M3 English for Science Term 1
Session: Lesson 3
Theme: Balanced and Unbalanced Forces
Topic: Balanced and Unbalanced Forces
Curriculum links: None

Terminal Objectives:

By the end of this lesson, students will be able to:

- Define and differentiate balanced and unbalanced forces.
- Predict the motion of an object based on the forces acting on it.
- Identify real-world examples of balanced and unbalanced forces.
- Explain how unbalanced forces cause changes in motion (acceleration, deceleration, or direction).

Key Vocabulary:

- Force, net force, balanced force, unbalanced force, friction, motion, equilibrium.

Main teaching points:

- What is a force? (A push or pull on an object)
- Balanced forces: Equal in magnitude and opposite in direction; net force = 0; no change in motion
- Unbalanced forces: Not equal; net force ≠ 0; causes acceleration or change in direction
- Net force: The overall force acting on an object when all the individual forces are combined
- How to use arrows (vectors) to represent direction and size of forces

Common Misunderstandings:

- "Balanced forces mean the object is at rest." → Clarify: *An object can move at constant speed with balanced forces.*
- "Only unbalanced forces exist if an object is moving."
- "Heavier objects always experience more force."

Materials:

Projector or smartboard
PowerPoint
Tug-of-War rope (optional)
Masking tape (optional)
Paper plates (optional)
Google Forms quiz:
https://docs.google.com/forms/d/e/1FAIpQLSdplxFEqCcrTk2HrCg0HdzFbjnrWwjUBbZ3LcVnSI3ABLA_5A/viewform?usp=header

Activities:

1. Warm-up (20 minutes)

- **Engage:** “If two people are arm wrestling and neither one is moving, is there force involved?” (Get a volunteer to arm wrestle me.) Then follow with: “What happens if one person suddenly gets stronger?” (“Cheat” by holding onto the table.)

  PowerPoint: I will give the PowerPoint about balanced and unbalanced forces.

2. Guided Practice (20 minutes)

Choose one (or both) depending on time, materials available, and how many students are likely to volunteer: Arm wrestling demo or tug-of-war demo.

Have students volunteer for the arm wrestling or tug-of-war game. Choose two additional students and give them force arrows – one small, one large. These two students will create a “force diagram” of the arm wrestling match or tug-of-war match.

For arm wrestling, have two students arm wrestle and have the force diagram students use arrows to indicate the opposing forces. For tug-of-war, use a similar arrangement, but several rounds can be used, as described below.

Round 1: Equal Forces = Balanced

- Have **equal numbers** of students on each side.
- Ask students to **pull steadily but not yank**.
- Observe what happens: rope moves little or not at all → **net force = 0**, **balanced**.
- 📓 **Discussion prompt:** “Why didn’t the rope move much?” “What do we know about the net force?”

Round 2: Unequal Teams = Unbalanced

- Add one more person to one team.
- Let them pull again.
- Rope will move in the direction of the **greater net force → unbalanced force causes motion**.

- 📓 **Discussion prompt:** “Which direction did the rope move? Why?” “What changed from last round?”

Round 3: Change the Force, Not the Number

- Keep equal team sizes, but allow one team to **pull harder** or assign one team to only pull with one hand.
- Emphasizes: It's not just *how many*, but **how much** force.
- 📓 **Discussion prompt:** “Can a smaller team win? How?”

Round 4 (Optional): Friction & Surface

- Try one round with socks on a slick surface or students standing on paper plates.
- Emphasize **friction as a factor in force and motion**.

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5. Wrap-up & Homework (10 minutes)

- **Exit Ticket:** Google Forms quiz https://docs.google.com/forms/d/e/1FAIpQLSdplxFEqCcrTk2HrCg0HdzFbjnrWwjUBbZ3LcVnSI3ABLA_5A/viewform?usp=header