \quad V_{iy} = 0 \text{ m/s}$$

$$U: \Delta y \quad t = 4.5 \text{ s}$$

$$\Delta y = \cancel{V_i t} + \frac{1}{2} a t^2 = -7.9 \text{ m}$$

Multiple Accelerations

- Keep track of direction.
- Break everything into its directional components (x and y).
- Solve your problems in one component.
- Combine later if resultant vector is needed.

A weather balloon moves at 110° with a velocity of 3.7m/s . A jet on the bottom of the balloon accelerates the balloon vertically at 2.1m/s^2 . A jet on the side of the balloon accelerates it at 0.8m/s^2 . What is the horizontal component of the velocity after 5.4s ?

$$K: V_{ix}, a_x, t \quad U: V_{fx}$$

$$V_{fx} = V_{ix} + a_x t$$

$$V_{fx} = 3.05 \text{ m/s}$$

A weather balloon moves at 110° with a velocity of 3.7m/s . A jet on the bottom of the balloon accelerates the balloon vertically at 2.1m/s^2 . A jet on the side of the balloon accelerates it at 0.8m/s^2 . What is the speed of the particle after 5.4s ?

$$K: V_{iy}, t, a_y$$

$$U: V_{fy} = 14.8\text{m/s}$$

$$V_f = \sqrt{V_{ix}^2 + V_{iy}^2} = 15.13\text{m/s}$$

A weather balloon moves at 110° with a velocity of 3.7m/s . A jet on the bottom of the balloon accelerates the balloon vertically at 2.1m/s^2 . A jet on the side of the balloon accelerates it at 0.8m/s^2 . What is the magnitude of the displacement after 5.4s ?

A ball is thrown horizontally off of a tall building at 9.4m/s . It continues to move with the same horizontal velocity, but begins to accelerate vertically at -9.8m/s^2 . What is its speed after 2.2s ?

$$S_f = 23.52 \text{ m/s}$$

