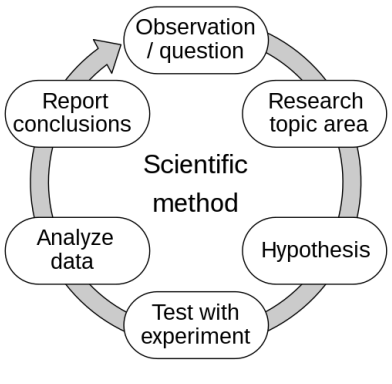
An Experimonkey Science Printout for Kids

The Scientific Method

Your guide to understanding the process scientists have been using for centuries to learn about our universe.

What Exactly Is the Scientific Method?



The scientific method is a process scientists use to learn about the world around them. It's a step-by-step way of figuring out why things happen and how they work. Scientists use this method to help them solve problems, answer questions, and make discoveries.

While the steps are not always exactly the same for all experiments, they almost always involve some form of making observations, asking questions, forming hypotheses, testing those hypotheses with experiments, and analyzing the results to draw conclusions. These steps help scientists to form high-quality experiments that can help them better understand our universe.

The History of the Method

The scientific method has been used by scientists for centuries to understand the world around us. Its roots can be traced back to ancient Greece, where philosophers like Aristotle and Hippocrates emphasized the importance of observation and experimentation. However, the modern scientific method, as we know it today, began to take shape during the Scientific Revolution of the 16th and 17th centuries. Scientists like Galileo Galilei, Johannes Kepler, and Francis Bacon developed systematic methods of observation, experimentation, and data analysis, which laid the foundation for modern science.

Galileo Galilei was a pretty smart guy.

Okay, Let's See the Method!

Step 1. Ask a Question

Scientists start by asking a question about something they want to know more about. This question should be specific and focused, and it should be something that can be tested through experimentation.

Step 2. Do Research

Scientists gather information about their question by reading books, looking online, and talking to other scientists. This helps them understand their question better and learn about any previous research that has been done on the topic. It's important for scientists to be thorough in their research, as this will help them form a better hypothesis and design a more effective experiment.

Step 3. Form a Hypothesis

A hypothesis is an educated guess about the answer to a question. It's based on the research that scientists have done and should be a testable prediction about what will happen in the experiment. A good hypothesis should be clear and to-the-point, and it should be based on the research that has been done.

A good way to form a hypothesis is the *if...then* method. For example, *if* the sky is dark, gray, and cloudy, *then* it is likely to rain. You'll see how this makes a lot of sense in the next step.

Step 4. Create an Experiment

Scientists test their hypothesis by designing an experiment. They make a change to one thing (the *if* from the hypothesis, referred to as the independent variable) and see how it affects another thing (the *then*, or dependent variable).

Scientists take special care to make sure that all other variables are kept the same, or constant. In this way, they can be confident that the change they create in the independent variable is the direct cause of the changes, if any, in the dependent variable. This is called controlling the variables.

Step 5. Analyze Results

Scientists look at the data they collected during their experiment and see if it supports their hypothesis. They might make graphs or charts to help them understand the data better. It's important for scientists to be objective when analyzing their results, and to look for patterns and trends in the data rather than just cherry-picking data that supports their hypothesis.

Step 6. Draw Conclusions

Based on the results of their experiment, scientists decide if their hypothesis was correct or not. If it was correct, they might have an answer to their question. If it wasn't correct, they might need to come up with a new hypothesis and do another experiment. It's also important for scientists to consider any limitations of their experiment, such as a small sample size or a lack of control over certain variables, and to think about how these limitations might have affected their results.

Step 7.(Wash, Rinse...) Repeat!

Maybe the hypothesis wasn't confirmed, maybe there was an issue with the experiment, or maybe the experiment just brought to light some super interesting questions to explore further. Scientists always look to take what they've learned and repeat to learn even more!

The Scientific Method in Action

A group of scientists on summer vacation happen to notice that seagulls on more crowded beaches tend to be much larger than seagulls from less-popular beaches. On a particularly crowded summer day, they happen to notice a few seagulls snacking on an entire carton of french fries. It occurs to them that seagulls might be growing larger in size because of their ability to easily find and eat food from people. To investigate further, they use the scientific method to develop an experiment.

Ask A Question

How does the type of food a bird eats affect its weight?

Do Research

The scientists learn that birds need a balanced diet of protein, fats, and carbohydrates to maintain a healthy weight.

Form a Hypothesis

If birds eat a high-fat diet, then they will gain more weight than birds that eat a lower-fat diet.

Create an Experiment

The scientists set up two groups of birds. They give one group a high-fat diet and the other group a low-fat diet. The birds' diet becomes the independent variable, since that's what they're changing. The weight of the birds becomes the dependent variable, since it depends on the birds' diets. They make sure to control for other variables, such as the birds' exercise habits and environment.

Analyze Results

The scientists weigh the birds and find that the birds on the high-fat diet gained more weight than the birds on the low-fat diet.

Draw Conclusions

The scientists note that their hypothesis was correct. They conclude that birds eating a high-fat diet gain more weight than birds that eat a low-fat diet, and that this is likely one of the reasons birds on crowded beaches are so large.

Repeat

After thinking about the results of their experiment, the scientists wonder if they can make a similar prediction about squirrels. They see a particularly chubby squirrel walking around and wonder if it's been sticking to its normal diet of wild acorns and nuts or has also been robbing the neighborhood bird feeders...