2008 PreAP Two Dimensions 1

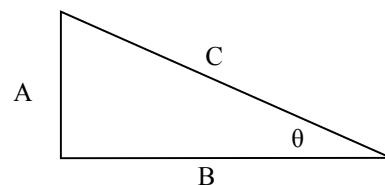*There are 4 pages to this homework.*

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:

$8^2 + 17^2 = C^2$ $353 = C^2$
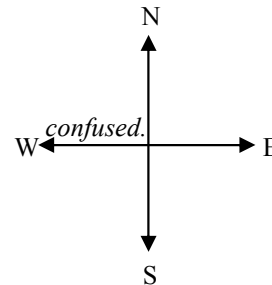
$64 + 289 = C^2$ $\sqrt{353}$ ⟨18.8m⟩ $= C$

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?
  B.   ___   Walking north?
  C.   ___   Walking south?
  D.   ___   Walking west?

3.   Δx or Δy?
  A.   ___   Walking east?
  B.   ___   Walking north?
  C.   ___   Walking south?
  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.

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!!!!!

8. Which arrows have negative y coordinates?

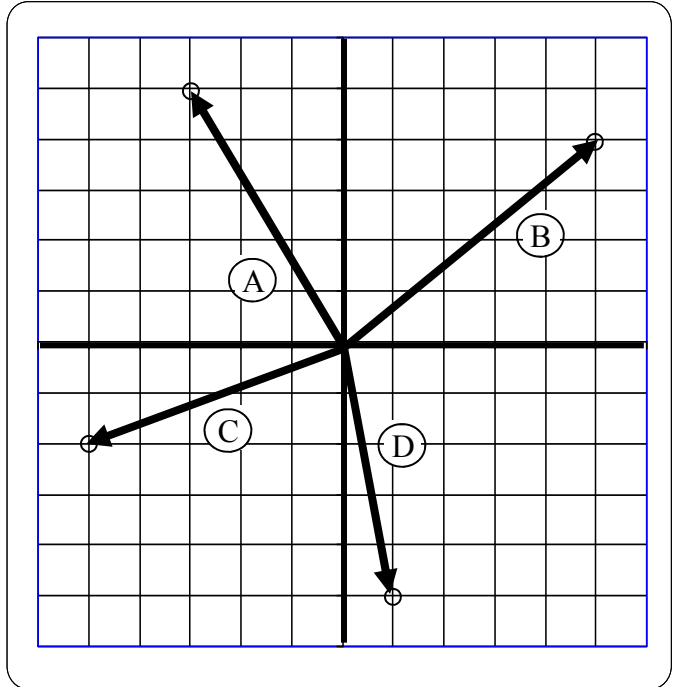9. Which arrows have negative x coordinates?

10. For Arrow B:

    A) Δx = _____; Δy = _____.

    B) Using Δx and Δy as A and B, find the total displacement of Arrow B (find "C").

11. For Arrow A: (*notice negatives*)

    A) Δx = _____; Δy = _____.

    B) Find the total displacement of Arrow A.

12. For Arrow C:

    A) Δx = _____; Δy = _____.

    B) Find the total displacement of Arrow C.

13. Find the total displacement of Arrow D.

Use your notes: "Trigonometry Basics" to answer the following.

1. What symbol do we use for any angle?

2. 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

3. In triangle 2
    A) ___ Which is adjacent to θ_1?
    B) ___ Which is opposite to θ_2?
    C) ___ Which is adjacent to θ_2?
    D) ___ Which is hypotenuse to θ_1?
    E) ___ Which is hypotenuse to θ_2?
    F) ___ Which is opposite to θ_1?

Triangle 2 14.3 m θ_2 6 θ_1 13 m
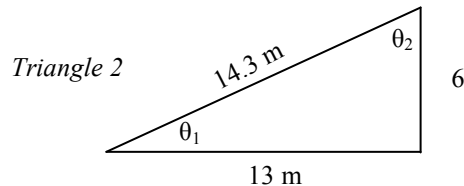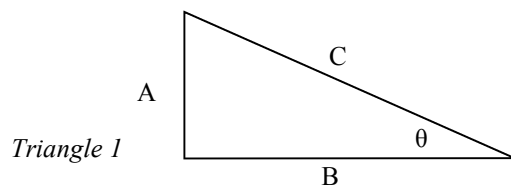
*Make SURE that your calculator is in degrees, not radians. Put sin30° into your calculator if it is not 0.5, then you're in radians.*

4. Use your calculator to find the following. (*YOU MUST be able to do this easily. If you have trouble come see me or go to the website and do the trigonometry study helps.*)

    A. $\sin 65° =$ _____

    B. If $\sin \theta = 0.56$, then $\theta =$ _____?

    C. $\tan 20° =$ _____

    D. $\cos 40° =$ _____

    E. $\tan 70° =$ _____

    F. If $\cos \theta = 0.45$, then $\theta =$ _____?

    G. $\sin 35° =$ _____

    H. If $\sin \theta = 0.56$, then $\theta =$ _____?

    I. $\cos 15° =$ _____

    J. If $\sin \theta = 0.5$ then $\theta =$ _____?

    K. If $\cos \theta = 0.866$, then $\theta =$ _____?

    L. If $\tan \theta = 1$, then $\theta =$ _____?
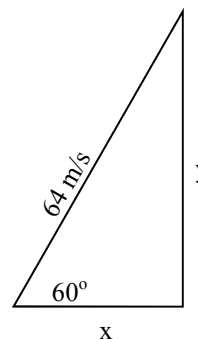
5. On triangle 3, find the y component of 21m (find y).
    Variables: Equation: Solve:
    $\theta =$
    opposite =
    adjacent =
    hypotenuse =

Triangle 3 21 m y θ_1 20 m
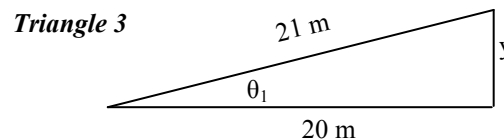
6. On triangle 4, find the y component of 64 m/s.
    Variables: Equation: Solve:

64 m/s y 60° x
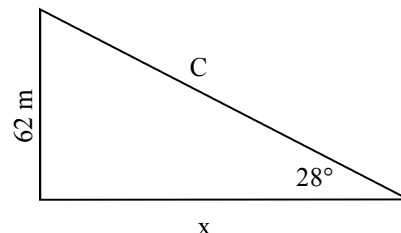*Triangle 4*

7. Now, find the x component of 64 m/s.
    Variables: Equation: Solve:

8. Find BOTH x and the hypotenuse.

62 m C 28° x
Triangle 5

More on back

Just so we don't forget….

9. An object is thrown into the air going 35 m/s, how long does it take to get back to the ground?
    A) Which two letters of the freefall diagram is this situation?

    B) What are you looking for?

    C) Write the variables of everything you know:
    Variables:

    D) Pick an equation and solve.

10. *Add these to your equation sheet.*

$$\sin\theta = \frac{opp}{hyp}$$

$$\cos\theta = \frac{adj}{hyp}$$

$$\tan\theta = \frac{opp}{adj}$$