1. Decide if relay will trigger when CdS cell is covered or uncovered. Note, most light activated artworks are triggered by the photocell being covered, that is, when a shadow is cast, or an object covers it. Others are triggered by someone opening a door and letting light into a room, or removing something like an object from a table, or opening a box.

a. By using a double throw switch, you can make the piece behave either way!
b. Consider battery life - more current is used when relay is energized.
c. Consider the effect of switching noise - sound/video switching on vs. off.
d. Consider sparking if switching large motors or AC. <ask Bill Jordan>

2. Measure photocell resistance in typical light and typical dark as expected for your piece.

Example: $R_{light} = 680\Omega$

$R_{dark} = 3K\Omega$

3. Choose potentiometer for voltage divider based on above. You want a value that is very close to the value of the CdS cell in light, so choose a pot that lets you work with this. For CdS cells with a range between 500Ω (light) and 10KΩ (dark), a 10KΩ pot is fine. Other cells may require using a 100KΩ pot or higher.

4. Build the voltage divider. Power it and measure the voltage that will eventually be fed to the base of the transistor.

Note: in this example I am assuming a dark triggered circuit, that is, the pot is connected to the power supply and the CdS cell is grounded. I'm also using an 8.75 volt power supply.

With the relay on the collector (most sensitivity, but also most potential false triggers), you are looking for a voltage in light around 0.55 Volts, and in dark around 2.5 Volts. With the relay on the emitter (less sensitivity, but possibly more stable), you are looking for a voltage in light around 2 Volts and in dark around 6 Volts. Measured without the 2N2222A:

Example:	Relay on Collector	Relay on Emitter
	$V_{light} = 0.55$ Volts	$V_{light} = 2.5$ Volts
	$V_{dark} = 2.3$ Volts	$V_{light} = 6$ Volts

5. Add the transistor and relay. Test and adjust pot as needed. Note: be sure to put a 220Ω resistor between the pot and the power supply when hanging the relay on the collector. This is needed to keep the current through the base of the transistor below 5mA in the event that the pot is turned to 0Ω during adjustments. Measure with the 2N2222A:

Example:	Relay on Collector	Relay on Emitter
	$V_{light} = 0.57$ Volts	$V_{light} = 0.57$ Volts
	$V_{dark} = 0.75$ Volts	$V_{light} = 2.3$ Volts

Transistors switch on when the voltage on the base is roughly 0.2 Volts higher than the normal 0.6 Volts it takes to trigger a diode. The base to emitter connection in a transistor is really just a diode. When the transistor is on, the voltage at the base is clamped at this level. When the relay is hanging on the emitter, the voltage is higher because the coil of the relay is basically like a 500Ω resistor which drops some voltage (including the 0.8 Volts of the transistor itself).