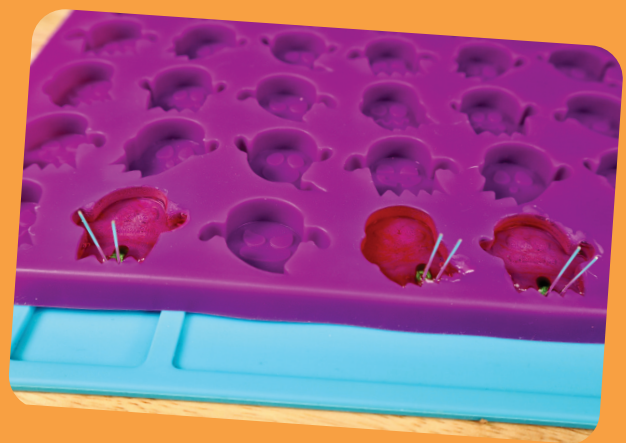
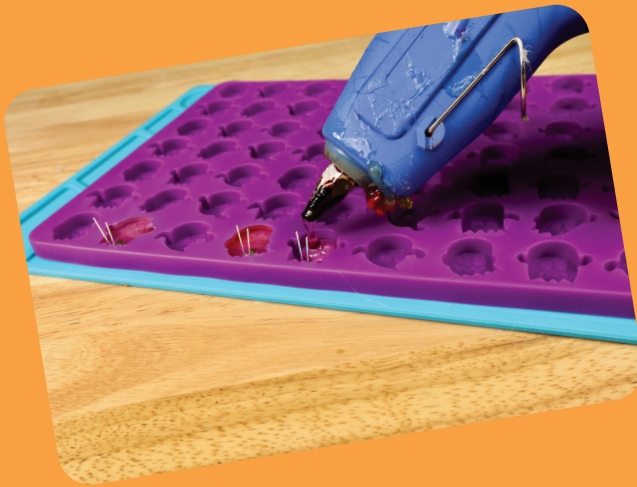


Molded LEDs

Activity eBook



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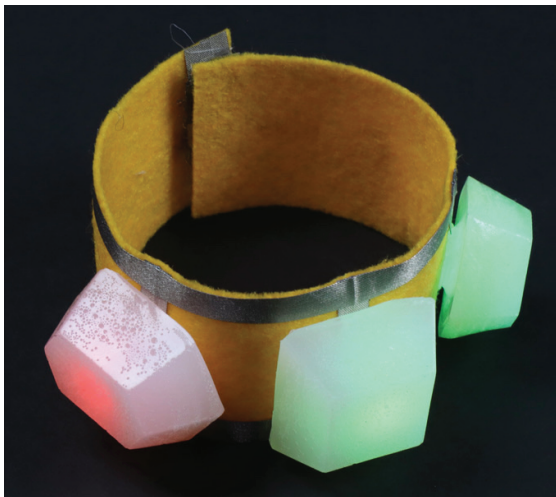
Contents

What are molded LEDs and what can you do with them?	3
General Materials for Circuitry	4
Tools & Materials For Molding	
•Tools.....	4
•Molds.....	5
•Glues.....	6
•LEDs.....	7
How do they work?	
•What is Diffusion?.....	8
•How does light travel from an LED?.....	8
Molding around the LED	
•Suspended LED method.....	9
•Prepping Smaller LEDs.....	10
•Layered Glue method.....	11
After Molding	12
Specific Projects	
•Jewel Bracelet.....	13
•Circuit Stick Diarama.....	14-15
•Bucket Hat.....	16

What ARE molded LEDs & what can you do with them?



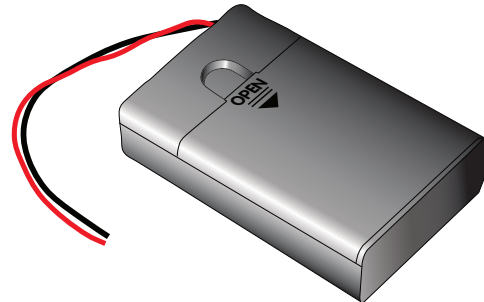
Simply put, they are just plain-old LEDs encased in a hardened liquid that allows light to pass through to a degree. We use silicone molds in different shapes and hot glue; making the ordinary...extraordinary. Skulls, pumpkins, ghosts, hearts...the sky is the limit! Molding LEDs is an easy and inexpensive way to jazz up just about any circuit.



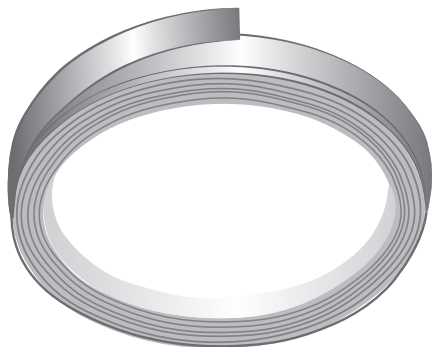
General Materials For LED Circuits



LEDs or light-emitting diodes are convenient low-voltage lighting components. Electricity only flows through them one way. The path contacting the negative side of your battery must connect to the shorter negative leg while the path connected to the positive side of the battery must connect with the longer positive leg.



Voltage Sources are needed to provide electricity to a circuit. Coin cell CR2032 batteries are small and convenient but may limit how MANY LEDs can be powered up. Small AA battery holders with 2 AA batteries are a bit bigger but will allow more LEDs to be powered up successfully in a circuit.

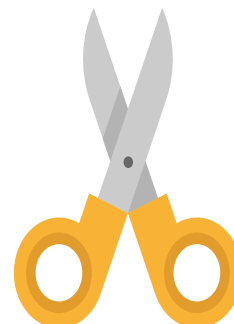


Maker Tape™ is conductive tape that is used in place of wires to create circuit pathways between components.

Molding-Specific Tools & Materials



Hot Glue Guns come in a variety of sizes. All will work. Just make sure your glue sticks match the gun size.



Scissors are good to have for trimming excess glue and cutting Maker Tape™ for your circuits.

Molds

Molds come in all shapes, sizes and materials. **Silicone molds are the type that hot glue will release best from.** Avoid anything bigger than a “candy mold” as it will be tough for a single LED to illuminate the entire thing and the resulting overall weight of a single LED will start to be problematic when you use it in a circuit.



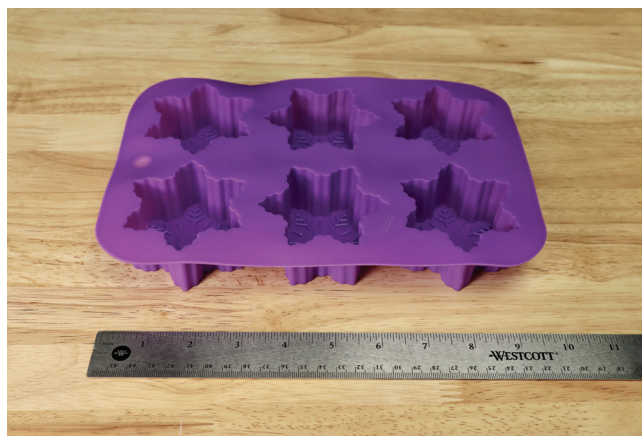
- Small Candy Molds
- Use 3mm LEDs



- Medium-Sized Candy Molds
- Use 3mm, 5mm LEDs



- Large Candy Mold
- Use 5mm, 10mm LEDs

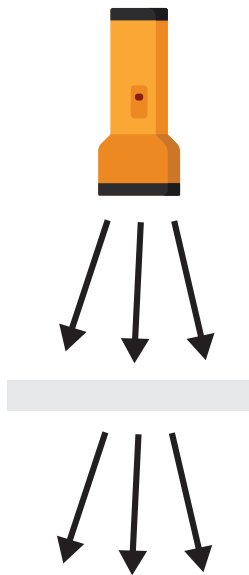


- Non-Candy “Cupcake” Mold
- TOO BIG for this process.

Hot Glue Types

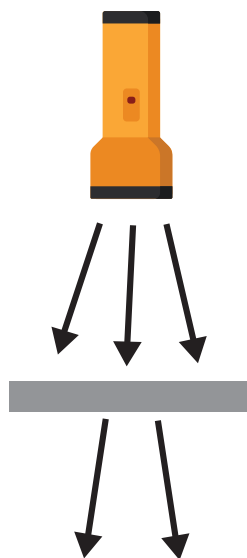
Any hot glue will work to a degree...but there are several types of hot glue available on the market and each will allow different amounts of light to pass through. Some are colored and pair well with white LEDs while others are colorless and pair well with colored LEDs. We've placed them on a line ranging from transparent to translucent to opaque for quick reference.

Transparent
light passes through
easily.



Clear Glue Sticks

Translucent
A fair amount light
passes through.

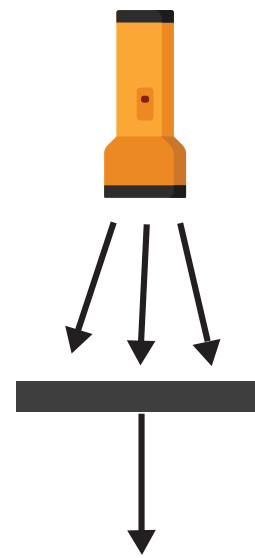


Glitter Glue Sticks



Translucent Glue Sticks

Opaque
Very little light passes
through.

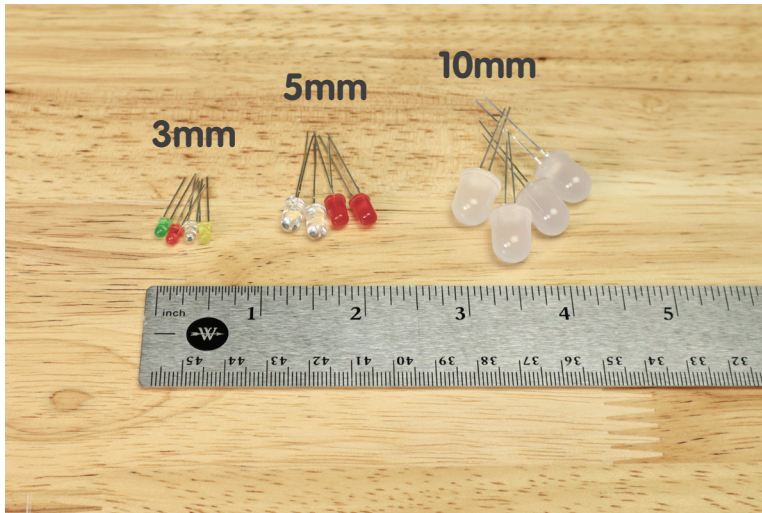


Colored Glue Sticks

LED Considerations

When selecting LEDs to mold, there are a couple areas of consideration that can impact how well your resulting component will work. If you want an even and uniform glow from your molded LEDs, pay attention to the ideas described below!

LED Sizes



Experiment to find the most ideal LED/mold combination for each project.

The size of the LED you use in relation to the size of the mold you are using is the most important consideration when molding LEDs. The desirable soft, “glowing” characteristic of a molded LED relies on the LED bulb being COMPLETELY covered by another material (in our case, hot glue). A large 10mm LED will be too large for that to happen in many candy molds while a tiny 3mm LED may not produce enough light to illuminate the glue required to fill the size of mold that works well with a 10mm. **Generally, 10mm LEDs will work with medium to large-sized candy molds while 5mm LEDs will work in medium to small-sized candy molds. Tiny 3mm LEDs will work in all small candy molds.**

LED Colors

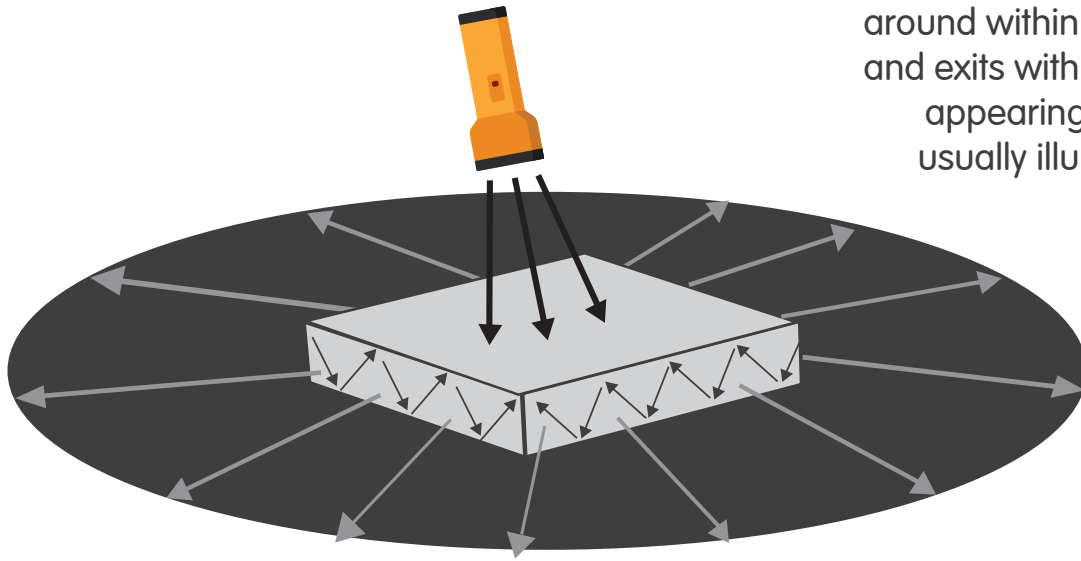
There are no wrong color choices in this process. However, if the goal is to get the resulting component to light up a certain color, you can achieve this by getting the color from either the glue OR the light. **Generally, we found that using CLEAR LEDs when using COLORED GLUE or using CLEAR GLUE and a COLORED LED gives the best result.** Blinking and color cycling LEDs can also give a nice effect. UV LEDs encased within glow in the dark glue can be used to recharge a glow effect by circuit.

How do they work?

In a word, molded LEDs work based on an idea in optics called **diffusion**.

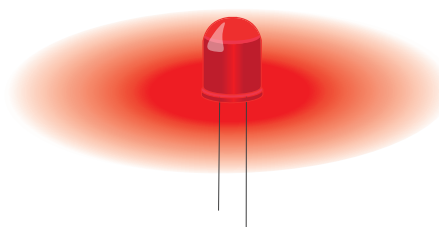
What the heck is diffusion?

Light enters the material (in our case, hot glue), bounces around within the material and exits with less energy; appearing softer while usually illuminating the material.



How does light travel from an LED?

- To understand the next setup considerations for the molding process, **it's helpful to be able to visualize where the vast majority of the light emitted by an LED goes and how it travels.**
- Because the light travels in these pretty defined paths, **you're going to want as much space for hot glue in these paths as possible.**
- Using **one of the two LED prep methods described next** will help you.



Light from colored LEDs



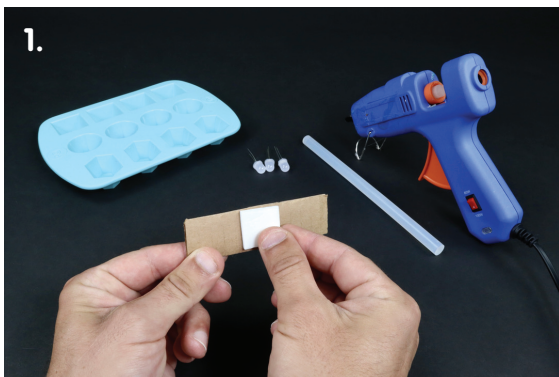
Light from clear LEDs

Molding around the LEDs

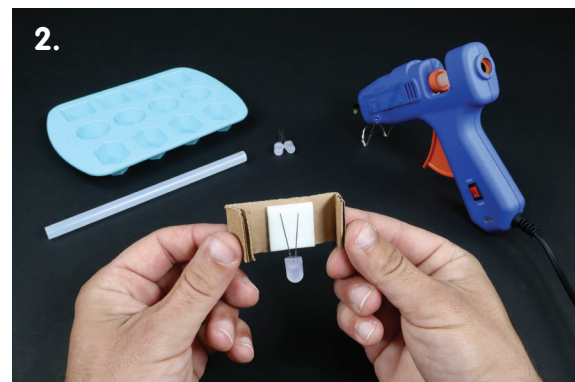
The process we use to mold a shape out of hot glue around an LED is ridiculously simple. **To be fair, the most involved and important things happen before the glue is ever squeezed into the mold.** At this point you've learned that the main concern is with making sure the LED is completely encased in glue with the most glue possible in FRONT of areas light is coming from on the LED bulb. The following pages outline two different methods for achieving this: one for molds with room for lots of glue, and another for smaller molds with less space for glue.

Suspended LED with cardboard & tape method

Good For:
Large, Deep Molds



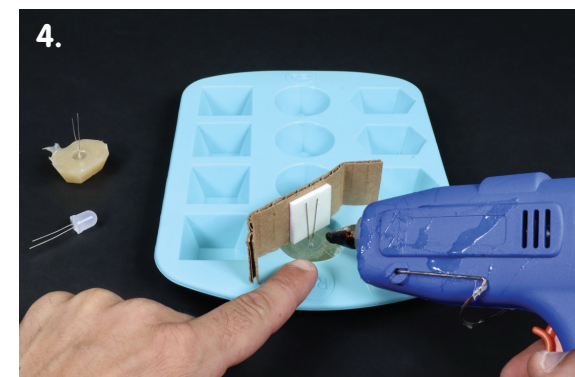
1. Cut a chunk of cardboard that can bridge the gap created by a single mold cavity. Stick a piece of tape (we used double sided foam tape) to the middle as shown.



2. Stick the LED legs to the tape so the LED bulb is oriented down at a depth that **DOES NOT** allow the tip of the bulb to touch the bottom of the mold cavity.



3. Fold the edges of the cardboard so it can hold the LED upright as glue is introduced and hardening. Place the whole thing in the center of your mold cavity.



4. Double check to make sure there is space for glue **BELOW** the bulb tip before introducing hot glue. Adjust if necessary. Squeeze hot glue into mold until cavity is full. Allow to harden.

Prepping 3 and 5mm LEDs for smaller molds

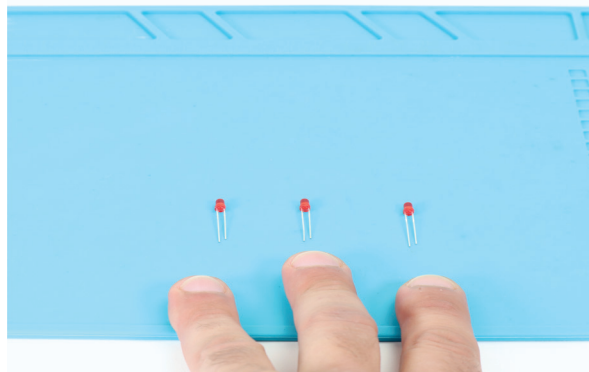
For smaller molds, suspending won't work because, even with tiny 3mm colored LEDs the light will be directed through the thinnest amount of glue and most light will go directly out of the shape.



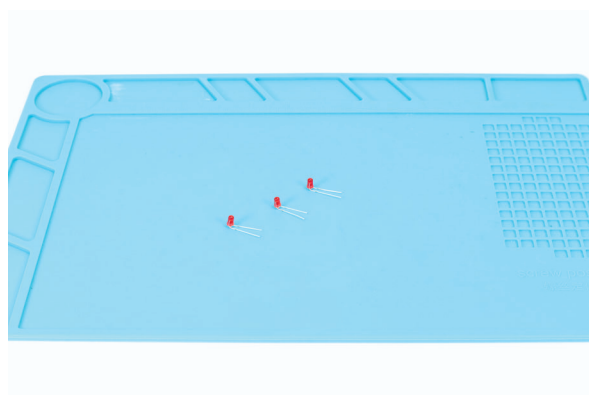
There is far more glue in the path of light if the LED is positioned in a small mold as shown here. But, you will need to bend the legs in order to make this work.



Polarity (positive/negative) matters when wiring LEDs in a circuit. So, if you are making more than one molded LED, having the short and long legs all oriented the same way from the start will make using them less confusing.



With LED legs all oriented the same way, simply bend the legs 90 degrees as shown. Doing so will allow you to use the "Layered Glue and Bent Leg" method of molding described next, achieving the position shown in photo 2.

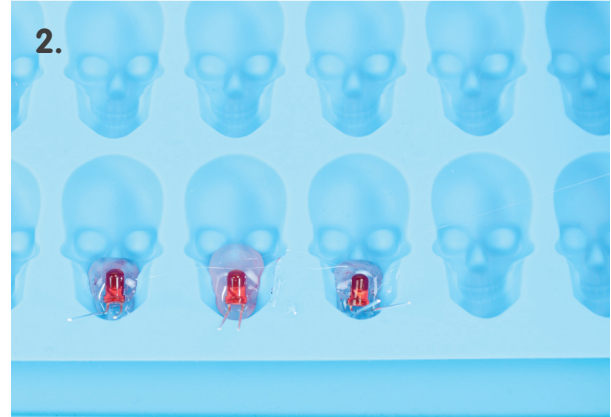


Layered glue & bent LED method

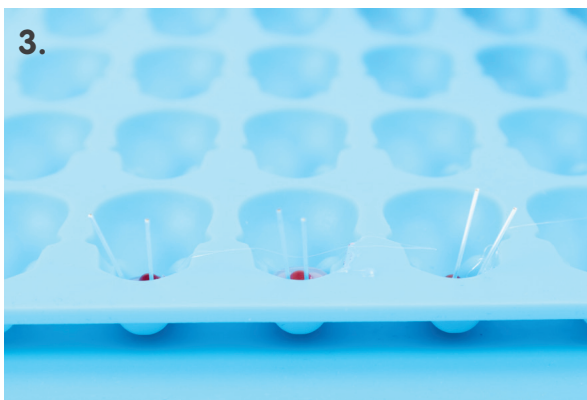
Good For:
Small, Shallow Molds



1. With LED legs set aside/pre-bent as described on **page 5**, squeeze a tiny bead of glue into each mold cavity at the lowest part of the shape. Let the glue cool a bit so that when you rest each LED atop each bead, the LED doesn't sink to the bottom.



2. Rest each bent-leg LED on top of each glue bead so the legs are sticking straight up at you. This puts glue below the LED & aims the bulb tip toward the top of the shape while holding it there.



3. Notice that when looking in the same direction the light will be shining, this position will give the light the most glue to travel through and illuminate. Also notice that the LED legs are sticking UP and have all the short legs oriented in the same direction.

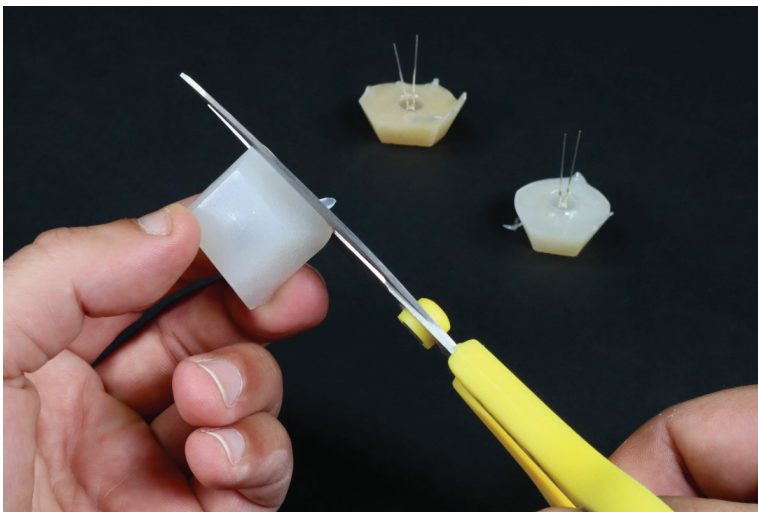


4. Once the glue beads have hardened, they will keep the LEDs in position within a given mold. At this point, squeeze hot glue of your choice into the molds until the cavities are filled. Allow to harden. Remove afterward.

After Removal From Molds

Depending upon how much of a perfectionist you are, **there are a couple ways to fine tune your molded LEDs once they have cooled, hardened and have been removed from the mold.**

Trimming



Once your LEDs have hardened and have been removed from the molds, it is not uncommon to find some excess material around the edges toward the back side of the shape. Cleaning them up with a scissors or carefully wielded craft knife is all you need to do.

Coloring Recessed Details



Many molds have recessed details that are subtle and hard to see. Use a fine-tipped black permanent marker to color them in! Not only will this make the details more visible when not lit, black will block light when they ARE lit for greater detail in the dark.

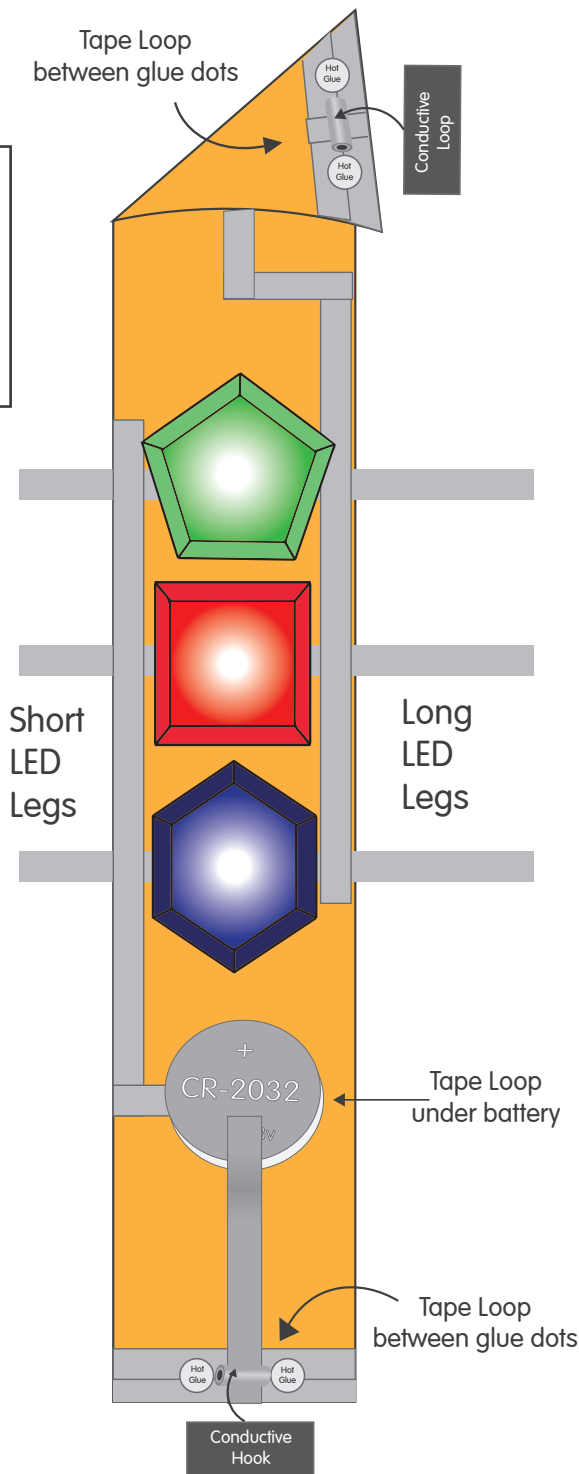
Jewel Bracelet



Follow the link if full step-by-step photo instructions are needed.

- Materials Needed:**
- 1/4" Maker Tape
 - 1-3 Molded LEDs of your choice
 - Felt scrap
 - CR2032 Battery
 - 1/2" Conductive Hook & Loop

Although the conductive hook & loop can be hot glued, it may release over time. Stapling through each piece also works. We made this bracelet with large 10mm jewel molded LEDs. You can use this same design with whichever molded LEDs you want to. Get creative and have fun with your own idea!



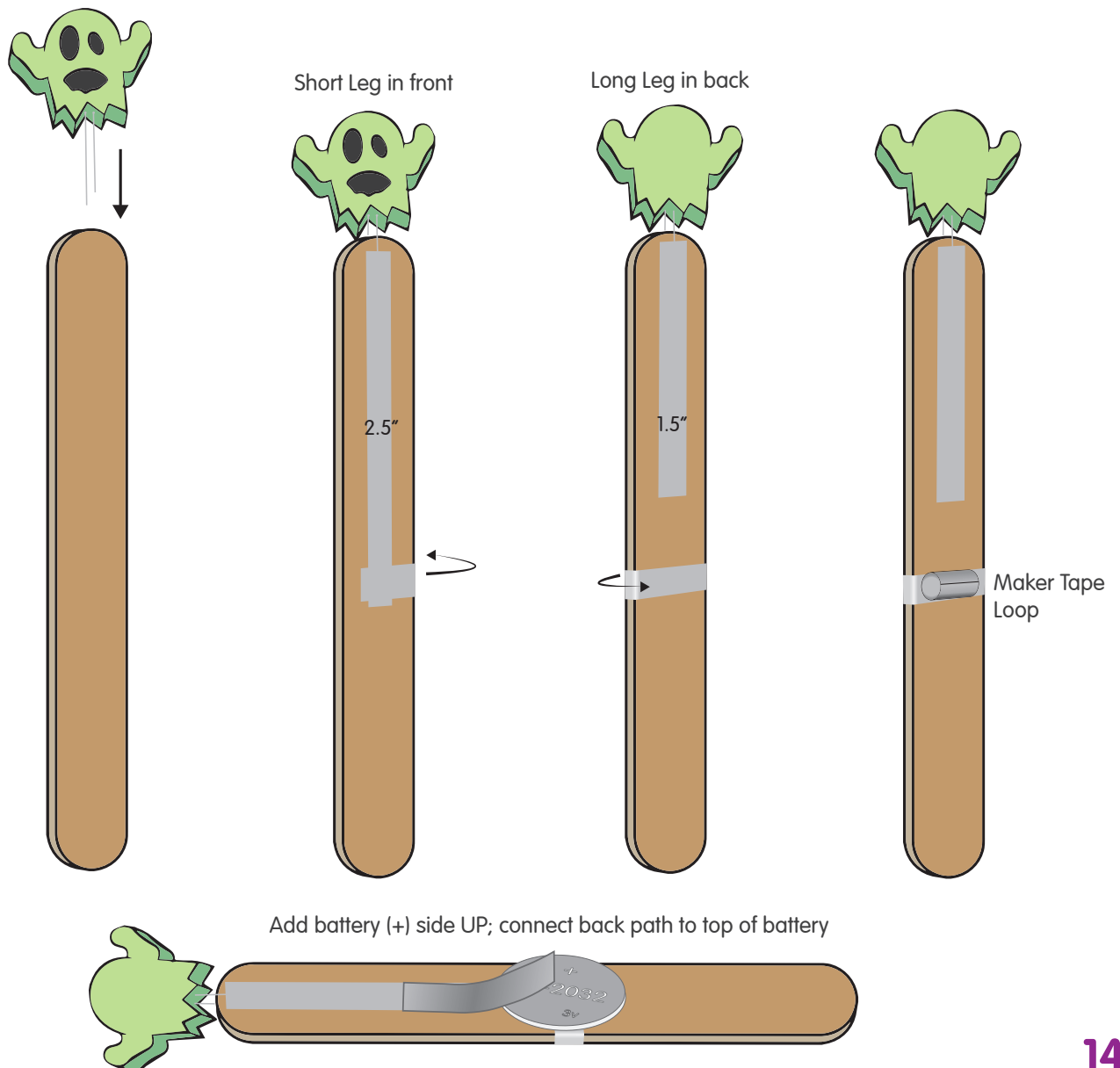
Circuit Stick Diaramas

Follow the link if full step-by-step photo instructions are needed.

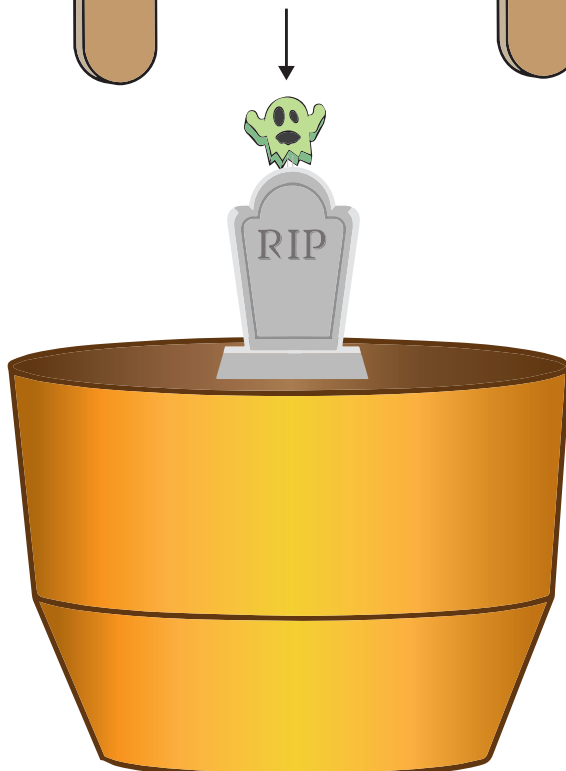
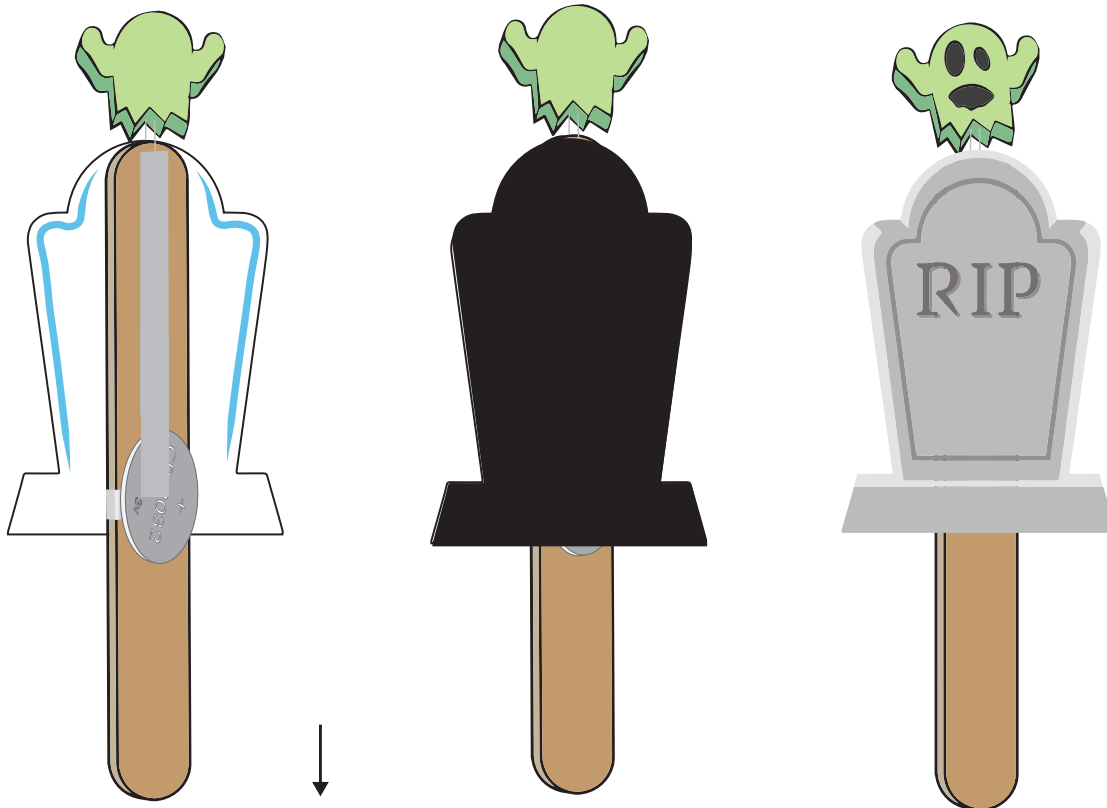


- Materials Needed:**
- 1/4" Maker Tape
 - 1-3 Molded LEDs of your choice
 - 1-3 Popsicle Sticks
 - 1-3 CR2032 Batteries
 - 1-3 double-sided cardstock cutouts to hide battery

We chose to make a diarama using a spooky graveyard theme with ghost LEDs and tombstone cutouts to hide the circuitry... Use your imagination and come up with a scene all your own! What molds will you need? What scene elements could you make out of paper or cardstock to hide the battery?



Follow the link to printable tombstone cutout templates if you are making **THIS** version of the project. Make your own to fit your theme if you've chosen to make a different circuit stick diorama! Just make sure they are big enough for the edges of the front and back to be glued together with the stick and battery in between.



Hiding The Circuit

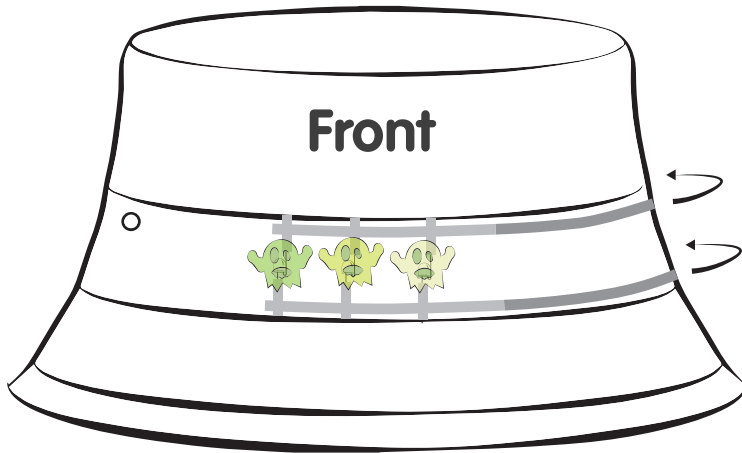
1. Cut out a tombstone and its black silhouette from the printable template page.
2. Lay the graphic version face down.
3. Position your circuit stick face down as shown.
4. Squeeze two beads of hot glue where shown.
5. Press black silhouette version over glue to seal the deal.
6. Stick finished version into a planter or flower pot.

Bucket Hats

Follow the link if full step-by-step photo instructions are needed.



- Materials Needed:
- 1/4" Maker Tape
 - 1-3 Molded LEDs of your choice
 - Felt scrap
 - Hat of choice
 - 2x AA Battery Holder
 - 2x AA Batteries

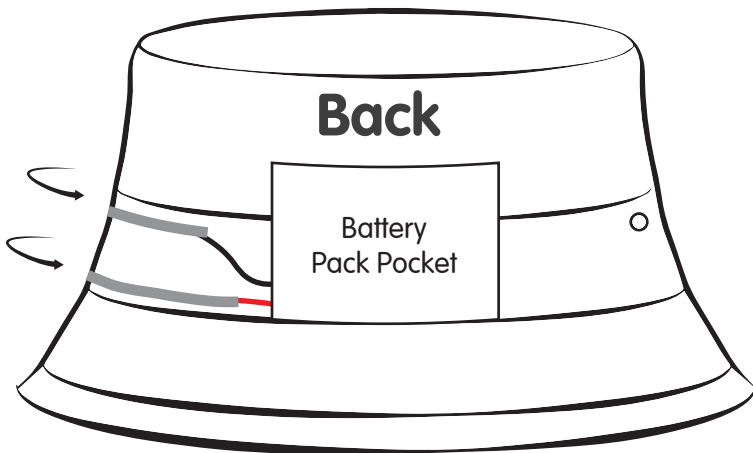


Upper path around to black negative wire.

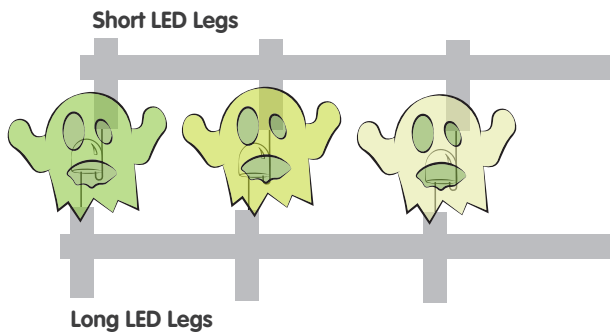
Lower path around back to red positive wire

From upper path around to black negative wire.

From lower path around back to red positive wire



Circuit Detail





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