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SUDBURY, ONTARIO, CANADA

Light and the Microbit	Grade 10 Physics

Lesson Plan	Coding Tool	Microbit
	Cross-curricular	Art (the colour wheel)

Big Ideas
- Light has characteristics and properties that can be manipulated with mirrors and lenses for a range of uses

- The behaviour of light depends on the materials with which it interacts

Specific Expectations
E2.1 use an inquiry process to investigate the laws of reflection, using plane and curved mirrors, and draw ray diagrams to summarize their findings

E2.5 investigate how various objects or media reflect, transmit, or absorb light, and record their observations using ray diagrams

E3.8 explain how the properties of light or colour are applied in the operation of an optical device

Description
This lesson plan contains three different activities that use the Microbit and its sensors to explore various properties of light.

Materials
- Microbit
- Light Sensor
- Rainbow LED
- Plasticine
- Mirrors
- Laser Pointer

Computational Thinking Skills
- Conditional statements
- Comparison
- Input and Output

Introduction
The behaviour of light is predictable and we can apply these properties to create and use various types of technology. Each of the three activities in this lesson demonstrate some of these properties:

Activity 1: Laser Maze
When reflected in a plane (flat) mirror, light bounces off at the same angle in the opposite direction from which it hit. Formally, this is the law of reflection which states that when a ray of light reflects off a surface, the angle of incidence is equal to the angle of reflection. Students will use the law of reflection to manipulate a laser to reach a light sensor.

Activity 2: Hue, Saturation and Luminosity
Web or digital colours are created using a combination of hue, saturation and luminosity. Each

of these can be set to create a specific colour and then adjusted to modify that colour. Students will adjust each of these settings on a rainbow LED to create definitions for hue, saturation and luminosity.

Activity 3: Light Intensity

Light intensity is a measure of the power emitted by a light source in a particular direction. The SI unit for light intensity is the candela (cd). The Microbit records the intensity of light that reaches its sensor. Placing different objects between a light source and the sensor will cause the light intensity measurements to change depending on the material. Students will explore concepts such as translucence, opaqueness, refraction and reflection.

Action

In this lesson, students will use the Microbit to explore different properties of light and optics. There are three different activities presented in this lesson that use either the light sensor or the rainbow LED.

Activity 1: Laser Maze

This activity requires students to construct a path that uses mirrors to direct a laser towards the Microbit's light sensor. When the laser makes it to the light sensor, it will turn the LED from red to green. Use pre-built courses or build your own using the provided grid.

Activity 2: Hue, Saturation and Luminosity

This is an activity that works better online than with the physical Microbit. Students will explore hue, saturation and luminosity on the rainbow LED to create a definition for each. They will then get the opportunity to compare that to the actual definition and make their own colours.

Activity 3: Light Intensity

The Microbit's light sensor is capable of recording the intensity of the light reaching it. Using the LED and the light sensor, students will place various objects between the two and observe how much light is able to pass through.

The procedure and the code for how to do each of the activities is presented in their respective handouts.

Consolidation/Extension

Three different activities using the light sensor were presented in this lesson but that doesn't mean there aren't more applications for the rainbow LED and the light sensor. Challenge students to create their own experiment that uses the Microbit.

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