2009 Two Dimensions 1

Let's ensure you know the Pythagorean theorem: $A^2 + B^2 = C^2$, where A and B are the two sides of a right triangle and C is the hypotenuse (long side). If A = 8m and B = 17 m, then:
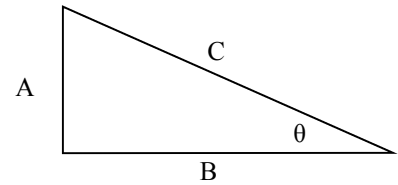
$$8^2 + 17^2 = C^2 \qquad\qquad 353 = C^2$$
$$64 + 289 = C^2 \qquad\qquad \sqrt{353} = \boxed{18.8m} = C$$

As always, show your work.

1. If A = 4m and B = 12 m, find C.

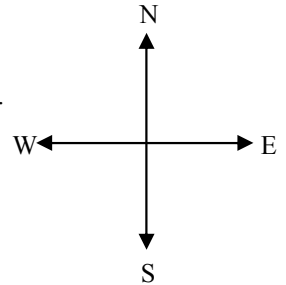*Don't outthink the following questions. Notice the compass directions at the right if you are confused.*

2. Positive or Negative?

    A. _____Walking east?   C. _____ Walking south?
    B. _____Walking north?   D. _____ Walking west?

3. Δx or Δy?

    A. _____Walking east?   C. _____ Walking south?
    B. _____Walking north?   D. _____ Walking west?

4. A person walks 4 m north, then 8 m south, then, totally confused, walks another 10 m north. Find their displacement. (If they started at the origin, where did they end up?)
Write each individual displacement, keeping track of + and -, then solve.

5. Another confused person walks 15 m east, then 20 m west, then 2 m east. What is their displacement?

6. A third, VERY confused person walks 30 m west, then 10 m north, then 5 m south, then 40 m east, then another 6 m north.
A) Find Δx.   B) Find Δy.

    C) Using the Pythagorean theorem, find their total displacement (*use Δy and Δx as A and B [doesn't matter which], C is the total displacement*).

7. (*As you did before.*) A FOURTH **PHENOMENALLY** confused person walks 50 m north, 12 m east, 60 m west, 10 m south, and another 5 m south. Find the person's total displacement.

From the "Trigonometry Basics" notes:

8. Which symbol do we use for any angle?

9. In triangle 1 at the right,
    A) ____ Which side is the hypotenuse?
    B) ____ Which side is opposite the angle?
    C) ____ Which side is adjacent to the angle?

Triangle 1
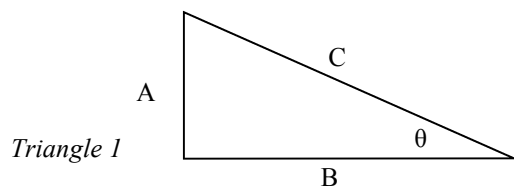
More on back

Let me explain the grid. The non-arrow black lines are the x and y axis. The arrow represent motion (vectors). Each vector starts at the origin (0,0) and ends at the end of the arrow (the circle). (I assume you know which is the x and y axis and which directions are positive and negative.) To simplify things, let's make each square equal to only 1 meter. When I ask for Δx or Δy I am asking for how far the object moves in the x direction and y direction from its start to its end. Since each arrow starts at the origin, the displacements are the x and y coordinates of the final position (since initial positions are 0,0). ALSO—Some displacements can be negative!!!!!

10. Which arrows have negative y coordinates?

11. Which arrows have negative x coordinates?

12. For Arrow B:

    A) Δx = _____; Δy = _____.

    B) Using Δx and Δy as A and B, find the total displacement of Arrow B (*find the hypotenuse*).
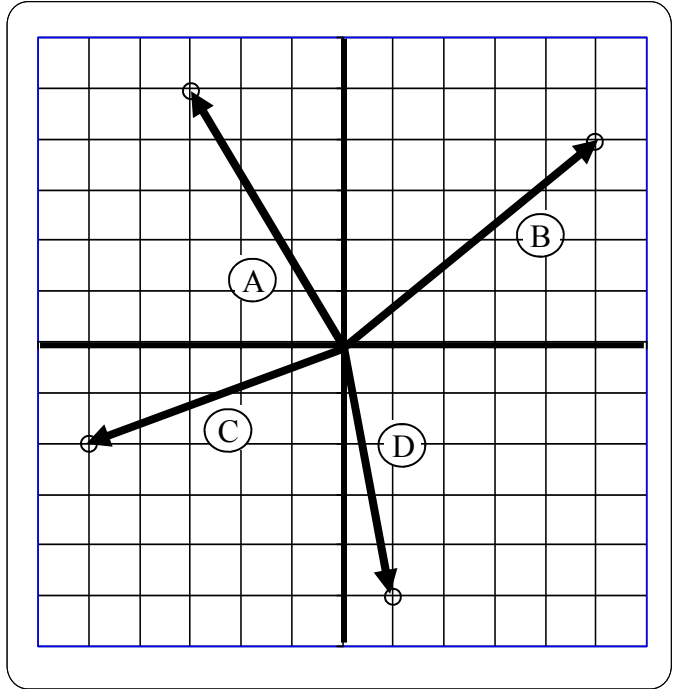
13. For Arrow A: (*notice negatives*)

    A) Δx = _____; Δy = _____.

    B) Find the total displacement of Arrow A.

14. For Arrow C:

    A) Δx = _____; Δy = _____.

    B) Find the total displacement of Arrow C.

15. Find the total displacement of Arrow D.

Also from the "Trigonometry Basics" notes:
16. Sin 70º =

17. Use the triangle at the right to answer the following:
    A. opposite =
    B. Adjacent =
    C. Hypotenuse =
    D. θ =
    E. Following the example at the bottom of the notes, calculate x and y.