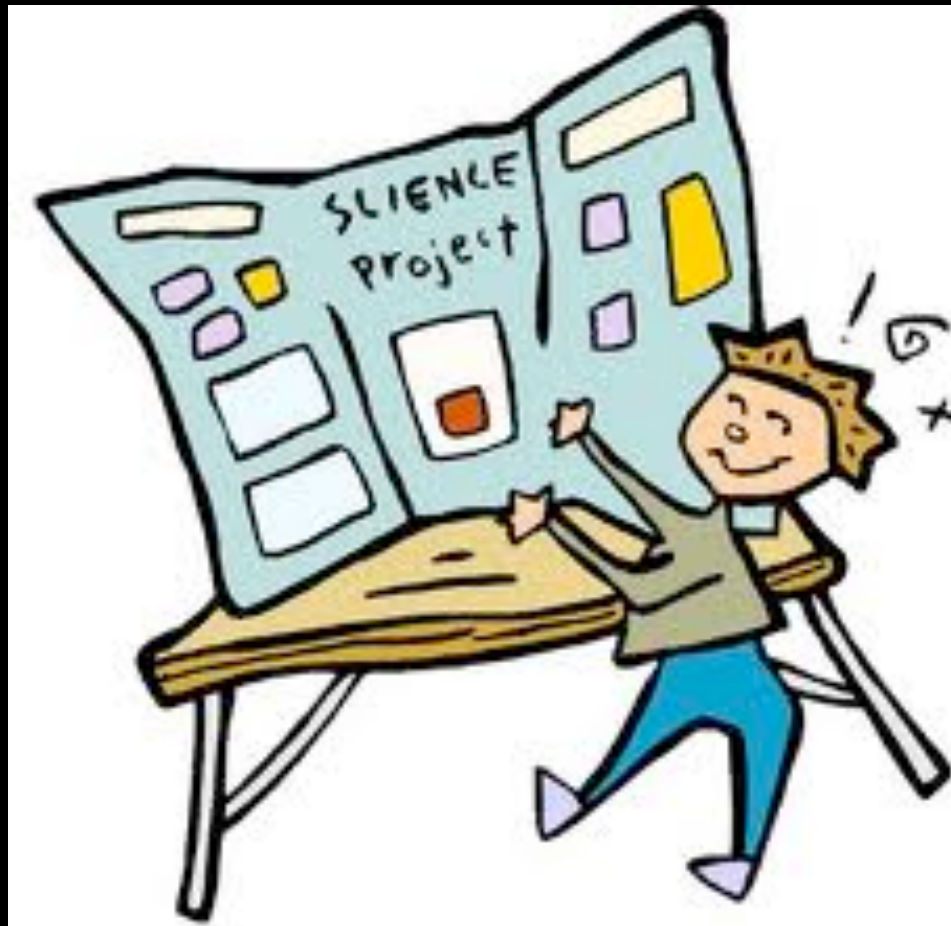


How To Plan and Do a Controlled Experiment

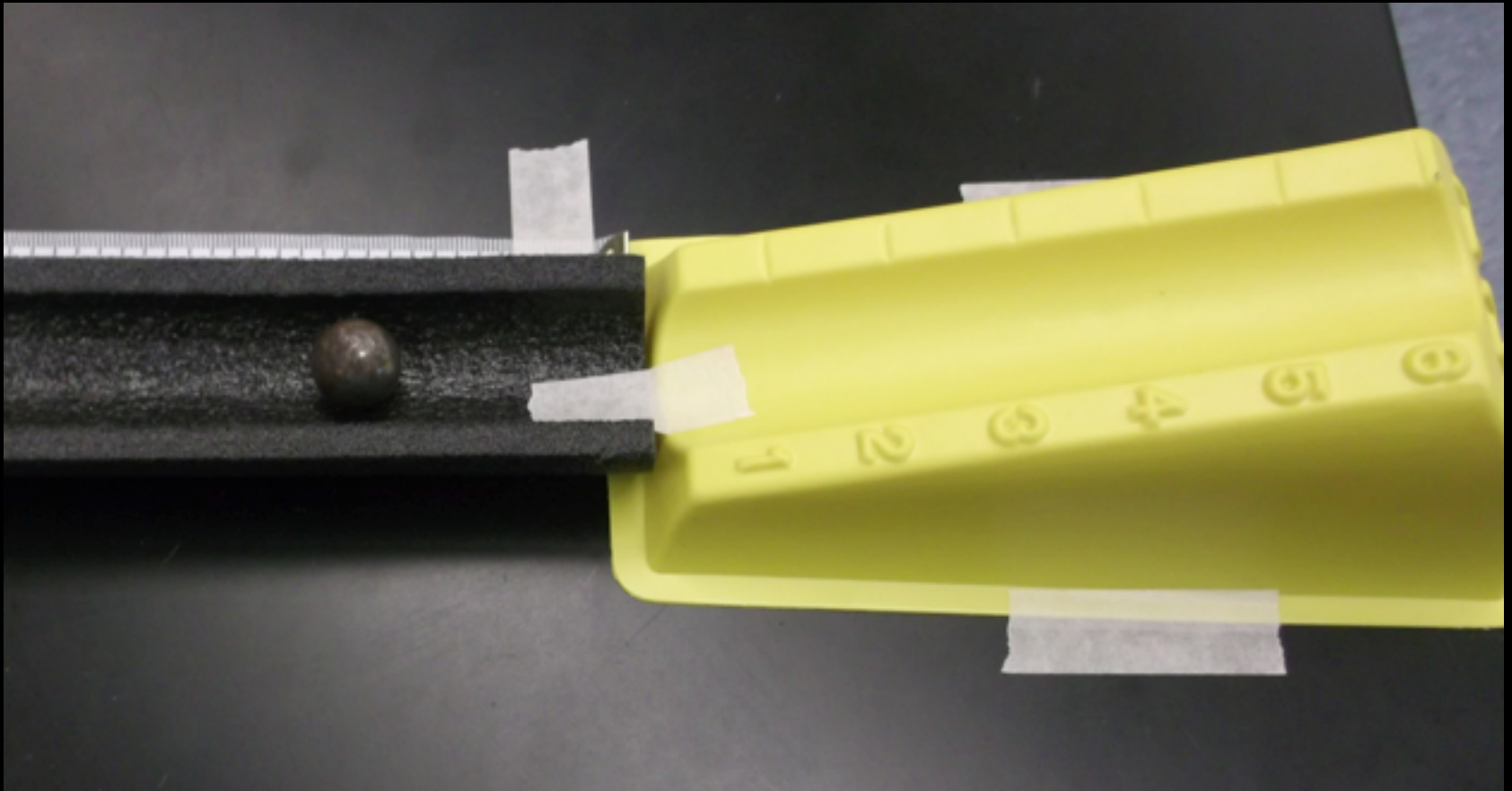


Project Ideas

Ideas can come from anywhere! The best ideas come from questioning things around our everyday life, or creating a question from our own interests.



Sample Experiment Project



Marble On a Ramp

Possible Variables

- marble size
- marble material
- release point
- obstacle on runway
- shape of runway
- wind
- runway material

Question

(specific and measurable)



~~Does releasing a marble from a higher position affect the distance the marble will travel?~~

How does releasing a marble from a higher position affect the distance the marble will travel?

Hypothesis/Prediction

What do you expect to happen?

If I put a drop of water on a slope,
then it will flow downhill.

Marble on Ramp

Hypothesis

If we release the marble higher on the ramp, then...

Background

- **Why project is important**
- History of
- Science behind
- Advancements in
- Scientists involved with
- Bibliography (3-5 only) – 3 sources

Procedure

Practice, practice, practice.

Step-by-Step

Diagrams/Photographs (no faces should be included in the photographs)

Begin each step with a verb and write them as commands.

Marble Runway Procedure

1. Tape the ramp securely on the table.
2. Attach two runways using minimal masking tape to hold them in place.
3. Tape the two measuring tapes on the table next to the runway.



Procedure (cont.)

4. Hold the marble at release point one so that the line on the ramp is even with the middle of the marble.
5. Release the marble.
6. Measure the distance it traveled (cm) down the runway being careful to measure the furthest point of the marble.
7. Record the distance the marble traveled.
8. Repeat steps 4-7 two more times.
9. Repeat steps 4-8 two more times testing the marble at release point 3 and 5.

Materials

Be specific about how many, what size, etc

- 1 steel marble
- 2 foam runways (90 cm)
- 2 measuring tapes (100 cm)
- masking tape

Trials/Samples

- Samples – The number of changes you test in an experiment. (at least 3)
- Trials – The number of times you do the experiment with each sample. (at least 3)

Variables

Independent Variable: the variable you are changing in the experiment

Release Point: 1, 3, and 5 (these are the samples)

Dependent Variable: what you are measuring (in metric)

Distance the marble travels (cm).

Constants:

marble, ramp, runway, location, measuring tape, release method

Control

The “basic” with which all other things are compared.

Note – not all experiments have a control.

Example:

Question: How does the salinity of water affect the growth of bean plants?

Control – distilled water.

Our Control – release point 1

Data Table

Be sure to average your data.

Data Table Title

	<u>Dependent Variable Label</u>			
<u>Independent Variable Label</u>	Trial 1	Trial 2	Trial 3	Average
Sample 1				
Sample 2				
Sample 3				

Marble on Ramp Data Table

The Relationship Between Release Point and Distance

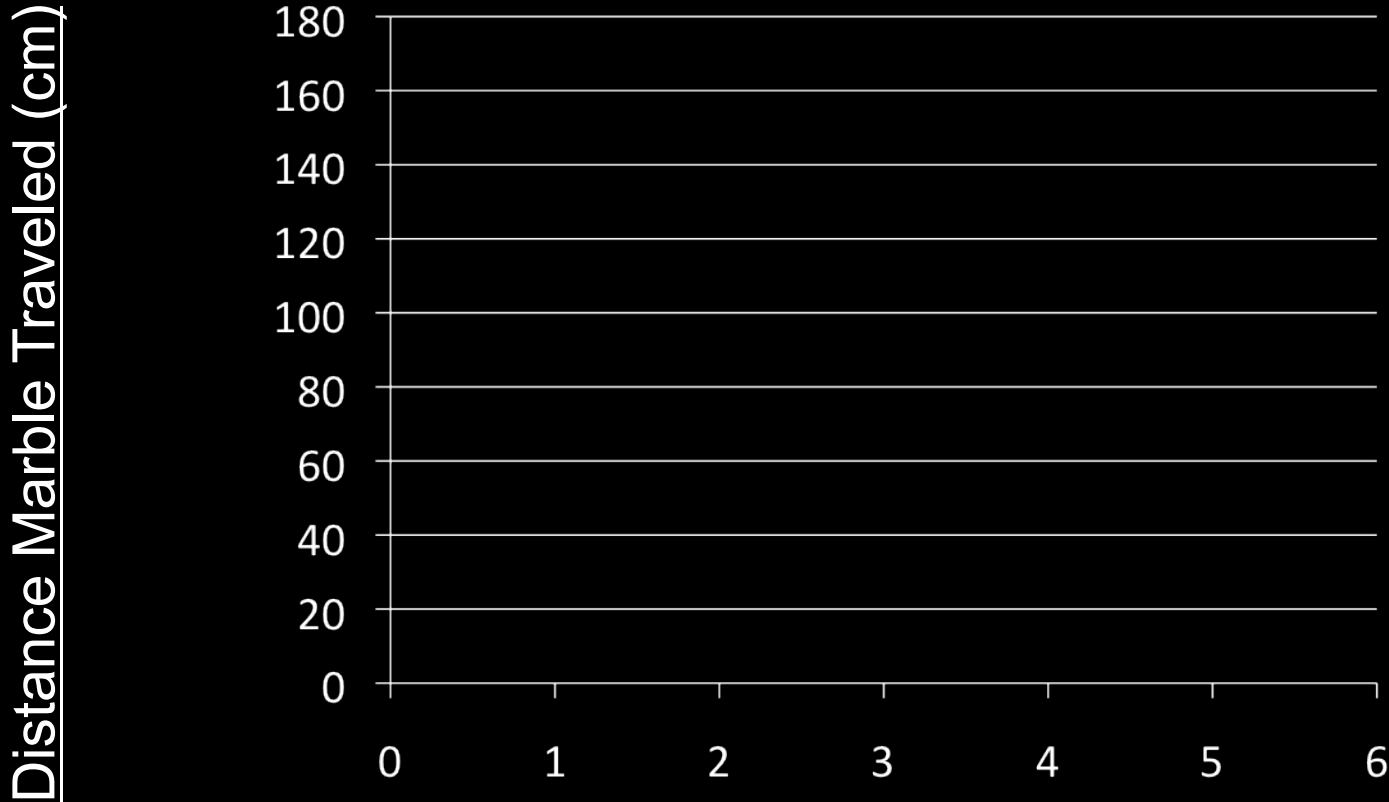
	<u>Distance Traveled</u>			
<u>Release Point</u>	Trial 1	Trial 2	Trial 3	Average
1				
3				
5				

Graph

- **Line graphs** should be used to show change over time or a change made to the same system.
- **Bar graphs** should be used to show isolated incidents.
- Only your average should be graphed.
- Type a sentence explaining the results of your data.

Marble on Ramp Graph

The Relationship Between Marble Release Point and Distance Traveled (cm)



Release Point of Marble
Sentence explaining the results.

Conclusion

Be sure to relate your conclusion to your original question and hypothesis and include specific data.

Claim: The statement you believe to be true.

Evidence: The specific evidence that supports your claim.

Marble on Ramp Conclusion

I thought that the further up the ramp the marble was released, the further the marble would travel. My experiment supports my hypothesis. When we released the marble at release point 1 it traveled _____ centimeters. From release point three the marble traveled _____ centimeters. The marble traveled an average of _____ centimeters when released from point 5.

Conclusion (cont.)

My results agreed with what I found in my research...

Reflection

- Explain how you know your results are valid and reliable.
- Describe how you might improve your project if you could do it again.
- Include ideas for what related questions you might now go on to explore.

Marble on Ramp Reflection

I feel confident that my results are reliable. I completed three trials getting similar results each time. Even so, there is room for improvement. It was difficult to let go of the marble at the exact spot every time. If I were to do this experiment again I would try to find a better way to make sure the marble was released from the very same spot each time.

Reflection (cont.)

This investigation is important for people who use ramps or hills in their every day lives (i.e. sledding, riding bikes, etc.). It is important to know that the higher up a hill you go, the more positional energy there is between you and the bottom of the hill. The more positional energy, the further you will move. While I was completing this investigation I wondered what would happen if I changed the size of the marble. This might be something I would like to study in the future.

Let the experiments begin!

