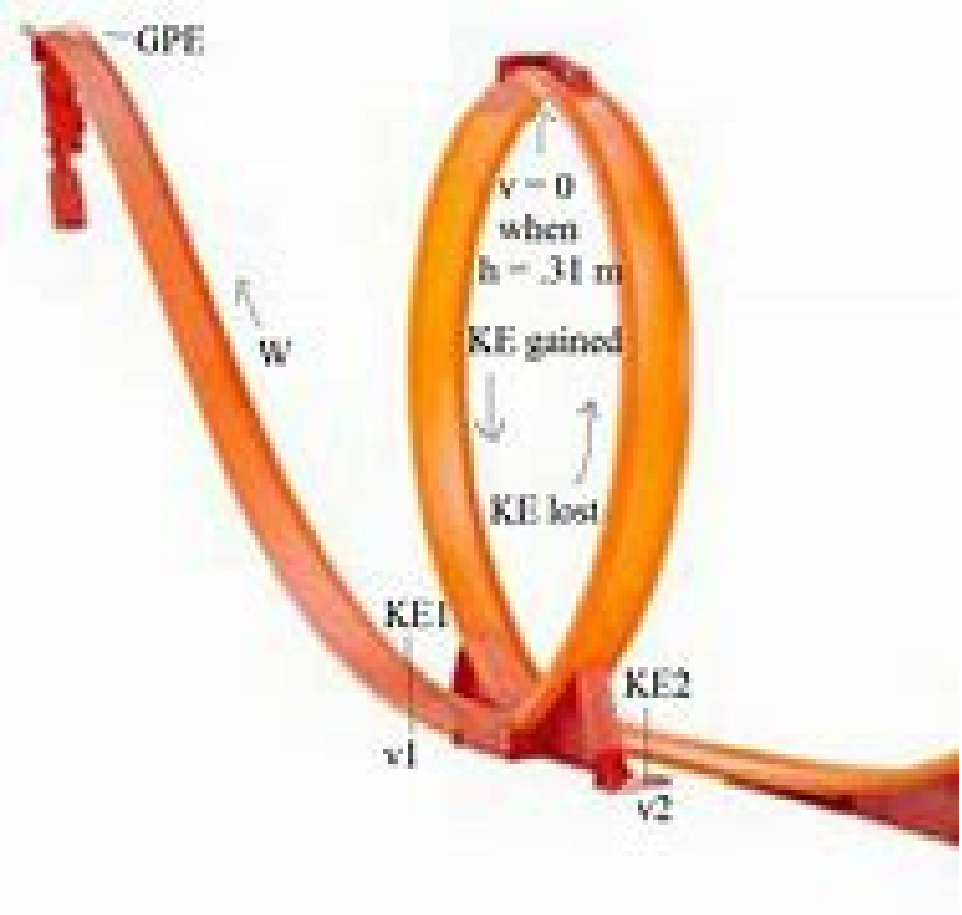
Hot Wheels Physics Extension Kit



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Hot Wheels Physics

The Hot Wheels Physics Extension Kit brings real-world math and science into motion. It provides students with the tools to collect, calculate, and analyze data from their Hot Wheels experiments. With tools like rulers, stopwatches, clipboards, calculators, and the engaging book Save the Crash Test Dummies, this kit deepens classroom connections to force, motion, velocity, and impact. It's the perfect addition to math, science, or physics lessons, transforming every test run into a hands-on investigation.

Grade Level

9th - 12th

Group Size

Entire Class

Time Duration

30 - 120 minutes

Content of Kits

Components

- "Save the Crash Test Dummies" book
- 3 calculators
- 4 rulers
- 4 clipboards
- 5 stopwatches
- A bundle of golf pencils

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Usage

Getting Started

1. **Review Basic Physics Concepts –** Begin with a quick overview of motion, speed, and force to ground students in core concepts.
2. **Introduce Data Collection Tools –** Demonstrate how to use stopwatches, rulers, and calculators for measuring time, distance, and calculating speed.
3. **Assign Roles for Observation –** Break students into groups with specific tasks (timer, measurer, recorder, calculator) to encourage collaboration.
4. **Use the Book as a Hook –** Read a passage from Save the Crash Test Dummies to spark curiosity and frame lessons around safety and impact science.

Storage

- Return all items to the storage bin when not in use, ensuring everything is organized and ready for the next session.

Troubleshooting

- **Stopwatch Not Starting –** Check for low batteries or stuck buttons; keep a few backup stopwatches on hand.
- **Inaccurate Timing –** Reinforce consistent timing techniques and use group averages to minimize human error.
- **Measurement Discrepancies –** Ensure rulers are aligned correctly and students measure from the same starting point each time.
- **Calculator Confusion –** Walk students through sample speed and acceleration calculations before they start using the tools independently.

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Activity Guide

Beginner

Speed Basics
Students will roll Hot Wheels cars down a basic straight track, measure the time it takes to travel a known distance, and calculate the speed of each trial. Using the formula Speed = Distance ÷ Time, they'll calculate the speed of each trial and compare results. This builds familiarity with tools and key physics vocabulary.

Intermediate

Comparing Ramps & Angles
Using adjustable track setups, students will test cars on ramps with different inclines. They'll measure time and distance, calculate speed, and graph their findings. Students will analyze the impact of gravitational force and slope on motion and discuss real-world parallels (e.g., hills, slides, roads).

Advanced

Crash Test Challenge
Students will design and run crash tests using obstacles at the end of their tracks. They'll record crash impact speed, assess the results (e.g., distance moved by the object hit), and connect findings to momentum and energy transfer. Students can experiment with different car weights or materials to explore variables.

Extension Activities:

Physics in Real Life
Students will read excerpts from Save the Crash Test Dummies and reflect on how principles like deceleration, impact absorption, and safety design relate to their Hot Wheels experiments. They can create presentations, posters, or write-ups linking their test results to real vehicle safety features.

STEM Data Analyst Challenge
Students compile their speed, distance, and time data into spreadsheets, create graphs (bar, line, scatter plots), and write a brief lab report on their experiment. They'll practice making predictions, drawing conclusions, and communicating scientific findings—just like real STEM professionals.

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Learning Extensions

STEAM Connections: Science - Engineering - Math

Learning Objectives:

- Apply formulas to calculate speed, distance, and time using real-world data.
- Use measurement tools (rulers, stopwatches, calculators) to collect and analyze experimental data.
- Explore the effects of force, gravity, friction, and impact through hands-on testing.
- Develop hypotheses, conduct controlled tests, and draw evidence-based conclusions.
- Strengthen data organization and interpretation skills through STEM-focused reporting.
- Connect physics concepts to real-world applications like vehicle safety and engineering.

Career Connections:

- **Mechanical Engineer –** Applies motion, energy, and material behavior to vehicle and machine design.
- **Automotive Safety Engineer –** Designs systems to reduce crash impact and improve passenger safety.
- **Data Analyst –** Collects, interprets, and visualizes data from physical tests and simulations.
- **Physics Educator –** Teaches scientific principles through real-world experimentation.
- **Product Tester or Quality Control Specialist –** Uses testing procedures to ensure performance and safety standards.

Essential Employability Skills:

- **Critical Thinking**
- **Problem-Solving**
- **Collaboration**
- **Attention to Detail**
- **Communication**
- **Adaptability**

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Resources and Accessibility

Safety Guidelines

- **Create Clear Track Zones** – Ensure tracks and crash zones are set up in open, uncluttered areas to avoid tripping or interference.
- **Secure Loose Materials** – Keep pencils, papers, and small tools organized to prevent floor hazards or distractions.

Accessibility

- **Adjust Track Height –** Set up track systems on low tables or adjustable platforms to accommodate students with mobility needs.
- **Use Large-Print Data Sheets –** Provide high-contrast, large-font versions of measurement sheets and calculation guides.
- **Offer Verbal Instructions** – Supplement written directions with clear spoken steps and demonstrations for multi-sensory learning.
- **Provide Alternative Roles** – Allow students to participate in roles such as timing, recording, or analyzing data if physical tasks are challenging.

Library Catalog

Library Resources

Feedback

QR to feedback survey