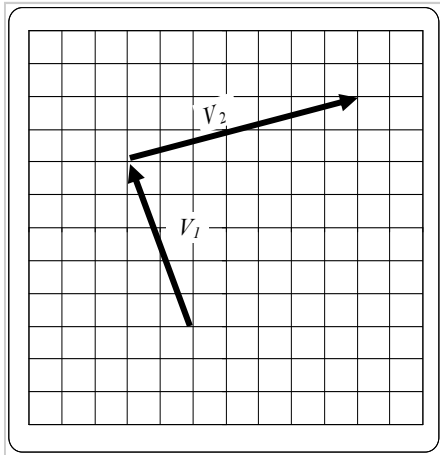


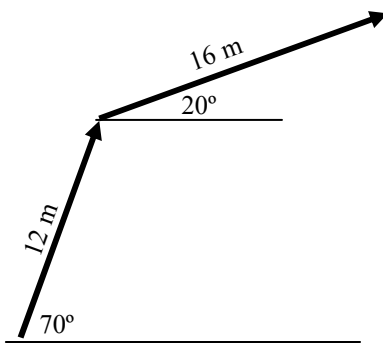
## 2009 Two Dimensions 5

- How can a vector have a vertical component that is equal to zero?
- How can a vector have equal x and y components?



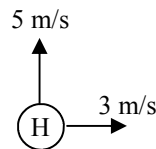
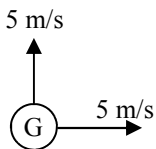
- Using the diagram at the left, add the two vectors together. *(Be sure to keep track of negatives and positives.)*
  - Below give the x and y components for each of the two vectors:
 

$X_1 =$ _____	$Y_1 =$ _____
$X_2 =$ _____	$Y_2 =$ _____
$X_{total} =$ _____	$Y_{total} =$ _____
  - Using the totals, calculate the resultant's magnitude (how far) and direction (at what angle).

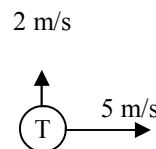
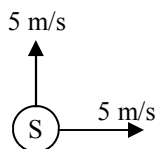


- Add the two vectors together.
  - Draw a line straight down from each arrow to show the y component of each vector.
  - Below give the x and y components for each of the two vectors:
 

$X_1 =$ _____	$Y_1 =$ _____
$X_2 =$ _____	$Y_2 =$ _____
$X_{total} =$ _____	$Y_{total} =$ _____
  - Using the totals, calculate the resultant's magnitude and direction (at what angle).



- Use projectiles G and H above to answer the following:
  - Which one will hit the ground first?
  - Which one has a faster  $V_x$ ?
  - Which one goes farther?

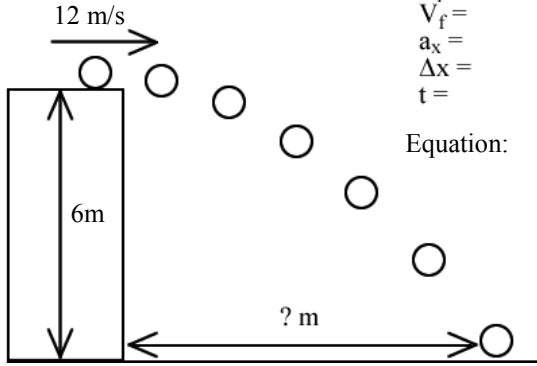


- Use projectiles S and T at the right to answer the following:
  - Which one is in the air for the longest time?
  - Which one hits the ground first?
  - Which one lands farther away?
  - Which one goes higher up in the air?

7. Projectile Motion questions:

- At the top of its path, what is a projectile's velocity in the y-direction?
- At the top of its path, what is a projectile's acceleration in the x-direction?
- A projectile is launched from the ground and lands on the ground. If it has an initial y velocity ( $V_{yi}$ ) of 20 m/s, what is its final y velocity ( $V_{yf}$ )?
- A projectile is launched from the top of a 12 m building, what is  $\Delta y$ ?
- You want to know how high a projectile goes. What is the final y velocity ( $V_{yf}$ ) of the object?

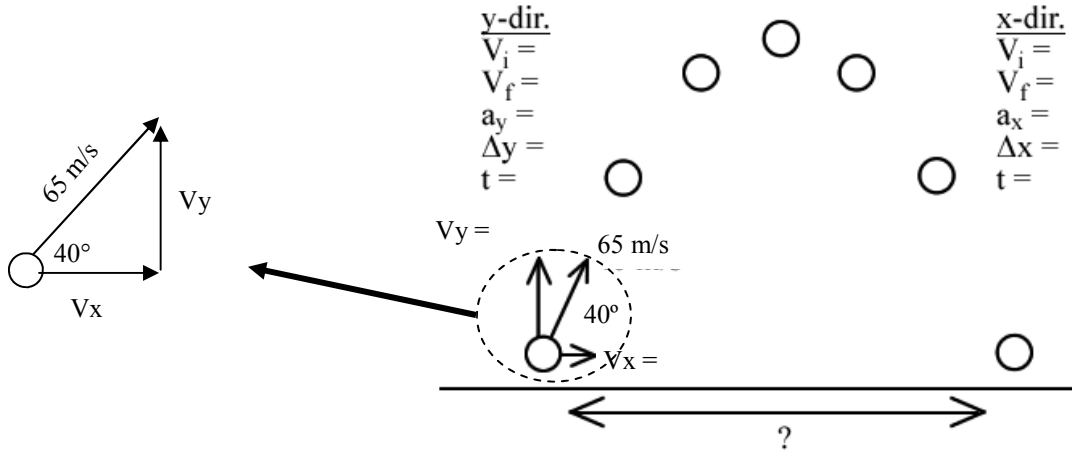
y-dir.  
 $V_i =$   
 $V_f =$   
 $a_y =$   
 $\Delta y =$   
 $t =$



x-dir.  
 $V_i =$   
 $V_f =$   
 $a_x =$   
 $\Delta x =$   
 $t =$

Equation:

8. A rock is thrown horizontally from the top of a 6 m tall cliff. How far away does it land?



y-dir.  
 $V_i =$   
 $V_f =$   
 $a_y =$   
 $\Delta y =$   
 $t =$

x-dir.  
 $V_i =$   
 $V_f =$   
 $a_x =$   
 $\Delta x =$   
 $t =$

9. A projectile is launched 65 m/s at an angle of 40°. It is shot from the ground to the ground. Calculate how far away it lands (calculate its range).

10. A bullet is fired horizontally from a gun aimed directly at a coconut dropped from a tree 5 meters away. The coconut is at the exact same height as the gun and drops at the exact same time the bullet is fired.
- Thinking about my demonstration of throwing a ball and dropping a ball at the same time. What is the initial y-velocity of both the coconut and the bullet?
  - What is the y-direction acceleration for both the bullet and the coconut?
  - Will the bullet hit the coconut?
  - Why or why not?

