Microbit Smart Home	Grade 9 Physics

Lesson Plan	Coding Tool	Microbit
	Cross-curricular	N/A

Big Ideas
Assess some of the costs and benefits associated with the production of electrical energy from renewable and non-renewable sources, and analyse how electrical efficiencies and savings can be achieved, through both the design of technological devices and practices in the home.

Specific Expectations
E1.3 produce a plan of action to reduce electrical energy consumption at home, and outline the roles and responsibilities of various groups in this endeavor
E2.5 Design, draw circuit diagrams of, and construct series and parallel circuits

Description
In this lesson, students will use a Microbit and various sensors to create smart home features that can be used to reduce electrical consumption in their home.

Materials
- BBC Microbit
- Elecfreaks Microbit Smart Home Kit

Computational Thinking Skills
- Conditional statements
- Comparison
- Variables
- Boolean

Introduction
The introduction of smart technology has made it easier and more convenient to save energy and money for home owners. Smart, synchronized, Wi-Fi enabled devices allow home owners to control home security cameras, light bulbs, thermostats and more through a smartphone. This home automation system lets technology work more efficiently and effectively, only consuming energy when needed. For example, a smart thermostat can learn a home's habits and adjust the temperature automatically. Another way that smart technology can reduce energy is to keep track of the rooms that are in use and reduce the energy consumption for the other rooms. When used to make the most out of available energy, smart homes can save a homeowner 15-30% in energy consumption.

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1

Action

In this lesson, students will use the Microbit and Smart Home Kit to create a system that can be used to reduce energy use around the home.

Students can use any combination of the sensors and Microbit functions for their project. The included handouts demonstrate the set-up and the code for two different smart home features.

The first of the projects is for a smart light. In this set-up, a light turns on when it is dark and turns off when it is light outside. This is an easier project to do, but can be expanded by dimming the brightness depending on the light intensity.

The more challenging of the projects is for a smart fridge. In this set-up, the crash sensor is used to indicate when a fridge is left open. If the fridge is left open for an extended period of time, an alarm is triggered to remind the home owner to close their fridge.

These are two sample projects and depending on the level of comfort with coding, students can either follow these projects or create their own smart home prototype.

Consolidation/Extension

It is possible to extend on the smart home project in the following ways:
- Use craft or building material to improve the prototype beyond the Microbit and sensors. Create a more detailed device, appliance or a model of a home that utilizes the smart device.
- Draw circuit diagrams for how the Microbit is wired using the different sensors.
- Calculate how much energy the smart device would save. Compare this to different scenarios. For example, run the light sensor for the day and record how much time the light is on or off. Compare the energy consumption to if the light were on for the entire day.

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2