1-1: What Is Science

6th Grade Earth Science
1-1: What Is Science

- DON’T COPY SLIDE
- Why do some volcanoes flow nicely from cones and other times lava shoots 1000s of feet into the air?
- What other questions do YOU have about volcanoes?
- When you ask questions you are thinking like a scientist!!!!!!
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What is Science?

• **Science** is a way of learning about the natural world.

• What other questions do YOU have about volcanoes?

• When you ask questions you are thinking like a scientist!!!!!
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What is Science?

• When scientists try and understand the world around them, they use skills such as:

1. Observing
2. Inferring
3. Predicting
What Is Science

Observing

- **Observing** is using one or more of your senses to gather information.

- This includes sight, hearing, touch, taste, and smell.

What would you observe at a volcano??
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Inferring

- **Inferring** is trying to explain what you have observed.

- Not a wild guess, but an EDUCATED guess based on what you have observed.

What might affect how lava erupts??
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Predicting

• Predicting is making a forecast, or prediction, about what will happen in the future based on past evidence.

Will the volcano erupt in the future??
What is Scientific Inquiry?

• **Scientific Inquiry**

  – The diverse ways that scientists investigate the natural world and propose explanations based on the evidence they gather.
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Scientific Inquiry • Steps to follow:

1. Posing Questions
2. Developing a Hypothesis
3. Designing an Experiment
4. Collecting and Interpreting Data
5. Drawing Conclusions
6. Communicate Results
7. Asking New Questions
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Pose a Question

• Scientific Inquiry (SI) begins with asking a question.
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Pose a Question

- Not all questions can be investigated – like, which color is the best?
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Pose a Question

• This type of question can’t be answered by SI because it deals with opinions, personal tastes, or judgments.
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Pose a Question

- You must be able to investigate the question by gathering evidence and making observations.
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Develop a Hypothesis

• Try to answer your question using what you know about the world around you – this is called a hypothesis.
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Develop a Hypothesis

• Come up with a possible explanation.
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Develop a Hypothesis

- The explanation MUST be testable.
- This means an experiment can be designed to test your hypothesis.
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Develop a Hypothesis

- A hypothesis should be stated like this:

  If *this* happens, then *that* will happen, because of *give reason*
Design an Experiment

- Experiments should only allow one **variable** to change, called the **manipulated variable**.
- Also called the **independent variable**.
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Design an Experiment

- When this is done it is called a controlled Experiment.
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Design an Experiment

• The variable that changes in response to the manipulated variable is the **responding variable**.

• Also called the **dependent variable**.
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Design an Experiment

- A control is another part of the experiment.
- It provides something to compare the results to.
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Design an Experiment

- An **operational definition** is a statement describing how to measure a variable or describe a term.
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Collect and Interpret Data

- **Data** are the facts, figures, and other evidence gathered during the experiment.

- Data should be kept in tables.
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Collect and Interpret Data

- Graphs and figures can be used to reveal patterns or trends in the data.
A conclusion is a summary of what you have learned from the experiment.
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Draw Conclusions

- It includes a statement of how your hypothesis was either correct or incorrect.
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Draw Conclusions

• Also a statement of how the data supported or didn’t support your hypothesis.
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Communicating Results and New Questions

• Scientists share the results of their experiments with other scientists.

• This is done through writing or speaking at conventions.
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Communicating Results and New Questions

• Scientists should be able to do your experiment and get the same results.

• New questions should be posed and more hypothesis made to continue the research.
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**Scientific Models**

- Scientists use models and develop theories and laws to help people understand the natural world.
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Scientific Models

- A model is a picture, diagram, computer image, or other representation of an object or process.
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Scientific Theory

- A **scientific theory** is a well-tested explanation for a wide range of observations or experimental results.
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Scientific Theory

- This can be a result of many observations having one explanation.
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Scientific Law

- A **scientific law** is a statement that describes what scientists expect will happen, every time, under a set of conditions.

- For example: Letting go of a rock will always cause the rock to fall down (**The Law of Gravity**).
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Summary

• The scientific process or scientific method starts with a question.
• A testable hypothesis is then made and an experiment designed to test it.
• Data is gathered and interpreted.
• From this data a conclusion is made which is shared with the rest of the scientific community.
• Finally, new questions are posed.
• This process has given rise to Scientific Theories, and Scientific Laws.