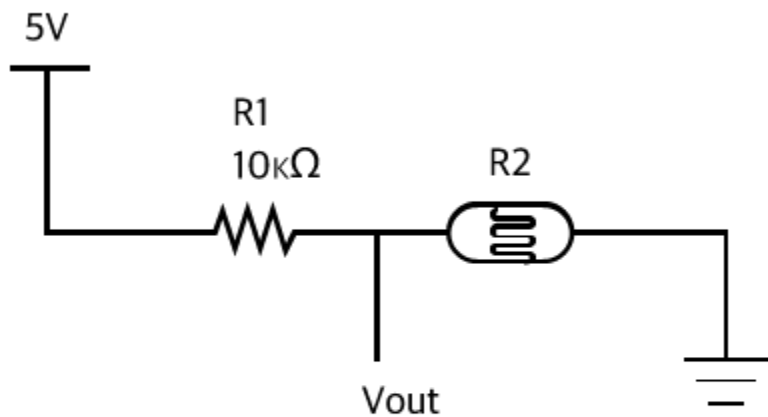


ON/OFF, IR 센서 실험

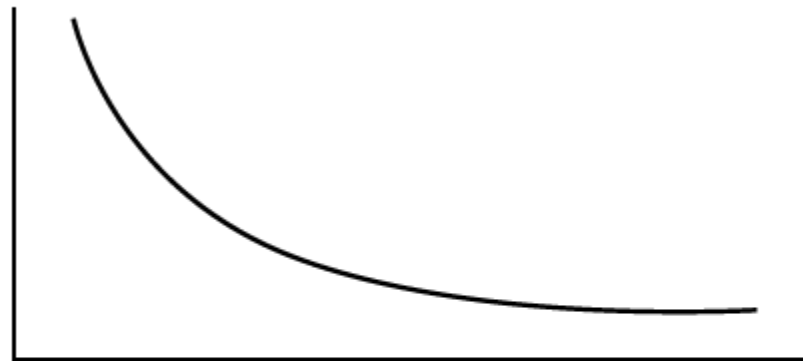
AnalogRead

조도 센서(CDS cell)



풀업 저항 사용

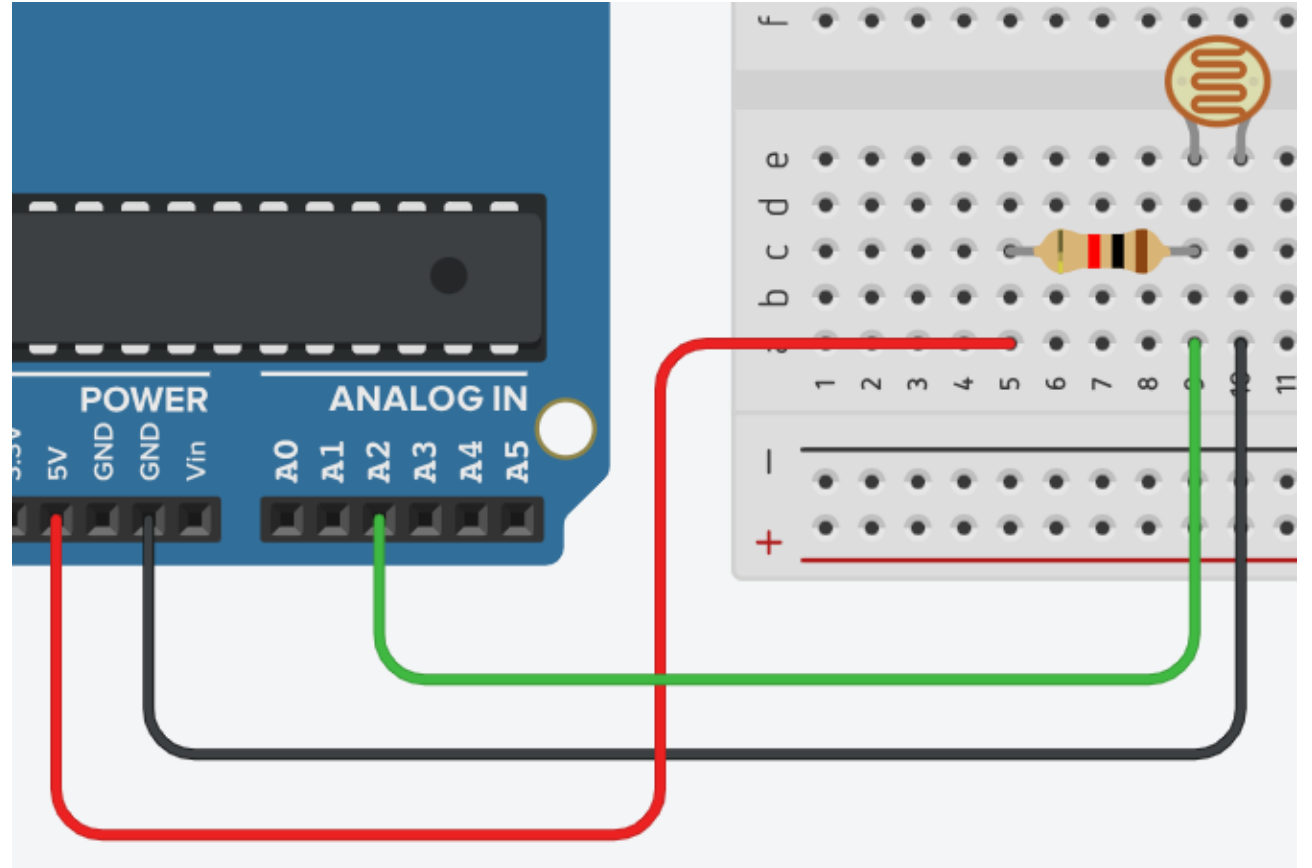
측정 전압
(Vout)



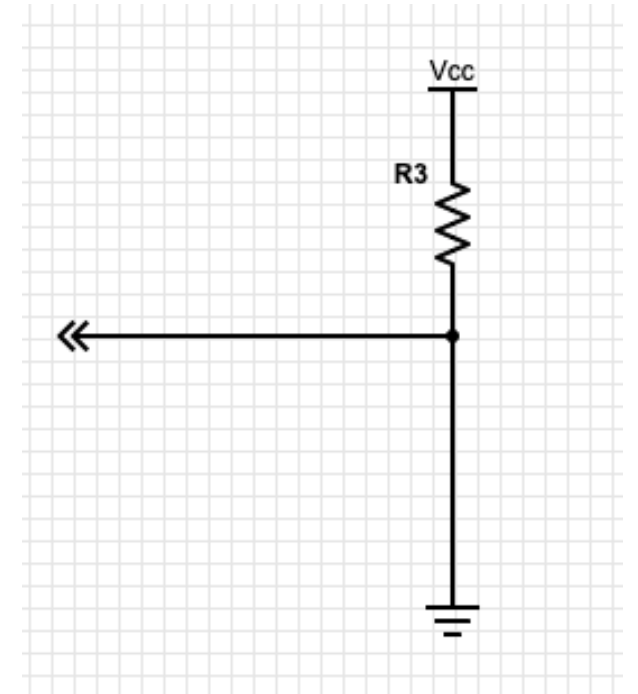
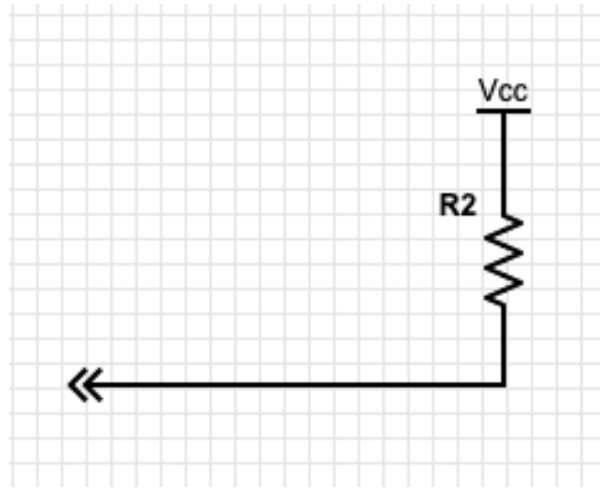
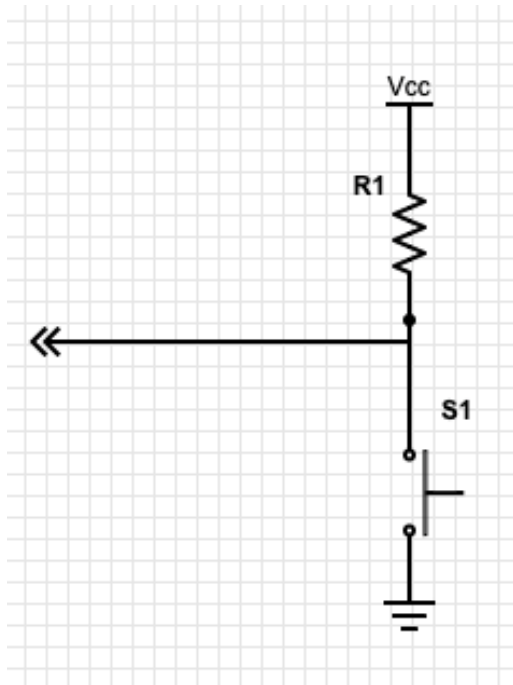
풀업 저항 사용시 밝기에 대한 측정 전압

AnalogRead Example

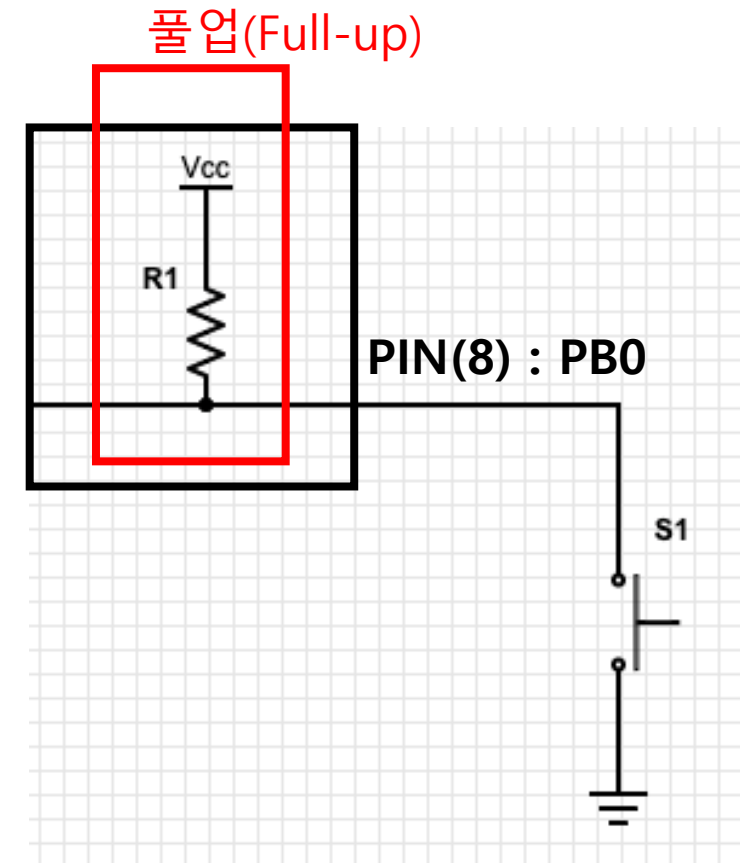
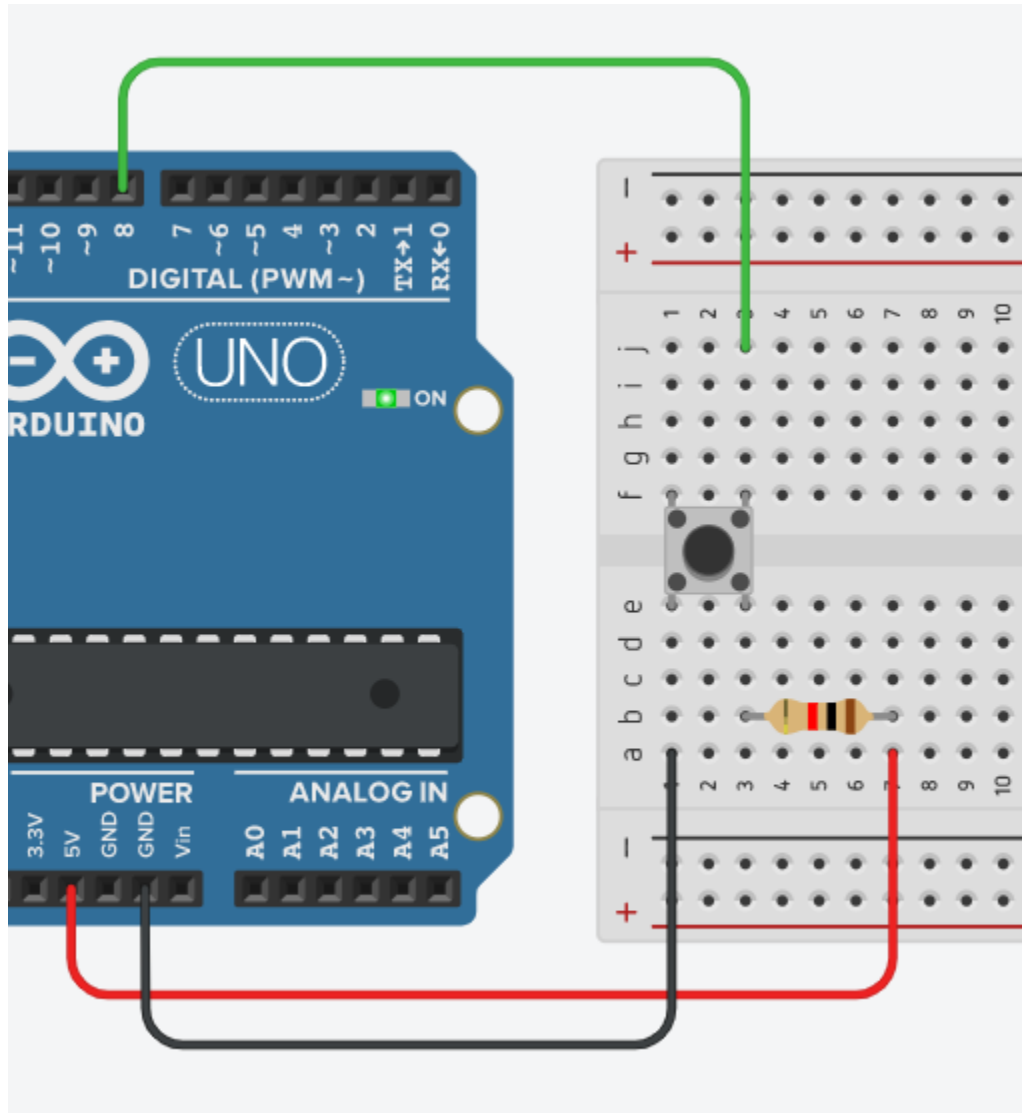
```
void setup ()  
{  
  Serial.begin(9600) ;  
}  
  
void loop()  
{  
  int val = analogRead(A2) ;  
  Serial.println(val) ;  
}
```



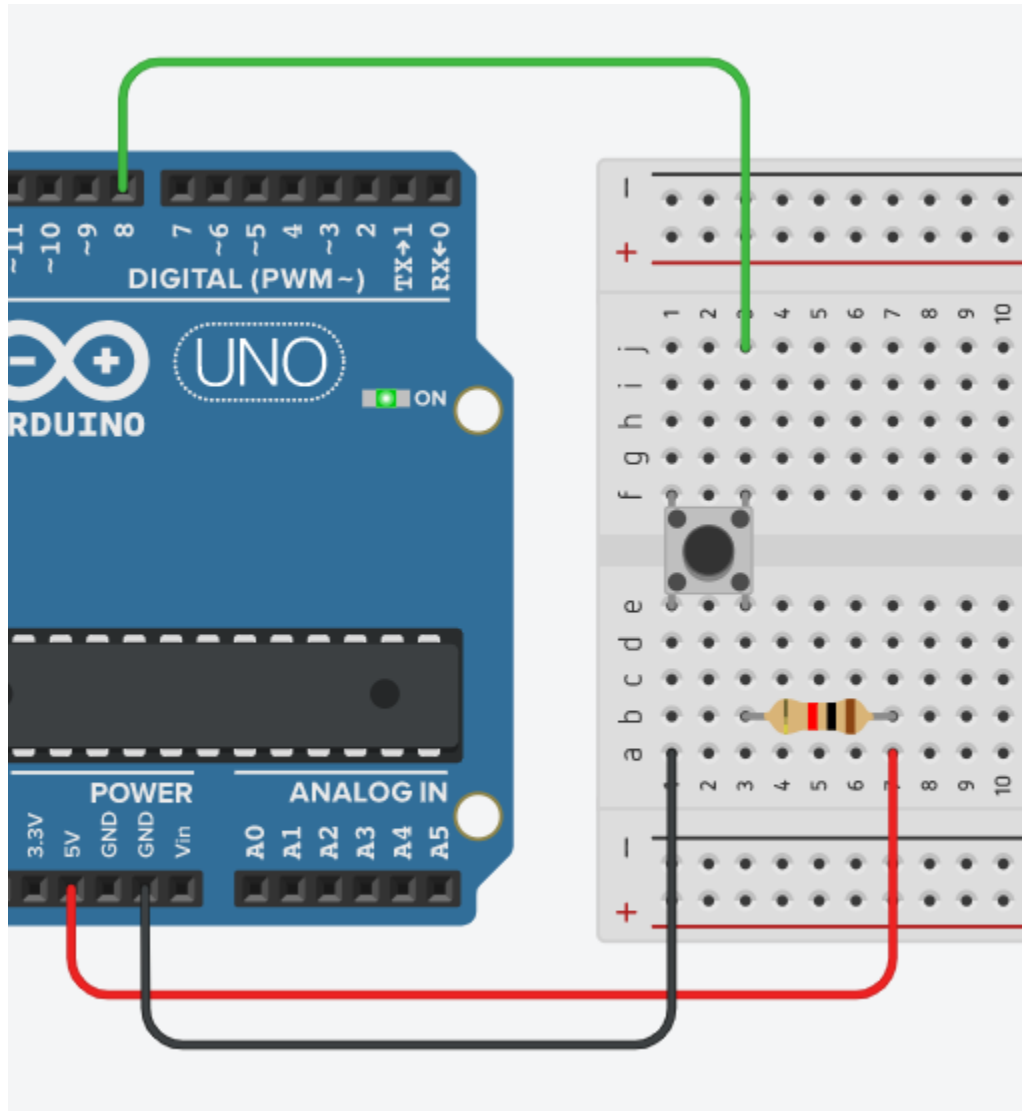
DigitalRead



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(빠)소리가출력
- 수동부저:진동을만들어특정주파수의소리를출력(다양한소리를출력할수있음,멜로디)



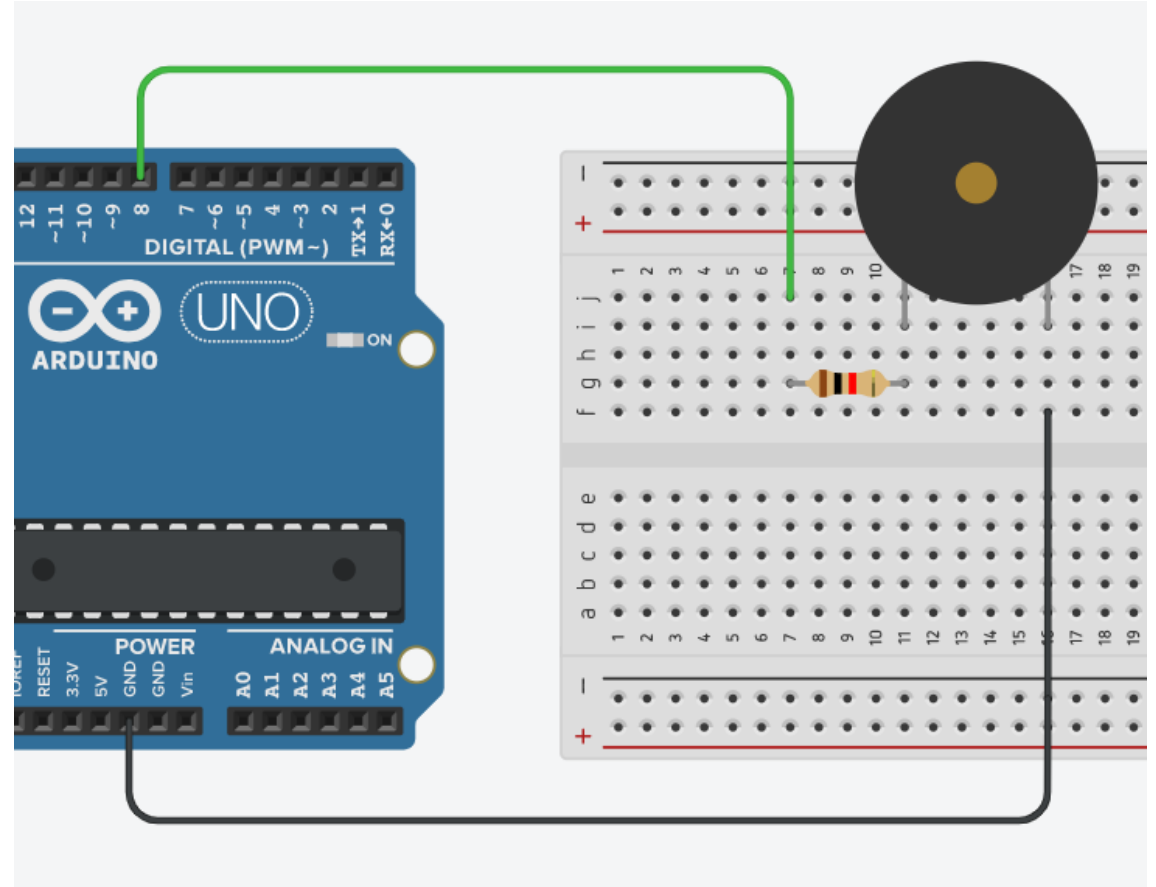
(단위 : Hz)

음계 \ 옥타브	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

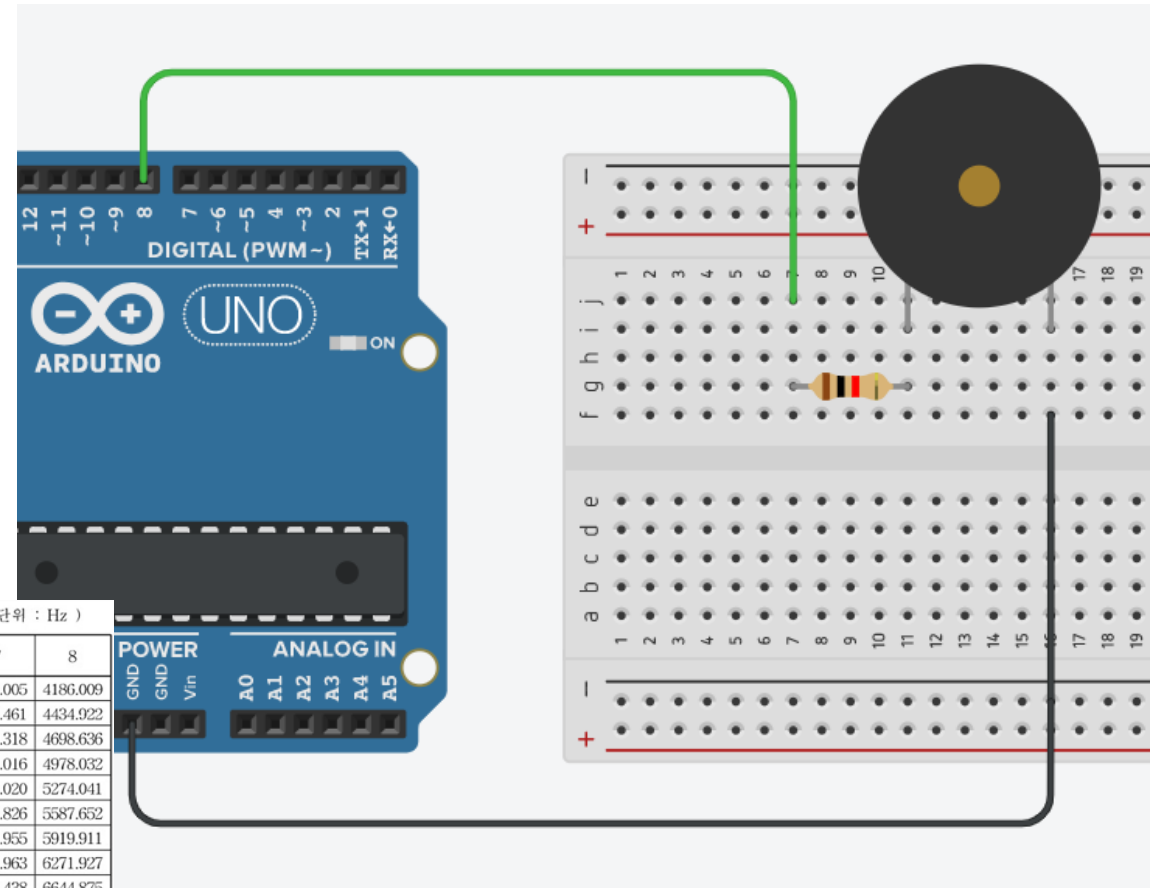
- 부저(소리) 출력 실험

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

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

(단위 : Hz)

음계 \ 옥타브	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.

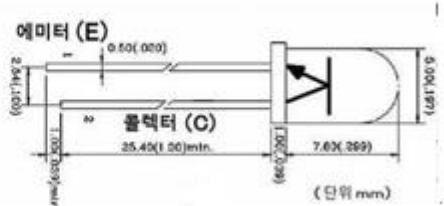
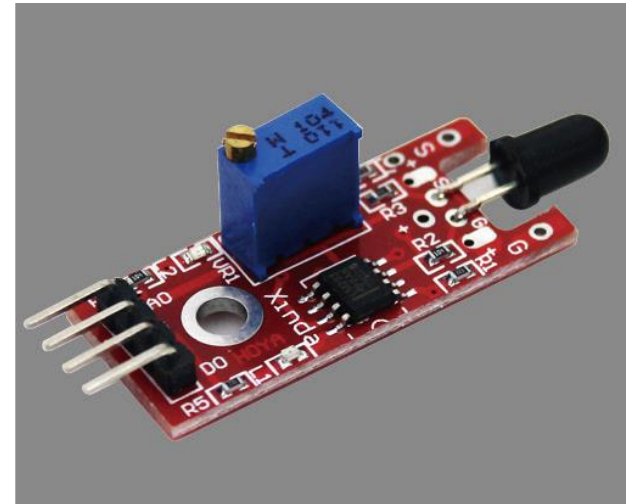
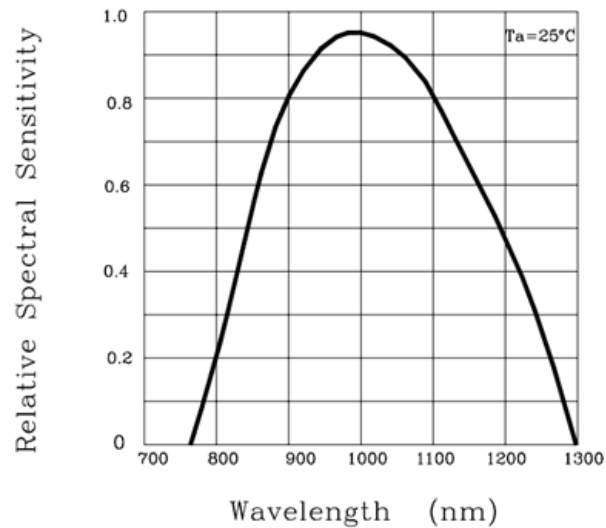
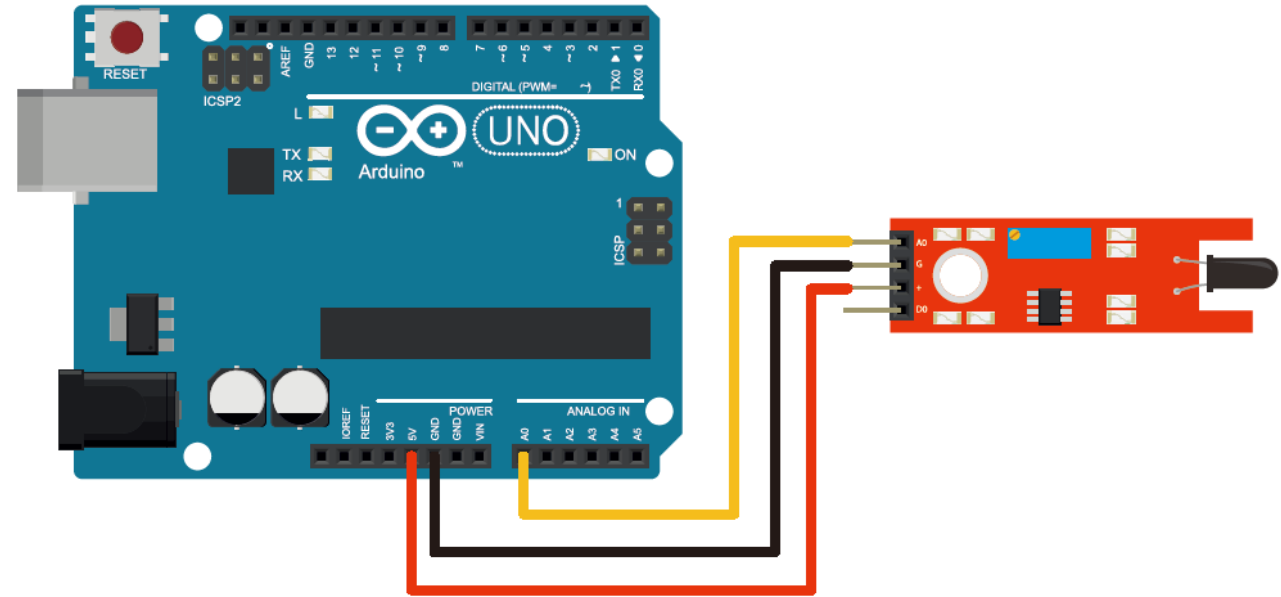


Fig. 5 Spectral Sensitivity



불꽃감지센서 (Flame sensor)

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



불꽃감지센서 (Flame sensor)

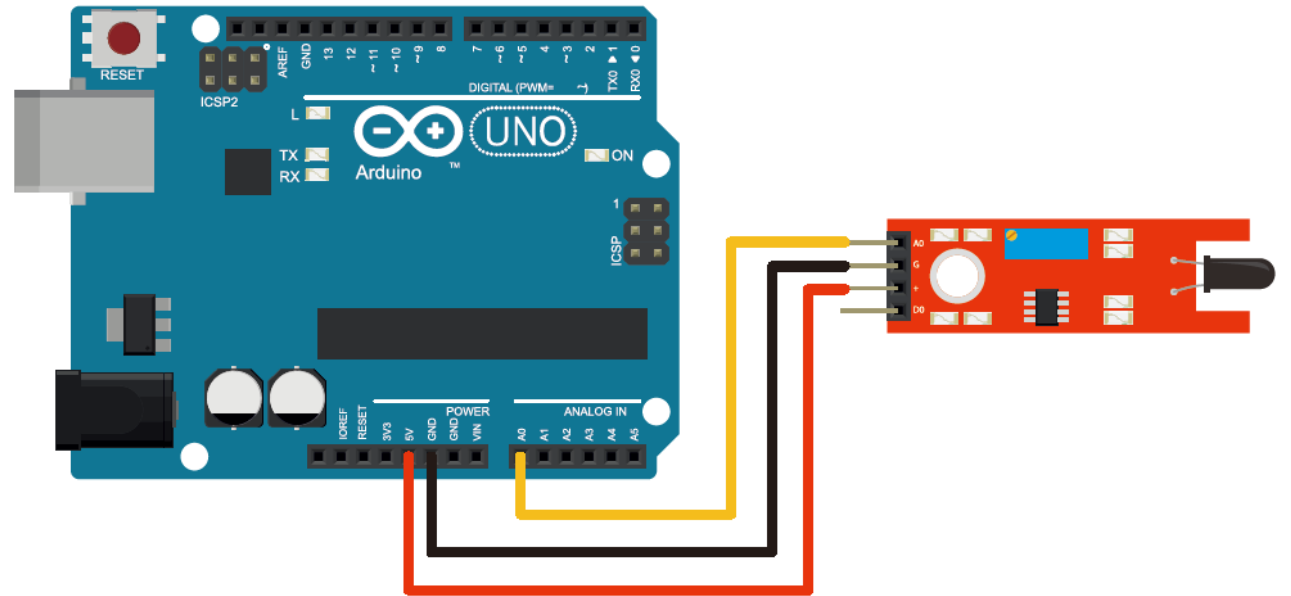
- 불꽃 감지 아두이노 실험 코드 작성

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

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

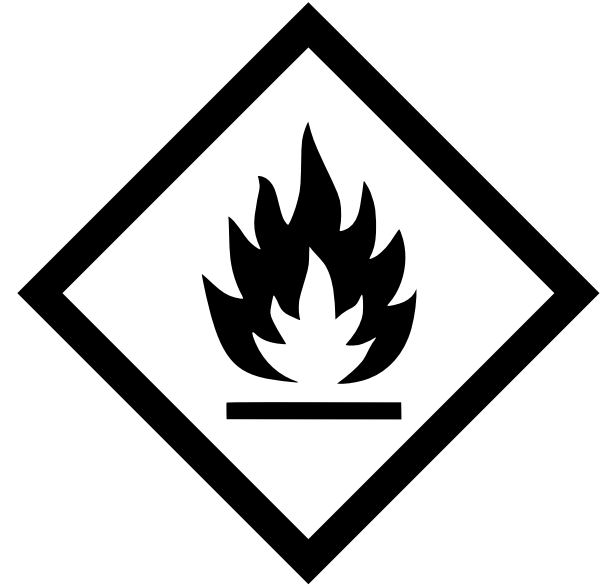
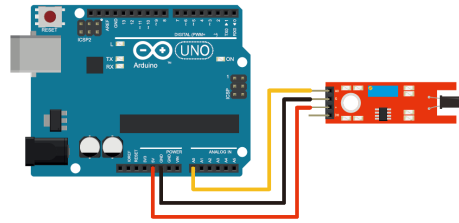
  Serial.println(analog_value);

  delay(100);
}
```



불꽃감지센서를 이용한 화재감지 응용

- 불꽃이 감지 되면 자동으로 경고를 발생시키자!



QUIZ



화재가 감지되면 경고음(부저)과 비상등을 켜세요!