1.1 What is Science?

- Biology is the scientific study of all forms of life.
1.1 What is Science?

- An organism is any individual **living thing**.
  - All are made of one or more **cells**.
  - All need **energy** for metabolism.
  - All **respond** to their environment.
  - All have **DNA** for reproduction and development.
1.2 How Scientists Work

The Scientific Process:

Science is a way of thinking, questioning, and gathering evidence.
1.2 How Scientists Work

- Scientific process begins with making observations.

  - **Observation** = any information that can be gathered from your five senses
  
  - **Quantitative Observation**: a) involve measurements and numbers  
    b) ex: There are 2 windows and 36 chairs in this room.

  - **Qualitative Observation**: a) do not involve measurements and numbers  
    b) ex: The chairs in this room are blue.
1.2 How Scientists Work

• The Scientific Process:
  - Inferences can be made based on observations.
    
    ➢ **Inference** = conclusions made from observations that try to explain those observations.

    ➢ **Example 1:**
      Observation = Bill is not in school today.
      Inference = Maybe Bill is sick.

    ➢ **Example 2:**
      Observation = Mom is late for an hour.
      Inference = She must be stuck in traffic.
There is no single “scientific method” but all scientific investigations have common stages:

- Asking questions (stating problems or objectives)
- Doing research (gathering background information)
- Forming hypotheses (making a possible prediction)
- Confirming predictions with experiments
- Collecting and analyzing data
- Drawing conclusions
1.2 How Scientists Work

Designing an experiment

- Experiments require two groups:
  1. Control group
     - the standard group; all conditions are kept the same.
  2. Experimental group
     - the test group; all conditions are kept the same except the variable (or the condition being tested)

Example: How does salt affect plant growth?

Control group = plant watered with plain water
Experimental group = plant watered with salt water
Variable = salt, plant growth
Two types of variables:

- **Independent Variable**
  A condition that is changed (ex: salt added to plant)

- **Dependent Variable**
  A change of second condition caused by the independent variable (ex: plant growth caused by salt)

Besides the variables, all other conditions have to stay the same = constants.
1.1 The Study of Life

Scientific Method in Action

• Homer notices that his shower is covered in a strange green slime.
• His friend Barney tells him that coconut juice will get rid of the green slime.
• Homer decides to do test this out by spraying half of the shower with coconut juice. He sprays the other half of the shower with water.
• After 3 days of “treatment”, there is NO change in the appearance of the green slime on either side of the shower.

1) **What was Homer’s hypothesis?**
2) **Identify: control group and independent/dependent variables**
3) **What should Homer’s conclusion be?**

1.2 How Scientists Work
1.1 The Study of Life

What do you see on each side of the cube?

- name (boy or girl)
- number (top and bottom)
- shading (shaded or not)

Can you figure out the pattern and guess what should be on the bottom square?

Name Cube