Physics 2010
Fall 2006
Sid Rudolph

EXAM 3

1

Name:_____ Student ID #:_____

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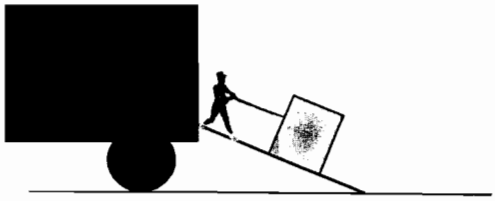
A. *[18 pts.]* A couple of movers are allowing a very heavy crate to slide slowly down a truck ramp at a constant speed by hanging tightly onto a rope tied to the crate (see drawing). There is kinetic friction between the crate and the ramp. In the space provided below, enter the name of the force (or forces) requested or a symbol representing the force. None is a possible entry.



1. $\vec{F}_G$ What is/are the conservative forces acting on the crate as it moves along the ramp?
2. T, f_k, F_N What is/are the nonconservative forces acting on the crate as it moves down the ramp?
3. $\vec{F}_G$ The conservative forces doing positive work.
4. NONE The conservative forces doing negative work.
5. NONE The nonconservative forces doing positive work.
6. T, F_R The nonconservative forces doing negative work.

B. *[10 pts.]* The following equations were presented in lecture and used in a homework item for calculating the final velocities of two masses, m_1 and m_2, after a 1-dimensional collision for which m_1 was moving to the right (positive velocity) with an initial velocity v_{o1} and m_2 was initially stationary.

$$v_1 = \left(\frac{m_1 - m_2}{m_1 + m_2}\right) v_{o1} \qquad v_2 = \frac{2m_1}{m_1 + m_2} v_{o1}$$

Below are a set of possible conditions.

a. $m_1 = m_2$
b. $m_1 > m_2$
c. $m_1 < m_2$
d. m_1 is much, much larger than m_2
e. m_1 is much, much smaller than m_2

In the spaces below, enter the letter of a single condition (from above) that best accounts for the statement.

1. a The masses exchange velocities, i.e., $v_1 = 0$ and $v_2 = v_{o1}$.
2. d v_1 is pretty much the same as v_{o1} and v_2 is twice v_{o1}.
3. c After the collision v_1 is negative.
4. b After the collision both masses are moving with positive velocities whose values depend on m_1, m_2 and v_{o1}.
5. e v_1 is the opposite of v_{o1}, and v_2 is ≈ 0, i.e., m_2 barely moves, if at all.