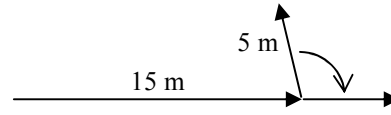


# 2009 Two Dimensions 6

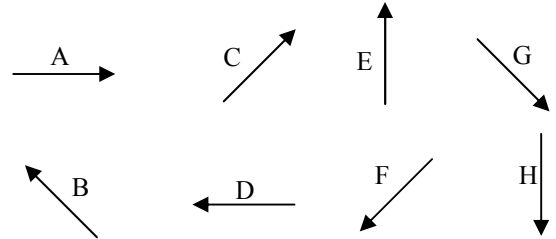
- Projectile Motion?
  - \_\_\_ Dropping a helium balloon
  - \_\_\_ Throwing a ball horizontally.
  - \_\_\_ Jumping off of a diving board.
  - \_\_\_ Running on the ground.
- A person walks 65 meters at an angle of  $22^\circ$ . How far east did they walk?

- Notice the two vectors at the right. Keep the 15 m long vector alone at  $0^\circ$  (pointing to the right). Think about all of the ways you could turn the 5 m long vector when you add them together.



- What is the largest the resultant could possibly be?  
(What is the greatest displacement from your starting position?)
- What is the shortest the resultant could possibly be?  
(What is the shortest displacement from your starting position?)

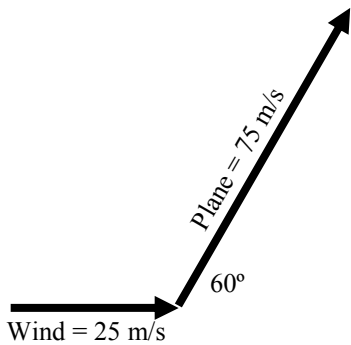
- Use the notes "Vector Basics" and "Adding Vectors."
  - What do we mean by the magnitude of a vector?
  - What is resolving a vector?



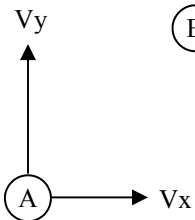
- Graphically add these vectors:  $E + B - 2D + G$ .

- Mathematically, what does  $B + H + G = ?$

- A plane is flying 75 m/s at a direction of  $60^\circ$ . It is pushed by a 25 m/s wind that is blowing directly east.
  - Does the wind increase or decrease the speed of the plane?
  - Does the wind have any vertical component?
  - Add the two vectors together to find the plane's total speed and direction in the wind.



- The arrows show the magnitude (amount) of  $V_x$  and  $V_y$  at point A on the projectile's parabola.
  - As the projectile goes from A to C, does  $V_y$  increase or decrease?
  - Use arrows to show  $V_x$  and  $V_y$  at each letter. Arrows don't have to be the exact right size, just bigger or smaller.



(C)

(D)

(E)

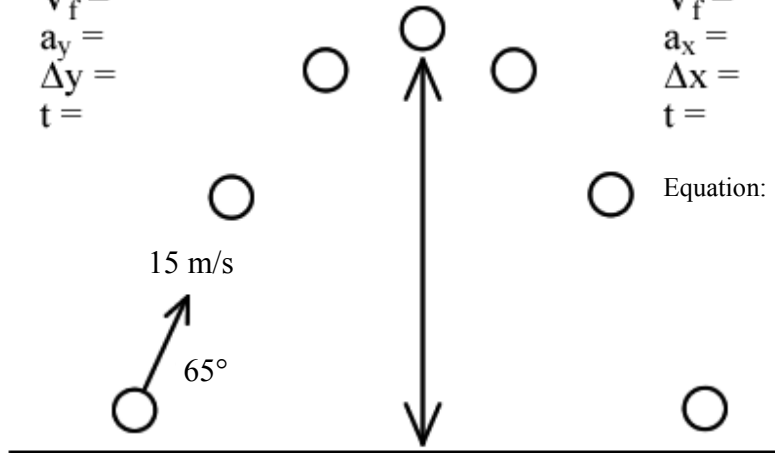
y-dir.

$V_i =$   
 $V_f =$   
 $a_y =$   
 $\Delta y =$   
 $t =$

x-dir.

$V_i =$   
 $V_f =$   
 $a_x =$   
 $\Delta x =$   
 $t =$

9. A ball is shot from the ground going 15 m/s at an angle of  $65^\circ$ . How high did it go?
- A. Find the x and y components of the initial velocity.
- B. Calculate how high it goes.



Equation:

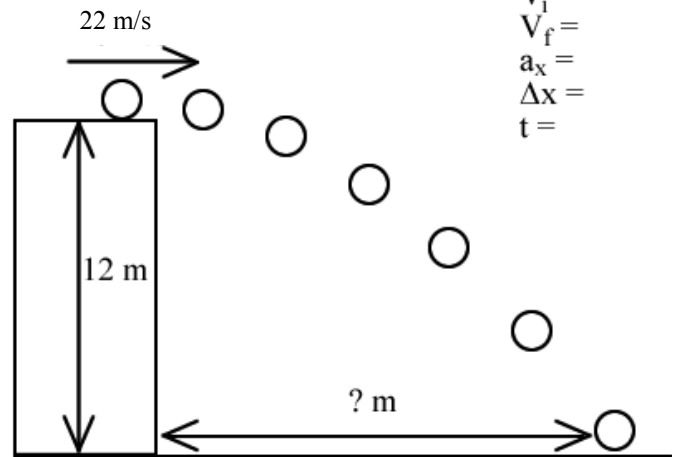
10. An object is shot horizontally going 22 m/s from the top of a 12 m ledge.
- A. Since it is shot horizontally, what is its initial y-velocity?
- B. Solve for how far away it lands.

y-dir.

$V_i =$   
 $V_f =$   
 $a_y =$   
 $\Delta y =$   
 $t =$

x-dir.

$V_i =$   
 $V_f =$   
 $a_x =$   
 $\Delta x =$   
 $t =$



11. A projectile is shot from the ground, to the ground.
- A. At what angle should it be shot to have the greatest range (to go the farthest)?
- B. Then it is shot at  $40^\circ$ ,  $60^\circ$ , and  $20^\circ$ . Rank the three angles from farthest range to least range.