Break It Down!

**Background**
Composting occurs naturally as organisms work to break down organic substances. As these substances are broken down, nutrient-rich material, called compost, forms. In this lab, you will be designing and building a compost bin. You will first research the necessary items for building it. Then, you will build it and monitor it over time. You will test the pH and the temperatures of the bins on Mondays and Thursdays and document your results. You will compare your results with other groups to determine which elements of the compost bins work the best.

**Prelab Questions**
You will watch a video about composting, based on your prior knowledge and the information shared in the video, answer the following questions:

1. What is a landfill?

2. What is composting? Why is it important?

3. What is pH?

4. What is an acid? What is a base? How is pH connected to each?

5. What is the difference between a chemical and a physical change?

6. What is a decomposer? How does it help the environment?
Problem
How can food waste be recycled into something beneficial to the environment?

Materials
- Two liter soda bottle
- Soil
- Newspaper-shredded into small pieces
- Food scraps (vegetables and fruits)
- Worms
- pH meter/paper
- Thermometer
- Water

Safety
- Always wear safety goggles when handling chemicals in the lab.
- Wash your hands thoroughly before leaving the lab.
- Follow the teacher’s instructions for cleanup of materials and disposal of chemicals.
- Make sure your compost bin has vent holes, as these are necessary for the worms and decomposers to breathe.
- Composting in a sealed bin can lead to accumulation of dangerous gases. Do not include meats or dairy products as they smell bad.

Procedure
1. You will be creating a compost bin in class. Add the following ingredients to your soda bottle:
   a. A handful of soil
   b. Shredded newspaper
   c. Water – enough to make it damp.
2. The following are independent variables that can be changed within your bin or added to your bin. Please only choose one:
   a. Heat added by placing it under a heat lamp
   b. Choice of vegetables or fruit
   c. Place your bin in a dark place
   d. Adding red worms
   e. Different amounts of components listed in the required section.
3. Record your independent variable in the space provided below.
4. Hypothesize what effect your variable will have on your compost bin. Write this in the space provided below.
5. Design your compost bin. Draw a labeled sketch of the compost bin and its contents in the space provided below.
6. Every Monday and Thursday, using a pH meter or paper and thermometer, measure the pH and temperature of your compost bin as well as your observations. Record this data in the table provided below.
**Data**

Independent variable:

Hypothesis Statement:

Labeled Sketch of Compost bin:

<table>
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<tr>
<th>Date:</th>
<th>pH:</th>
<th>Temperature:</th>
<th>Observations:</th>
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Analysis
1. What changes did you see in the pH levels over time? Did your compost become more acidic, more basic, or is there no change? Why do you think changes in pH occurred?

2. What changes did you see in the temperature over time? Why do you think these changes in temperature occurred?

3. Compare the data collected from your compost bin to the data from the control bin. What was different between yours and the control?

4. How did your independent variable cause a change that was different from the control? If no changes occurred, what might you have done differently to help your fruit or vegetable decompose?

5. Inspect other compost bins in your classroom and compare the results to your own. Based on this, what do you think would be the best combination of variables to promote composting?

Conclusion
Describe how we can recycle our food waste into something useful to the environment.