

Grade Level: Fourth Grade

Subject Area: Science

Materials Needed: Toy cars, sand paper, bubble wrap, wax paper, meter stick, friction data sheet, textbooks (for stacking), cardboard

Standards:

SCI-4.3.4 Identify the effects forces may have when applied to objects (i.e., start, stop, change direction)

SCI-4.2.2 Conduct simple investigations to answer questions based on observations

Objectives:

Students can identify the effects forces may have when applied to objects.

Students can do a simple investigation to answer questions based on what is learned.

Learning Activities:

- Review terms: force, push, pull, movement, friction
- The students will be making the car go down the ramp to see how friction affects how far the car will go.
- Introduce science experiment of sliding a car down a ramp.
Driving Question: Which type of material will create the least amount of friction for a car when it is going down a ramp?
Have class split into four groups, each building a car ramp with their textbooks and cardboard pieces. Each group gets a car, a piece of wax paper, bubble wrap, and sand paper. They will follow friction data sheet to complete the experiment.
- Students will create a hypothesis on which material will create the least amount of friction for a car while going down a ramp.
- After hypothesis has been made, groups will follow through with the experiment, creating results.
- Students will measure how far the car will go with each of the materials, measuring with a yard stick. Make sure to let students know not to push the car, as it will affect the results.
- Come back together as a big group discussion, talk about results. Some questions to ask:

Which material created the least amount of friction for a car when it is going down a ramp?

Why do you think that this material allowed the least amount of friction?

How does the change of material affect the distance of the traveling car?

Assessment:

Assessment for this experiment is through observation. It is important to observe children actively engaged in the experiment, and see that they are making accurate results. Ask questions about the

different textures and materials, and how they affect the friction. Assessment can also be done through a group discussion. Reflecting on the experiment and understanding how the difference in the materials used affected the distance of the traveling car will show how the students understand force, motion, and friction.

For a summative assessment, there is a worksheet that the students can match key terms to definitions. This will help the teacher understand what it is the students learned, and how we can go over these definitions for future lessons.

Reflection:

This activity went very well. Students partnered up in groups of three and they were able to make predictions on what they thought was going to have the least amount of friction. There were a few students who became off task, but redirecting was simple to do for them. For those students who finished earlier than everyone else challenged themselves to change up the height of the ramp and try new elements to use with friction. This was a great experiment and the children were really understanding the key terms. At the end of the experiment, they all got the CFA with key terms and definitions, and for the most part were really successful with it.

CFA assessment in the end is a PDF file attached.



Friction Lab



Question/Problem: Which type of material will create the least amount of friction for a car when it is going down a ramp?

Hypothesis: I think that _____ will have the least amount of friction.

Results:

Type of material:	How far the car went:
Carpet	
Sand paper	
Wax paper	
Bubble wrap	

Conclusion:

_____ had the least amount of friction.

(Circle one)

My hypothesis was correct incorrect



Friction Lab



Question/Problem: Which type of material will create the least amount of friction for a car when it is going down a ramp?

Hypothesis: I think that _____ will have the least amount of friction.

Results:

Type of material:	How far the car went:
Tile	
Sand paper	
Wax paper	
Bubble wrap	

Conclusion:

_____ had the least amount of friction.

(Circle one)

My hypothesis was correct incorrect

Directions

This is a lab that I use when students are learning about force, motion, gravity, and friction. Separate your students into groups (I do groups of four).

Here are the materials you will need for each group:

Binder
Toy car (Matchbox)
Sand paper (The more coarse the better)
Bubble wrap
Wax paper
Meter stick
Friction data sheet

The students will be making the car go down the ramp to see how friction affects how far the car will go. Here are the steps:

- 1. Have the students place the binder on floor. If you have carpet, you will want to use the first recording sheet. If you have tile, you will want to use the second recording sheet.**
- 2. Explain to the students they will be making the car go down the “ramp” (binder) and measuring how far the car goes. My students measure from the edge of the binder to the end of the car to keep it consistent. DO NOT PUSH THE CAR! This adds a variable to the experiment because one student might push the car harder than another student. Let gravity do the work.**
- 3. The students will release the car at the top of the binder and then measure how far it goes. They will then record the measurement.**
- 4. The sandpaper is next. I use about one foot. The students feel the paper to see how rough it is. Then, have them open the binder and place a bit of the sandpaper in the binder. Most of the paper will be sticking out. This is to create a smooth transition from the binder to the sandpaper. Have the car go down the ramp and measure.**
- 5. Repeat with the wax paper and the bubble wrap.**
- 6. I create a chart with all the groups’ results together and talk about making sure an experiment is reliable. We make a conclusion by looking at the measurements and then checking their hypotheses.**