A background image of a space shuttle launch. The shuttle is ascending vertically, leaving a large, bright plume of fire and white smoke. The sky is a pale, hazy blue. The text is overlaid on this scene.

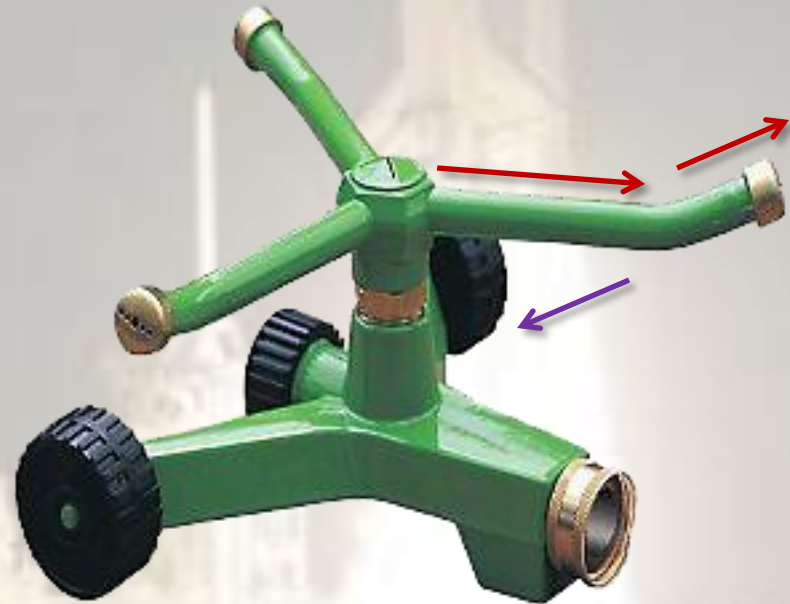
NEWTON'S THIRD LAW

Action
Reaction

THE LAW IN A LAWN SPRINKLER

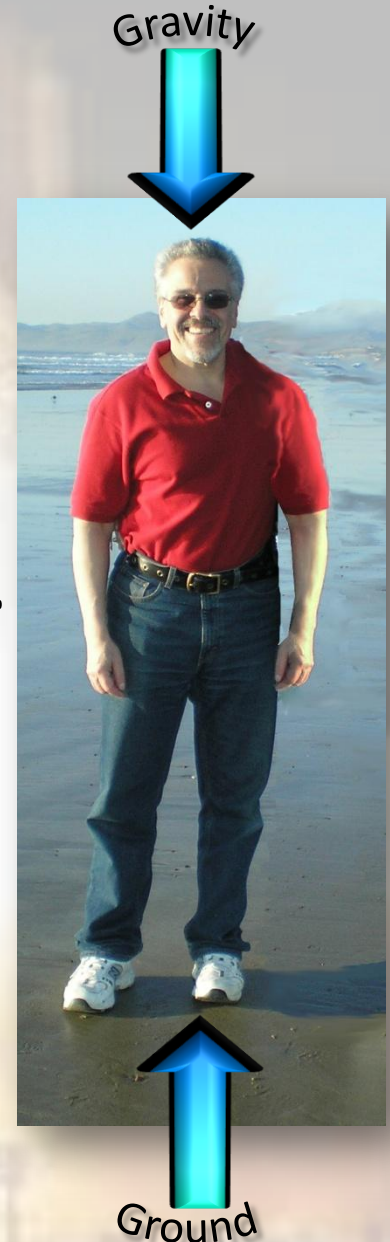
You turn on the water, and the lawn sprinkler begins to spin. Why?

- The arm is curved.
 - At first, the water flows as shown by the arrow.
 - Then its path changes as shown by the next arrow.
 - The arm must have exerted a force on the water to change its direction.
- The arm begins to move.
 - The water must exert a force on the arm to make it move.
 - The force is equal and opposite to the force the arm exerts on the water.



UNSEEN REACTION FORCES

- You're walking along the beach.
- Gravity is pulling you down, . . .
 - but you're not falling.
- The ground must be pushing up, . . .
 - but you're not rising either.
- The two forces must be equal and opposite since there is no net force in any direction.



THE LAW



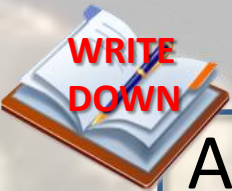
Forces always act in equal but opposite pairs.

For every action force, there is an equal but opposite reaction force.

THE FORCES



- The action force and the reaction force are on two different objects.
 - Example: when you push on a wall, the wall pushes back on you.



Action and reaction forces don't cancel because they are on separate objects.

- Consider the runner shown to the right.



- The runner pushes off on the ground (action)
- She is propelled forward (reaction)

A FINAL EXAMPLE

- Action/Reaction forces explain how rocket ships and jets fly.
 - The rocket pushes burning gases out behind it. (Action)
 - The rocket is propelled forward. (Reaction)

