

Science Experiments – The low-down

3rd Grade

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Benchmarks:

SLC 2: Students will select and use appropriate instruments for observing naturally occurring events including organisms and weather events (i.e., microscopes, binoculars, stop watches, measuring sticks, etc.) and weather events (i.e., anemometer, barometer, thermometer, etc.) and will provide detailed facts in their writing of observations and conclusions.

SLC 6: Students will design and conduct experiments and will identify variables and constants within the experiments.

SLC 7: Students will participate in a variety of scientific explorations and choose the appropriate tools when given the stated conditions.

SLC 8: Students will distinguish, verbally and in writing, between inferences and observations (including measurements, attributes, etc.) to determine reliable results in a variety of experiments.

Objectives:

The students will come away from the activities with a more comprehensive understanding of experiments in science and the ability to apply their understanding to create their own science experiment plans. The goal is to help the students through the scientific process so that they can recognize it and use it.

Materials:

For each group

- A set of incline planes (one short and the other long)
- A toy car

Initial Activity:

To get the students into the process of thinking about what science experiments are and why we would like to do them, ask the students to share any science experiments they have done. Why did you do that experiment? What did you find out?

Target Observations:

- I did an experiment with taste-testing – we were trying to figure out which type of soda people like best if they didn't know what they were drinking. We found that most people like Coca-Cola...
- I did an experiment with magnets; we were trying to figure out what materials are attracted to magnets. We found out that most metals are attracted, but not all (like pop cans).

Target Model:

-Science experiments can be done to answer questions.

Activity:

Split the class up into groups of ~4 students each group. Give each group a set of incline planes and a toy car. Tell the students that we, as a class, are going to do a science experiment about the incline planes and the car. However, as we have seen, science experiments are used to answer a question, and we don't have a question to answer yet! The students are to work in groups for ~5 minutes and come up with at least one scientific question they would like to test about the incline plane.

Note: students likely will not really understand what you means by a question in this context, and will probably come up with questions like those under "Expected Observations." As the students are working, they should be steered towards questions like those under "Target Observations" by encouraging them to think about comparisons – will the long incline plane make any differences in the way the car moves than the short incline plane?

Expected Observations:

- Will the car roll down the incline?
- Will the car make the jump?
- Why does the car roll down? / Why doesn't the car roll up?

Target Observations:

- How far will the car roll after rolling down the incline?
- How far can a car jump off of an incline?
- What has to be done to keep the car from rolling down? / What has to be done to make the car roll up?

Target Model:

-Science experiments can be done to answer questions.

-There are many different questions that can be asked about materials.

Procedure:

Have the class come back together and briefly share their question ideas. Pick one of the questions mentioned for the class to test. Write this question on a chalkboard or in a visible place – this is going to be the Question that drives our experiment. [For example in the rest of the lesson, let us suppose the class chose "How far will the car roll after rolling down the incline."]

Ask the class to work in groups and find out things that they think will affect how far the car will roll after rolling down an incline. Some groups may start doing mini experiments to try and find out things that matter – they should be encouraged to wait to actually do experiments until we are ready for the test. Have the students try hard to just think about what might matter.

Target Observations:

- The type of car – heavy, light, truck or race car.
- The height the car is released from.
- Whether you push the car to start, or you let it go.

- The surface the car rolls on.
- Something in the way of the car (wall, book, pencil, etc...).
- Long incline or short incline.

Target Model:

- Science experiments can be done to answer questions.
- There are many different questions that can be asked about materials.
- There are many different variables that can affect a scientific question.*

Procedure:

Bring the class back together and talk about the different things they found mattered, writing them up on the board briefly. These things that may affect the answer to the question are called *variables*. Pick two of the variables students listed above, and perform a brief experiment, changing both of them, i.e. roll the car down the long incline plane, then roll the car down the short incline plane with a couple of pencils at the bottom, and ask which variable, type of incline plane or stuff in front of car, changes the distance the car rolls.

Target Observations:

- The car went further down the long incline plane because it is longer
- The car went further down the long incline plane because there were no pencils in front of it
- We can't tell why the car went further down the long incline plane because there were too many things going on

Target Model:

- Science experiments can be done to answer questions.
- There are many different questions that can be asked about materials.
- There are many different variables that can affect a scientific question.
- Only one variable at a time should be changed in order to see how it affects the answer to a scientific question.*

Procedure:

Which variable should we choose? Which variable can you test with the materials that you have? How can you test this variable – remember your question? What types of measurements do you need to make?

Target Observations:

- It is easiest to test how the length of the incline plane matters
- We can roll the cars down the incline planes at the same time and compare their distances
- We can roll the cars down the incline planes one at a time and measure the distance they travel

Target Model:

- Science experiments can be done to answer questions.

- There are many different questions that can be asked about materials.
- There are many different variables that can affect a scientific question.
- Only one variable at a time should be changed in order to see how it affects the answer to a scientific question.
- Measurements are an important part of doing a science experiment.*

Procedure:

Ask the students to come up with some educated guesses about what they think will happen. Why do you think that will happen? An educated guess about an outcome is called a hypothesis.

Ask the students what materials they will need to do this test. Make sure the every group has the materials that they need.

Have the students carry out the test. As the students are experimenting, visit each group and make sure that they are writing down their results (Why do we want to write them down?) and that they are using good measuring techniques. Also, it may be helpful for them to show you that variables are all the same except the one included in the test.

Bring the class back together after the groups have had the chance to do the test several times, perfecting their techniques. Have each group share their results with the rest of the class. Compare the results across the class: Do group 1's results agree with group 2's results? Etc...

Target Observations:

- My hypothesis is that the car will roll further from the long incline plane because the car will have a longer distance to speed up
- It is useful to write down measurements so that we don't forget them
- The car rolled further from the short incline plane

Target Model:

- Science experiments can be done to answer questions.
- There are many different questions that can be asked about materials.
- There are many different variables that can affect a scientific question.
- Only one variable at a time should be changed in order to see how it affects the answer to a scientific question.
- Measurements are an important part of doing a science experiment.
- A hypothesis is an educated guess about what will happen.*
- Sometimes a hypothesis can be wrong.*
- It is useful to record measurements so they are not forgotten*

Procedure:

Outline the process the students went through, including the steps of:

- I.) Question
- II.) Variables
- III.) Design a Test
- IV.) Hypothesis – educated guess
- V.) Materials
- VI.) Do the Test

VII.) Take data

VIII.) Share/compare results

Have the students fill out the provided worksheet in their groups as a review of what they just did.

Group Member Names:

Date:

Write the class's *question* about the car:



What are the things that affect your experiment (*variables*)?

What is your group's *educated guess* (*hypothesis*)?



Why did you pick only 1 thing to test?



Describe what *methods and materials* you need to design an experiment using measurements to answer the class's question.

(write what you are going to do or draw a **labeled** picture:)



Collect measurements here from *testing* your experiment (label well):

Other notes or drawings from the experiment: 



What is the *answer* to the question after you've done your experiment?

What *other things* could you do to make this experiment better


