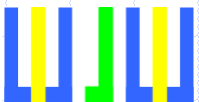


회로 이론/실습

1. 저항 읽기 및 브레드 보드



1. 저항 읽기 및 브레드 보드

1-1. 목적 및 배경

1-2. 소요 부품 및 장비

1-3. 저항 읽기

1-4. 저항의 정격 전력

1-5. 가변 저항

1-6. 그 밖의 저항

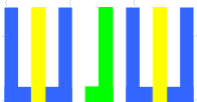
1-7. 표준 저항값

1-8. 브레드 보드 (Bread Board)

1-9. 브레드 보드를 이용한 직렬 저항 연결

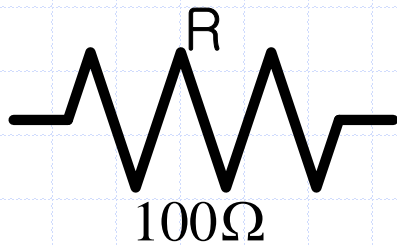
1-10. 브레드 보드를 이용한 병렬 저항 연결

1-11. 브레드 보드를 이용한 직병렬 저항 연결

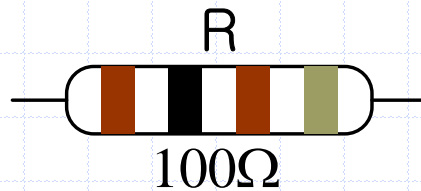


1-1. 목적 및 배경

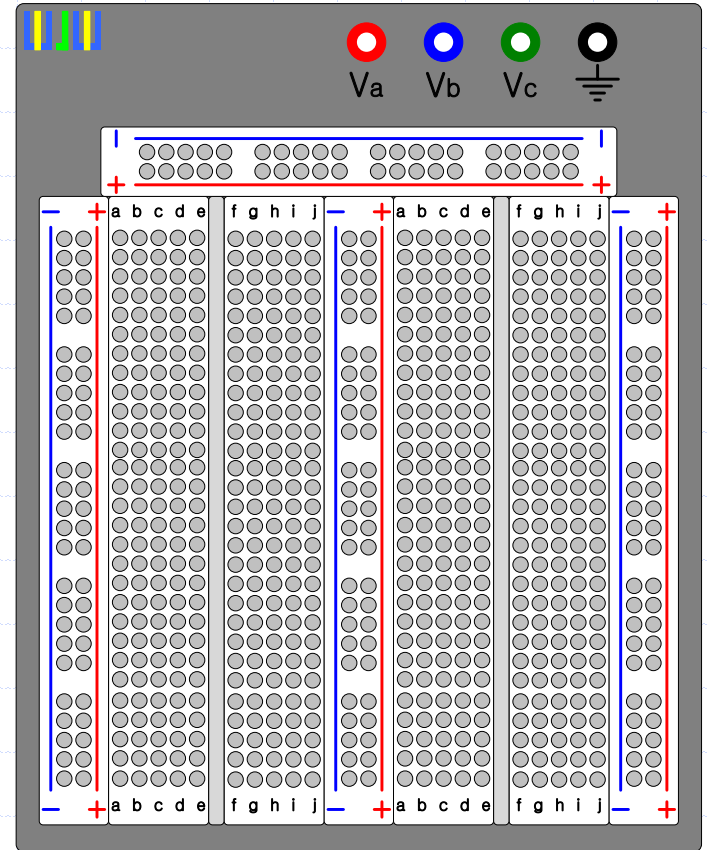
- ✓ 색깔로 표현된 저항값을 읽는 방법을 익힌다.
- ✓ 회로 구성에 사용하는 브레드 보드의 사용법을 익힌다.



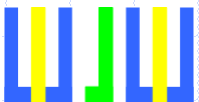
저항 심볼



저항



브레드 보드 (Bread Board)



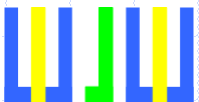
1-2. 소요 부품 및 장비

✓ 부품

- ✓ 저항 (1/4W) : 10Ω, 47Ω, 100Ω, 150Ω, 200Ω, 300Ω,
1kΩ, 2kΩ, 2.49kΩ, 2.7kΩ, 3kΩ, 4.7kΩ,
6.8kΩ, 1MΩ

◆ 장비

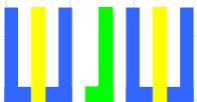
- ✓ 브레드 보드
- ✓ 디지털 멀티미터 (Digital Multimeter)



1-3A. 저항 읽기

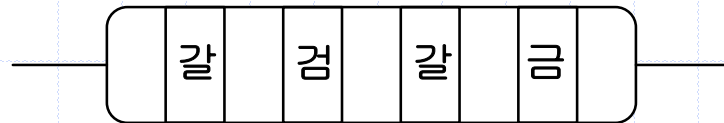
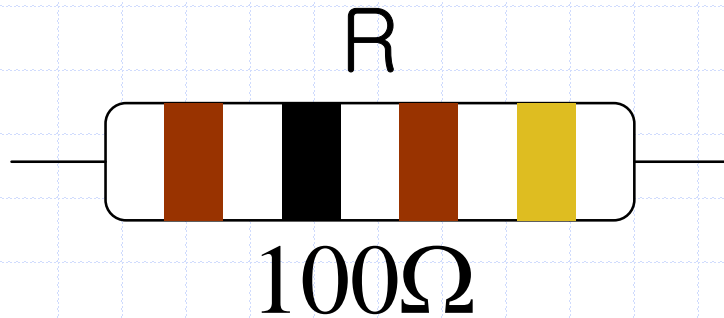
✓ 색깔에 의한 정격 표시 (4색 띠의 경우)

저항 몸체 의 색깔	색깔	A	B	D	E
		첫째자리 숫자	둘째자리 숫자	배수	오차[%]
	검정색	0	0	$10^0=1$	-
	갈색	1	1	$10^1=10$	± 1
	빨간색	2	2	$10^2=100$	± 2
	주황색	3	3	$10^3=1,000$	-
	노란색	4	4	$10^4=10,000$	-
	녹색	5	5	$10^5=100,000$	± 0.5
	파란색	6	6	$10^6=1,000,000$	-
	보라색	7	7	$10^7=10,000,000$	-
	회색	8	8	$10^8=100,000,000$	-
	흰색	9	9	$10^9=1,000,000,000$	-
	금색	-	-	$10^{-1}=0.1$	± 5
	은색	-	-	$10^{-2}=0.01$	± 10
	무색	-	-	-	± 20

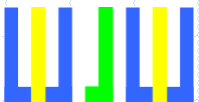


1-3A. 저항 읽기

- ✓ 색깔에 의한 정격 표시 (4색 띠의 경우)



↓ ↓ ↓ ↓
1 0 X10 ±5% = 100 Ω 오차 ±5% 저항



1-3A. 저항 읽기



갈 검 검

$$1\ 0\ \times\ 1 = 10\ \Omega$$



노 보 검

$$4\ 7\ \times\ 1 = 47\ \Omega$$



갈 검 빨

$$1\ 0\ \times\ 100 \\ = 1,000\ \Omega = 1\ \text{k}\Omega$$



갈 녹 갈

$$1\ 5\ \times\ 10 = 150\ \Omega$$



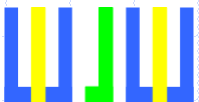
빨 검 갈

$$2\ 0\ \times\ 10 = 200\ \Omega$$



빨 검 빨

$$2\ 0\ \times\ 100 \\ = 2,000\ \Omega = 2\ \text{k}\Omega$$



1-3A. 저항 읽기



주검빨

$$30 \times 100 = 3 \text{ k}\Omega$$



파회빨

$$68 \times 100 = 6.8 \text{ k}\Omega$$



갈검주

$$10 \times 1,000 = 10 \text{ k}\Omega$$



노보빨

$$47 \times 100 = 4.7 \text{ k}\Omega$$



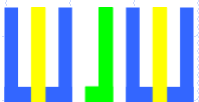
빨보빨

$$27 \times 100 = 2.7 \text{ k}\Omega$$



갈검녹

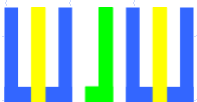
$$10 \times 100,000 = 1 \text{ M}\Omega$$



1-3B. 저항 읽기

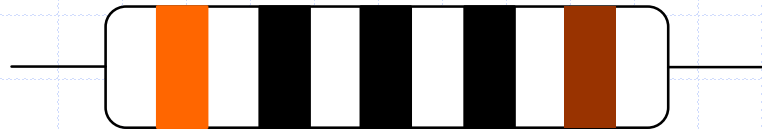
✓ 색깔에 의한 정격 표시 (5색 띠의 경우)

	색깔	A	B	C	D	E
		첫째자리 숫자	둘째자리 숫자	셋째자리 숫자	배수	오차[%]
저항 몸체의 색깔	검정색	0	0	0	$10^0=1$	-
	갈색	1	1	1	$10^1=10$	± 1
	빨간색	2	2	2	$10^2=100$	± 2
	주황색	3	3	3	$10^3=1000$	-
	노란색	4	4	4	$10^4=10000$	-
	녹색	5	5	5	$10^5=100000$	± 0.5
	파란색	6	6	6	$10^6=1000000$	± 0.25
	보라색	7	7	7	$10^7=10000000$	± 0.1
	회색	8	8	8	$10^8=100000000$	-
	흰색	9	9	9	$10^9=1000000000$	± 5
	금색	-	-	-	$10^{-1}=0.1$	± 10
	은색	-	-	-	$10^{-2}=0.01$	± 20



1-3B. 저항 읽기

✓ 색깔에 의한 정격 표시 (5색 띠의 경우)



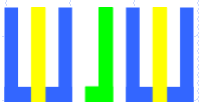
↓ ↓ ↓ ↓ ↓
3 0 0 X1 ±1%

= 300 Ω 오차 ±1% 저항



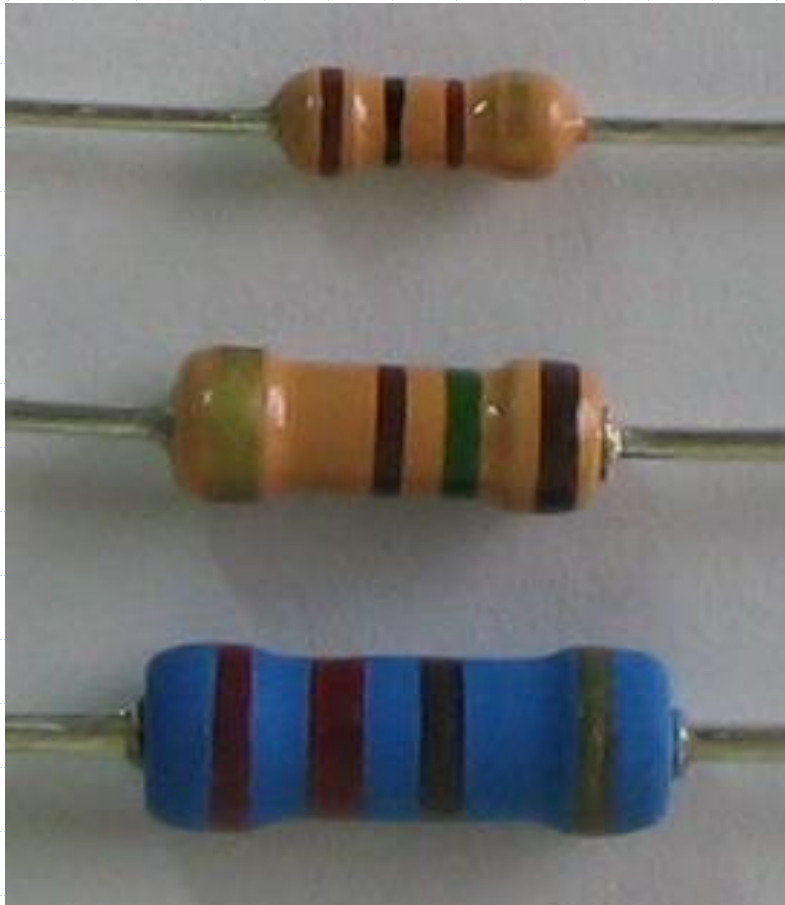
빨 노 흰 갈 갈

2 4 9 X10 ±1% = 2,490 Ω = 2.49 kΩ 오차 ±1% 저항



1-4. 저항의 정격 전력

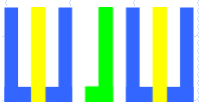
- ✓ 크기에 따라 정격 전력 표시



1/8 W
(0.125W)

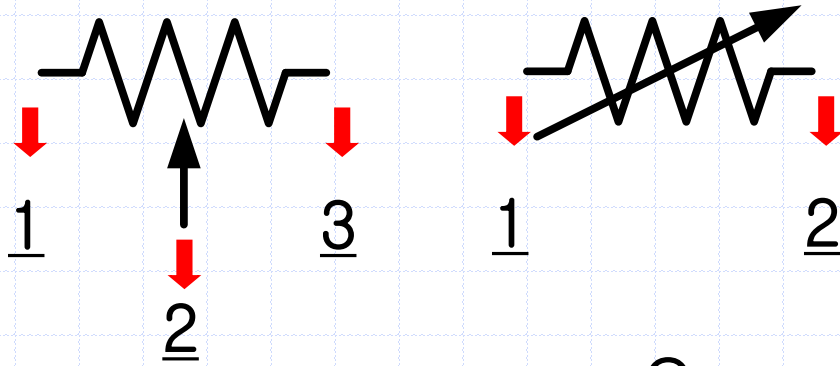
1/4 W
(0.25W)

1/2 W
(0.5W)

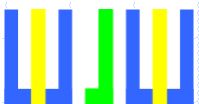
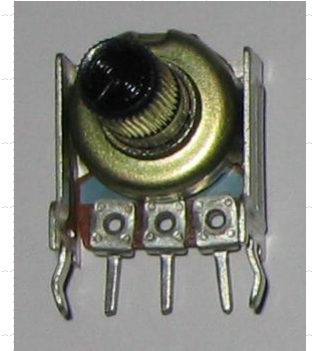
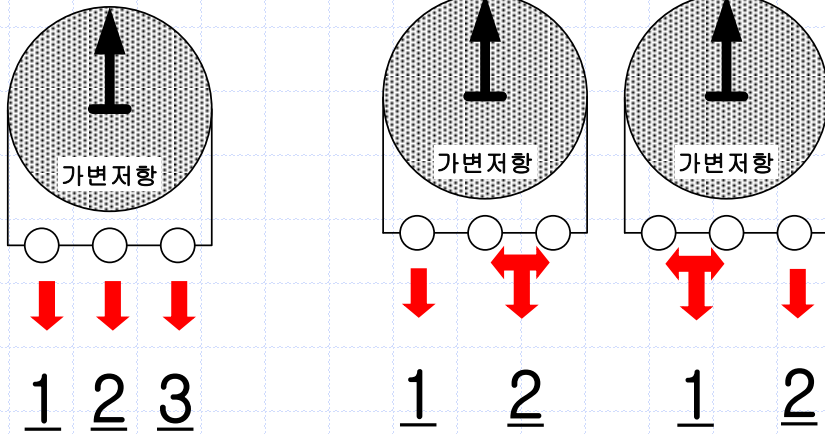


1-5. 가변 저항

✓ 저항의 크기가 변화 가능한 저항



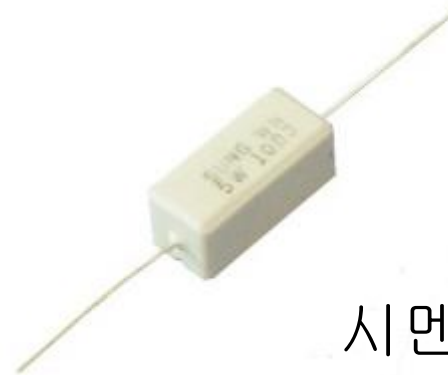
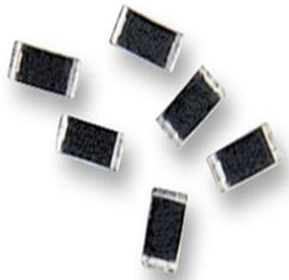
Or



1-6. 그 밖의 저항



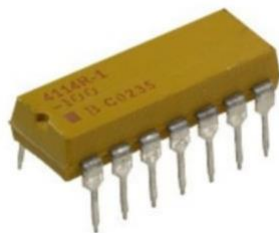
칩 저항



시멘트 저항



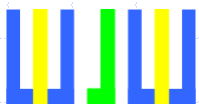
어레이 저항
(SIP Type)



어레이 저항
(DIP Type)



어레이 저항 (SMD Type)



1-7. 표준 저항값

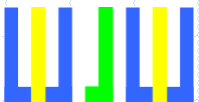
- ✓ 오차 $\pm 10\%$ (K급) 표준 저항의 10배수 기준 값

1.0	1.2	1.5	1.8	2.2	2.7
3.3	3.9	4.7	5.6	6.8	8.2

예) 0.18Ω , 1.8Ω , 18Ω , 180Ω , $1.8k\Omega$, $18k\Omega$, $180k\Omega$, $1.8M\Omega$, $18M\Omega$

- ✓ 오차 $\pm 5\%$ (J급) 표준 저항의 10배수 기준 값

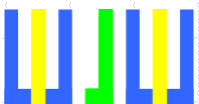
1.0	1.1	1.2	1.3	1.5	1.6
1.8	2.0	2.2	2.4	2.7	3.0
3.3	3.6	3.9	4.3	4.7	5.1
5.6	6.2	6.8	7.5	8.2	9.1



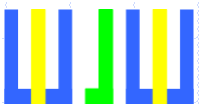
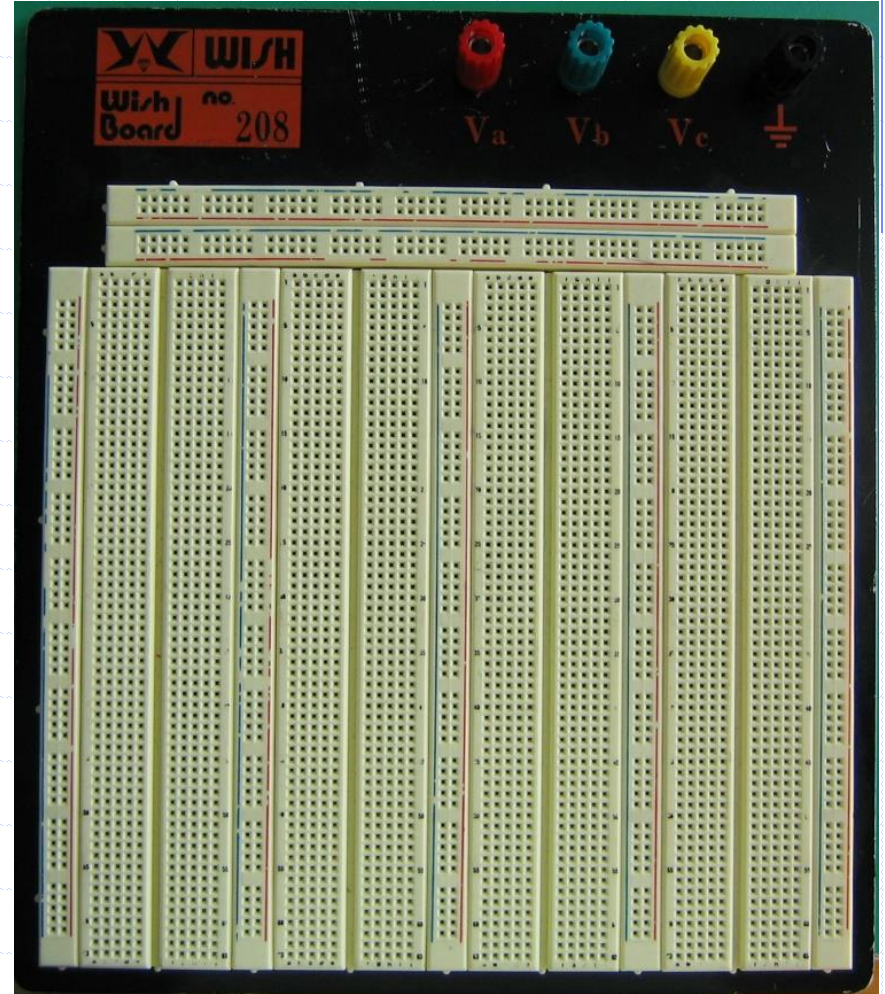
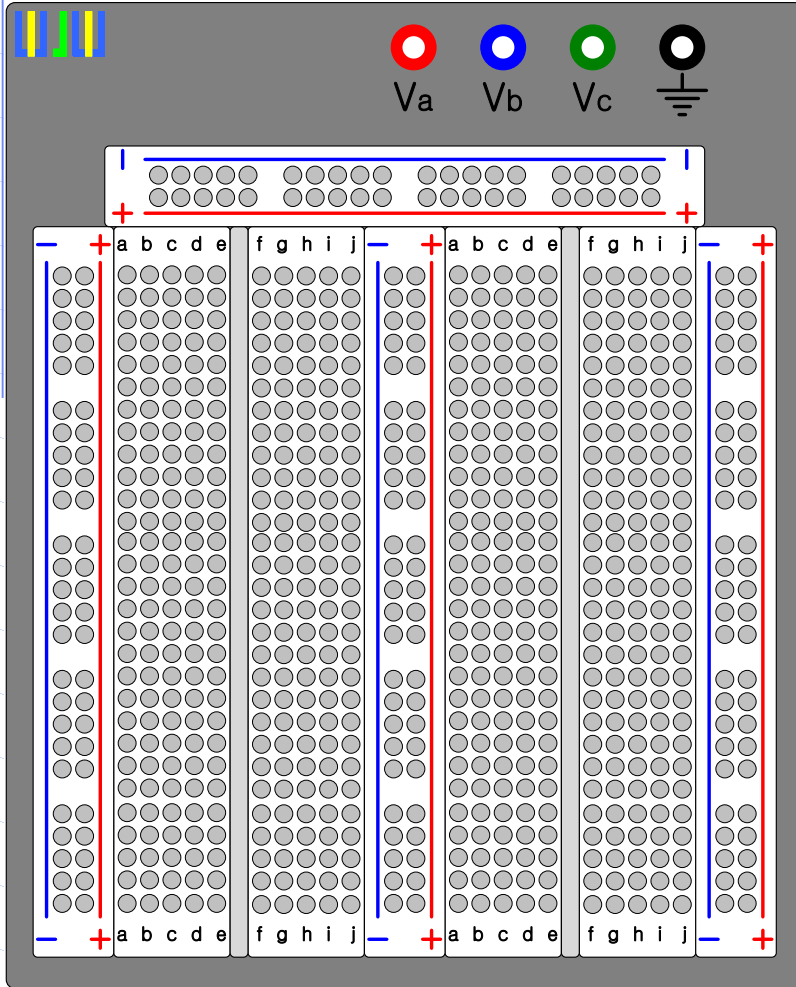
1-7. 표준 저항값

✓ 오차 $\pm 1\%$ (F급) 표준 저항의 10배수 기준 값

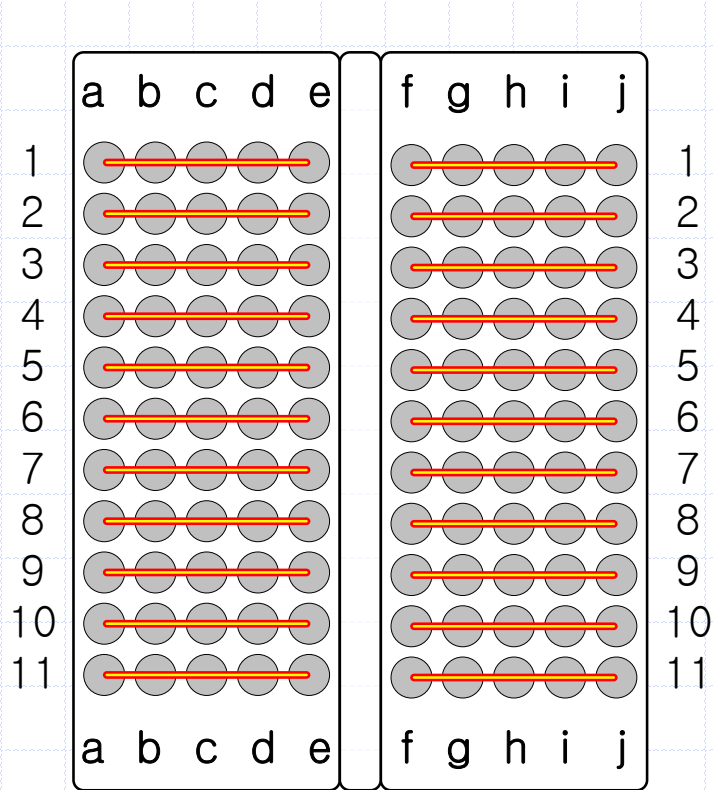
100	102	105	107	110	113
115	118	121	124	127	130
133	137	140	143	147	150
154	158	162	165	169	174
178	182	187	191	196	200
205	210	215	221	226	232
237	243	249	255	261	267
274	280	287	294	301	309
316	324	332	340	348	357
365	374	383	392	402	412
422	432	442	453	464	475
487	499	511	523	536	549
562	576	590	604	619	634
649	665	681	698	715	732
750	768	787	806	825	845
866	887	909	931	953	976



1-8. 브레드 보드 (Bread Board)



1-8. 브레드 보드 (Bread Board)

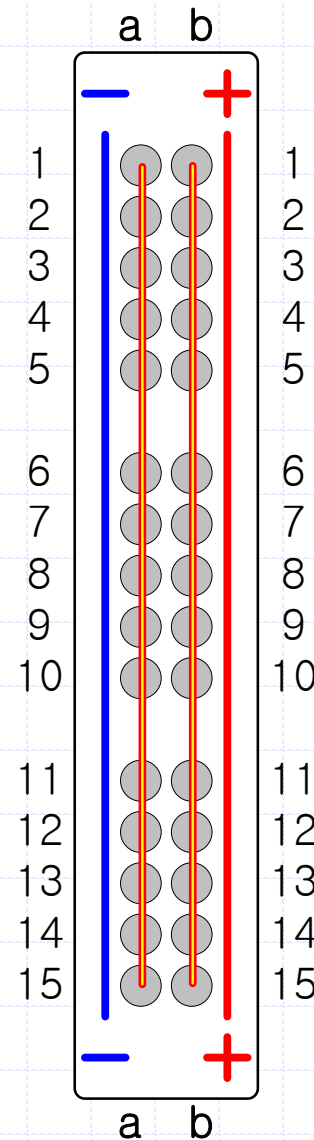


가로점 5개는 하나로 연결

Ex) 1-a, b, c, d, e

Ex) 1-f, g, h, i, j

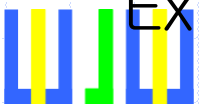
Ex) 7-a, b, c, d, e



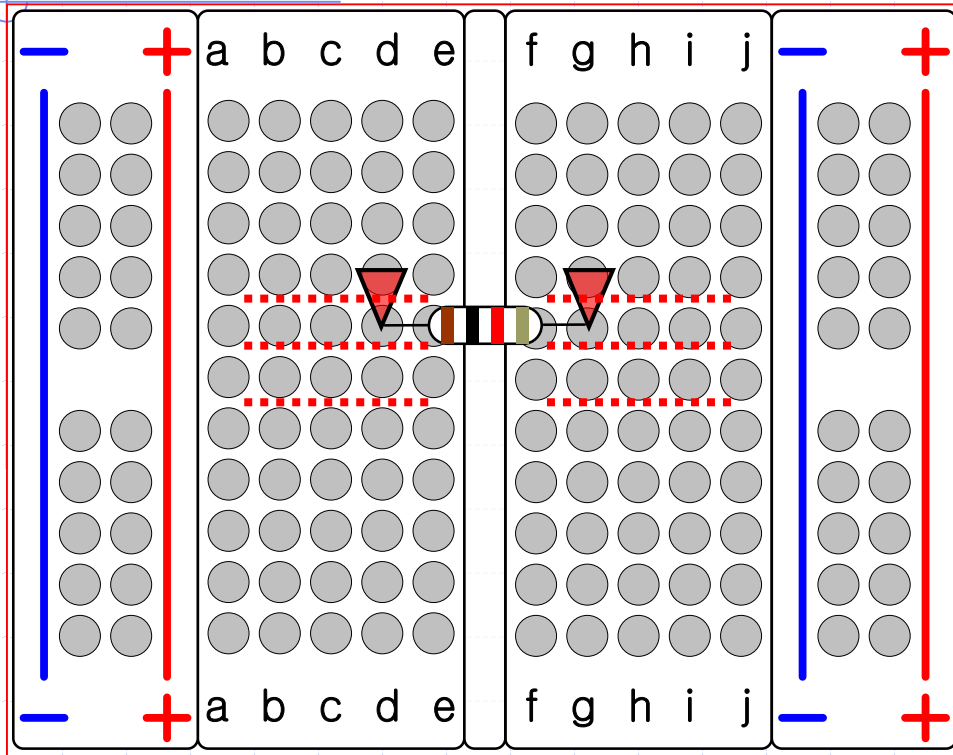
세로점은 하나로 연결

Ex) a-1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, ...

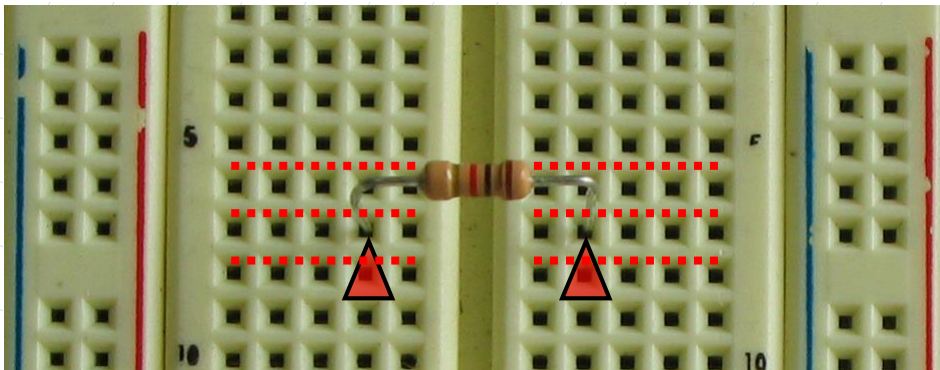
Ex) b-1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, ...



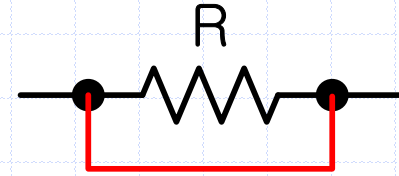
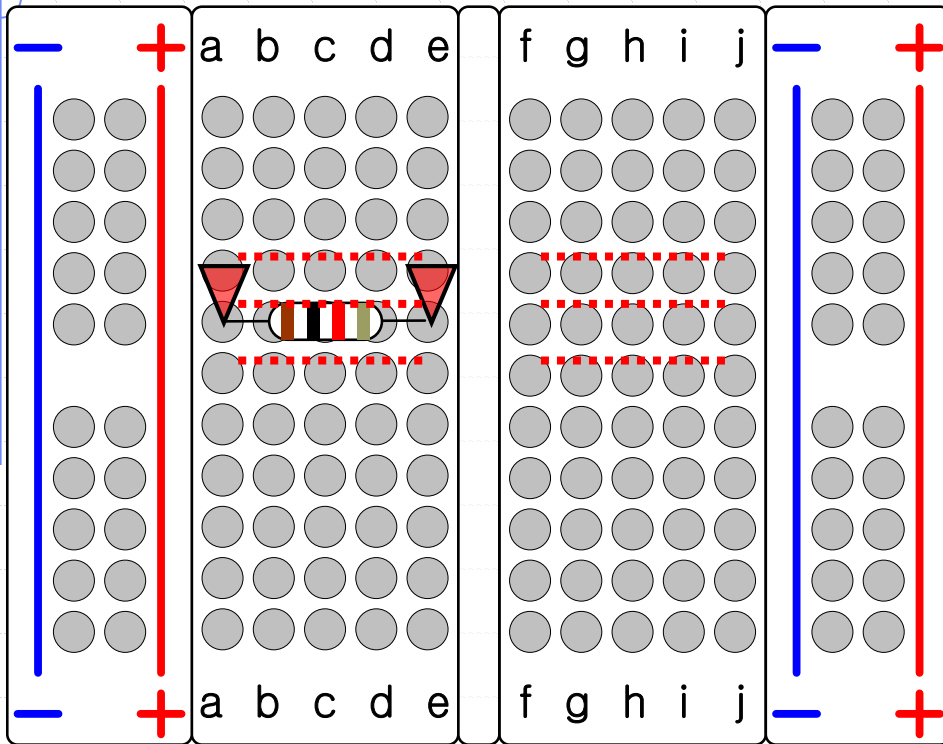
1-8. 브레드 보드 (Bread Board)



브레드 보드에 저항을
연결하는 기본적인 방법

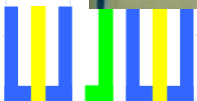
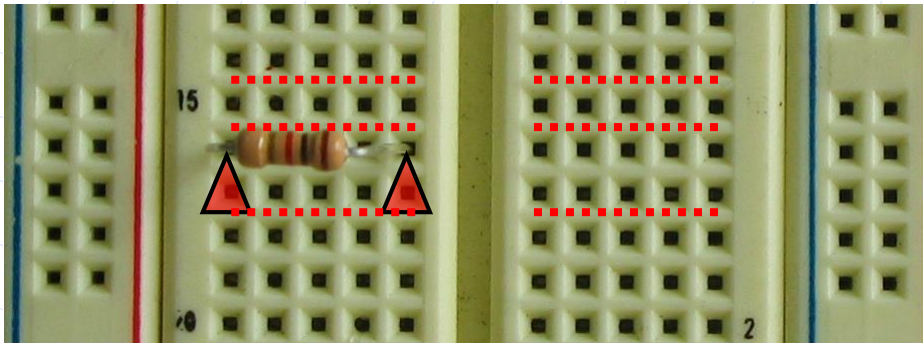


1-8. 브레드 보드 (Bread Board)

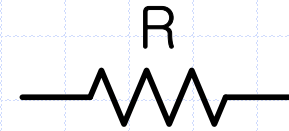
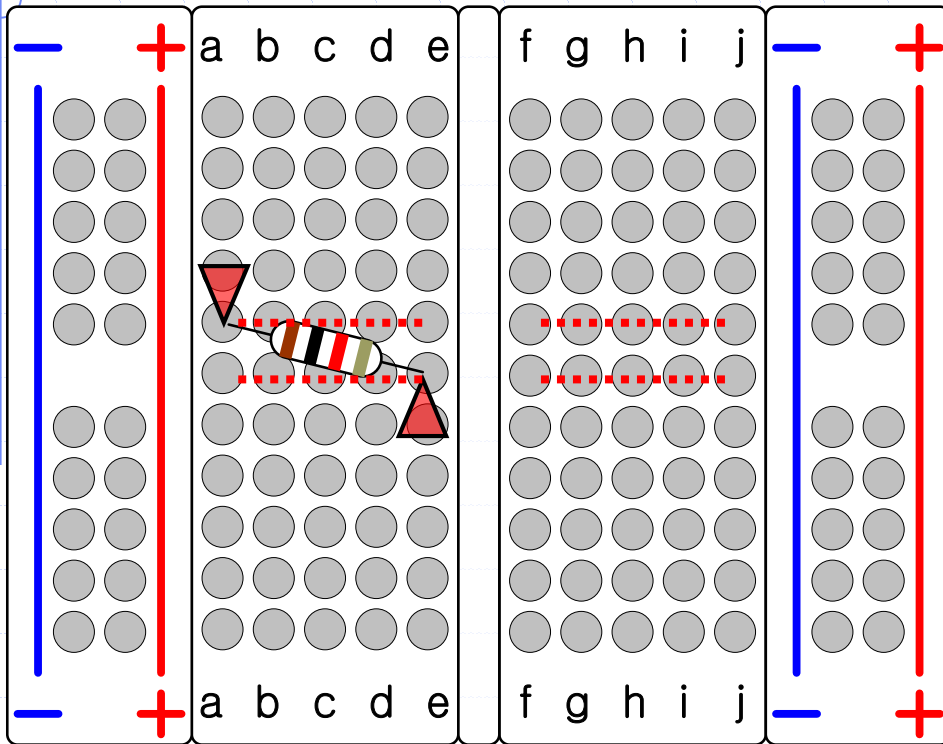


브레드 보드에 저항을
잘못 연결하여
저항의 양단이
단락이 되는 경우이다.

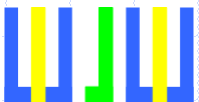
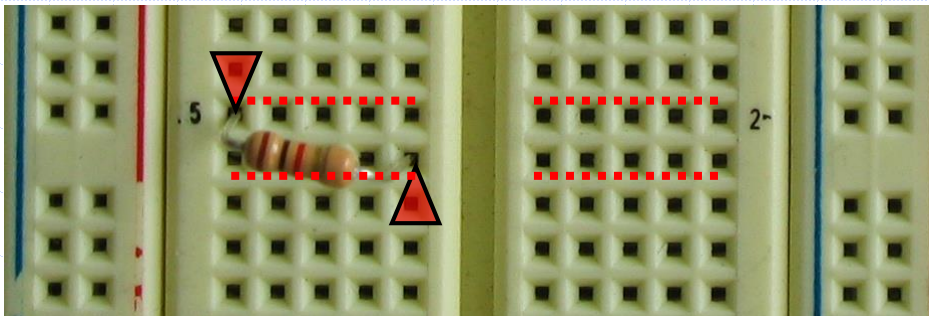
이 경우 저항 값은
무조건 0Ω 이 된다



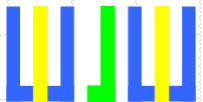
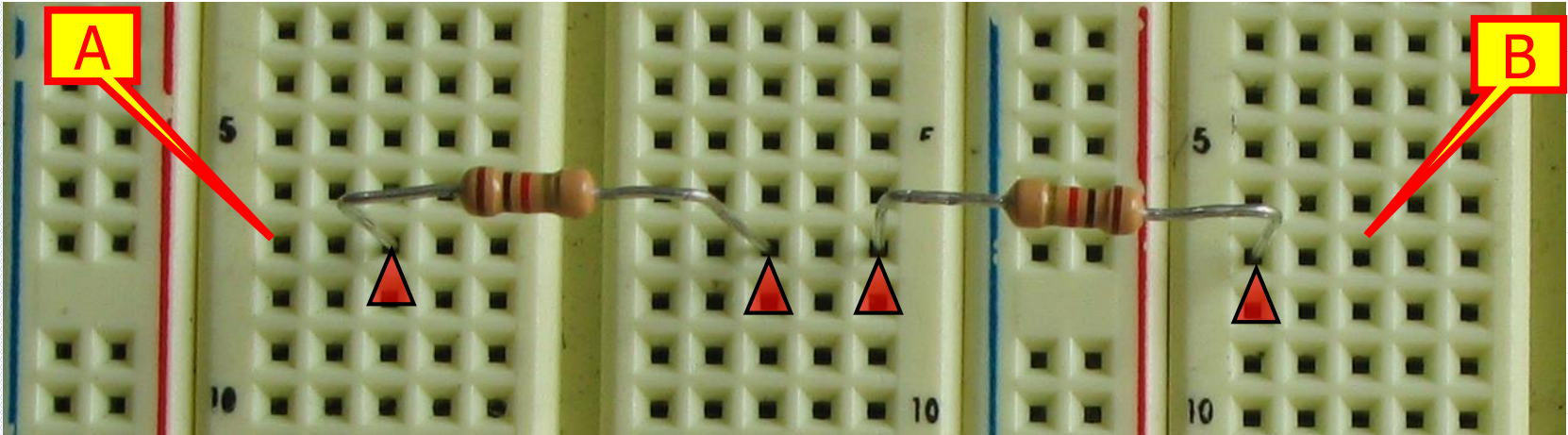
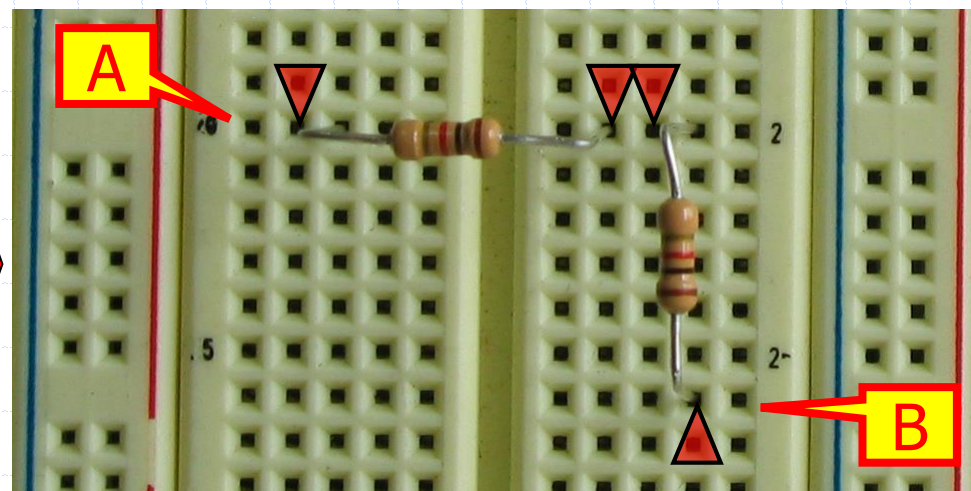
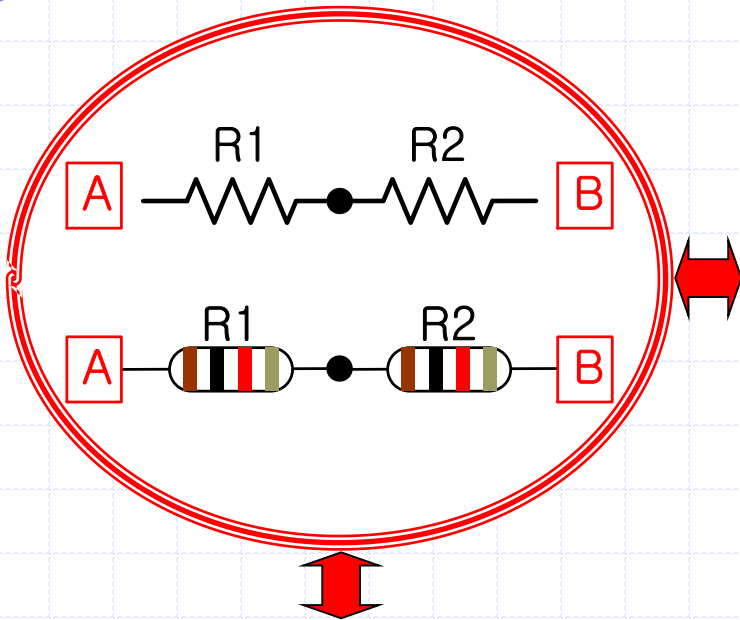
1-8. 브레드 보드 (Bread Board)



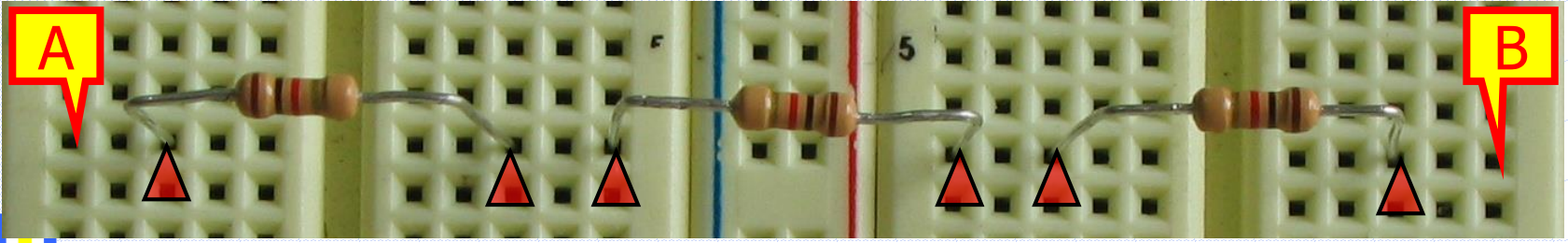
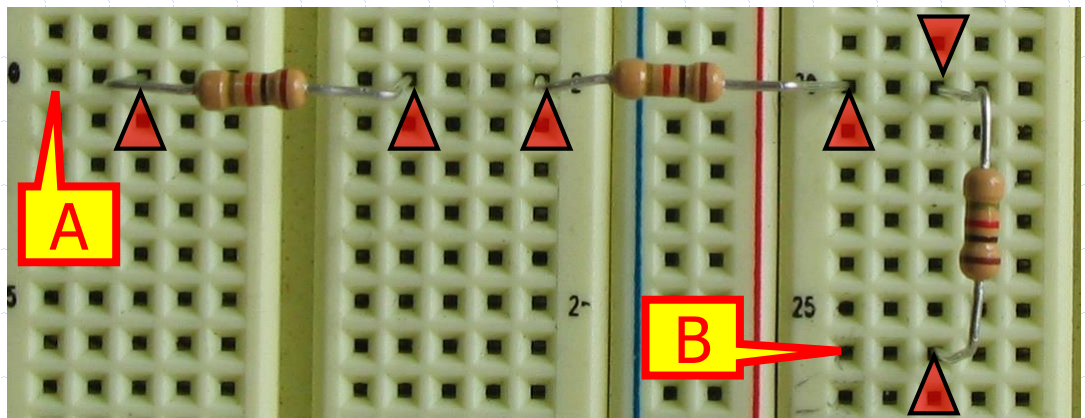
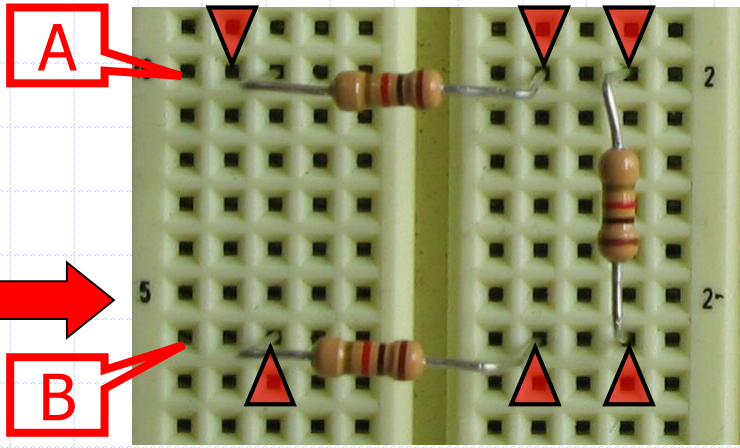
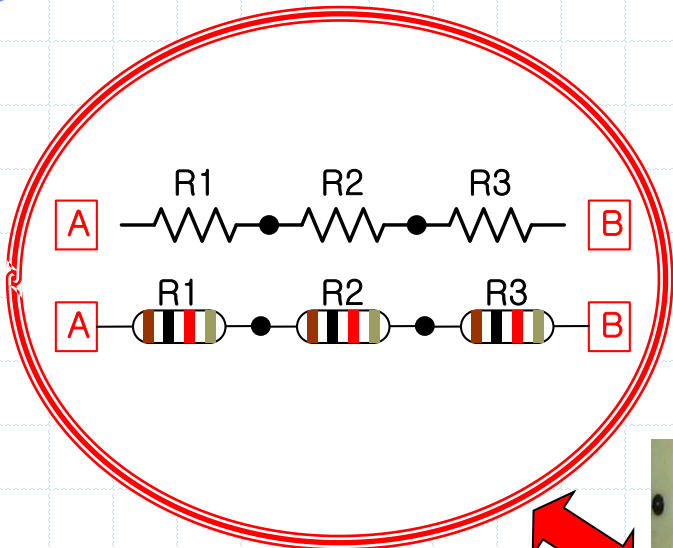
브레드 보드에 저항을
연결하는 변형 방법



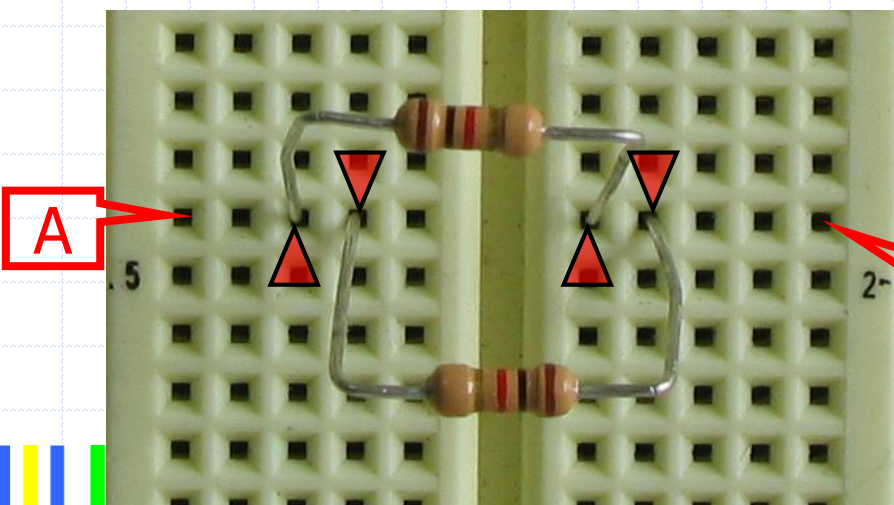
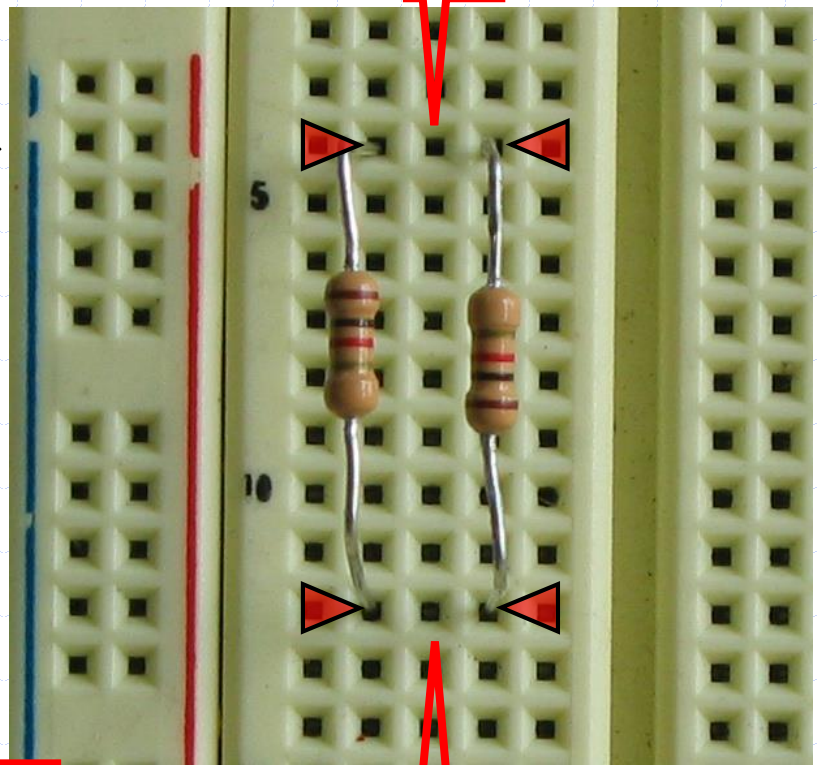
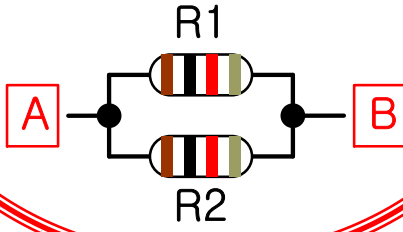
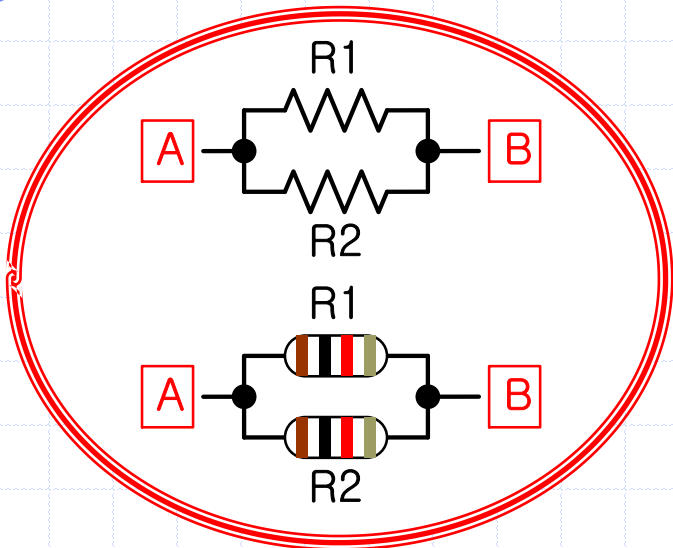
1-9. 브레드 보드를 이용한 직렬 저항 연결



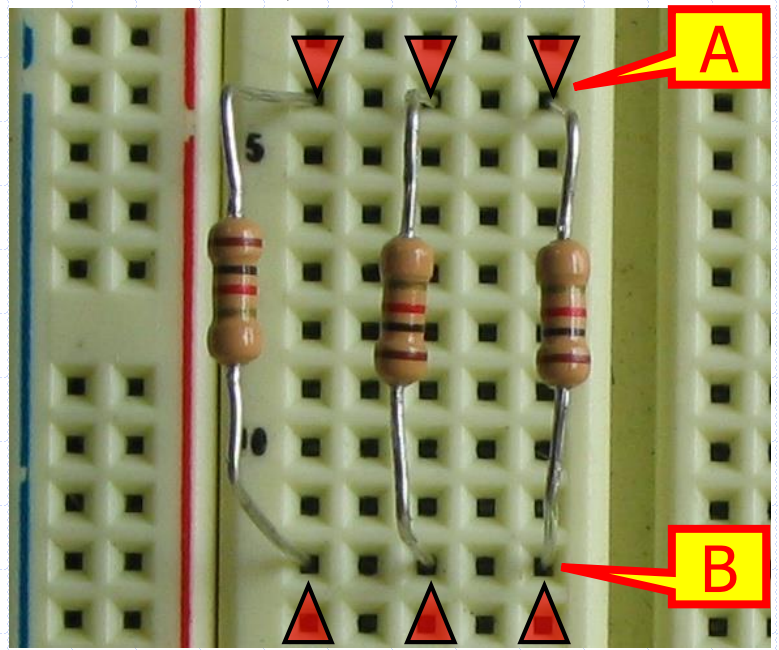
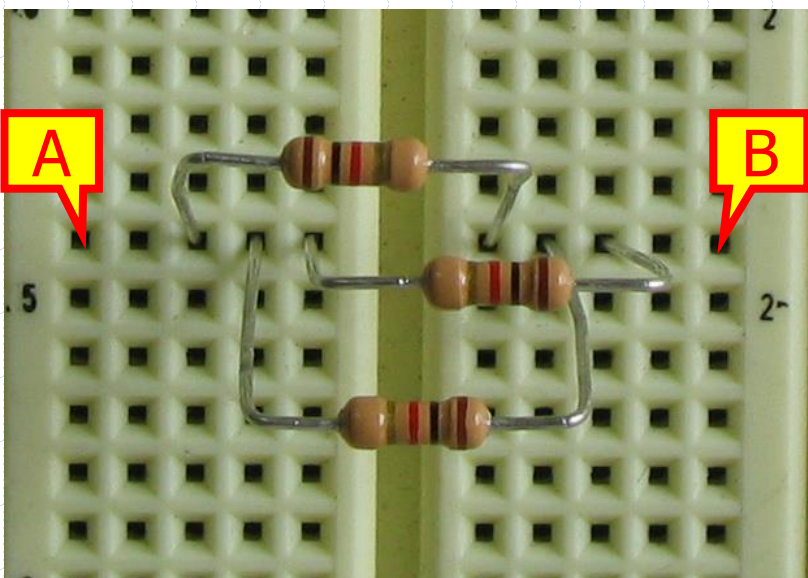
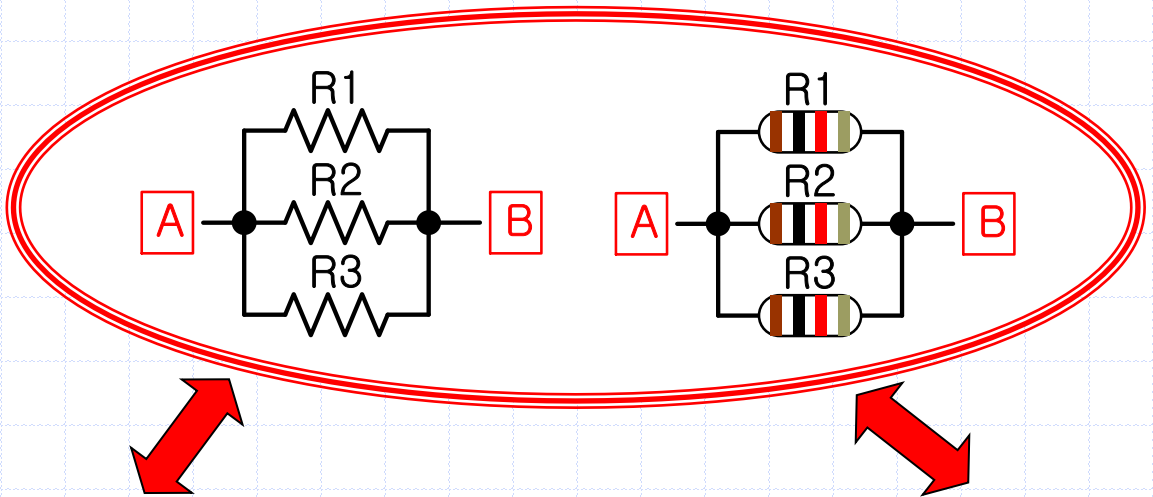
1-9. 브레드 보드를 이용한 직렬 저항 연결



1-10. 브레드 보드를 이용한 병렬 저항 연결



1-10. 브레드 보드를 이용한 병렬 저항 연결



1-11. 브레드 보드를 이용한 직병렬 저항 연결

