



# Hayesfield Girls School

## Design and Technology.

### Electronic Communications Technology.

## Year 9 PIC Controlled Musical Product

Name

Tutor Group

Teaching Group

#### Introduction

During the project you will make a PIC controlled Electronic Game or Produce. This will further your knowledge of electronics.

You will:

Further your knowledge of Electronics.

Learn how flexible a PIC approach to electronics is.

Learn how to programme the PIC using a flow diagram approach.

Further your knowledge on electronic components and theory.

#### Assessment

During this project, your teacher will be focussing on 2 areas of your technology work. You will be awarded a level for each of these targets as well as a mark for the end of module test. To help you achieve your best possible level, helpful descriptions of how to achieve each level is available in the classroom.

1. Soldering and electronic construction      Final Level    S / G / E

S – Satisfactory – your electronics work but corrections had to be made by the teacher and soldering is messy in places.

G – Good – your electronics work but some corrections were made by the student. Soldering is mostly neat and soldered well.

E – Excellent – your electronics did not need any correcting and are of a professional standard. They are neat and looks similar to a shop purchased circuit board.

2. Overall grade for product      Final Mark \_\_\_\_\_

3. Flow diagram approach (booklet work)      Level \_\_\_\_\_

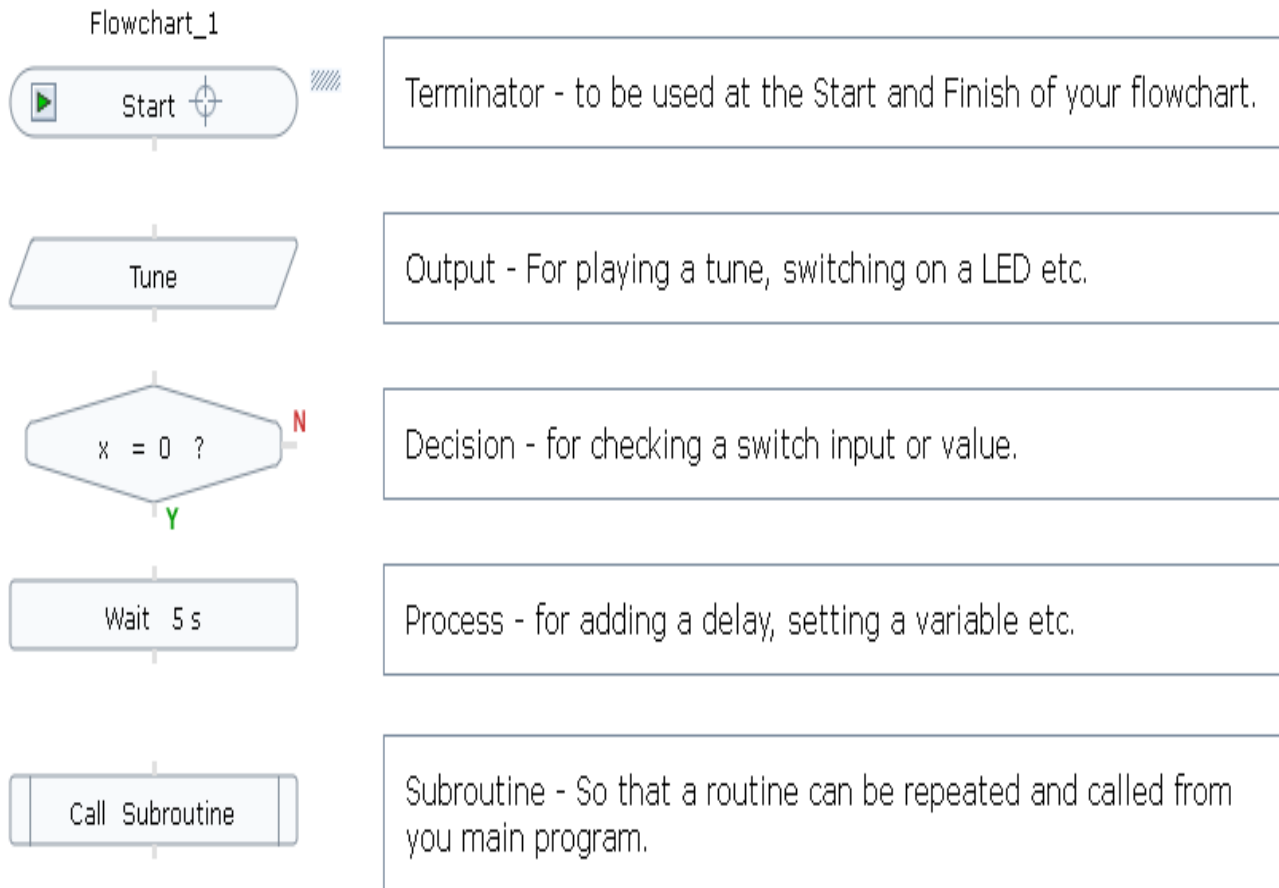
# Design Brief

An electronic games company has an idea for an electronic product aimed for young children.

Your product can use a variety of inputs and outputs, it can play Nokia style tunes, flash lights, have a switch, light or steady hand game style input.

# Design Development

Select the idea you think will work best and develop it using a more detailed drawing. Add colour to your design using pens / pencils and detailed notes. You will need to add notes to your design on what you would like it to do, for example have a count down timer with beeps or flash the LED's and play a tune when the game is started or completed.



# Flowchart

# Plan of Making

Using pictures and text explain the process and tools you have used to make your Electronic Product. You may add to this as you go so plan to leave room and use additional pieces of paper if necessary.

# Electronic Formulas.

During year 8 you touched on the Resistor Colour Code and Ohms Law. Both of these play a very important part in Electronics and are explained below. You will need to complete the answers on the next page.

In electronics we are dealing with voltage, current and resistance in circuits.

**Voltage** is the electrical force that causes current to flow in a circuit. It is measured in VOLTS .

**Electrical Current** is the movement of electrical charge - the flow of electrons other charged particles through the electronic circuit. The direction of a current is opposite to electrons flow direction. Current is measured in AMPERES (AMPS, A ).

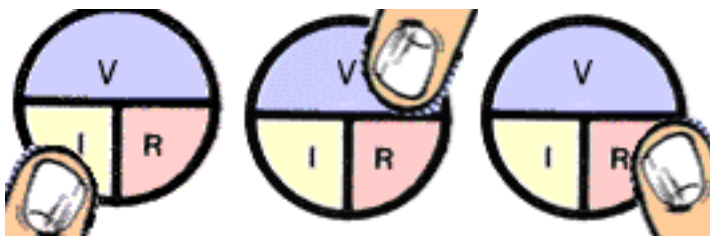
**Resistance** causes an opposition to the flow of electricity in a circuit. It is used to control the amount of voltage and/or amperage in a circuit. It is measured in OHMS.

**Ohm's law** is the main basic electrical law and defines the resistance of a device to the flow of electrons.

There are three different notations of Ohm's law

1.  $I = \frac{V}{R}$       Unknown current
2.  $V = IR$       Unknown voltage
3.  $R = \frac{V}{I}$       Unknown resistance

Most people can remember a picture easier than a mathematical formula. By knowing any two values you can figure out the third. Simply put your finger over the portion of the symbol you are trying to figure out and you have your formula.



Try to answer the following questions using Ohms Law:

1. Voltage = 3 Volts, Resistance = 100 Ohms, Current =                      Amps
2. Current = 1 Amp, Resistance = 10K Ohms, Voltage =                      Volts
3. Voltage = 4.5 Volts, Current = 0.2 Amps, Resistance =                      Ohms

## The Resistor Colour Code:

0	Black
1	Brown
2	Red
3	Orange
4	Yellow
5	Green
6	Blue
7	Violet
8	Gray
9	White

1. First find the tolerance band, it will typically be gold or silver.
2. Starting from the other end, identify the first band - write down the number associated with that colour
3. Now 'read' the next colour – write down this number.
4. Now read the third or 'multiplier' band and write down that number of zeros.

### For example:

A Resistor with the following bands: Red, Red, Orange reads 2,2,3. The last number is the number of zeros so this reads as 22,000 or 22k

### Try to write down the following resistor values:

1. Red, Red, Yellow. =
2. Brown, Black, Red. =
3. Brown, Black, Orange =
4. Red, Violet, Black =
5. 47K =
6. 22K =
7. 1K5 =
8. 470 Ohms =

## End of module test. Question sheet reference \_\_\_\_\_

At the end of the module there will be a short assessment test, questions will not be the same for each group and will be selected at random from what you have learnt.

### Answers

- 1)
- 2)
- 3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)
- 10)