AP Physics 1
1.2 – Scalars and Vectors; Distance and Displacement
Assessment

Oh, the distance you will go to do well on this assessment…

Name: _____   Period: _____

1. Differentiate between a scalar and a vector, giving an example of each.

2. Given a particle in motion in two dimensions, is it possible for the distance the particle travelled in time t to be positive while the displacement during that same time interval is negative? Justify your answer.

3. An Indy 500 driver finishes the race. Front start line to finishing line, what was the driver's total distance and displacement?

4. Forces of 12 N and 5 N both act on the same point, but their directions can be varied.
    a. What is the greatest possible resultant?

    b. What is the least possible resultant?

    c. If the two forces are at right angles, find the size and direction of the resultant.

5. A person is mowing his yard. He is pushing in the lawnmower with a force of 100 Newtons (a vector) and the handle he is pushing on makes an angle of 30 degrees with the horizontal.
    a. Sketch the system, including the components and the hypotenuse.

    b. Calculate the vertical and horizontal components of the 100 N force.

    c. If the lawnmower weighs 300 N, what is the total downward force on the ground? (Weight is a downward force, perpendicular to the ground.)

    d. If the lawnmower is pulled rather than pushed, how does this affect the total downward force?

6. Two observers each use different reference frames to record the changing position of a bicycle rider. Both use Earth as the object of reference, but the origins and the directions of the x-axes are different. The data for the cyclist's trip are presented below for each observer:

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Observer 1

Clock Reading (s)	Position (m)
0.0	40.0
1.0	30.0
2.0	20.0
3.0	10.0
4.0	0.0

Observer 2

Clock Reading (s)	Position (m)
0.0	0.0
1.0	10.0
2.0	20.0
3.0	30.0
4.0	40.0

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Sketch a motion diagram for each observer and how they view the cyclist; that is, on a number line, indicate the direction of travel of the cyclist (marked in increments of 10 m) and where each observer is standing with respect to the cyclist when their clocks are started. Then, construct a position versus time graph for each observer.