# Water Sensor Activity

*Lesson Plan for Grade 4, Science*

*Estimated activity time: 40 Minutes*

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## OVERVIEW & PURPOSE

Pupils will be programming a device which will help to raise awareness in water conservation and provide a platform for pupils to show concern for water as a limited natural resource and the need for it in their everyday lives. Students will use the Micro:bit to develop a moisture sensing device for plants.

## EDUCATION STANDARDS

The Standards Aligned System (SAS)—Pennsylvania Department of Education

**S4.A.2.1**. Apply skills necessary to conduct an experiment or design a solution to solve a problem.

## PREREQUISITES

1. Using the knowledge of previous lessons, students will understand the importance of proper moisture levels in soil for a plant to grow. Important background knowledge includes: coding, building circuits, proper lab procedures, recording and interpreting data. Here are several lesson plans that cover the prerequisites: Computing Fundamentals (Programming 1), Water Conservation with Micro:bit (Lesson 1 and Lesson 2), and Case 04: Soil Moisture Sensor.

## OBJECTIVES

1. Students will use coding to sense the amount of moisture in soil.

## MATERIALS NEEDED

1. Laptop
2. Micro:bit
3. Handout including coding instructions
4. Moisture sensor and various wire connectors to complete circuits
5. Wire connectors with alligator clips
6. Data record sheet
7. Cup
8. Soil
9. Water
10. Paper towels
11. AAA batteries

## VOCABULARY

1. Variable: A value that can change.
2. Moisture: A small amount of liquid in the air or on a surface.
3. Alligator clip: A clip used for making temporary electrical connections.
4. Resource scarcity: Lack of availability of supplies required to maintain life or a certain quality of life.
5. Sustainability: Capable of continuing or being kept up over time.

## ACTIVITY

Brief overview of past lessons regarding agriculture, importance of proper watering, and the purpose of coding.

Steps of the lesson:

1. Students will review step-by-step instructions prior to starting the project.
2. Students will go to Micro:bit coding site (https://makecode.microbit.org/#editor) and open a "new project" to begin to code. (This has been done in previous lessons)
3. Following instructions once their code is completed, it can be downloaded onto the Micro:bit.
4. Once downloaded, students will follow the wiring schematic provided in handout to connect all necessary wiring to the Micro:bit, and build the circuit.

5. Students will observe the number readout on the Micro:bit to determine the moisture value in the air and write it on the data sheet.
6. Next, the students will place sensor in a cup of water and write down the value displayed on the Micro:bit.
7. Once dried with a paper towel, students will place the sensor in dry soil then add water and record each value.

## ASSESSMENT

Student success with be determined by three factors:

1. Correct programming. This can be checked by connecting to a known working circuit.
2. Correct wiring.
3. Data results should be in a range consistent with each test material.

## REFLECTION/MODIFICATIONS

1. After reviewing the data results, students will write how this is a benefit and potential uses for this assignment. Identify what was difficult or successful regarding the process.

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