A-Day: Due Tues., Oct 6
B-Day: Due Wed., Oct 7

PreAP Two Dimensions 5

When you add vectors: 1) set up the vector with the angle starting at the +x axis; 2) calculate each x-component using Hcosθ; 3) calculate each y-component using Hsinθ; 4) total up the x's and y's, remembering to keep track of +s and −s; 5) using x_{total} and y_{total} calculate the resultant's hypotenuse with Pythagorean Theorem and its angle with inverse tangent. When do we use this process? ALWAYS! ALWAYS! ALWAYS! Do I make myself clear?

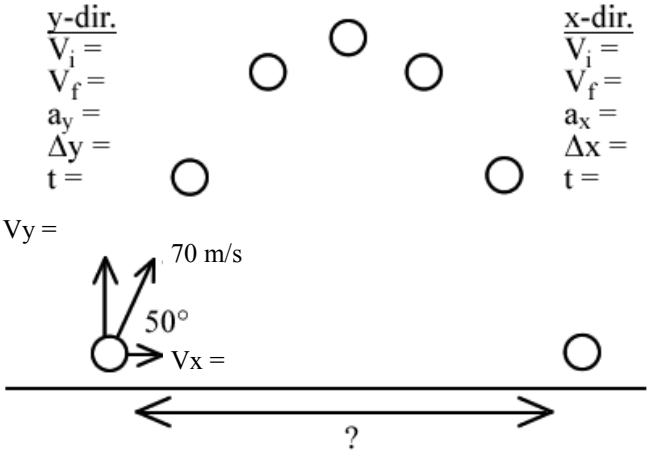
1. All of these vectors are given with correct angles already, you do not need to change the angles.
   A. Calculate the x and y components of the given vectors. DO NOT DRAW THEM—do this with your calculator only.
   B. Add together all of your x-components to find x-total.
   C. Add together all of your y-components to find y-total.
   D. Use Pythagorean theorem to find the magnitude (size) of the resultant.
   E. Use inverse tangent to find the direction of the resultant.

	X component	Y-component
Vector 1: 250m at 35°	_____	_____
Vector 2: 85m at 256°	_____	_____
Vector 3: 424m at 346°	_____	_____
Vector 4: 34 m at 90°	_____	_____
Totals:	_____	_____

Resultant: Magnitude = Direction =

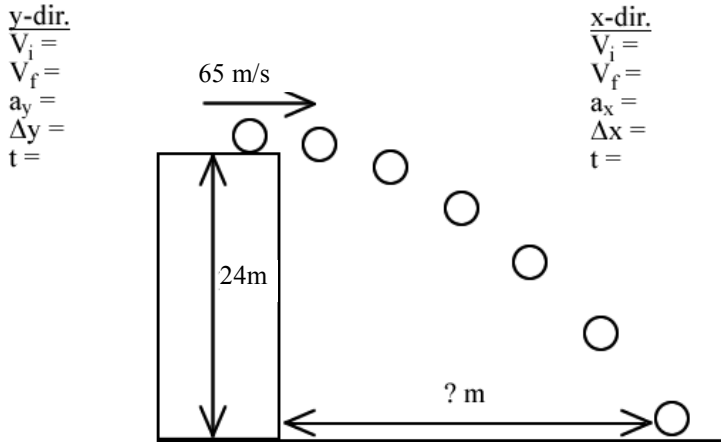
Remember that the negative of a vector means turn the vector around (or put the arrow on the opposite end of the vector). So, the negative direction of 30° is 30° + 180° = 210°.

2. Given these vectors: A = 425 m at 75°; B = 68 m at 130°; C = 91 m at –319°; D = 213 m at 234°.
   Using the same procedure as above, add together these vectors: A − 3B + 2C + D.
   A. Calculate each of the vectors: A, -3B, etc. and write them below.
   B. Then do the table above with each.



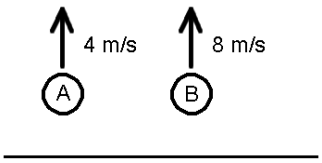
3. An object is thrown 70 m/s at 50°, from the ground to the ground.
   A. Calculate Vy and Vx.
   B. Fill in the variables on the chart.
   C. Calculate how far away the object lands.

4. An object is shot horizontally from a 24 m cliff going 65 m/s. How far away does it land?

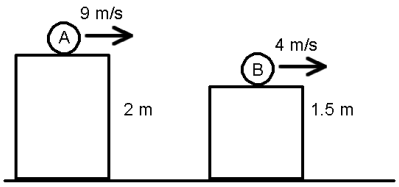


5. A person jumps from the top of a house onto a ground level trampoline. They rebound off of the trampoline going 12 m/s at an angle of 52°. (*Draw the diagram and write out the variables.*)
   A. Calculate the person's "hang time"

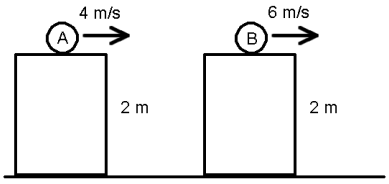
   B. How far away do the land from the trampoline?



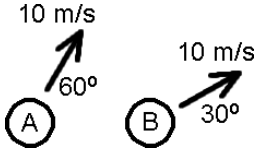
6. Object A or B?
   A. ____ Which has the greatest vertical acceleration?
   B. ____ Which has the greater maximum height?



8. Which has the greatest hang time": object A or B?



7. Object A or B?
   A. ___ Has the greatest range (greatest Δx)?
   B. ___ Hits the ground first?
   C. ___ Has the greatest initial y-velocity?
   D. ___ Has the greatest magnitude of velocity?



9. Object A or B?
   A. ____ Has the greatest Vy?
   B. ____ Is in the air for the most time?
   C. ____ Has the greatest Vx?

10. Here are the things that we know about projectile motion ALWAYS: (*some will be with variables only*)
    A. a_y always =
    B. a_x always =
    C. If given V and θ, Vy_i always =
    D. Vx_i always =
    D. If shot from the ground to the ground Δy =
    E. The x equation always =

Let me show you how you can solve harder problems with this process.

11. A projectile is shot from the ground to the ground. It is in the air for 3.5 seconds and travels 54 meters.
    A. Assign any variable you know AND write the equation you know you are going to use in the x-direction.
    B. Using what you learned in Q5, write Vi and Vf in the y-direction using variables.
    C. Solve for the initial velocity and direction of the object.