



CdS Transistor Candles

"how do cellphones lighten and darken the screen?"

"how do nightlights work?"

"what's that thing like an eye on the nautilus?"

Components:

- 1) PN2222BU--"NPN Transistor" @ 6 cents each
- 2) CM8-A241--"12 volt Incandescent Lamp" @ 25 cents each
- 3) CDS002-9008--"CdS Photocell" @ \$1.35 each
- 4) A104-R--"9 volt Battery Clip" @ 39 cents each
- 5) ALK 9V 522--"9 volt battery @ \$2.05 each.
- 6) Cardstock & Needle

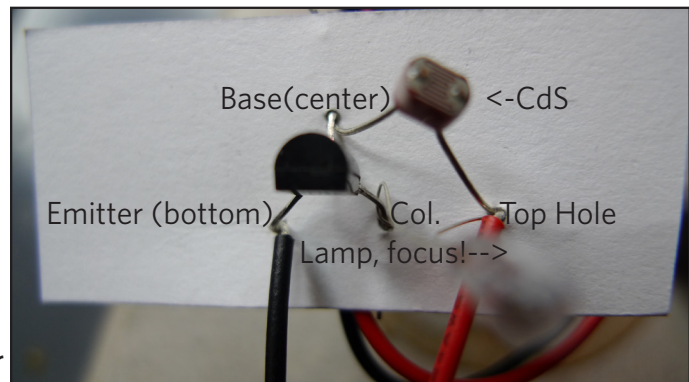
--all components are priced from jameco.com, located in burlingame. if you plan on purchasing often, open an educational account for better pricing--

Process:

- 1) Cut the cardstock into 1"x2" strips.
- 2) Poke 4 holes in the center of the strip, like in the image. Try to make a "main" triangle with the first three holes, so that one edge of the triangle is parallel the cardstock. The last, "top hole" should be just above the triangle.
- 3) Insert the leads of the transistor into the "main" triangle, with the flat side of the transistor parallel to the edge of the cardstock. The pins line with the holes, from top to bottom in the same order they come out of the transistor.
- 4) Insert 1 lead of Incandescent Lamp into the remaining hole, and the other one into the "top" hole of the triangle (there should already be a transistor lead there).
- 5) Insert one lead of the Photocell into the topmost hole, and the other lead into hole with the center pin of the transistor.; Twist the center pin of the transistor with this lead to make the connection.
- 6) Take the Battery clip and place the red lead into the topmost hole, and the black lead into the bottom most hole.
- 7) Wherever there are holes with leads, twist the connections together. This will ensure that electricity flows correctly.
- 8) Connect the Battery! If you are in a bright room, it should light up.
- 9) Assuming step 9 worked, disconnect the battery, go to a darkened room, and connect the battery. It should remain off. Use a flashlight or lighter and shine it on the CdS. It should turn the lamp on!

What's happening?:

The transistor has three pins: Base, Collector and Emitter. When a small amount of current is passed to the Base (center pin), electricity is allowed to flow between the Collector (Top) pin and Emitter (Bottom) pin. The CdS Photocell acts like a varying resistor, controlling the Base current. When the CdS senses light, more electricity flows to the Base, allowing more electricity to flow through the lamp (which is connected to the Collector-Emitter junction).



need more info than can fit on one page!? -->tchiang@calacademy.org