

UNIT 3

Sensors

Daily Required Materials

- Teacher/students' HP Stream & projector
- Student notebooks

Lesson 3.1 Sensing Light

- Investigate the structure and function of the OPIC analog light sensor.
- Learn how the BasicBoard sends output signals from a sensor to the HP Stream.
- Use experimental observations to explain the structure and function of the OPIC analog light sensor.

Additional Materials

- BasicBoard
- Wire as needed
- Wire stripper
- OPIC analog light sensor

Lesson 3.2 Interpreting Light Sensor Readings

- Use a digital multimeter as a tool to investigate sensor signals.
- Model the mathematical relationship between analog sensor readings and digital BasicBoard outputs.

Additional Materials

- BasicBoard
- Digital multimeter with probes and extension wires

Lesson 3.3 Build a Night Light

- Learn how computational tools for making decisions are used in the Logo programming language.
- Use the comparison Logo words $<$, $>$, and $=$ to compare numbers.
- Use the conditional Logo word, *if*, to make decisions.
- Test and refine a Logo program that turns light sensor input signals into output instructions for blinking an LED.

Additional Materials

- BasicBoard
- Digital multimeter with probes and extension wires

Lesson 3.4 Sensing Temperature

- Wire additional temperature sensors to the BasicBoard and write Logo code to read their signals.
- Gather evidence to assess the accuracy and precision of the temperature sensors.
- Design an investigation to determine the relationship between sensor readings and temperature in degrees Celsius.

Additional Materials

- BasicBoard
- 2 TMP 36 Temperature Sensors
- Wire stripper
- Wire as needed
- Thermometer

Lesson 3.5 Sensors and Data Packets

- Use clues from patterns within Logo program files and patterns displayed on the computer to explain the structure and function of data packets.
- Write uLogo code to assemble data packets with readings from all three sensors on the BasicBoard.

Additional Materials

- BasicBoard

Lesson 3.6 Temperature Calibrations

- Interpret graphical representations of temperature calibration.
- Learn how to use the Logo calibration program to automatically convert ADU readings to the physical quantity, temperature in degrees Celsius.

Additional Materials

- BasicBoard
- 2 Leashed temperature sensors
- 2 Insulated cups
- Access to hot and cold water

Lesson 3.7 Understanding Temperature

- Identify patterns of evidence by organizing, representing, and analyzing data in the Logo programming environment.
- Interpret graphical representations of measured quantities.

- BasicBoard
- Graph paper (if needed)

Lesson 3.8 Design an Experiment

- Design an experiment that uses the hardware, software, sensors, and data analysis techniques acquired throughout Units 1, 2, and 3.
- Create a presentation to share your experimental design process and preliminary results.

- BasicBoard
- Experiment Plan Worksheet