Newton's Third Law
Pre E-lab Lesson Plan (45-50 minutes)

I. Introduction

The material contained within this lesson plan is meant to be used as preparation for the Newton's Third Law e-Lab. As part of this pre-lab lesson, students will

- **A.** Be able to state Newton's Third Law and explain how a forces act in pairs.
- **B.** Identify examples of action and reaction forces, and how the forces exerted are equal but on different objects.

II. Objective:

Students will gain an understanding of Newton's Third Law of motion: "For every action there is an equal and opposite reaction."

III. Key Vocabulary:

- Force- a push or pull exerted on an object; they can be balanced or unbalanced.
- Friction- a force between two surfaces that opposes motion; it depends on the type of surfaces and force between two surfaces.
- Gravity – an attraction force between all masses proportional to the mass of the objects and the distance between them.
- Mass- the measure of the amount of matter in an object; the more mass an object has, the more inertia it has.

IV. Materials:

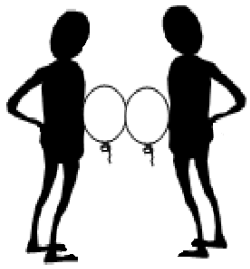
- Balloons (at least 2 blown up in two different colors)
- Chair with wheels (at least 2)
- Large ball like a basketball or soccer ball
- Piece of rope approximately 5 meters in length
- Third Law Note Worksheet
- Newton's Third Law PowerPoint
- Newton's Third Law Prelab Worksheet

V. Lesson Sequence:

A. Engage and Explore

1. Inform the students that today they will be learning about Newton's Third Law.
2. To capture students attention, conduct the following balloon Investigation:

- Place two balloons between two students, like in the diagram. Ask students to predict what will happen to the shape of the balloon if both students lean in towards each other. Have both students lean in towards each other, and ask students to observe what happens to the balloons. Explain to students that Newton's Third Law states that forces act in pairs. In this demonstration, a student pushed on a balloon, and the balloon pushes back on the student.



- Next, have students predict what will happen to the shape of the balloons if only one student leans in. Have each student take turns leaning in, one at a time not both at the same time. Ask students to observe what happens to the balloons. When only one student pushes, both balloons are still equally deformed. Ask students to explain why they think this may have happened.

3. Discuss with students what forces are exerted on and by the balloons. Explain that the balloons both become deformed because forces act in pairs. One balloon pushes on the other balloon which also pushes back. This is why the balloons both become flattened.

B. Explain and Elaborate

4. Give each student a Newton's Third Law Note Worksheet. If each student is able to use a computer, have them read through the Newton's Third Law PowerPoint while filling out the note worksheet. If computers are limited, you can have them work in small groups, or you can project the PowerPoint to the class and have them fill out the notes together.
5. As a class, discuss and answer the comprehension check questions on the last slide.

C. Evaluate

6. Have students complete the Newton's Third Law Prelab Worksheet either in small groups or together as a class.