

# Exploring Forces and Motion with Toy Cars

## NGSS Standard:

- **3-PS2-4 Forces and Interactions:** *Define a simple design problem that can be solved by applying the principles of forces and motion.*

## Lesson:

- Exploring Forces and Motion with Toy Cars
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## Objective:

- To understand how forces affect the motion of objects.
  - To investigate how changing the angle of a ramp or applying a force to a toy car impacts its speed and distance.
  - To observe Newton's Laws of Motion in real-life experiments using simple materials.
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## Materials:

- Toy cars
  - Ramps (books or cardboard to create ramps)
  - Measuring tape
  - Stopwatch or timer
  - Chalk or tape (to mark distances)
  - Data recording sheets
  - Pen or pencil
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## Safety Precautions:

- Ensure the ramps are stable to avoid any accidents when toy cars are released.
  - Make sure students handle the toy cars gently to prevent them from becoming a hazard.
  - Remind students to avoid any sharp or hard edges on the ramps or surrounding materials.
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## Procedures:

1. **Design the Ramp:**
  - Set up a simple ramp using books or cardboard to create an incline.
  - Ensure the ramp is not too steep to prevent the toy car from speeding uncontrollably.
2. **Conduct the Experiment:**
  - Place the toy car at the top of the ramp and release it, observing how far the car travels and how fast it moves.
  - Use a stopwatch to time how long it takes the toy car to reach the bottom of the ramp.
  - Measure the distance the car travels after coming off the ramp using the measuring tape.
3. **Adjust the Ramp's Angle:**
  - Change the angle of the ramp (make it steeper or less steep) and repeat the experiment. Observe how this changes the motion of the toy car.
4. **Apply a Force:**

- Gently push the car with your hand at the top of the ramp and compare the motion with the version where the car is only acted on by gravity.
5. **Record Data:**
- Record the time, distance, and any observations on the data sheet for each trial.
  - Draw conclusions based on the observations (Does a steeper ramp make the car go faster? Does applying more force make the car go further?).
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**Clean-Up:**

- After the experiment, make sure all materials (ramp, toy cars, measuring tape, etc.) are put back in their proper places.
  - Dispose of any used data sheets or unnecessary items.
  - Ensure the workspace is cleared of any objects or materials that could pose a safety risk.
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**Notes:**

- Encourage students to work in pairs or small groups to help each other with measuring, timing, and recording data.
- Provide visual aids (e.g., pictures of toy cars, ramps, and force diagrams) to help ELL students better understand the experiment.
- Allow students to present their findings in both written and oral formats to accommodate different learning styles.