LEDs for Beginners

by noahw on December 14, 2006

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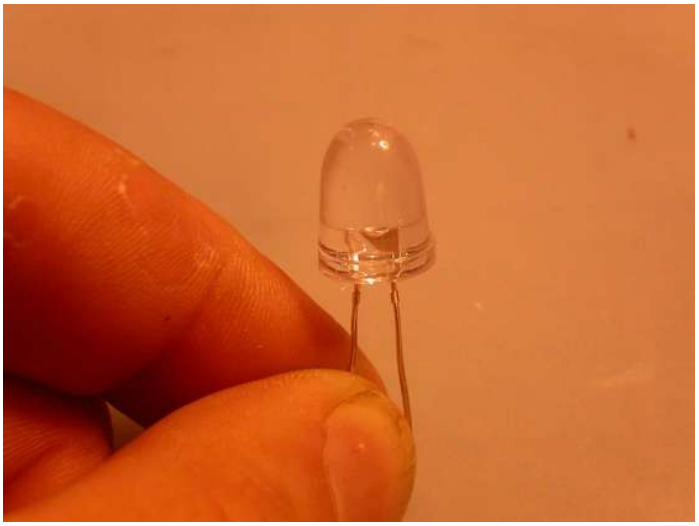
Intro: LEDs for Beginners

This instructable shows how to wire up one or more LEDs in a in a basic and clear way. Never done any work before with LEDs and don't know how to use them? Its ok, neither have I.

If you have wired up LEDs before, this explanation might seem overly simplistic. Consider yourself warned.



step 1: Get some LEDs

So I wasn't completely honest - I have used LEDs once or twice before for simple applications, but I never really knew what I was doing, and since so many projects on instructables use LEDs, I thought I might as well teach myself and post about it too.

I know that there are many projects already posted that contain information about how to wire LEDs for simple projects - LED Throwies, LED Beginner Project: Part 2 and 9v LED flashlight - teh best evarrr!, but I think that there could still be some use for a detailed step by step explanation about the basics of LEDs for anyone who could use it.

The first step was to buy some supplies and figure out what I would need to experiment with. For this project I ended up going to Radioshack because its close and a lot of people have access to it - but be warned their prices are really high for this kind of stuff and there are all kinds of low cost places to buy LEDs online.

To light up an LED you need at the very minimum the LED itself and a power supply. From what I have read from other LED instructables wiring in a resistor is almost always a good idea.

If you want to learn about what these materials are check out these wikipedia entries:
LEDs
Power supply
Resistors

Materials:

LEDs - I basically just reached into the drawer at Radioshack and pulled out anything that wasn't more than $1 or $2 per LED. I got:

2760307 5mm Red LED 1.7 V
2760351 5MM Yellow LED 2.1 V
2760036 Flasher Red LED 5 V
2760041 2 Pack Red LED 2.6 V
2760086 Jumbo Red LED 2.4V

Power Supply - I really didn't know what I would need to power them so I bought some 9V batteries and some 1.5V AA's. I figured that would allow me to mix and match and make enough different voltage combinations to make something light up - or at least burn those little suckers out in a puff of smelly plastic smoke.

Resistors - Again, I wasn't too sure what I would need in terms of resistors here either. Since I got a whole bunch of different LEDs with various voltages I knew that I would need a couple different types of resistors, so I just bought a variety pack of 1/2 Watt Carbon Film Resistors (2710306).

I gathered up a soldering gun, solder, needle nose pliers, electrical pliers, some primary wire and electrical tape too since I thought they might be useful.

step 2: The LED

LEDs come in different sizes, brightnesses, voltages, colors and beam patterns, but the selection at Radioshack is pretty small and so I just picked up a couple different LEDs from what they had in a few different brightnesses and voltages. I kept close track of what LED was what voltage because I didn't want to accidentally send too much current through one of the low voltage LEDs.

The first thing I did with the LEDs was figure out which wire (its called an electrode) was positive and which was negative. Generally speaking the longer wire is the positive electrode and the shorter wire is the negative electrode.

You can also take a look inside the LED itself and see whats going on. The smaller of the metal pieces inside the LED connects to the positive electrode and the bigger one is the negative electrode (see picture below). But be warned - in the LEDs I picked up I didn't always find this to be true and some of the LEDs had the longer electrode on the negative when it should be on the positive. Go figure - its OK though, if it didn't light up I just flipped it around.

Once I knew what was positive and what was negative I just had to remember what the voltage of each LED was.

All my LEDs recommended 20mA of current. 20mA is standard for most LEDs.

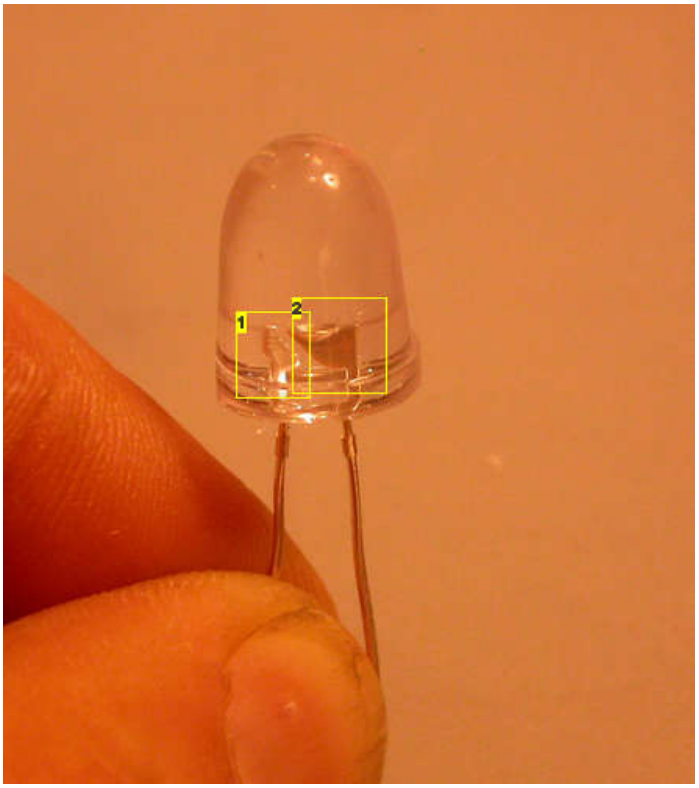


Image Notes
1. This is the annode or the positive ( ) electrode.
2. This is the cathode or the negative (-) electrode.

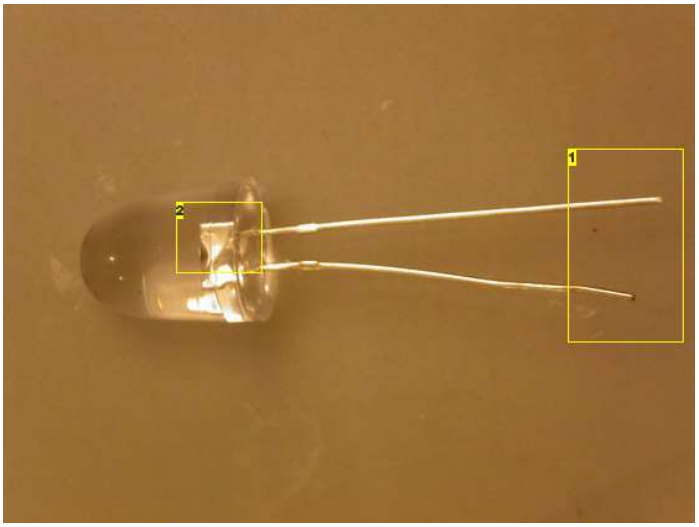
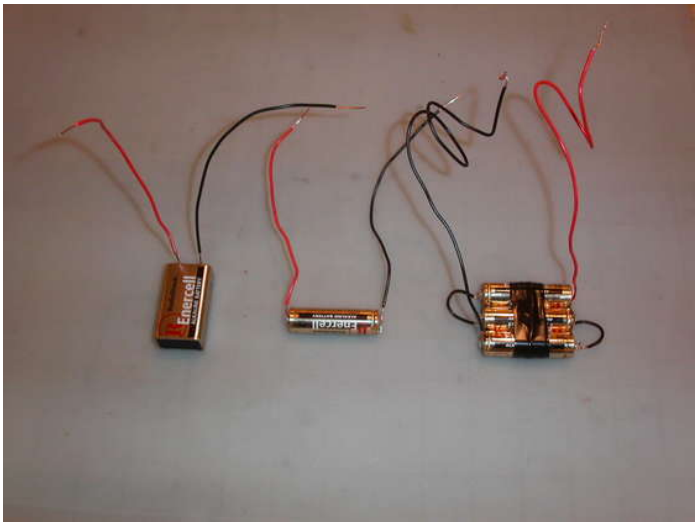


Image Notes
1. The longer wire here turned out to be the positive electrode even though it connected to the bigger piece of metal in the LED itself.
2. The bigger piece inside means it should be the negative electrode, but it has the longer of the two leads coming off and in actuality turned out to be the positive electrode.

step 3: Power supply

To make the power supplies I just soldered some wire onto the ends of the batteries I had bought so that I could easily attach the LEDs to them. The 9V battery served as my 9V power supply, one AA battery made a 1.5V power supply and three AA batteries bundled together made a 4.5V (1.5V + 1.5V + 1.5V = 4.5V) power supply. I didn't use alligator clips on the ends of the wire, but they would have been helpful here.



step 4: Resistors

I opened up the assortment pack to find that resistors aren't labeled with what value they are. The pack said it contained a whole bunch of different resistors from 100 ohms to 1 Meg ohm so I set out to see what was what. When I poked around online I found that all resistors have a coding system on them that tells you what value they are.

Here are two pages which explain in depth about how to calculate resistor values.

Do it yourself
or
Have it done for you

I'll go through the examples of how I calculated the values myself in the next few steps when I start wiring up my LEDs.

For the time being I just admired their little colored stripes and moved on to trying to get just one LED to light up.

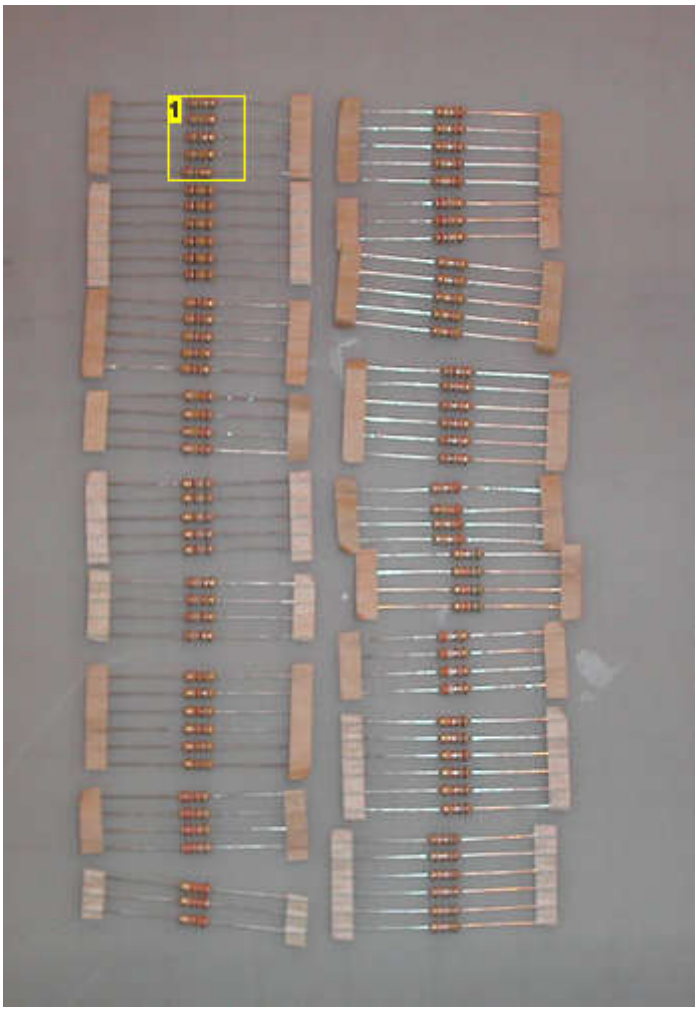


Image Notes
1. The color bands on the resistors indicate what value they are. Using the websites I linked to above, you can find whatever value resistor you need.

step 5: One LED, no resistor

I thought that I would start as simply as I possibly could - just one LED with no resistor. First I had to decide what power source to use and which LED to light up. This may seem obvious, but this was my first time through so I might as well be as clear as possible...

LEDs require sufficient voltage to light them. Sometimes if you give them too little voltage they wont light at all, other times they will just shine dimly with low voltage. Too much voltage is bad and can burn out the LED instantaneously.

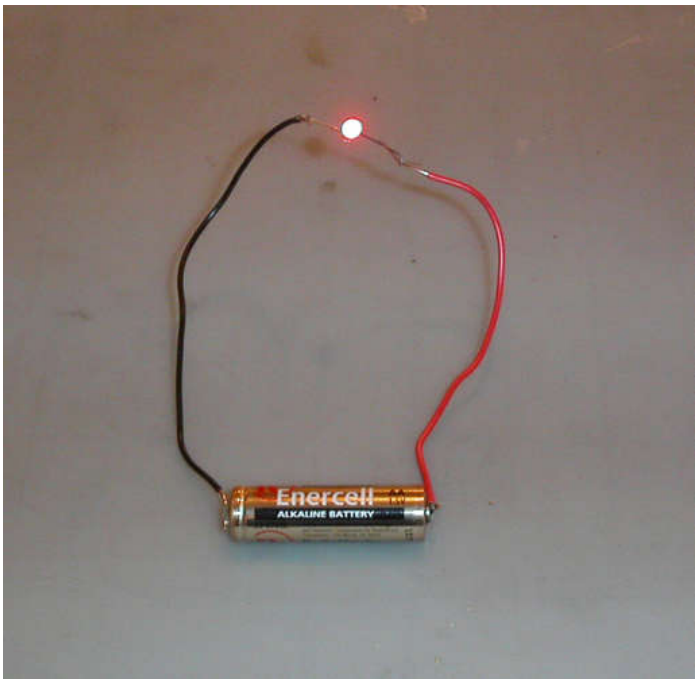
So ideally you would like the voltage of the LED to match the voltage of your power supply, or even be slightly less. To do this you can do a couple of things: change your power supply voltage, change the LED your using, or you can use a resistor that allows you use a higher voltage power supply with a lower voltage LED.

For now I just wanted to get one lit up so I chose my the power supply that had the lowest voltage - the single AA battery which outputs 1.5V.

I chose to light the red 1.7V LED since the battery outputs 1.5V and I knew I wouldn't kill the LED with too much power.

I wrapped my positive wire from the battery to the positive electrode of the LED and wrapped the negative wire from the battery to my negative electrode and presto - let there be LED light!

This first experiment was pretty easy to do - just some wire twisting and enough knowledge to know that the 1.5V power supply would light the 1.7V LED without need a resistor.



step 6: One LED with a resistor

It was just a coincidence that I bought an LED that was 1.7V and that it ended up working being able to be powered by my 1.5V power supply without the use of a resistor. For this second setup I decided to use the same LED, but up my power supply to the three AA batteries wired together which output 4.5V - enough power to burn out my 1.7V LED, so I would have to use a resistor.

To figure out which resistor to use I used the formula:
R = (V1 - V2) / I

where:
V1 = power supply voltage
V2 = LED voltage
I = LED current (usually 20mA which is .02A)

Now there are lots of calculators online that will do this for you - and many other instructables reference this as a good one, however, the math really isn't too hard and so I wanted to go through the calculation myself and understand whats going on.

Again, my LED is 1.7V, it takes 20mA (which is .02 A) of current and my supply is 4.5V. So the math is...

R = (4.5V - 1.7V) / .02 A
R = 140 ohms

Once I knew that I needed a resistor of 140 ohms to get the correct amount of voltage to the LED I looked into my assortment package of resistors to see if I could find the right one.

Knowing the value of a resistor requires reading the code from the color bands on the resistor itself. The package didn't come with a 140 ohm resistor but it did come with a 150 ohm one. Its always better to use the next closest value resistor greater than what you calculated. Using a lower value could burn out your LED.

To figure out the color code you basically break down the first two digits of the resistor value, use the third digit to multiply the first two by and then assign the fourth digit as an indicator of tolerance. That sounds a lot more difficult than it really is.

Using the color to number secret decoder website found here, a 150ohm resistor should have the following color code...

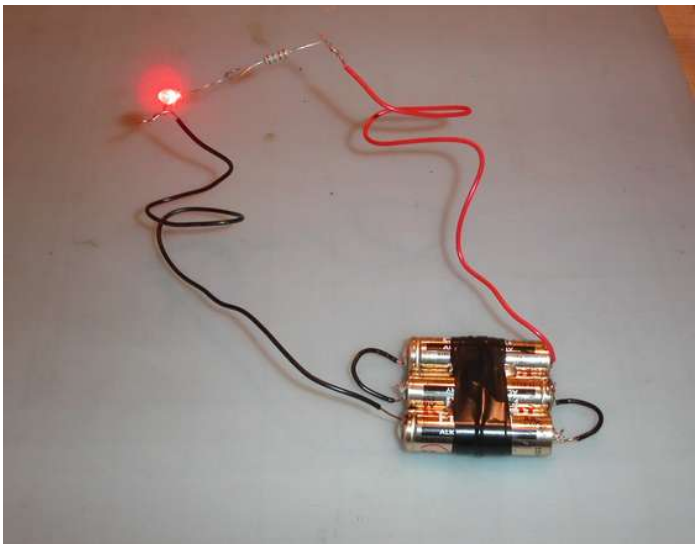
Brown because the first digit in the value resistor I needed is 1
Green because the fifth digit is 5
Brown because in order to get to 150 you have to add one 0 to 15 to get to 150.
Gold - the resistors I got all have 5% tolerance and 5% is represented by gold

Check out the decoder page link above if this isn't making sense.

I looked through all the resistors, found the one that was brown, green, brown, gold, and wired it in line on the positive electrode of the LED. (Whenever using a resistor on an LED it should get placed before the LED on the positive electrode).

Low and behold, the LED lit up once again. The 150 ohm resistor stopped enough of the 4.5V power supply from reaching the 1.7V LED that it lit up safely and kept it from burning out.

This is just the process that I went through to figure out what resistor to use with my particular LED with my particular power supply. You can easily use the formula above to figure out what value resistor to use with whatever LED and power source you happen to be using.



step 7: Wiring up multiple LEDs in series

Now that I knew how to wire one LED with various combinations of LED voltages and power supplies, it was time to explore how to light up multiple LEDs. When it comes to wiring more than one LED to a power supply there are two options. The first option is to wire them in series and the second is to wire them in parallel.

To see an in depth explanation about the difference between series and parallel check out this page. I'm going to cover wiring LEDs in series first.

LEDs wired in series are connected end to end (the negative electrode of the first LED connects to the positive electrode of the second LED and the negative electrode of the second LED connects to the positive electrode of the third LED and so on and so on...). The main advantage of wiring things in series is that it distributes the total voltage of the power source between all of the LEDs. What that means is that if I had a 12V car battery, I could power 4, 3V LEDs (attaching a resistor to each of them). Hypothetically this could also work to power 12, 1V LEDs; 6, 2V LEDs; or even 1 12V LED if such a thing existed.

Ok, let's try wiring 2, 2.6V LEDs in series to the 9V power supply and run through the math.

R = (9V - 5.2V) / .02A
R = 190 Ohms
Next higher resistance value - 200 Ohms

Now the variety package of resistors didn't come with a 190 or 200 Ohm resistor, but it did come with other resistors which I could use to make a 200 Ohm resistor. Just like LEDs, resistors can be wired together in either series or parallel (see next step for an explanation on wiring things together in parallel).

When same value resistors are wired together in series you add their resistance. When same value resistors are wired together in parallel you divide the value of the resistor by the number of resistors wired together.

So, in the most simplified sense, two 100 Ohm resistors wired together in series will equal 1 200 Ohm resistor (100 + 100 = 200). Two 100 Ohm resistors wired together in parallel will equal one 50 Ohm resistor (100 / 2 = 50).

Unfortunately, I learned this key point after I wired my resistors together for the experiment. I had originally wanted to wire two 100 Ohm resistors together to equal the 200 Ohms of resistance I needed to protect my LEDs. Instead of wiring them in series, as it should have been, I wired my resistors in parallel (did I mention I am beginner with resistors?) So my resistors were only providing 50 Ohms of resistance - which apparently worked out OK on my LEDs in the short duration of the experiment. Having too much power getting to the LEDs would probably burn them out in the long term. (Thanks beanwaur and shark500 for pointing this out.)

I took my resistors and placed them in front of the positive lead of the first LED that was wired in series and hooked them up to the battery and once again, there was LED light!

With three different combinations of LEDs and battery power supplies and no puffs of plastic smoke yet things were looking good - aside from my little confusion between wiring resistors in series and in parallel.

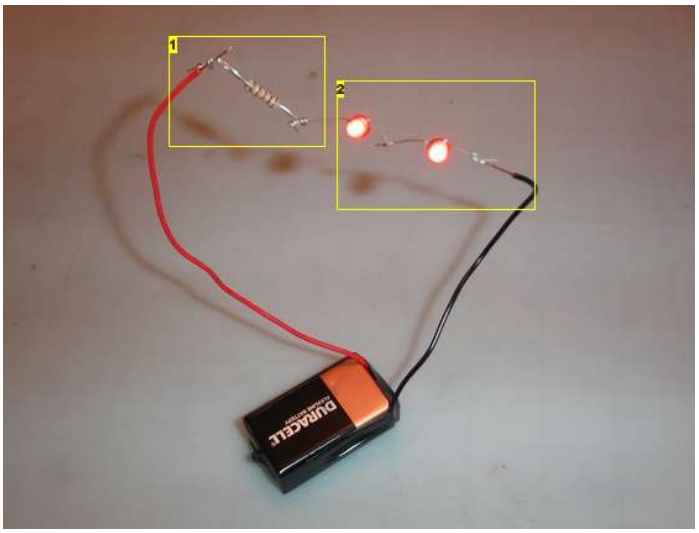


Image Notes
1. Two 100ohm resistors were wired together in parallel to provide 50 Ohms of resistance. I had meant to wire them together in series to provide the 200ohms of resistance that the LED's needed. These LED's were forgiving.
2. LED's wired in series

step 8: Wiring up multiple LEDs in parallel

Unlike LEDs that are wired in series, LEDs wired in parallel use one wire to connect all the positive electrodes of the LEDs your using to the positive wire of the power supply and use another wire to connect all the negative electrodes of the LEDs your using to the negative wire of the power supply. Wiring things in parallel has some distinct advantages over wiring things in series.

If you wire a whole bunch of LEDs in parallel rather than dividing the power supplied to them between them, they all share it. So, a 12V battery wired to four 3V LEDs in series would distribute 3V to each of the LEDs. But that same 12V battery wired to four 3V LEDs in parallel would deliver the full 12V to each LED - enough to burn out the LEDs for sure!

Wiring LEDs in parallel allows many LEDs to share just one low voltage power supply. We could take those same four 3V LEDs and wire them in parallel to a smaller power supply, say two AA batteries putting out a total of 3V and each of the LEDs would get the 3V they need.

In short, wiring in series divides the total power supply between the LEDs. Wiring them in parallel means that each LED will receive the total voltage that the power supply is outputting.

And finally, just some warnings...wiring in parallel drains your power supply faster than wiring things in series because they end up drawing more current from the power supply. It also only works if all the LEDs you are using have exactly the same power specifications. Do NOT mix and match different types/colors of LEDs when wiring in parallel.

OK, now onto to actually doing the thing.

I decided to do two different parallel setups.

The first one I tried was as simple as it could be - just two 1.7V LEDs wired in parallel to a single 1.5V AA battery. I connected the two positive electrodes on the LEDs to the positive wire coming from the battery and connected the two negative electrodes on the LEDs to the negative wire coming from the battery. The 1.7V LEDs didn't require a resistor because the 1.5V coming from the battery was enough to light the LED, but not more than the LEDs voltage - so there was no risk of burning it out. (This set up is not pictured)

Both of the 1.7V LEDs were lit by the 1.5V power supply, but remember, the were drawing more current from the battery and would thus make the battery drain faster. If there were more LEDs connected to the battery, they would draw even more current from the battery and drain it even faster.

For the second setup, I decided to put everything I had learned together and wire the two LEDs in parallel to my 9V power supply - certainly too much juice for the LEDs alone so I would have to use a resistor for sure.

To figure out what value I should use I went back to the trusty formula - but since they were wired in parallel there is a slight change to the formula when it comes to the current - I.

R = (V1 - V2) / I

where:
V1 = supply voltage
V2 = LED voltage
I = LED current (we had been using 20 mA in our other calculations but since wiring LEDs in parallel draws more current I had to multiply the current that one LED draws by the total number of LEDs I was using. 20 mA x 2 = 40 mA, or .04A.

And my values for the formula this time were:

R = (9V - 1.7V) / .04A
R = 182.5 Ohms

Again, since the variety pack didn't come with that exact value resistor I attempted to use the two 100 Ohm resistors bundled together in series to make 200 Ohms of resistance. I ended up just repeating the mistake that I made in the last step again though, and wired them together in parallel by mistake and so the two 100 Ohm resistors only ended up providing 50 Ohms of resistance. Again, these LEDs were particularly forgiving of my mistake - and now I have learned a valuable lesson about wiring resistors in series and in parallel.

One last note about wiring LEDs in parallel - while I put my resistor in front of both LEDs it is recommended that you put a resistor in front of each LED. This is the safer better way to wire LEDs in parallel with resistors - and also ensures that you don't make the mistake that I did accidentally.

The 1.7V LEDs connected to the 9V battery lit up - and my small adventure into LED land was completed.

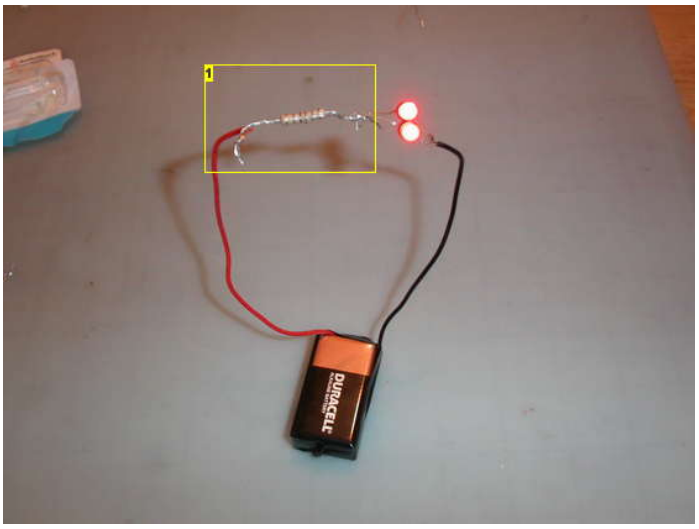


Image Notes
1. This is where I made a mistake - these two resistors were wired together in parallel when they should have been wired together in series and placed before the positive electrode of each of the LED's. I ended up providing only 50 Ohms of resistance for the LED's when I had wanted to give them 200 Ohms.

step 9: Extrapolation

While I didn't actually end up making anything besides a couple of lit LEDs, this information can be used to make all kinds of cool things!

The take away concepts hopefully were:
- Power a whole bunch of different value LEDs using the same basic principals.

- Figure out what is the positive electrode and what is the negative electrode of an LED by looking at it and testing it.

- Use resistors, or combinations of resistors wired together in series or in parallel to supply the correct amount of power to the LED.

- Make calculations to determine what resistor is needed using the formula, or using web sites that do it for you.

- Wire LEDs in series or in parallel depending on the application.

- Make LEDs light up!

This was the most basic kind of walk through for LEDs possible - and I learned a whole lot along the way. LED arrays and wiring schemes can get significantly more complicated - but for the most part, LEDs are pretty simple to work with, and with relatively little knowledge I was able to light them up - all be it if I sent a little too much juice through them towards the end of the experiment. I don't fear the LED now. They are my friends.

Related Instructables


Parallel and Series Circuit by tjayfowler

LED Beginner Project: Part 2 by Willd


LED Light Drawing Pens: Tools for drawing light doodles by unklstuart


Breadboard Basics for Absolute Beginners by Cew27


Beginners wiring projects: LED banks by Firebert010


LED Disco Light in a Jar! by jeff-o


Power LED underwater lights by Waterfox51


LED Pants by LouiseJohnson

Comments

50 comments Add Comment view all 386 comments

Kevio bro says: Dec 2, 2009. 9:23 PM REPLY
Hey, I have always had this question, but I seem to find no answer, I'm wondering if the electricity comes out the negative, or postive end of the battery, I've heard from multiple source both stories, so I'm not sure what to think. I'm sure knowing this won't really help with anything, i'm just curious.(I'm leaning to it coming out the negative end.)

bryant.mtu says: Dec 6, 2009. 8:28 AM REPLY
When electricity was first discovered, the assumption was made that the current flows through the positive terminal and into the negative, this is called conventional current. More recently it has been found that the electron flow (current) actually flows into the positive and out of the negative. Most electronic devices are designed according to conventional current so we continue to use this method. LED's are designed according to the conventional current method.

ghavo says: Nov 10, 2009. 9:32 AM REPLY
Great article... Quick Question... Does it matter which end you put the resistor? On the Positive or the Negative side? Thanks!!!

X-22 says: Dec 6, 2009. 7:20 AM REPLY
so long as the resistor is in series it doesnt matter at all, the electrons have to pass through it and where ever in the circuit it is it will reduce the total current

verence says: Dec 1, 2009. 2:54 PM REPLY
Not. At. All.

BSmitty358 says: Nov 22, 2009. 9:11 AM REPLY
No.

jfd492 says: Dec 4, 2009. 3:01 PM REPLY
thanks... great, simple, explanations

tchiseen says: May 20, 2008. 4:24 PM REPLY
It's like the "hello world" of LED electronics. I like it!

ghos7man says: Sep 21, 2008. 2:12 PM REPLY
Java ftw

Coffee bean says: Nov 25, 2008. 3:59 PM REPLY
c++ wft

Minifig666 says: Dec 2, 2009. 10:46 AM REPLY
Batch FTW

Coffee bean says: Dec 2, 2009. 11:18 AM REPLY
What is FTW again lol?

ghos7man says: Dec 2, 2009. 1:23 PM REPLY
for the win

shalow says: Dec 3, 2009. 4:54 PM REPLY
hmm, perhaps we should start a "FTM" for all the mac people out there

Coffee bean says: Dec 2, 2009. 6:25 PM **REPLY**

Well then Basic FTW!

osirisbrackhaus says: Dec 3, 2009. 12:59 AM **REPLY**

Great instructional, took a lot of reluctance off my hands. Thanks a ton!

s600cam says: Mar 11, 2007. 8:35 PM **REPLY**

Never solder anything to a battery. Instead, use a battery pack and place the batteries into that. Soldering to a battery can/will make it explode, and battery acid will get everywhere.

Minifig666 says: Dec 2, 2009. 10:42 AM **REPLY**

Most batteries these days have a more powdery substance in them. Although I still would not recommend it.

MikyVengeance says: Jun 24, 2009. 4:01 PM **REPLY**

what does a battery pack look like? any links? thanks : D

Coolboyme says: Sep 5, 2009. 12:52 AM **REPLY**

please tell me if led's fuse like other bulbs
i have this doubt as LED"s dont have filaments

daspoint says: Oct 2, 2009. 8:57 AM **REPLY**

You are correct - they do not have a filament. They have a "Junction". This is what makes them less prone to damage do to dropping and other abuse.... that's not to say they can not -not- be damaged in this manner-- they can .
If an LED is fed to high a voltage a couple of things happen almost immediately before failure. First- They get hot ! They can get hot enough to melt the lens - Be careful !!! Second - they change colour (red turns to an orange, green turns almost yellow) then the junction fails. Sometimes it is permanent - sometimes the damage is temporary. Hope this helps.

Minifig666 says: Dec 2, 2009. 10:36 AM **REPLY**

They can sometimes explode too!

Coolboyme says: Oct 4, 2009. 3:58 AM **REPLY**

Thank you very much daspoint.
Your post was very Helpful.

Virtuous says: Jul 23, 2009. 9:02 PM **REPLY**

Are there any ways to tell how much voltage an LED can take...without testing it o burn out...like if I desolder and plan to reuse LEDs out of some circuit board from some random thing, is there ne way to tell the voltage on the LEDs i salvage?

bware says: Dec 2, 2009. 3:50 AM **REPLY**

Voltage is a function of color, as in a rainbow red=1.5v to purple=4v. White are usually 3.5v, infra-red and UV are usually fairly close to the respective ends of the rainbow.

More practically the is no danger of under powering LEDs. You can start at a low voltage (say 1v) and turn the voltage up till the LED lights at full brightness. If you burn it out before you get to the brightness you were expecting it probably wasn't a very useful LED anyway.

Rileymi323 says: Oct 20, 2009. 9:14 PM **REPLY**

or solder the wire to a piece of aluminum and then tape tht to the ends of the batteries??

verence says: Dec 1, 2009. 3:01 PM **REPLY**

Solder anything to a piece of aluminium?!? If you know how to do that, please tell me!

In normal atmosphere, aluminium coats itself with a (very thin) layer of aluminium oxide. Which can't be soldered with anything I know about. It might be possible in a nitrogen atmosphere with very powerful (reducing) flux.

With aluminium, IMHO crimping is the way to go. But with LEDs I would just use the good old copper wires.

whunt says: Oct 24, 2009. 9:29 PM **REPLY**
Good idea Riley, thanks for turning me on to this site, your phlebotomist, Bill

freddyavan says: Nov 19, 2009. 9:54 PM **REPLY**
plese tell me how much are the leds rounder price on ebay i see a big deal for 100 leds and free resistors for 6.99 is that true?

akamm2011 says: Nov 17, 2009. 2:51 PM **REPLY**
So i need a way to turn the LEDs on and off like a flash light type of thing. Does anyone know any links that show what i need and how to do this

ktalex says: Oct 4, 2009. 10:18 PM **REPLY**
so if i use a 3v led and running 5v as power what resistor should i use? im noob sorry.

Rileymi323 says: Oct 20, 2009. 10:41 PM **REPLY**
a resistor with color code brown, black, brown, gold would break even but brown, brown, brown, gold would be a better choice

Lotsafish says: Oct 4, 2009. 1:01 PM **REPLY**
Thanks man, this is a lot of help, I'm just starting out working with LEDS and your guide is a great starting point.

gfear says: Sep 19, 2009. 8:30 AM **REPLY**
Hi - I've been interested to read all of these comments regarding LEDs and hope that someone here may be able to help.

I have 40 x 5mm White Leds. I wish to use all 40 lit at the smae time and they were supplied with 40 x 0.25 Watt 68 ohm resistor.

It makes no difference to me if they are wired in parallel or in series and I would appreciate your advice on the best way. Can I use just one resistor for the whole circuit or will I have to use more resistors or even all 40 of them?

The only other information I have about these is as follows:

Specification :
- Emitting Color: White
- Lens Type: Water clear
- Material: InGaN
- Luminous Intensity: 27,000+ mcd
- Viewing Angle: 20 ± 5 Degree
- Reverse Voltage: 5.0 V
- DC Forward Voltage: Typical: 3.2 V Max: 3.4 V
- DC Forward Current: 25mA

Can anyone help me - I would really appreciate it - not very strong on electronics!

Regards

Gary

cupofsoup says: Sep 10, 2009. 3:40 PM **REPLY**
ive got a led grow light i just bought and it calls for 12 vdc .i was hoping you would know of va adapter i could use//////////////////////////
Product Information
We are proud to offer the only 12 Volt DC LED Grow Light Panel.

Quality built dual color blended LED Grow Light Panel

FEATURES: Solid state, Cooler running, High efficiency, Wide angle, Dual Color Blended full spectrum plant lighting.

BENIFITS: This panel works like our standard light panel, except it used 12 volt DC. It draws about 1 amp; so a 15 amp hour battery can power the light panel for 15 hours. You will not experience unsightly brown burned leaves when they accidentally touch the LEDs. This is common with most other lights that get very hot. Because the running temperature is more controlled, it reduces the need to water so often and keeps rooms with plants from getting uncomfortably hot in the summer months, which requires additional air conditioning. Extreme energy efficiency permits this new LED panel to pay for itself many times over each year in electricity savings. It saves 50% to 90% in energy consumption compared to incandescent bulbs or fluorescent tubes. Wide angle projection insures uniform leaf coverage.

Scientifically calculated even blending of red and blue LEDs eliminates the time consuming task of repositioning separate colored lights back and forth trying to achieve uniform exposure. 14 to 16 hours per day is all that is necessary for maximum plant health with this wave blended lighting system. This allows distances 4"-8" and less between the LEDs and the plants accelerating photosynthesis. Red and blue wavelengths are for growing and flowering of plants.The typical white plant lights that are very hot is unnecessary and just consume excessive electricity. The purity of the LED generated light lengthens flowering periods. These LEDs turn on instantly and can be turned on by hand each day or work well with all standard lamp timers.

The design of this new all in one Full Spectrum plant lighting panel allows maximum level photosynthesis food production, growth and flowering all in one. It is the new Full Spectrum system providing maximum plant health, beauty and productivity.

These LED light panels are perfect as an all year plant light for permanent plant benches and especially productive for spring vegetable and flower seedling

development.

Specifications:
Body material: Thermoplastic
Circuitry board material: Diecast Chrome
60 Blue light LEDs: 465nm (nanometer) wave length
165 Red light LEDs: 650nm (nanometer) wave length
165 + 60 = Total 225 LEDs

Color: Red + Blue = Purple looking to the eyes
Working Voltage: 12V or 110V-220V (This only works on 12 Volt DC. We have 110 Volt and 220 volt in Different Listings)
Power: 13.8 Watts
Dimensions: 12 ¼ x 12 ¼ inches (30.5cm x 30.5) square
Thickness: Low profile 1.25" or 32 mm
Power cord length: 48 inches with 2 wires for 12V connection
Recommended coverage: one panel per 18" x 18" (about 2 sq ft)
LED life: Approx. 15 years used all year long.

Cynda2 says: Sep 4, 2009. 10:19 PM **REPLY**
where do you get the wire?

moo of the cow says: Aug 29, 2009. 2:12 AM **REPLY**
so in it a resistor per led or one per bunch???

ShOoP dUh WoOp says: Jul 29, 2009. 5:51 PM **REPLY**
Hi i have a question :

bye having a greater voltage and adding the proper resistor to the LED will there be longer battery life.

thnx :)

crosman01 says: Aug 27, 2009. 1:32 PM **REPLY**
not really, because all a resistor does is dissipate electricity as heat, it will however preserve LED life(though if you're over powering an LED you significantly lower its life expectancy, so by being right at or a little below the recommended voltage(of the LED) is highly preferable)

sharlston says: Jul 30, 2009. 4:04 AM **REPLY**
thanks noah this really helped but what is the purpose of a resistor? ive wired multiple leds up before with no problem

ShOoP dUh WoOp says: Jul 30, 2009. 9:24 PM **REPLY**
the purpose of a resistor is to lower the power given from the source (battery, etc.) and lowering (resisting) the voltage to a piont the LED can handle.

so using a resistor on a power source greater than the led can take will prevent the LED from burning out (if you use the right resistor)

:-)

sharlston says: Aug 26, 2009. 2:13 PM **REPLY**
oh so if i had a 9v battery and a led that will only take 1 v i add a right resistor and it will lower it?

crosman01 says: Aug 27, 2009. 1:30 PM **REPLY**
yup, exactly.
in fact in that case the resistor you'd need would be:
R=(v1 - v2) / I
R=(9v - 1v) / I
(and assuming your 1v LED is .02 amps)
R=8v / .02a
R=400ohms
you would need a 400ohm resistor to power a 1v .02a LED with a 9v battery(or you could also use a little more than 400ohms if you didn't have the right resistor(s) to make 400ohm of resistance)

pancho del rancho says: Jul 27, 2009. 8:41 AM **REPLY**
do we really need he reisistor

mannyboy2680 says: Jul 28, 2009. 11:26 PM **REPLY**

You need the resistor IF the power supply has more voltage and amperage than ther LED. if they're the same, you don't need a resistor

pancho del rancho says: Jul 29, 2009. 7:48 AM **REPLY**

that clears a lot thx

mannyboy2680 says: Jul 28, 2009. 11:23 PM **REPLY**

Great 'ible! i can finally stop burning LEDs now!

Virtuous says: Jul 23, 2009. 8:33 PM **REPLY**

I wish i would have read something like this like a month ago...I instantly burned out one LED I could of used now I don't have ne more of them lol.

Virtuous says: Jul 23, 2009. 8:31 PM **REPLY**

Now this is a pretty useful page....i was trying to figure out what color combinations equaled what

tvilot says: Jul 23, 2009. 7:51 PM **REPLY**

"or even 1 12V LED if such a thing existed."

Actually ... such a thing now does exist!!!

http://led.linear1.org/12vdc-leds-from-best-hong-kong/

Insane!!!

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