

I.2

Investigations and Experiments



Question: How do we ask questions and get answers from nature?

1 **Setting up the experiment**

a. Look around the class and note which hole each group is using for its ramp. With your group, make a prediction as to which group will have the fastest car, and therefore the shortest time from A to B. This prediction is your group's hypothesis. Write down this hypothesis so you can compare it to your results.

b. Roll the car down the ramp and record the time it takes to go from photogate A to photogate B. Be sure you look at the timer reading with the A and B lights on.

c. Compare your results with other groups. Did the times that everyone measured agree with your hypothesis about how the angle of the ramp would affect the speed? Why or why not?

d. Is there a better way to test whether increasing the ramp angle makes the car go faster? Explain how you would redo this experiment so the results make sense.

2 Variables in an experiment

What variables will affect how fast the car moves down the ramp? List all the variables discussed by your group.

3 Doing a controlled experiment

1. In the table, record any variables you think should be controlled to make the experiment a comparison of how cars behave on ramps of different angles. Write values for these variables in the table. These values will not change during the experiment.

Variable	Chosen value

2. Develop a good technique for rolling the car down the ramp so you get three times that are within 0.0005 seconds of each other. Write a description of your technique.

3. Using your new technique and setup, record the time it takes the car to travel from photogate A to photogate B.

Once you have your new results, compare them with the results of the other groups.

a. Did your times agree with your hypothesis about how they would change with the angle of the ramp?

b. In one or two sentences describe why this experiment was better or worse than your first experiment. Your answer should talk about cause and effect relationships and variables.

4

Applying what you learned

a. It is often easy to confuse cause and effect. When we see something happen, we think up a reason for why it happened, but we don't always get the right reason. If you drop a piece of paper and a steel weight at the same time, which one hits the ground first? If the paper is flat, the steel always hits first. Why does the steel hit first? Is it because heavier objects fall faster, or is there another reason? In your answer give at least one other reason why a steel weight might fall faster than a flat sheet of paper.

- b. Plan and perform another experiment to test the effect of one of the other variables on the speed of the car. Create a data table and a procedure for controlling the variables you don't want to change.
