Lesson: Balloon Rocket Science	Name:
Teacher:	Date:

Balloon Rocket Science – Exploring Newton's Third Law of Motion

Florida State Standard: SC.6.P.13.3 – Investigate and explain that Newton's Third Law of Motion states that forces act in pairs and for every action, there is an equal and opposite reaction.
Florida State Benchmark: SC.6.P.13.3 – Investigate and explain that forces cause objects to move or change their motion.
NGSS Performance Expectation: MS-PS2-2 – Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.

Grade Level: 6th–8th Grade
Subject: STEM/Science
Duration: 45–60 minutes
Lesson Focus: Understanding Newton's Third Law of Motion through the Balloon Rocket Experiment.

Materials

- 1 balloon (any size)
- 1 long piece of string (3–5 meters)
- 1 plastic straw
- Tape (scotch or masking tape)
- 2 chairs (or other sturdy objects to tie the string to)
- Stopwatch (optional)
- Ruler or measuring tape (optional)

Lesson Objectives

Students will:

1. Conduct a balloon rocket experiment to observe Newton's Third Law of Motion.
2. Document the motion of the balloon rocket along the string.
3. Explain how action and reaction forces result in motion.

Procedures

1. Introduction (10 minutes)

- Introduce Newton's Third Law of Motion: *"For every action, there is an equal and opposite reaction."*
- Ask students to recall previous experiences with balloons or rockets and discuss how air pressure affects motion.
- Present the objectives of the experiment and define key terms: **action, reaction, force, motion**.

2. Experiment (25–30 minutes)

Step 1: Set up the string. Tie one end to the back of a chair and thread the straw onto the string. Tie the other end to the second chair, keeping the string taut.
Step 2: Inflate the balloon but do not tie it. Hold the open end shut.
Step 3: Attach the balloon to the straw using tape. Ensure the balloon is parallel to the string with the open end facing away from its travel direction.
Step 4: Release the balloon and observe its motion along the string as the air escapes.
Step 5: Record observations on distance traveled and time taken (using a stopwatch if desired). Use a ruler or measuring tape to measure distance.

3. Observation (5–10 minutes)

- Have students share observations.
- Discuss how the balloon moved and what factors influenced its speed or distance, such as the amount of air or balloon size.

4. Generalization (5–10 minutes)

- Reinforce the key concept: **Newton's Third Law of Motion** – the action of air rushing out creates an equal and opposite reaction, propelling the balloon forward.
- Ask students to provide other real-life examples, e.g., rocket launches, swimming, jumping.

5. Assessment

5.1 Comprehension Questions

1. What happens to the balloon when you release it?
2. How does the balloon demonstrate Newton's Third Law of Motion?
3. How does the size of the balloon or the amount of air in it affect its movement?
4. Why does the balloon move in the opposite direction to the escaping air?
5. What are some real-world applications that demonstrate Newton's Third Law of Motion?

5.2 Reflection

- Write a short paragraph explaining how the experiment demonstrates Newton's Third Law and discuss factors affecting the balloon's speed and distance.

Safety Notes

- Balloons may burst if overinflated – remind students to hold the balloon at the open end until ready to launch.
- Ensure chairs or objects holding the string are stable.
- Students should stand at a safe distance from the balloon's path to avoid accidents.

Accommodations (ELL, ESE, etc.)

- Provide visual aids like diagrams of Newton's Third Law.
- Use simplified vocabulary lists or bilingual instructions if needed.
- Break tasks into smaller, manageable steps.
- Pair students with peers for support or provide one-on-one assistance.
- Use hands-on, active participation to engage all students.