

# LIGHTS 1

## MAKE AN LED FLASH

LEVEL: BEGINNER

### COMPUTING PoS KS1:

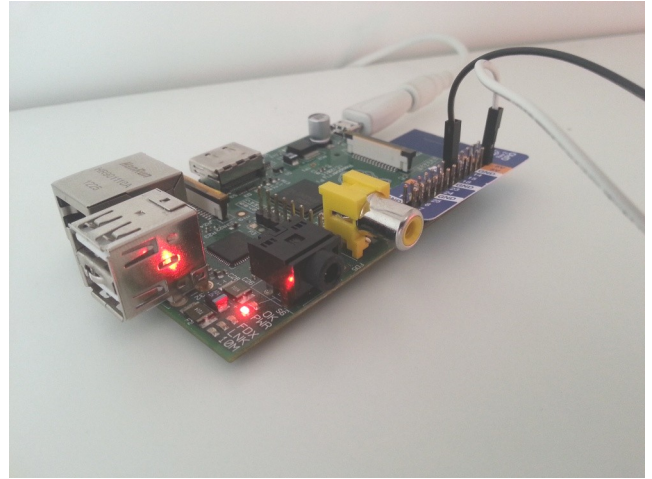
- Understand what algorithms are
- Create and debug simple programs
- Use logical reasoning to predict the behaviour of simple programs

### 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



### COMPUTER SCIENCE CONCEPTS COVERED:

- Algorithm
- Sequence
- Repetition

## 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

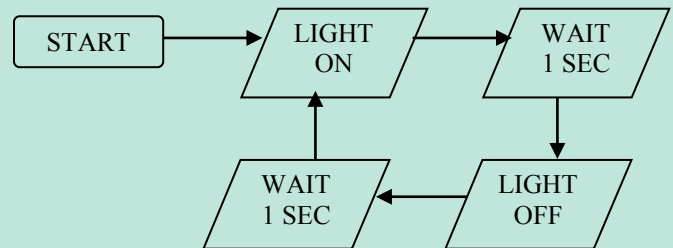
Can you write the pseudocode for flashing a light?

### Pseudocode:

```

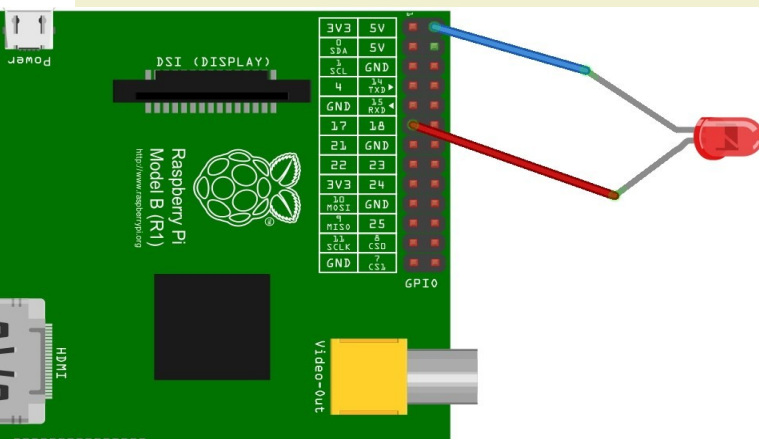
Start
  Repeat
    Turn Light On
    Wait 1 Second
    Turn Light Off
    Wait 1 Second
  
```

### Flow Diagram:



## HARDWARE SETUP

### Diagram:



### Equipment:

Raspberry Pi; 1 x LED; 2 x Female to Female Jumper Leads

### Method:

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

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### PROGRAM: SCRATCH

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

You need to use Scratch GPIO  
See <http://cymplecy.wordpress.com/scratchgpio/>  
for details.

Code:



### PROGRAM: PYTHON3

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.