WW2
Air Resistance

LOVE OUTDOOR LEARNING

Curriculum Links

Scotland

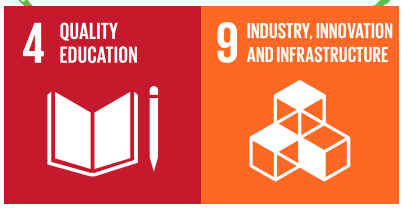
By investigating forces on toys and other objects, I can predict the effect on the shape or motion of objects.
SCN 1-07a

UK

identify the effects of air resistance, water resistance and friction, that act between moving surfaces

Key Concept

I can explore how air resistance affects the speed of falling objects by testing different parachute designs.



Background

In this lesson, students will learn about air resistance by creating parachutes and testing their impact on the speed of falling objects. The activity simulates how air resistance slows down objects as they fall, similar to how parachutes work for skydivers. By working in teams, students can analyze how parachute design affects descent and landing.

Resources

- Tissue paper, plastic bags, or lightweight fabric for parachute canopies
- String or twine
- Small action figure or toy for weight (such as a Lego person or small teddy)
- Tape for reinforcement
- Stopwatch for timing falls
- Ruler or measuring tape for recording height of drops
- Clipboards, paper, and pencils for recording predictions and results

Wider Skills

- Scientific Inquiry: Observing, predicting, testing, and recording results.
- Teamwork: Working together to design, build, and test parachutes.
- Problem-Solving: Adjusting designs based on observations and discussing improvements.
- Math and Measurement: Measuring time and distance for each drop and recording results.

Lesson

Introduction (10 minutes):
Explain to students that air resistance (or drag) is the force that slows objects as they fall. Discuss how parachutes create a large surface area that catches air, which increases resistance and slows descent. Show them a simple parachute model and explain that they'll be building and testing parachutes in teams to see how well they work.

Introduce vocabulary:

- Air Resistance: The force that pushes against a moving object through air.
- Gravity: The force that pulls objects down to Earth.
- Drag: Another term for air resistance, which helps slow down falling objects.

2. Building the Parachutes (15 minutes):
   1. Divide into Teams: Split students into small teams and provide each team with materials for building parachutes. Each team will create a parachute with a canopy (tissue paper, plastic, or fabric) and four suspension lines attached to a small toy.
   2. Constructing the Parachute:
      - Cut the canopy into a square or circle (about 30 cm x 30 cm).
      - Reinforce the corners with tape and punch a small hole in each corner.
      - Attach a 30 cm string to each corner, then tie all strings together at the bottom.
      - Attach the parachute to the toy or weight using tape.
   3. Making Predictions: Each team predicts how well their parachute will slow down the fall and where it will land.

3. Testing the Parachutes (15 minutes):
   1. Initial Drop without Parachute:
      - Drop the toy without the parachute from a set height, timing how long it takes to reach the ground.
      - Record the time and describe the landing (soft or hard).
   2. Parachute Drop:
      - Drop the parachute from the same height and time the descent.
      - Record the time, note the softness of the landing, and observe how the parachute affected the descent path.
   3. Repeat with Variations:
      - Test the parachute several times to ensure consistent results. Teams can experiment with different canopy materials, shapes, or suspension line lengths.

Lesson

4. Reflection and Discussion (10 minutes):
Gather students together to discuss their findings. Use questions to guide reflection:

- How did the parachute change the way the toy fell?
- What happened to the landing when the parachute was used?
- Did any designs work better than others? Why?
- What could be changed to improve the parachute's performance?

Encourage students to think about how air resistance changes when parachute size, shape, or material is varied.

Assessment

Assessment
Observation of Engagement and Teamwork:

- Task Engagement: Observe students as they build and test their parachutes, noting how well they follow instructions.
- Team Collaboration: Assess teamwork skills, focusing on how students communicate, share roles, and solve problems.

Reflection Responses:

- Understanding of Air Resistance: Listen for students' ability to explain how parachutes create air resistance and why it slows down the fall.
- Problem-Solving Skills: Observe students' ability to discuss what worked, what didn't, and how they might improve their designs.

Accuracy of Predictions and Results:

- Recording Results: Review students' recorded predictions and results, checking for accurate measurements and thoughtful observations.
- Consistency in Testing: Ensure teams are consistently testing from the same height and recording each trial, demonstrating an understanding of fair testing.

This parachute drop experiment provides a hands-on way for students to understand air resistance and gravity while building skills in teamwork, scientific inquiry, and reflection.

Younger Classes

For Younger Children (3-5 years old):
Simplify the activity by focusing on watching the parachutes fall and discussing what they see.

- Observe and Describe: Have children watch parachute drops and describe what they notice.
- Basic Concepts: Focus on simple ideas of “slow” vs. “fast” and “soft” vs. “hard” landing.

Older Classes

Introduce more complexity by experimenting with parachute shapes and studying drag more scientifically.

- Advanced Experimentation: Students can test parachutes of different shapes (square, circle, triangle) and compare descent times.
- Calculating Average Descent Times: Older students can calculate average descent times over multiple trials and analyze which designs worked best.