

## I.2 Investigations and Experiments

Science is about figuring out cause and effect relationships. If we do something, what happens? If we make a ramp steeper, how much faster will a car roll down? This is an easy question. However, the process we use to answer this question is the same process used to answer more difficult questions, like what keeps the moon in orbit around the Earth?

The rules of nature are often well hidden. We ask questions about nature and then design experiments to find clues. A series of one or more experiments that helps us answer a question is called an **investigation**. In this section you will learn how to design investigations using the scientific method.

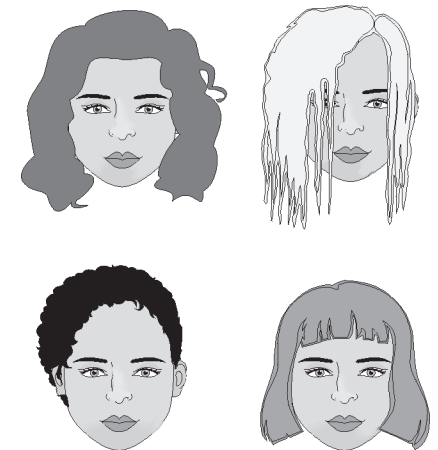
### Designing experiments

**What is an experiment?** An **experiment** is any situation we set up to observe what happens. You do experiments every day. You might wear your hair a new way to see if people treat you differently. That is an experiment.

**Measurements can be recorded** In science, we usually plan our experiments to give us **measurements**, which are observations we can record and think about. You might ask 10 friends if they like your hair the new way or the old way. That would be a way of collecting data from your experiment. From the results of the survey, you might decide to leave your hair the new way, or change it back. We usually do experiments for a reason, because we want to know something.

**Experiments start with questions** Experiments usually have a question associated with them. The question might be “Will people like my short hair better?” Sometimes you are aware of the question and sometimes you are not. If you push a door to see if it opens, that is an experiment. You often do it without thinking about the question. But the question is still there. What will happen if I push on this door?

**Answers from nature** Experiments are the way we ask questions of nature. You might want to know if salt water freezes at a lower temperature than fresh water. To answer the question you do an experiment. Place containers of salt water and fresh water in a freezer. Observe the water samples, and when ice forms measure and record the temperature of the sample. You can now compare the freezing points. Nature answers our questions about how things work through the results of experiments.



**Figure 1.6:** Changing your hairstyle to see what people think is an experiment. You are setting up a situation to see what happens. We all do experiments every day.