

Force of Friction

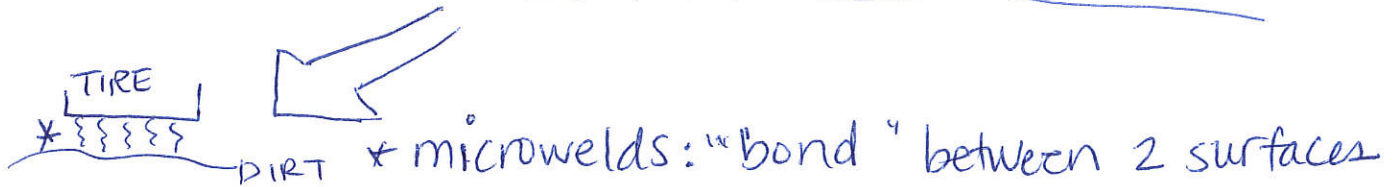
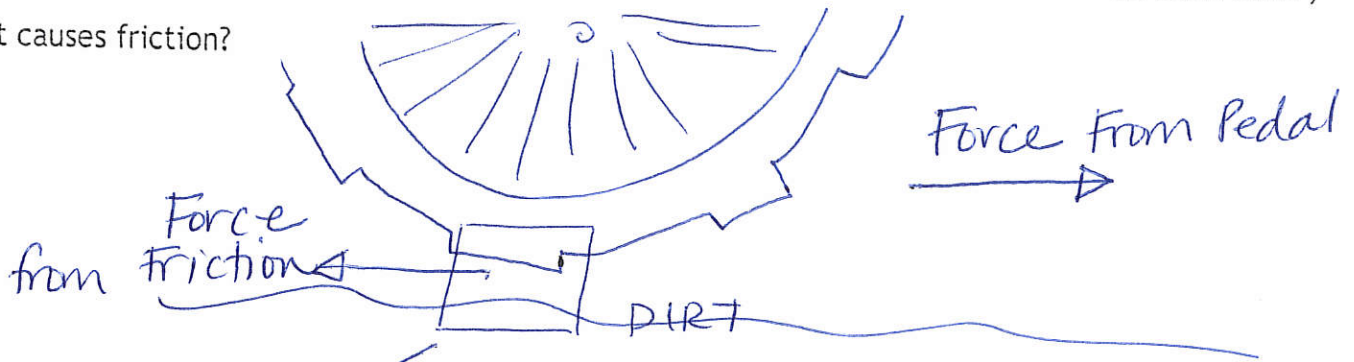
Ex. Riding a bike, speeding along on a flat surface

Stop pedaling and you continue to move to slow to a stop eventually

Why does the bike slow down? *unbalanced force*

FRICITION: force that opposes "sliding" motion of two surfaces in contact with each other,

What causes friction?



Remember Friction is an electromagnetic force

Rough surfaces have more surface area for microwelds $\therefore F_f$ (force of friction is greater)

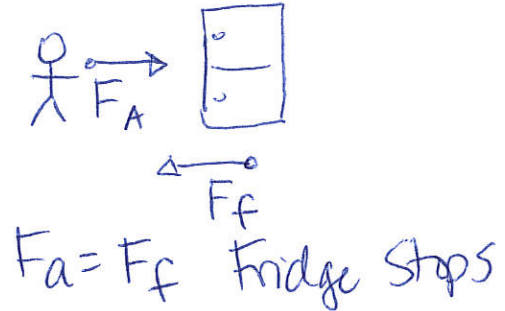
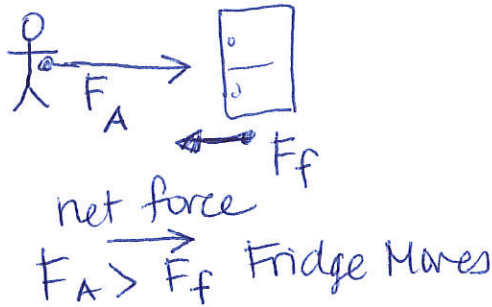
Four Types of Friction:

1. static friction (STRONGEST): a force that prevents two surfaces, in contact, from sliding past each other.

Ex. You push and push against the bookshelf but it doesn't budge

- the person or applied force (F_a) is NOT strong enough to break all microwelds

2. Sliding Friction (STRONG): the force that acts in the opposite direction of the sliding motion



3. Rolling Friction (WEAK):

easier to move objects on wheels

slows objects on wheels down

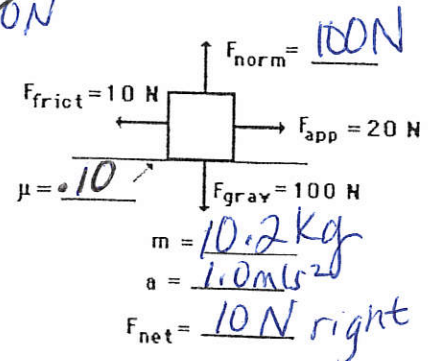
4. Fluid friction: force that opposes the motion of objects through the air or any fluid

Friction coefficient: μ

$$F_f = \mu N \quad \frac{10N}{100N} = \mu \frac{100N}{100N}$$

$\mu = 0.10$

: An applied force of 20 N is used to accelerate an object to the right across a frictional surface. The object encounters 10 N of friction. Use the diagram to determine the normal force, the net force, the coefficient of friction ("mu") between the object and the surface, the mass, and the acceleration of the object. (Neglect air resistance.)



$$F_g = m \times g$$

$$\frac{100N}{9.8 \text{ m/s}^2} = \frac{m(9.8 \text{ m/s}^2)}{9.8 \text{ m/s}^2}$$

$$10.2 \text{ kg} = m$$

$$F_{\text{net}} = ma$$

$$10N = 10.2 \text{ kg}(a)$$

$$0.98 \text{ m/s}^2 = a \sim 1.0 \text{ m/s}^2$$