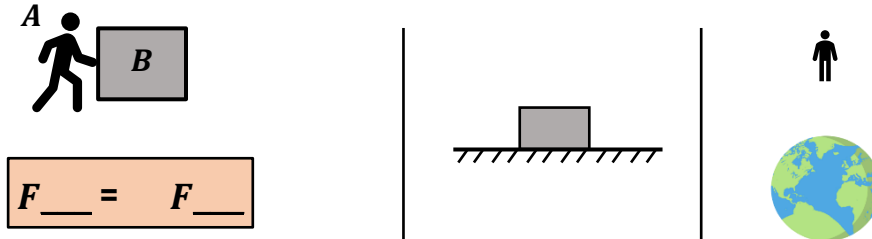


## CONCEPT: NEWTON'S THIRD LAW

- Remember: Newton's 1<sup>st</sup> Law: Law of **Inertia**, Newton's 2<sup>nd</sup> Law:  $\Sigma F = ma$
- **Newton's 3<sup>rd</sup> Law: Law of \_\_\_\_\_**
  - Every action (force) results in a \_\_\_\_\_ of (1) equal \_\_\_\_\_ but (2) opposite \_\_\_\_\_.
  - All forces exist in Action-Reaction force pairs, which (3) always act on \_\_\_\_\_ objects.



EXAMPLE: You (80 kg) stand on a frozen lake with a 40kg ice block. You push the ice block with a force of 20N. Assuming no friction, (a) what is the force the block exerts on you? (b) What is the block's acceleration? (c) What is your acceleration?

### FORCES WITH MULTIPLE OBJECTS

*For each object:*

- 1) Draw FBD:  $W, F_A, T, N, f$
- 2) Write  $\Sigma F = ma$
- 3) Solve

- Remember from  $\Sigma F = ma$ : Sum of all Forces [ **ON** | **BY** ] **A** = mass OF **A** × acceleration OF **A**
- Action-Reaction \_\_\_\_\_ mean 2 objects have the same acceleration! Acceleration is inversely proportional to mass.

PROBLEM: Which of the options is NOT an action-reaction pair in the following situation? A book slides across the floor, slowing down due to friction.

- A) Friction on the **book** from the **floor** & friction on the **floor** from the **book**
- B) Weight of the **book** from the **Earth** & gravitational force on the **Earth** from the **book**
- C) Weight of the **book** & normal force on the **book**
- D) Normal force on the **book** from the **floor** & normal force on the **floor** from the **book**