

# Electronics Wiring Basics

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## Wiring Review

- Breadboards
- LEDs
- DIP switches
- Resistor Arrays
- Keypads
- Wiring Tips
- Layout Tips

# Wiring review

**Wiring Review**

**Breadboards**

LEDs

DIP switches

Resistor Arrays

Keypads

Wiring Tips

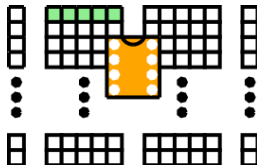
Layout Tips

# Breadboards

## Wiring Review

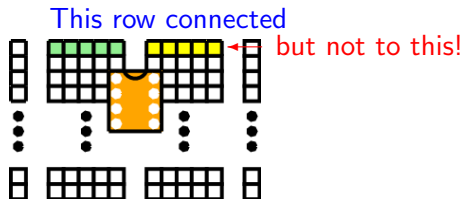
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This row connected



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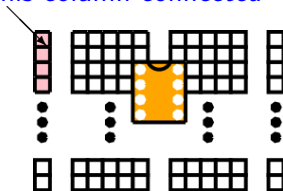


The row across the trough is *not* connected to this one.

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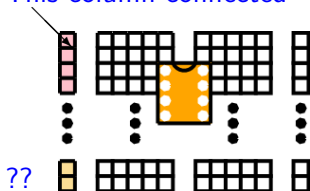
This column connected



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This column connected

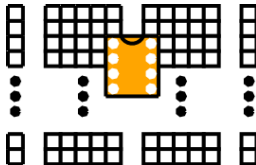


This column may or may not break halfway down the board.

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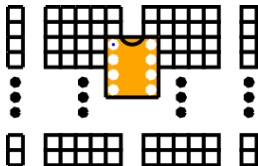
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## Chip goes over trough



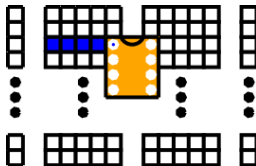


## Chip goes over trough



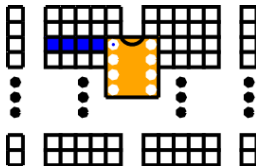
With a normal chip, this will allow four connections to each pin.

## Chip goes over trough



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## Chip goes over trough



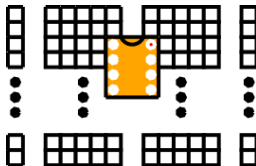
With a normal chip, this will allow four connections to each pin.

*Make sure the chip has no bent pins!*

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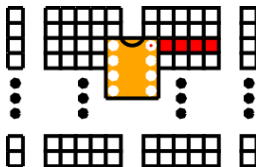
$V_{CC}$  is usually upper right



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$V_{CC}$  is usually upper right

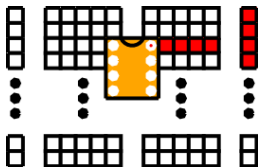


Use the right column for  $V_{CC}$ .

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$V_{CC}$  is usually upper right

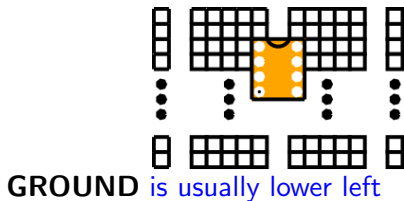


Use the right column for  $V_{CC}$ .

Only use red wires for  $V_{CC}$ .

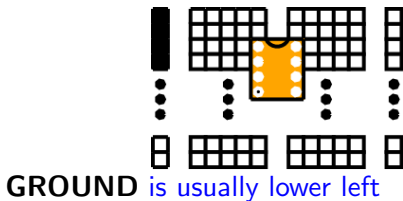
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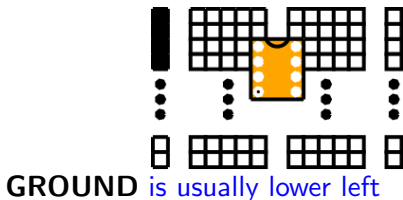


Use the left column for **GROUND**.



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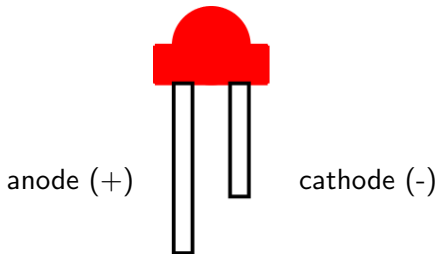
Use the left column for **GROUND**.

Only use **black** wires for **GROUND**.

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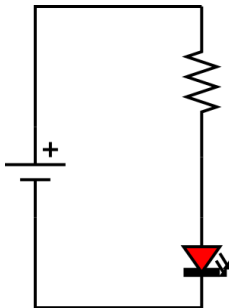
## LEDs (Light Emitting Diodes)



- The LED lights up when current flows from the anode to the cathode..

## Wiring Review

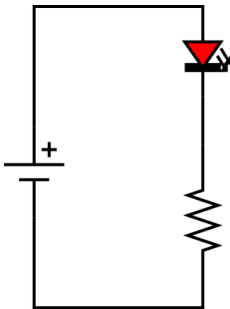
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- You must use a resistor to limit the current.
- *Without a resistor, the LED will probably be destroyed.*

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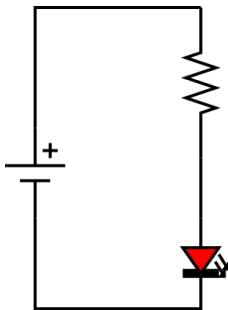
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- The resistor can go before or after the LED.

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- The resistor can go before or after the LED.

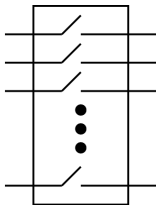
Wiring Review

Breadboards  
LEDs  
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Keypads  
Wiring Tips  
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## DIP switches

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Keypads  
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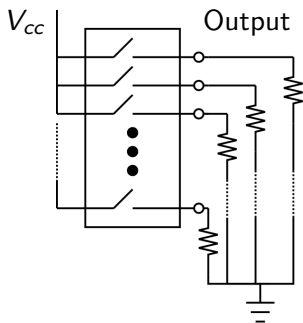


- DIP stands for **D**ual **I**ncline **P**ackage.
- Each switch is either connected or not.



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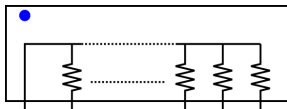
- In order to make the outputs **HIGH** or **LOW**, pull-up or pull-down resistors must be added.
- The output is taken where the resistor and switch meet.

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DIP switches  
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## Resistor arrays

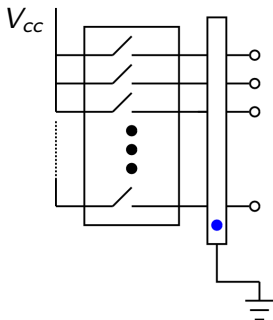
common pin



- A **resistor array** is convenient when you need several resistors which will all have one end connected to the same point in a circuit.
- A resistor array is especially convenient to replace all of the individual resistors for a DIP switch.

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Breadboards  
LEDs  
DIP switches  
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Keypads  
Wiring Tips  
Layout Tips



- A resistor array can replace all of the pull-up or pull-down resistors for a DIP switch.

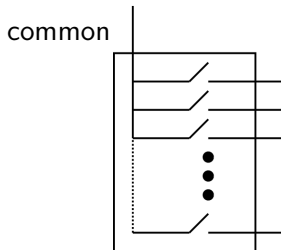
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LEDs  
DIP switches  
Resistor Arrays  
**Keypads**  
Wiring Tips  
Layout Tips

# Keypads

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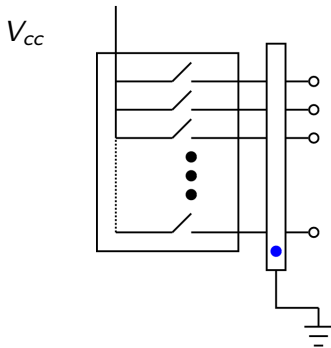
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DIP switches  
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Wiring Tips  
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- A **keypad** consists of several switches with one end tied to a common pin.
- A keypad and a resistor array allow very simple connections.

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Wiring tips:



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- **Red** signifies **+5V**, power, “high”,  $V_{CC}$  etc.

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- **Red** signifies **+5V**, power, “high”,  $V_{CC}$  etc.
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- Colour coding helps in debugging; i.e. i/o green, data blue, etc.

## Wiring tips:

- **Red** signifies **+5V**, power, “high”,  $V_{CC}$  etc.
- **Black** signifies **ground**, “low”, etc.
- Colour coding helps in debugging; i.e. i/o green, data blue, etc.
- Cut wires to approximately right length; avoid “rat’s nest”

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- Place all chips the same way up
- Place chips close but not crammed together, and arranged so that wires don't have to be any longer than necessary.
- Don't "trap" chips under wires; you might need to replace a chip, so make it easy to do