Challenge: Crush the Can

Objective: Without applying any external force themselves, students must figure out how to crush an empty soda can. This challenge explores the relationship between temperature and pressure.

Materials:

- Empty soda can (one per group)
- Water
- Ice bath
- Hot plate
- Tongs
- Any decoy items of your choosing

Challenge Set Up:

- Place the empty soda can in front of each group
  - To provide a hint - already have poured a few tablespoons of water into the can
- Place hot plates, ice bath and any decoy items on a lab bench

Challenge Procedure:

- State the goal of the challenge:

Crush the can without applying any external force yourself (cannot step on it, drop something on it, ect)

- Explain any addition rules (no talking, only one person can move, ect)
- Provide ten minutes of work time
- At the end of ten minutes, have a successful group demonstrate their solution,
  - if no group is successful, demonstrate the correct solution

Challenge Solution

- Heat up a small portion of water in the can until steam is visible.
  - At this point the water is turning into a gas and expanding - increasing pressure inside the can.
- Use the tongs to flip the can upside down into the ice bath
- The rapid change in temperature causes the water vapor in the can to rapid contract, thus lowering the pressure inside the can. The can crushes.