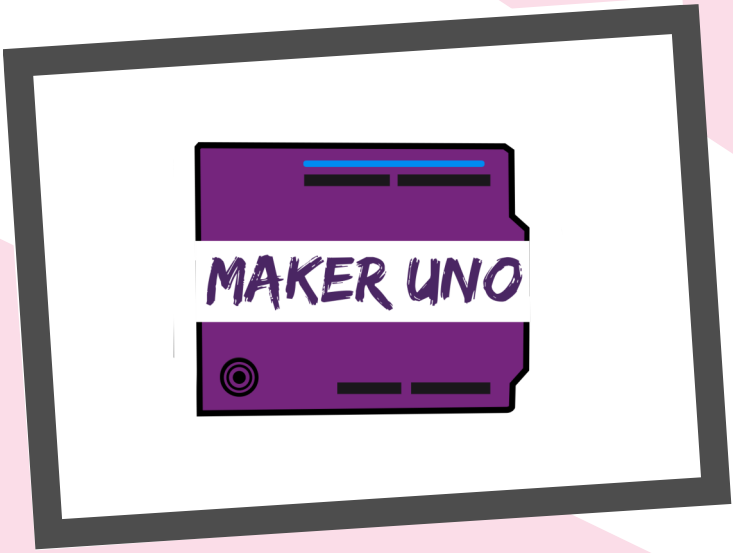
Student Module



Nama:

Tingkatan:

LEARN MAKE INNOVATE

WORKSHEET 1

INTRODUCTION TO MICROCONTROLLER

LEARNING STANDARD

2.4.1 State the meaning of microcontroller and microprocessor

2.4.2 Explain parts within the microcontroller

2.4.3 Sketch a schematic diagram for a microcontroller

ASSESSMENT STANDARD

TIER 1 State the meaning and parts in a microcontroller

TIER 2 Explain the function of each hardware in a microcontroller

TIER 3 Sketch a schematic diagram using a microcontroller

MASTERY

TIER 1

TIER 2

TIER 3

WORKSHEET 1

INTRODUCTION TO MICROCONTROLLER

PART A: DIFFERENCE BETWEEN MICROCONTROLLER AND MICROPROCESSOR

1. State the difference between microcontroller and microprocessor

Microcontroller	Microprocessor
1. Can be treated as a small computer	1. It is the _____in a computer
2. Contains CPU, _____, _____dan I/O devices in a single chip.	2. Contains only CPU in the chip.

2. Microcontroller system is like the human _____ system.

3. Microcontroller receives _____ and gives out OUTPUT.

4. Microcontroller processes information based on the _____ in it.

5. Microcontroller keeps the programming in its system once uploaded. It only requires _____ for it to work.

WORKSHEET 1

INTRODUCTION TO MICROCONTROLLER

PART B: PARTS IN A MICROCONTROLLER

1. Match the parts of a microcontroller and its function

CPU	Use to produce frequencies for
RAM & ROM	Provides power to the microcon-
Serial input/output	Receives information and program for it top process input and
Timing circuit	Allows the microcontroller to control the system based on its in-
Timer / Crystal	Connects to input and output devices such as LED, motors and sensors There are two types of signals–
Power supply	Memory spaces to store infor-

WORKSHEET 1

INTRODUCTION TO MICROCONTROLLER

PART C: SCHEMATIC DIAGRAM

1. Guides to drawing a good schematic diagram.

a. Ensures that all lines drawn are _____

b. Ensures that all lines are not _____.

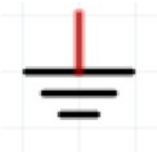
c. Ensures that all lines drawn are _____ or _____only.

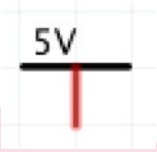
d. Minimize lines _____ each other to avoid confusion

e. Use standardized _____ to represent each componnets.

f. Ensures that all components in the diagram are _____

2. What does each of the following symbol means?:

a. 

b. 

WORKSHEET 2

OUTPUT

LEARNING STANDARD

2.4.4 Build functioning simulated circuit with dedicated software.

2.4.5 Connect input and output circuit on the microcontroller

2.4.6 Write simple program based on input and output circuit

ASSESSMENT STANDARD

TIER 4 Test out functionality of a circuit that includes microcontroller.

MASTERY

TIER 4

WORKSHEET 2

OUTPUT

PART A: OUTPUT CIRCUIT PROGRAMMING

A) Answer the following question:

1. Arduino runs two programs–which are _____ and _____
2. There are two types of signals that can be sent and received by Arduino, which are _____ signals and _____ signals.
3. To use pin 8 to turn on the LED, pin 8 needs to be set as _____ with the program command _____
4. pinMode(5, OUTPUT) sets pin _____ to become _____
5. digitalWrite(13, HIGH) will send digital signal _____ to pin _____
6. analogWrite(7, 120) will send analog signal _____ to pin _____
7. The number 1000 in delay(1000) means 1000 _____
8. Each program line must end with the symbol: _____

WORKSHEET 2

OUTPUT

B) State the function of the code, or the code for the function:

1. pinMode(5, INPUT) : _____
2. _____ : Tetapkan pin 8 sebagai output
3. delay(1000) : _____
4. _____ : Wait 0.1 second
5. digitalWrite(5, HIGH) : _____
6. _____ : Send digital signal LOW to pin 8
7. analogWrite(3, 255) : _____
8. _____ : Send analog signal 100 to pin 4

B) Write the program for the following action:

1. Turn on LED connected to pin 5

```
void setup() {
  pinMode(5, OUTPUT);
}

void loop() {
  digitalWrite(5, HIGH);
}
```

WORKSHEET 2

OUTPUT

2. The LED connected to pin 6 will turn on for 3 seconds and turn off for 1 second.

WORKSHEET 2

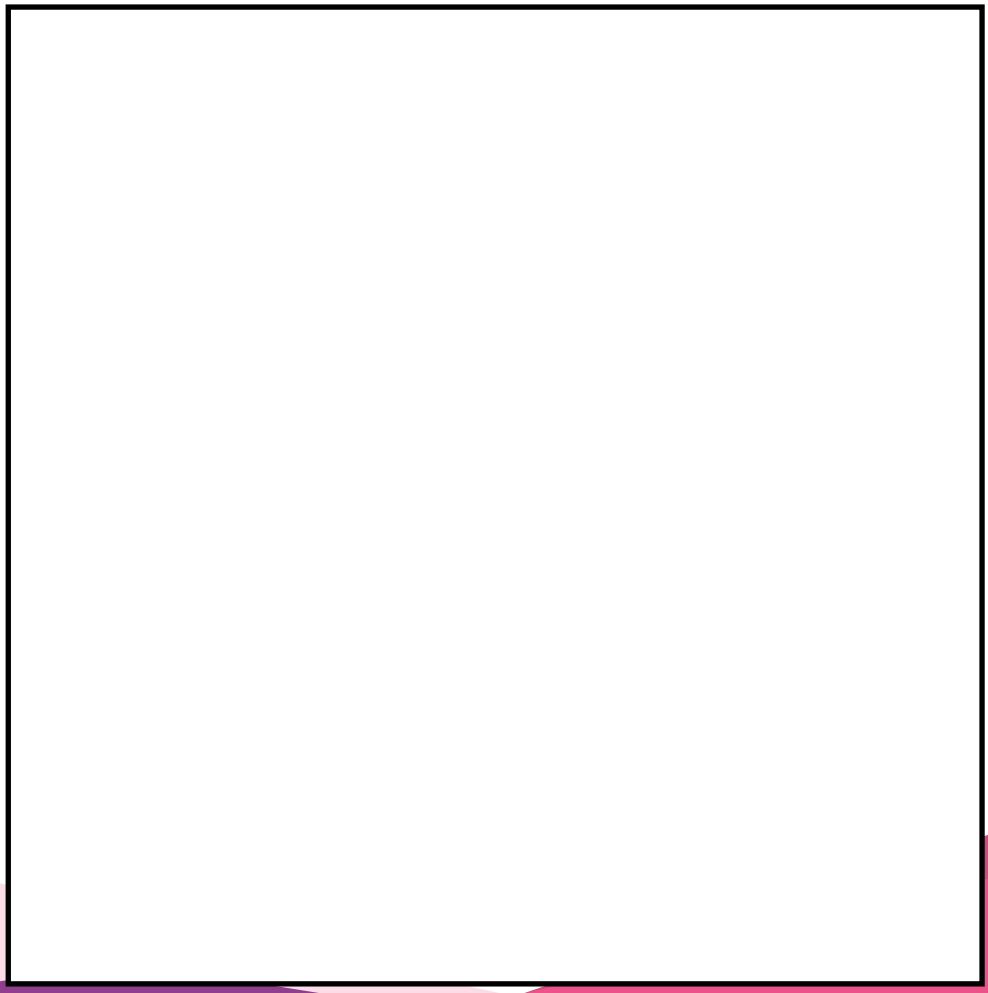
OUTPUT

3. By using the red LED (pin 5), green LED (pin 6) and yellow LED (pin 7), create a traffic light program

WORKSHEET 2

OUTPUT

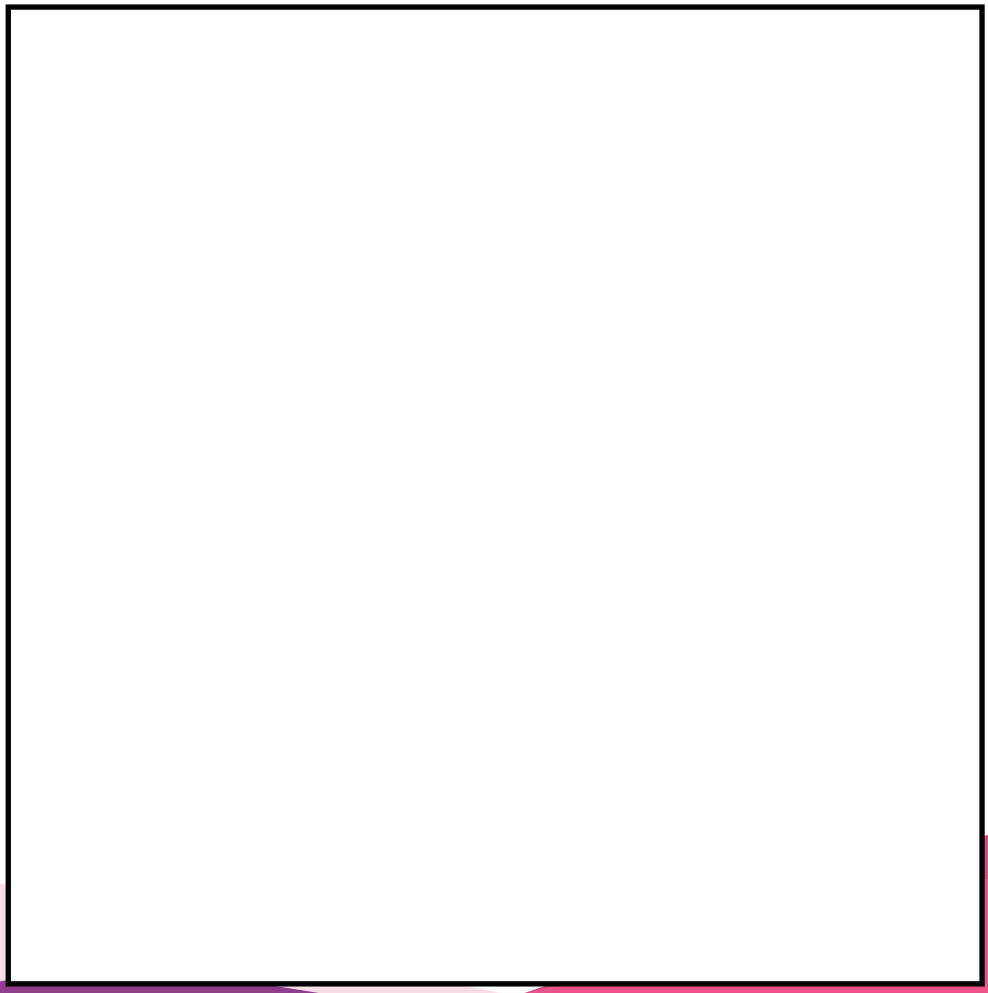
4. The LED connected to pin 9 will turn on with 50% brightness



WORKSHEET 2

OUTPUT

5. Buzzer to play two different sounds



WORKSHEET 2

OUTPUT

PART B: INTRODUCTION TO OUTPUT CIRCUIT CONNECTION AND SIMULATION

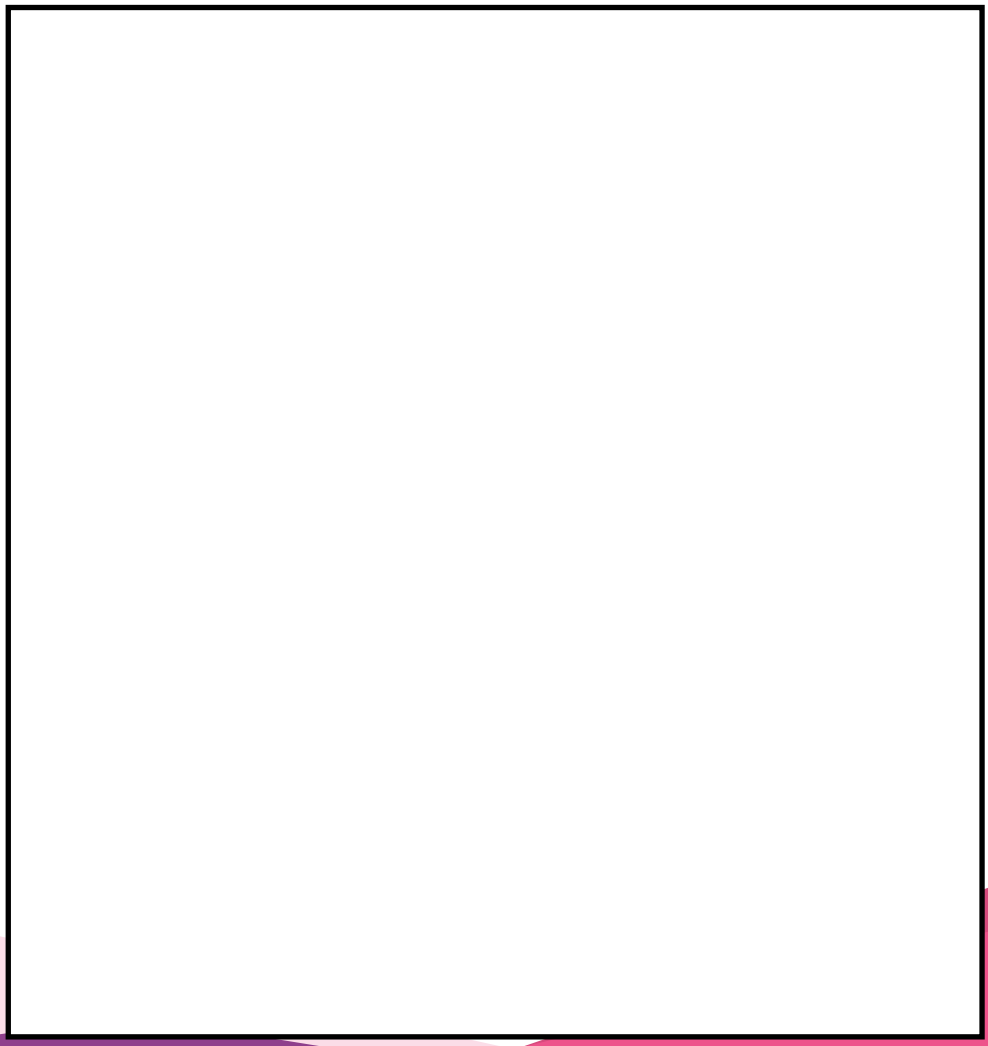
A) Draw the following schematic:

1. 1 LED connected to pin 5

WORKSHEET 2

OUTPUT

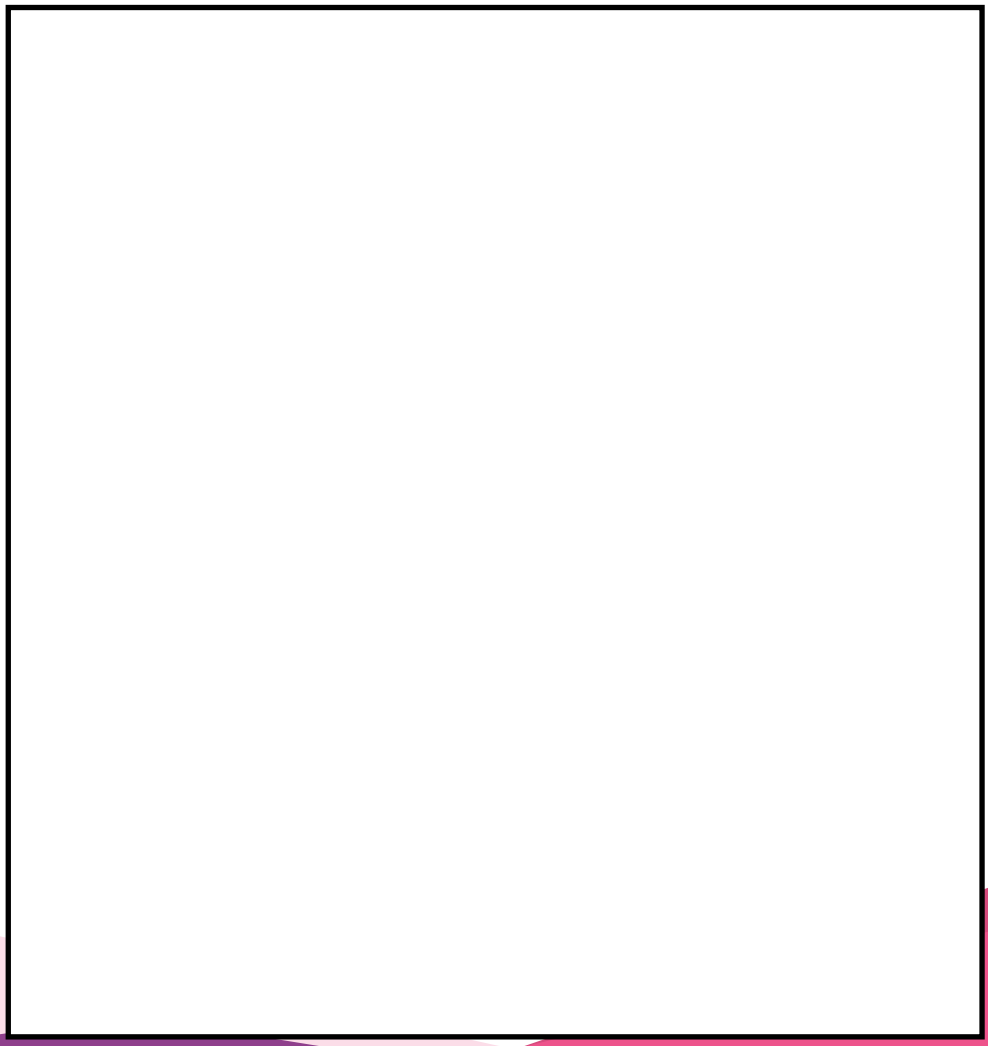
2. Buzzer connected to pin 8



WORKSHEET 2

OUTPUT

3. Red LED connected to pin 5 and green LED connected to pin 6



WORKSHEET 2

OUTPUT

B) Simulate the circuit in Part A and produce the program that will perform the following action.

Write the project URL for checking

1) Circuit A1 - Blinking LED

2) Circuit A1 - LED turned on with 50% brightness

3) Circuit A2 - Buzzer to play musical notes “Do Re Mi”

4) Circuit A3 - Red and green LED takes turn to turn on

5) Circuit A3 - Pedestrian traffic light

WORKSHEET 3

INPUT

LEARNING STANDARD

2.4.4 Build functioning simulated circuit with dedicated software.

2.4.5 Connect input and output circuit on the microcontroller

2.4.6 Write simple program based on input and output circuit

ASSESSMENT STANDARD

TIER 4 Test out functionality of a circuit that includes microcontroller.

PENGUASAAN

TIER 4

WORKSHEET 3

INPUT

PART A: INPUT CIRCUIT PROGRAMMING

A) Answer the following question

1. To use pin 8 as input pin, the pin needs ot be set as _____ with the programming command _____
2. analogRead can be used at pin _____ only.
3. To open a communication channel between the computer and Arduino, we need to write _____ at setup and _____ in loop

B) State the function of the code, or the code for the function

1. analogRead(A0) : _____
2. _____ : Reads digital signals from pin 8
3. x = analogRead(A0) : _____
4. _____ : Set the digital value read from pin 5 to the variable z

WORKSHEET 3

INPUT

C) Write the program for the following function

1. Read the value received in analog pin A2 and display it through Serial communication

WORKSHEET 3

INPUT

2. Read the value received in digital pin 5 and display it through Serial communication

WORKSHEET 3

INPUT

PART B: INTRODUCTION TO INPUT CIRCUIT CONNECTION AND SIMULATION

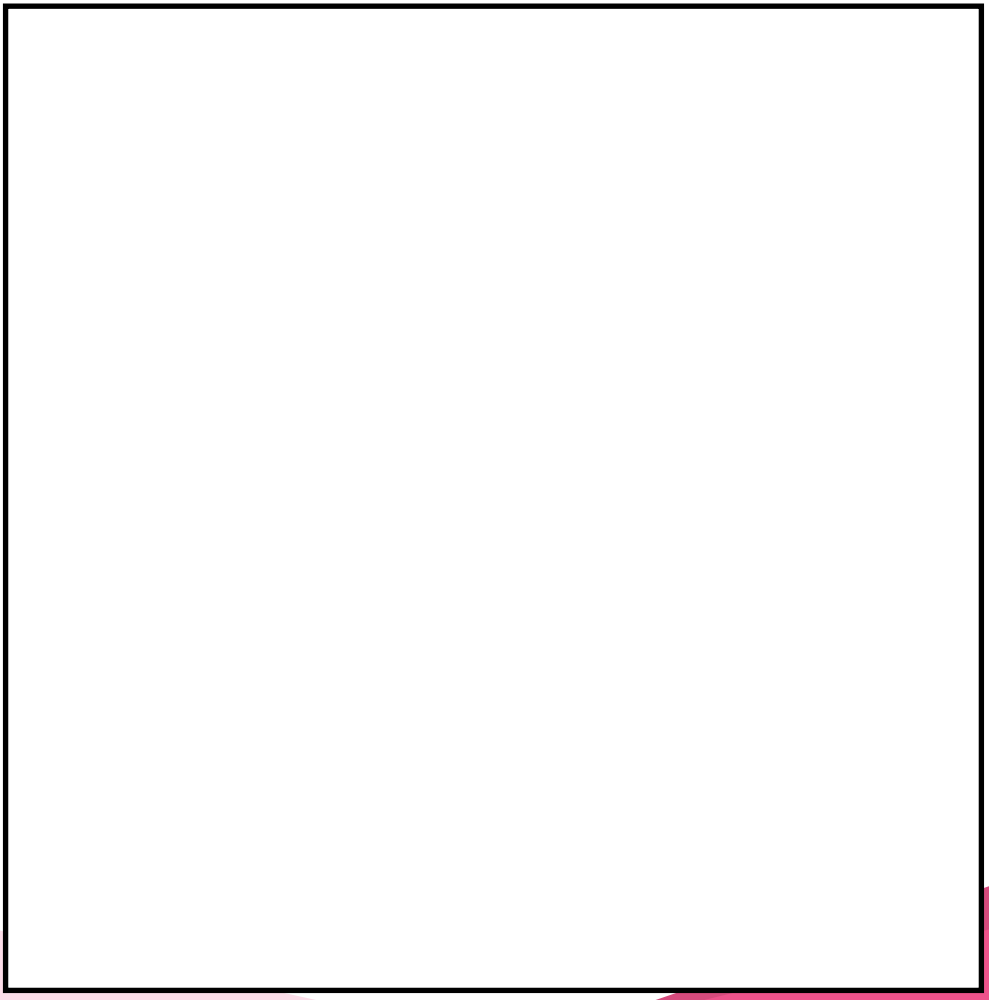
A) **Draw the schematic for the following circuit**

1) 1 push button connected to pin 2

WORKSHEET 3

INPUT

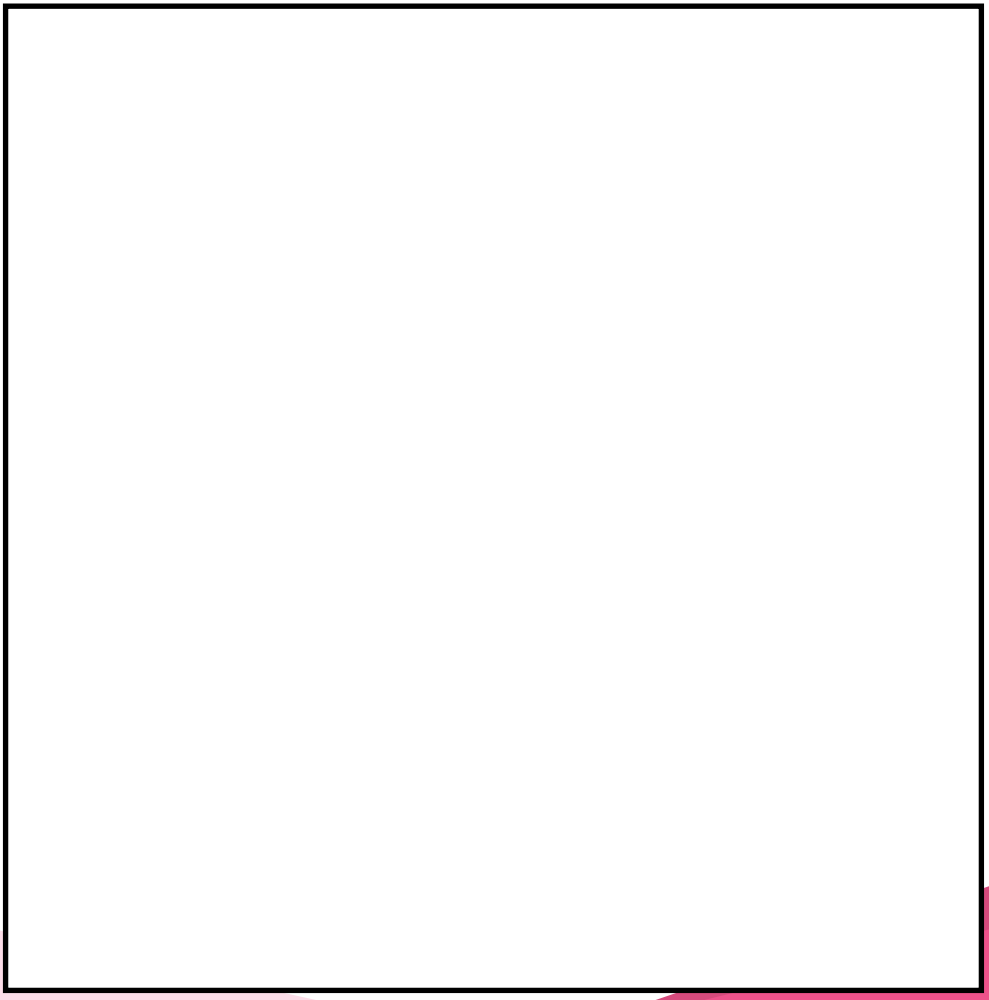
2) 1 potentiometer connected to pin A2



WORKSHEET 3

INPUT

3) 1 Light Dependent Resistor connected to pin A0



WORKSHEET 3

INPUT

B) Simulate the circuit in A and produce the program that will perform the following action.

Write the project URL for checking

1) Circuit A1 - Read the pushbutton valueand display it with Serial Communication

2) Circuit A2 - Read the potentiometer value and display it with Serial Communication

3) Circuit A3 - Read the LDR value and display it with Serial Communication

WORKSHEET 4

INPUT AND OUTPUT

LEARNING STANDARD

2.4.4 Build functioning simulated circuit with dedicated software.

2.4.5 Connect input and output circuit on the microcontroller

2.4.6 Write simple program based on input and output circuit

2.4.7 Test and evaluate the function of the electronic circuit

2.4.8 Recommend improvement on electronic circuit.

ASSESSMENT STANDARD

TIER 4 Test out functionality of a circuit that includes microcontroller.

TIER 5 Justify programming control structure for input and output to solve a problem.

TIER 6 Construct working microcontroller circuit.

MASTERY

TIER 4

TIER 5

TIER 6

WORKSHEET 4

INPUT AND OUTPUT

PART A: INPUT AND OUTPUT PROGRAMMING

A) State the meaning of the following symbol:

1. `>` : _____
2. `<` : _____
3. `<=` : _____
4. `>=` : _____
5. `!=` : _____
6. `==` : _____

B) **Write the program that performs the following function:**

1) Read the pushbutton at pin 2. If it is pressed, turn on the LED at pin 5

WORKSHEET 4

INPUT AND OUTPUT

2) Read the light dependent resistor connected to pin A0. If the value read is more than or equals to 500, turn off the LED at pin 5 and 6.

WORKSHEET 4

INPUT AND OUTPUT

PART B: INTRODUCTION TO INPUT AND OUTPUT CIRCUIT CONNECTION AND SIMULATION

A) Draw the following schematic:

1) Push button connected to pin 2 and 3 LED connected to pin 3,4 and 5

WORKSHEET 4

INPUT AND OUTPUT

2) Potentiometer connected to pin A0 and buzzer connected to pin 8

WORKSHEET 4

INPUT AND OUTPUT

B) Simulate the circuit in A and produce the program that will perform the following action.

Write the project URL for checking

1) Circuit A1 - Read the pushbutton. If the pushbutton is pressed, turn on the LED at pin 3 and 4. Or else, turn on the LED at pin 5.

2) Circuit A2 - Read the pushbutton. If the pushbutton is pressed, turn on all the LEDs. Or else, turn off all the LEDs.

3) Circuit A3 - Read the potentiometer. If the potentiometer value is more than 250, play sound on the buzzer.

WORKSHEET 4

INPUT AND OUTPUT

By using the components provided, choose and make one:

1) Alarm that will be activated when the door is opened
2) Music box
3) LEDs that will be turned on when it is night time

For each project, you need to produce the following documentations:

1. Block diagram for project design
2. Schematic diagram for the circuit
3. Program for the circuit and justification why you choose the program strucutre
4. Simulation on tinkerlab and the URL for the simulation
5. Actual functioning project
6. Recommendation or suggestions to improve the project

Collect all the evidences for the project to create a portfolio for your creation.