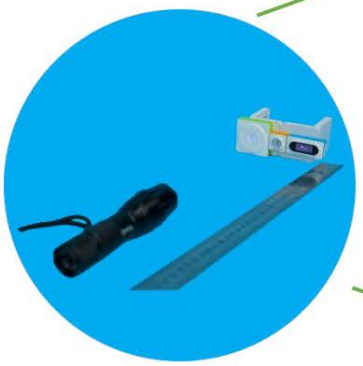
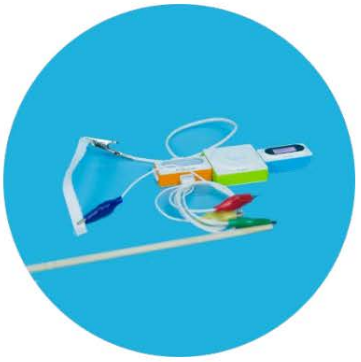
Scientist

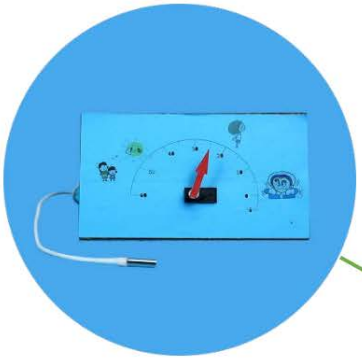
Reflectivity of Different Colors



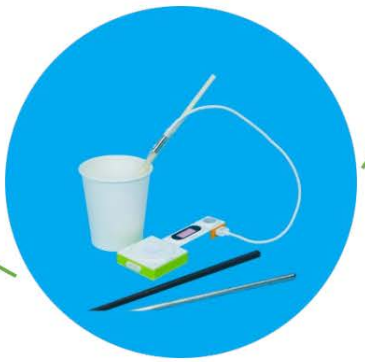
Exploring the Relationship between
Light Energy and Distance



Know Common Conductors and Insulators



Thermometer



Thermal Energy Transmission

Scientific Experiment: Reflectivity of Different Colors

Difficulty: Basic

Time: 30 Minutes

Lesson Description:

Use RGB lamps to create direct light that reaches on the paper. Use the light intensity sensor to measure the intensity of light reflected by the paper. Change the color of paper and observe the measured results.

Teaching Procedure

Objective of Experiment:

1. Investigate the effect of color on the light reflection.
2. Learn how to choose colors in architecture and design.

Question: Which color has great reflectivity? What color has strong light absorption ability?

Experiment process:

Step 1: Collect colored paper made of the same material.

Step 2: The distances between RGB lamp, light intensity sensor and paper should remain unchanged.

Step 3: Wait for the data on the light intensity sensor to become stable, then record the result.

Step 4: Change a paper in different color.

Step 5: Record at least 3 measurement results for each color.

Thinking after Class

- **Review on Key Points:**
  1. Which color can reflect light with the greatest reflectivity?
  2. Which fields in our lives does the rule apply to?
- **Improvement and Optimization:**

  How can we use this principle?

List of Materials

Module List

Name	Qty.	Unit
Power supply	1	PCS
Light sensor	1	PCS
RGB lamp	1	PCS
Display	1	PCS
Knob	1	PCS
Connection cable 10CM	1	PCS
Magnetic board	4	PCS

Material List

Name	Qty.	Unit
Worksheet	1	PCS

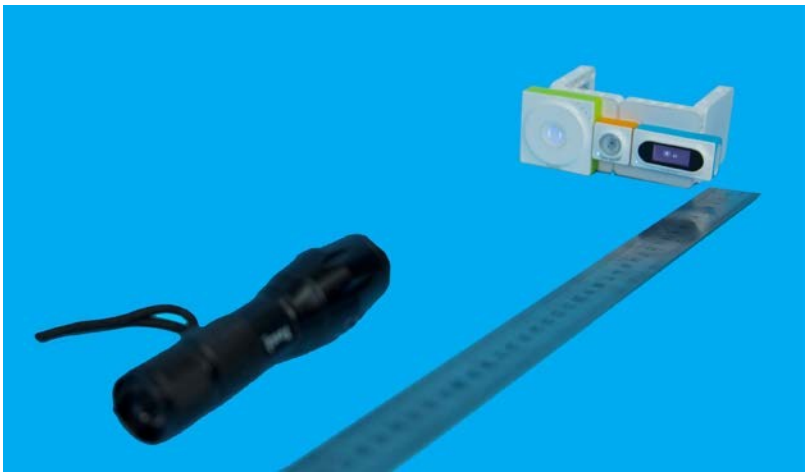
Data

Color	Reflectance				Average
White					
Blue					
Green					
Red					
Yellow					
Black					

Tips

- ✓ Descriptions for hardware modules and software nodes can be found in the appendix at the end of the page;
- ✓ For paper-based models of the same design, please find in the appendix at the end of the page~
- ✓ The works with "✪" are under online modes. Download Neuron APP on IPad or smart phone for programming;
- ✓ Download video of the work from official educational website: http://education.makeblock.com/
- ✓ Neuron APP Software version: 1.3.2

Scientific Experiment:
Explore the Relationship between Light Intensity and Distance



Difficulty: Basic:

Time: 30 Minutes

Lesson Description:

Use the Neuron's light sensor module along with the display module to make a simple instrument for detecting light intensity. Use this instrument to measure the light intensity at different distances to conclude the relationship between light energy and distance.

Teaching Procedure

Objectives:

1. Explore relationship between light intensity and distance.
2. Learn the control variable method in scientific experiments

Experiment Process:

Step 1: Place the measuring tape on the table for 50 cm.

Step 2: Set up the measuring instrument on the starting point of the tape (0 cm) .

Step 3: Put the flashlight at 10cm on the tape. Ensure that the height of the flashlight is the same as that of the measuring instrument.

Step 4: Record the result when the displayed result of the instrument becomes stable.

Step 5: Move the flashlight backward by 10 cm and record the result.

Step 6: Repeat Step 4 and Step 5.

Step 7: When the flashlight is moved to 30 cm, record the result and return the flashlight to 10 cm on the tape.

Step 8: Repeat this experiment 3 times to get the average value of the results.

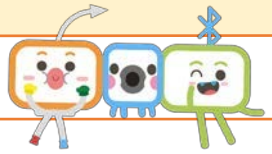
Conclusion:

The intensity of flashlight decreases as the distance from a light source increases.

Thinking after Class

- **Review on Key Points:**
  1. Why should we repeat the experiment more than 3 times?
  2. Is there a relationship between the energy of light and the distance?
- **Improvement and Optimization:**
  Try to find the current rule of light decay

List of Materials



Module List

Name	Qty.	Unit
Power supply	1	PCS
Light sensor module	1	PCS
Display	1	PCS
Magnetic board	4	PCS

Material List

Name	Qty.	Unit
Measuring tape	1	Roll
Worksheet	1	PCS

Data

Distance (CM)	Light Intensity					Average
10						
20						
30						

Tips

- ✓ Descriptions for hardware modules and software nodes can be found in the appendix at the end of the page;
- ✓ For paper-based models of the same design, please find in the appendix at the end of the page~
- ✓ The works with "✪" are under online modes. Download Neuron APP on IPad or smart phone for programming;
- ✓ Download video of the work from official educational website: http://education.makeblock.com/
- ✓ Neuron APP Software version: 1.3.2

Scientific Experiment:
Know Common Conductors and Insulators

Difficulty: Basic

Time: 30 Minutes

Lesson Description:

With the feature of a touch switch, make an instrument to determine whether an object is a conductor. Use the instrument to do an exploratory experiment, with the objective to let students learn the conductive properties of household materials.

Teaching Process

Objectives:

Identify the conductive household materials

Question: How do I make the touch switch work (forming a loop) ? Give examples of conductors and insulators.

Experiment Process:

Step 1: Find at least 10 commonly used materials (such as toothpicks, fruits, soda cans, white paper) .

Step 2: Based on the materials found, provide your assumptions as to which ones are conductors and which ones are not.

Step 3: Test the materials one by one, and record the results.

Thinking after Class

- **Review on Key Points:**
  1. What is a loop?
  2. What are conductors and insulators?
- **Improvement and Optimization:**
  Explore new question: Can the electrical conductivity of objects be changed?

List of Materials

Module List

Name	Qty.	Unit
Power supply	1	PCS
Touch switch	1	PCS
Display	1	PCS

Material List

Name	Qty.	Unit
Worksheet	1	PCS

Data

Material	Conductor	Insulator

Tips

- ✓ Descriptions for hardware modules and software nodes can be found in the appendix at the end of the page;
- ✓ For paper-based models of the same design, please find in the appendix at the end of the page~
- ✓ The works with "✪" are under online modes. Download Neuron APP on IPad or smart phone for programming;
- ✓ Download video of the work from official educational website: http://education.makeblock.com/
- ✓ Neuron APP Software version: 1.3.2

Scientific Experiment: Thermal Energy Transmission

Difficulty: Basic

Time: 30 Minutes

Lesson Description:

Use the temperature sensor to detect temperature changes of objects, and record the rules.

Teaching Procedure

Objectives:

Explore the thermal conductivity of different materials.

Experiment Process:

Step 1: Collect at least 3 kinds of objects of the same size but of different materials (such as wooden chopsticks, plastic chopsticks, and iron chopsticks) .

Step 2: Attach the temperature sensor on each object. Make sure that the temperature sensor is attached to the same position on each object.

Step 3: Prepare 3 cups of the same size and pour the same amount of hot tap water into each cup.

Step 4: Turn on the timer and record the temperature sensor's results once every 3 minutes.

Step 5: Record 3 sets of results

Thinking after Class

- **Review on Key Points:**
  1. Which household material has the best thermal conductivity?
  2. Which fields in our lives does the rule apply to?
- **Improvement and Optimization:**
  How can we use this principle?

List of Materials

Module List

Name	Qty.	Unit
Power supply	1	PCS
Temperature sensor	1	PCS
Display	1	PCS

Material List

Name	Qty.	Unit
Worksheet	1	PCS
Disposable cup	Several	PCS
Iron chopsticks	1	PCS
Plastic chopsticks	1	PCS
Wood chopsticks	1	PCS
Transparent adhesive tape	1	Roll

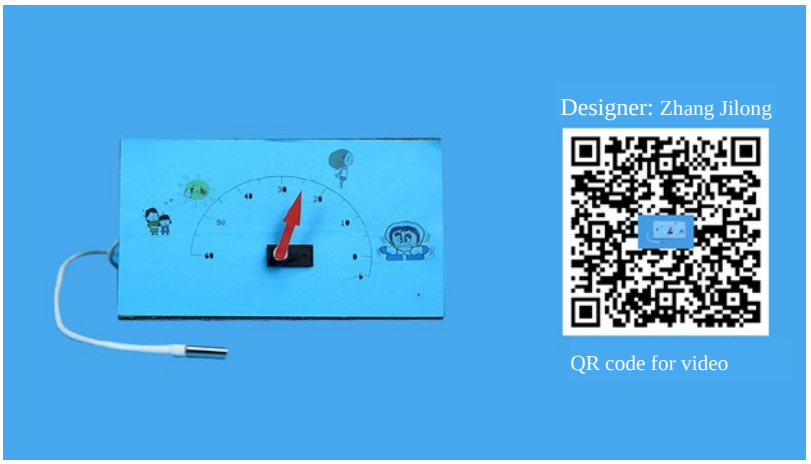
Data

Material	Time		
	3min	6min	9min
Iron			
Plastic			
Wood			

Tips

- ✓ Descriptions for hardware modules and software nodes can be found in the appendix at the end of the page;
- ✓ For paper-based models of the same design, please find in the appendix at the end of the page~
- ✓ The works with "✪" are under online modes. Download Neuron APP on IPad or smart phone for programming;
- ✓ Download video of the work from official educational website: http://education.makeblock.com/
- ✓ Neuron APP Software version: 1.3.2

Name of Work: Thermometer✪



Video Link: http://static.education.makeblock.com/Thermometer.mp4

Difficulty: Intermediate

Time: 30 Minutes

Lesson Description:

Use the temperature and humidity sensors to detect the temperature and humidity in the surrounding environment. Use the neuron APP programming feature to "map" the data into degrees which will be displayed on servo.

Teaching Procedure

Objectives:

1. Know and learn how to use the temperature and humidity sensor module to explore the surrounding environment.
2. Understand the "Mapping" node.
3. Make a thermometer.

Teaching Process:

Step 1: Start the lesson by telling a story (or a model) related to temperature.

Step 2: In the exploration stage, the students learn the knowledge covered in this lesson by self-study, such as Neuron modules and software nodes.

Step 3: Changes the external factors to cause temperature and humidity changes, which will let the students experience the natural changes. (For example, hold the sensor tightly and blow into the sensor)

Step 4: Show finished work to the students. Then provide them with necessary materials.

Step 5: After observing the sample finished work, the students start to make their own works.

Step 6: Share works with each other.

Thinking after Class

- **Review on Key Points:**
  1. Know and learn how to use the temperature and humidity sensor module to explore the nature environment.
  2. Understand the "Mapping" node.

- **Improvement and Optimization:**
  Try adding other sensors to make the thermometer smarter. For example, add RGB lamp or buzzer to realize reminding function.

List of Materials

Module List

Name	Qty.	Unit
Power supply	1	PCS
Bluetooth module	1	PCS
Temperature and humidity sensor	1	PCS
Dual servo-driver	1	PCS
Servo kit	1	Kit
Magnetic cable（10cm)	1	PCS

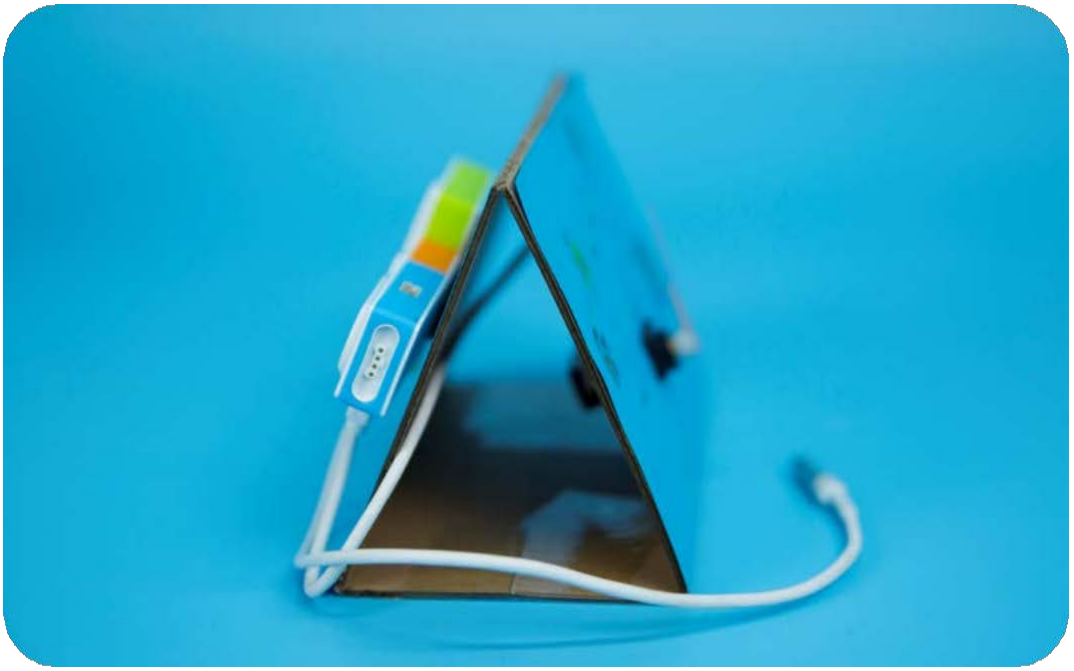
Material List

Name	Qty.	Unit
Cardboard	1	PCS

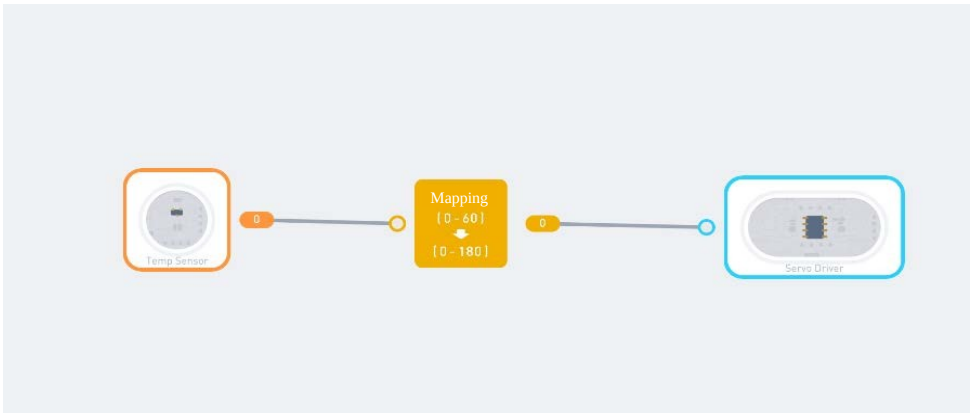
Work Production Procedure

➢ Work Production Process:


Bluetooth
Power
Temp Sensor
Temp
Servo Driver
Servo



➢ Demonstration for online programming



Tips

- ✓ Descriptions for hardware modules and software nodes can be found in the appendix at the end of the page;
- ✓ For paper-based models of the same design, please find in the appendix at the end of the page~
- ✓ The works with "✪" are under online modes. Download Neuron APP on IPad or smart phone for programming;
- ✓ Download video of the work from official educational website: http://education.makeblock.com/
- ✓ Neuron APP Software version: 1.3.2