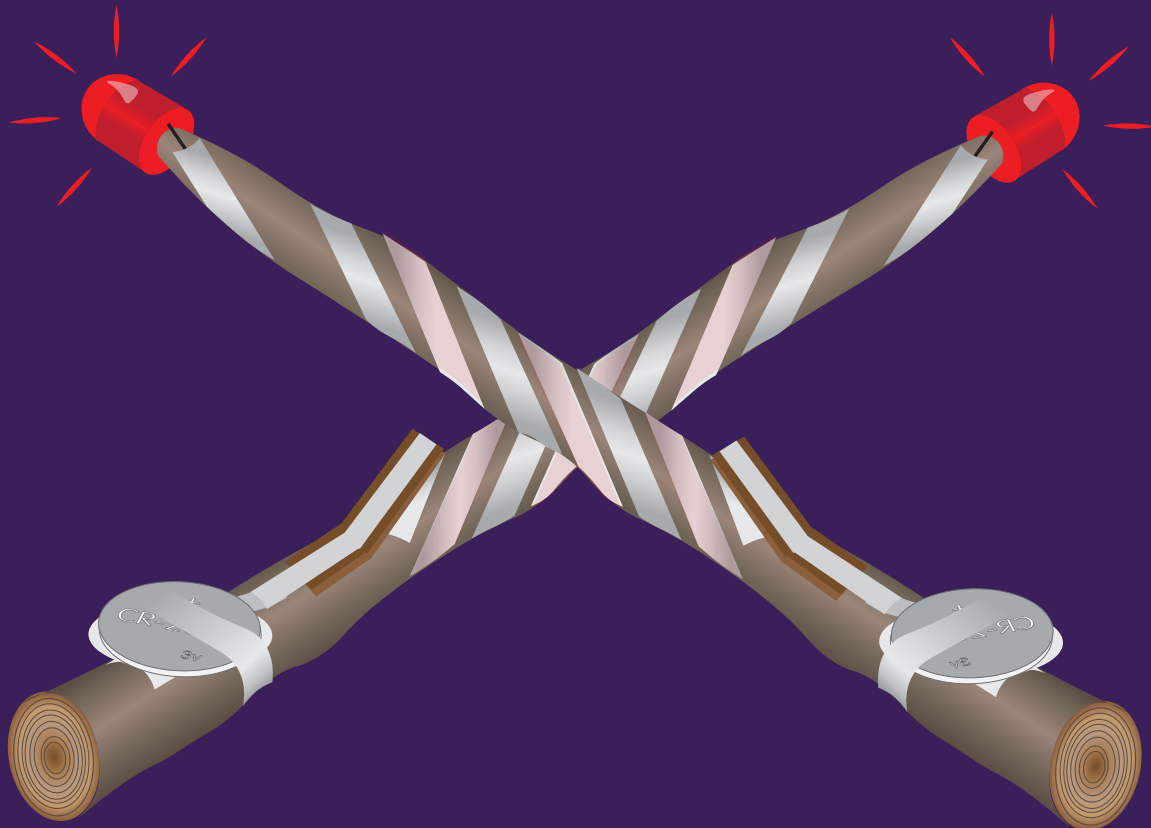


LED Wands and Torches

Activity eBook



BROWN DOG *Gadgets*

BrownDogGadgets.com

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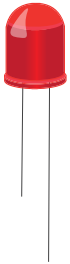
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Looking for even MORE details on these and other wand projects? Use the QR code at right or the link below to find an entire section of our projects and guides repository dedicated to this topic!



<https://learn.browndoggadgets.com/c/Wands>

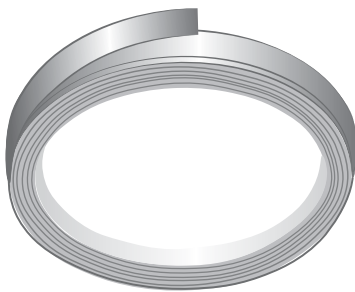
Components For LED Wands & Torches



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. All wand and torch projects described in this guide only require at MOST two LEDs.



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

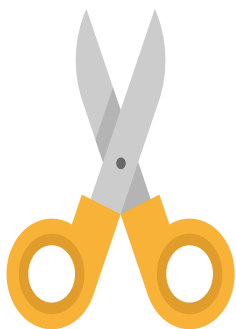
Invisible Tape & Masking Tape

These common non-conductive tape types are useful for joining crafts sticks and securing wrapped paper that may be a part of your chosen wand.

Tools



Hot Glue Guns come in a variety of sizes. All will work. Just make sure your glue sticks match the gun size. They are used in this ebook to glue clothespins to wand stems, mold glue around LEDs and create battery holders for rounded wands.



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



A Craft Knife is used in this ebook for altering ping pong balls to accommodate LEDs, cutting a notch in hot glue battery mounts and parts of Circuit Scepter projects.

Useful household items For LED Wand and Torch stems

The circuit variations described in this eBook all use 1/4" Maker Tape to create conductive pathways. So, it's not only important to make sure that the wand material is long enough to look like a wand but it ALSO needs to be something that tape can stick securely to WHILE accomodating two separated 1/4" tape paths from one end of a wand to the opposite. **The materials suggested below all share these characteristics and therefore make good wand stems.**

Craft Sticks



Because they are flat and have two sides, using craft sticks makes mounting a battery easy and keeping the two paths from an LED separate from one another. **One works fine; more can be added with masking tape to get the length you desire!**

Wood Trim

Inexpensive and trimmable to any number of lengths, wood trim is nice because it is flat and has two sides. This makes mounting a battery easy and keeping the two paths from an LED separate from one another.



Wooden Dowels

Dowels can be any length but should not be any narrower than 1/4" to aid in keeping the two paths from an LED separate. **Their round shape makes mounting a battery tricky but we have included plans on page 14 for a simple battery holder for rounded wand stems.**



Actual Sticks



Actual sticks look AWESOME! Just be aware that the Maker Tape paths used in the simple LED circuits described here may have a hard time staying stuck to loose bark. You'll also need a special way to attach the battery because sticks are not flat. **Follow the special guidelines on page 17 to assist you!**

Rolled Paper

Rolling ordinary paper into either cylindrical sticks or cones is a quick, easy and surprisingly strong way to create a useful shape for a wand stem.

Useful household items For LED Wand Switches

Although the first wand you will encounter in this ebook does not include a switch in the interest of simplicity, you may wish to add a more convenient way of turning the LED circuit on and off. **Below are some materials that will be used in the switch variations featured on some of our more advanced wand designs.**



Cardboard Scraps

There is a switch described in this ebook that can be made out of paper or cardboard. **We listed cardboard here simply because it is a bit more sturdy and easy to find in a color that blends in with wooden wand materials.** The more secret the switch, the more magical the wand!

Clothespins

With a little ingenuity, clothespins can make great switches.

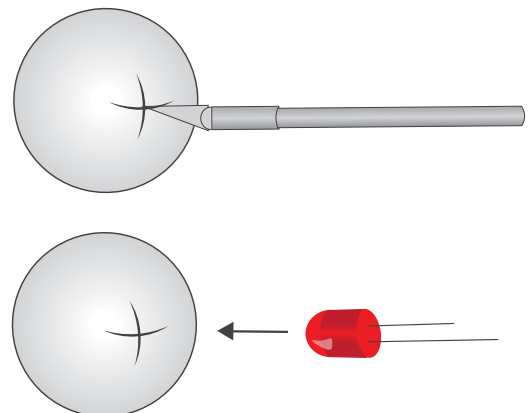
Because there are two separated halves and a spring under tension, one end of a clothespin can be made into a pushbutton switch that is normally off and momentarily on when pressed. The opposite end works great as both a battery holder and a pushbutton switch that is normally on and momentarily off when pressed.



Simple LED Embellishments

Plain LEDs at the end of a wand are pretty cool “as-is”. However, there ARE some relatively simple and inexpensive ways to add some interesting and fun shape to them. **Below are two simple LED embellishments that are shown in some of the wand designs featured in this eBook.** Although wand assemblies in this eBook are all shown with a plain LED, Ping Pong & Molded LEDs are still just an LED and can be wired the exact same way as the plain LEDs pictured.

Ping Pong Balls



Ping Pong balls are light, hollow and allow light to pass through them. **Two 1/2” slits which make an X can easily be made with a craft knife and allow for an LED bulb to be pushed securely into the ball.** Wire it into your circuit just as you would a solo LED and you’ll have a softly glowing orb!

Molded LEDs



Molding hot glue around LEDs using silicon candy molds is surprisingly simple and can turn any LED into literally ANY shape. Many kinds of hot glue allow light to pass through it but can get a bit heavy. So, there’s a limit to how BIG you should make these. There’s a brief description of the process above but we suggest checking out our **Molded LEDs eBook** for a deeper dive. You can find it by following the QR Code at left or click the link below.

<https://learn.browndoggadgets.com/Guide/Molded+LEDs+Activity+eBook/564?lang=en>

The Basic Wand

Materials Needed:

- 1x Jumbo LED
- 1-2x Jumbo Craft Sticks
- 1x CR3032 Battery
- 1/4" Maker Tape
- Masking tape (if using 2 craft sticks)

This basic wand is quick and easy! **Although two craft sticks are pictured, know that it can also be made with one while using shorter versions of tape paths "a and b".** It also does not include a switch. This means that for the LED to be ON, the small piece of Maker Tape labeled "e" will need to contact "c" and be peeled back from it to turn the LED OFF. Keep in mind that nearly all other variations in this eBook will be based on some of the core ideas used here.

1.

OPTIONAL: Use **Masking Tape** to join two sticks together for a longer wand.



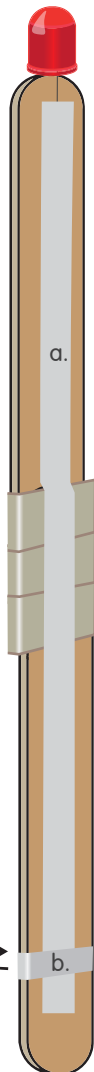
2.

Position LED with each leg on opposite sides.



3.

Maker Tape path "a" atop long leg as shown.

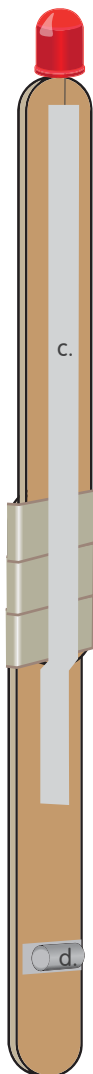


Overlap **Maker Tape** path "b" and "a".
Curl around TO and stop ON opposite side.



4.

Shorter **Maker Tape** path "c" atop short leg on opposite side.



"Sticky side out" **Maker Tape** loop atop path "b"



5.

Now it's time to **mount the battery** and power up the LED.



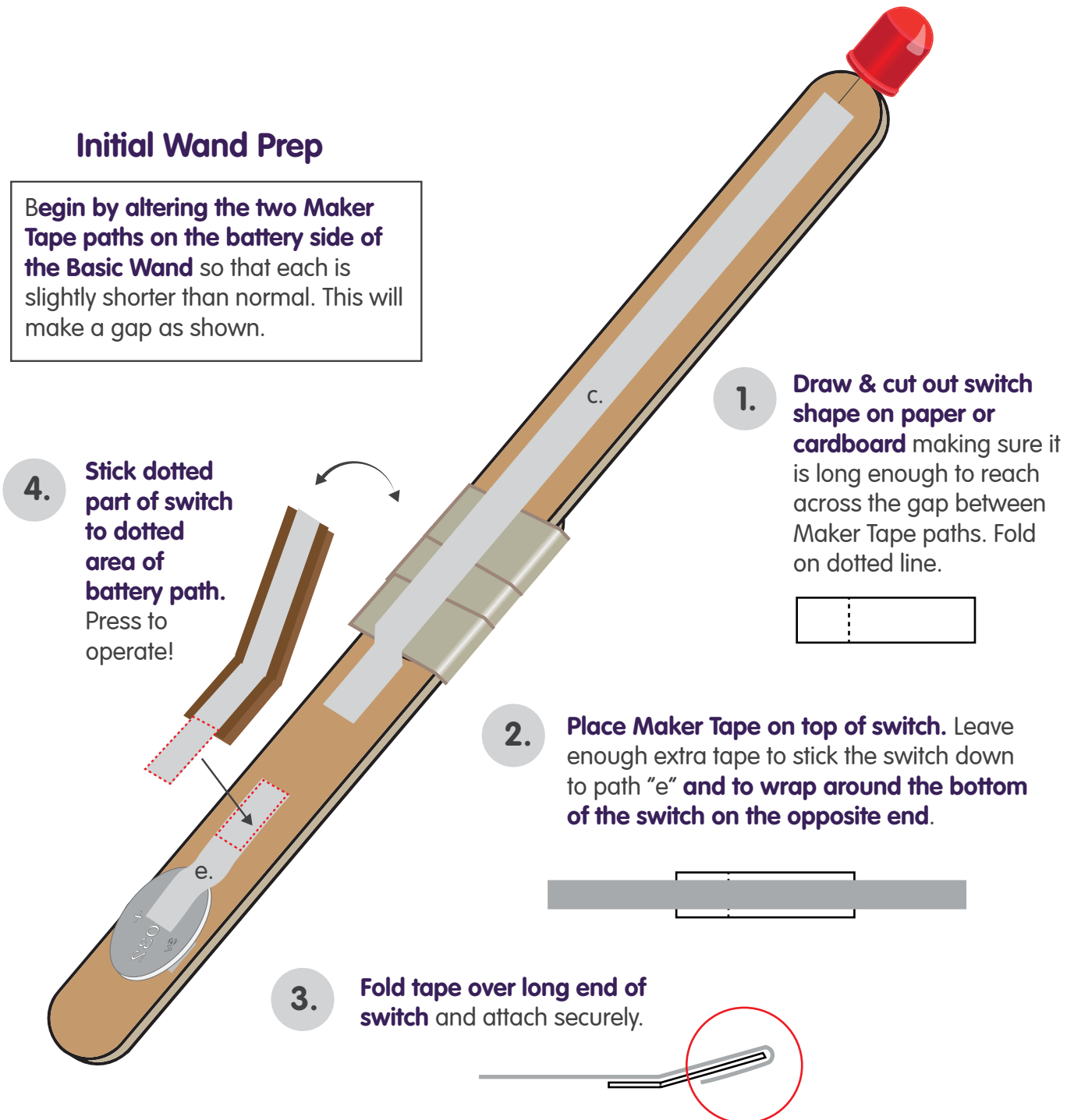
Battery atop tape loop with positive side UP. **Maker Tape path "e"** from battery to path "c" as pictured.

Cardboard Lever Switch

The Basic Wand assembly shown on the previous page has no convenient way to turn the LED on and off aside from peeling Maker Tape away from the circuit. The addition of a switch will make your wands more user-friendly while also prolonging battery life. **One of the simplest switches you can make is shown here as a variation of the Basic Wand and all you need to make it is a scrap of paper or cardboard and some 1/4" Maker Tape.**

Initial Wand Prep

Begin by altering the two Maker Tape paths on the battery side of the Basic Wand so that each is slightly shorter than normal. This will make a gap as shown.



UV LED "Marker" Wands

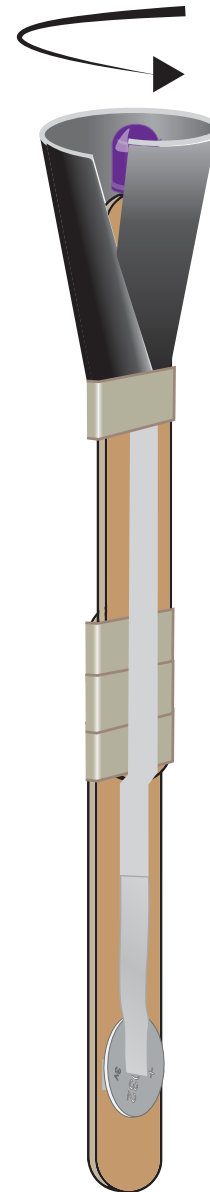
A fun variation on the basic wand is to simply use UV LEDs instead of a colored light. As the name suggests, these LEDs give off only Ultraviolet Light. It won't be easily viewable. However, it WILL charge glow-in-the dark surfaces. On the next page, we will show you how to set up a simple way to use them as markers of different widths so you and your friends can draw or play pictionary in the dark!



Large Light Shade



Small Light Shade



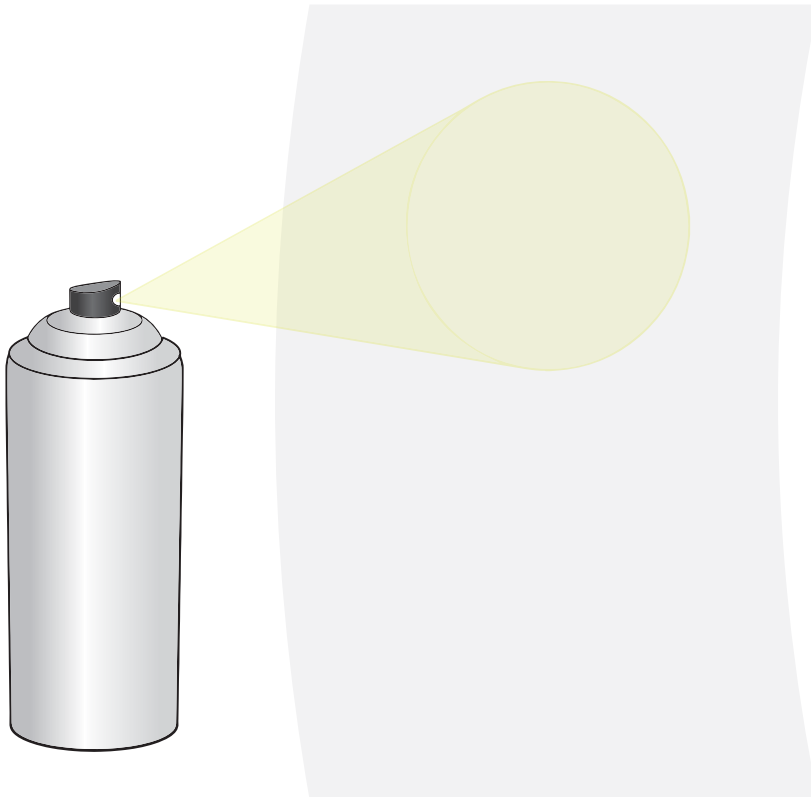
2.

Trim LED end flat once cone is taped into its final shape.

1.

To make UV LED markers of different widths, **make a Basic Wand with a UV LED**. Then cut out the shade templates at left. Wrap and tape base with masking tape as shown to focus the light differently.

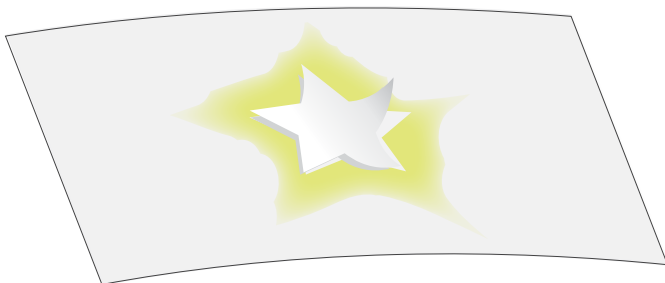
Glow-In-The-Dark Drawing



Once you've made a UV LED wand, you can use that UV light energy to charge and illuminate materials that glow in the dark. Glow-in-the-dark spray paint is widely available and can be used to turn an ordinary piece of posterboard into a glow-in-the-dark posterboard! Give a sheet several coats of your chosen glow paint, allow it to dry and then draw in the dark to your heart's content using your wand as a pen or marker. Below are a couple of ideas that put this new capability into fun contexts.

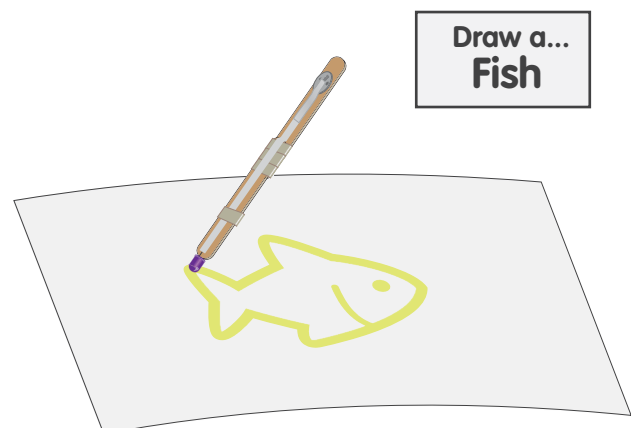
Stencilling

Anything that blocks light can be used as a **stencil**. For paper cut outs or small objects; simply lay them on top of the glow paint treated paper and run the UV light over top and past its edges. When you remove the object, the glow effect outside the stencil will define the edges.



"Pictionary"

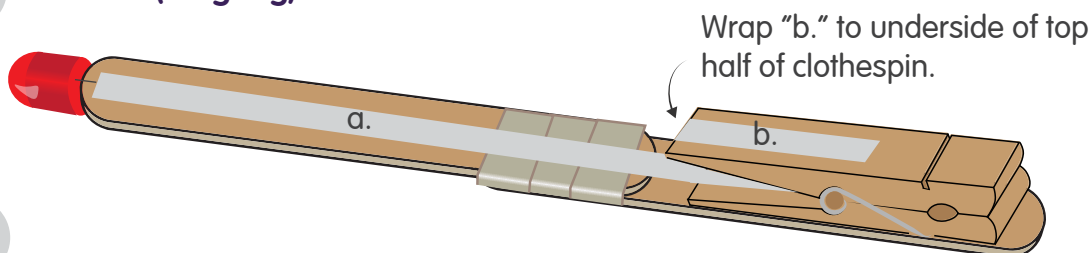
Play the classic drawing game...in the **dark!** No need to use a timer while guessing what the drawing is. It will disappear shortly. Guess before its gone!



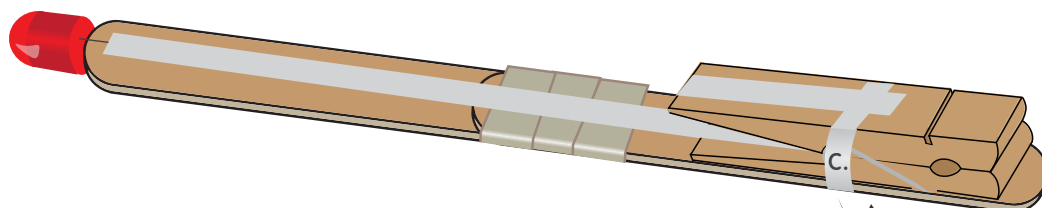
Clothespin Switch Wand 1

Use a clothespin to **create a switch that is normally OFF and only turns on when the end is pressed!** Begin by mounting the clothespin atop your wand stem with hot glue; oriented as shown.

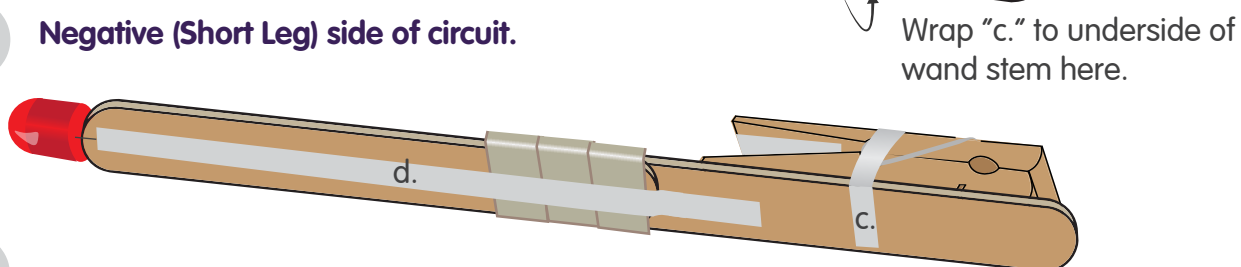
1. **Positive (Long Leg) side of circuit.**



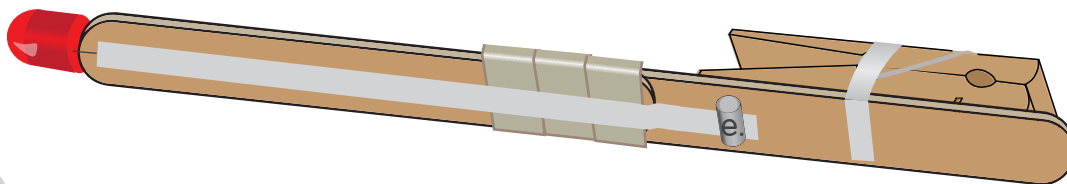
- 2.



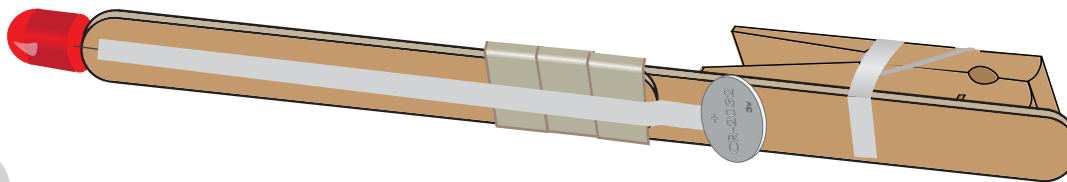
3. **Negative (Short Leg) side of circuit.**



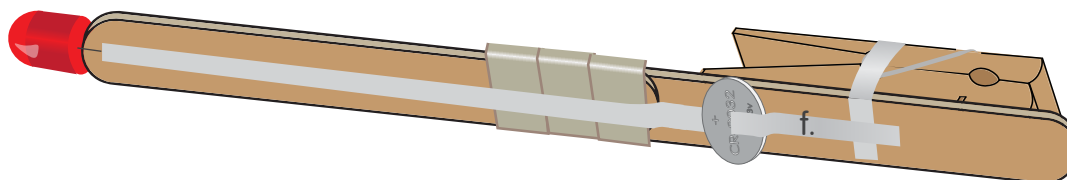
- 4.



- 5.



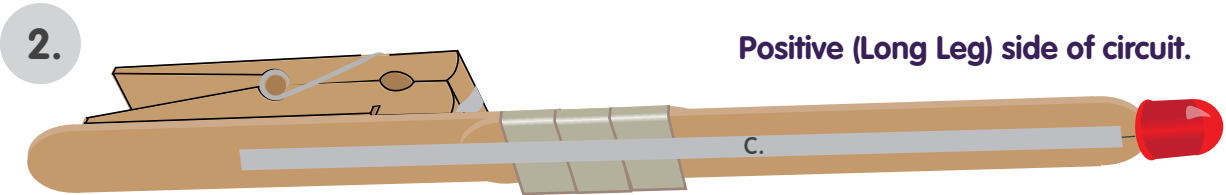
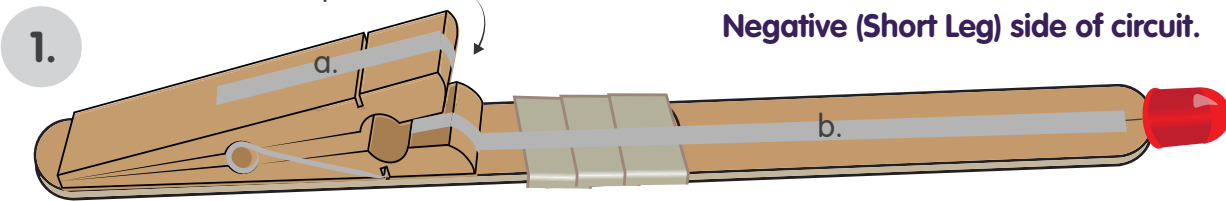
- 6.



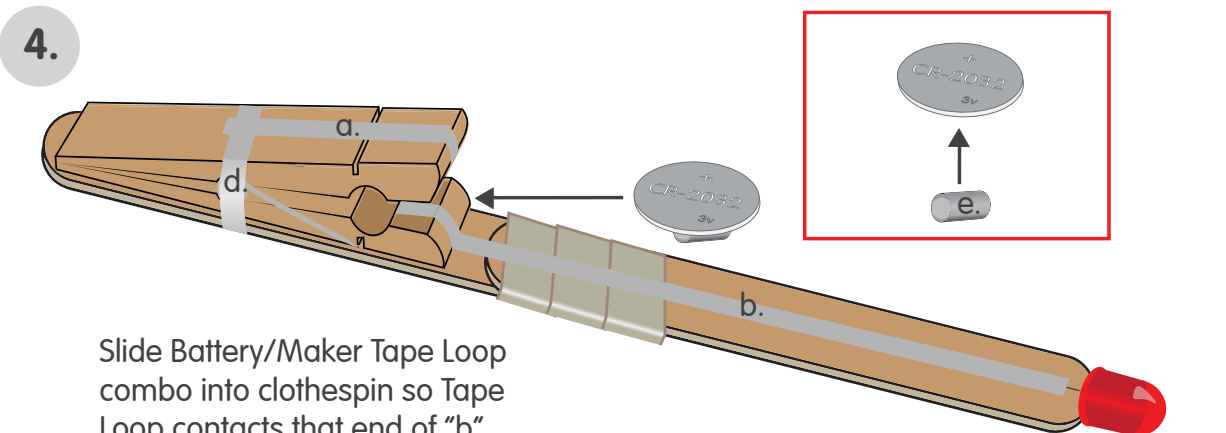
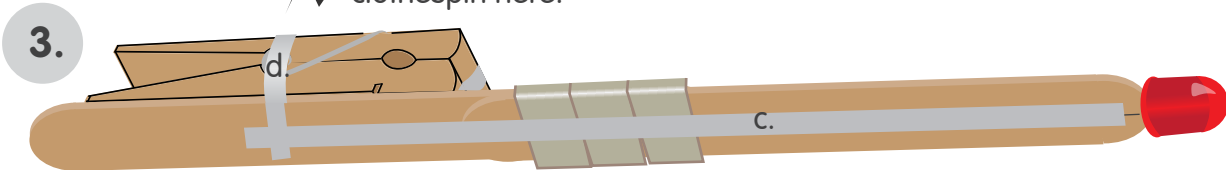
Clothespin Switch Wand 2

Use a clothespin to create a switch that is normally ON and only turns off when the end is pressed! Begin by mounting the clothespin atop your wand stem with hot glue; oriented as shown.

Wrap "a." to underside of top half of clothespin.

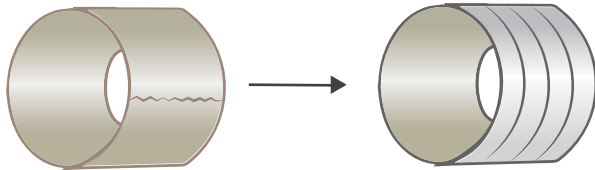


Wrap "d." to top side of clothespin here.



Slide Battery/Maker Tape Loop combo into clothespin so Tape Loop contacts that end of "b" .

Secret Ring Switch



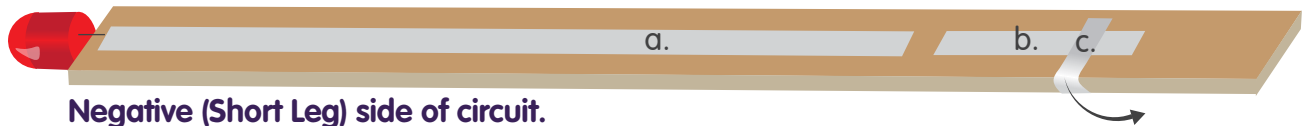
Pssst! The secret ring is just a masking tape ring with the outside wrapped in Maker Tape.

Make a wand that only works for you with these plans for a secret ring switch!

Start by grabbing your wand stem and marking where your pointer finger naturally lands. Then follow the instructions below to assemble the circuit. The gap on the negative side should be right where you made the mark for your finger.



Pressing the conductive ring over the gap completes the circuit and turns the LED on. Only the keeper of the ring may operate this magical wand!



Negative (Short Leg) side of circuit.

1. Path "a" over the Negative (short) leg of your LED to where shown. Leave a small 1/8" gap before placing path "b". Then curl "c" from where shown to opposite side.

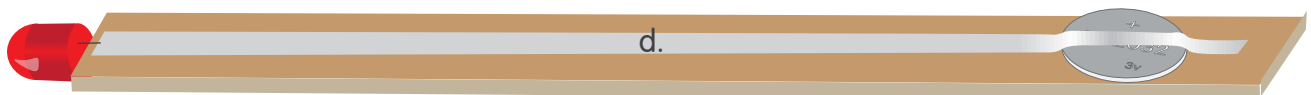


Positive (Long Leg) side of circuit.

2. Path "c" around edge from negative side to this side. Make & stick a Maker Tape Loop on top.



3. Battery placed atop the Maker Tape Loop Positive side UP.



4. Path "d" over Positive (Long) Leg of your LED to the top of the battery.

Optional Hot Glue Battery Mount

Materials Needed:

- 1x Jumbo Marker
- 1x Silicone Craft Mat
- 2x Jumbo Craft Sticks
- 1x CR2032 Battery
- 1x Hot Glue Gun/Hot Glue
- 1x Craft Knife

All wand details described in this ebook so far work as pictured for flat wand stems including: craft sticks (big and small), wood trim, rulers and yardsticks. The same details can also be applied to rounded wand stems including dowels, rolled paper and paper cones. However, the shape of THESE stems is problematic when it comes to mounting and securing the flat coin-cell battery. **If you wish to make a wand that uses a rounded or conical stem, follow the process below to quickly make a battery holder.**



The battery holder creates a flat spot on a rounded wand stem.



Gather materials and set up as shown.



Trace your battery on the mat.



Squeeze hot glue onto the center and stop once it spreads to the edge.



Press marker into glue before it sets.



Pull marker and attached glue dot off mat.



Peel from marker once glue has set.



Use craft knife to cut small notch for
Maker Tape.



The notch.

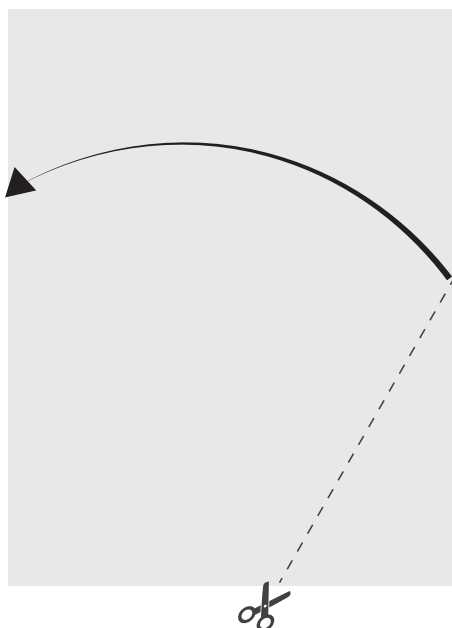


Flat top is for the battery; curved side can
be glued to rounded wand stems.

Rolled Paper Cones and Stick Wands

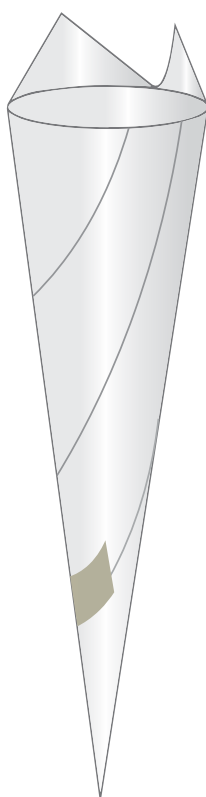


Rolling sheets of paper into tightly wound cylinders or cones is an easy way to add strength to a generally weak material while creating useful wand shapes. A cylindrical stick shape is easy to make and should require no template; just roll a sheet the long way as tightly as you can and tape it into place! Look below for instructions that should aid your approach to creating a tidy cone shape. Once the shape is made and taped into place with either invisible or masking tape, the only difference between these wands and a Basic Wand is the need for one of the hot glue battery holders described on pages 14-15.



The bottom of a cone made from a full piece of paper can get a little bulky near the pointy bottom. **Trim a bit off where shown before curling and twisting into a cone.** You'll get a pointier tip and be able to make the open end narrower!

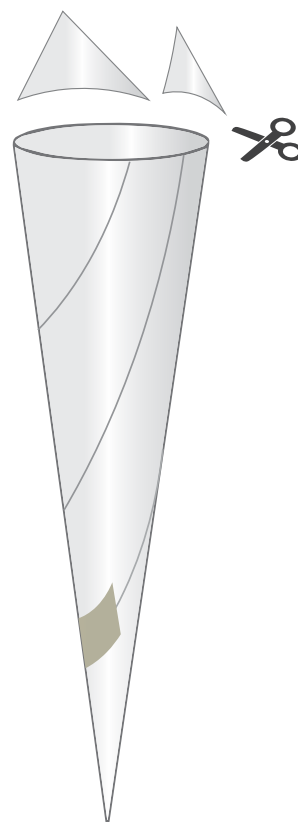
Ping Pong Ball LEDs work great with cone shapes!



- Bring the two edges shown at left together and twist into a cone shape.

- Tape in place when you're satisfied with the shape.

- Use a scissors to trim the open end even.

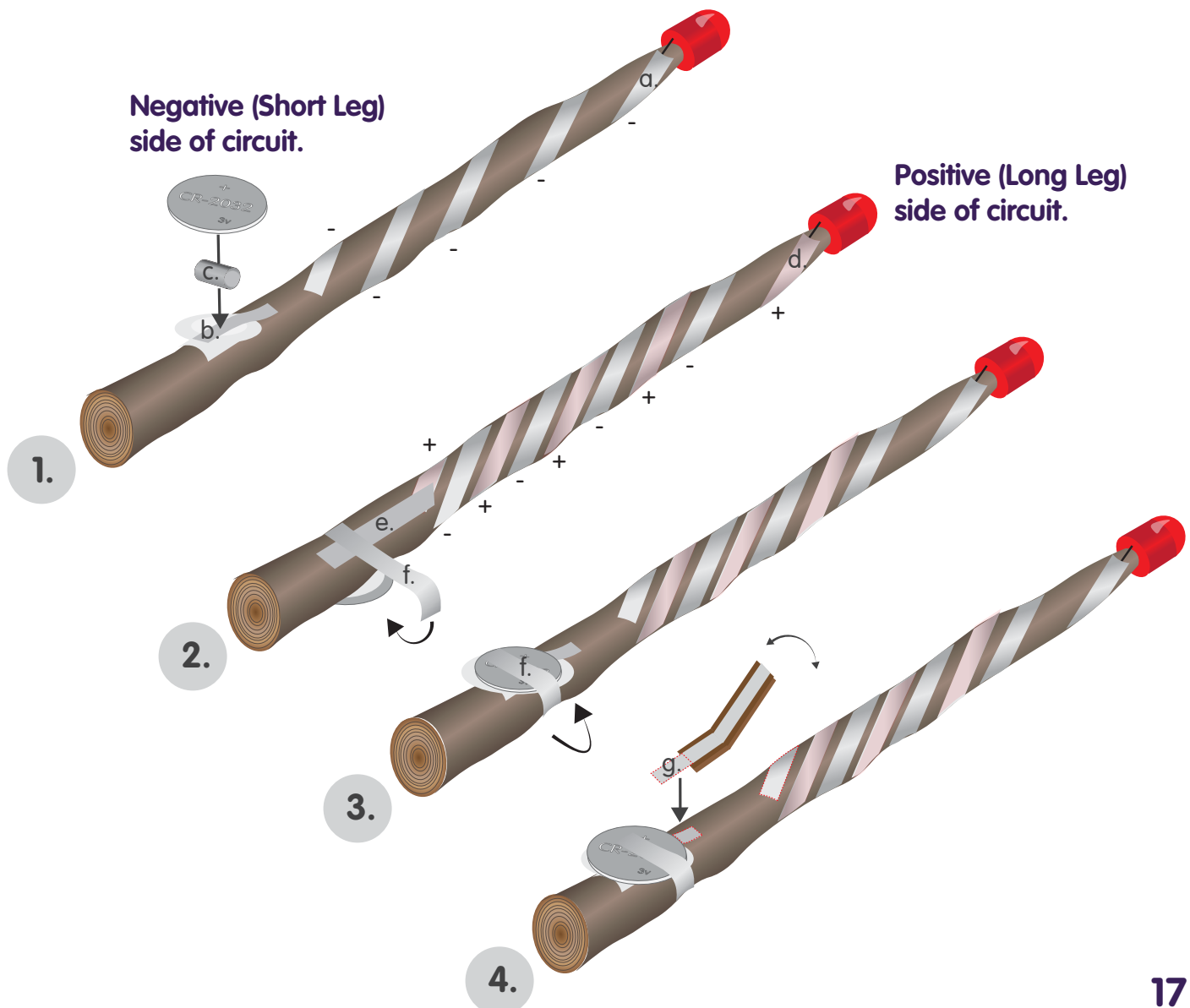


Natural Stick Wands



Using natural sticks for wands can be nearly as easy as the Basic Wand! Keep in mind that this stem type is usually more round than flat.

You'll benefit from making one of the battery holders described on pages 14-15. You'll also need to set the two LED legs at angles which will allow you to use separated spiral paths down to the battery. This is not only decorative but will help to secure everything better over the top of the inconsistencies of bark.

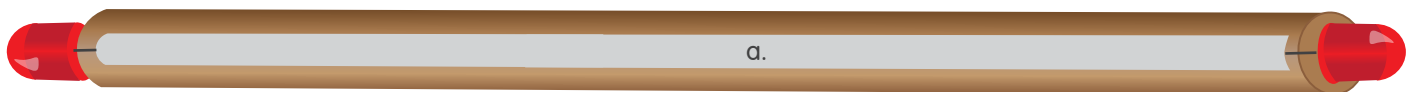


2 LED Baton Wand



So far, all wand designs shown in this ebook include only 1 LED in their circuitry. **This wand, inspired by the classic twirling baton, has a circuit assembly for an LED on each end.** This design works best on a round wooden dowel OR a tightly rolled piece of legal-sized paper that has been taped to stay rolled. You will also need to make a custom battery mount as shown on pages 14-15. Twirl it in your hand or spin it like a top on a table using the flat battery as the balance point! This one is a little more advanced...but also a little more FUN!

1.



Long LED Leg 1
under "a"

Positive (Long Leg) side of circuit
on one side of wand stem.

Long LED Leg 2
under "a"

2.



Short LED Leg 1
under "b"

Negative (Short Leg) side of
circuit on the opposite side of
wand stem.

Short LED Leg 2
under "b"

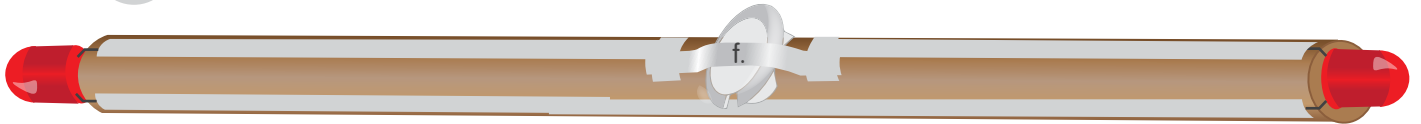
3.



Your two LEDs should now be secured at the opposite ends of the baton (both long legs under Maker Tape path "a" and short legs 1 and 2 under "b" and "c"). Now add Maker Tape paths "d" and "e" while hot gluing a custom battery holder in the gap between them.

2 LED Baton Wand (continued)

4.



Now add Maker Tape path "f" so it contacts "d", goes OVER the battery holder and then contacts "e".

5.



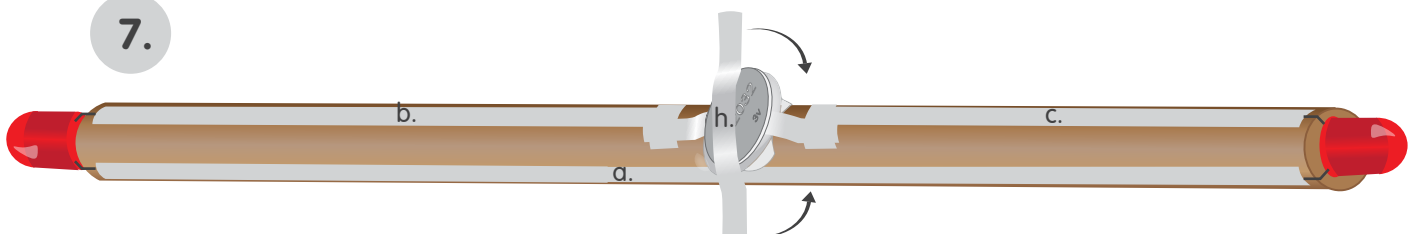
Make a Maker Tape Loop "g" and stick it atop path "f" as shown.

6.



Stick your battery atop the tape loop with the positive (+) side UP.

7.



Wrap path "h" atop battery and around the battery holder. It should contact path "a" but not "b" or "c".

Long Exposure Wand Photos



Under normal circumstances, the shutter of a camera only opens for a moment after you push the button; allowing the light from THAT instant to hit a sensor or light sensitive film for creation of the image. **If you adjust and lengthen the amount of time that the shutter stays open, you can capture the light from MORE than just a moment.** With your camera adjusted, move the light from your wand during the time between when you hit the shutter button and when it stops filming. You will capture the movement of the light allowing you to “paint” with light!

Camera settings for “Light Painting”

ISO: Low (between 100-200 ISO)

Aperture (F STOP): f/11

Shutter Speed: Long (between 10-30 seconds)

***Note:** All of these adjustments will be found in the settings menu of any DSLR camera. Most cameras on cell phones do not have these adjustments directly available in their settings. However, there are apps that can expand the capabilities of the on-phone camera. Light painting with cell phones will likely require you to download and use one.

Tips for “Light Painting”

- **Use a tripod** so that any movement captured comes from what’s happening in front of the camera, not the camera itself.
- **Photos taken in complete darkness will only show the wand LED movement and not who is moving the wand.** A little bit of dim, indirect light will allow for the “painter” to show up on the image as well.
- **Focus the camera where you will be located when “painting”** with a few test shots ahead of time.
- Squiggles, fun lines, and **simple symmetrical shapes like hearts & stars require no planning.**
- **Writing words and making non-symmetrical shapes will need to be made BACKWARDS** in order for the camera to make the image... planning and practicing will make this easier!

Circuit Scepters



These fun wands are made out of two different weights of paper and allow you to use markers to make the top lantern part all your own! There are templates on the following pages for two slightly different versions: with and without a switch. You'll need access to a printer so that you can make use of the templates.

Materials Needed:

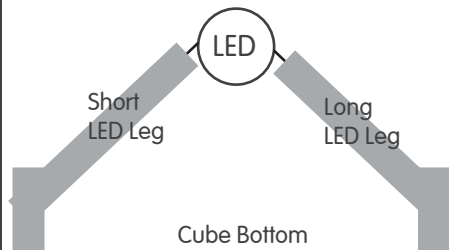
- 1x Jumbo LED
- 1x CR3032 Battery
- 1/4" Maker Tape
- Invisible Tape
- Tracing Paper
- Heavy Cardstock
- Markers

Begin by choosing & printing the topper you want and the stem template on heavy cardstock.

Topper Assembly Instructions

1. **Cut around perimeter** of flattened cube shape.
2. **Cut out inner squares on dotted lines** leaving 4 "frames".
3. **Assemble circuit.**
4. **Cut black square and trace 4x** onto thin paper (tracing paper is best).
5. Use markers to **decorate the tracing paper panels.**
6. **Apply glue** to inside of the 4 frames; press colored panels into place.
7. **Fold** into cube shape.
8. **Tape** edges.

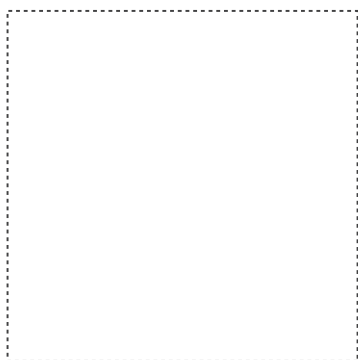
Circuit Scepter Topper 1



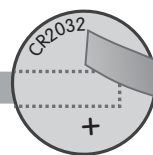
d



Cut, remove and save this square to use as a tracing template for 4 translucent panels (each glued to frames of sides "a-d" from the inside).

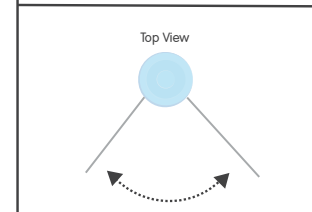
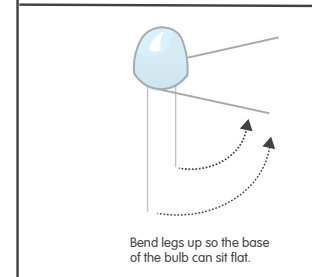
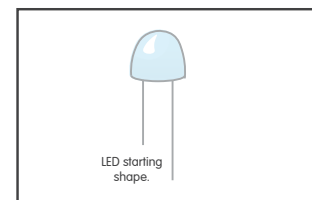


Maker Tape loop under battery

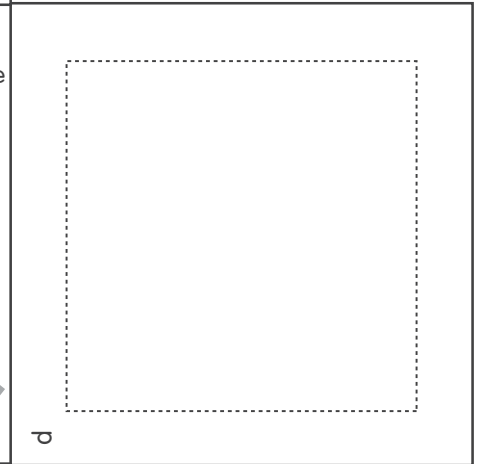
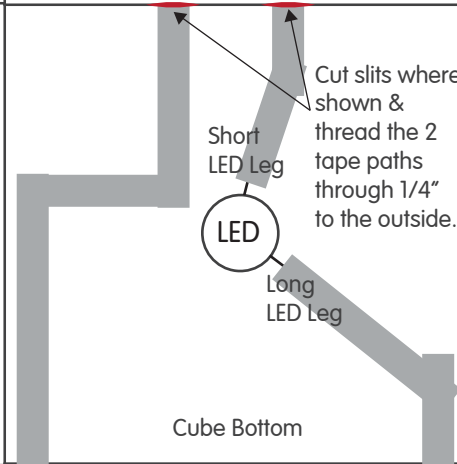
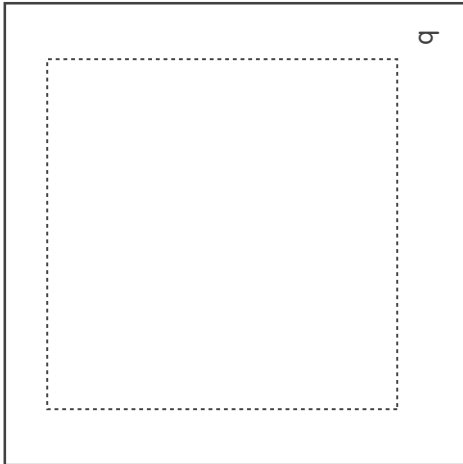
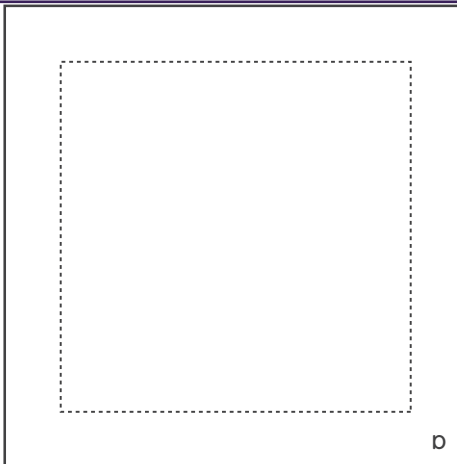


Cube Lid

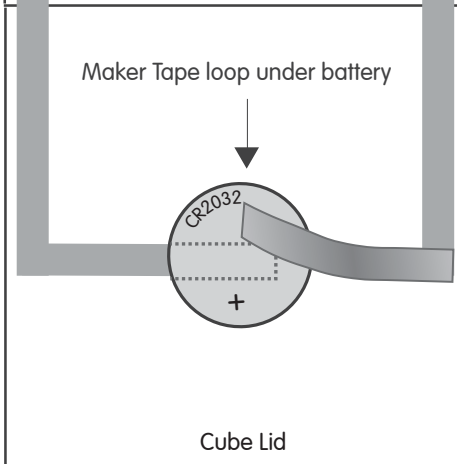
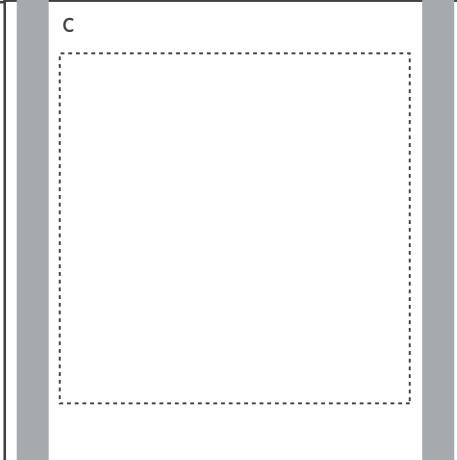
Preparing the LED Legs



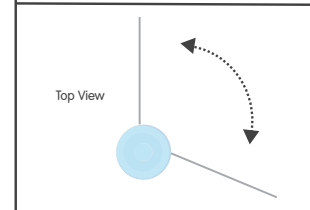
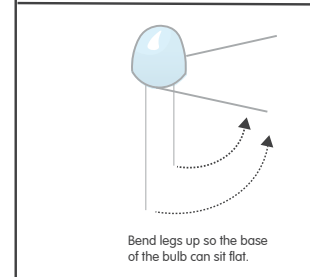
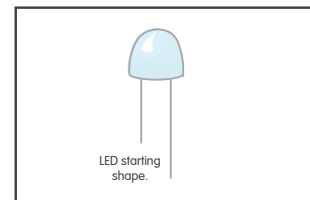
Circuit Scepter Topper 2 (Switch Option)



Cut, remove and save this square to use as a tracing template for 4 translucent panel (each glued to border of sides "a-d" from the inside).



Preparing the LED Legs



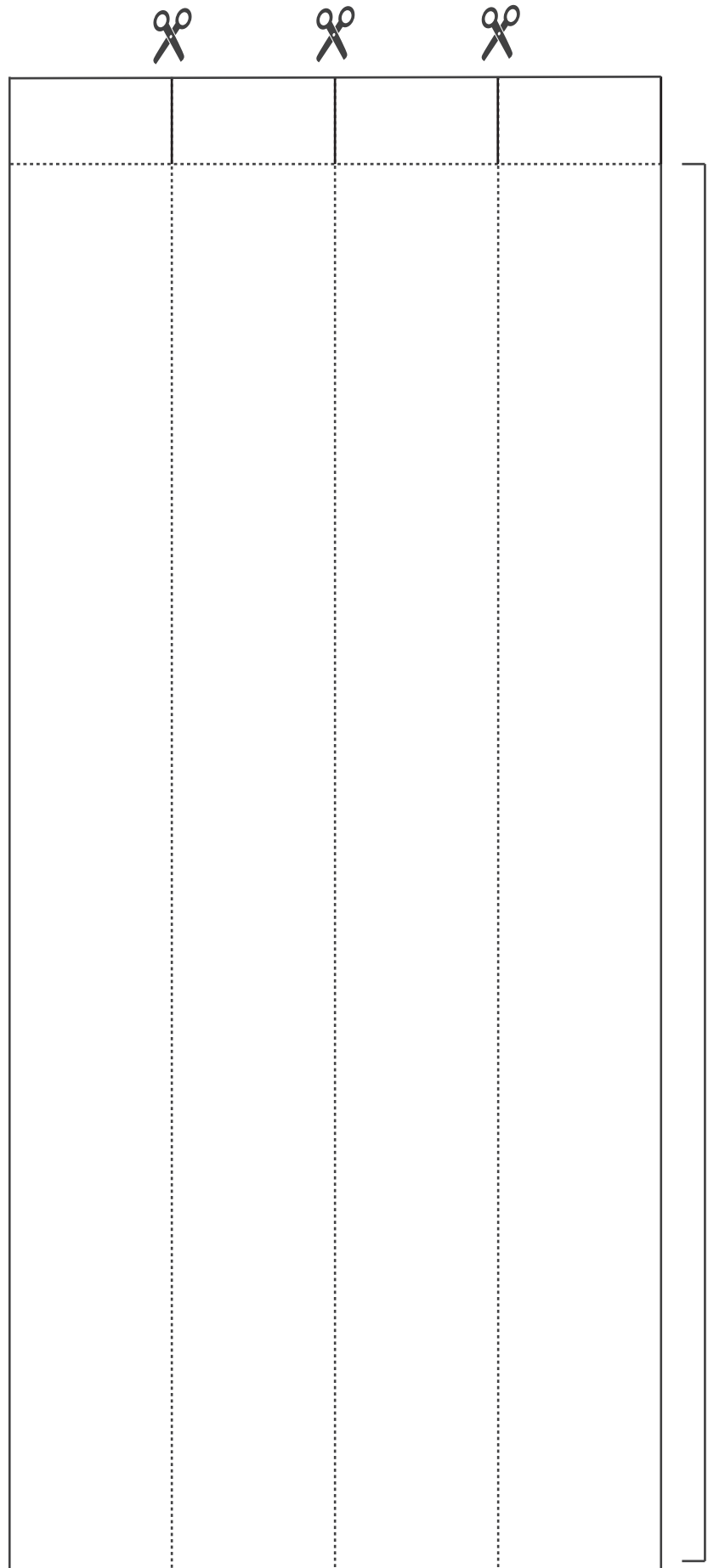
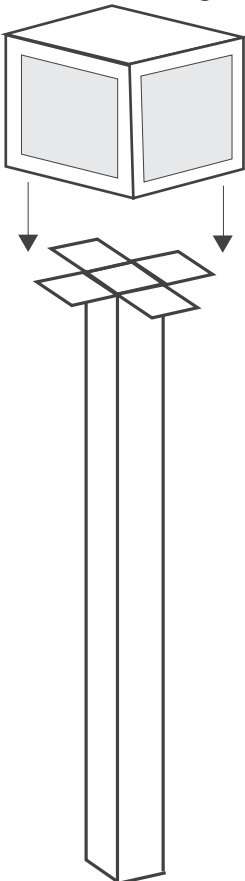
Scepter Handle

Prepare

1. **Cut shape** perimeter.
2. **Fold** at all dotted lines.
3. Use a scissors to **cut in the three places indicated** TO the horizontal fold.

Secure

1. **Fold** into shape shown below, **taping the long seam** from the bottom to the horizontal fold.
2. **Fold tabs outward** as shown below.
3. **Tape or glue** by the tabs to the underside of the light cube.



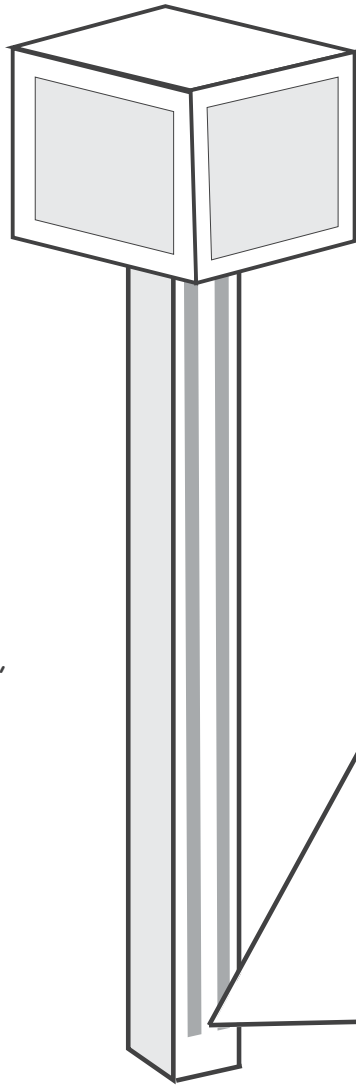
Tape seam from bottom to horizontal fold.

Wiring the Lever Switch

Continue with the assembly instructions below if you decided to make the version of this project that features a switch.

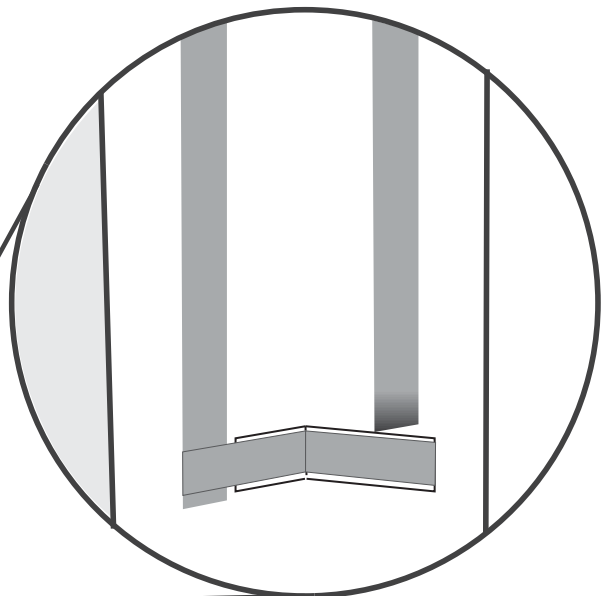
1.

From inside the cube, **you should have two small ends of Maker Tape leaving the cube** on the same edge with space in between them. First, **press those to the underside of the cube toward the handle**. Next **extend those two paths DOWN the handle** with two longer pieces of Maker Tape as pictured.



5.

When your switch is ready, **stick it down** to the paper where indicated. Pressing the free end in contact with path below it turns the LED on.



2.

Cut out switch using scissors. **Fold** on dotted line.



3.

Prepare and stick Maker Tape on top of switch. Leave enough extra tape to stick to switch down and to wrap around the bottom of the switch.



4.

Fold tape over long end of switch to underside of switch.





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