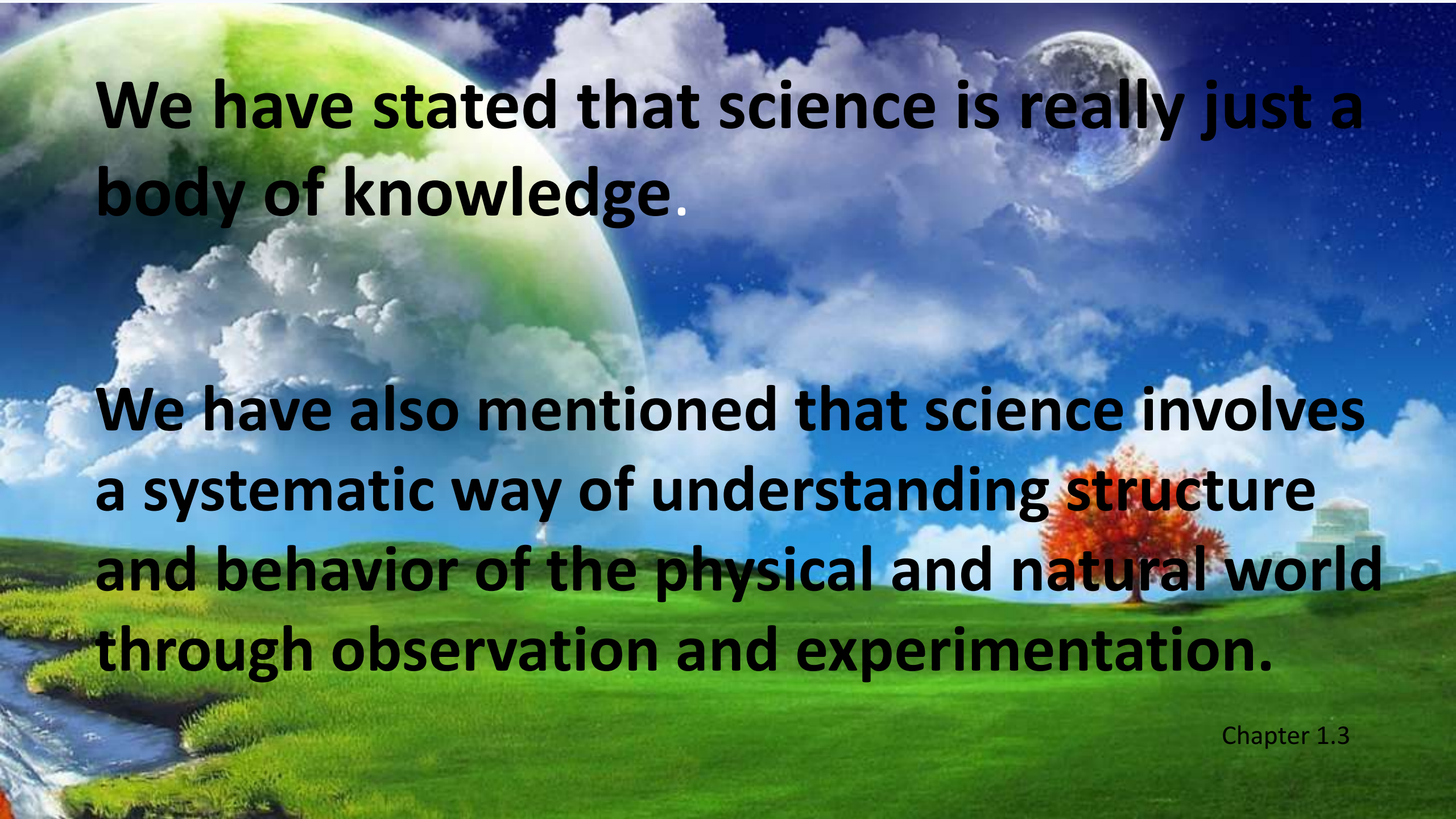
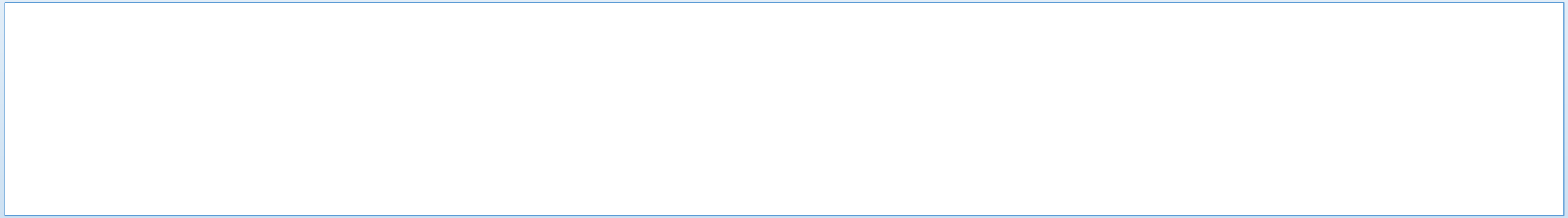

We have stated that science is really just a body of knowledge.
We have also mentioned that science involves a systematic way of understanding structure and behavior of the physical and natural world through observation and experimentation.
Chapter 1.3

How do we get this knowledge and how do we know it is true and accurate?

Beginning in the 17th Century, a method started to be developed to solve problems and gather data about the physical and natural world. Today we call it the:

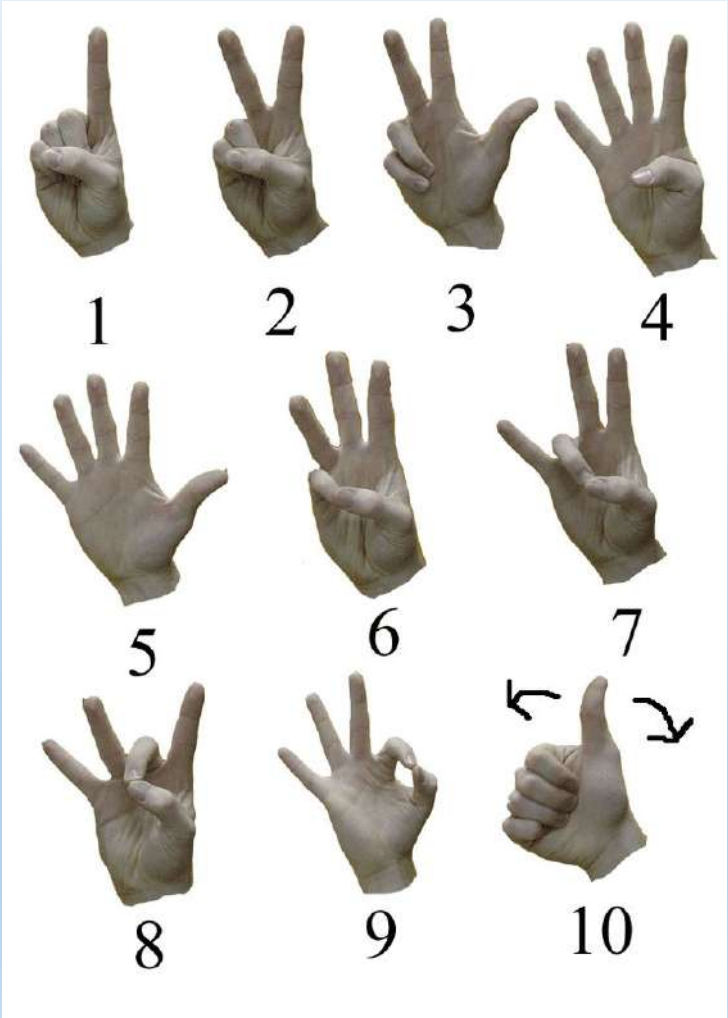
Scientific Method can be defined many ways but all have a central theme:



The answer to the question is then proposed in a hypothesis.

The hypothesis is then tested, the results collected, analyzed, communicated, and the new data should all be able to be repeated by others.

Steps of the Scientific Method:



1. Observation

- **direct observation** (include all 5 senses)

- **indirect observation**

Click

2. Observations lead to Questions

After making some initial observations of the world around you.

Form a question you would like to be answered.

Example:

Observation 1 – During basketball practice my heart rate appears to increase.

Observation 2 – When resting after practice my heart rate appears to go down.

Question: **Does exercise affect heart rate?**

3. Hypothesis

In science, a prediction known as a hypothesis is made to help explain one possible answer to the question.

_____

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_____

_____

Hypothesis = singular
Hypotheses = plural

Which of the following are valid hypotheses concerning our exercise question?

1. **Will exercise increase my heart rate?**
2. **If I exercise, then my heart rate will increase.**
3. **If I exercise, then my heart rate will decrease.**
4. **If exercise increases my heart rate, then I will be hungry.**

4. Investigate

An investigation is a systematic study of the facts or finding new information about a particular truth.

Scientists perform investigations by using:

A. Controlled experiments

B. When performing an experiment is not possible or unethical, a Study can be performed to test a hypothesis.

A. Controlled Experiments

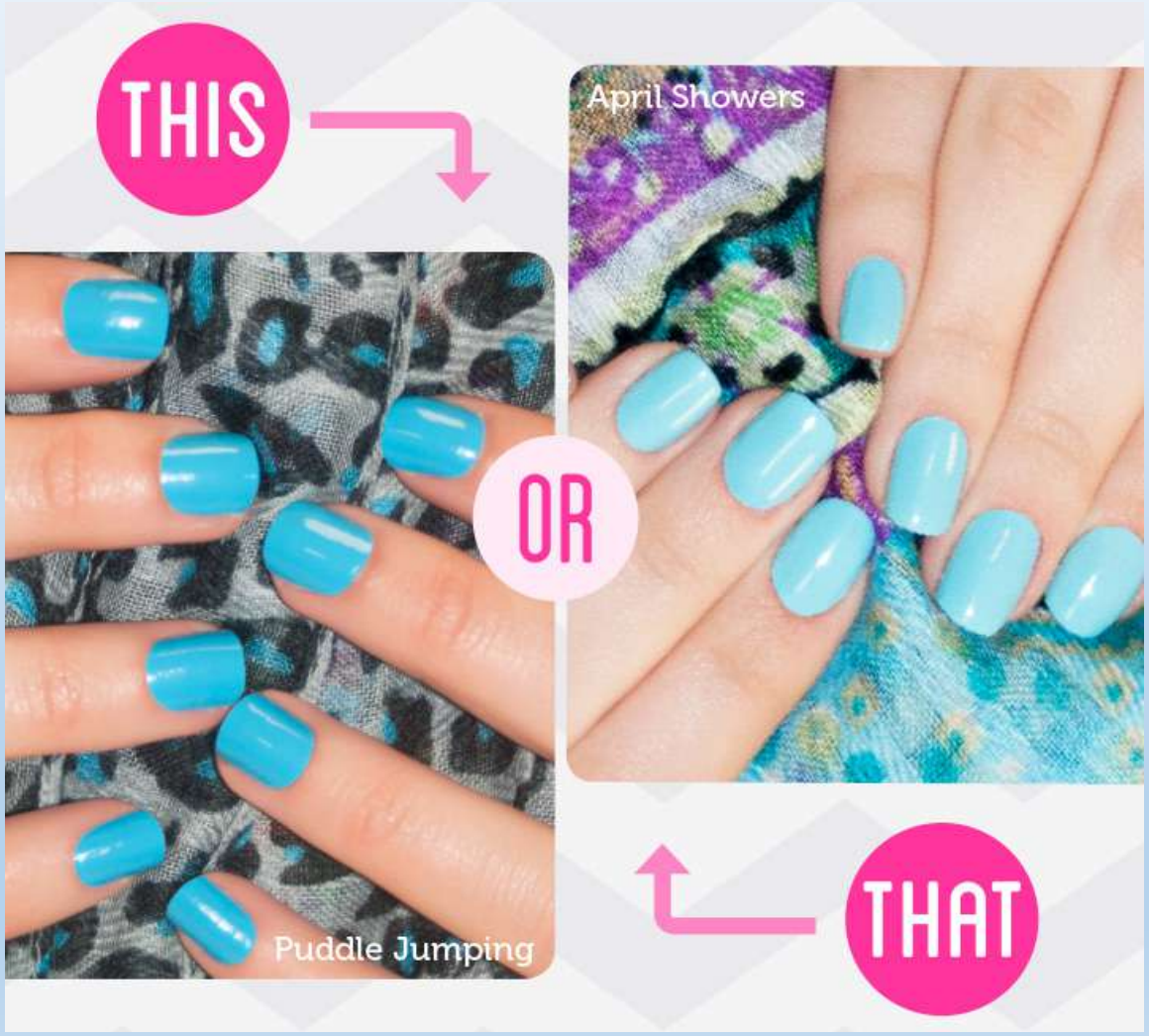
A controlled experiment tests only ONE factor at a time while keeping all other factors the same.

Typically there two groups:

B. Research Study

In a Study, researchers gather information from various sources and attempt to find trends in the data collected.

The researchers will try to limit the number of variables (factors) that can affect their data.



5. Evaluate

During an investigation data (evidence) will be collected which will help you draw an informed conclusion whether your hypothesis was valid or not.

_____

_____

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_____

Whichever type is collected these results must be analyzed using indices, graphs, charts or other statistical tests.

6. Communicate findings

In the final evaluation, **conclusions are drawn** based on the newly found evidence.

The *hypothesis* is checked whether it is **supported** by the evidence or not supported by the evidence.

_____

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_____

Whether the investigation supported the hypothesis or did not support the hypothesis, the new evidence and conclusions must be communicated to others.

Scientific Theory

The difference between a theory and a hypothesis is:

A hypothesis is a specific, testable prediction for a limited set of conditions.