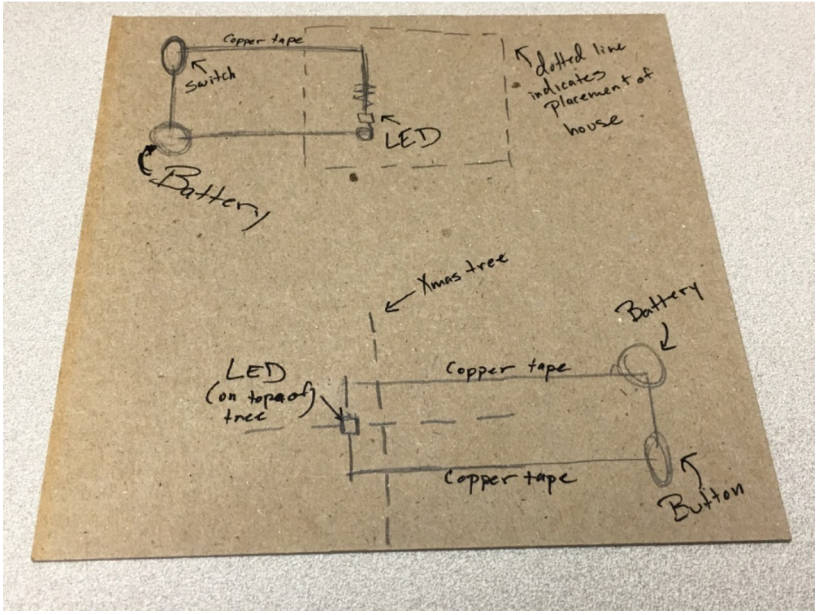
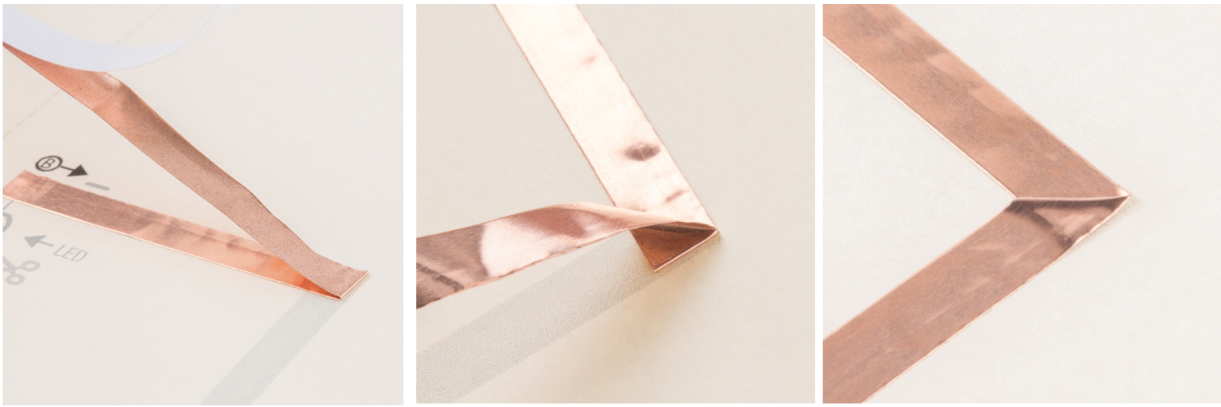
Step 1: Create Copper Traces (House)

Create a power path with copper tape. Plan out your circuits using pencil on your cardboard.



Now, create your circuits using the copper tape. To keep a solid connection of copper around corners, we'll be using a folding technique to press the tape into shape. Start by sticking the copper tape down until you reach the corner, then fold the tape backward on itself. Use a fingernail or pen to give it a good crease at the edge.

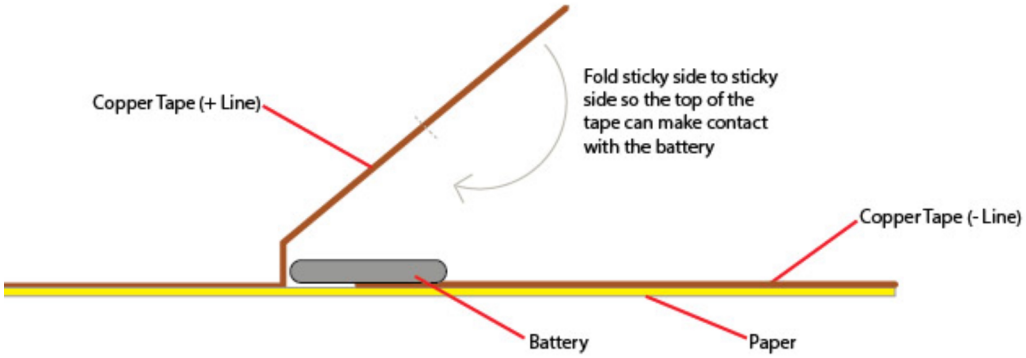


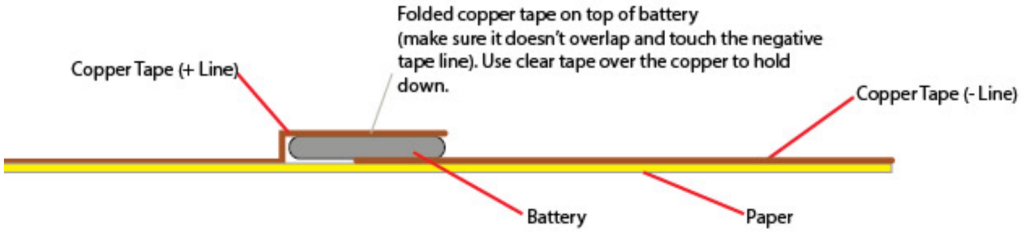
Then carefully move the tape down around the corner - you should see the fold forming - and press down flat against the paper. The neatness of the fold doesn't matter that much, it will be covered by your pop up in the end. Finally, cut the tape when you reach the scissors icon.

The last copper tape line will also form a battery holder. We'll start by folding ½" of copper tape onto itself, sticking the adhesive sides together to form a flap.

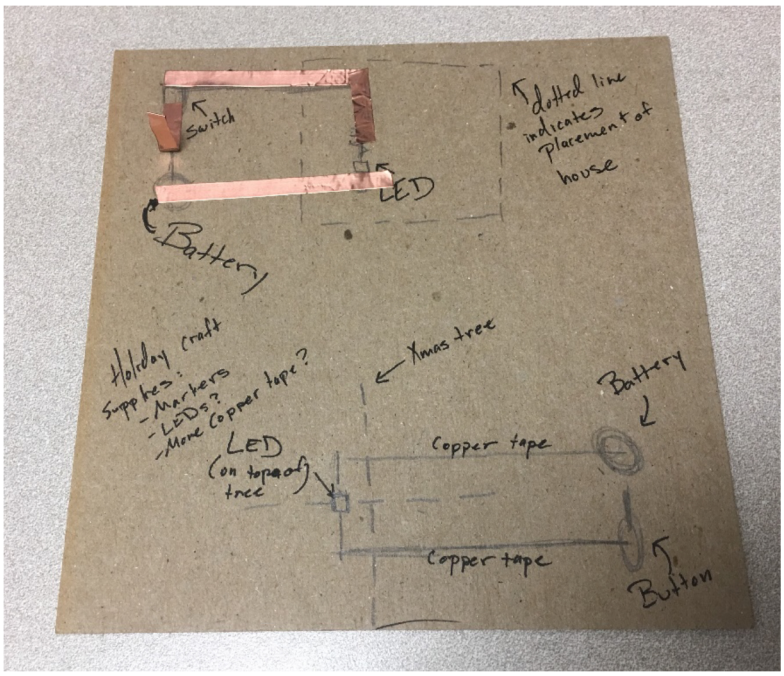
This allows the top of the copper to fold down over the coin cell battery - **the positive side of the battery is the top and negative side is the bottom**, which allows us to create a 'battery sandwich' with copper tape touching each side.

See the diagrams below to explore how this method works. We won't be installing the battery until the end of our project, so set that aside for now. Fold the card in half along the dotted center line before moving onto the next step.



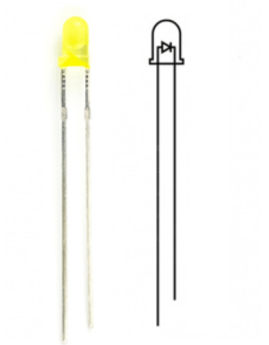


With your circuits placed, your cardboard should look something like this:

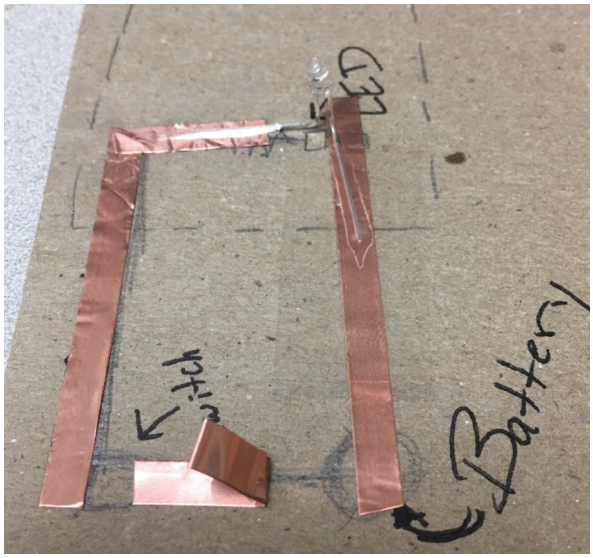


Step 2: Prepare and Place LED (House)

Now that our copper is in place, time to add the LED. The template has an LED symbol which shows shaped wires - we use this method to help us remember which side is positive and negative on the LED.



Using your finger, bend the legs of the LED so they align with the copper traces. Also, be careful not to break the wire by bending back and forth over the same joint too many times. The long leg (**Positive**) should go on the tape leading to the switch, while the shorter leg (**Negative**) should be bent towards the battery. Secure the legs to the copper with scotch tape. See the image below for an example.



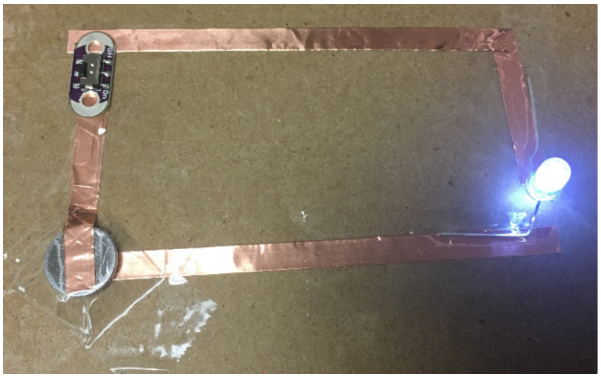
Step 4: Attach Switch

Next, we'll place the button over the oval icon on the template facing up. It doesn't matter which side touches positive and negative. **Make sure the conductive pads on the bottom of the button touch the copper tape**, then tape down the ends with clear tape. Be careful not to tape directly over the push part of the button, or it may interfere with the ability to press it.

Step 5: Insert Battery

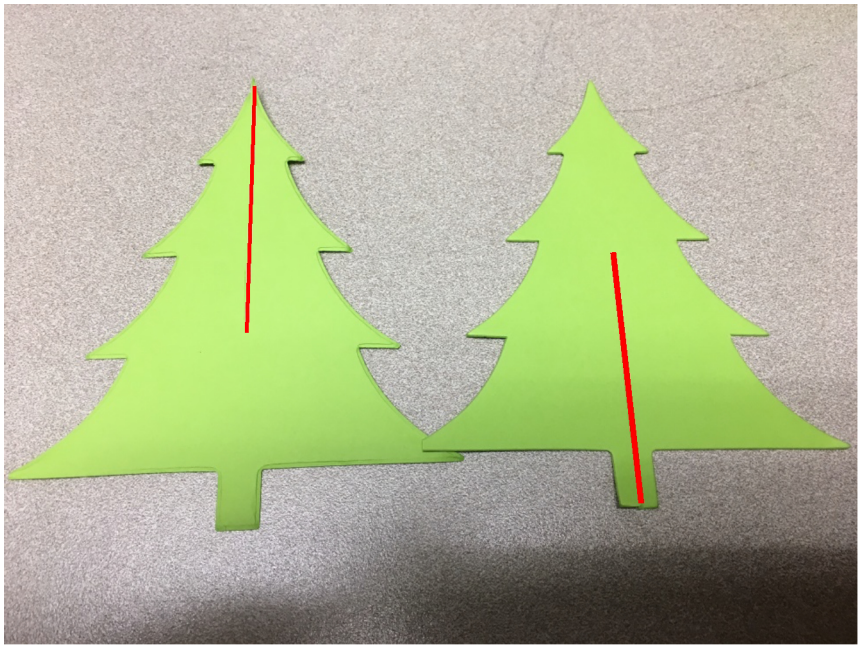
Once all the components are installed, it's time to test our circuit by adding a battery. Carefully slip the battery underneath the copper tape flap we made earlier, and center it inside the circle icon. Make sure the positive side of the battery (top, marked with the battery model and +) is facing up. Press the copper over the battery, and tape with clear tape.

Now, flip the switch and the LED should light up! How does this work? The copper tape creates an electrical connection between the battery, LED, and the switch!



Step 6: Prepare and Place LED (Tree)

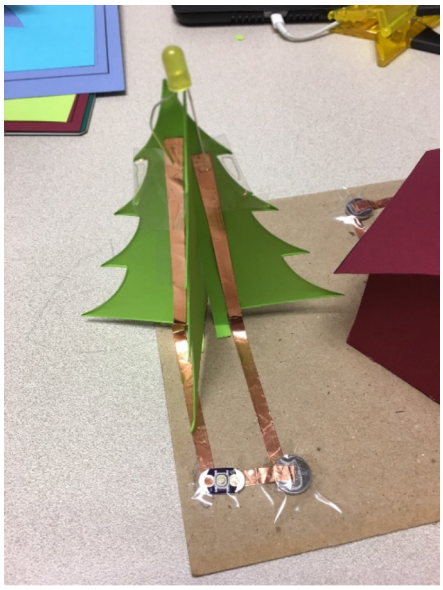
Make a cut half way down the tree. One from the bottom, and another from the top. Secure the tree with tape.



Now, create a similar set of copper tracers like you did for the house. The only difference here is you're going to run the copper tape up the Christmas tree.

For your LED, there's no need to bed the legs like before. Instead, just make sure the legs touch the copper tape and secure it with scotch tape. Or, you could simple affix the LED in place by covering the legs with copper tape. Either way works!

Once again, the long leg of the LED (**Positive**), should be on the side of the button and the short leg (**Negative**) should be on the side of the battery. See the picture below for a visual example.



Troubleshooting

Check the tape connections - use your nails or a pencil to make sure the tape is firmly adhering the components to the copper tape.

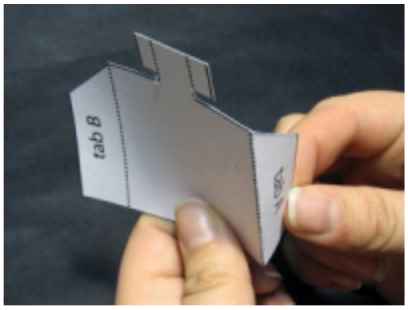
Check the battery - make sure it is sandwiched firmly between the top and bottom copper tape lines and that the top copper is not accidentally touching the bottom of the battery.

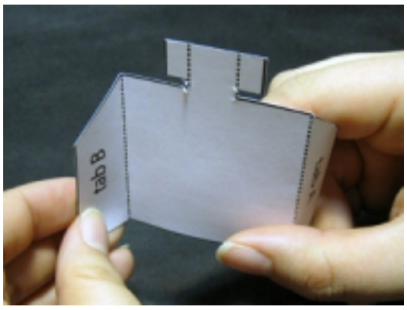
Check the wires of the LED - double check that they weren't accidentally broken while bending them into shapes with pliers.

House Pop-Up Card Instructions

Carefully cut out the House pieces following the solid, black lines.

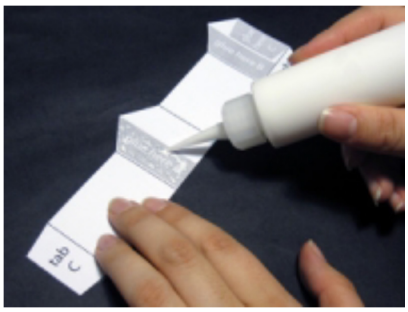
Cut out the house windows using the hobby knife. Take a piece of vellum and cover the holes. This will create a diffused lighting effect.



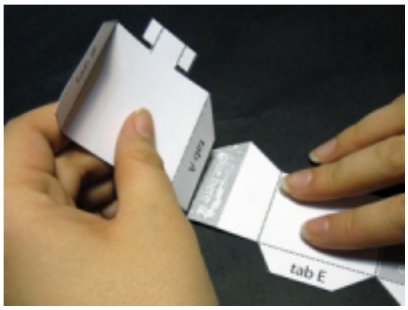


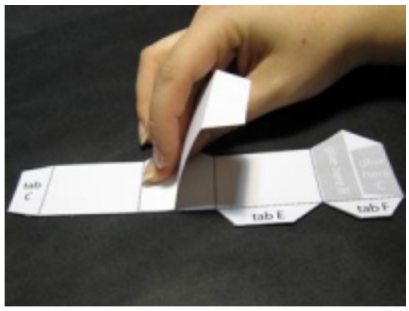
Take the piece with Tabs labeled "A" and "B" and fold tab "A" BACK along the dotted lines.

Fold tab "B" FORWARD along the dotted lines.

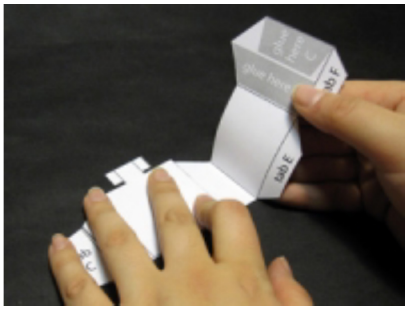


Put a small amount of glue on the area marked "Glue here A" on the main house piece.

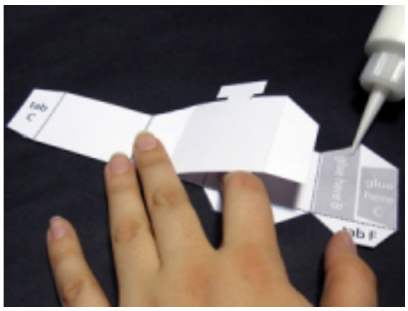




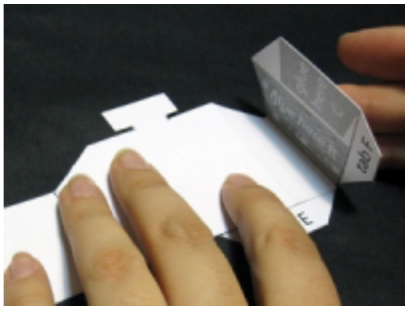
Line up tab "A" with the area marked "glue here A". Press down firmly and allow the glue time to dry.



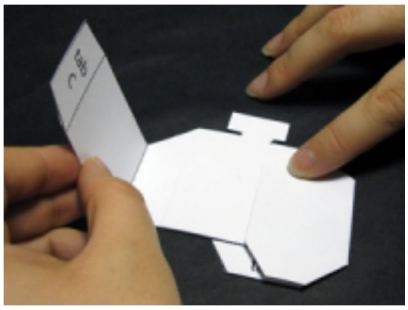
Find the dotted line to the left of tab "E" and fold UP along that line.



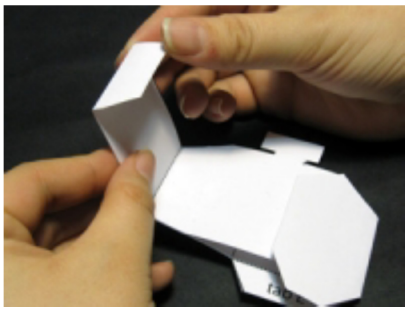
Put a small amount of glue on the area marked "glue here B".



Fold the wall with tab "F" over to match the area marked "glue here B" with tab "B". Press firmly and allow time for the glue to dry.

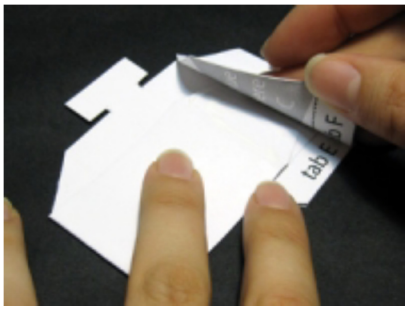


Fold the left wall up along the dotted line.

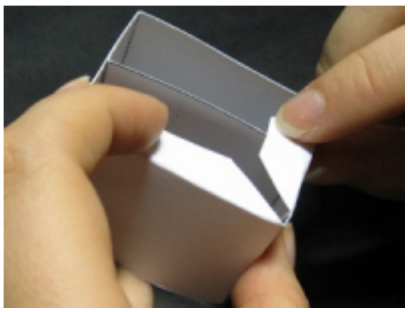


Fold tab "C" down.

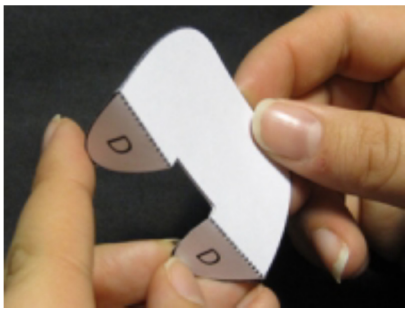
Put a small amount of glue on the BACK of tab "C".

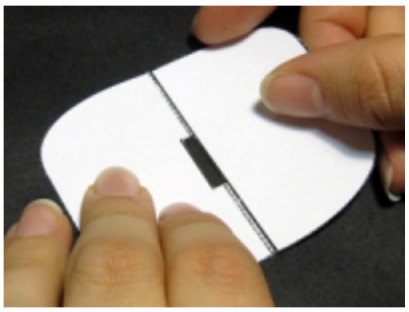


Match tab "C" with the area marked "glue here C" (the tab tucks underneath). Press firmly and allow the glue time to dry.

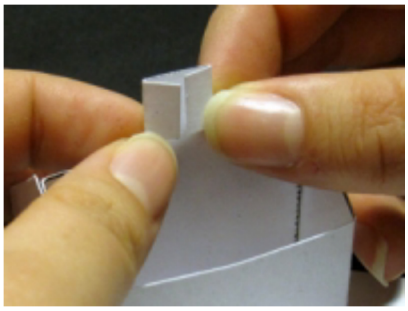


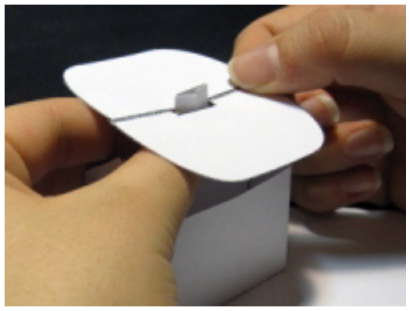
Tabs "E" and F" need to be folded in. **Glue them to the cardboard base**. Make sure your house covers the LED.





Crease the tabs on the roof piece labeled "D" downwards along the dotted lines. Put a small amount of glue on the tabs labeled "D". Line up the other half of the roof with the dotted lines, and press down firmly.





Fold the small tabs around and hold them in place. Thread them through the hole in the roof piece. Open the tabs to lock the roof in place.