

## Core Skills Analysis

### Physics

- The student learned about basic mechanical principles such as force, motion, and friction through the operation and modification of the RC car.
- They explored concepts of electricity and circuits by understanding the role of the car's battery, motor, and remote control's signal transmission.
- The student gained hands-on experience with energy conversion, observing how electrical energy from the battery is transformed into kinetic energy to propel the car.
- Through troubleshooting and adjustments, the student comprehended the effects of variables such as weight distribution and wheel traction on the car's speed and handling.

### Engineering

- The activity introduced the student to basic engineering design principles, emphasizing iterative testing and refinement of the RC car setup for improved performance.
- They practiced problem-solving skills by diagnosing malfunctions and making mechanical adjustments to optimize functionality.
- The student experienced practical application of mechanical assembly skills, learning how different components of the RC car interact and fit together.
- Concepts such as structural stability and material properties were implicitly explored when modifying or repairing parts of the RC car.

### Mathematics

- The student applied measurement skills by quantifying distances traveled by the RC car and potentially calculating speed using time and distance.
- They likely engaged with geometric understanding by analyzing the car's design, including angles of wheels and chassis to optimize turning and stability.
- Basic data collection and interpretation skills were developed when recording performance changes after modifications.
- The student may have utilized proportional reasoning when adjusting gear ratios or motor settings affecting speed and torque.

### Tips

To further enhance learning from the RC car activity, encourage the student to systematically record performance data and graph results to visualize improvements over time. Integrating more structured lessons on electronics, such as simple circuit-building exercises, can deepen understanding of the car's control systems. Facilitating group challenges like designing custom modifications or racing competitions can increase engagement and practical application of physics and engineering concepts. Additional activities like building simple robots, experimenting with wind-powered vehicles, or programming basic remote control sequences can expand the student's skills in mechanics, electronics, and coding.

### Book Recommendations

- [How to Build and Maintain Your RC Car](#) by Mike Johnson: A practical guide for teens on assembling, tuning, and troubleshooting remote control cars with a strong focus on mechanical and electrical fundamentals.
- [The Science Behind Remote Control Vehicles](#) by Lisa Franklin: This book explains the physics and engineering principles involved in RC cars, making complex concepts accessible to young learners.
- [RC Car Racing Strategy and Mechanics](#) by David Smith: Combining technical skills with strategic thinking, this book helps teens understand how physics, engineering, and math

interplay in RC car racing.

## **Learning Standards**

- CCSS.Math.Content.HSF-IF.B.6: Calculate and interpret rates of change, applicable when measuring car speed.
- CCSS.ELA-Literacy.RST.9-10.3: Follow precisely a multistep procedure, as students do when assembling and tuning an RC car.
- Next Generation Science Standards HS-PS2-1: Analyze data to support the claim that Newton's second law of motion describes the motion of macroscopic objects.
- Next Generation Science Standards HS-ETS1-2: Design a solution to a complex real-world problem, involving the development and refinement of the RC car's design.