Physics 200 **Unit 3** Name: _____

Part 1: Friction

1. What is friction?

2. When there is relative motion between objects in contact, the friction is called _____ friction. The symbol for its "coefficient" is _____.

3. When there is no motion between objects in contact, the friction is called _____ friction. The symbol for its "coefficient" is _____.

4. According to the table, which type of friction is stronger?

5. Aside from the materials involved, what else affects the force of friction between two surfaces?

System	Static Friction μ_s	Kinetic Friction μ_k
Rubber on dry concrete	1.0	0.7
Rubber on wet concrete	0.5-0.7	0.3-0.5
Wood on wood	0.5	0.3
Waxed wood on wet snow	0.14	0.1
Metal on wood	0.5	0.3
Steel on steel (dry)	0.6	0.3
Steel on steel (oiled)	0.05	0.03
Teflon on steel	0.04	0.04
Bone lubricated by synovial fluid	0.016	0.015
Shoes on wood	0.9	0.7
Shoes on ice	0.1	0.05
Ice on ice	0.1	0.03
Steel on ice	0.04	0.02

Table 6.1 Approximate Coefficients of Static and Kinetic Friction

6. Write the equation for the magnitude of static friction.

7. Write the equation for the magnitude of kinetic friction.

8. Someone slides a 1kg textbook rightward across the classroom floor. The book accelerates at a rate of -4.9m/s^2. Find μ_k for the book on the floor. What would μ_k have been if the book's mass had been 2kg?

Practice: Force Problems with Friction and Some Kinematics

1. Someone slides a 20kg rock across a horizontal floor. If the person does this by applying a 150N horizontal force, and the rock accelerates at 3.5m/s^2, what is the coefficient of friction between the desk and the floor?

2. If the coefficient of kinetic friction between a 35-kg crate and the floor is 0.30...
   a. What horizontal force is required to move the crate at a steady speed across the floor?

   b. What horizontal force is required if μ_k is zero?

3. A force of 48.0 N is required to start a 5.0-kg box moving across a horizontal concrete floor.
   a. What is the coefficient of static friction between the box and the floor?

   b. If the 48.0-N force continues, the box accelerates at $0.70\ \mathrm{m/s^2}$. What is the coefficient of kinetic friction?

4. Suppose that you are standing on a train accelerating at 0.20g. What minimum coefficient of static friction must exist between your feet and the floor if you are not to slide?