



DATE	HOMEWORK
Monday	→ Read "Question" passage on Page 1 → Answer the questions on Page 2
Tuesday	→ Read "Hypothesis" passage on Page 3 → Answer the questions on Page 4
Wednesday	→ Read "Variables" passage on Page 5 → Answer the questions on Page 6
Thursday	→ Teacher Planning Day - No School
Friday	→ No Homework

REMINDERS

-Homework due Monday, 9/20/21

SCIENCE VOCABULARY

Problem Statement

Research

Hypothesis

Manipulated/Independent/Test Variable

Responding/Dependent Variable

Control Variables

Materials

Procedures

Results

Conclusion

Applications

Abstract

Question

Name: _____

Every investigation begins with a question or a wondering.

How does _____ work?

Why does _____ happen when I _____?

What will happen if I _____?

The questions are endless! Our brains naturally wonder about things. If we observe something we don't understand, we can take steps to try and understand it. Mysteries are great exercises for our brains because they help us to wonder and question, then we can practice finding answers to those questions.

When we are developing an experiment or investigation, our scientific question needs to be testable. For example, if our question was *Which of the planets in our solar system is the largest?* we could simply do research to find the answer and an investigation wouldn't be necessary. If our question was *Which sports drink helps keep athletes hydrated for a longer period of time?* we would be able to design an experiment and discover the answer ourselves. If your question can be answered with "yes" or "no", it is not an investigation. When forming your questions, think of a problem you would like to solve or at least start with something you are interested in.

How does
_____ affect
_____?

Which _____
will work the
best?

Why does
_____ happen
when _____?

Questions have to be testable and must solve a problem. Creating a model of a scientific concept is not testable. Models can help represent an idea or something too big or too small to observe normally, but they do not solve a problem or answer a question.

Question

Name: _____

Determine if the questions below could be used for a scientific investigation. If the question could not be used for an investigation, rewrite it into a testable question.

1. How many dogs visit a dog park each day?

2. Which materials would keep your hands protected when handling items of a high temperature?

3. How do different types of music affect animal behavior?

4. How many hours does a dog sleep during the day?

5. Can a plant survive without water?

6. How many students are tired at school?

7. How will different types of foods affect athletes during games?

8. How far away from the sun is Mars?

9. Is plastic biodegradable?

10. What temperature does water have to be to brew tea?

Hypothesis

Name: _____

After a scientist has chosen their question to test, they must form a hypothesis. A hypothesis is a prediction of the outcome of the experiment. A hypothesis should be as specific as possible. For example, let's say a scientist asked the following question:

How does music affect plant growth?

The scientist could easily form the hypothesis: *Yes, I think music will affect plant growth.* This hypothesis, while it does reveal an expected outcome, could be much more specific. Instead of just saying yes, this scientist could say *I think calm, soothing music will help plants grow taller.* Or, *I think aggressive rock music will stunt plant growth.*

After being specific, the scientist could add on a justification. This means they can state why they predicted what they did. *I think calm, soothing music will help plants grow taller because it will create a positive atmosphere.* Usually a justification will come after the scientist conducts research. Research will help a scientist learn about their topic and will also help them design their experiment.

If a scientist makes a hypothesis that they find to be incorrect, that doesn't affect the validity of their experiment. If they conduct multiple trials and these results are consistent, then scientists will learn from their findings. Scientists are wrong all the time. That's why they do experiments and investigations. Don't ever become discouraged if your hypothesis is incorrect. That just means you learned something new!

Research Resources:

- ☐ Internet
- ☐ Books
- ☐ Articles
- ☐ Interviews

A hypothesis is often formed using the following statement:

I think _____ because
_____.

Hypothesis

Name: _____

Read each question below. Decide which hypothesis would best for each question. Write the number of the sticky note in the blank.

- _____ 1. What light brightness makes plants grow the best?
- _____ 2. Can the food we eat affect our heart rate?
- _____ 3. Which paper towel brand is the strongest?
- _____ 4. Does shoe design really affect an athlete's jumping height?
- _____ 5. Does having worms in soil help plants grow faster?
- _____ 6. What type of foods allow mold to grow the fastest?
- _____ 7. Does the color of a room affect human behavior?
- _____ 8. Do athletic students have better lung capacity?
- _____ 9. Can background noise levels affect how well we concentrate?
- _____ 10. What material would be best to wear to stay warm in winter?

1. I think athletes have a larger lung capacity because they need to be fit.

2. Room color will always affect human behavior.

3. I don't think eating certain foods will affect heart rate.

4. The greater the background noise, the more difficult it will be to concentrate.

5. Plants will always need light to help them grow.

6. Paper Towel Brand X will last longer without tearing.

7. Worms have nothing to do with plant growth.

8. Athletes have larger muscles, not larger lungs.

9. Thicker materials will help you stay warm in the winter.

10. Background noise will affect concentration.

11. Athletes can wear whatever shoes they want to wear.

12. The more cushioned the shoe, the higher an athlete can jump.

13. Foods with more moisture will grow mold quicker.

14. Brighter colors will cause more positive human behavior.

15. Any clothing will help keep you warm during winter.

16. Paper Towel Brand X is the strongest.

17. Foods with high amounts of sugar and fats will increase heart rate.

18. The brighter the light, the more the plant will grow.

19. All foods will grow mold.

20. The more worms in soil, the more nutritious it is, increasing plant growth.

Variables

Name: _____

Scientists conduct experiments and investigations in order to answer the questions they have. When scientists are designing their experiments, there are many things they need to consider, such as variables. Using variables in experiments helps generate accurate results. The word *variable* means that something is changing. There are 3 different types of variables scientists include in their experiments. Let's explore them...

Independent Variable

Let's say Sally wants to identify the best temperature in which to grow a tomato plant. She chooses three rooms to use for this investigation: room A is 50 degrees Fahrenheit, room B is 75 degrees Fahrenheit, and room C is 100 degrees Fahrenheit. The temperature of each room, because it differs, is the **independent variable**. The independent variable is what is directly and purposefully changed when designing an experiment. Using more than one independent variable in an experiment can result in inconsistent or muddled results.

According to her plan, Sally is expecting the different room temperatures to affect the growth of the tomato plants. The growth of each plant will be dependent on the temperature of the room they are placed in. Therefore, the growth of each plant is the **dependent variable**. If the experiment is done correctly, the data collected from the dependent variable will lead to an answer to your question.

Dependent Variable

Controlled Variable

Since Sally is using the same type of plant in each room (tomato plants), the plant type is her **controlled variable**, because she can control it.

Independent Variable- *What I CHANGE*
 Dependent Variable- *What I OBSERVE*
 Controlled Variable- *What I KEEP THE SAME*

Variables

Name: _____

Each of the following experiments includes an independent variable, dependent variable, and controlled variable. Underline each independent variable in blue, each dependent variable in red, and each controlled variable in green.

1. Rachel has 3 cups made of 3 different materials (metal, plastic, and Styrofoam). She fills each cup with the same amount of water at a temperature of 60°F. Every 15 minutes, Rachel measures and records the temperatures of the water in each cup.
2. Paul and his friends want to know the best way to fold a paper airplane. Their goal is to find the airplane that flies the furthest. They take plain white papers and fold each piece in a different style. They throw each plane four times and measure the distances traveled.
3. Mary's family is going camping. They want to make sure they have batteries that will last a long time to use in their flashlights. They purchase 3 of the same flashlights and 3 different types of batteries. After putting a different type of battery in each flashlight, they will leave the flashlights on for hours at a time and observe which light beam stays the strongest for the most amount of time.
4. Henry wants to make sure he gives his dog, Molly, food that she likes. He chooses 3 different flavors of the same brand of food: salmon, chicken, and beef. Henry sets the food out in bowls, then allows Molly to approach them. Henry takes note of which bowl Molly eats from first and how much of each bowl she eats.
5. In order to choose the best detergent, Tyler and his mom purchased a few different brands to test. They put ketchup, coffee, and ink stains on 3 different towels. Each towel was washed with a different detergent, then the stains were observed by Tyler and his mom.
6. Patrick had 4 pennies that are very dirty. He learned that certain liquids can clean pennies. He gathers 4 different liquids (Coke, honey, vinegar, and water) and submerges each penny in a different liquid for 3 days. After that, he rinses each penny off and determines which penny is the cleanest.
7. Samantha's dad wants to purchase the strongest paper towels on the market. They begin by purchasing 3 different brands. They will hold one sheet flat and drop 5g weights in the center until 2 of them rip and there is only one paper towel left.