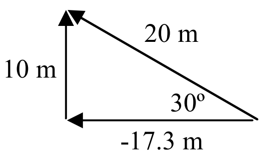
A-Day: Due Fri., Oct 2
B-Day: Due Mon., Oct 5

2009 Two Dimensions 2

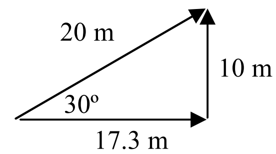
All angles must start at the +x axis (to the right) and be measured counterclockwise (up and to the left). Why? Because this is the way your calculator reads angles and we should talk to the calculator in its language.

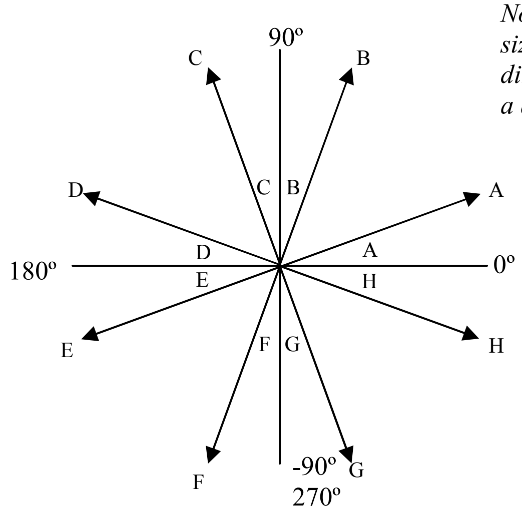


The x component of this triangle is negative (pointing left). But if you put 30º into your calculator and use cosine, you will get a +17.3 m.

WHY?

Because "30º" to the calculator means 30º above the +x axis, or the triangle at the right. We have to be this specific.





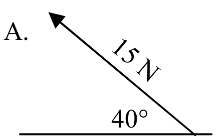
Notice the directions on the diagram at the left. Each of the angles (A thru H) have a size of 20º, but your calculator needs you to be more specific. Ex. Arrow C has a direction which is 20º greater than 90º. So, we use 90º + 20º = 110º. Arrow C has a direction of 110º.

1. Find the direction of the other arrows. (*Study Help Available*)

   Arrow A = Arrow E =
   Arrow B = Arrow F =
   Arrow D = Arrow G =

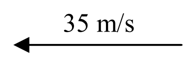
2. For the following, give the correct directions (like on the diagram at the left).

A.



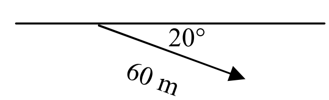
θ = ______

B.



θ = ______

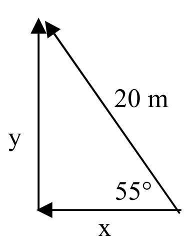
C.



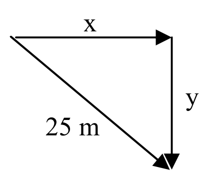
θ = ______

3. For the following vectors, find x and y. (*Be sure that all angles start at the +x axis.*)

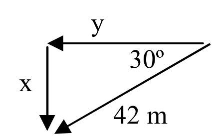
A.



B.

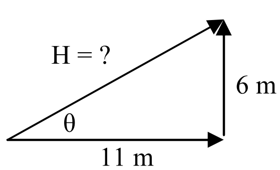


C.

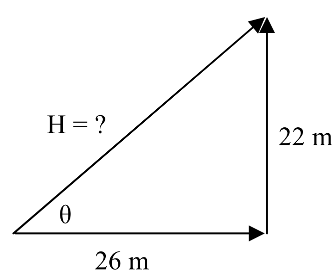


4. Given x and y on the following triangles, find the hypotenuse's length and direction (find θ).

A.



B.



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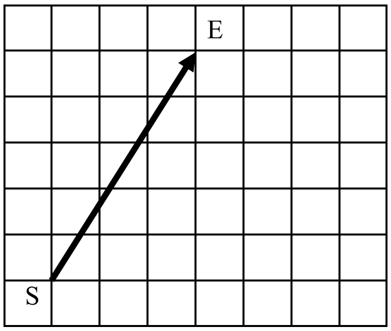
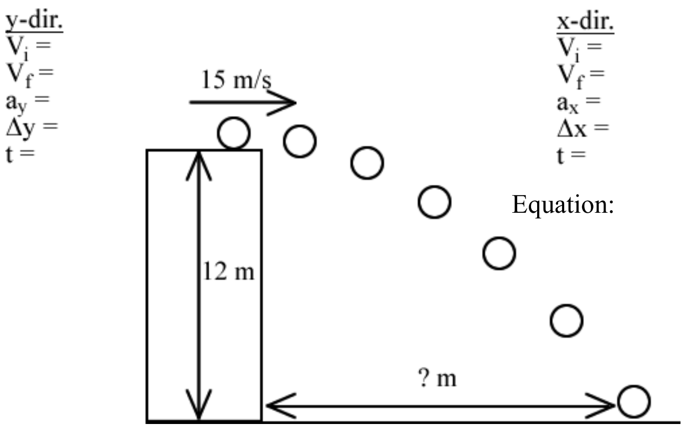


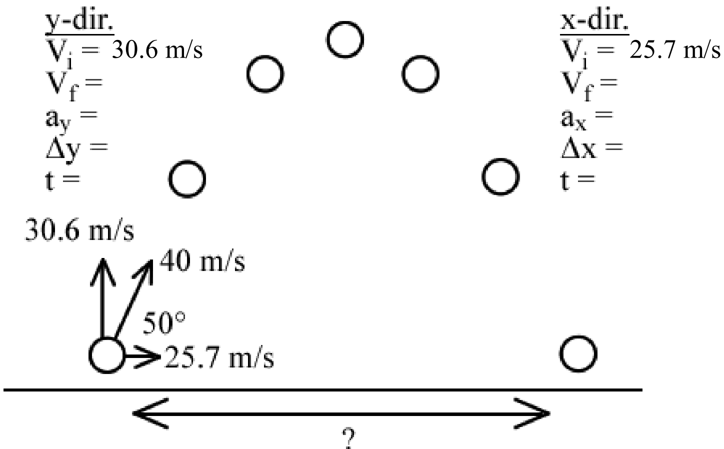
5. Use the arrow on the grid at the left to answer the following questions.
   Each square equals 1 m.
   Going from the start of the arrow to the end of the arrow,
   A. How far does it move in the x-direction? *This is the x-component*
   B. How far does it move in the y-direction? *This is the y-component*
   C. Using the x and y components you just found, calculate how long it is. (*Known as the "magnitude*")
   D. Using the x and y components, calculate the direction of the arrow.



6. A ball is thrown horizontally off of a 12 m tall cliff going 15 m/s. Write each of these answers on the diagram as you answer them.
   Since it is thrown horizontally,
   A. What is its initial y-velocity?
   B. What is its initial x-velocity?

   In the y-direction it is in freefall.
   C. What is its y-direction acceleration?
   D. Since it falls 12 m, what is Δy?
   E. Solve for the time it takes to hit the ground in the y-direction.

   In the x-direction it is at constant speed.
   F. So, what is its x-direction acceleration?
   G. What is its final x-direction velocity?
   H. What equation can you use in the x-direction?
   I. Using the time from the y-direction, solve for Δx.



7. An object is thrown from the ground to the ground, as shown on the diagram at the left. 30.6 m/s is the initial y velocity. 25. 7 is the initial x-velocity. Remembering that in the y-direction that it is in freefall and that in the x-direction it is at constant speed, fill in the variables on the diagram.

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