

# 12.1 Scientific Method and Safety



Summarize main points from each video.

Video Title / topic \_\_\_\_\_

Video Title / topic \_\_\_\_\_

Video Title / topic \_\_\_\_\_

# Topic Introduction



**Summarize your understanding of each paragraph.**

The scientific method consists of (1) making observations (2) writing down a hypothesis and (3) testing the hypothesis. When new observations do not support the original hypothesis, a new hypothesis is required.

Sometimes, hypothesis are formulated before observations are collected; sometimes observations are made before hypothesis are created. Either way, it is important that scientists carefully record their procedures.

In Earth Science classes in high school, student observations are sometimes made outside – or “in the field.” Some science tests are conducted inside – in a lab environment. In both of these situations, safe practices are required.

Identification of hazards and safety risks prior to beginning lab work, or making observations in the field is an important step. The best way to reduce risk is to eliminate them. But at a minimum, personal protective equipment must be work and following procedures.

# Read/Summarize Text



1. Read the passage.
2. Underline key expressions in each sentence.
3. Re-write each word (or expression) you underlined.
4. Summarize the passage.

*About scientific hypothesis, observations, theories, and laws.*

The scientific method is employed by scientists around the world, but it is not always conducted in the order above. Sometimes, hypothesis are formulated before observations are collected; sometimes observations are made before hypothesis are created. Regardless, it is important that scientists record their procedures carefully, allowing others to reproduce and verify the experimental data and results. After many experiments provide results supporting a hypothesis, the hypothesis becomes a theory. Theories remain theories forever, and are constantly being retested with every experiment and observation.

**NOTE: Theories can never become fact or law.**

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*Re-write words you underlined*

\_\_\_\_\_

\_\_\_\_\_

*Using a complete sentence, summarize or rephrase the passage*

\_\_\_\_\_

# Read Text for Comprehension

Read this article for deeper understanding. No summary is required, although you may want to circle, underline, or mark key ideas and words.

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## About Experiments

In science, we need to make observations on various phenomena to form and test hypotheses. Some phenomena can be found and studied in nature, but scientists often need to create an experiment.

**Experiments** are tests under controlled conditions designed to demonstrate something scientists already know or to test something scientists wish to know.

Experiments vary greatly in their goal and scale, but **always rely on repeatable procedure and logical analysis of the results**. The process of designing and performing experiments is a part of the scientific method.

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## About the Scientific Method

The scientific method is the process used by scientists to acquire new knowledge and improve our understanding of the universe. It involves making observations on the phenomenon being studied, suggesting explanations for the observations, and testing these possible explanations, also called hypotheses, by making new observations. A hypothesis is a scientist's proposed explanation of a phenomenon which still must be tested.

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## Contrast of Scientific Theories and Laws

In science, a law is a mathematical relationship that exists between observations under a given set of conditions.

There is a fundamental difference between observations of the physical world and explanations of the nature of the physical world. Hypotheses and theories are explanations, whereas laws and measurements are observational.

### Explanations

Theories & Hypothesis

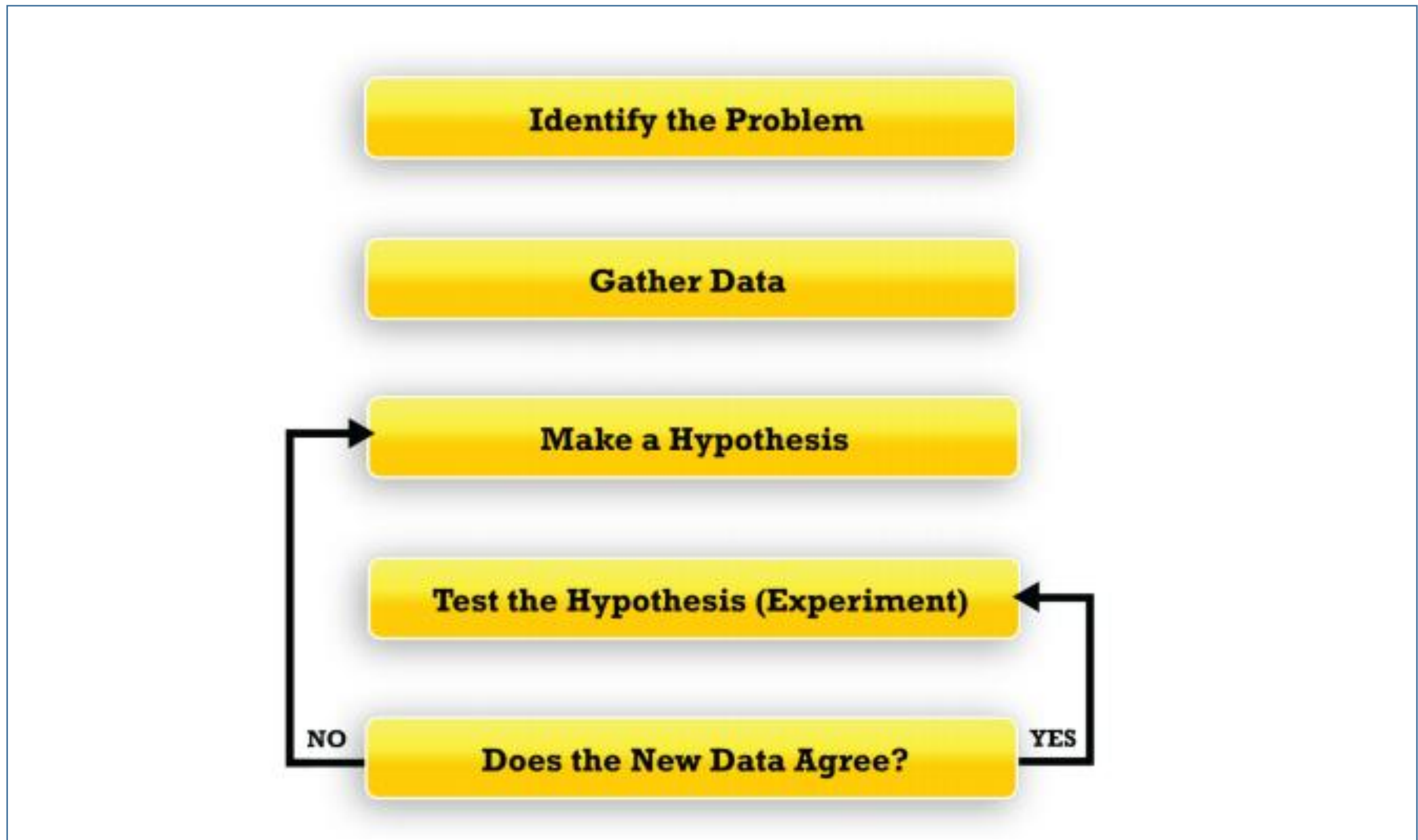
### Observational

Scientific Law

# Draw Illustration



Copy and Label the Illustration in the Space Provided



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Draw (Copy) the Illustration Here



# Interpret a Graph



Write the title of the graph \_\_\_\_\_

Circle the type of chart this represents

*Bar Chart   Line Chart   Pie Chart   Other*

If applicable,

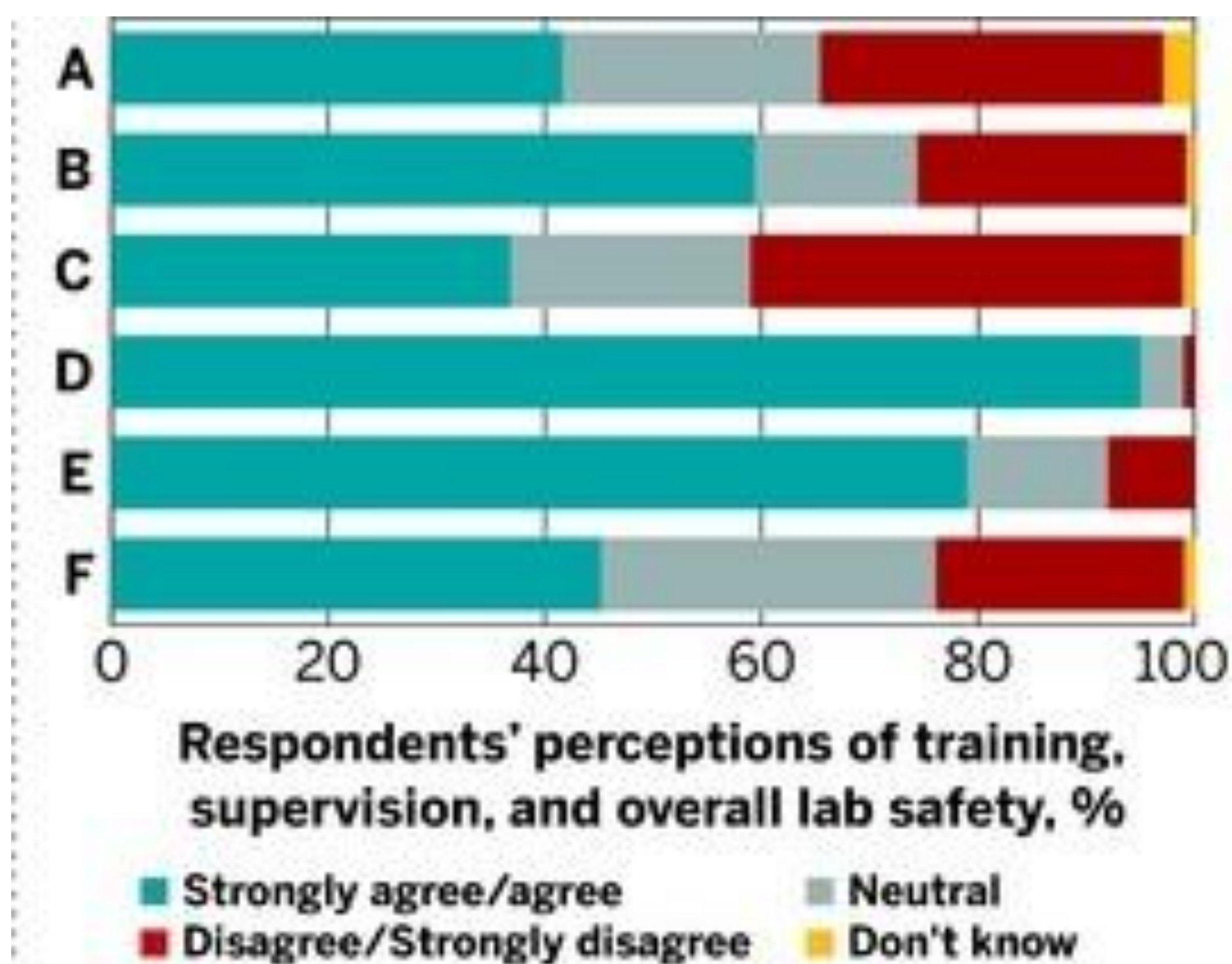
What does the X-axis represent \_\_\_\_\_

What does the Y-axis imply \_\_\_\_\_

Summarize what this graph represents or conveys

\_\_\_\_\_

<http://cen.acs.org>



# Show-Off Your Smarts!



## Instructions

- Complete as an individual or small group.
- Discuss your ideas/answers/responses in a small group.
- Select one person to present your responses to the class.

**Q1. How can this information be applied to a young-person's life?**

**Q2. How does this information apply to (or impact) communities?**

**Q3. When do scientists need to apply this information? How?**

**Q4. How would a person from 100 years ago view this information?**

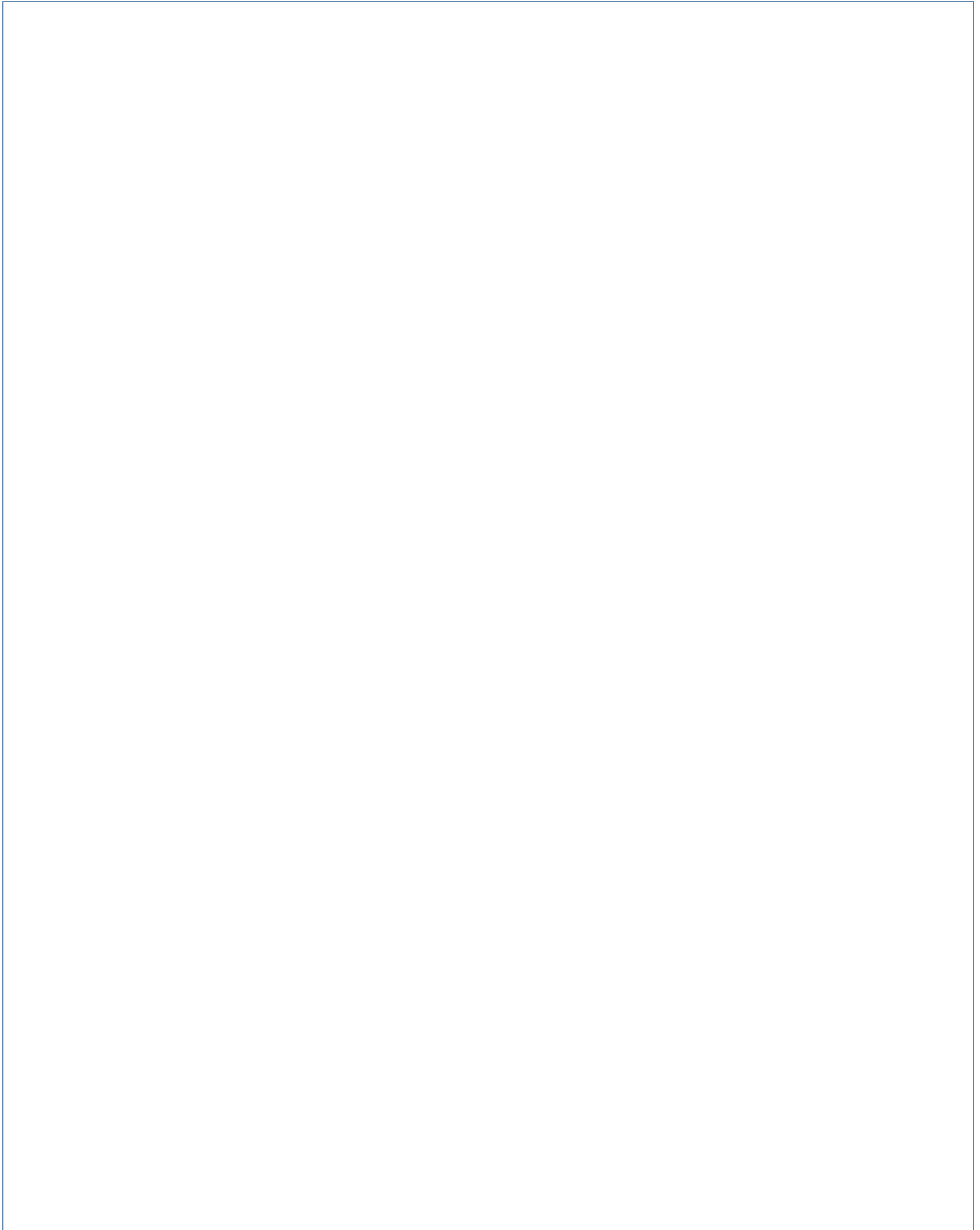
**Q5. How does this topic connect to other science topics or math?**

*Write down at least three words introduced or covered by this topic.*

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

# Make a Poster

In the space provided here, create/draw a poster which conveys the concepts you have learned on this topic.

A large, empty rectangular box with a thin blue border, intended for the student to create a poster. The box occupies most of the page below the instructions.