Determining Coefficients of Friction Worksheet #2

1. Can the coefficient of friction ever be greater than one? Less than one? Explain.
2. In a tug-of-war contest on a firm, horizontal sandy beach, Team A consists of six players with an average mass of 65 kg and Team B consists of five players with an average mass of 84 kg. Team B, pulling with a force of 3.2 kN, dislodges Team A and then applies good physics principles and pulls on Team A with a force of 2.9 kN, just enough to keep Team A moving at a low constant velocity. Determine Team A's coefficient of
   a. static friction
   b. kinetic friction on sand
3. If the coefficient of kinetic friction is 0.25, how much horizontal force is needed to pull each of the following masses along a rough desk at a constant speed?
   a. 25 kg   b. 15 kg   c. 250g
4. For each situation given below, draw a FBD of the object and then answer the question. The forces described are acting horizontally; the net vertical force is zero.
   a. A butcher pulls on a freshly cleaned side of beef with a force of 2.2×10^2 N. The frictional resistance between the beef and the countertop is 2.1×10^2 N. What is the net force exerted on the beef?
   b. A net force of 12 N [S] results when a force of 51 N [S] is applied to a box filled with books. What is the frictional resistance on the box?
   c. Two students exert a horizontal force on a piano. The frictional resistance on the piano is 92 N [E] and the net force on it is 4.0 N [E]. What is the force on the piano applied by the students? Describe and explain what is happening to the piano.
5. A sled of mass 5.0×10^1 kg is pulled along snow-covered, flat ground. The static friction coefficient is 0.30, and the sliding friction coefficient is 0.10.
   a. What does the sled weigh?
   b. What force will be needed to start the sled moving?
   c. What force is needed to keep the sled moving at a constant velocity?
   d. Once moving, what total force must be applied to the sled to accelerate it 3.0 m/s^2 [fwd]?
6. A force of 4.0×10^1 N accelerates a 5.0-kg block at 6.0 m/s^2 along a horizontal surface,
   a. How large is the frictional force?
   b. What is the coefficient of friction?
7. A 2.00×10^2-kg crate is pushed horizontally with a force of 7.00×10^2 N. If the coefficient of friction is 0.20, calculate the acceleration of the crate.