RAA 2

LBCC PH201 FA2016 Name:_____

October 24, 2016 Class time:_____

Instructions: You have 40 minutes to work on this assessment. You need to show your work to receive credit. A solution without a picture is not complete. A picture or a free body diagram without a coordinate system is not complete

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1. (4 points) We are living on a rotating sphere (-: The diameter of earth is 7918 miles.

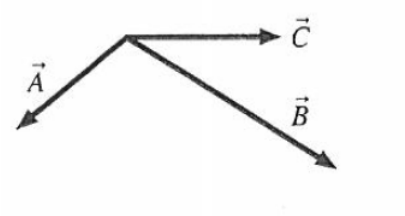
   I. What is the period of the rotation of earth around its center axis (in s)?

   II. What is the frequency of the earth rotation (in rev/s)?

2. (6 points) Yesterday your instructor was driving along HW20 with a speed of 45mph. In a moment of physics curiosity he shifted the car in neutral and let it roll. 13 seconds later the speed of his car was 55mph.
   What was the slope of HW 20 at that location? (Do you remember from lab how the acceleration and the angle are related? Assume no drag and no friction)

3. (10 points) A bit later while your instructor was driving along a perfectly level stretch of HW20 with a speed of 24m/s he was thinking about the following question: How steep (what angle to the horizontal) of a ramp would he need to jump with his car over a person with a height of 1.83m.
    I. Draw a picture of the situation showing all known and unknown variables that are important to solve this problem. Include a coordinate system that will help you solve the problem.
    II. Your instructor did not have pencil and paper so please calculate the ramp angle.
    III. Based on your result of II. how far would your instructor jump in his car before he would hopefully safely land back on the road. You can assume that the car would take off the ground at exactly the same height it would land.

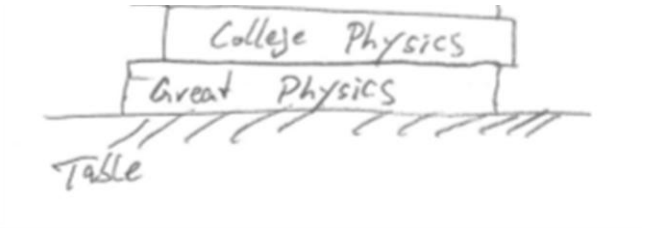
4. (5points) Given are three vectors $\vec{A}$, $\vec{B}$, and $\vec{C}$. What vector $\vec{D}$ do you need to add to these 3 vectors so that the resulting sum of all four vectors is 0. The coordinates of A are A_x = -3.0N and A_y = -3.0N. The magnitudes of A and C are equal. B_x = 6.0N, B_y = -4.0N and Cy = 0.
   I. Draw the coordinate system
   II. Calculate the vector sum of $\vec{A} + \vec{B} + \vec{C}$.
   III. Determine the vector $\vec{D}$., and explain how you derived at your solution.



5. (2 points) A ball is shot out of a launcher and flies through the lab. Draw a free body diagram of the ball.

6. (2 points) A bucket is being lowered by a rope with a constant downward acceleration. Draw a FBD that clearly describes this situation.

7. (5points) … Draw a free body diagram for each of the two books. Clearly mark Newton's 3rd Law Pairs with a dotted line.



8. (6points) A bag of groceries is on the back seat of your car as you stop for a stop light. The bag does not slide.
   I. Draw a picture of the bag in the car and identify all forces on the bag.
   II. Draw a free body diagram of the bag
   III. Draw the motion diagram of the bag.