

1. **DESCRIPTION:** Participants design, build, test, and document a Rube Goldberg®-like device that completes a required action through an optional series of specific actions.

A TEAM OF UP TO: 2

IMPOUND: State & National only

EYE PROTECTION: C

SET-UP TIME: 30 minutes for points

MAXIMUM RUN TIME: 3 minutes

2. **EVENT PARAMETERS:**

- a. All participants must properly wear eye protection at all times. Participants without proper eye protection must be immediately informed and given a chance to obtain eye protection if time allows. Participants without eye protection will not compete.
- b. Each device must pass a safety inspection before operation.
- c. Devices with potential hazards or safety concerns will not be permitted to run unless safety concerns are resolved to the satisfaction of the Event Supervisor; otherwise they must receive only participation points.
- d. Event Supervisors will need meter sticks, stopwatches, balance/scale, and measuring tape.

3. **CONSTRUCTION PARAMETERS:**

- a. During operation, device dimensions can be no greater than 60.0 cm (D) x 60.0 cm (W) x 60.0 cm (H).
- b. All actions used for scoring must be visible **and/or verifiable**. The top and at least two vertical walls must be open or transparent for viewing all actions.
- c. Any action in the device not designed to contribute to the completion of the Final Action will not count for points. Parallel and dead-end actions are not allowed **and will not count for points**.
- d. Each movable/adjustable physical object in the device must be utilized by at most one assigned action.
- e. Other non-scorable actions may be incorporated into the device but must contribute to the completion of the Final Action, receive no points, and be listed on the Action Sequence List (ASL).
- f. Energy devices (i.e., springs/mousetraps) may be set prior to starting the device.
- g. **Use of electricity is limited to Scorable Actions ii., v., xi. and raising the Final Action platform.**
- h. Only commercial batteries, not exceeding 9 volts as labeled, may be used to energize each of the Device's electrical circuits. Multiple batteries may be connected in series or parallel as long as the expected voltage output across any two points does not exceed 9 volts as calculated using their labeled voltage. Teams must be able to show the Event Supervisors the labeled voltage. All energy storage devices must be contained in the device. **Non-compliant batteries must be removed prior to device operation.**
- i. **Arduinos, Raspberry Pis, or Programmable components are not allowed.** Timers must not be powered by electricity or springs. A timer is defined as a scorable or non-scorable action that takes longer than 10 seconds.
- j. **Candles, flames, matches, cell phones, hazardous liquids, gases, materials (e.g., rat traps, lead objects, combustible fuses, dry ice, liquid nitrogen, flammable gas), and unsafe handling of chemicals are not permitted.**
- k. Students must be able to answer questions regarding the design, construction, and operation of the device per the Building Policy found on www.soinc.org.

4. **THE COMPETITION:**

- a. **Start Action (100 points) – From completely above the device, the participants must drop an unaltered Ping-Pong ball into the device, causing a standard, unmodified golf ball to move, starting the next action.**
- b. **Scorable Actions (50 points each) – Participants may have up to 12 scorable unique actions to count for points.**
 - i. Use **vinegar and baking soda** to inflate a balloon so that the **unguided** balloon strikes an object that originally was at least 20 cm away from the balloon causing **the object to initiate the next action**.
 - ii. Use an endothermic action that initiates the next action as a result of the reduction in temperature.
 - iii. **Drop two effervescent heartburn relief tablets into water so the reaction triggers the next action.**
 - iv. **Add water to a container to raise a golf ball located in the same container at least 5 cm so that the golf ball rolls out of the top of the container and initiates the next action.**
 - v. Use an infrared beam where the transmitter and receiver are at least 20 cm apart to initiate the next action.