Exam 1 Chapters 1-5 in Young 9e

Multiple choice questions. Circle the correct answer. No work needs to be shown and no partial credit will be given.

(5 pts) 1. A baseball is thrown straight up with an initial speed of 16.0 m/s. Air resistance can be neglected. At the highest point reached by the baseball, the acceleration of the baseball is
(a) zero
(b) nonzero and downward
(c) nonzero and upward

(5 pts) 2. A small rock is thrown from ground level with a velocity that has magnitude 20.0 m/s and direction $36.9^\circ$ above the horizontal. Neglect air resistance. When the rock is at its maximum height above the ground its speed is
(a) 16.0 m/s
(b) 12.0 m/s
(c) zero
(d) 20.0 m/s
(e) none of the above answers

(5 pts) 3. A 10 kg block is sliding down a frictionless incline that is at an angle of $36.9^\circ$ above the horizontal. The acceleration of the block has magnitude
(a) zero
(b) 9.8 m/s$^2$
(c) 7.8 m/s$^2$
(d) 5.9 m/s$^2$
(e) none of the above answers

(5 pts) 4. A 10 kg block is at rest on a horizontal surface. The coefficient of static friction between the block and the surface is $\mu_s = 0.400$. If a horizontal force $F = 30.0 \text{ N}$ is applied to the block, the magnitude of the friction force that the surface exerts on the block will equal
(a) 98.0 N
(b) 39.2 N
(c) 30.0 N
(d) zero
(e) 0.400 N
(f) 4.00 N
(g) none of the above answers
(5 pts) 5. A 10 kg block is sliding down an incline that is at an angle of 36.9° above the horizontal. The coefficient of kinetic friction between the block and the surface of the incline is $\mu_k = 0.200$. As the block slides, what is the magnitude of the friction force that the surface of the incline exerts on the block?

(a) 11.8 N  
(b) 15.7 N  
(c) 19.6 N  
(d) zero  
(e) 0.200 N  
(f) none of the above answers

(5 pts) 6. A 30 kg block is on a frictionless tabletop. A light rope connected to the 30 kg block passes over a light frictionless pulley and a 10 kg block is suspended from the end of the rope. The system is released from rest and the blocks move. While the blocks are moving, what is the tension in the rope?

(a) zero  
(b) 90.0 N  
(c) 24.5 N  
(d) 73.5 N  
(e) none of the above answers.

On the following problems show all your work. Partial credit will be given, if earned. Write your answers in the blanks provided. All answers must include the correct plus or minus sign (if appropriate) and the correct units.

(16 pts) 7. A Physics student is walking on level ground. She walks 20.0 m due west and then 80.0 m is a direction 37.0° north of east. How far must she walk to return to her starting point by the shortest route?

Ans. _______________
8. A small rock is thrown from ground level toward a tall building. The building is a horizontal distance of 22.0 m from the point from where the rock is thrown. The initial velocity of the rock has magnitude 20.0 m/s and direction 37.0° above the horizontal. Neglect air resistance.

\[ \begin{align*} 
\text{20 m/s} & \quad \downarrow \\
\text{37°} & \quad \downarrow \\
\text{12 m} & \quad \rightarrow 
\end{align*} \]

a) How much time does it take the rock to reach the building? \hspace{2cm} \text{Ans.} \quad \underline{} \\

b) What is the height of the rock above the ground when it hits the building? \hspace{2cm} \text{Ans.} \quad \underline{} \\

c) What is the speed of the rock just before it hits the building? \hspace{2cm} \text{Ans.} \quad \underline{}}
(19 pts) 9. A 10.0 kg block is on a horizontal surface. The coefficient of kinetic friction between the block and the surface is $\mu_k = 0.300$. A constant force $F = 85.0 \text{ N}$ that is directed at $53.1^\circ$ above the horizontal is applied to the block and the block accelerates in a direction parallel to the surface.

\[ \text{F} \]
\[ \mu_k = 0.3 \]

a) What is the magnitude of the normal force that the surface exerts on the block? Ans. 

b) What is the magnitude of the acceleration of the block? Ans. 

(16 pts) 10. A small rock is released from rest at the edge of the roof of a tall building and falls past a window that is below the roof. It takes the rock 0.380 s to travel 1.90 m from the top of the window to the bottom of the window. Neglect air resistance.

a) What was the speed of the rock when it was at the top of the window? Ans. 

b) What is the distance from the roof to the top of the window? Ans.