**Science**- a **body of knowledge** accumulated by a large **community** of individuals and an **active process** that involves certain ways of looking at the **natural world**.

**Scientific methods**- Ways in which scientists answer questions and solve problems. (MORE than 1 way)

**1.\_\_Problem/ Question\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

* Asking a question helps focus the purpose of the investigation. Scientists often ask a question after making an observation.
* This is what will be considered, solved, or answered in an experiment. Must be testable or researchable…need evidence.
* For example, students observing deformed frogs might ask, “Could something in the water be causing the deformities?”

**2.\_\_\_Observations/ Research\_\_\_\_\_\_\_\_\_**

**Observations**- Noting, Recording an event, characteristic, behavior, or anything else detected with an instrument or with the senses.

**Two Types of Observations**

**Qualitative** – observations that do not involve measurements or numbers

Ex: ("My brother is shorter than my sister," is a qualitative observation.)

**Quantitative** – observations that involve measurements and numbers

Ex: ("My brother is 30cm shorter than my sister," is a quantitative observation.)

**3.\_\_Form a Hypothesis\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

* **Hypothesis** – possible explanation or answer to a question that is based on observation and can be tested.

**4.\_\_\_\_Test the Hypothesis (Experiment/Observations/ Research)\_\_\_\_\_\_\_\_**

* **Under Control -** A controlled experiment tests only one factor at a time and consists of a control group and one or more experimental groups.

|  |  |  |
| --- | --- | --- |
| **Independent Variable** | **Dependent Variable** | **Constants/Control** |
| The factor you wish to test or is changed.  IF…. | The factor that is measured to gather results.  THEN… | All other factor that must stay the same in control group and experimental group.  **Control Group-** groups that is used as standard of comparison. |

**5.\_\_\_Collect Data\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Scientists keep clear, accurate, honest records of their data so that other scientists can repeat the experiment and verify the results. DATA TABLES!!

**6.\_\_\_Analyze the Results\_\_\_\_\_\_\_\_\_\_\_**

* After they finish their tests, scientists must analyze the results. Analyzing the results helps scientists explain and focus on the effect of the variable.
* Graphs, charts or tables make data easy to read and see. Choosing the right graph is important!

**7.\_\_\_\_Conclusions\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

* Scientists must conclude if the results of their tests support the hypothesis. Conclusions can lead to more questions or the need for more experiments/hypotheses. Possibly revise and repeat experiment.
* Hypotheses are supported or not supported. Not supporting a hypothesis can be as valuable as supporting it.

**8.\_\_\_\_Communicate the Results\_\_\_\_\_**

After finishing an investigation, scientists communicate their results. Sharing allows other scientists to repeat experiments to see if they get the same results.

* Sometimes, new data leads scientists to change their hypotheses.