



SAFETY PROTOCOL FOR SCIENCE DEMONSTRATION INVOLVING BOTTLE ROCKET LAUNCHING

This protocol specifies safety and permitting requirements to be followed when conducting launching of water filled bottle rockets on District property.

Bottle Rocket Construction

1. Only 2- liter plastic drink bottles designed to hold carbonated soda beverages are to be used. New 2- liter bottles should be used whenever possible. Bottles that contained non-carbonated water or beverages are not acceptable.
2. Soda- bottles must be in pristine condition, with no cracks, dents, crinkles, scratches or any defects that could compromise the bottle's strength and lead to bottle bursting/failing during pressurization and launch. Soda-bottles must be inspected by the instructor to ensure condition of bottle and any bottles appearing to show any weaknesses should not be used. Bottles must be identified by the student's name or I/D number and retired from use after 10 launches.
3. The manufactured structural integrity of the bottle shall not be altered.
4. No materials can be used that can compromise the integrity of the plastic bottles (e.g., hot glues or super glues). Sanding or other abrasion of the plastic is not allowed. Duct tape may be used.
5. No sharp, hardened plastic, metal or other dangerous/hazardous materials may be used in the construction of rockets. Rockets must be constructed of soft materials and contain no sharp edges nor pointed tips.
6. The nose of the rocket must be rounded and made of a soft flexible material.
7. All energy imparted to the rocket must originate from water/air pressure combination. No other potential or kinetic source of energy is permitted. No incendiaries or fuel-powered motors of any type are permitted.

8. The bottle rocket must fit the launcher used, using the correct bottle-neck design to release from the launcher. Extra care should be given to the fit process to ensure that bottles do not stick, catch-on, hang-on or otherwise fail to release from the launcher.
9. The class instructor must inspect each rocket design prior to each launch to verify it meets class and safety requirements. Site administration has final discretion on questionable materials or designs and must be cleared in advance.

Rocket Launcher Rules

1. Rocket Launchers should be obtained through a commercial school science supply vendor, approved by the District Purchasing Department, designed for the specific purpose of launching soda bottle designs for science demonstrations. Home built rocket launchers are permitted only upon inspection and written approval by Risk Management.
2. Modifications to launchers shall not be permitted under any circumstances.
3. A stable launch platform is required, ensuring a safe flight path. All rocket-launching devices shall be anchored, to prevent tipping over when launching rockets.
4. Air pressure to launch rockets is 60 pounds per square inch (psi), not to exceed 75 psi under any circumstance. Air pressure must be monitored by an air pressure gauge monitoring constant pressure applied to the bottle rocket. Faulty gauges shall be replaced with a new gauge immediately. Gauges shall be inspected and maintained on a regular basis to ensure proper working. The National Science Olympiad uses 75 psi for their launches.
5. Use only bicycle pumps or approved air compressors to pressurize rockets. (Some air tanks require a permit from the State). Always have a means for accurately measuring air pressure. Never charge a rocket without air pressure measurements.

Safety Precautions

1. All rockets will be launched using a level and stable launching platform with the rocket launcher secured to prevent tipping.
2. Keep all electrical cords away from all water sources, including wet grass or wet fields. If an air compressor is used, use long air hoses rather than long electrical cords. All electrical cords shall be UL rated and have a 3 prong connector. Electrical cords shall be of the proper gauge for the air compressor.

3. A safety boundary must be clearly identified, using rope or safety cones, a minimum of 30 feet away from the pressurized rocket. Students and observers must be behind the boundary during all launches.
4. Safety glasses are required at all times during rocket launches for students and staff conducting the actual launch of the rocket.
5. Launching mechanisms must be used that allows launch personnel to stand a minimum of 10 feet away from the rocket when pressurized on the launch pad.
6. The instructor and a designated (adult) safety officer, familiar with all safety protocols :
 - Checks for safe practices and can stop a launch whenever unsafe practices are observed.
 - Responsible for securing the rocket to the launcher and charging the rocket with the appropriate air pressure.
 - Ensures the launch platform is secured to the ground.
7. Once the rocket is pressurized, no one can touch or approach the rocket.
8. Never lean over a pressurized rocket.
9. All persons in the launch area shall be made aware of the pending launch. An audible 5-second countdown shall take place.
10. If a leak is observed during pressurization, stop adding air and release the rocket using standard launch technique and repair the leak.
11. If a rocket fails to release after the pin is pulled, immediately clear the area. The instructor will jiggle the rocket with a long stick and cause it to release.
12. Rockets must be launched in an area clear of overhead obstructions (trees, electrical wires, flight paths, etc), other students, staff, passers-by and must not leave District property into neighboring properties.
13. No attempt shall be made to retrieve a rocket if it becomes entangled in a power line or other dangerous place.
14. Rockets shall not be launched in wind of more than 20 mph, into a cloud or near an aircraft in flight.
15. The launch device shall be pointed within 30 degrees of vertical.
16. Launched rockets should be carefully tracked by all individuals and avoided as the rocket returns to the ground. Never attempt to catch a spent rocket that has been launched.

17. Teachers must instruct students on the rules and safety precautions of the water rocket activity.

Permitting Requirements

1. The Site Administrator must obtain authorization and provide written permission, allowing use of site facilities, for the launching of rockets to the Riverside City Fire Department as follows:
 - Submit the Site Administrator’s written permission to use site facilities for launching of the rockets and the “*Authorization to Launch Model Rockets*” form to the Safety Technician, at the Risk Management Department, a minimum of 20 school days prior to the launch date.
 - The Safety Technician will submit the authorization request to the fire department and send a copy of the authorization to the site after receiving the signed authorization form back from the Riverside Fire Department.
2. A copy of the Site Administrator’s written permission and a copy of the signed *Authorization to Launch Model Rockets* must be maintained on site prior to the launch date.

◆ Important Notice ◆

An employee who disregards established district safety protocol and an accident and/or injury occurs as a result, the employee can be held individually liable and named in a lawsuit. Such an employee may not rely on indemnification and defense by the district for their willful negligence in disregarding established district safety protocols.

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