



## Temperature Management and Its Importance

### **Annotation:**

This lesson will describe how temperature is influenced in a controlled environment and how changes in temperature influence plant and animal production.

### **Primary Learning Outcomes**

Why is temperature control important in an agriculture setting?

### **Additional Learning Outcomes**

How do temperature sensing devices work?

### **Assessed Georgia Performance Standards:**

**SCSh1.** Students will evaluate the importance of curiosity, honesty, openness, and skepticism in science.

**SCSh2.** Students will use standard safety practices for all classroom laboratory and field investigations.

**SCSh3.** Students will identify and investigate problems scientifically.

**SCSh4.** Students will use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.

**SCSh5.** Students will demonstrate the computation and estimation skills necessary for analyzing data and developing reasonable scientific explanations.

**SCSh6.** Students will communicate scientific investigations and information clearly.

**SCSh7.** Students will analyze how scientific knowledge is developed.

**SCSh8.** Students will understand important features of the process of scientific inquiry.

**SPS7.** Students will relate transformations and flow of energy within a system.

**SPS9.** Students will investigate the properties of waves.

## **Procedures/Activities**

### ***Step 1 : Duration: 30 minutes***

1. Discussion to include how temperature is influenced in controlled environments as well as the influence of temperature changes on plant and animal production.

### ***Step 2: Duration: 60 minutes***

Discuss how thermometers work and have students build a water thermometer.

## **Attachments for Step 2**

**Title:** Building a Water Thermometer **FileName:** [Building a Water Thermometer.doc](#)

**Description:** Handout and procedure for building a water thermometer

### ***Step 3: Duration: 30 minutes***

Demonstrate to students how thermostats work by wiring a simple circuit on plywood using a 120-volt thermostat to control a light. This can be done by connecting the copper wire to both the positive and negative end of the battery and then connecting each of these wires to the thermostat light fixture. Diagram also included.

## **Materials and Equipment**

1. 120 V thermostat light fixture 2. 60 watt light bulb 3. #14 two w/6 copper electrical wire. 4. power source (battery) 5. thin plastic test tube 6. pipette 7. stopper 8. water vial

## **Total Duration**

2 hours

## **Assessment**

Students will be assessed in this activity via the lab activity and the answering of the questions associated with the water thermometer lab activity.

# BUILDING A WATER THERMOMETER

YOU CAN BUILD A WATER THERMOMETER WITH SOME SIMPLE MATERIALS, WATER, AND AIR. GALILEO FIRST USED THIS TYPE OF THERMOMETER IN 1593 TO MEASURE BODY TEMPERATURES, BUT IT WASN'T VERY ACCURATE. IT WORKS BECAUSE WHEN THE THERMOMETER IS WARMED, THE AIR EXPANDS AND PUSHES THE WATER DOWN THE TUBE. WHAT IS IT PUSHING AGAINST?

COLLECT FOUR THINGS FIRST:

- A. PLASTIC TEST TUBE WITH THIN SIDES
- B. THIN PLASTIC PIPETTE, ABOUT FOUR INCHES LONG &
- C. A SINGLE-HOLE STOPPER THAT CAN FIT THE TEST TUBE AND HOLD THE PIPETTE
- D. BOTTLE OR GLASS OF WATER

1. FIT THE PLASTIC PIPETTE INSIDE THE STOPPER UNTIL IT HAS A TIGHT FIT.
2. FILL THE TEST TUBE HALF-FULL WITH WATER. FIT THE STOPPER IN THE TEST TUBE AND FLIP THEM OVER SO THE TUBE IS POINTING DOWN.
3. LIGHTLY SHAKE OR FLICK THE TUBE UNTIL YOU SEE A NICE WATER LEVEL.

## QUESTIONS

WHY DOESN'T THE WATER POUR OUT OF THE TUBE THROUGH THE PIPETTE?

TO TEST THE THERMOMETER, HOLD THE TEST TUBE INSIDE YOUR HAND AND WATCH THE WATER LEVEL. WHAT HAPPENS? WHY?

CAN YOU THINK WHY THIS THERMOMETER ISN'T VERY ACCURATE?

WHAT WOULD HAPPEN AT 0° C?

### Simple Circuit Diagram

Note: If you are wanting a more permanent set-up, you may want to attach the wires permanently to the light fixture instead of using clamps. Use of the clamps allows the circuit to be broken and a quick review of electricity can be incorporated into this demonstration.

