BOTTLE ROCKET

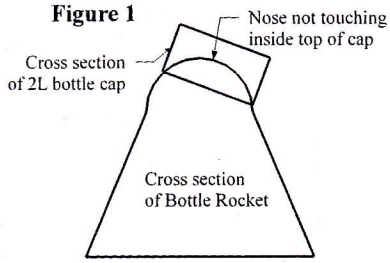
Read the General Rules in the manuals and on www.soinc.org as they apply to every event.

1. **DESCRIPTION:** Prior to the tournament, teams construct up to 2 rockets designed to stay aloft for the greatest amount of time.

   TEAM OF UP TO: 2 **IMPOUND:** No **EYE PROTECTION:** #5 **APPROXIMATE TIME:** 10 min.

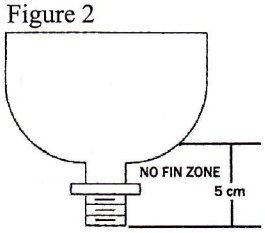
2. **EVENT PARAMETERS:**
   a. Teams must design, build, and bring 1 or 2 rockets to the tournament.
   b. Teams must wear eye protection during the loading, launching, and retrieving of their rockets.
   c. Event supervisors provide the launcher and water.
3. **CONSTRUCTION PARAMETERS:**
   a. Rocket pressure vessels must be made out of a single 2-liter plastic carbonated beverage bottle with a neck/nozzle opening internal diameter of approximately 2.2 cm (a 1/2 inch Schedule 40 PVC pipe must fit tightly inside the nozzle opening). Labels may be removed from the bottle but labels must be presented at the safety inspection.
   b. Tape and/or **silicone or polyurethane-based glues** may be used to attach fins and other components to the pressure vessel. Metal and commercial model rocket parts are prohibited in the constructed rocket.
   c. The structural integrity of the pressure vessel must not be altered. This includes, but is not limited to: physical, thermal, or chemical damage (e.g., cutting, sanding, using hot or super glues). Alteration to the structural integrity of the pressure vessel results in a safety violation of the rocket and it must not be launched. Event supervisors must assess the structural integrity by looking through the nozzle and sides of the bottle for discoloration, bubbles, thinning or cuts in the walls.
   d. **Rockets must use a blunt or round nose. The nose must be designed such that when a standard 2 liter bottle cap is placed on top of the nose, no portion of the nose touches the inside top of the bottle cap (see Figure 1). Teams must not use a nose that is sharp, pointed, or consisting of a rigid spike regardless of the material used.**

   Figure 1

   e. Explosives, gases other than air, chemical reaction, pyrotechnics, electric or electronic devices, elastic powered flight assists, throwing devices, remote controls, and tethers are prohibited at any time. All energy imparted to the rocket at launch must originate from the water/air pressure combination.
   f. All rockets must be launched using the launcher provided by the supervisor. Fins and other parts added to the bottle must be 5 cm or higher above the level of the bottle's opening to ensure rockets fit on the launcher (see Figure 2).
   g. **Rockets must not change shape or deploy any type of recovery system.**

   Figure 2

4. **THE COMPETITION:**
   a. Teams must arrive at the competition site ready to launch. Following the safety inspection of up to 2 rockets, teams may add any amount of water to the inspected rocket(s). When called to launch, the teams have a total of 10 minutes to launch 1 or 2 rockets (only 1 launch per rocket). Any rocket launched before the time expires must be scored.
   b. All rockets must be launched at **75 psi**. Once the rocket is pressurized, teams must not touch or approach the rocket.
   c. **Parts of the rocket must not fall off or become separated during launch or flight.**
   d. Time aloft is recorded in hundredths of a second. Timing begins when the rocket separates from the launcher and stops when any part of the rocket touches the ground, goes out of sight, or comes to rest on an obstruction (e.g., a tree or building).
5. **SCORING:**
   a. Ranking within each tier is determined by the greatest time aloft of any single rocket.
   b. Tiers:
      i. Tier 1: Any launch without Construction or Competition violations.
      ii. Tier 2: Any launch with rocket parts separating during launch or flight (4.c.).
      iii. Tier 3: Any launch with Construction or Competition violations other than 4.c.
   c. Ties are broken by the better score of each tied team's other rocket.
   d. Teams unable to launch their rockets due to Safety or Construction violations receive participation points.

Recommended Resources: All reference and training resources including the **Bottle Rocket DVD** are available on the Official Science Olympiad Store or Website at http://www.soinc.org