Heaters
Heater Circuit

1. Set out kit
Heater Circuit

2. Layout Resistors on Perf Board

Front: 

Back:
3. Fold the leads of two of the resistors and solder them together as shown:
4. Clip the leads:
Hands-on: Heater Circuit

5. Repeat steps 3 and 4 so the resistors are soldered in series, using the leads of the resistors
Heater Circuit

Your circuit should look like this:
Heater Circuit

6. Twist all the Red wires from the 9V connector together and solder them to the single red wire in your kit
Heater Circuit

7. Twist all the Black wires from the 9V connector together and solder them to the single black wire
Heater Circuit

8. Check continuity for all “-” and “+” terminals to each other
Heater Circuit

9. Check continuity for all “+” terminals of the battery with the end of the single **RED** wire

10. Check continuity for all “-” terminals of the battery with the end of the single **BLACK** wire
Heater Circuit

11. Put electrical tape on solder joints
12. Solder the single **RED** wire from 9V connector to one end of the resistor string and the **WHITE** wire to the other end of the resistor string

*Green boxes are battery connectors*
Heater Circuit

13. Solder the switch in between the black wire and the white wire
Heater Circuit
Heater Circuit

14. Put electrical tape on black to black connection
Heater Circuit

15. Put electrical tape on white to red connection
Heater Circuit

16. Test your finished Heater by turning on the switch and putting your finger on the resistors – if they get warm, you’re good. If they don’t, check continuity at the following points:
Heater Circuit

16. Now add an LED to the circuit
Heater Circuit

17. Add wires to red LED
Heater Circuit

17. Add wires to red LED
18. Add heat shrink to wires on red LED
19. Add resistor to circuit (in parallel to power) to heater circuit
Heater Circuit

20. Connect resistor to red wire of circuit and red wire from LED
Heater Circuit

20. Connect resistor to red wire of circuit and red wire from LED
Heater Circuit

21. Connect black wire from LED to white wire of heater circuit
Heater Circuit

22. Retest your heater by switching it ON. Red LED should now also come on
How To Build an Arduino
Switch

101
Tools Needed

Wire Strippers
Wire Cutters
Needle Nose Pliers
Materials Used

1 Power Switch  
1 LED  
1 330 ohm Resistor  
1 Barrel Jack  
2 9V Battery Plugs (some barrel jacks come with a battery plug that you can reuse)  
Wire (lengths in picture)  
Heat Shrink/Electrical Tape
The Barrel Jack

Use an x-acto knife to strip away the tubing around the internal wires and snip the battery connector from the wire. The tubing and battery connector may be discarded.
The LED

Trim the leads of the LED to about half a centimeter.
The LED cont.

Trim one of the leads on the resistor, and solder it to the LED.

IMPORTANT:
Make sure that you solder the resistor to the anode (positive side)!

The negative side of the LED is almost always indicated with a flat edge.
The LED cont.

Trim the other end of the resistor and solder the short red wire to it.
The LED cont.

Heat shrink or wrap with electrical tape so that the metal connection is covered
The LED cont.

Solder the long black wire to the cathode (negative) end of the LED.
The LED cont.

Heat Shrink or wrap with electrical tape!
The LED cont.

More heat shrink or electrical tape!!!
This is to help prevent the leads of the LED from breaking from repeated back and forth motion as well as it prevents electrical shorts.
The LED cont.

Solder the red wire from the LED and the red wire from the barrel jack together.

Solder the black wire from the LED and the black wire from the barrel jack together.
The Battery Connectors

Solder the red wires together from each of the two battery connectors and do the same for the two black wires. If you will only be using one battery to power your Arduino, you may skip this step or simply cover the second battery connector with electrical tape.
Battery Connectors cont.

Place heat shrink around red wires but do not heat. If using electrical tape, skip this step.
Battery Connectors cont.

Solder the two-wire junction from the battery connectors to the red wire from the switch provided. See next slide for larger image.
Battery Connectors cont.
Battery Connectors cont.

Place the heat shrink around the junction and heat. This was the heat shrink previously added around the red wires from slide 43. If you skipped that step, simply wrap the junction with electrical tape.
More Heat Shrink!!

Place the heat shrink around the red wires and also around the black wires of the LED-barrel plug junctions made earlier.

If using electrical tape, skip this step.
Junctions!!

Solder the red wire from the LED-barrel jack junction to the black wire of the switch.
More Junctions!!

Solder the black wire from the LED-barrel jack junction to the black wire battery connector junction.
Final Step!!

Place the heat shrink around the two junctions and heat. This was the heat shrink previously added around the wires from slide 47. If you skipped that step, simply wrap the junction with electrical tape.
Finished!!