

# WHAT IS SCIENCE AND INQUIRY?

OBJECTIVE: I CAN SUMMARIZE AND APPLY THE PROCESSES INVOLVED IN SCIENTIFIC INQUIRY.

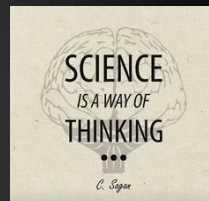
## WHAT IS SCIENCE?

- Take 3 minutes and write down everything that comes to your mind when you think about science.
- Your answers don't have to be complete sentences, and they can even be just one word, but you must write the entire time!
- If you get stuck, simply write "science" over and over until you get more ideas.
- At the end of our time we'll share out.



## SO WHAT IS SCIENCE?

- Science is the **investigation** and **exploration** of natural events.
- Science provides **new information** that results from those investigations.
- There are three, main branches of science:
  - **Life Science** (This is our focus for 7<sup>th</sup> grade!)
    - The study of all living things.
  - **Earth Science**
    - The study of Earth, including its landforms, rocks, soil, and forces that shape Earth's surface.
  - **Physical Science**
    - The study of chemistry and physics. Physical scientists study the interactions of matter and energy.



## KEY COMPONENTS OF SCIENCE

- Brainstorm qualities of a good scientist
- We will share in 3 minutes.

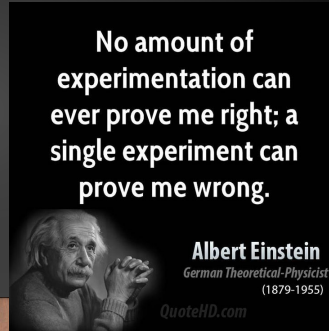
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WORLD



## QUALITIES OF SCIENTISTS (SOME IDEAS)

- Curious
- Creative
- Skeptical
- Precise
- Open minded
- Resourceful
- Persistent
- Use Reasoning



## WHAT DO SCIENTISTS DO?

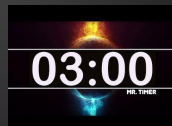
- Scientists seek to **understand** how the world around them works.
- Scientists ask **questions**, and then perform **experiments** or make **observations** in order to test their **hypothesis** or **claims**.
- Scientists have to be creative in order to think of solutions that have never been considered before.
- Scientists have to be open minded. Sometimes their results will disprove other ideas they considered to be certain.

## WHAT IS SCIENTIFIC INQUIRY?

- **Inquiry** is a close examination of a matter in search for information or truth.
- **Scientific Inquiry**: the ways in which scientists **explore** or **study** the natural world.

**Brainstorm:** What are the skills or tools a scientist might use to answer questions about the natural world?

We will discuss in three minutes.



## YOU USE A VERSION OF SCIENTIFIC INQUIRY EVERY TIME YOU...



Play a game



Solve a difficult math problem

Experiment with new foods



- Scientific inquiry uses a variety of skills and tools to answer questions.
- It is not a mysterious list of complicated steps, it is what any logical person would do would do if they wanted to solve a problem!
- There is no one way to complete this process.



Let's look at the skills and steps a scientist may use in this process!



## QUESTION/PROBLEM

- Making observations about the natural world can lead to questions.
- Ask a question that science can solve!
  - Which bird food attracts the most birds?
  - How long does my Pop-Tart need to cook before it burns?
  - Why do we stick to the ground?
  - What is beyond the universe?



Can you think of any more questions science could/could not answer?

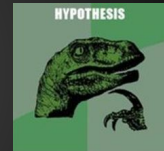
## GATHER INFORMATION



- **Observation:** Using one of more of your senses to gather data or information (sometimes this is your only option). Take note of what occurs.
- **Inference:** A logical interpretation of an observation that is based on evidence, prior knowledge, or experience.
- **Data/Evidence:** facts, figures, and other info gathered through observation.

## HYPOTHESIZE: MAKE A CLAIM

- **Hypothesis (Claim):** a possible explanation for a set of observations or to answer a scientific question
- A hypothesis MUST be something that can be tested!
- Hypotheses will be supported or rejected depending on experiments
- After you make a claim, you may make a prediction.
- A **prediction** is a statement of what will happen next in a sequence of events.
- You should write your hypothesis as an "If...then..." statement.



# TEST YOUR HYPOTHESIS (CLAIM)

- After you state your hypothesis (makes a claim), you must design an experiment to test it.
- You will need to collect data or evidence during your experiment in order to see if you are able to support your claim.
- Scientific experiments are all about **isolating variables**.

What are some good ways to make sure nothing outside your hypothesis affects your experimental results?



# WHAT ARE VARIABLES?

- **Variable:** factors that can change in an experiment.
  - The **independent variable** is the variable that is changed or tested in the experiment.
  - The **dependent variable** is the variable that is studied or measured in the experiment.
- **Controls** are factors that are kept constant in an experiment.

- **Example hypothesis:** If I add more drops of food coloring to water, **then** it will become more darkly colored. (Worded as "if.., then..")
- **Independent variable:** the number of drops of food coloring (This is what we control as experimenters)
- **Dependent variable:** the shade of the water (We are not in control of this. It *depends* on the independent variable.)
- **Controls:** amount of water, size of drops, container the water is held in (Why is it so important that these things are the same?)

# CONTROLLED EXPERIMENT

- **Controlled experiment:** an experiment where all the variables stay the same (are controlled) except for the independent and dependent variables.
- It's important to control EVERYTHING in an experiment; otherwise, how will you know that the independent variable is the **ONLY** factor causing a change in the dependent variable?

# ANALYZING DATA (EVIDENCE)

- After your data or evidence is collected it must be organized and interpreted.
- You are looking for relationships and patterns within your data/evidence.
- What are ways we can make data more easy to understand or interpret?
  - Data Tables
  - Graphs
  - Diagrams or Charts
  - Labels

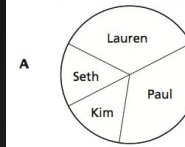
Professional scientists would normally have a LOT more data than this to organize, but how could we make this simpler to read?

Books Read over Summer

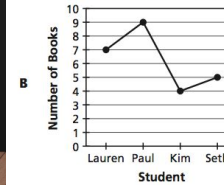
Student	Number of Books
Lauren	7
Paul	9
Kim	4
Seth	5

Which of these best displays the data from the table?

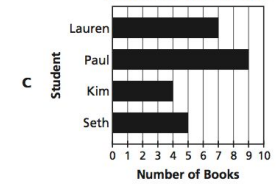
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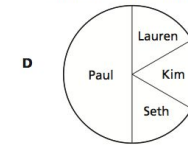
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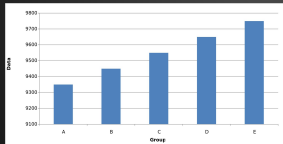


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# CONCLUSION (REASONING)

- After your data or evidence is organized, you must then draw a conclusion.
- You now determine if your conclusion supports your original hypothesis.
- A conclusion is a summary of the information gained from testing a hypothesis.



As the number of drops of food coloring increases, the color of the water gets darker.

RESULT



# COMMUNICATE RESULTS

- Scientists must communicate their findings to other scientists and to the world to contribute to the growth of scientific knowledge.
- Would you know that the Earth orbits the sun and not the other way around if this hadn't been communicated to you?
- Sharing knowledge helps us all learn more and push further into the unknown.

## REFLECTION

- Which quality of a good scientist do you embody the most? Why?
- Which parts in the process of scientific inquiry do you use the most?