

Name: Key

Notes - 5.1 Friction

1. What is friction? Friction is a force that opposes the relative motion of 2 objects in contact with one another
2. When there is relative motion between objects in contact, the friction is called kinetic friction.
3. When there is no motion between objects in contact, the friction is called static friction.

4. The harder two objects are pushed together, the greater the friction becomes.

5. Write the equation for the magnitude of static friction.  $F_{fs} \leq \mu_s F_N$

6. Write the equation for the magnitude of kinetic friction.  $F_{fk} = \mu_k F_N$

7. Looking at Table 5.1, which coefficient of friction is greater, static or kinetic?

8. From Table 5.1, give the three highest examples of the coefficient of static friction.

- Rubber on dry concrete 1.0
- Shoes on wood 0.9
- Rubber on wet concrete 0.7

9. From Table 5.1, give the three lowest examples of the coefficient of kinetic friction.

- Bone lubricated by synovial fluid 0.015
- Steel on ice 0.02
- Steel on steel (oiled) / ice on ice 0.03

10. A skier with a mass of 62 kg is sliding down a snowy slope with an incline of 25° with respect to the horizontal. Find the coefficient of kinetic friction for the skier if friction is known to be 45.0 N.

$$F_{fk} = \mu_k F_N$$

$$= \mu_k mg \cos 25^\circ$$

$$\mu_k = \frac{F_{fk}}{mg \cos 25^\circ} = \frac{45.0 \text{ N}}{(62 \text{ kg})(9.80 \frac{\text{m}}{\text{s}^2}) \cos 25^\circ} = 0.082$$