Student:_____

How Things Work

Homework 3– Due Sunday, June 24, in class

1) A rock is 3.0 kg. The acceleration due to gravity is 10 m/s^2.

   a) What is the **mass** of the rock?

   b) Determine the **weight** of the rock.

   c) Explain the difference between the concepts of **mass** and **weight.** Illustrate your explanation using the numerical figures (including units) for **mass** and **weight** of the rock mentioned in this problem.

INSTRUCTIONS FOR ANSWERING QUESTIONS 2 & 3

PLEASE READ CAREFULLY

Questions 2 & 3 in this assignment are provided as aids for you *to learn* from the textbook. In order *to learn* from these questions you must do the following:

(1) Carry out Active Reading of the corresponding section. By Active Reading I mean reading seeking understanding. This is done by reading slowly, taking notes, highlighting, asking and writing down questions, re-reading, explaining things to yourself in your own words, discussing with your peers, asking the instructor, etc.
(2) After Active Reading answer the questions in writing WITHOUT looking at the answers available in the book.
(3) Read your own answer and verify that it represents your best understanding of the question. If you are not satisfied, revise your answer.
(4) Compare your answer with that provided in the book.
(5) If there is agreement, you understood the concept.
(6) If there is disagreement, study the section again and attempt another answer.
(7) Repeat steps (2) through (6) until your answer agrees with the book.
(8) If you cannot answer to your satisfaction, contact the instructor for discussion.

No verbatim rendering, copying, or paraphrasing from answers in the textbook will be accepted!

2) Read Section 2.2 in the Textbook (Pages 54-62) and write a summary explaining the central concepts of *static friction, sliding friction, work, and energy (including thermal energy* and *kinetic energy*) (1-page maximum).

3) Answer the following "Check your understanding" questions from the textbook

a. Check Your Understanding #1: The One That Got Away (**Textbook p. 55**)

b. Check Your Understanding #2: Weight and Friction (**Textbook p. 56**)

c. Check Your Understanding #3: Skidding to a Stop (**Textbook p. 57**)

d. Check Your Understanding #5: Burning Rubber (**Textbook p. 59**)

e. Check Your Understanding #6: Throwing a Fastball (**Textbook p. 62**)

Complete the following "Exercises" from the **Textbook (p. 79).**

4) Exercise #26

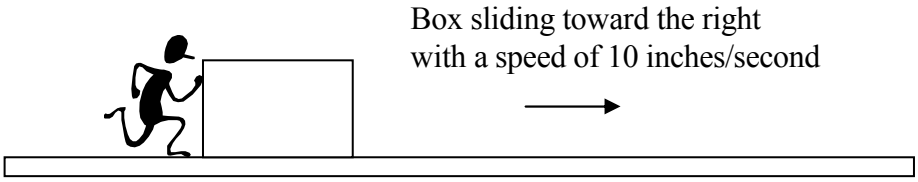
5) Exercise #27

6) Exercise #28

7) Exercise #29

8) Work Problem #11 in **Textbook (p. 80)**

9) A man pushes a 40 kg wooden box on a level surface. If the coefficient of sliding friction between the box and the surface is 0.25, find the *force of sliding friction* acting on the box.



10) A distracted motorist drives his car along a freeway. Suddenly he sees a deer crossing the road. As he steps on the brakes, the wheels of the car lock and skid over the pavement. Unfortunately he hits the deer, kills the animal and damages his car. What type of friction was at work between the tires and the road after the wheels locked? Why?

11) A careful motorist drives his car along a freeway. From far away he notices a deer entering the road. He gently steps on the brakes, making it slow down to a full stop without skidding over the pavement. He pulls out his camera and takes nice pictures of the animal. What type of friction was at work between the tires and the road as the car slowed down to a full stop? Why?

12) Considering that all surfaces present some roughness at the microscopic level, explain why the peak static friction between two surfaces has a value larger that the sliding friction.