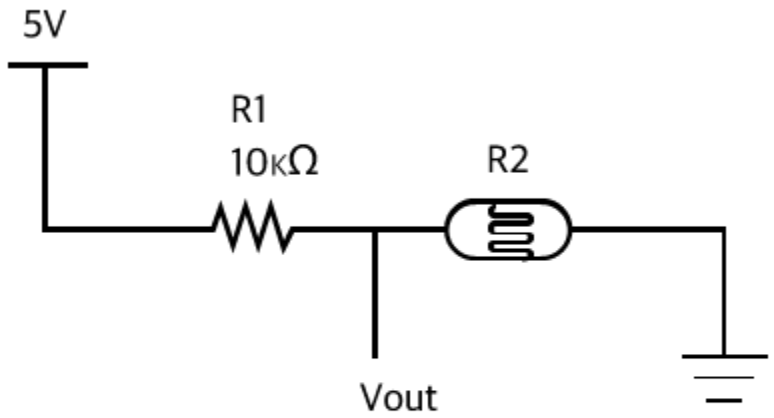
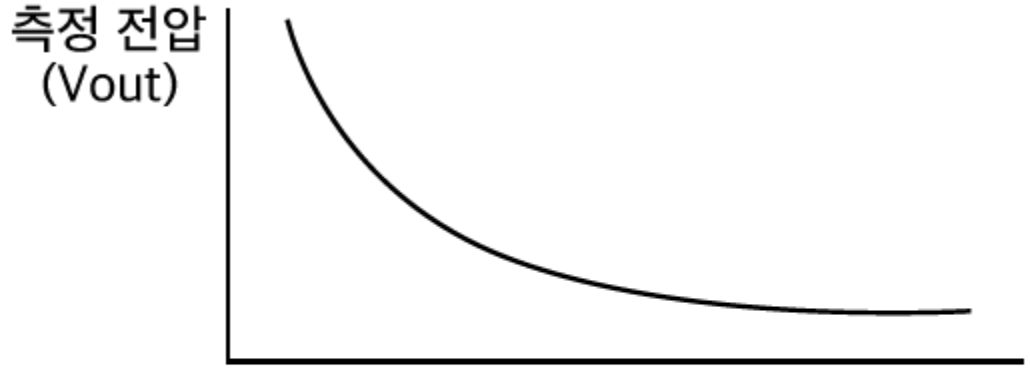
# ON/OFF, IR 센서 실험

# AnalogRead

**조도센서(CDS cell)**



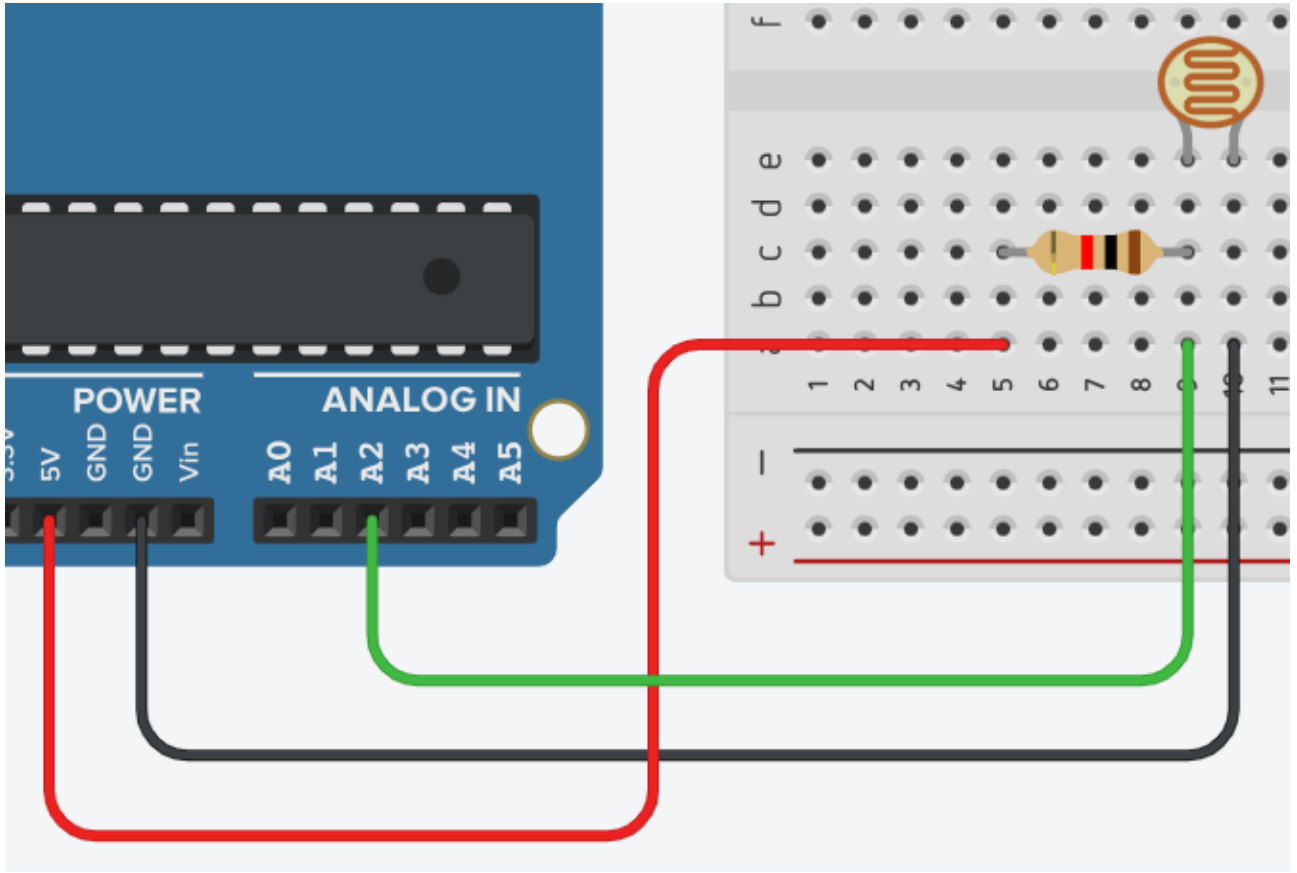

풀업 저항 사용



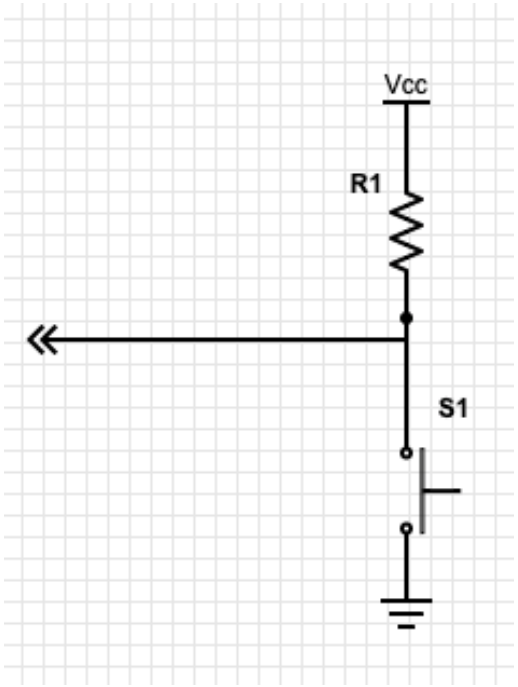

풀업 저항 사용시 밝기에 대한 측정 전압

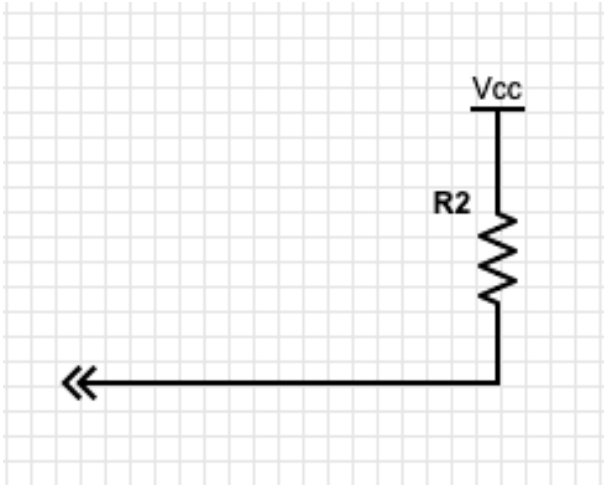
# AnalogRead Example

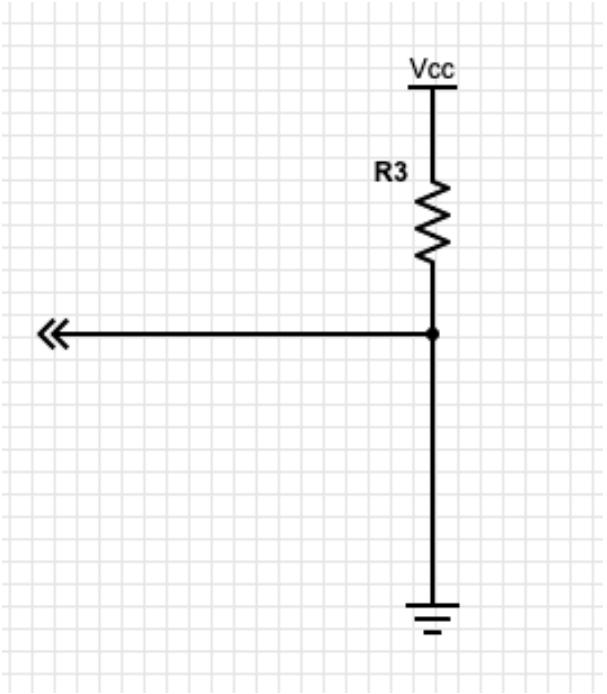
```
void setup ()
{
  Serial.begin(9600) ;
}

void loop()
{
  int val = analogRead(A2) ;
  Serial.println(val) ;
}
```



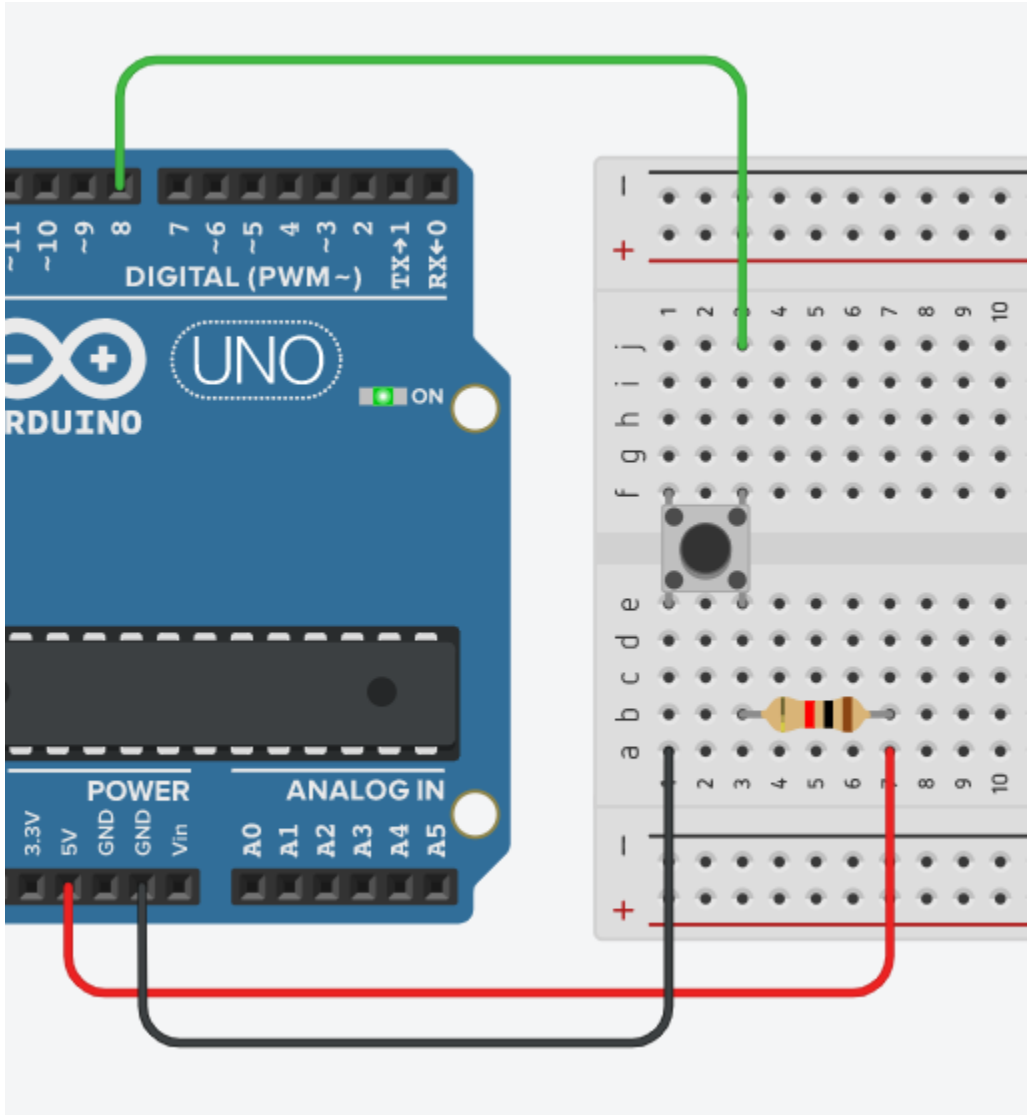
# DigitalRead

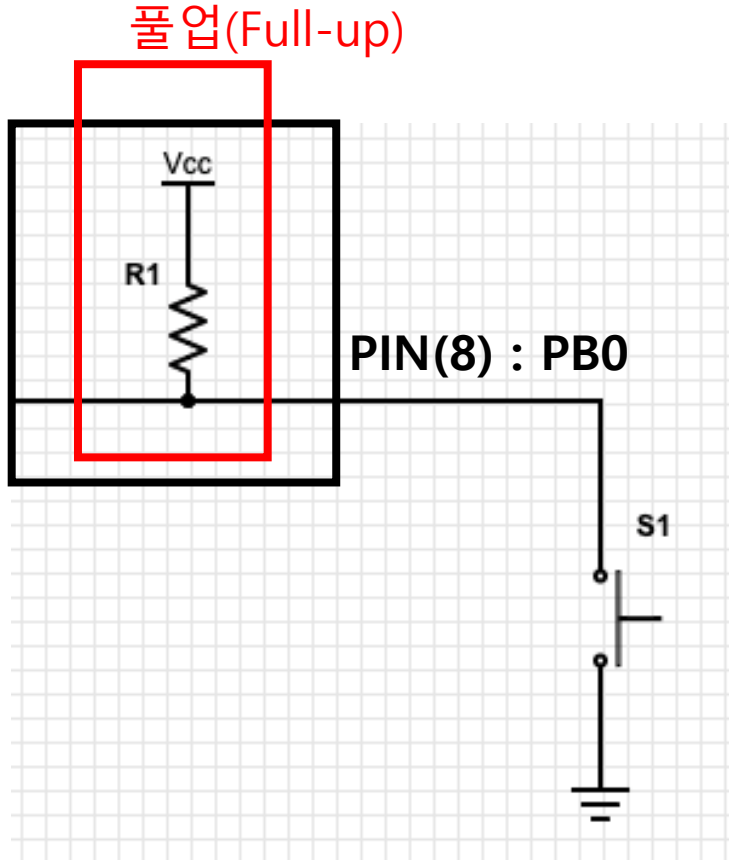


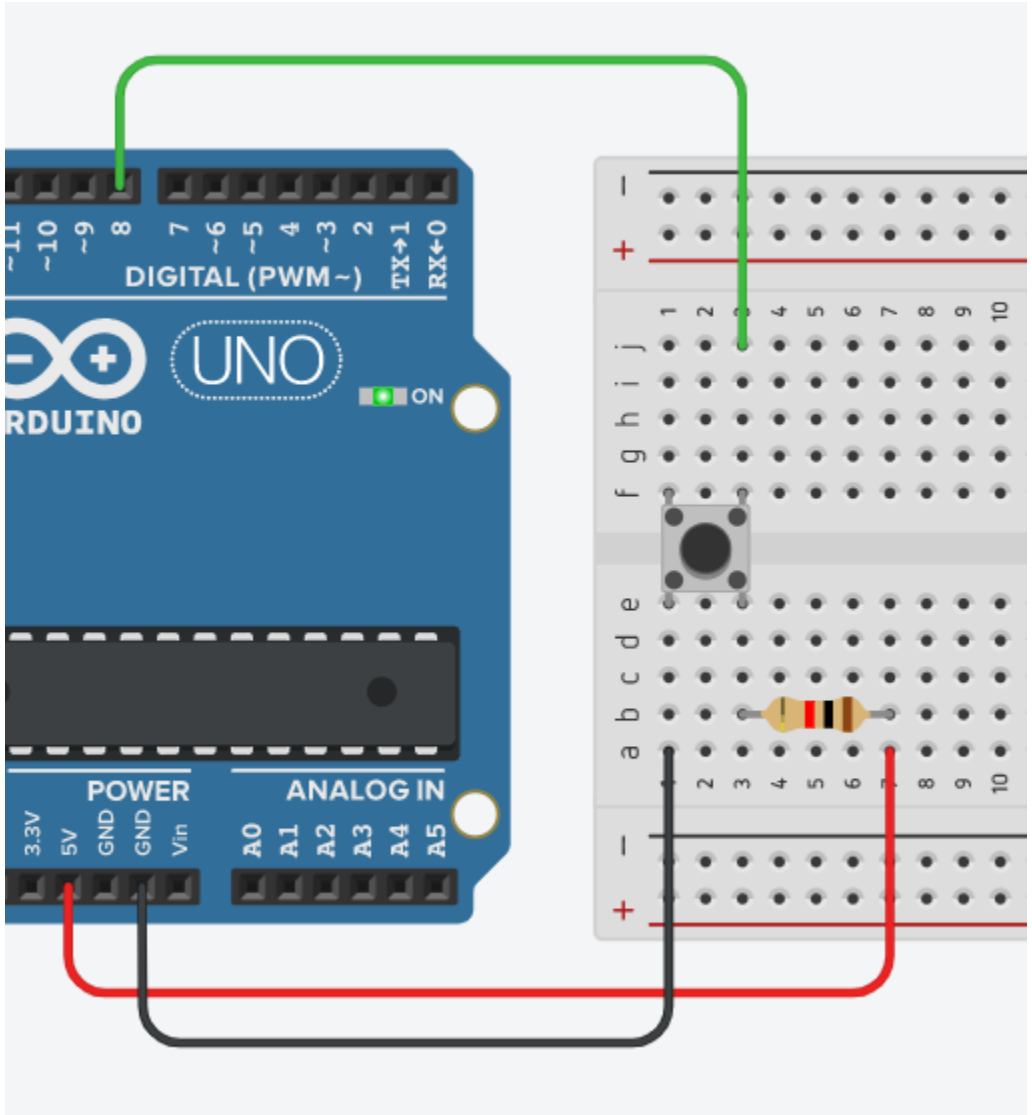



# DigitalRead



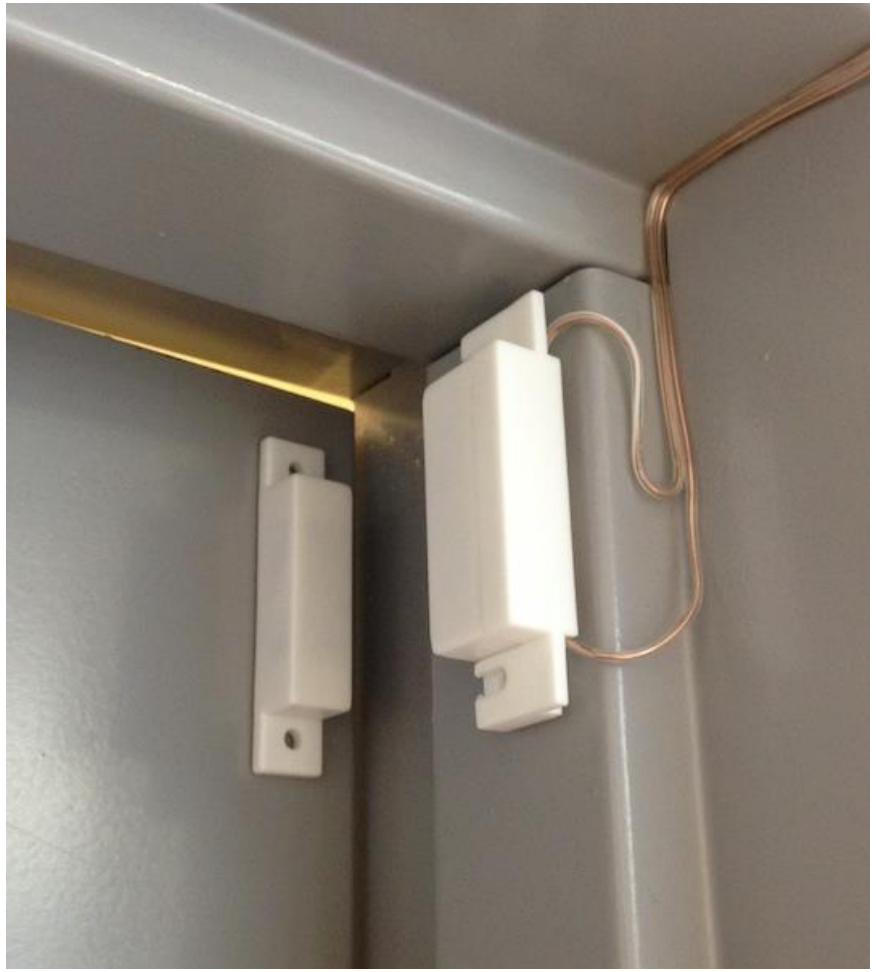



# DigitalRead




```
void setup()
{
  pinMode(8, INPUT) ;
  Serial.begin(9600) ;
}

void loop()
{
  int read = digitalRead(8) ;
  Serial.println(read) ;
}
```

# 마그네틱 도어센서 실험



# 부저 실험

- 부저(소리) 출력 실험
  - 능동부저:전원을공급하면단음(삐)소리가출력
  - 수동부저:진동을만들어특정주파수의소리를출력(다양한소리를출력할수있음,멜로디)

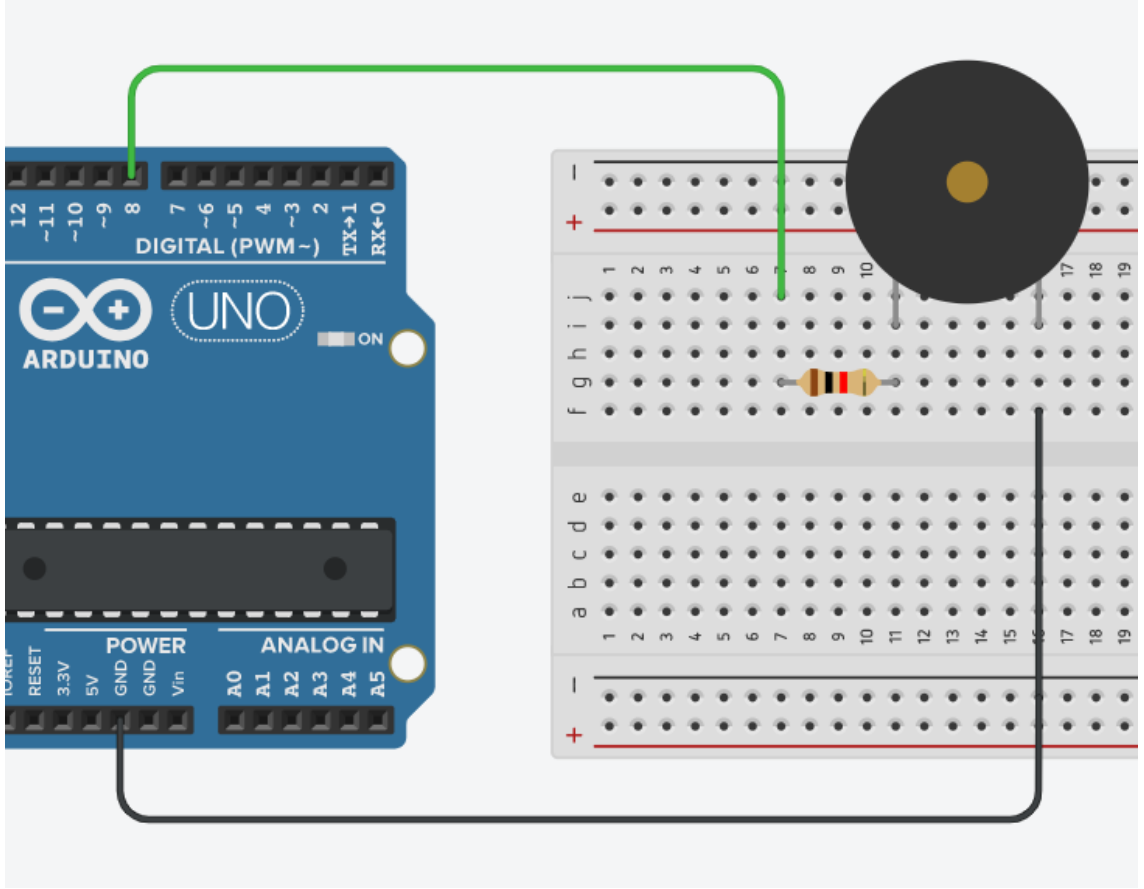
( 단위 : Hz )

| 옥타브 / 음계 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| C(도) | 32.7032 | 65.4064 | 130.8128 | 261.6256 | 523.2511 | 1046.502 | 2093.005 | 4186.009 |
| C# | 34.6478 | 69.2957 | 138.5913 | 277.1826 | 554.3653 | 1108.731 | 2217.461 | 4434.922 |
| D(레) | 36.7081 | 73.4162 | 146.8324 | 293.6648 | 587.3295 | 1174.659 | 2349.318 | 4698.636 |
| D# | 38.8909 | 77.7817 | 155.5635 | 311.1270 | 622.2540 | 1244.508 | 2489.016 | 4978.032 |
| E(미) | 41.2034 | 82.4069 | 164.8138 | 329.6276 | 659.2551 | 1318.510 | 2637.020 | 5274.041 |
| F(파) | 43.6535 | 87.3071 | 174.6141 | 349.2282 | 698.4565 | 1396.913 | 2793.826 | 5587.652 |
| F# | 46.2493 | 92.4986 | 184.9972 | 369.9944 | 739.9888 | 1479.978 | 2959.955 | 5919.911 |
| G(솔) | 48.9994 | 97.9989 | 195.9977 | 391.9954 | 783.9909 | 1567.982 | 3135.963 | 6271.927 |
| G# | 51.9130 | 103.8262 | 207.6523 | 415.3047 | 830.6094 | 1661.219 | 3322.438 | 6644.875 |
| A(라) | 55.0000 | 110.0000 | 220.0000 | 440.0000 | 880.0000 | 1760.000 | 3520.000 | 7040.000 |
| A# | 58.2705 | 116.5409 | 233.0819 | 466.1638 | 932.3275 | 1864.655 | 3729.310 | 7458.620 |
| B(시) | 61.7354 | 123.4708 | 246.9417 | 493.8833 | 987.7666 | 1975.533 | 3951.066 | 7902.133 |

- 도:261.6256Hz
- 레:293.1826Hz
- 미:329.6276 Hz
- 파:349.2282 Hz
- 솔:391.9954 Hz
- 라:440.0000 Hz
- 시:466.1638 Hz
- 도:523.2511 Hz

# 부저 실험

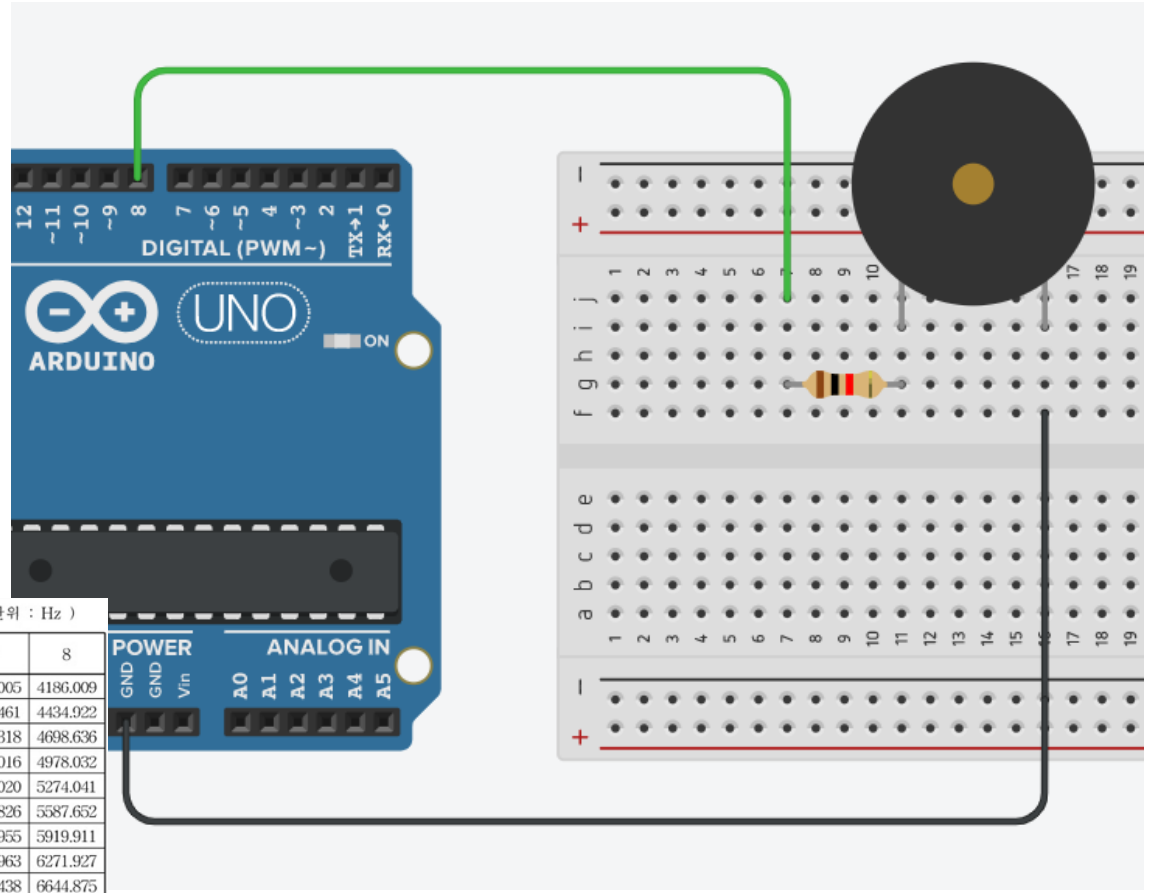
- 부저(소리) 출력 실험
  - 부저 + <> 아두이노 8번핀
  - 부저 - <> 아두이노 GND



# 부저 + LED 실험

- 부저(소리) 출력 실험

```
void setup()
{
    pinMode(8, OUTPUT);
}

void loop()
{
    tone(8, 262, 500);
    delay(500);
}
```




( 단위 : Hz )

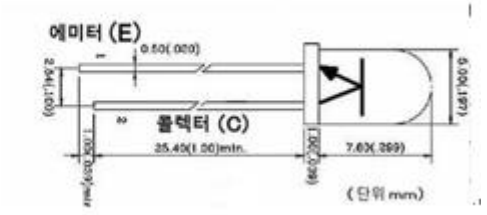
| 옥타브 / 음계 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| C(도) | 32.7032 | 65.4064 | 130.8128 | 261.6256 | 523.2511 | 1046.502 | 2093.005 | 4186.009 |
| C# | 34.6478 | 69.2957 | 138.5913 | 277.1826 | 554.3653 | 1108.731 | 2217.461 | 4434.922 |
| D(레) | 36.7081 | 73.4162 | 146.8324 | 293.6648 | 587.3295 | 1174.659 | 2349.318 | 4698.636 |
| D# | 38.8909 | 77.7817 | 155.5635 | 311.1270 | 622.2540 | 1244.508 | 2489.016 | 4978.032 |
| E(미) | 41.2034 | 82.4069 | 164.8138 | 329.6276 | 659.2551 | 1318.510 | 2637.020 | 5274.041 |
| F(파) | 43.6535 | 87.3071 | 174.6141 | 349.2282 | 698.4565 | 1396.913 | 2793.826 | 5587.652 |
| F# | 46.2493 | 92.4986 | 184.9972 | 369.9944 | 739.9888 | 1479.978 | 2959.955 | 5919.911 |
| G(솔) | 48.9994 | 97.9989 | 195.9977 | 391.9954 | 783.9909 | 1567.982 | 3135.963 | 6271.927 |
| G# | 51.9130 | 103.8262 | 207.6523 | 415.3047 | 830.6094 | 1661.219 | 3322.438 | 6644.875 |
| A(라) | 55.0000 | 110.0000 | 220.0000 | 440.0000 | 880.0000 | 1760.000 | 3520.000 | 7040.000 |
| A# | 58.2705 | 116.5409 | 233.0819 | 466.1638 | 932.3275 | 1864.655 | 3729.310 | 7458.620 |
| B(시) | 61.7354 | 123.4708 | 246.9417 | 493.8833 | 987.7666 | 1975.533 | 3951.066 | 7902.133 |

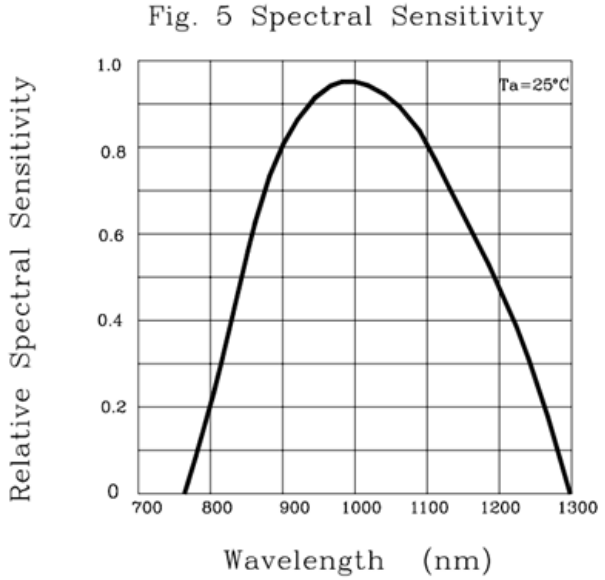
# QUIZ

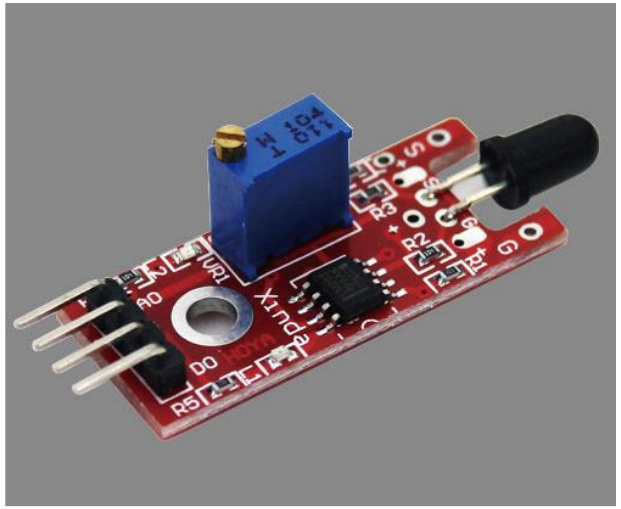

문이 열리면(버튼이 눌렸을 때) 경고음(부저)을 울려봅시다.

# 불꽃감지센서 (Flame sensor)

- 불꽃 또는 화염은 사람의 눈으로 확인 할 수 없는 자외선과 적외선의 파장이 발생
- 불꽃감지센서는 적외선 감지센서로서 760nm ~ 1100nm파장을 감지한다.

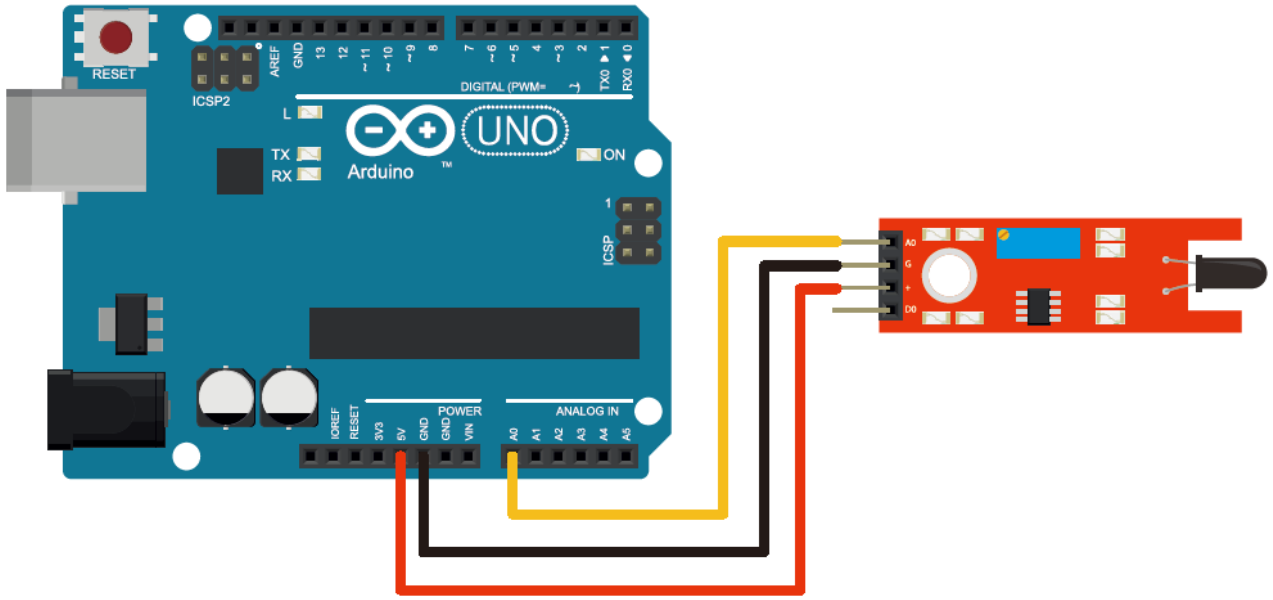


# 불꽃감지센서 (Flame sensor)

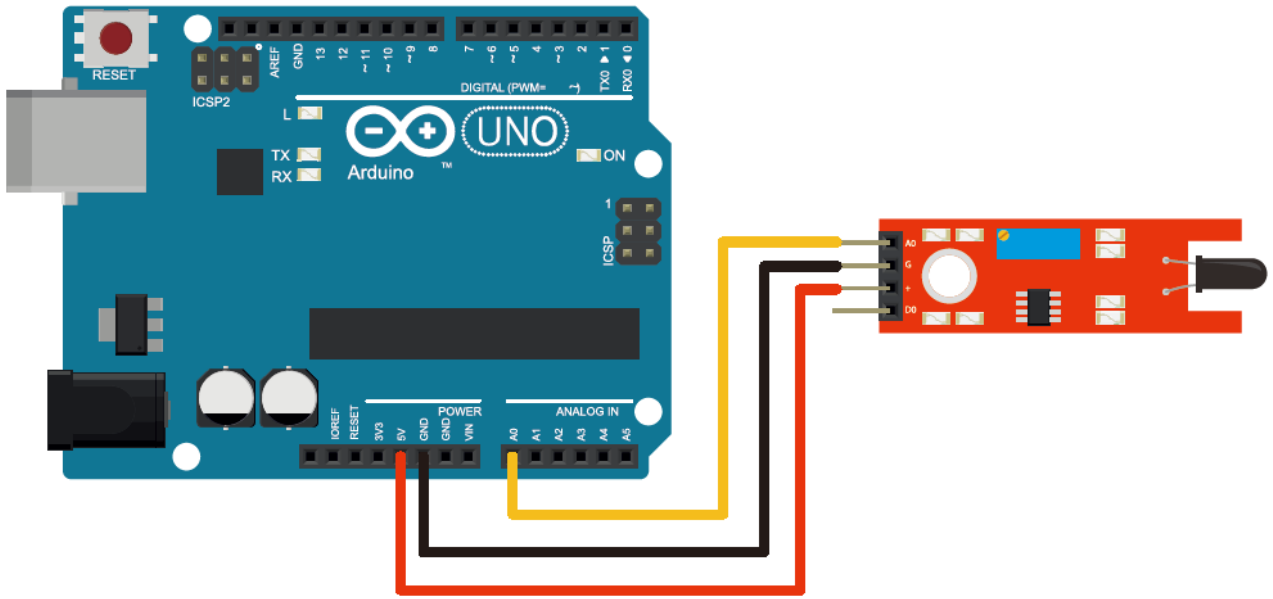
- 불꽃 감지 아두이노 실험 구성
  - 센서모듈 A0 <> 아두이노 A0
  - 센서모듈 G <> 아두이노 GND
  - 센서모듈 + <> 아두이노 5V



# 불꽃감지센서 (Flame sensor)

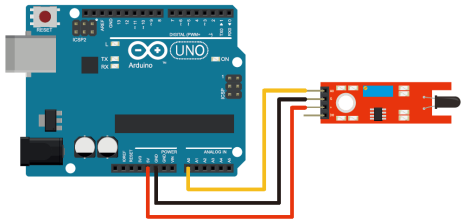
- 불꽃 감지 아두이노 실험 코드 작성

```
void setup()
{
    Serial.begin(9600);
}

void loop()
{
    int analog_value = analogRead(A0);

    Serial.println(analog_value);

    delay(100);
}
```



# 불꽃감지센서를 이용한 화재감지 응용

- 불꽃이 감지 되면 자동으로 경고를 발생시키자!




# QUIZ


화재가 감지되면 경고음(부저)과 비상등을 켜세요!