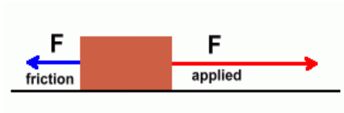
Force of Friction

Objective:

Define friction and understand its role in motion.

Differentiate between static & kinetic friction.

Understand and calculate the coefficient of friction for two surfaces.

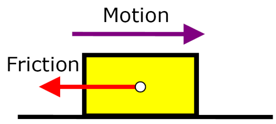


Force of Friction

Force that opposes motion.

Provides motion as well as stops it.

Ex: sliding, rolling, fluid



Friction depends on ...

Weight (normal)

Surfaces - coefficient of friction

$$F_f = \mu \cdot F_n$$

Coefficient of Friction

μ means "mu"

ratio that measures the effect of the surfaces

$$\mu = \frac{F_f}{F_n}$$

Friction and Automobile tires μ = .7 on dry roads and μ = .4 wet roads.

Static vs. Kinetic

Static (F_s)

Friction on an object @ rest

$$F_s = \mu_s \cdot F_n$$

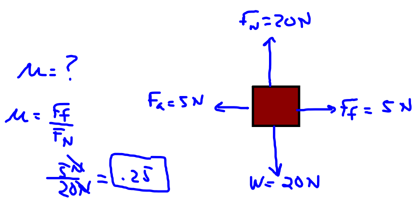
$$F_f = \mu F_N$$

Kinetic (F_k)

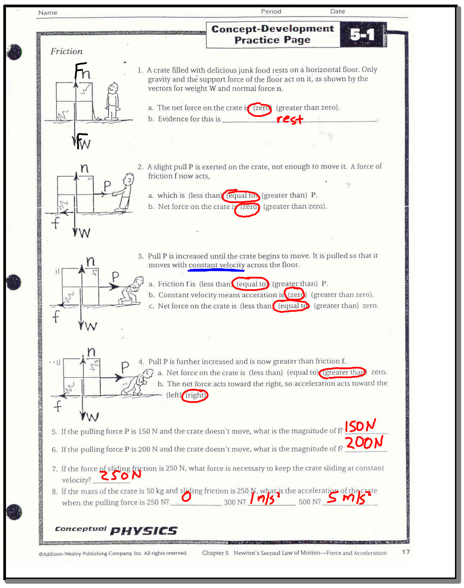
Friction on a moving object

$$F_k = \mu_k \cdot F_n$$

FBD



Friction



Name Period Date

Concept-Development Practice Page **5-1**

Friction

1. A crate filled with delicious junk food rests on a horizontal floor. Only gravity and the support force of the floor act on it, as shown by the vectors for weight W and normal force n.
   a. The net force on the crate is (zero) (greater than zero).
   b. Evidence for this is rest.

2. A slight pull P is exerted on the crate, not enough to move it. A force of friction f now acts,
   a. which is (less than) (equal to) (greater than) P.
   b. Net force on the crate is (zero) (greater than zero).

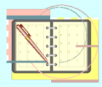
3. Pull P is increased until the crate begins to move. It is pulled so that it moves with constant velocity across the floor.
   a. Friction f is (less than) (equal to) (greater than) P.
   b. Constant velocity means acceration is (zero) (greater than zero).
   c. Net force on the crate is (less than) (equal to) (greater than) zero.

4. Pull P is further increased and is now greater than friction f.
   a. Net force on the crate is (less than) (equal to) (greater than) zero.
   b. The net force acts toward the right, so acceleration acts toward the (left) (right).

5. If the pulling force P is 150 N and the crate doesn't move, what is the magnitude of f? 150N
6. If the pulling force P is 200 N and the crate doesn't move, what is the magnitude of f? 200N
7. If the force of sliding friction is 250 N, what force is necessary to keep the crate sliding at constant velocity? 250N
8. If the mass of the crate is 50 kg and sliding friction is 250 N, what is the acceleration of the crate when the pulling force is 250 N? 0 300 N? 1 m/s² 500 N? 5 m/s²

Conceptual **PHYSICS**

Assignment . . .



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