

# Biology 11 Assignment

## The Scientific Method and Designing Experiments

**Big Idea:** Science matters! (<https://www.youtube.com/shorts/mEOeCi8pjog>)  
Life is the result of interactions at the molecular and cellular level.

- **Curricular Competencies:**

- ✓ Questioning and predicting: Formulate scientific questions and hypotheses.
- ✓ Planning and conducting: Design and carry out investigations using appropriate scientific methods.
- ✓ Processing and analyzing data: Recognize patterns and draw conclusions.
- ✓ Communicating: Present findings using appropriate scientific language and formats.

### Assignment Overview

In this assignment, you will apply the **scientific method** to **design and reflect on a simple experiment**. Understanding how scientists build knowledge through careful observation, questioning, hypothesis-making, testing, and analysis is a key foundation for the Life Sciences 11 course. Before moving on, watch the following video

(<https://www.bing.com/videos/riverview/relatedvideo?q=scientific+method+video&&mid=5B1F4B671EEFE8C5C2F05B1F4B671EEFE8C5C2F0&FORM=VAMGZC>) and read the following pages in your Life Sciences 11 textbook: Pages 5-13

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### Part A: The Scientific Method (Short Response)

Answer the following questions in complete sentences (you can use your Life Sciences 11 textbook:

1. Why is the scientific method important in biology?

2. List the main steps of the scientific method.
  
  
  
  
  
  
  
  
  
  
3. Provide an example of how someone might use the scientific method in daily life.

**Part B: Experimental Design (there is an attached example at the end of this handout to help you with part B if needed).**

Choose one of the following testable questions, or create your own with teacher approval:

- Does light affect the growth of plants?
- Does salt concentration affect how fast water freezes?
- Does temperature affect the activity level of yeast?
- Does the size of a container affect the rate of evaporation?

For your chosen question, complete the following:

1. **Question:** State your scientific question clearly.
  
2. **Hypothesis:** Write a testable hypothesis in “If ... then ... because ...” format.
  
3. **Variables:** Identify:
  - Independent variable (what you change)
  - Dependent variable (what you measure)
  - Controlled variables (what you keep the same)

4. **Materials & Method:** Outline the steps of your experiment and the materials you would need.
5. **Data Table:** Create a simple chart where you would record your results.
6. **Expected Results:** Predict what you think the outcome will be and why.

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### Part C: Reflection

Answer the following after you complete Part B:

1. Why is it important to only change one variable at a time in an experiment?
2. How do scientists make sure their results are reliable?
3. What could be some sources of error in your experiment?

**Your completed assignment should be written neatly or typed and stapled to this assignment. Be sure to include all three parts (A, B and C).**

### **Total: /20 marks**

- Part A (Understanding): /5 marks
  - Part B (Design): /10 marks
  - Part C (Reflection): /5 marks

# Example:

## Experimental Design

### 1. Question

Does the presence of salt affect how quickly ice melts?

### 2. Hypothesis

**If** salt is added to ice, **then** the ice will melt faster **because** salt lowers the freezing point of water, causing the ice to turn into liquid water more quickly.

### 3. Variables

- **Independent Variable (what I change):** Presence (or absence) of salt on the ice.
- **Dependent Variable (what I measure):** Time it takes for the ice to completely melt.
- **Controlled Variables (what I keep the same):**
  - Size and shape of ice cubes
  - Amount of salt added (for the “with salt” condition)
  - Type of container used
  - Room temperature
  - Location (all samples kept in the same environment)

### 4. Materials & Method

#### Materials:

- 6 ice cubes (all the same size)
- 2 small bowls or cups
- Measuring spoon
- Timer or stopwatch
- 1 tablespoon of table salt

Name:

TA:

**Method (Steps):**

1. Place 3 ice cubes in Bowl A (no salt).
2. Place 3 ice cubes in Bowl B and sprinkle 1 tablespoon of salt evenly over them.
3. Start the timer as soon as the ice cubes are in the bowls.
4. Observe both bowls at regular intervals (every 2 minutes).
5. Record how long it takes for the ice cubes in each bowl to completely melt.
6. Repeat the experiment at least two more times for reliability.

**5. Data Table**

Trial	Time for Ice to Melt Without Salt (min)	Time for Ice to Melt With Salt (min)	Observations
1			
2			
3			
Average			