

Name: _____ Date: _____ Period: _____

Calculating Friction

Bell Ringer: What are the two factors that affect the amount of friction?

Learning Target:

Coefficient of Friction:

- How much materials _____.
-
- The _____ the coefficient, the *MORE* two surfaces _____
- _____ if surfaces are *SLIDING* past each other

What does friction depend on?

-
-

Friction Formula:

- $F_f = \mu F_N$,
- $F_f =$
- $\mu =$
- $F_N =$

Example:

How much force must be applied to begin moving a stationary 5 kg wooden box on a wooden floor?

Check for Understanding:

The coefficient of kinetic friction between a 640.-newton crate and a level warehouse floor is 0.25. Calculate the magnitude of the horizontal force required to move the crate across the floor at constant speed.

Practice Problems:

We can use the generalized formula

$$F_f = \mu F_N$$

1. An object has a coefficient of kinetic friction of 0.2 and a normal force of 30N. Find the force of kinetic friction.
2. An object has a coefficient of static friction of 0.3 and a normal force of 30N. Find the force of static friction.
3. An object has 45 N of static friction and a normal force of 450. What is the coefficient?
4. There are 80 N of kinetic Friction and a coefficient of 0.25. What is the Normal Force?
5. An object has a mass of 20 kg and a coefficient of friction of 0.4.
 - a. Find the force of gravity (weight) for the mass.
 - b. If gravity and normal force cancel, what is the normal force?
 - c. Find the force of friction in this situation.

Static: $F_{fs} = \mu_s(F_N)$

Kinetic: $F_{fk} = \mu_k(F_N)$

6. An object is known to have a coefficient of kinetic friction (μ_k) of 0.167 and a coefficient of static friction (μ_s) of 0.42. If the normal force is 200 N, how much frictional force will it encounter while it is moving?

7. An 80 kg object has a $\mu_k = 0.35$ and a $\mu_s = 0.60$. Assuming it is on a flat surface
- What is the normal force on the object (*draw a diagram if needed*)
 - How much force is required to get the object to start to move from rest?
 - If the above object is moving already, and a tension force of 15 N to the right is pulling it, what will be the NET Force on the object? *Force is a vector so direction should be included.*
 - What is the acceleration (*with direction*) of the object based on your answer for part c?