

# LIGHTS 1

## MAKE AN LED FLASH

LEVEL: BEGINNER

COMPUTING PoS KS1:

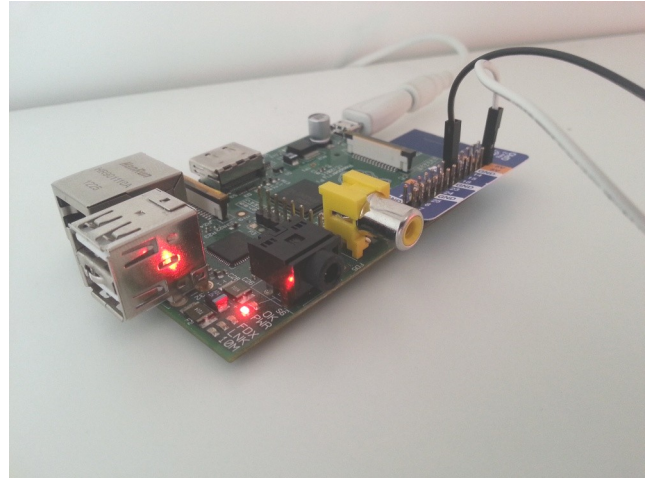
- Understand what algorithms are
- Create and debug simple programs
- Use logical reasoning to predict the behaviour of simple programs

COMPUTING PoS KS2:

- Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems
- Use sequence, selection, and repetition in programs
- Use logical reasoning to explain how some simple algorithms work

PROGRESSION PATHWAYS:

- I know what an algorithm is and I can express simple algorithms using symbols
- I can create a simple program
- I can run, check and change programs



### PERFORM

How does a light work?  
How do you make a light flash?  
How do you control the speed of flashing?

Equipment: Double sided A4 card: Light bulb on/off; 2 actors: Lightbulb & Controller

Act Out:

- 1) Controller and Light bulb stand next to each other – Light bulb is off
- 2) Controller touches Lightbulb actor and light switches on
- 3) Controller disconnects from Lightbulb actor and light bulb switches off
- 4) Repeat 2) then 3)

### PLAN

Can you write the pseudocode for flashing a light?

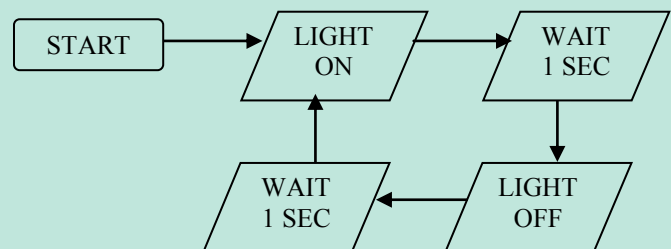
Pseudocode:

Start

Repeat

Turn Light On  
Wait 1 Second  
Turn Light Off  
Wait 1 Second

Flow Diagram:



### PROGRAM: SCRATCH

Equipment: Raspberry Pi; 1 x LED; 2 x Female to Female Jumper Leads; Pi Leaf (Optional)

Code:

Using pseudocode/flow diagram what blocks in Scratch will we need to use?

Method:

- 1) Attach +ve (long) leg of LED to Pin 2 of the Raspberry Pi using one jumper lead.
- 2) Attach -ve (short) leg of LED to Pin 11 of the Raspberry Pi using the other jumper lead.

You need to use Scratch GPIO

See <http://cymplecy.wordpress.com/scratchgpio/> for details.



# LIGHTS 1

## MAKE AN LED FLASH

### PROGRAM: PYTHON3

Equipment: Raspberry Pi; 1 x LED; 2 x Female to Female Jumper Leads; Pi Leaf (Optional)

Method:

- 1) Attach +ve (long) leg of LED to Pin 11 of Raspberry Pi using one of jumper leads.
- 2) Attach -ve (short) leg of LED to Pin 2 (Ground) of Raspberry Pi using other lead.

You need to download and install the RPi GPIO library – see <http://www.raspberrypi.org/documentation/usage/gpio/> for instructions

You also need to run python as *sudo* in order to access the GPIO pins on the Raspberry Pi.

Code:

```
import RPi.GPIO as GPIO    #GPIO Library
import time                 #for "sleep"

#set up Pins
GPIO.setmode(GPIO.BOARD)   #use Board numbering
GPIO.setup(11, GPIO.OUT)    #pin 11 to output

#repeat
For i in range(0,10):       #ten times
    GPIO.output(11, true)    #turn on
    time.sleep(1)           #1 sec
    GPIO.output(11, false)   #turn off
    time.sleep(1)           #1 sec

GPIO.cleanup()
```

### EXTENSION:

Could you add another LED? (Use Pins 2 and 13)  
Can you get them to flash in sequence?

(You could even add a third using Pins 6 and 9)

**PERFORM** the extra flashing LEDs.  
Create associated pseudocode and flow diagram as your **PLAN**.  
Then **PROGRAM** for Scratch and/or Python3.