🔬 Lesson Plan: The Nature of Science

Grade Level: 5
Subject: Science
Duration: 45-60
NGSS 5-PS1-4: Conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered.

🎯 Learning Objectives

By the end of this lesson, students will be able to:

- **Identify** the steps of the scientific method and explain their purpose
- **Describe** different scientific tools and their specific uses for observation and measurement
- **Differentiate** between dependent and controlled variables in an experiment

💼 Materials Needed: (all links are included in this PDF)

- Printed copies of the Study Guide (https://newpathworksheets.com/api/guide/study-guide-science-grade-5-the-nature-of-science.pdf)
- Practice Worksheet 0 (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-5-the-nature-of-science-0.pdf)
- Practice Worksheet 1 (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-5-the-nature-of-science-1.pdf)
- Practice Worksheet 2 (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-5-the-nature-of-science-2.pdf)

Lesson Procedure

Step 1: Introduction (5 minutes)

- Hook students by asking: "Have you ever wondered how scientists discover new things or test their ideas?"
- Introduce the concept of the scientific method and the specialized tools scientists use.
- Show the 'Scientific Method' section from the Study Guide. (https://newpathworksheets.com/api/guide/study-guide-science-grade-5-the-nature-of-science.pdf)

Step 2: Direct Instruction (15 minutes)

- Walk through the 7 steps of the scientific method: Question, Hypothesis, Control, Test, Data, Interpret, and Conclusion.

- Instruct them to focus on identifying controls, analyzing hypotheses, and interpreting simple graphed data. (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-5-the-nature-of-science-1.pdf)

Step 5: Assessment (10 minutes)

- Administer Practice Worksheet 2 as a short quiz to evaluate understanding of the scientific method, tools, and safety rules.
- Review the answers as a class to correct any misconceptions and collect the quizzes. (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-5-the-nature-of-science-2.pdf)

Differentiation Strategies

For advanced learners:

- Have students design their own simple experiment, explicitly labeling their hypothesis, the control variables, and the specific measuring tools they will need.

For learners needing support:

- Provide a visual flowchart of the scientific method.
- Physically show the measurement tools (like a graduated cylinder or balance) in the classroom to aid conceptual understanding.

Extension Activities

science-grade-5-the-nature-of-science-1.pdf)

- Practice Worksheet 2 PDF (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-5-the-nature-of-science-2.pdf)

THE NATURE OF SCIENCE

Science process skills include observing, classifying, estimating, measuring, inferring, predicting, creating graphs, and developing models….just to name a few!

Scientific Method

Scientists use the **scientific method** when they conduct experiments and investigations. You can be a scientist too! When conducting an experiment, you might use all or only some of the steps in the scientific method:

Steps to Using Scientific Method

Step 1: Ask a **question** about something you observe.

Step 2: State your **hypothesis**, which is a possible answer to your

A **control variable** is the part of an experiment that you do not make any changes to which you can use to compare the other parts of your experiment to.

During an Experiment

During an investigation, you often will make predictions, interpret your results, draw conclusions, and justify your conclusions. During your experiments, you should create charts and graphs to show your data results to justify the predictions you have made during your investigations.

Science Tools

There are many **scientific tools** you will use during your investigations and experiments. Many tools will help you observe and measure various things while conducting an experiment. These tools will help gather data during your investigations, draw conclusions, and interpret your results. Here are some tools you may use during an experiment:

Tools Used to Observe Things Closer and in MORE Detail:

- Telescopes – used to see things very, VERY far away, like stars
- Hand lens/magnifying lens – used to enlarge an object or item
- Binoculars – used to make object far away seem larger

- Hot plate – used to create heat

Tools Used for Calculating and Recording:

- Calculator - - used for figuring out—or calculating—various equations or number sentences
- Computer – used for recording, collecting, and organizing information.

Lesson Checkpoint: What is one tool used for measuring?

Safety in the Lab

Please read over the following important rules and guidelines to follow when you are conducting an experiment or investigation.

- Listen to ALL directions before beginning – even if you think you know what to do!
- Always wear goggles to **protect your eyes**.
- Clean up all spills right away.
- Never taste anything used during an experiment.
- Handle all equipment carefully, especially sharp or breakable tools.
- If something doesn't look or smell right, tell an adult right away.
- Put all supplies away when your experiment is completed.
- Wash your hands thoroughly when you are all finished.

The nature of science

Sci E

Name_____ Class_____ Date_____

1 Joseph was examining a rock he had found. He **looked** closely at the rock, he noticed the rock **smelled** like moss, and **felt** the rock with his fingers. What was Joseph using to examine the rock he had found?

A his textbook knowledge
B his past experiences
C his senses
D his science book

2 Amy was **sorting** leaves into different piles according to their shape, veins, and other physical characteristics. What was Amy doing with the leaves?

A matching
B labeling
C tagging
D classifying

3 After it started raining on Monday, Kelli made an **educated guess** on how much rain would fall in one hour based on her previous observations and her background knowledge. What was Kelli doing?

A estimating how much rain would fall

4 As a scientist, what should you do after you state a **hypothesis**?

A think of another hypothesis
B tell others your hypothesis is true
C state your hypothesis as fact

5

7

B making an inference
C classifying
D making a hypothesis

C letters
D experiments

9 Scientists do not just collect information during experiments, they also need to _____ the information they collected. This helps to **understand** and **explain the meaning** of that information.

A classify
B hypothesize
C guess
D interpret

10 What is the main reason scientists **conduct experiments** and **investigate**?

A because they want to make graphs
B because they want to answer questions
C because they want to write notes
D because they want to use chemicals

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Sci E

Name_____ Class_____ Date_____

1 What is written on **Line 2** of this lab report?

Line 1: Mark Hetfield
Line 2: I think that plant A will grow taller than plant B.
Line 3: 2 seeds, 2 cups, soil, water, marker

A the results of Mark's experiment
B the supplies needed for experiment
C Mark's name
D Mark's hypothesis

2 An experiment needs at least two parts that can be **compared**. What is the part of an experiment that you **do not make any changes to**?

A your hypothesis
B your data
C the dependent variable
D the control variable

3 What is the best way to **test** your hypothesis?

A look on computer
B ask a friend
C conduct an

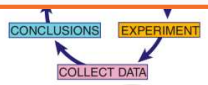
4 It is important to **collect** and **record** the data you get from an experiment. When should this be done?

A before the experiment
B during and after
the experiment

5

7

C predict
D clean up



C Vinegar and oil will not mix together.
D The baking soda will bubble when mixed with vinegar.

9 Which **hypothesis** would be best tested by conducting this experiment?

Hypothesis: _____

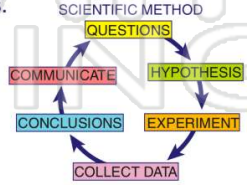
Experiment: Place a piece of bread in a plastic bag labeled A, and a piece of bread on a plate labeled B. Observe both pieces of bread each day.

A Mold will grow in the sun, but not in shade.
B Mold will grow faster in a bag than on a plate.
C Mold will grow on bread soaked in water.
D Mold will grow faster on white bread than rye.

10 Completing **every step** of the scientific method **in order** will lead to the most accurate results.

True or false?

A true
B false



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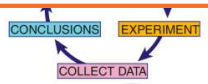

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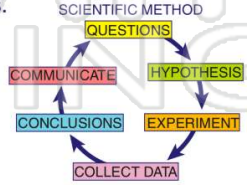


A

The nature of science

Sci E

Name_____ Class_____ Date_____

1 Cause: A pan of water was placed on the hot stove.
Effect: _____

A The water in the pan cooled down.
B The water in the pan turned red.
C The water in the pan spilled on the floor.
D The water in the pan began to boil.

2 A(n) _____ is the **variable** that is being observed during an experiment.

A restricted variable
B dependent variable
C independent variable
D controlled variable

3 Emma was conducting an experiment to determine the length of time it would take dough to rise above the loaf pan it was in. As she made the dough, Emma added salt to pan B, water to pan C, and baking soda to pan D. She did not add anything to pan A. Which pan was the **controlled** variable?

4 Which tool is used to **observe things closer** and in **more detail**?

A a thermometer
B a spring scale
C a hand lens

5

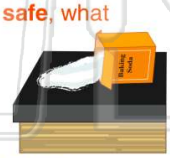
7

B a campfire
C a gas grill
D a hot plate

C binoculars
D a graduated cylinder

9 Jerry was conducting an experiment and accidentally **spilled baking powder** all over his lab table. To be **safe**, what should Jerry do next?

A finish his experiment
B clean up the spill right away
C clean up the spill after school
D move to a different lab table



10 What is the **most** important item students **should wear** while they are conducting a science experiment?

A a headband
B a visor
C glasses
D safety goggles

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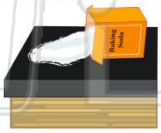

B

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