

## Lesson Plan: Classifying Balanced and Unbalanced Forces

**Grade Level:** 8th Grade

**Duration:** Approx. 60 minutes

**Standards:** NGSS PS2.A (Forces and Motion)

**Learning Goal:**

Students will be able to differentiate between balanced and unbalanced forces by evaluating various real-world scenarios.

**Materials Needed:**

- Cricut Machine
  - Cricut Design Space software
  - Cricut mat
  - Cricut pen (0.4 Tip, black or other color)
  - Cardstock paper (12" x 12")
  - Printed out scenarios (using Cricut's print-then-cut feature)
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**Teacher Preparation Using Cricut:**

1. Design the Layout: Use the Cricut Design Space template to create a 12x12 mat grid, dividing it into sections labeled "Balanced Force" and "Unbalanced Force."
2. Clue Sections: Use the Cricut's drawing tool (pen) to add visual hints (e.g., force arrows) or light text clues in certain areas.
3. Print-Then-Cut Feature: After the design is drawn, use the print-then-cut feature to create the removable terms and force arrows. These can be printed on colored paper for easy identification.

## Lesson Structure

### 1. Introduction to Forces (10 minutes)

- **Objective:** Provide students with a clear understanding of balanced vs. unbalanced forces.
- **Engage:** Start by asking students, “What happens when you push a stationary object? What about a moving object?”
- **Mini-lecture:** Review that balanced forces result in no change in motion, while unbalanced forces cause a change in motion (speed up, slow down, or change direction).
- **Demonstration:** Show an example using objects (like a ball and a block). Push the objects to demonstrate when forces are balanced and unbalanced.

### 2. Scenario Classification: Balanced or Unbalanced? (20 minutes)

- **Objective:** Students apply knowledge to classify real-world scenarios.
- Give pairs or groups scenario cards that describe various situations (e.g., a book resting on a table, a car accelerating, two people pushing an object in opposite directions).
- Students will place force arrows and terms on their mat based on the scenario, determining if the forces are balanced or unbalanced.
- **Discussion:** After students classify each scenario, ask groups to explain their reasoning and discuss why forces are balanced or unbalanced.

### 3. Practice & Review (10 minutes)

- **Independent Work:**
  - Students will write in their notebooks or on a guided note sheet (attached) whether each scenario involves balanced or unbalanced forces and describe what the force is doing (e.g., “The forces are unbalanced because the object is moving forward”).
  - **Review as a class:** Go over a few examples and discuss why the forces are classified the way they are.
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**Accommodation** - To support students who need additional guidance, the Cricut Design Space template includes a second version of the mat with visual and text-based clues for each term or scenario.

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### **Assessment:**

- **Formative:** Teacher circulates during the activity, observing students' use of vocabulary and reasoning during the mat activity.
  - **Summative:** Exit ticket – students write their own scenario involving two or more forces and classify it as balanced or unbalanced
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### **Extensions:**

- **Challenge Activity:** For advanced students, add friction into the scenario cards and ask them to explain how friction affects the forces involved.

NAME \_\_\_\_\_

SCIENCE NOTEBOOK - FORCES & MOTION

| <b>BALANCED FORCE</b> | <b>UNBALANCED FORCE</b> |
|-----------------------|-------------------------|
|                       |                         |
|                       |                         |
|                       |                         |
|                       |                         |

NAME \_\_\_\_\_

# Exit Ticket

*Draw or describe a scenario in which two or more forces are acting on an object. Your description must include the forces, vectors (magnitude and direction), and whether or not the force is balanced or unbalanced.*

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NAME \_\_\_\_\_

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NAME \_\_\_\_\_

SCIENCE NOTEBOOK - FORCES & MOTION **KEY**

| BALANCED FORCE  | UNBALANCED FORCE   |
|---|--|
| <i>No net force means that it is a balanced force.</i>                          | <i><math>8N - 5N = 3N \rightarrow</math> (to the right, because <math>8N</math> is a stronger force)</i> |
| <i>If there is no change in motion, it is a balanced force.</i>                 | <i>The biker sped up is unbalanced because there is a change in motion.</i>                              |
| <i>An apple sitting on a desk is a balanced force because it is not moving.</i> | <i>The plane speeding up is an unbalanced force because there is a change in motion (speeding up).</i>   |
| <i><math>1N - 1N = 0N</math> (no movement)</i>                                  | <i><math>2N + 12N = 14N \rightarrow</math> (to the right, combining forces in the same direction)</i>    |

**Exit Ticket Rubric: Classifying Balanced and Unbalanced Forces (1 Scenario)**

| <b>Criteria</b>          | <b>1 - Meets Criteria</b>                                    | <b>0 - Does Not Meet Criteria</b>    |
|--------------------------|--|--------------------------------------|
| Correct                  | Correctly classifies the scenario as balanced or unbalanced. | Incorrect classification             |
| Explanation of Reasoning | Provides clear and correct reasoning for the classification. | Explanation is unclear or incorrect. |
| Use of Vocabulary        | Correctly uses force-related vocabulary.                     | Incorrect or no use of vocabulary.   |
| Completion               | Completes all parts of the question.                         | Does not complete all parts.         |