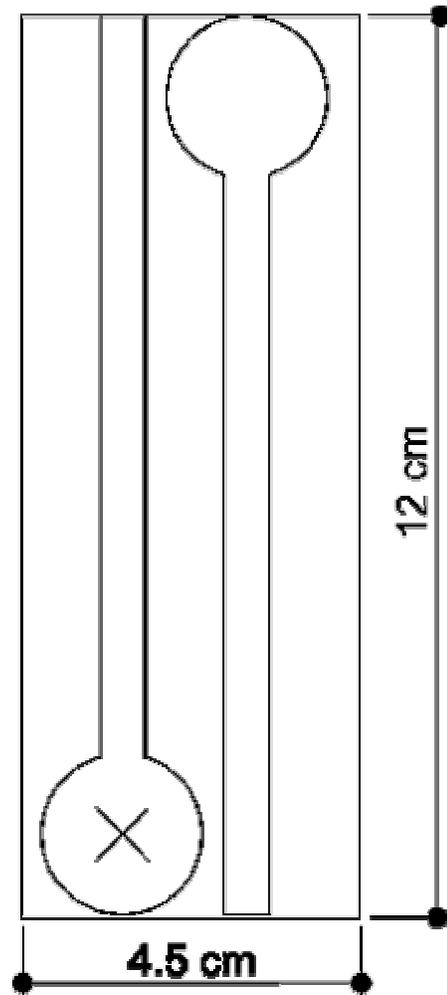


Camp Hat Flashlight

Flashlights illustrate the concept of an electric circuit, one of the key principles of electrical engineering. The circuit must be continuous and closed (or completed) to turn the flashlight on. On/Off circuits form the basis for many devices including computers!

Materials:

- ✿ 1.5V flashlight bulb
- ✿ AA size battery
- ✿ Film canister & lid
- ✿ Pill bottle to fit inside film canister (or 2nd film canister)
- ✿ 5 x 12 cm piece of aluminium from a disposable pan
- ✿ Small piece of yarn or string
- ✿ Corrugated cardboard
- ✿ Duct tape
- ✿ Scissors
- ✿ Craft knife



How To:

1. Prepare the Canisters

- ✿ Using the craft knife, carefully cut around the bottom of the film canister to remove it, leaving a hollow tube.
- ✿ Use the craft knife to make a small hole in the centre of the film canister lid. ** This is to hold the light bulb – cut slowly, enlarging the hole a little bit at a time until the bulb fits tightly. The light bulb can be left in place.
- ✿ Make a small hole near the bottom edge of the canister with the bottom removed. Put a piece of yarn or string through the hole and tie the ends together to make a loop for hanging.

2. Make the Conductors

- ✿ Attach the pattern to the aluminium using a bit of tape.
- ✿ Cut out both pieces.
- ✿ Use a craft knife to cut the "X" in the centre of one piece as shown.

3. Assemble the Lid

- ✿ Insert the light bulb into the hole in the lid.
- ✿ Fold the conductor strip with the "X" cut into it at the edge of the circle so it resembles a soup ladle.
- ✿ Carefully fit the round part of the conductor inside the lid. Push the end of the light bulb through the "X".
- ✿ Wrap a small piece of duct tape around the base of the light bulb to hold the points of the conductor strip in place.

** Make sure you don't cover the bottom of the bulb!



4. Assemble the Base

- ✿ Fold the second conductor strip as with the first.
- ✿ Insert the folded strip into the pill bottle so the round part rests on the bottom.
- ✿ Wrap a 2 cm wide strip of corrugated cardboard around the battery.
- ✿ Place the battery in the pill bottle so the negative (flat) end rests on the conductor at the bottom.
- ✿ Add extra cardboard if necessary to stabilize the battery in the centre of the bottle.
- ✿ Fold the end of the conductor strip down on the outside of the bottle.



5. Assemble the flashlight

- ✿ Place the lid on the outer canister, allowing the conductor strip to hang down on the inside of the canister.
- ✿ Fold the excess conductor strip up on the outside of the canister, & tape in place.
- ✿ Place the film canister over the pill bottle with the conductors strips aligned.
- ✿ Push down gently on the outer canister. When the base of the bulb touches the positive end of the battery, the flashlight should go on.
- ✿ Turn the light off by pulling the canisters apart slightly or twisting so the metal strips are not touching.

Notes:

- ✿ The outside of the outer film canister can be covered with tape or a label, and decorated.
- ✿ If two film canisters are used (instead of a pill bottle), prepare the inner canister by trimming off the top rim. Cut a slit part way up the side of the outer canister to allow it to fit over the inner one. After the flashlight is assembled, cover the slit with tape or a label.