



LESSON PLAN

BALANCED AND UNBALANCED FORCES GRADES 3-5

SUMMARY

Students identify and explain how strength and direction of forces can lead to motion.

DURATION

One to two 45-minute classroom periods

PRE-ASSESSMENT QUESTIONS

Please see Discussion Questions. These can be discussed as a group or answered individually in student science notebooks.



ENGAGE

Demonstrate, or show a video, of a tablecloth being pulled off a table without disturbing the place settings. Explain to students that through this lesson they will be exploring how pushes and pulls—forces—on objects cause them to move or not move.



EXPLORE

Explain to students that to understand what is happening in the tablecloth phenomena, they must first understand how forces work together. To do this they will use a game called “tug of war.” Pair off students and assign them partner A or B. Give them a ~2 foot piece of string or rope. Explain that they will each pull on the string and adjust the forces

MATERIALS

- Science notebooks
- Pencils
- Water
- String
- Scissors
- Plastic cups (at least one per four students)
- Eggs (at least one per four students)
- Metal or plastic plate (e.g. pie pan—at least one per four students)
- Toilet paper tubes (at least one per four students)
- Bouncy ball

(independent variable) to test out what happens to the motion of their partner's hand (dependent variable) through the following scenarios. **Emphasize safety and do this outside or in the gym.** In their science notebooks they should make a prediction about which way, if any, each partner's hand will move during each scenario.

- Partner A pulls with the same amount of force as Partner B (neither partner will move)
- Partner A pulls with more force than Partner B (Partner B will move in the direction of Partner A)
- Partner B pulls with more force than Partner A (Partner A will move in the direction of Partner B)
- While both partners are pulling, the rope is cut (they will both move)

Organize the students into pairs and run through the scenarios. After each scenario, they should record their actual observations of what happened next to their prediction for that scenario. Were their predictions correct? Why or why not?



EXPLAIN

Explain to students that they will now watch the Generation Genius episode where a full explanation of what happened will be provided.



WATCH THE GENERATION GENIUS BALANCED AND UNBALANCED VIDEO AS A GROUP.

Then facilitate a conversation using the Discussion Questions.



ELABORATE

Provide materials for students to try Zoe's DIY Activity egg drop. Allow them to experiment with the amount of force applied to the plate, and to stack additional materials. What works and what does not? Why?



EVALUATE

In their science notebooks, have students individually explain the forces involved in the egg drop demo. Ask them to compare this to the tablecloth demo from the Engage portion of the activity. Students should also write a short paragraph explaining how cause and effect relationships are demonstrated by unbalanced forces and motion of an object. (*Gravity is pulling the table settings down, while the table cloth and table underneath are pushing them up. Forces are balanced. When the tablecloth is pulled out with enough force, the forces on the place settings are no longer balanced and they fall to the table. There are no forces pulling the place settings to the side so they remain where they were sitting.*)* (*Cause and Effect: Motion of an object is caused by unbalanced forces acting upon it. If an object is not moving, it is because the forces on it are balanced. When the forces become unbalanced, the effect is the object moves in the direction of the larger force.*)

**This is an early understanding of the concept of inertia based on Newton's First Law of Motion.*

