September 11, 2013	Physics 210: UnTest #1:page 1	Name _____

Time Start_____ Time finish_____ Pledged_____

Instructions: You have a total of 55 minutes to complete this test.
Answer each of the following questions completely.
Supply all details that led to your answer and correct SI units where required.
Do not discuss any aspect of this test with anyone until I return the test.

[1] Suppose $\vec{A} = 5\hat{i} + 4\hat{j}$. $\vec{B} = 2\hat{i} + 8\hat{j}$, and $\vec{C} = 3\hat{i} + 9\hat{j}$. Find the following:

(a) $\vec{A} \bullet \vec{B}$

(b) $\vec{A} - 2\vec{C}$

(c) $\vec{A} + \vec{B} + \vec{C}$

(d) $|\vec{A} - \vec{C}|$

(e) the angle between $\vec{B}$ and $\vec{C}$.

[2] Suppose an object is seen to have an acceleration given by:

$$\vec{a} = b\hat{y}$$

where b is a constant that has SI units of m/s^2. You may assume any initial velocity is given by $\vec{v}_0 = v_0\hat{y}$ and the initial position is given by $\vec{y} = y_0\hat{y}$.

(a) What is the **vector** velocity at any time t?

(b) What is the **vector** position at any time t?

(c) If the object has a mass m, what is the **vector** force on the object at any time t?

(d) Suppose $b=-2\ m/s^2$. Find the time at which the position is at a maximum if $v_0=10$ m/s and $y_0=0$.

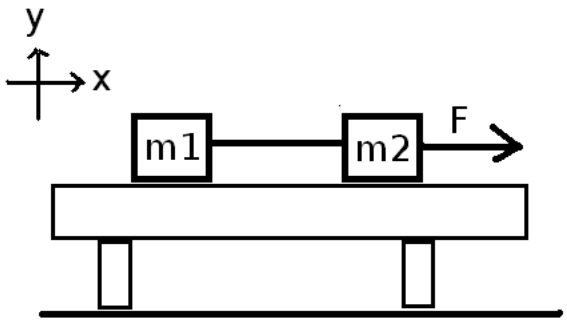
[3] A ball is thrown upward from ground level with an initial speed of 5 m/s. If the initial velocity makes an angle of 40^0 with respect to the x-axis (i.e., the ground), answer the following (using correct SI units).

(a) How far does the ball travel in the x-direction when it returns to the ground?

(b) How high did the ball go at its maximum altitude?

(c) How long was the ball in the air?

(d) What is the impact velocity **vector** (express using the unit vectors $\hat{i}$ and $\hat{j}$)?



[4] Two masses, m_1 and m_2 are resting on a frictionless table and are connected by a string as shown. A force F is applied to the system.

(a) On the diagram provided, show **all forces** acting on the masses and indicate the direction of accelerations.

(b) In the boxes below, provide correct and complete free body diagrams for the system.

fb1

fb2

(c) Solve (symbolically) for the tension and the acceleration of the system.

(d) Provide numerical answers for the tension and acceleration, together **with correct SI units** for the case F=2N, m_1=1Kg, m_2=3Kg.

T=_____ a=_____