**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Chem Period: \_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Lab

3

|  |  |
| --- | --- |
| **Date:** | **Title:**  Design an Experiment—Density & Buoyancy |

THE SCIENTIFIC METHOD

PROBLEM

HYPOTHESIS

EXPERIMENT

OBSERVATION

CONCLUSION



TASK: Design an experiment testing the following question:

**What is the effect of salt in water on an egg’s buoyancy?**

# STEPS OF THE SCIENTIFIC METHOD

1. **State the problem**: The problem is a question that the scientist is trying to find an answer to.

*What is the effect of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_?*

*Independent variable Dependent variable*

1. **Propose a Hypothesis**: A hypotehsis is a prediction about the posible answer to the problem based upon both research an observations.

## If\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ then \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

## because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. **Design an experiment**: to test the Hypothesis.

* **Independent Variable:** You-Change-It Variable.:
* **Dependent Variable:** You-measure-it Variable.:
* **Constants:** Things you will keep the same between your groups.:
* A **controlled experiment** must test only the group with the Independent Variable.
* The **control** is the same experiment but does not contain the variable.

1. **Make observations**. The scientist makes observations and collects **data**.

* Observations include **measurments.**
* Data is organized by diagramas, tables, graphs, equations,…

1. **State a Conclusion**. The conclusion is the answer to the problem. **Theories and scientific laws** result only when many scientists repeatedly reach the same conclusion.

**NOW IT’S YOUR TURN!**

THE SCIENTIFIC METHOD FOR YOUR EXPERIMENTAL DESIGN

|  |  |
| --- | --- |
| **State the problem** | *What is the effect of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_?* |
| **Propose a Hypothesis** | *If\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*  *then \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*  *because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* |
| **Independent Variable:**  You-Change-It Variable. |  |
| **Dependent Variable:**  You-measure-it Variable |  |
| **Control**  What needs to stay the same |  |
| **Materials**  What will you use for the experiment |  |
| **Design an experiment:**  to test the Hypothesis.  **(Procedure)** |  |
| **Make observations.**  **Collect data.** |  |
| **State a Conclusion.** |  |

DISCUSSION:

* My hypothesis was correct incorrect inconclusive (circle one)
* 2 pieces of evidence (use specifics) that proved my hypothesis to be correct/incorrect:
* Explanation for hypothesis (connect to density):
* Sources of error
* Things to change in the experiment to make it better
* Two questions about experiment:
* REAL WORLD CONNECTION: Can one float more easily in the open waters or when you're swimming in fresh water/in a swimming pool? Explain your answer, connecting it to density.

|  |
| --- |
| Group work reflection: |
| **Roles: (4 pts) Please put first AND last name!**   1. Task Manager: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 2. Spokesperson: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 3. Data Collector: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 4. Resource Manager \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   **Checklist: (4 pts)**   * Did each person play a part in the lab and on task? * Did you follow safety rules? * Were all parts of lab completed? * Was group workspace cleaned up?   **Answer the following questions: (10 pts)**  What worked well the most during the assignment for the group?  What did not work so well during the assignment for the group?Where did you disagree as a group or saw mistakes in each other’s work?  What will you do next time to improve how your group worked together?  How much did you as an individual participate in the group?  What can you do next time to improve your own performance in the lab group? |

**Group Rubric:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Poor**  **1 point** | **Developing**  **2 points** | **Good**  **3 points** | **Excellent**  **4 points** | **Group Rating**  **(YOU RATE)** | **Teacher**  **Rating** |
| **Contribution** | One or more members do not contribute. | All members contribute, but some contribute more than others. | All members contribute equally. | All members contribute equally, and some even contribute more than was required. |  |  |
| **Cooperation** | Teacher intervention needed often to help group cooperate. | Members work well together some of the time. Some teacher intervention needed. | Members work well together most of the time. | All members work well together all of the time; assist others when needed. |  |  |
| **On task** | Team needs frequent teacher reminders to get on task. | Team is on task some of the time. Needs teacher reminders. | Team is on task most of the time. Does not need any teacher reminders. | Team is on task all of the time.  Does not need any teacher reminders. |  |  |
| **Communication** | Members need frequent teacher intervention to listen to each other and speak to each other appropriately. | Members need some teacher intervention to be able to listen to each other and speak to each other appropriately. | All members listen to each other and speak to each other in equal amounts. | Each member listens well to other members. Each member speaks in friendly and encouraging tones. |  |  |
| **Total Score: /32** | | | | | /16 | /16 |

* **TOTAL SCORE ON GROUP RATING: \_\_\_\_\_\_\_\_\_\_\_/32**
* **TOTAL SCORE ON REFLECTION: \_\_\_\_\_\_\_\_\_\_\_\_\_\_/18**
* **TOTAL SCORE ON COMPLETING ASSIGNMENT: \_\_\_\_\_\_\_\_\_/50**
* **Overall Score on Lab: \_\_\_\_\_\_\_\_\_\_\_\_\_**