Experiment 1

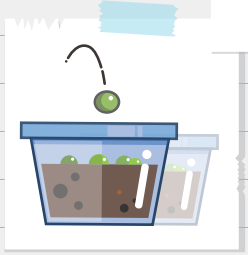
Effects of Soil Moisture on Plants

Have you ever failed in planting things? What caused your flowers to die shortly after planting? The BOSON Science Kit can help you identify the reasons.

Plants usually grow in soil. We will carry out an experiment to further explore the effects that soil moisture exerts on plants.

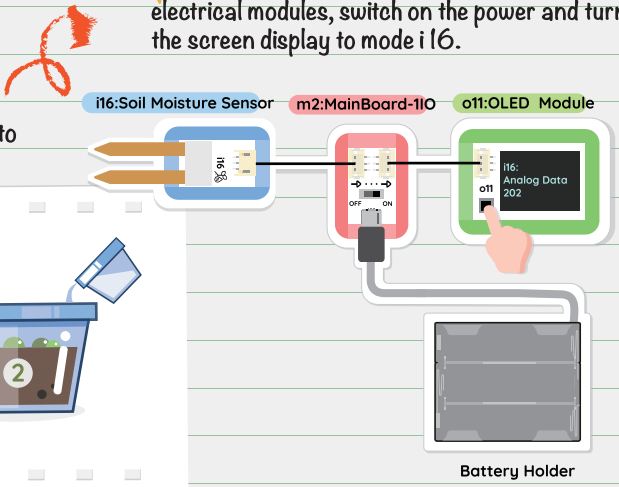
Steps :

1. Add appropriate depth of soil to each container.

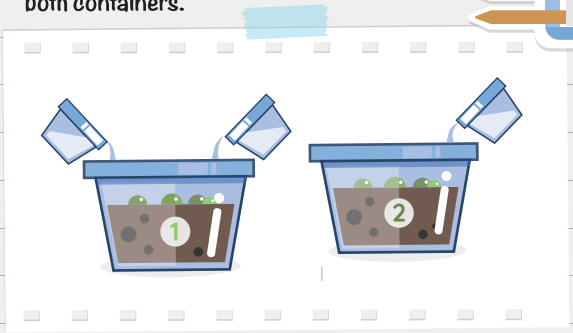


2. Place 6 mung bean seeds into each container

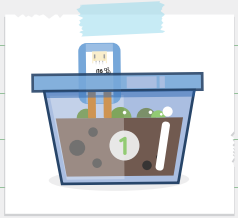
4. Connect all the BOSON electrical modules, switch on the power and turn the screen display to mode i16.



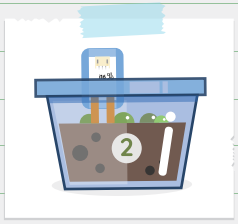
3. Add different amounts of water to both containers.



5. Set the soil moisture sensor to detect the soil humidity in one container.



6. Detect the other one.



Tips

Keep the two pots of soil in different moisture conditions.

7.Record the seeds' germination status under different moisture conditions.
Tips: If no germination is observed, please keep monitoring or change the soil moisture.

Form

Time Tested Soil moisture	1st	2nd	3nd	4th	5th	6th	7th

Further Exploration

Given the same Moisture level , if the monitored plant is switched from mung beans to soybeans, how will the germination times change? Start this second experiment and take notes.

Experiment 2

Effects of Soil Temperature on Plants

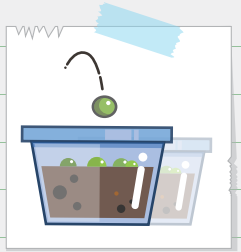
The goal of the experiment is to explore the impact that soil temperature has on plants.

Steps :

Materials needed:

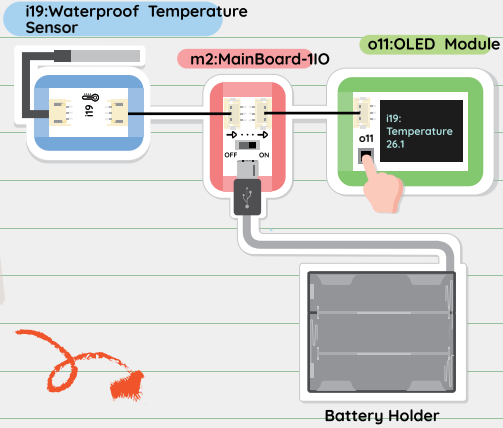
- Ice cubes
- 12 mung bean seeds
- Soil
- Two containers ×2

1. Add appropriate depth of soil to each container.

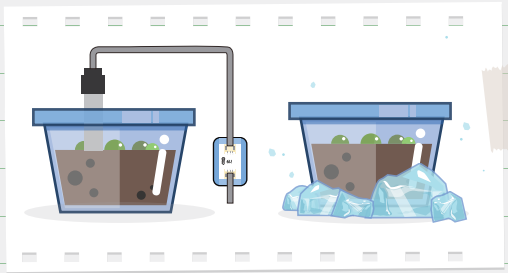


2. Place 6 mung bean seeds into each container

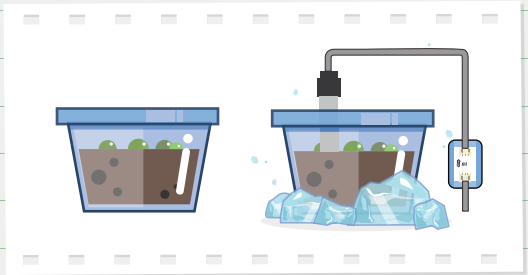
3. Connect all the BOSON electrical modules, switch on the power and turn the screen display to mode i 19.



4. Set the waterproof temperature sensor （i19 ） to detect the soil temperature in one container.



5. Detect the other.



Tips

Keep the two pots of soil in different temperature conditions. Equipment to increase temperature or ice can be used to change the temperature.

6. Record seeds' germination status under different temperature conditions. (If no germination is observed, please keep monitoring or change the soil temperature.)

Form

Time / Tested Soil Temperature	1st	2nd	3nd	4th	5th	6th	7th

Further Exploration

Given the same soil temperature, if the monitored plant is switched from mung beans to soybeans, how will the germination times change? Start this second experiment and take notes.

Experiment 3

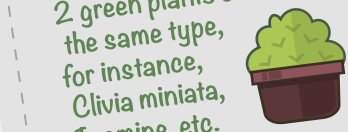
Effects of Sunlight Intensity on Plants

With the purpose of discovering how sunlight intensity impacts plants, we carry out the following experiment.

Steps :

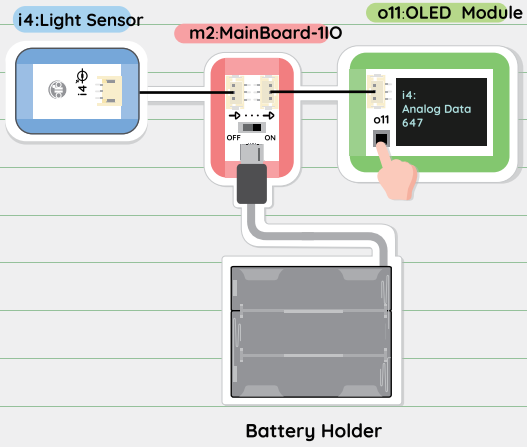
Materials needed:

2 green plants of the same type, for instance, Clivia miniata, Jasmine, etc.

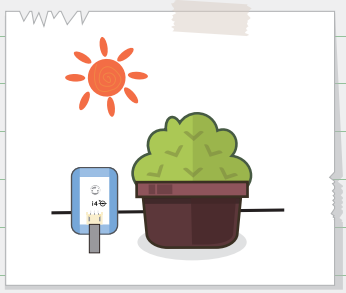


1. Place one of the plants in the sun, while another in the shade

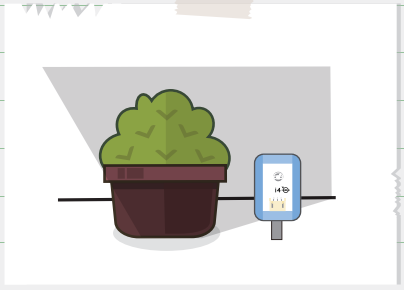
2. Connect all the BOSON electrical modules, switch on the power and turn the screen display to mode i 4.



3. Set the light sensor to detect the sunlight intensity in the area



4. Detect the other one.



5. Record their growing status.
Tips:You can record by your camera everyday

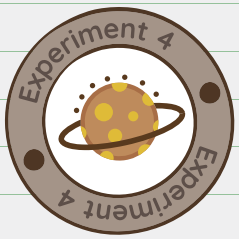
Form

Time / Tested light intensity	1st	2nd	3nd	4th	5th	6th	7th

Further Exploration

Given the same sunlight intensity for two plants, e.g., money plant or spathiphyllum, what will be the differences between their growing status?

Tips: Some plants are shade-requiring plants that should not be placed in direct sunlight.

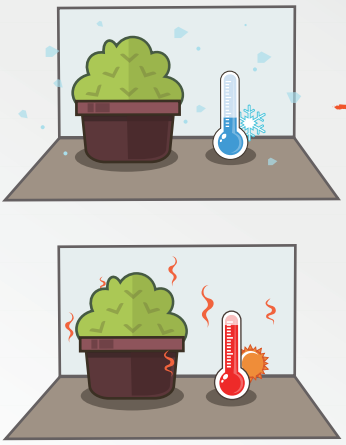


Effects of Ambient Temperature on Plants

This experiment allows the researcher to inspect how ambient temperature influences plants.

Steps :

1. Place the two plants in different ambient temperature surroundings.



Materials needed:

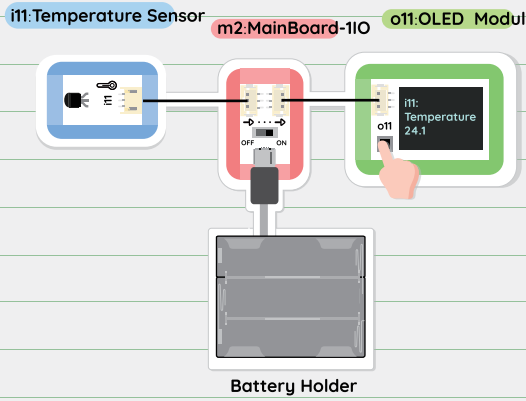
2 green plants of the same type

x2

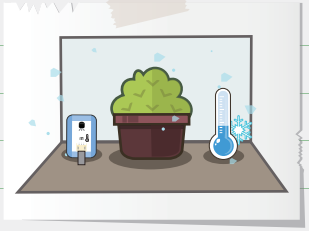
Tips

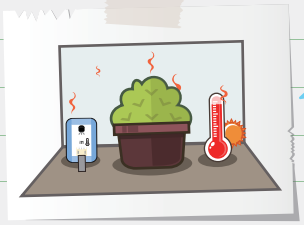
Cooling/ heating devices can be considered to generate various ambient temperatures.

2. Connect all the BOSON electrical modules, switch on the power and turn the screen display to mode i 11.



3. First detect the ambient temperature of a pot of plant.





4. Detect the other one.

5. Record their growing status.
Tips:You can record by your camera everyday

Form

Time / Tested temperature	1st	2nd	3nd	4th	5th	6th	7th

Further Exploration

Specific soil and ambient temperatures are required for plants' growth. How do changes in the ambient temperature impact these plants? Start this second experiment and take notes.

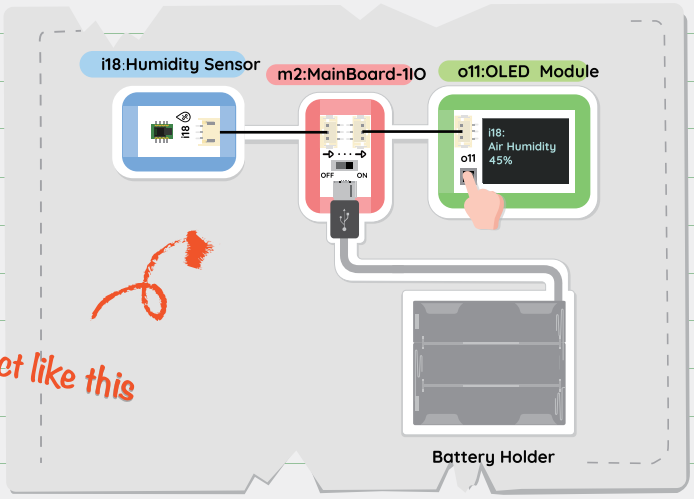
Tips: Plants can be divided into groups such as tropical, subtropical and temperate plants on account of their natural environments. Some tropical plants, such as cocoa trees, even demand an annual average temperature from 24°C to 28°C.

The Effects of Plants on Air Humidity

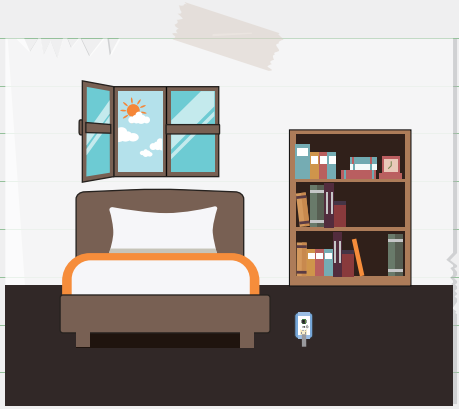
We've seen that many families are bringing plants into their homes. This research project aims to understand the effect that plants have on their surroundings?

Steps :

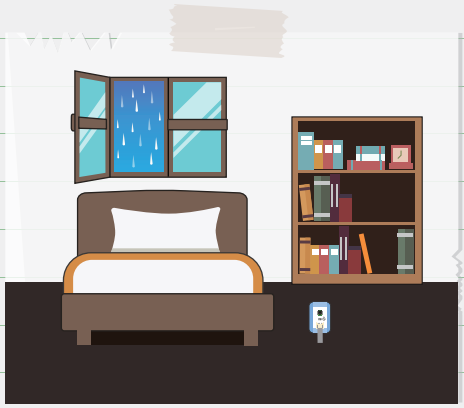
1. Connect all the BOSON electrical modules, switch on the power and turn the screen display to mode i18.



2. On a sunny day, use humidity sensors to detect the humidity in one room.



3. Detect the humidity in a rainy day.



4.Record the air humidity

Form

Time / weather	8:00	10:00	12:00	14:00	16:00	18:00
Sunny Day						
Rainy Day						

Further Exploration

Will there be different changes in air humidity in the outdoors? For example, a park with green plants. You can monitor the other places

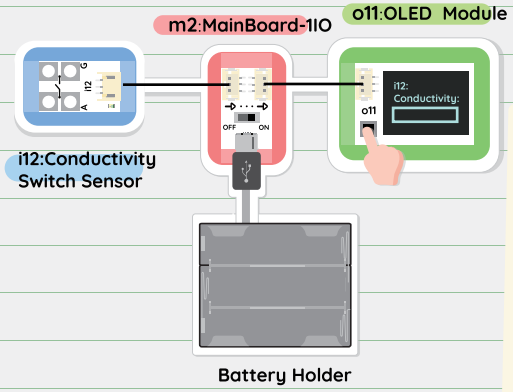
Time / place	8:00	10:00	12:00	14:00	16:00	18:00
a park with green plants						

Exploration of Conductive Objects in our Life

Have you ever noticed any Conductive Objects in your surroundings? You can use the BOSON Science Kit to explore their conductivity.

Steps :

1. Connect all the BOSON electrical modules, switch on the power and turn the screen display to mode i12.



Materials needed:

easily accessible materials in your house, for instance:

glasses

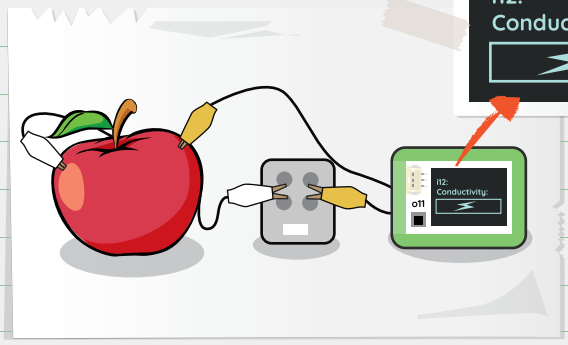
pieces of wood

apples

distilled water and clear water

ceramic cups

2. Connect the alligator-clip wires in position A and G to the tested material.



Tips: This voltage is safe for the human body.

3. Distinguish conductive and non-conductive objects, and keep track of which object falls into which group.

Conductive Objects include:

Non-conductive Objects include:

Further Exploration

Use your two hands to hold the two alligator-clip wires separately to test whether the human body is conductive. What differences will be found while using wet hands and dry hands?

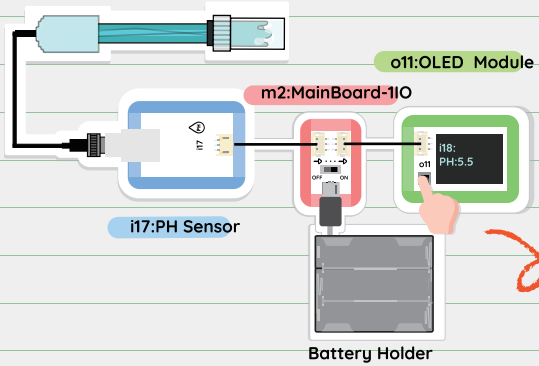
Experiment 7

Exploration of the PH Values of Beverages in Our Life

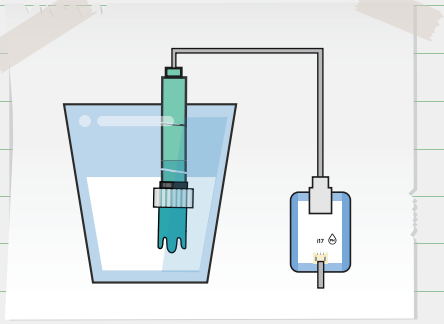
Have you ever studied the pH values of your favorite beverages? Is lemon water really an acidic liquid?

Steps:

1. Connect all the BOSON electrical modules, switch on the power and turn the screen display to mode i17.



2. Place the probe of pH sensor into the tested liquid.



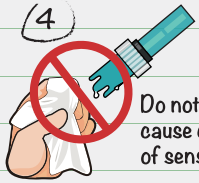
Notes:

1. Remove the protection cover from the pH sensor probe before testing.

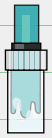
2. Make sure the protective liquid does not spill out of the protection cover.

3. Use clear water to clean sensor probe after a test is finished.

4. Do not wipe, as this may cause damage to the top end of sensor probe.



5. Maintain the pH sensor probe in protection cover after the test is finished.



3. Record the tested liquid's pH values.

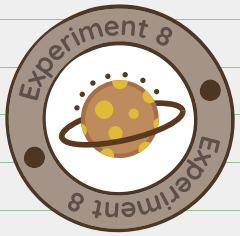
Beverages types / pH values	Cola	Lemon water	Drinking water	Coffee	Milk
pH values					

Further Exploration

What other beverages do you want to take a test?

Beverages types / pH values					
pH values					

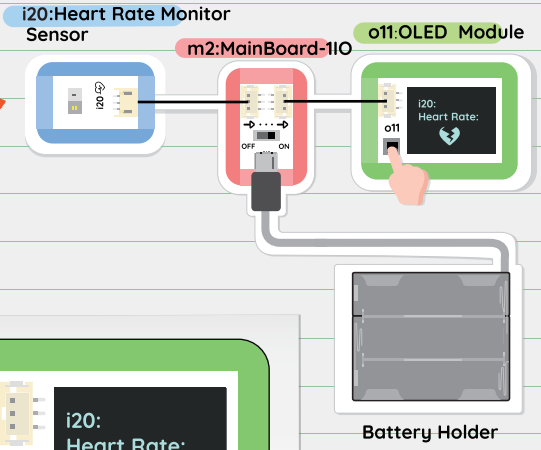
Tips:
Acidic liquid, pH<7, the lower pH value a liquid has, the stronger acidity it has;
Alkaline liquid, pH>7 , the higher pH value a liquid has, the stronger alkalinity it has.



Heart-rate Monitoring

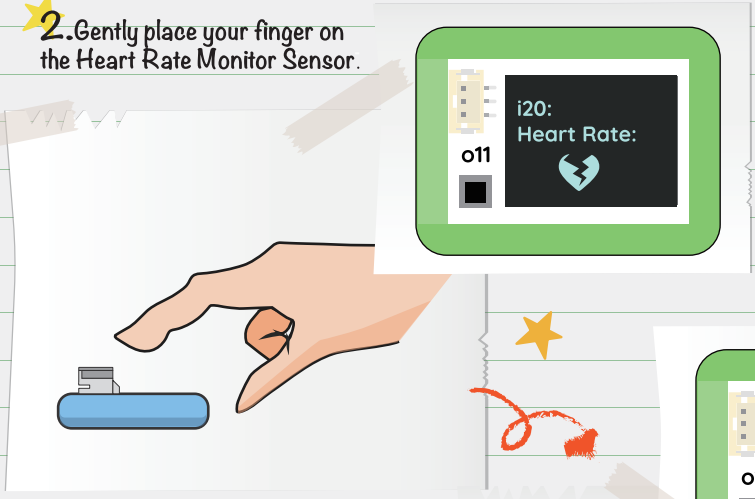
Usually, a heart-rate monitor can tell a person's health condition. We will set up this experiment to record the impact on heart-rates of differing situations.

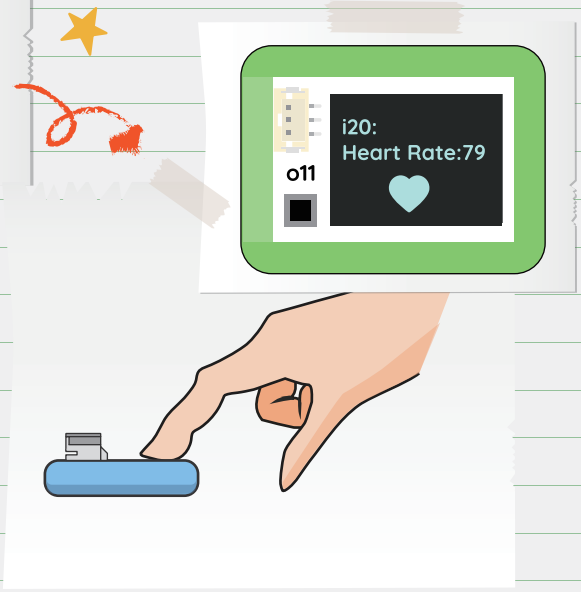
Steps :



1. Connect all the BOSON electrical modules, switch on the power and turn the screen display to mode i 20.

2. Gently place your finger on the Heart Rate Monitor Sensor.





Tips: the values should be measured with a steady heartbeat rhythm.

3. Measure heart-rate values under different conditions and keep a record of the data.

Situations	Tranquil Sitting	20mins' Jogging	Consecutive Jumps and Leaps for Ten Times
You			

Further Exploration

How do heart-rate values differ among different people? Go and find some other people to help you complete the test

People	Father	Mother	others
Heart rates			