ACTIVITY 1-4: **WATER ROCKETS**

OBJECTIVE(s): After completing the activity, students will be able to:

- create water rockets out of a 2 liter plastic pop bottle.

MATERIALS:	
30-2 liter plastic pop bottles (**save caps for Activity 9-2**)	
construction paper-assorted colors	Awards-3 categories-prizes
15 rolls of clear tape	15 colored marking pens/crayons

PROCEDURE:

1. In this activity students will be designing their water rockets for launch on day 3.
2. Students should work individually for this activity.
3. Be sure to remind students to have their names on their rockets.
4. Students can use colored construction paper, marking pens, crayons, etc. to decorate their rockets. They can choose a theme or cartoon character to decorate their rocket. For example, a Halloween theme rocket, garfield the cat rocket, etc.
5. Judges will awards prizes in the following categories:
    a. Most Creative
    b. Funniest
    c. Most Aerodynamic

ACTIVITY 3-4: **WATER ROCKETS-LAUNCHING**

OBJECTIVE(s): After completing the activity, students will be able to:

- ▷ understand the steps necessary for launching a water rocket.
- ▷ explore the aerodynamics of a water rocket using Newton's Laws of Motion.

MATERIALS:	
decorated water rockets	bicycle pump
water rocket launcher	cards numbered 1-30
Certificates	

BACKGROUND INFORMATION:

Newton's 3 Laws of Motion are all demonstrated in the launching of a rocket. The laws of motion explain rest, constant motion, and accelerated motion, as well as how balanced and unbalanced forces act to cause these states of motion. Newton's first law introduces the concept of inertia. Inertia is the tendency of an object to resist changes in motion. For example, when you are riding in a car and it stops suddenly, you keep moving forward. If you did not have a safety belt on to stop you, your inertia would send you through the windshield! Newton's second law focuses on how force (a push or pull), mass, and acceleration are related (F = ma). Acceleration can indicate a change in direction of motion as well as a change in speed. For example, the greater the mass of an object, the greater the force needed to accelerate it. Suppose you have to push a stalled car to get it started. One person can supply only a small force. You might not be able to accelerate the car enough to make it start. If ten people push, the force is large and the car will accelerate enough to start. Newton's third law explores the concept of action and reaction. For every action there is an equal and opposite reaction. For example, in a simple water rocket, air is pumped into the bottle increasing the pressure inside the bottle. When the clamps are released the pressure inside the bottle has to escape from a small opening which causes a downward push, thus the bottle rocket moves in the opposite direction, or upward.

PROCEDURE:

1. Students will work individually to launch their own water rocket. Have a lottery drawing to establish order of launch (number cards from 1-30).

2. Go over safety rules with students.

    A. All students except for the student who is launching will have to be at least 50 feet away from the launcher. Teachers will designate a safe area.
    B. The student who is launching is responsible for recovery of their rocket. Other students need to stay in designated area.
    C. Instructor will determine the number of pumps of air the student will put into their rocket.
    D. Any student who does not follow the above rules or exhibits any other unsafe behaviors will forfeit the opportunity to launch their rocket.

3. Ask student how much water should they put into their rockets? (Rockets should be 1/3 to 1/2 full of water for best results.)

4. Have students fill their rockets with appropriate amount of water.

5. Place launch pad in an open area. **Rockets cannot be launched on school grounds due to Portland Public School rules. However, they can be launched at Community Centers and nearby parks.

6. Launch rockets.

7. Present students with certificates of participation upon completion of a successful launch.