

TITLE: Open-Ended Scientific Method Lab

TOPIC: All topics

GRADE LEVEL: 4-12

CONTENT STANDARD: All standards

CONTENT OBJECTIVE: To have students come up with a hypothesis for each of the 2 problems, to test each, hypothesis, and to have them evaluate how successful each of their hypotheses are.

TIME REQUIRED: 20-30 minutes, homework assignment

MATERIALS NEEDED: Attached student pages

LESSON PLAN AUTHOR & CONTACT INFO:

Michael Stark

Honor/Regents Earth Science

Schuylerville, Jr/Sr High,

Schuylerville, New York

STARMICH@schuylerville.org

- Task:** 1) To come up with a hypothesis for each of the 2 problems presented below*
2) To test each hypothesis, and
3) To evaluate how successful each of your hypothesis is

Details: After you create your 2 hypotheses you will need to devise an experiment for each one, testing each to see whether it works or not. You will need to make numerous observations, collecting, recording, and graphing all your data carefully and neatly. Then you will need to analyze your results and draw some conclusions (inferences) based on your observations. These conclusions must relate back to your hypotheses.

General Procedure: Since this is your first lab of this kind I will offer you some guidance in terms of how the lab will be set up, organize, and written up.

- 1) Create a hypothesis for each problem* (your “answer” to each of the questions/problems).
- 2) Design an experiment you can do to prove each of your hypotheses – describe each in detail.
- 3) Include a labeled diagram or picture of the set up for each experiment you do.
- 4) Run the experiments, make careful observations, and collect data in labeled record tables.
- 5) After you gather all your observations, graph any numerical data on labeled graphs.
- 6) Now, look at your results. Draw any conclusions you can based on those results.
- 7) Lastly, compare your results to your original hypotheses. Discuss whether your results proved the hypotheses or not and tell why.

Equipment: Ramps, tennis balls, stop watches, meter sticks, cardboard blocks, other items as requested

***The Problems:** A tennis ball is rolled down a ramp:

Problem 1: How can you make the tennis ball go farther?

Problem 2: How can you make the tennis ball go faster?

Bonus: Extra Credit:

Problem 3: How can you make the tennis ball roll a specified distance?

Hypothesis 1: _____

Equipment Used: _____

Description of Your Experiment for Problem 1 (Include a diagram):

Hypothesis 2: _____

Equipment Used: _____

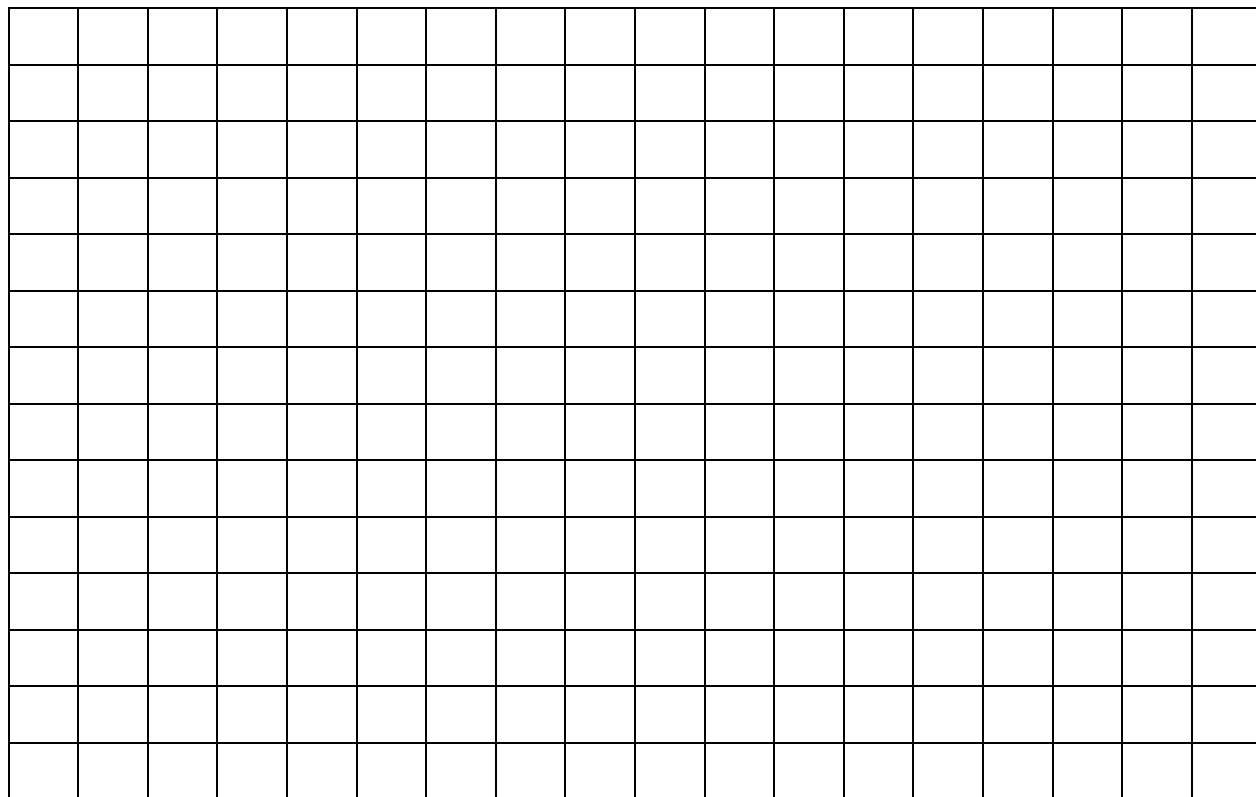
Description of Your Experiment for Problem 2 (Include a diagram):

Observations/Data for Experiment 1:

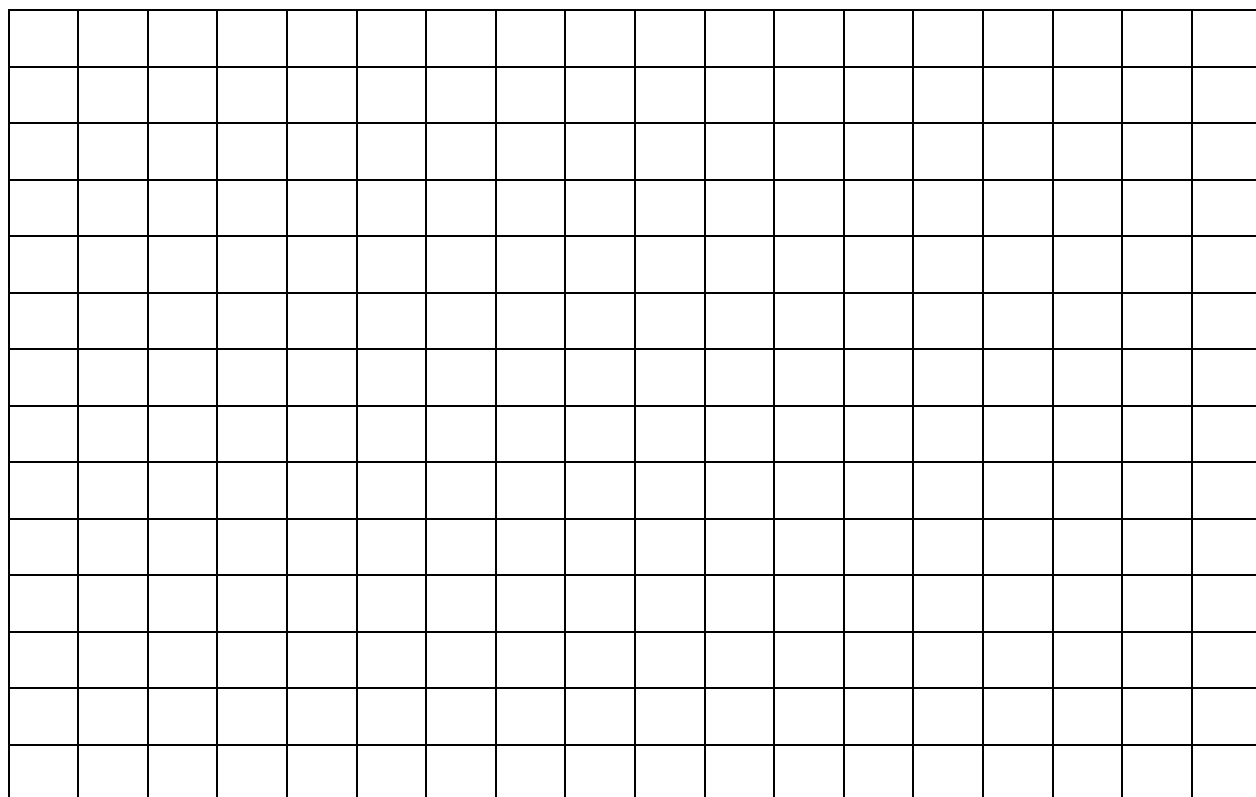
Describe the results/what happened when you ran this experiment. Give details here:

Observations/Data for Experiment 2: (find the formula for speed/velocity: velocity =)

Describe the results/what happened when you ran this experiment. Give details here:



Graph for Experiment #1



Graph for Experiment #2

Analysis:

After running experiment #1, making all your observations, and collecting and analyzing the data, what conclusion(s) did you come to about problem #1? Did your experiment prove your hypothesis correct or wrong? Why do you say that?

After running experiment #2, making all your observations, and collecting and analyzing the data, what conclusion(s) did you come to about problem #2? Did your experiment prove your hypothesis correct or wrong? Why do you say that?

Questions:

1) What is an observation? Give an example of one you made.

2) Of what value are instruments? Give an example of how you used one for that purpose.

3) What is an inference? Give an example of one you made.