

# Technique 12

## Using the Scientific Method



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

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

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.

When a hypothesis is tested in a lab, it is always important to follow safe procedures. In high school labs, students should never “play around” during their work. “Horse-play” and just “joking around” can be dangerous.

These tips are always important. Before starting a lab test, study the steps and procedures. Identify the potential risks of each step before starting. Remove or eliminate risks if possible. Always wear appropriate attire and safety gear.

# 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

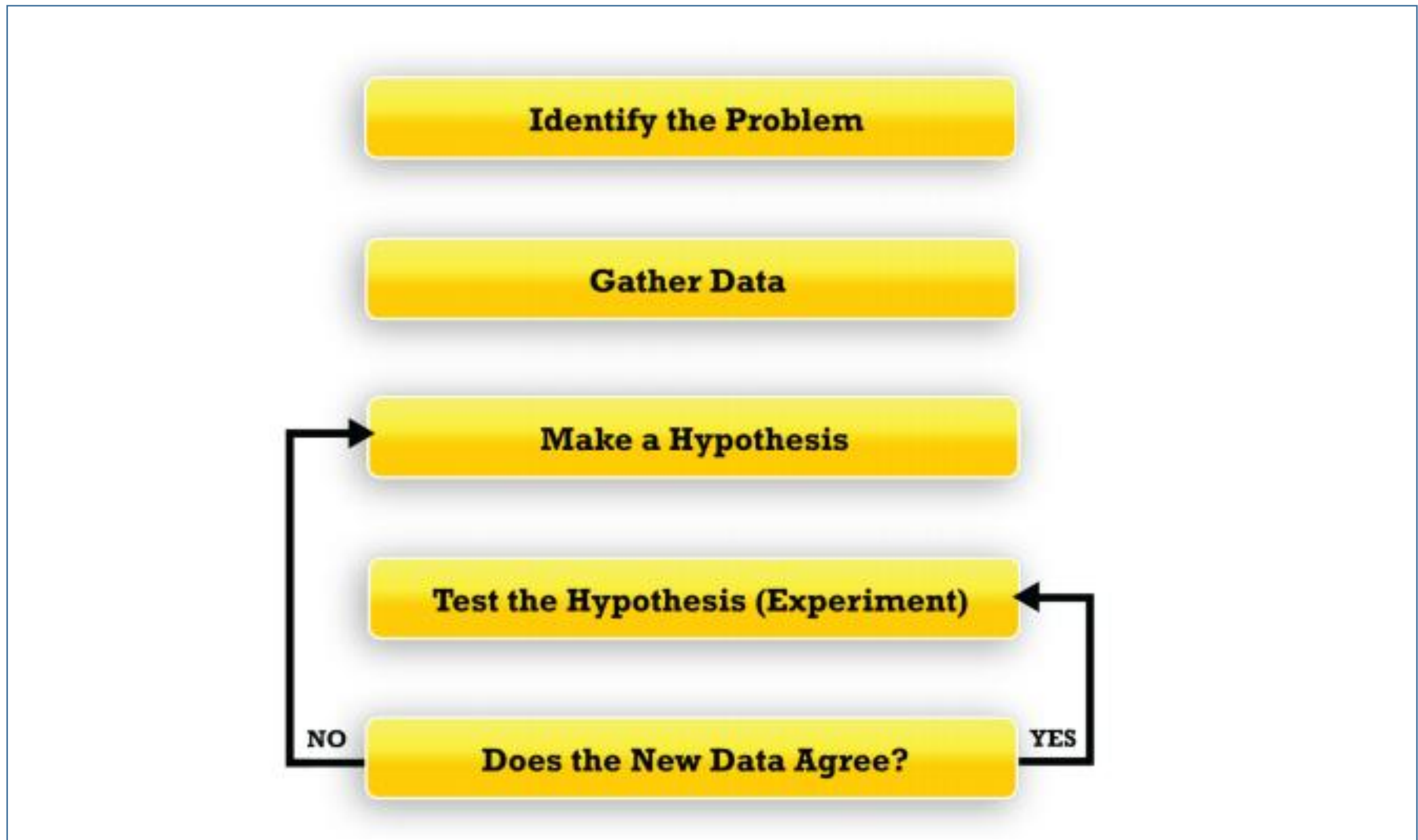
### Observational

Scientific Law

# Draw Illustration



Copy and Label the Illustration in the Space Provided



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Draw (Copy) the Illustration Here

# Draw a Bar Chart



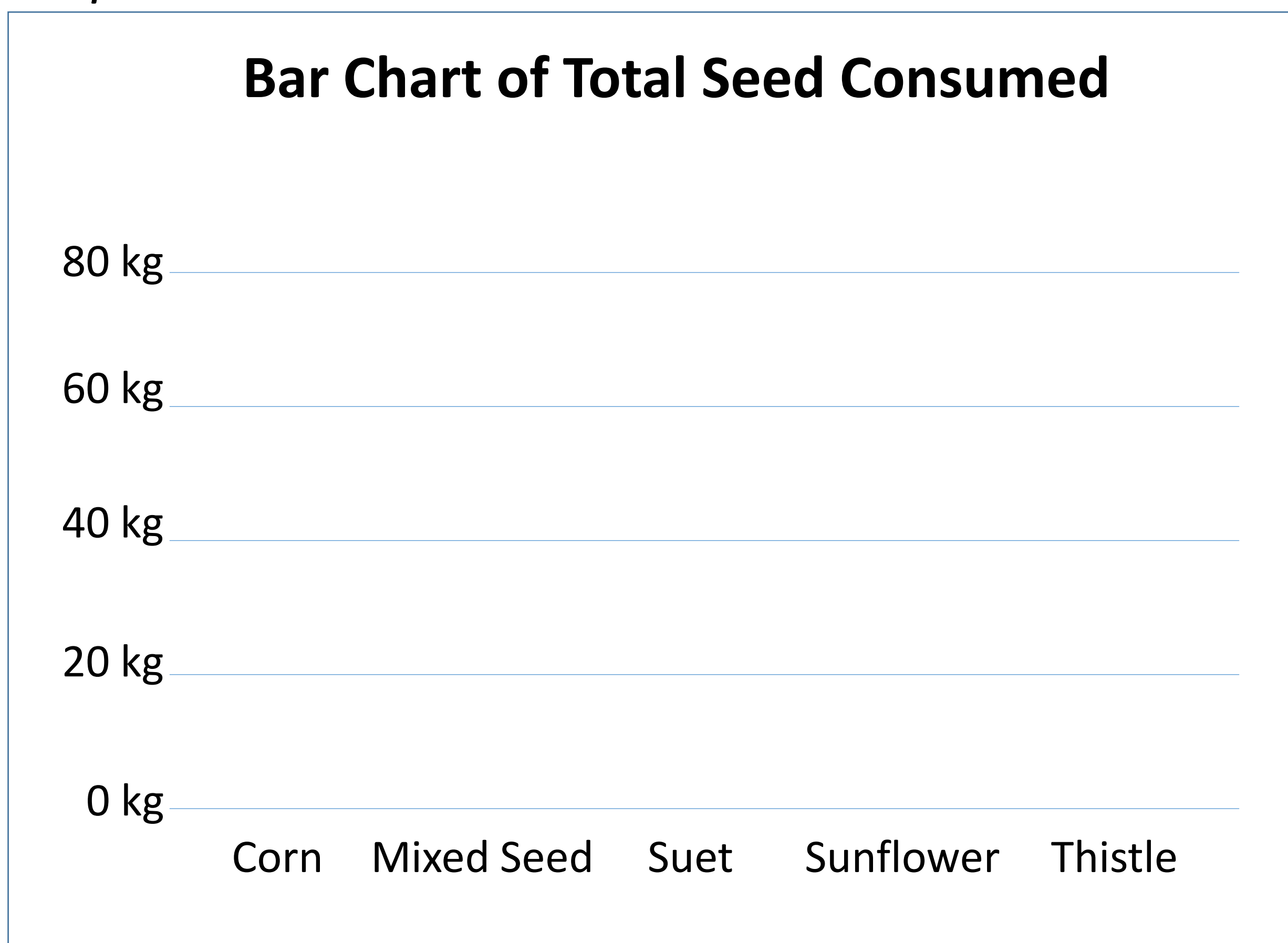
Hypothesis: Wild birds near Sallisaw, Oklahoma prefer sunflower seeds compared to other available feedstock in the area during summer months.

## Data Collected from June 19 through July 17.

### *Observed Type of Seed Consumed (in kilograms)*

|        | Corn  | Mixed Seed | Suet  | Sunflower | Thistle |
|--------|-------|------------|-------|-----------|---------|
| Week 1 | 26 kg | 19 kg      | 10 kg | 15 kg     | 14 kg   |
| Week 2 | 5 kg  | 13 kg      | 12 kg | 19 kg     | 6 kg    |
| Week 3 | 2 kg  | 8 kg       | 3 kg  | 15 kg     | 8 kg    |
| Week 4 | 10 kg | 12 kg      | 6 kg  | 17 kg     | 20 kg   |

*Complete the bar chart.*



# Show-Off Your Smarts!



## Instructions

- Complete as an individual
- Prepare to discuss in small groups, then as a class.

**Q1. How can concepts of the scientific method be applied to a young-person's life?**

**Q2. Look at the data from the bar chart you completed.  
Was the hypothesis supported by the data?**

(yes) ..... (no) ..... Circle your response

**if you said "yes" ... explain how the data supports the hypothesis.**

**if you said "no" ... explain your response.**

**Q3. How might this topic apply to other subjects – other than natural science?**

# Compare and Contrast

In the space provided here, list things that are in common between the scientific method and every-day observations. (Both)

Then list things that are unique to each.

