Motion with constant Acceleration, Newton's Laws and Friction

Lecture 5

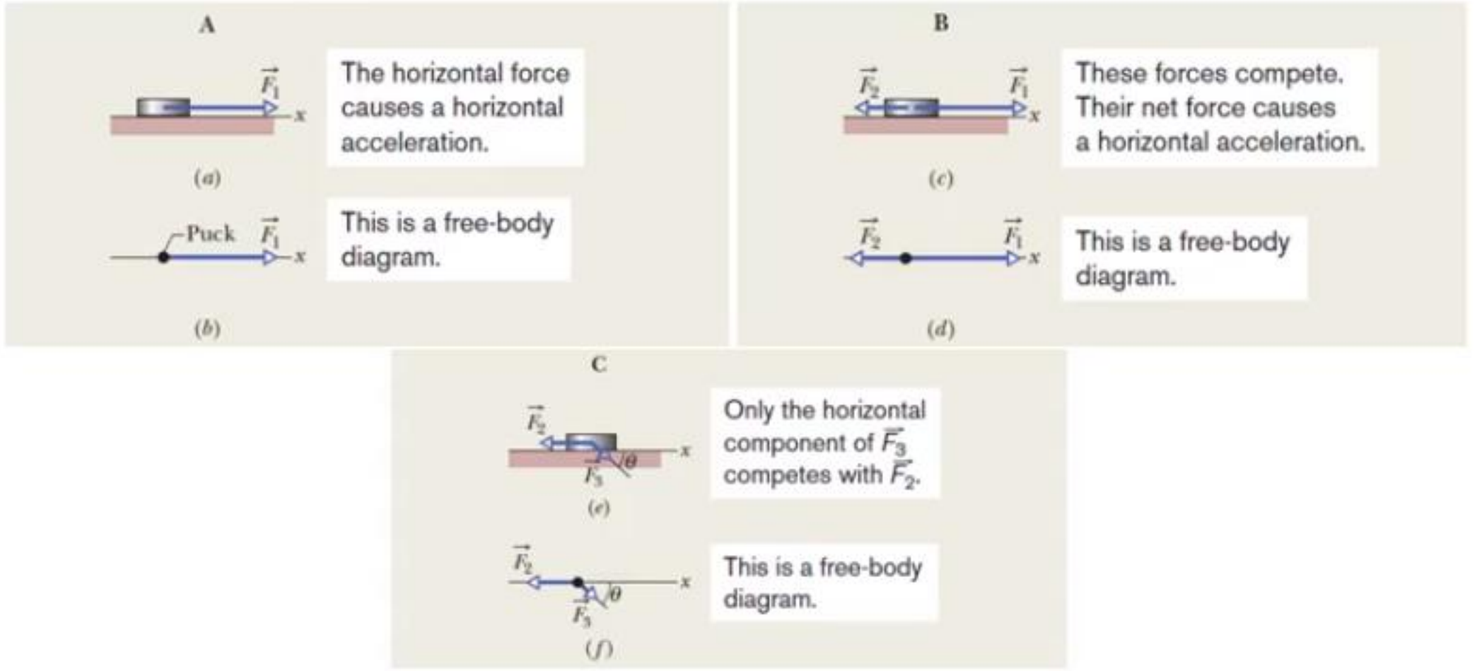
PH-122

Motion with Constant Acceleration

- Three basic equations:
- $V_f = V_i + at$
- $2aS = V_f^2 - V_i^2$
- $S = V_i t + \frac{1}{2} a t^2$

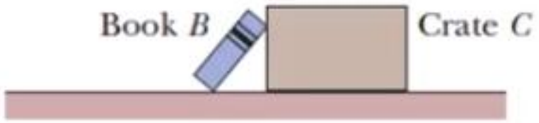
Newton's Laws

- 1st law: law of inertia
- 2nd law: force is directly proportional to acceleration.



Newton's Laws

- 3rd law: action-reaction pair, mutual forces.



(a)

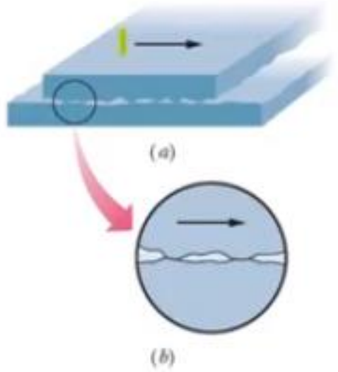
(b)

The force on *B* due to *C* has the same magnitude as the force on *C* due to *B*.

Friction

- Force opposing motion.
- Can be static or kinetic, min. value of kinetic friction is zero whereas static friction reduces to a non-zero minimum value.
- In essence, it is the vector sum of various forces acting between atoms of surfaces in contact.
- Dependent on actual area of contact.

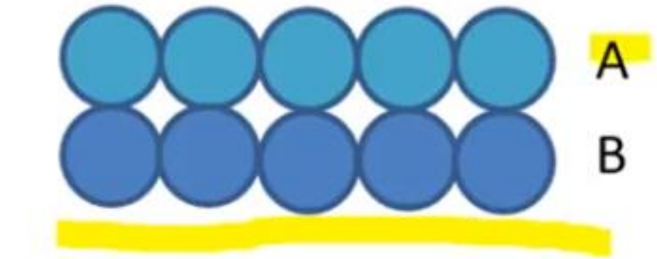
Friction: apparent and actual area of contact

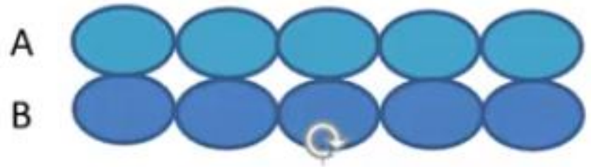


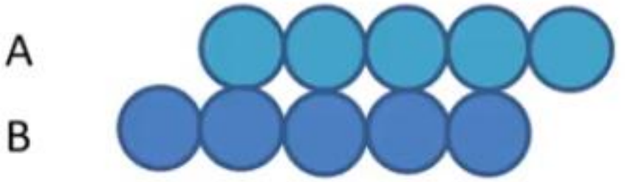
Apparent area of contact

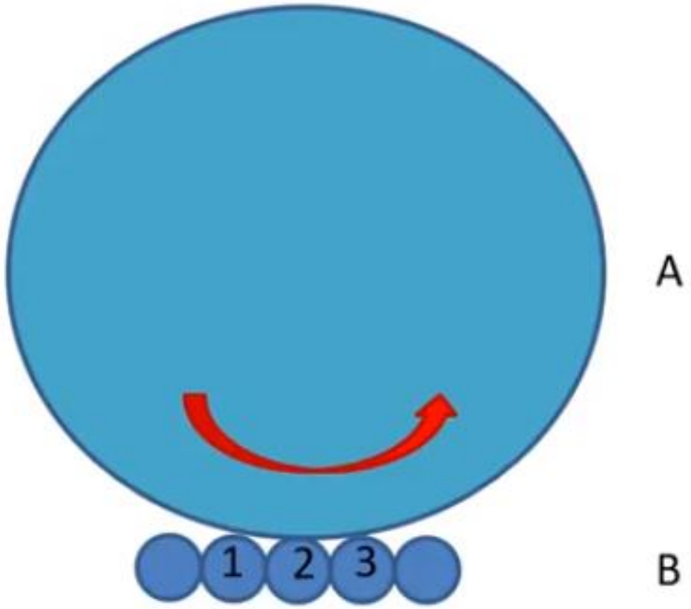
Actual area of contact

Friction: Polished and highly polished surface









Recap

- Three basic equations:
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- 1st law: law of inertia
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- 3rd law: action-reaction pair,

mutual forces.

- Friction