Chapter Four: Forces in One Dimension
Section 3: Interaction Forces

When you exert a force on your friend to push him forward, he exerts an equal and opposite force on you, which causes you to move backwards.

The forces $\boldsymbol{F}_{\text{A on B}}$ and $\boldsymbol{F}_{\text{B on A}}$ are an interaction pair.

Interaction pair: the two forces that are in opposite directions and have equal magnitude.

- An interaction pair is also called an action-reaction pair of forces.
- This might suggest that one causes the other; however, this is not true.
- For example, the force of you pushing your friend doesn't cause your friend to exert a force on you.
- The two forces either exist together or not at all.
- They both result from the contact between the two of you.

The force of you on your friend is equal in magnitude and opposite in direction to the force of your friend on you.

Newton's third law: states that all forces come in pairs.

- Newton's Third Law states that the force of A on B is equal in magnitude and opposite in direction of the force of B on A.
- The two forces in a pair act on different objects and are equal and opposite.
- $\boldsymbol{F}_{\text{A on B}} = -\boldsymbol{F}_{\text{B on A}}$
- In other words, for every action, there is an equal and opposite reaction.

Action-reaction pairs do not imply that the net force on either object is zero.

The action-reaction forces are equal and opposite, but either object may still have a net force on it.

Consider driving a nail into wood with a hammer. The force that the nail exerts on the hammer is equal and opposite to the force that the hammer exerts on the nail. But there is a net force acting on the nail, which drives the nail into the wood.

Tension: the force exerted by a string or rope

- At any point in a rope, the tension forces are pulling equally in both directions.

Normal force: the perpendicular contact force exerted by a surface on another object.

- The normal force is important when calculating resistance.