Annex B

Greenview Secondary School
Lesson Plan

Name of Teacher : Patrick Wee

Class/Venue : Sec 3 Diamond / D&T Workshop 3

Date/Time/Duration :

Subject : Design & Technology

Topic : Simple light sensing circuit + Microprocessor based light sensing circuit

Pre-requisite Knowledge:	Recognise various types of components. Understand the operation of a simple transistor-based light sensing circuit.
Specific Instructional Objectives:	At the end of the lesson, pupils should be able to: 1) identify the different types of basic electronic components 2) able to understand the function of a simple transistor-based light sensing circuit. 3) able to understand that similar function can be obtained by replacing transistor and resistors with simply a microprocessor. 4) able to understand that using microprocessor-based, we can simplify the overall circuit, reduce the number of electronic components to be use and ability to add in more features.
Pedagogy:	Hands-on activity
Resources:	Design & Technology Design for Life textbook (Upper Secondary page 303) Powerpoint slides

Introduction			
Time	**Lesson Activities**	**Rationale**	**Assessment**
	Student arrival to workshop from classroom. Greet and settle down. Brief students on today lesson objectives.	Settle down the class for lesson To prep students mentally	
Lesson			
Time	**Lesson Activities**	**Rationale**	**Assessment**
	Quick recap on Transistor-based light sensing circuit they learnt in theory and copper tape circuit which they had done in class.	To prep students mentally for the lesson proceeding.	

	Ask student what are function of each of the components they had used. Ask students to explain how the circuit works. Ask students how we can make the circuit more sensitive Ask students how we can make the sensitivity adjustable. Ask student how we can invert the operation. **<u>Introduction of Microprocessor :</u>** Introduce what is a microprocessor. (Show a Microbit board) Show a microprocessor-based light sensing circuit. Explaining the components use and ask students to make a comparison between the transistor-based and microprocessor – based light sensing circuit. Transistor circuit : The circuit are taken from textbook under chapter 14.12: Bipolar Transistors. Explain to students that for the microprocessor, we assume it is a black box. Some programming needs to be done in order for it to function the way we	Check for students' understanding and clarify when necessary. Show a Microbit board to students and explain this is an example of a microprocessor board. There are many different types pr microprocessor that can be programmed to do simple or very complex functions. Simple function like playing a melody or light up etc, commonly found in toys. More complex is like home security system, automation system. Ask student to compare the different between the two type of circuits. (using microprocessor, we have more flexibility in changing the variables by changing the program and downloading it into the microprocessor)	Post question to students. Microbit Electronic Kit set

	way it to. Introduce to students some simple programming function that is used for the light sensing circuit: Using **Microsoft Block Editor**, explain briefly what are programming functions used See Appendix A & B: **<u>Displaying the reading :</u>** When button A us pressed, the LEDS on the microbit display the value (text message) being read by the sensor. **<u>Reporting the light levels :</u>** There is a forever loop that goes on forever. Within the loop, we have set a variable called brightness to register the value being read by the sensor. We then in introduce a few conditional statements : If brightness is more than 700, then the LEDS display the message " Blindingly Bright" If brightness is under 700 and over 350, then the LEDs display the message "Fairly Bright" If brightness is less than 350, then the LEDs display the message "Dark" The values that constitutes "dark,"Fairly bright" or "Blindlingly Bright" by adjusting the numbers in the conditional statements. If the environment you are testing is generally brighter, increase the values, or if we want to make it more sensitive to brightness, we can decrease the values.	Show in Microsoft block editor the program used to make it operate as a light sensing circuit. Show **Microsoft Block Editor program** on light sensing circuit. Also using **flow chart** to explain how the program works.	PC with internet access

	Give 10 min for students to create the program in Microsoft Block Editor. Guide students how to download it into the Microbit board, allow them to explore the sensitivity of the light sensing circuit. **Tell students that they can adjust the sensitivity by :** Increase the values in the conditional statements to make it less sensitive to brightness, or Decrease the values to make it more sensitive to brightness. Give students 10 mins to try it. **<u>Challenge</u>** Students to connect an Ultra bright white LED (in series with a resistor) to the Microbit and modify the existing program such that the LED will light up when "dark" is met. Give students 15 mins to do this challenge	Allow hand-on, experiential learning to take place.	LED, resistor and connecting wires. After the challenge, collect back the all the Electronics and Microbit board.

Closure

Time	**Lesson Activities**	**Rationale**	**Assessment**
12.25	Check with students how many are able to make a working microprocessor circuit. Ask for the possible reasons why some of their classmates' circuit fail to work?	To ensure students know what are the requirement conditions for making a functional microprocessor-based electronic circuit. Allow students to be expose to Microprocessor-based electronics. .	A functional microprocessor-based light sensing electronic circuit.

Lesson Plan prepared by: Patrick Wee Date: _____

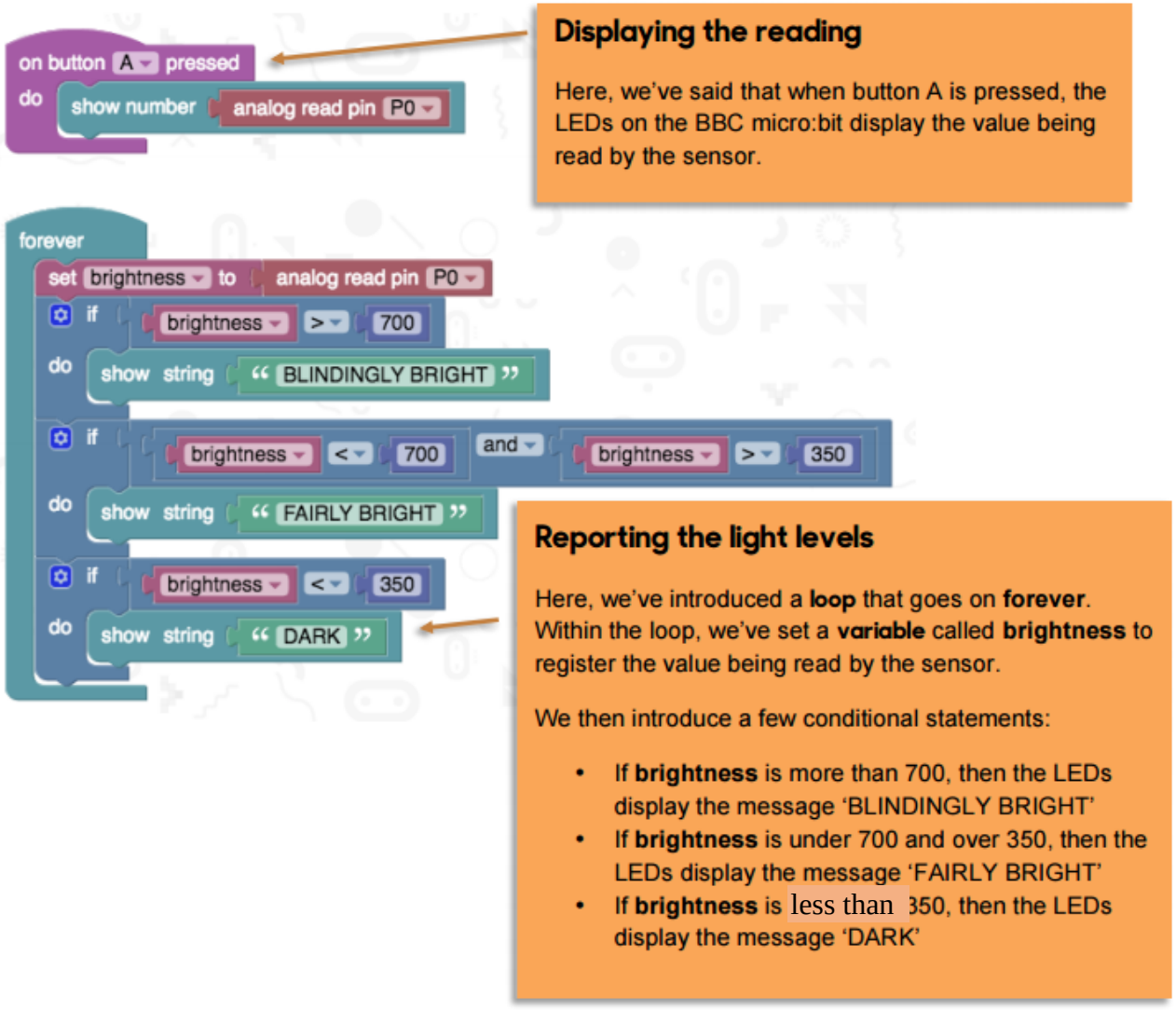
(name and signature)

Pre-lesson observation conferencing with _____ Date: _____

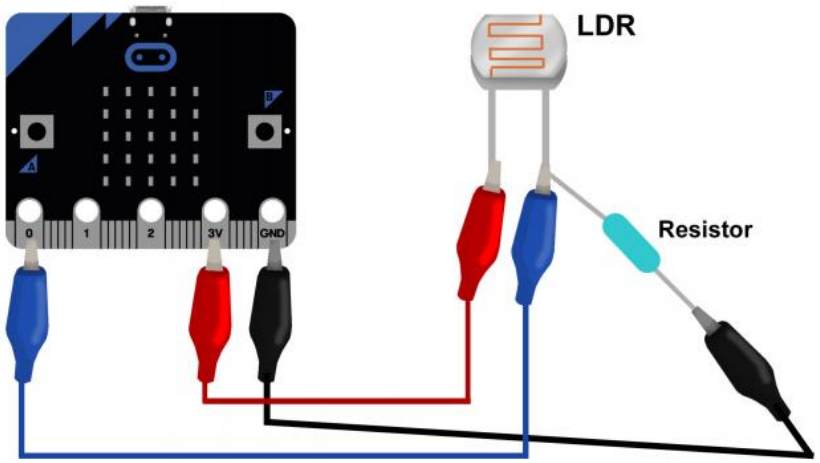
(name and signature)

Appendix A:

Microbit Block Editor program :



Microbit circuit connection



Appendix B :

Flow Chart on Microbit program :