Lesson Plan

<Investigating rate of emission of infra-red radiation>

Subject: Physics

Level: Lower Sec (modular Sci(Phy) component

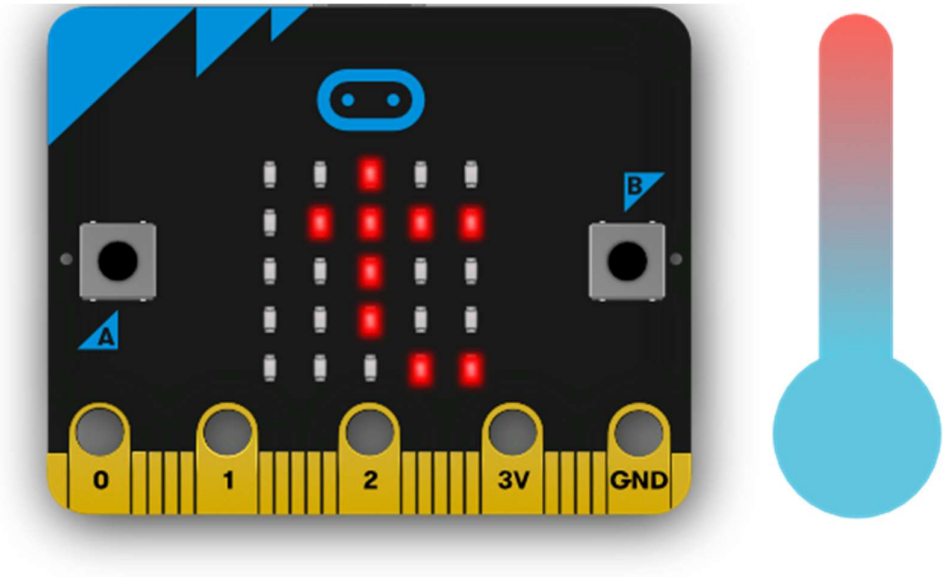
Unit: Transfer of Thermal Energy

Topic: Emission of Infra-red Radiation

Summary

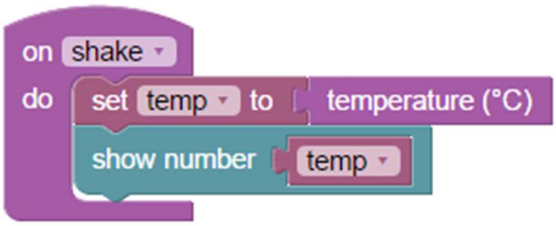
The aim of the lesson is to investigate how light and dark colors, and surface texture, affect the rate of emission of thermal energy, using microbit as a temperature sensor. The difference in the temperatures displayed and recorded will allow students to understand how the choice of color affects the rate of emission of infra-red radiation.

<Please insert a photo here that is representative of the lesson idea. This photo will be used as the thumbnail of the lesson idea when it is posted on the Digital Maker website.>



Prior Knowledge:	Students should already know: 1. transfer of thermal energy takes place from a region of higher temperature to a region of lower temperature 2. radiation is a process whereby electromagnetic infra-red radiation carrying thermal energy are emitted and absorbed by all matter
Learning Objectives:	By the end of the lesson, students should be able to: 1. light colours and smooth surfaces are generally poor emitters of infra-red radiation. 2. dark colours and rough surfaces are generally good emitters of infra-red radiation.

Lesson Plan

Time	Teacher Activities	Purpose	Resources Needed
Introduction/Pre-activity			
During after-school hours.	Training for the students to set up the microbit as a thermometer sensor will be done by the ICT TA. Students will then be tasked to upload the following microbit code into the microbit before the lesson. 	To expose the concept of coding to students. To prepare students for the use of the microbit as a temperature sensor	Microbit sensors (2 per group of 4 students)
Lesson development/Main activities			
	Split the class into groups of 3 or 4. Task one quarter of the groups to fill hot water into one container coloured black. Task another quarter to fill the same amount of hot water at the same temperature to another container of the same material but coloured white. These 2 containers should have roughly the same surface area colored.	To ensure that there are as many constant variables as possible	2 containers of the same material but 1 coloured black and 1 coloured white
	Task another quarter to fill the same amount of hot water at the same temperature to a container with a rough and dull surface. Task the last quarter to fill the same amount of hot water at the same temperature to another similar container of the same material with a smooth surface. These 2 containers should have roughly the same surface area exposed to the microbit.	To ensure that there are as many constant variables as possible	2 containers of the same material but 1 with rough surface and 1 with smooth shiny surface
	Task students to place the microbits near to the containers. Each microbit must be equidistant from the containers.	To ensure that there are as many constant variables as possible	

	Task students to record the temperatures displayed across 1 or 2 minute intervals.		
Closure and consolidation/Post-activity			
	Task all groups to present their recordings to their classmates and compare the differences recorded according to the two factors: 1. colour 2. texture		
	Conclude that 1. light colours and smooth surfaces are generally poor emitters of infra-red radiation. 2. dark colours and rough surfaces are generally good emitters of infra-red radiation.		
	Task students to discuss/find out what happens if the surface area is not kept constant as a trigger to teach them about this third factor that affects infra-red radiation.	Trigger activity for the third factor	

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Contributed by:

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Name of Teacher (Optional):

Date: 26th Sep 2018