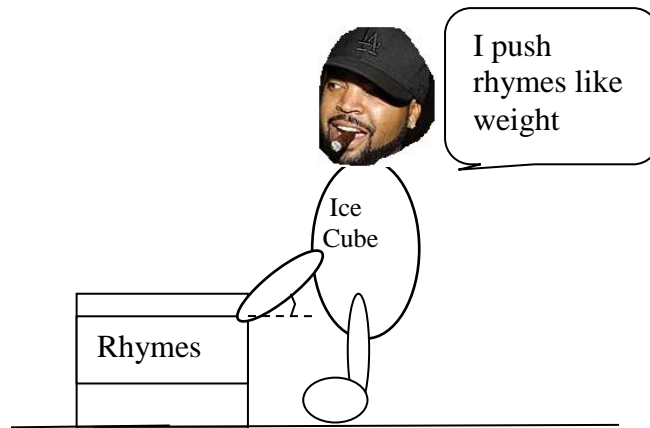Note: For the FBD make sure that you have:
    i)   Drawn a LARGE diagram
    ii)   Labeled all forces clearly
    iii)   Included the necessary equations
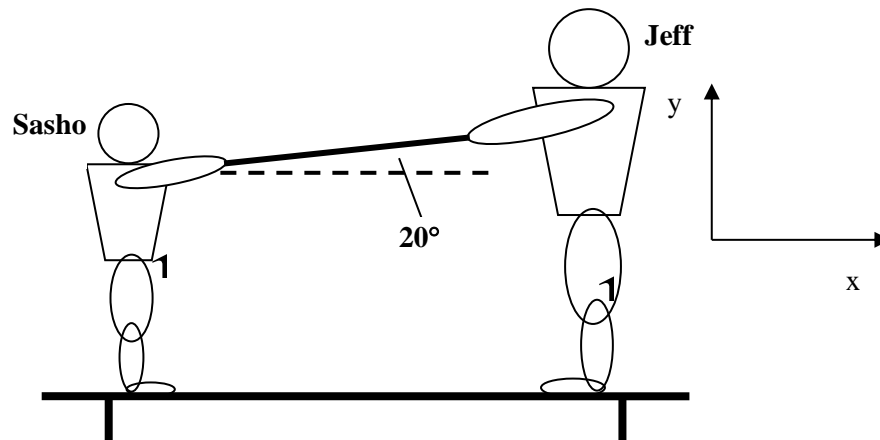   iv)   Followed all of the other rules stated in class and in the labs

1. Draw a free body diagram for:
    a. Ice Cube $a_x < 0, a_y = 0$ (3)
   b. Ice Cube's box of rhymes $a_x < 0, a_y = 0$ (3)

2. Draw a free body diagram for

    c. **Sasho**. Assume that $a_x > 0, a_y > 0$.   (3)
    d. **Jeff**. Assume that $a_x > 0, a_y = 0$ (3)
   e. the **table**. Assume that $a_x = 0, a_y = 0$ (3)

3. Using the diagram above, and given that Jeff has a mass of 75kg and that there is 1200 N of tension in the rope, answer the following.

    a. What is the y component of the tension in the rope that acts on Sasho? (1)
    b. What is the magnitude of the ground reaction force acting in the y direction on Jeff's feet? (2)

4. The area under the angular velocity curve during a certain time interval is? (1)

    a. average angular displacement
    b. the instantaneous angular acceleration at the end of the interval
    c. the change in angular displacement for that time interval
    d. the tangential linear velocity
    e. related to centripetal acceleration

5. The derivative of velocity is? (1)

    a. displacement
    b. average acceleration
    c. instantaneous acceleration
    d. the tangent line on a displacement graph
    e. the rate at which velocity is changing over an infinitely small time interval
    f. both e and c

6. An angular velocity graph of the knee has more area above the zero degrees/second axis (the x-axis) than below. Which of the following is true? (1)

    a. The knee has undergone no angular displacement
    b. The knee has been moved through it's full range of motion
    c. The knee has had zero angular acceleration
    d. None of the above are correct
    e. The angular velocity of the knee is zero
    f. Both e and b

7. The graph below shows the velocity curves for the centers of mass of sprinters "A" and "B" for the first 8 seconds of a 100m race. According to the graph, who would be ahead at each of the times listed on the x axis below? (1, 3, 3.5, 7, and 8 seconds) (5)
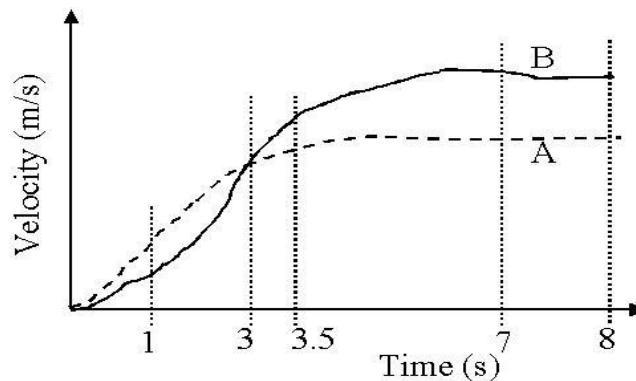
8. Below is a graph showing forearm angular velocity relative to the humorous during a Judo chop (See: Austin Powers). Match the correct answers. Note that the negative portion of the graph is an inverted mirror reflection of the top half. There may be more than 1 correct answer for each of the following statements (8)

   a. Greatest negative acceleration _____
   b. Negative angular velocity _____
   c. Zero angular acceleration _____
   d. Positive acceleration _____
   e. Elbow is extending the fastest _____
   f. Zero angular velocity _____
   g. Greatest angular displacement _____
   h. Zero angular displacement _____

   At what point would Austin Powers (the chopper) want to make contact if he was taking out a random henchman? Why?   _____
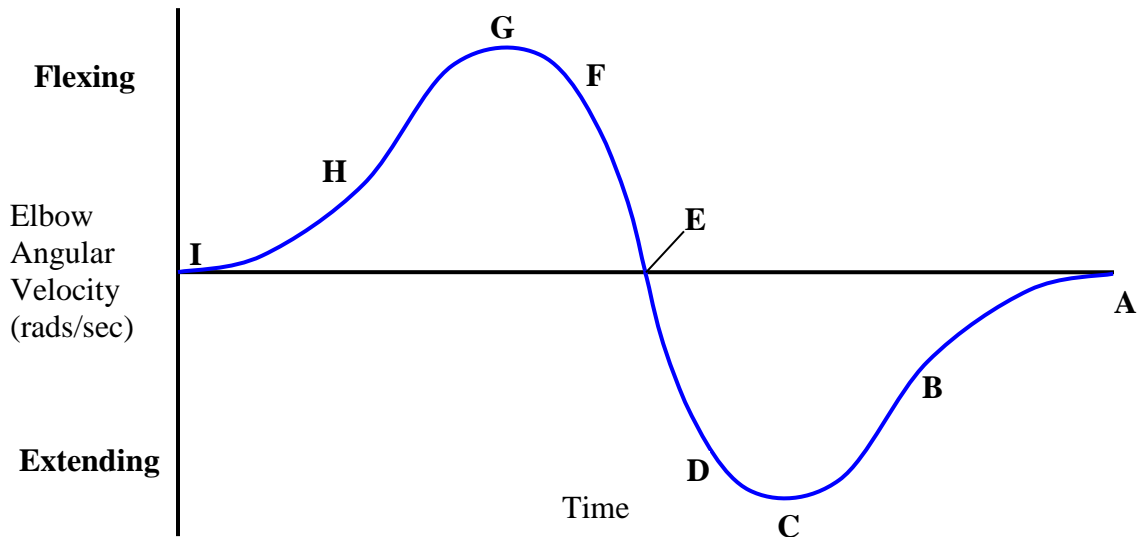
9) If a 125 kg man was standing motionless on the ground, what would the magnitude of the ground reaction force be in Newtons? (1)

10) The force of gravity produces an acceleration of -9.81 m/s/s on a 125 kg man standing motionless on the ground. (1)

   a. True
   b. False   Explain your answer.

11) The acceleration of gravity produces a force of approximately -981 N on a 100 kg falling freely in the air. (1)

    a. True
    b. False   Explain your answer.

12) A puck is moving along the surface of the ice to the right and accelerating to the left. In which direction is the friction force? Explain? (1)

13) In the diagram below, you are looking down from the ceiling at a ball being whirled on a string. If the ball is to pass through point "X" after being released, at which position should the person let go of the string? Explain using Newton's Laws. (1)
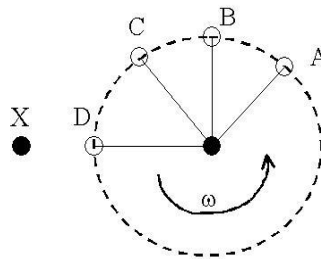
Instructions: Please show all your work. Please ensure that your assignment is stapled once in the top left corner prior to submission. This assignment is due at the start of class on Monday September 24th

Late assignments will result in a 25% per day deduction in the assignment mark.