



Name: _____

Assessment Soil Sensor

- 1) What is the main purpose of the soil sensor?
 - a) To measure the temperature of the soil
 - b) To measure the amount of moisture in the soil
 - c) To measure the acidity of the soil
 - d) To measure the nutrients in the soil

- 2) Why is it important to use copper tape strips to construct the soil moisture sensor?
 - a) Copper tape strips are inexpensive.
 - b) Copper tape strips are waterproof.
 - c) Copper is a good conductor of electricity, which helps in measuring soil moisture.
 - d) Copper tape strips are easy to cut and shape.

- 3) Why is it essential to ensure that the copper tape strips do not touch each other on the plant stake?
 - a) To prevent short circuits and ensure accurate moisture readings
 - b) To make the sensor look prettier
 - c) To allow the tape to stick better
 - d) To make it easier to handle the plant stake

- 4) What is the role of the 1 MOhm resistor in the circuit?
 - a) To speed up the charging process
 - b) To prevent the charge from draining back too quickly
 - c) To reduce the size of the sensor
 - d) To change the color of the LEDs

- 5) How does the soil moisture sensor use capacitance to measure moisture levels?
 - a) By heating the soil and measuring temperature changes
 - b) By creating sound waves and measuring their speed
 - c) By charging the copper strips and measuring how long it takes for the charge to drain away
 - d) By sending electric shocks into the soil

- 6) Explain how you would use the soil moisture sensor in a real-world application to help care for a garden or a farm.



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7) Imagine you want to improve the soil moisture sensor so that it automatically waters plants when the soil gets too dry. Describe how you would modify the setup or program.

8) Look at the Python code below. This code makes a rooster sound when the soil moisture sensor detects the soil is too dry. Can you change the code so that instead of making a rooster sound, it plays a cat meowing sound when the soil is too wet? How would you change the code to do this?



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Answer Key Soil Sensor

- 1) B - To measure the amount of moisture in the soil
- 2) C - Copper is a good conductor of electricity, which helps in measuring soil moisture.
- 3) A - To prevent short circuits and ensure accurate moisture readings
- 4) B - To prevent the charge from draining back too quickly
- 5) C - By charging the copper strips and measuring how long it takes for the charge to drain away
- 6) *Example:* The soil moisture sensor can monitor the moisture levels in the soil of a garden or farm. By placing the sensor in the soil, I can get readings that tell me if the soil is too dry or has enough moisture, which helps me know when to water the plants. If the sensor shows low moisture levels, I can water the plants to ensure they get the right amount of water to grow healthy. This prevents overwatering or underwatering, which can harm plants.
- 7) *Example:* I would add a relay module and a water pump to the circuit to improve the soil moisture sensor to water plants automatically. The relay would act as a switch that the sensor can control. I would modify the program so that when the sensor detects low moisture levels (below the "Dry + 50" value), it sends a signal to the relay to turn on the water pump. The pump would then water the plants until the sensor detects the soil moisture level is back in good range. This way, the plants get watered automatically without me needing to do it manually.
- 8) *Example:* To make the sensor play a dog barking sound when the soil is too wet, we need to change two parts of the code:
 1. Change the condition in the `if` statement to check for wet soil (a high moisture reading).
 2. Change the sound file name to `"animals-CatMeow"`.

```
## ---- Code ---- ##
cycles = 0
while True:
  piperBarGraphLED(False, (mapValue((GP0.readCapSenseValue()), 1450, 6050,
0, 10)))
  if (GP0.readCapSenseValue()) > 5500: # Changed condition to check for wet
soil
    if cycles == 10:
```



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```
playSound("animals-CatMeow") # Changed sound to dog barking
cycles = 0
cycles = isNumber(cycles) + 1

time.sleep(0.5)
```