

Science Homework #6

SECTIONS 3A, B, C, D, & E

SEPTEMBER 22-26, 2025

Homework

- Read and complete the attached Study Guide.
- Review and study the information on the study guide and review vocabulary Quizlet

Vocabulary

[Topic 1 Vocabulary: Nature of Science](#)



Reminders

- Homework #6 due Monday, 9/29/25
- **Topic 1 Nature of Science Test MOVED TO FRIDAY 9/26**



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Study Guide: Nature of Science



Scientific Investigation

- **Definition:** An **organized process** scientists use to answer questions.
- **Two Types:**
 1. **Experimental Investigation** – involves a **controlled experiment** to test a **hypothesis**.
 2. **Observational Investigation** – used when experiments aren't possible; scientists **observe** and draw **conclusions**.
- **Examples:**
 - Animal behavior in the wild → **observational**
 - Movement of planets in the solar system → **observational**



Safety Rules

- Always wear **safety glasses** and **gloves** when handling dangerous or harmful chemicals.
- Use lab **equipment** only for its intended purpose.
- No **food or drinks** in the lab.
- Never **taste, smell, or touch** lab substances unless instructed.
- Unknown substances may be **flammable** or **harmful**.
- Always **wash hands** after working with materials.



The Scientific Method

An **organized**, and step-by-step **process**:

1. **Identify the problem OR Ask a Question**
2. **Research** the problem
3. Write the problem as a **testable question**
4. Propose a **hypothesis** (educated guess)
5. Collect **materials**
6. **Design and conduct** the experiment
7. Record and analyze **data**
8. Draw a **conclusion**



Experiment Basics

- All steps must be **documented** so others can **repeat** and confirm results.
- The problem is written as a **testable question** using **cause and effect** relationship (**For example: *How does water affect the growth of plants?***)
- A **hypothesis** is written as an **IF, THEN, BECAUSE** statement: ***If I change the amount of water I give a plant, then the plant with the most amount of water will grow the fastest because plants need water to grow and live.***
- Only **one variable** (the **independent variable**) should be tested at a time.
- The **dependent variable** is what you **measure** in an experiment.
- Other conditions remain **constant** to make sure results are accurate and fair.
- **Data tables** help spot **patterns** that lead to a **conclusion**.



Observational Investigations

- Used when variables can't be **controlled** (e.g., volcano eruptions, climates).
- Example: Climatologists studying how a volcanic ash cloud affects climate.
 - They **hypothesize** that less **sunlight** will lower temperatures.
 - They collect **data** from **observations**.
 - They look for **patterns and changes**.
 - They decide if their hypothesis is **supported** and draw **conclusions**.

Key Takeaways

- Scientific investigations = **Experimental** vs. **Observational**
- Always follow **safety rules** in the lab
- The **Scientific Method** = step-by-step process
- Good experiments test **only one variable**
- Observations help answer questions when experiments aren't possible

Observations vs. Inferences

- **Observation:** Information collected using the **five senses** (sight, hearing, touch, taste, smell) or tools.
 - Example: The beaker has 100 mL of water.
- **Inference:** A **logical explanation** or interpretation based on observations.
 - Example: The beaker was filled using a graduated cylinder.
- Scientists use **both** to form questions, hypotheses, and conclusions.

Scientific Tools

- **Measuring length** → Ruler, meter stick
- **Measuring volume** → Graduated cylinder, beaker
- **Measuring mass** → Balance scale
- **Measuring temperature** → Thermometer
- **Viewing objects** → Microscope, hand lens
- **Timing events** → Stopwatch or clock
- **Recording data** → Notebook, computer

Fill-in-the-Blank Review: Nature of Science

Scientific Investigation

1. A scientific investigation is an _____ process scientists follow.
2. The two types are _____ and _____.
3. Experimental investigations test a _____ using a _____ experiment.
4. Observational investigations use _____ and then make _____.
5. Studying animal behavior or planets is an example of an _____ investigation.

Observations vs. Inferences

6. An _____ is information gathered using the five senses or tools.
7. An _____ is a logical explanation based on observations.
8. "The beaker has 100 mL of water" is an _____.
9. "The beaker was filled using a graduated cylinder" is an _____.

Safety Rules

10. Always wear _____ and _____ when handling chemicals.
11. Lab _____ should only be used as intended.
12. Food and drink are never allowed in the _____.
13. Substances should never be _____, _____, or _____ without permission.
14. Unknown substances may be _____ or _____.
15. Always _____ your hands after experiments.

The Scientific Method

16. The scientific method is an _____ plan scientists follow.
17. First step: _____ the problem.
18. Next: _____ the problem.

19. Write the problem as a _____ question.
 20. Propose a _____.
 21. Collect _____.
 22. _____ and conduct the experiment.
 23. Record and analyze _____.
 24. Draw a _____.
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Experiment Basics

25. Steps must be carefully _____ so others can _____ them.
 26. The factor that changes is the _____ variable.
 27. The _____ variable is what you measure in an experiment.
 28. All other factors stay _____.
 29. A _____ table organizes _____ to spot _____.
 30. From these, scientists form a _____.
 31. The problem is written as a _____ using _____ relationship.
 32. A _____ is written as an IF, THEN, BECAUSE statement.
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Scientific Tools

30. To measure **length**, use a _____ or _____.
 31. To measure **volume**, use a _____ or _____.
 32. To measure **mass**, use a _____.
 33. To measure **temperature**, use a _____.
 34. To see small objects, use a _____ or _____.
 35. To measure time, use a _____.
 36. To record data, use a _____ or _____.
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Observational Investigations

37. A _____ studies climates.
38. The _____ studied by climatologists is how volcanic ash affects the climate.
39. They _____ that ash blocks _____, lowering temperatures.
40. Volcanoes cannot be _____, so scientists do _____ investigations.
41. They gather _____ from _____.
42. They look for _____ and _____ to see if their hypothesis is _____.
43. Finally, they draw _____.