

Kidders DIY Saltwater Car – Cat# 80-50-W249



Science Curriculum Strands:

1. **Understanding Life Systems**
2. **Understanding Structures and Mechanisms**
3. **Understanding Matter and Energy**
4. **Understanding Earth and Space Systems**

Relevant Curriculum Expectations:

1. **Understanding Structures and Mechanisms:**
 - **Grade 3** - Strong and stable structures; Forces that act on structures and mechanisms
 - **Grade 6** - Understanding basic mechanisms related to simple machines; Understanding electrical circuits
2. **Understanding Matter and Energy:**
 - **Grade 5** - Properties of and changes in matter; Conservation of energy and resources

Matching with the Kidder DIY Salt Water Car Kit:

1. **Strong and Stable Structures:**
 - The car kit likely involves building a stable chassis to support the moving parts.
 - Students can learn about the importance of structure stability in vehicle design.

2. Forces Acting on Structures:

- Students can explore how forces like friction, gravity, and air resistance affect the car's movement.
- They can experiment with different designs to optimize speed and efficiency.

3. Basic Mechanisms and Simple Machines:

- The kit may involve wheels and axles, teaching basic mechanical principles.
- Students can learn about gear ratios and how they affect speed and torque.

4. Understanding Electrical Circuits:

- Depending on the kit's complexity, it may incorporate electrical components powered by the saltwater battery.
- Students can learn about circuits, conductivity, and energy conversion.

5. Properties of Matter:

- Exploring the materials used in the kit, such as plastics, metals, and electrolytes in the saltwater battery.
- Discussing how materials' properties influence design and functionality.

6. Conservation of Energy and Resources:

- Discussing alternative energy sources like the saltwater battery and their environmental impact.
- Encouraging discussions on sustainable energy solutions for transportation.

Lesson Plan: Exploring Energy and Forces with the Kidder DIY Salt Water Car Kit

Grade Level: Grade 5-6

Subject: Science (Physics, Energy, and Forces)

Duration: 2-3 class periods

Lesson Objectives:

1. **Content Knowledge:** Students will understand the concepts of energy conversion, forces, and circuitry using the Kidder DIY Salt Water Car Kit.
2. **Critical Thinking:** Students will analyze and optimize the design of their saltwater cars based on scientific principles.
3. **Collaboration:** Students will work in teams to design, build, and test their saltwater cars, encouraging teamwork and communication skills.

Materials Needed:

1. Kidder DIY Salt Water Car Kits (1 kit per student team)
2. Various building materials (cardboard, tape, scissors, etc.)
3. Saltwater solution (for battery activation)

4. Measuring tools (rulers, timers)
5. Worksheet or journal for recording observations and data

Lesson Outline:

1. Introduction to Energy and Forces (30 minutes)

- Discuss the concepts of energy conversion and forces with students.
- Introduce the Kidder DIY Salt Water Car Kit and its components.
- Explain the learning objectives and the design challenge for the students.

2. Building and Testing Phase (60 minutes)

- Divide students into teams (3-4 students per team) and distribute materials.
- Instruct students to follow the kit instructions to build their saltwater cars.
- Encourage students to test different designs and record observations about speed, distance traveled, and any challenges faced.

3. Data Analysis and Optimization (30 minutes)

- Have students gather and analyze their test data as a team.
- Discuss factors affecting the car's performance (e.g., wheel size, weight distribution).
- Encourage students to brainstorm and implement design modifications for improved performance.

4. Circuitry and Energy Discussion (30 minutes)

- Review basic circuitry concepts with students using the saltwater battery and motor from the kit.
- Discuss energy conversion in the saltwater battery and its advantages compared to traditional batteries.
- Have students make connections between energy usage in their cars and real-world energy conservation.

5. Presentation and Reflection (30 minutes)

- Each team presents their final design, data analysis, and optimization strategies to the class.
- Facilitate a class discussion on lessons learned, challenges faced, and ideas for further improvements.
- Have students reflect on the importance of energy-efficient transportation and sustainable energy sources.

Assessment:

- **Performance Task:** Evaluate students based on their teamwork, creativity in design modifications, data analysis, and presentation skills.
- **Worksheet or Journal Entries:** Review students' recorded observations, data, and reflections to assess understanding of energy and forces concepts.

Extension Activities:

1. **Advanced Circuitry:** Explore more complex circuit designs using additional components like switches and resistors.
2. **Alternative Fuel Sources:** Research and discuss other alternative energy sources for vehicles (solar, wind, etc.) and their feasibility.
3. **Engineering Challenges:** Create challenges like uphill races or payload carrying to further test and optimize the saltwater cars' designs.

This lesson plan integrates hands-on STEM learning with curriculum-aligned concepts, encouraging students to apply scientific principles in a practical and engaging way while fostering collaboration and critical thinking skills.