

Teacher's Guide

Exploring Ramp Height, Toy Car Speed, and Motion

Student's will:

- explore what happens to the speed of a toy car when the height of a ramp is increased.
- construct an explanation to summarize the motion of a toy car by its position, direction of motion, and speed in respect to the starting point.

You will need the following materials for each group of students:

a toy car, 3 books of the same size (like textbooks), a "ramp" (a piece of paper or a piece of cardboard), stopwatch or timer, measuring tape, tape, recording sheets

Setup:

Before students begin, you will need to model the lab procedure.

1. Tape a piece of paper (or cardboard) to the edge of one textbook.
2. Let go of the toy car at the top of the ramp. Measure its distance and time of travel. It should be measure in centimeters and seconds.
3. Repeat twice, adding a book each time.

**** If you use paper for the ramp, you'll need a student volunteer to hold the paper edges to make it a straight ramp.**

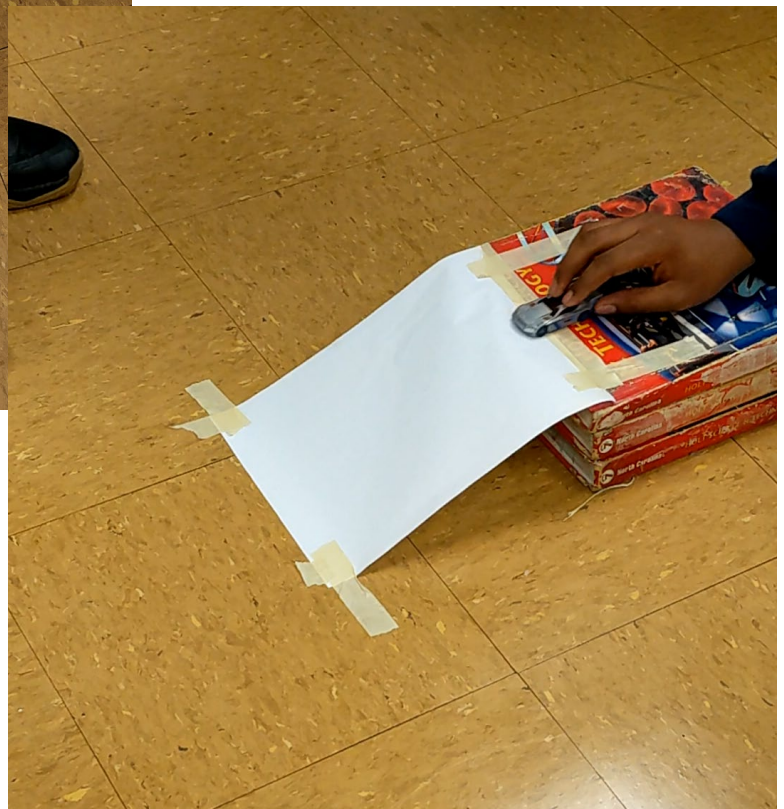
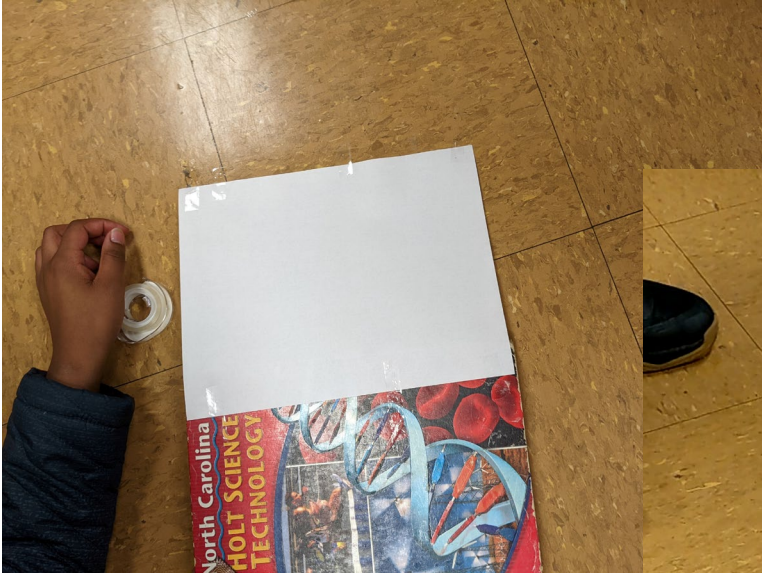
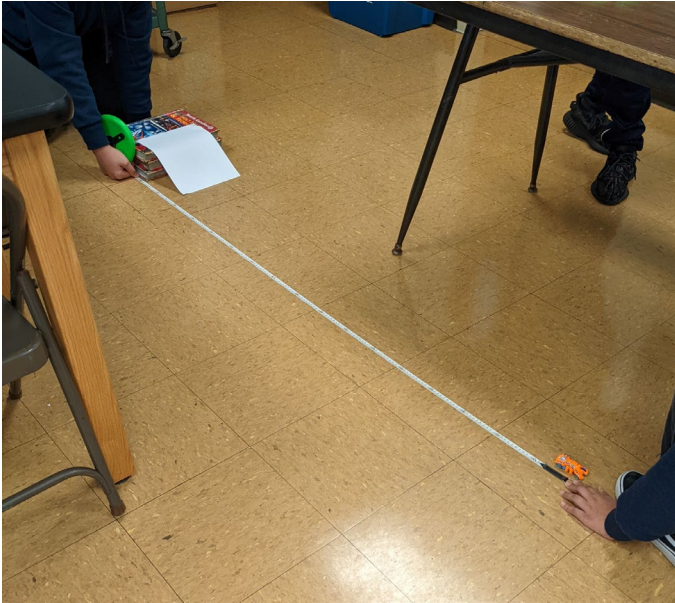
**** Be sure to model and LET GO of the car on the edge at the same place and with the same force. Students shouldn't push the car, but just let it go.**

CER Framework:

Encourage students to use evidence from their lab sheet to construct an explanation to summarize the motion of the toy car by its position, direction of motion, and speed in respect to the starting point.

Students will draw conclusions based on their observations and data. A sample key is provided.

SIMPLE AND EASY MATERIALS! EASY TO IMPLEMENT!



Include Lab Sheet and CER Framework

An Example KEY is included!

Date: _____
Group Members: _____

Motion - Toy Car Lab



Big Question: What will happen to the speed of a toy car when the height of a ramp is increased?

Hypothesis: If I increase the height of a ramp, then...

Materials: 3 books, toy car, tape, piece of paper or cardboard, measuring tape, stopwatch

Procedures:

1. Tape a piece of paper (or cardboard) to the edge of one book.
2. Let go of the car at the top of the ramp. Measure its distance and time of travel.
3. Repeat twice, adding a book each time.

Date: _____

Number of Books	Distance (cm)	Time (s)	Speed (Distance/Time)cm/s
1			cm/s
2			cm/s
3			cm/s

Conclusion: _____

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The next sheet is provided just in case you are interested in letting your students create a NEW question and experiment to explore (if time allows)!

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New Big Question

Hypothesis:

Materials:

Procedures:

Date: _____

Conclusion:

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Claim - Evidence - Reasoning

Name _____
Date _____

Question:

Claim:

Evidence:

Reasoning:

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Claim - Evidence - Reasoning

Name _____
Date _____

Question: How does changing the height of the ramp affect the toy car's position, direction, and speed in relation to its starting point?

Claim: The height of the ramp impacts the motion of the toy car and affects its position, direction, and speed relative to the starting point.

Evidence:

Reasoning:

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Also Included:

EDITABLE slides to use during the lab!

[Date Goes Here]

What do I do?

Find a seat and quietly

Think-Pair-Share

What is speed and

Speed is:

$$S = \frac{d}{t}$$

distance
traveled
per unit
time

Calculating Speed - Toy

Big Question

What will happen to the speed of the toy car when the height of the ramp is increased?

How is this done?

I will model!



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We will also look at:

the motion of the toy car by its position, direction of motion, and speed in relation to the starting point.



Choose your roles:

Materials Manager:

- gathers and organizes materials
- lets go

data
distance

with stop

Gather your materials and begin!

You will need:

- one measuring tape
- one stopwatch
- three books
- tape
- white sheet of paper (or cardboard)
- I will bring your car.

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Be sure to:

- Measure the distance THE same each time. For example: measure from the base of the book to the front of the car.
- The only variable that you should change in each trial is THE HEIGHT OF THE RAMP.
- Let the car "fall" onto the ramp. Don't push it!

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