Quiz 2--PHYS 201--F13

Multiple Choice  (30 points)
Identify the choice that best completes the statement or answers the question.

1. A baseball is thrown by the center fielder (from shoulder level) to home plate where it is caught (on the fly at an equal shoulder level) by the catcher. At what point is the ball's speed at a minimum? (air resistance is negligible)
   a. speed is constant during entire trajectory
   b. just after leaving the center fielder's hand
   c. just before arriving at the catcher's mitt
   d. at the top of the trajectory

2. If we know an object is moving at constant velocity, we may assume:
   a. the object is accelerating.
   b. there are no forces acting on the object.
   c. the net force acting on the object is zero.
   d. the object is losing mass.

3. In the terminology a 500-N block, the 500-N refers to the block's:
   a. force.
   b. weight.
   c. mass.
   d. None of the above.

4. The following are 2 vectors. Which figure best represents the sum \( \mathbf{A} - \mathbf{B} = \mathbf{C} \)?

   a. 
   b. 
   c. 
   d. 

5. This figure shows an inclined plane with a block; the block is accelerating up the inclined plane. Which of the following is an appropriate equation that follows from the application of Newton’s second law of motion?

   a. \( \mathbf{F}_w \sin 60^\circ = \mathbf{F}_N \)
   b. \( \mathbf{F}_N = \mathbf{F}_w \)
   c. \( \mathbf{F}_N - \mathbf{F} = 0 \)
   d. \( \mathbf{F}_N - \mathbf{F}_w \sin 30^\circ = ma_x \)
Problem

6. (30 pts) Two blocks are arranged as shown in this figure. A force is applied to the top block, and the bottom block is secured to the top one by a string. The coefficient of kinetic friction for both blocks is 0.1. The top surface does not interfere with the string as the system moves to the right.

\[ \mu_k = 0.1 \]

\[ m_1 = 10 \text{ kg} \]

\[ m_2 = 2 \text{ kg} \]

\[ F = 10 \text{ N} \]

\[ 30^\circ \]

a) Label all of the force vectors acting on these blocks. Place the labels on the figure.
b) Now, draw the vector diagrams with the resolved vectors.
c) Write the system of 4 equations that describe the vector diagrams.
d) If the tension in the string is 8.152 N, what is the acceleration of the system? (Use next page if necessary.)
7. (15 pts) A vector $\vec{A}$ has a magnitude of 3 m and is in the direction of the +x axis. The vector $\vec{B}$ has a magnitude of 2 m and is 30° below the +x axis. The vector $\vec{R} = \vec{A} + \vec{B}$.

   a) Express $\vec{R}$ in vector notation.

   b) What is the magnitude and direction of $\vec{R}$?
8. (25 pts) A projectile’s motion is given by this function:

\[ \vec{d}(t) = 3.4t \hat{i} + (4.2t - 4.9t^2) \hat{j} \]

a) Give the functions for the velocity and acceleration. Express these in vector notation.
b) What time has elapsed when the object reaches the end of the trajectory (when \( y = 0 \) m)?
c) What is the object’s velocity at the top of the trajectory?
d) What horizontal distance has the object traveled at the end of the trajectory?
e) What is the direction of \( v_o \)?
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Answer Section

MULTIPLE CHOICE

1. ANS: D  PTS: 1  DIF: 2  TOP: 3.4 Motion in Two Dimensions
2. ANS: C  PTS: 1  DIF: 1  TOP: 4.1 Forces | 4.2 Newton's First Law | 4.3 Newton's Second Law | 4.4 Newton's Third Law
3. ANS: B  PTS: 1  DIF: 1  TOP: 4.1 Forces | 4.2 Newton's First Law | 4.3 Newton's Second Law | 4.4 Newton's Third Law
4. ANS: A  PTS: 1
5. ANS: A  PTS: 1

PROBLEM

6. ANS:
  .
  PTS: 1
7. ANS:
  .
  PTS: 1
8. ANS:
  .
  PTS: 1