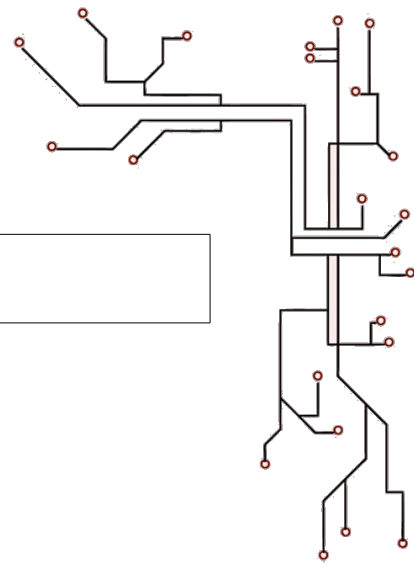


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<b>Name:</b>		<b>Class:</b>	
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## Scratch 4 Arduino

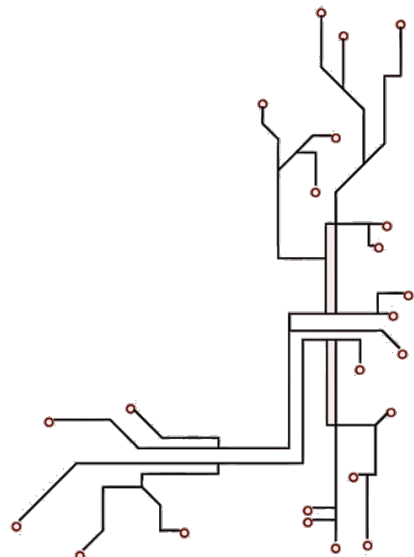
You will also need the following hardware...

Item	Qty
Laptop	x1
USB Cable	x1
Arduino	x1
Jumper wires	A bunch
LED	x1 set
Resistors	x1 set
Breadboard	x1

As the lessons progress, you will be provided with more hardware, but this is enough to start.

### Getting the slides...

- <https://a9i.sg/huayi> – look for Lesson 2 (S4A) Slides
- **Please use the PDF version**  
(your school laptops don't carry software that can properly show .ODP files)



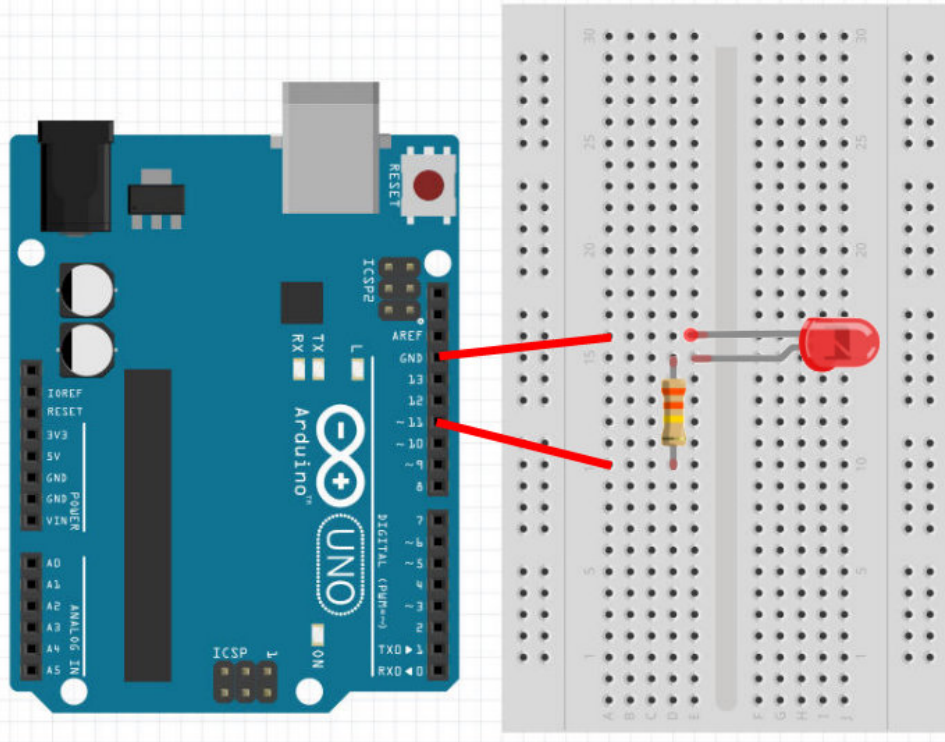
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## Lesson 2 (PWM)

### Exercise 2a (Control LED Brightness)

Review LED Circuit



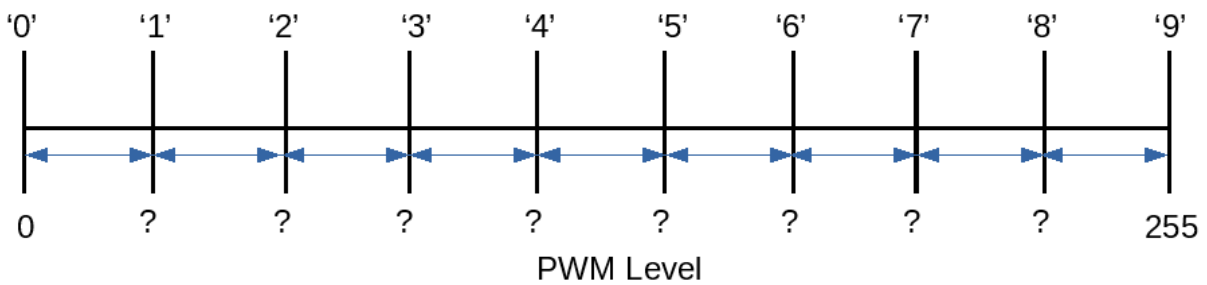
#### LED

Connect short leg to ground (GND) and long leg to resistor.

#### Resistor

Use a 330 ohms resistor. Connect one end to resistor and the other to Pin 11.

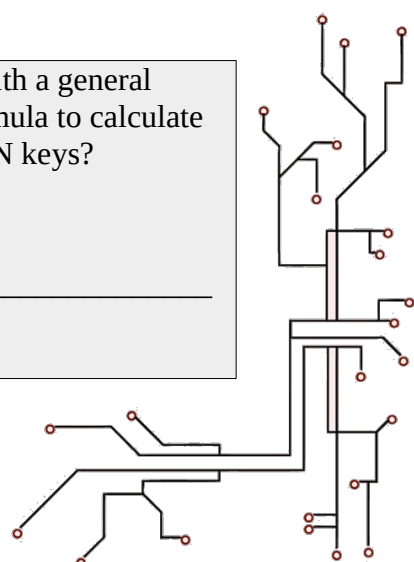
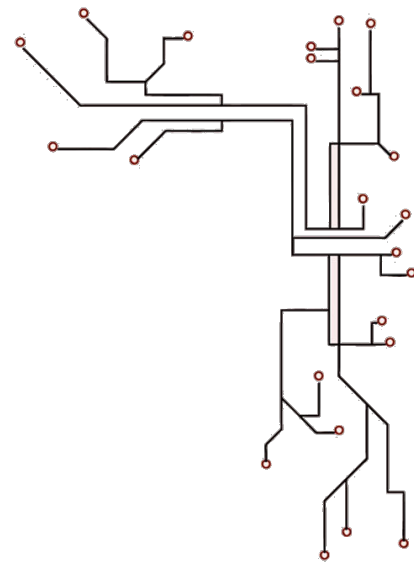
Key Pressed



Fill in the correct levels

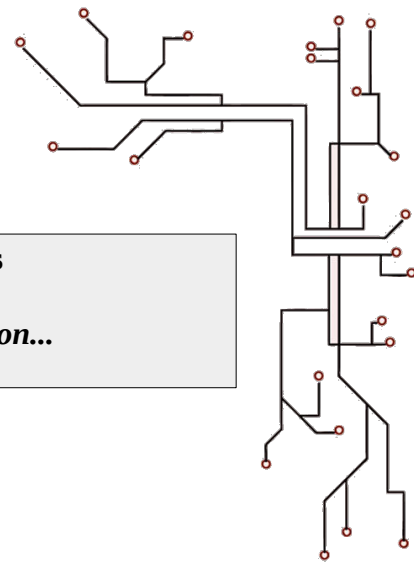
Key	PWM Level	Key	PWM Level
0	0	5	
1		6	
2		7	
3		8	
4		9	255

Try to come up with a general mathematical formula to calculate PWM Levels for N keys?



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2a) Add code to control LED brightness levels using **all ten digit (0-9) keys**

*You may be able to generalize the output as the above mathematical function...*

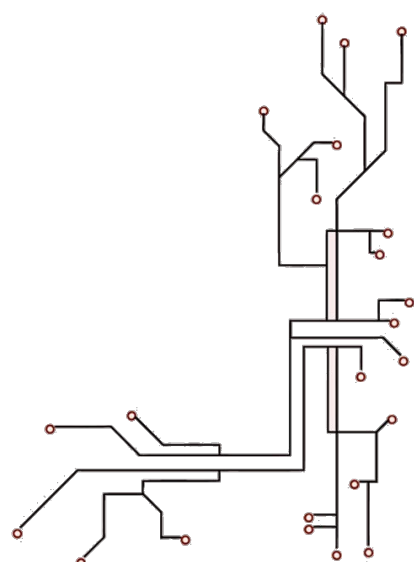
```
when 0 key pressed
  analog 9 value 0
```

```
when 1 key pressed
  analog 9 value ?
```

?  
?  
?  
?  
?

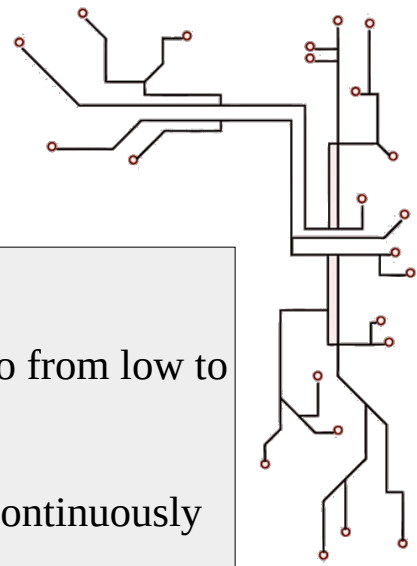
```
when 8 key pressed
  analog 9 value ?
```

```
when 9 key pressed
  analog 9 value 255
```



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2b)

- \* Extend the program above to make the dimmer effect go from low to high and back to low again.
- \* Extend the program to repeat this dim-up-down effect continuously for 10 times.

## Extra Challenges

- \* Convert your variable to a **Slider** and use it as a graphical **Variable Dimmer Switch**
- \* Create a Graphical **Dashboard** to control Lights (on/off & blink buttons using sprites, slider dimmers using variables)
- \* Use a physical button to act as a **Toggle** Dimmer Switch (on/off)



- \* Use multiple LEDs to create a **Light Show** with blinking, dimming, and any other effects you can muster

