Kutz Science Fair 2024
The Scientific Method

The *scientific method* is a tool for scientific discovery. There are many versions of the scientific method, but they all follow a similar formula. One example is shown below.

1. **Ask a question.** Decide what you want to find out from your project. This question must be asking about something that can be measured or observed.

2. **Do Background Research.** Collect information related to your problem. You might do this by reading science books and magazines on your topic or by doing research on the internet. (Look for university or government sites). You can also talk to people who work in a related scientific field and are knowledgeable about your topic. Find out what research has already been done.

3. **Construct a Hypothesis.** A hypothesis is an educated guess that attempts to answer your question: "If I do this, then this will happen." Predict an answer to your problem based on the information you found.

4. **Test with an Experimental Procedure.** This is the hands-on portion when you design and conduct an experiment to test whether the hypothesis is correct. It is important for your experiment to be a fair test. You can conduct a fair test by making sure you change only one factor (variable) at a time. Controlling variables is essential for getting accurate results.

For Example: Variables for a plant growth experiment include the kind of seed, amount of water, position in sun as well as the amount of light. If you are testing the effect of less light, this is a changing variable. You must make sure that the other variables (seed type, amount of water, location of Sun) remain constant (do not change) between experiments. You should also repeat your experiment several times. You would not just cover one bean sprout with a paper bag for an hour and compare it to another bean sprout. You could use more than one plant as your test subjects and more than one plant as the control group. Your experimental procedure is like a step-by-step recipe for your science experiment.

5. **Collect Data.** Determine a method for collecting and organizing the data from your experiment. You may be collecting numbers, observations or a combination of both. Keep your data in one place and update it regularly.

6. **Analyze Results.** Once your experiment is complete, and you have collected your measurements, it's time to analyze them to see if your hypothesis was correct. It might be helpful to show your results in a table, graph or chart.

7. **Draw Conclusions.** This is your chance to think about your experiment and explain your findings. Scientists often find that their hypothesis was incorrect, and in such cases, they will make a new hypothesis starting the entire process of the scientific method over again. Even if they find that their hypothesis was correct, they may want to test it in a new way.