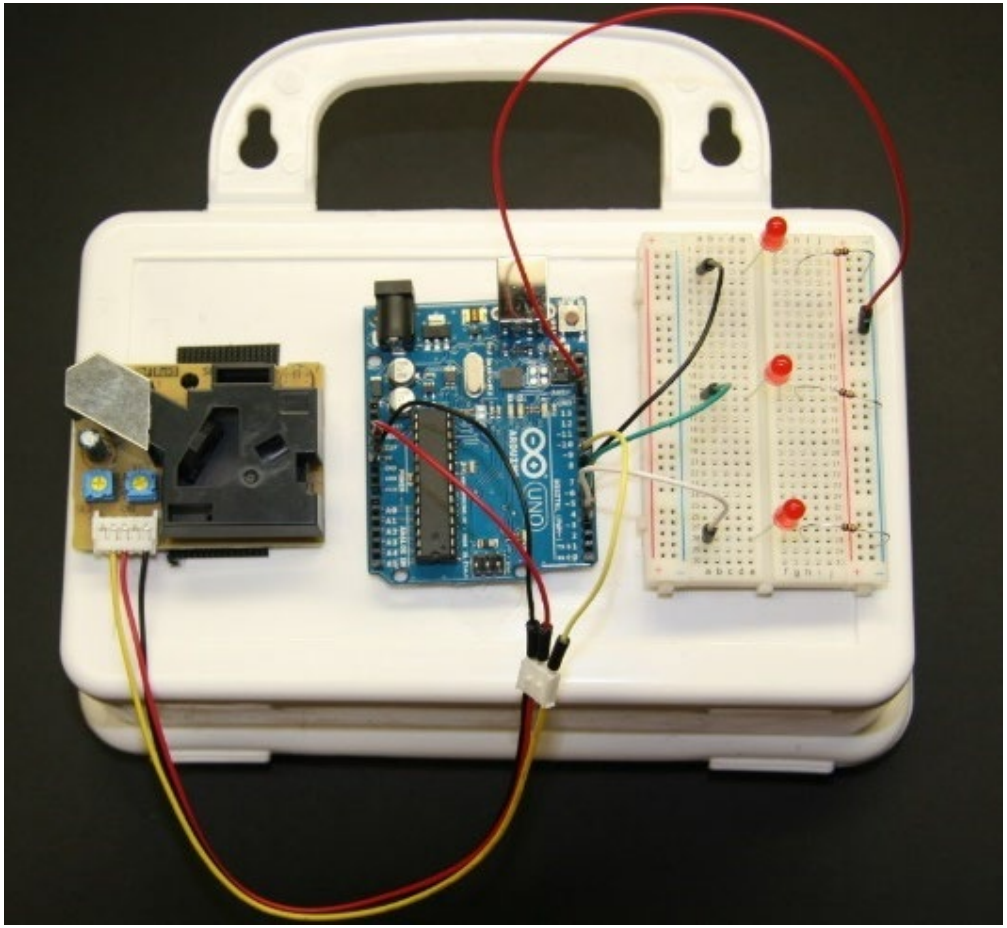
Air Quality Sensor Kit Instructions



Instructions can also be found here: https://www.epa.gov/air-research/air-quality-and-energy-choice-stem-activities-educators

Set up Arduino Code (see attachments)

“These are the important pins! One will receive the PM signal, three will control the lights”

“Check the PM signal every 5 seconds”

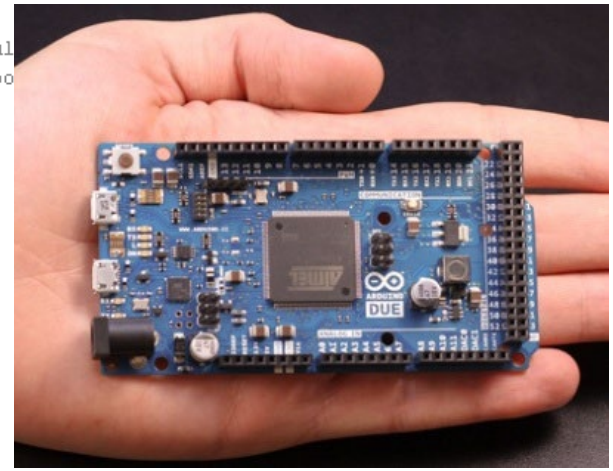
“Turn these lights on if PM level = …”

PM_outreach_best | Arduino 1.0.3

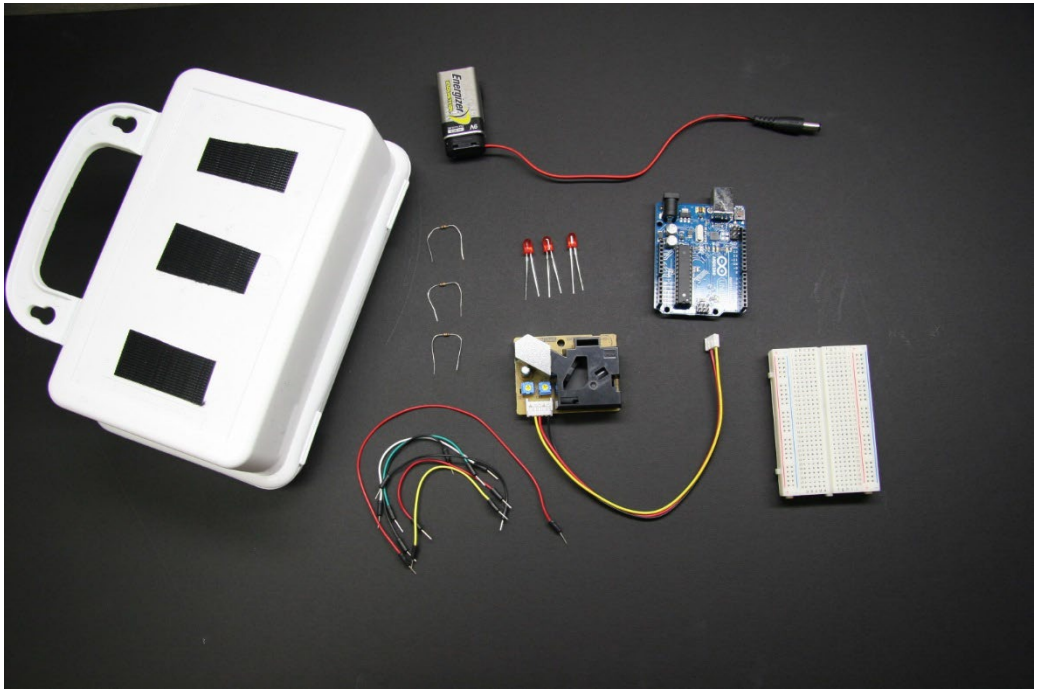
File Edit Sketch Tools Help

PM_outreach_best §

```
/*Build your own PM sensor Outreach activity
 grey text preceded by // or surounded by /* is commented code that is not read by the Arduino*/
int PM=8;//tell the arduino which pin you are plugging the PM sensor into
//tell the arduino which pin you are pluggin the LEDs into
int LED1=3;
int LED2=4;
int LED3=5;//could easily modify to use more LEDs
//Amount of time the sensor collects data before displaying the resul
//For PM sensor accuracy should be 30 s or greater (accuracy not impo
unsigned long sampletime_ms = 5000;
//Define additional Variables
unsigned long duration;
unsigned long starttime;
unsigned long lowpulseoccupancy = 0;
unsigned long timediff;
float ratio = 0;
void setup(){
  Serial.begin(9600);//start communication with computer
  //(not necessary just for error checking or code modification)
  pinMode(LED1,OUTPUT);//Define the LEDs as outputs
  pinMode(LED2,OUTPUT);
  pinMode(LED3,OUTPUT);
  pinMode(8,INPUT);
  starttime = millis(); //set the start time of the PM measurement
  //(millis() gives the time since the program started)
  Serial.println("BUILD YOUR OWN SENSOR INITICIALIZING");//Prints to the computer screen
}
void loop (){
```

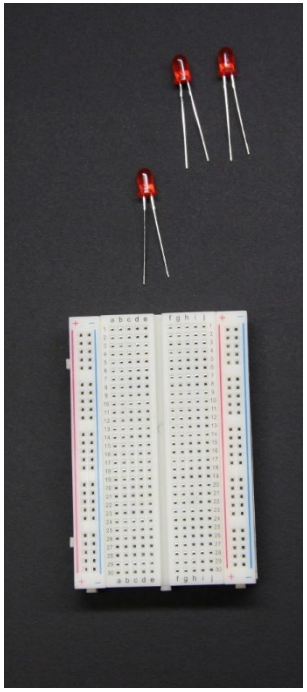


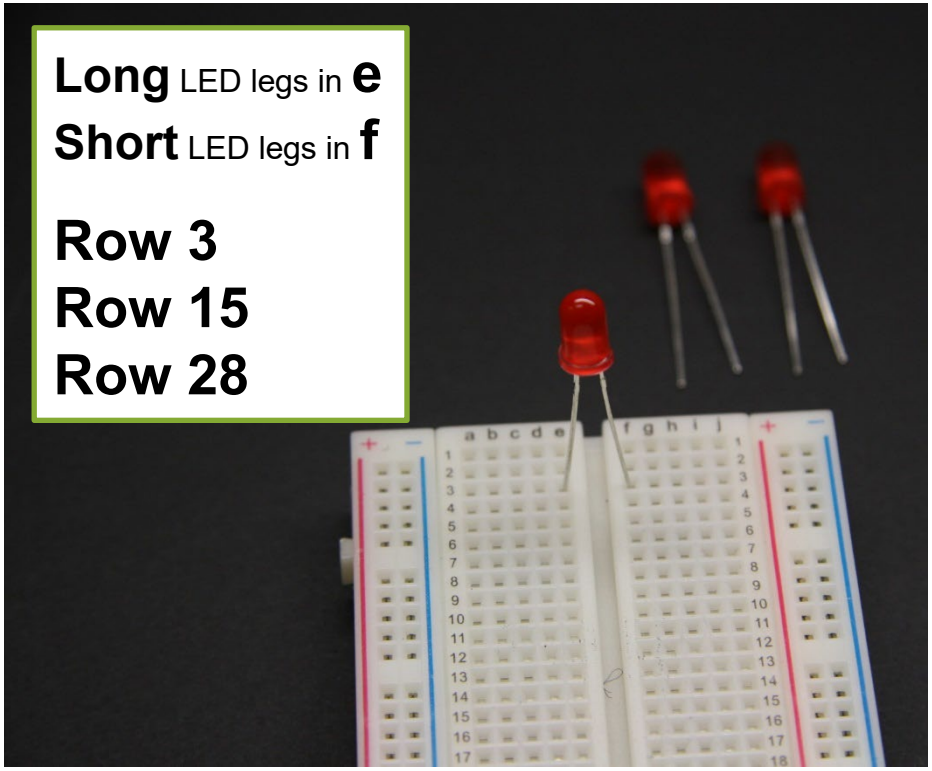
First, lay out all the parts.

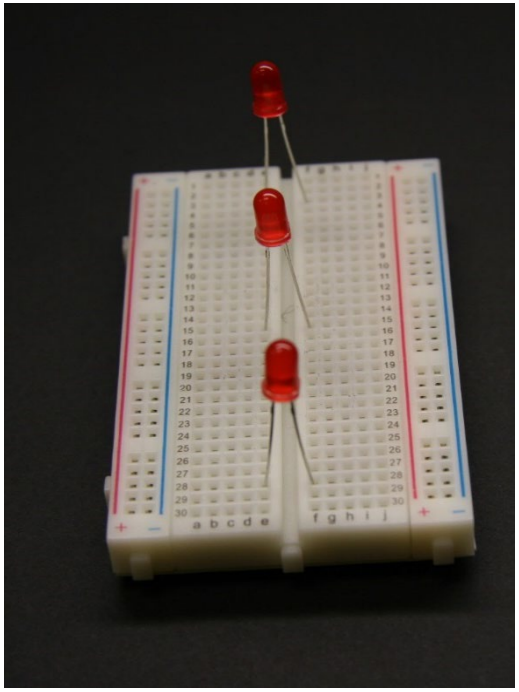


Tip: Store all the bags in the box during the activity.

Put the 3 red LED lights on the breadboard.



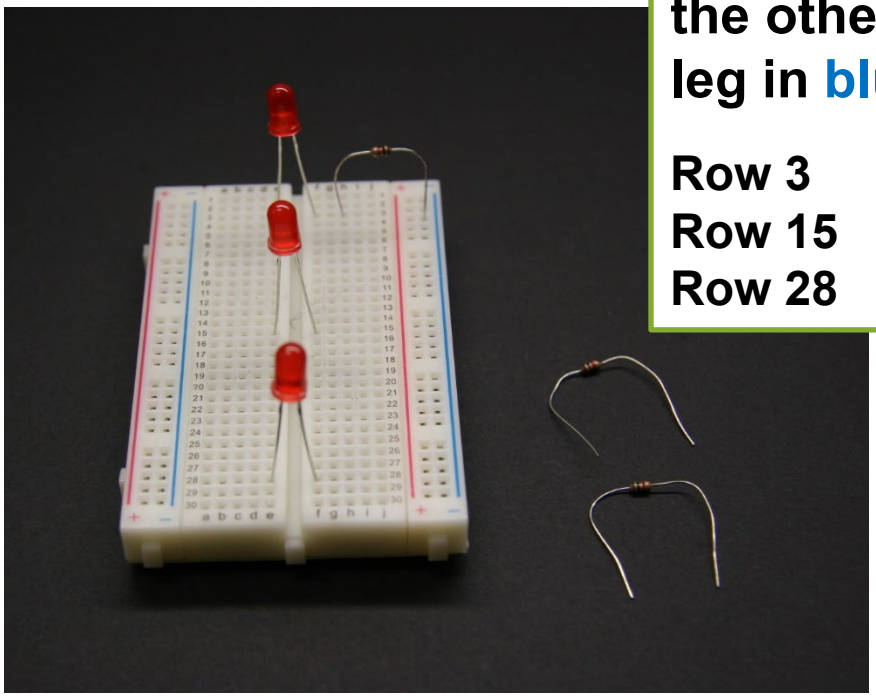


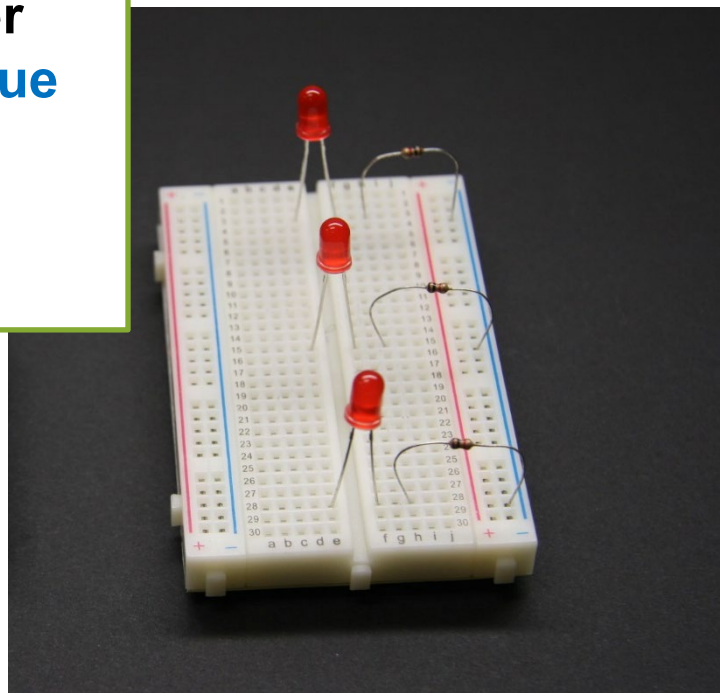


Put the 3 resistors on next to the LED lights.

One leg in h
the other
leg in blue

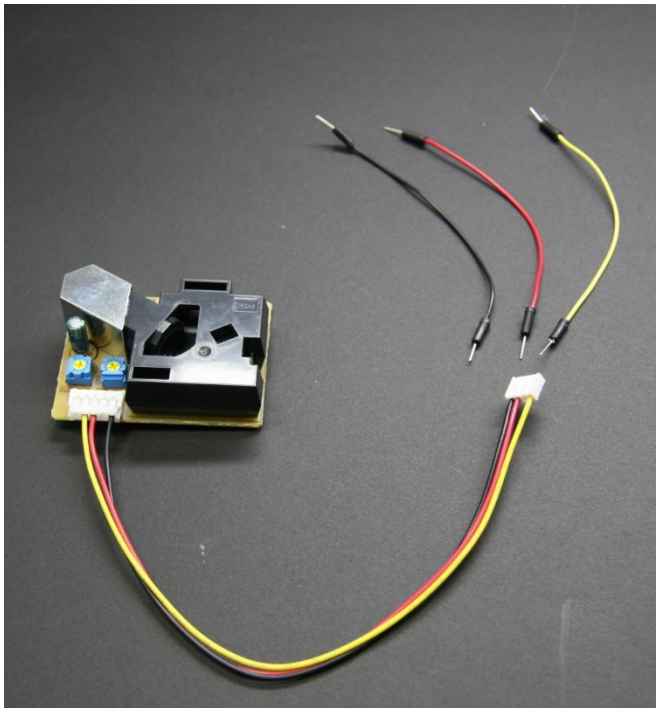
Row 3
Row 15
Row 28

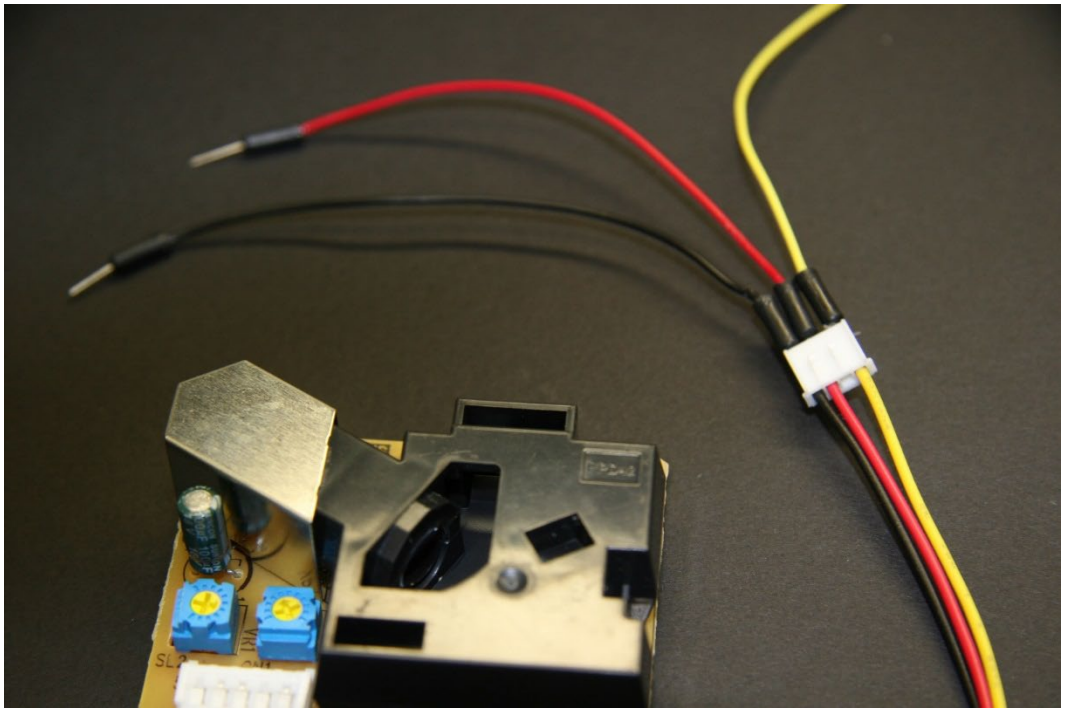




Attach 3 wires to the PM sensor like this:

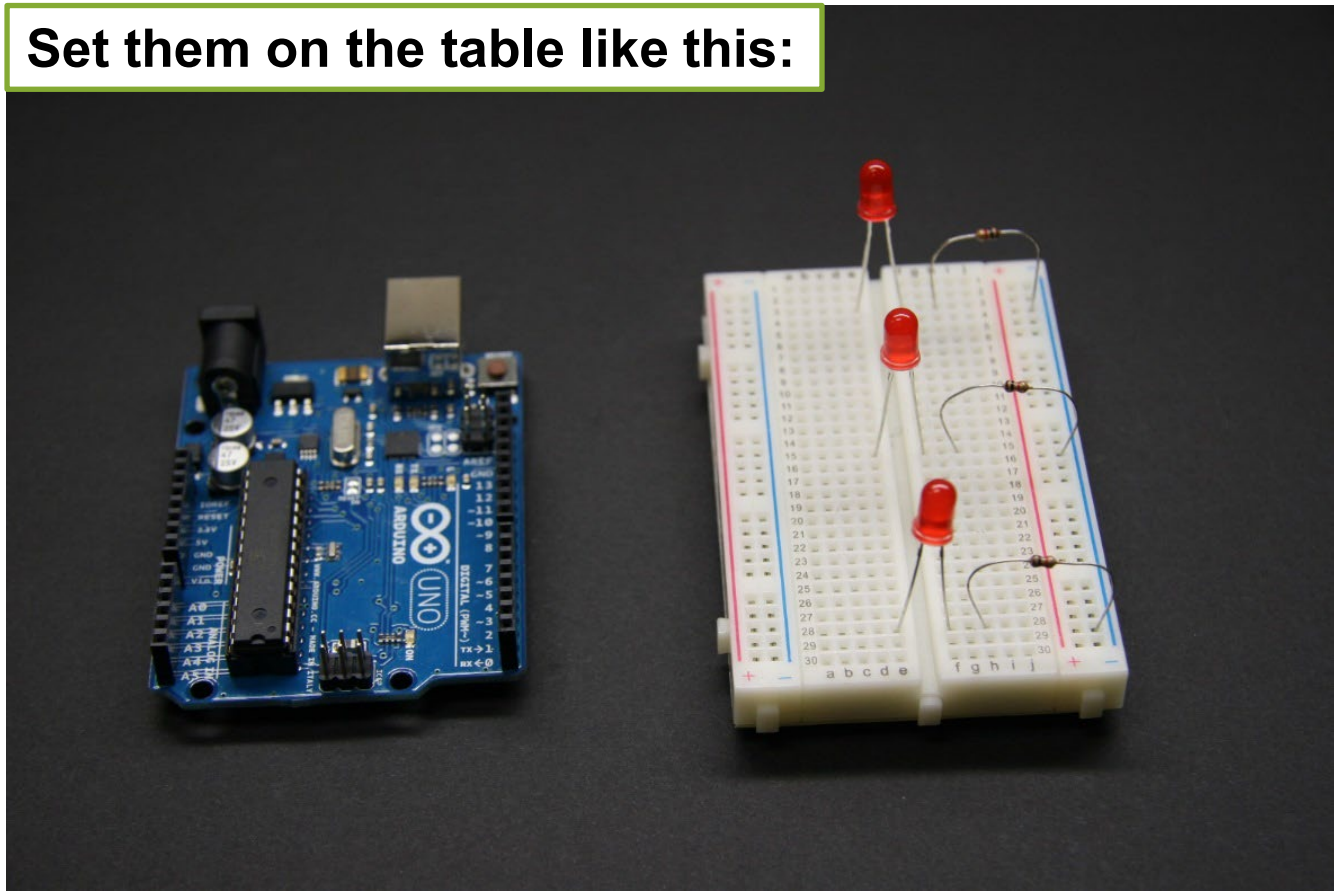
Use black, red, and yellow if you have them, but <u>any</u> color wire will work.





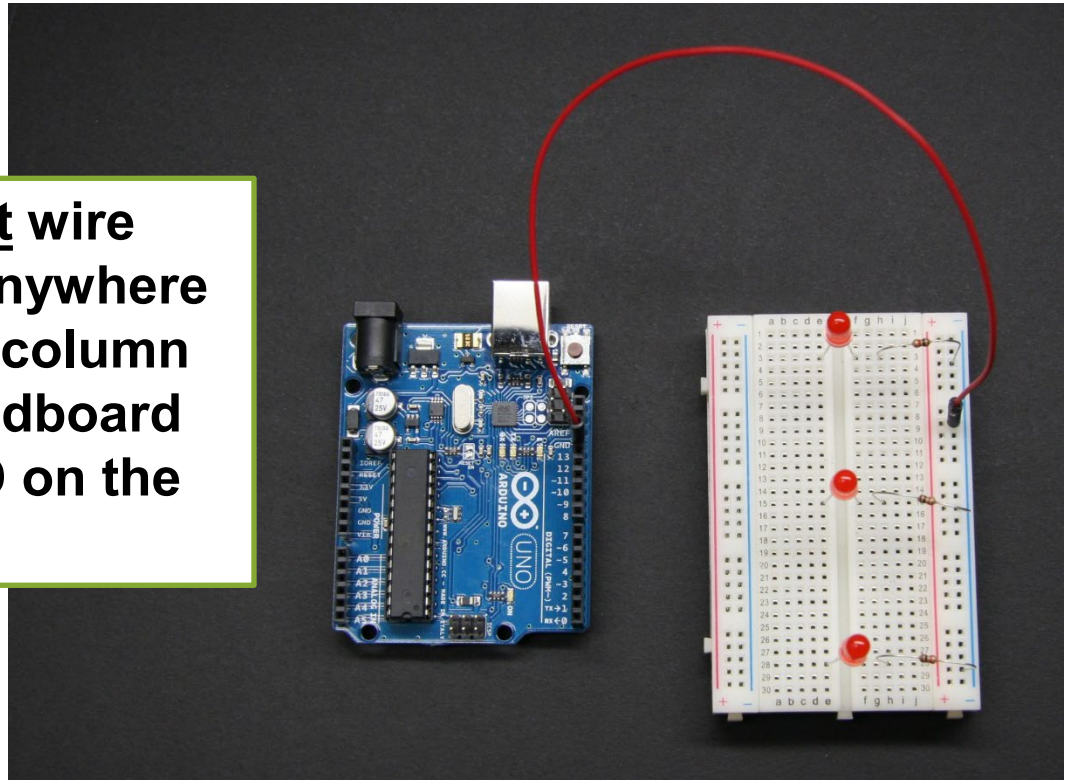
Great job! Next, you will wire the Arduino computer to the breadboard.

Set them on the table like this:

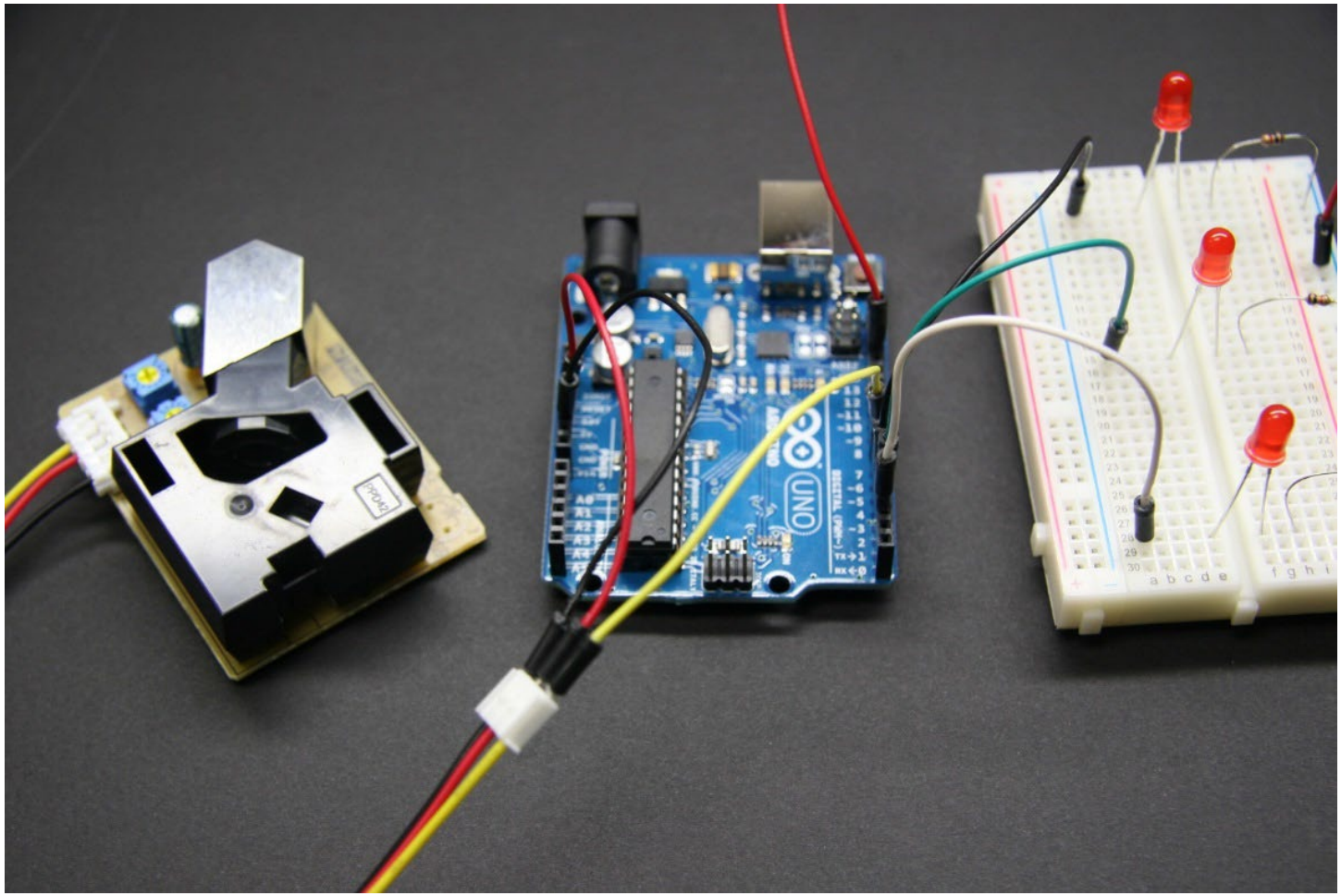


It doesn't matter what color wires you use but look carefully to see where they go.

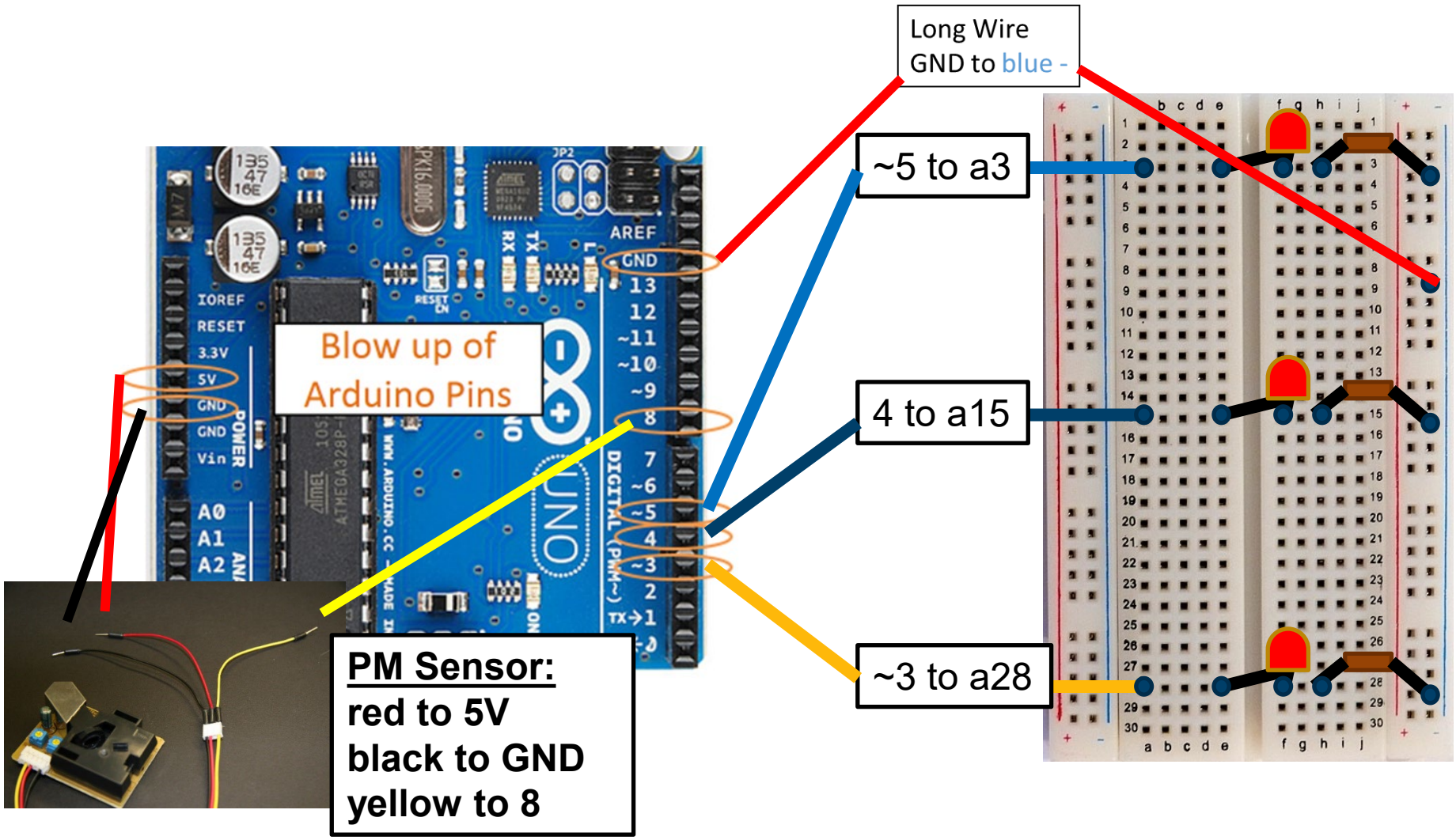
The longest wire connects anywhere in the Blue column on the breadboard and to GND on the Arduino



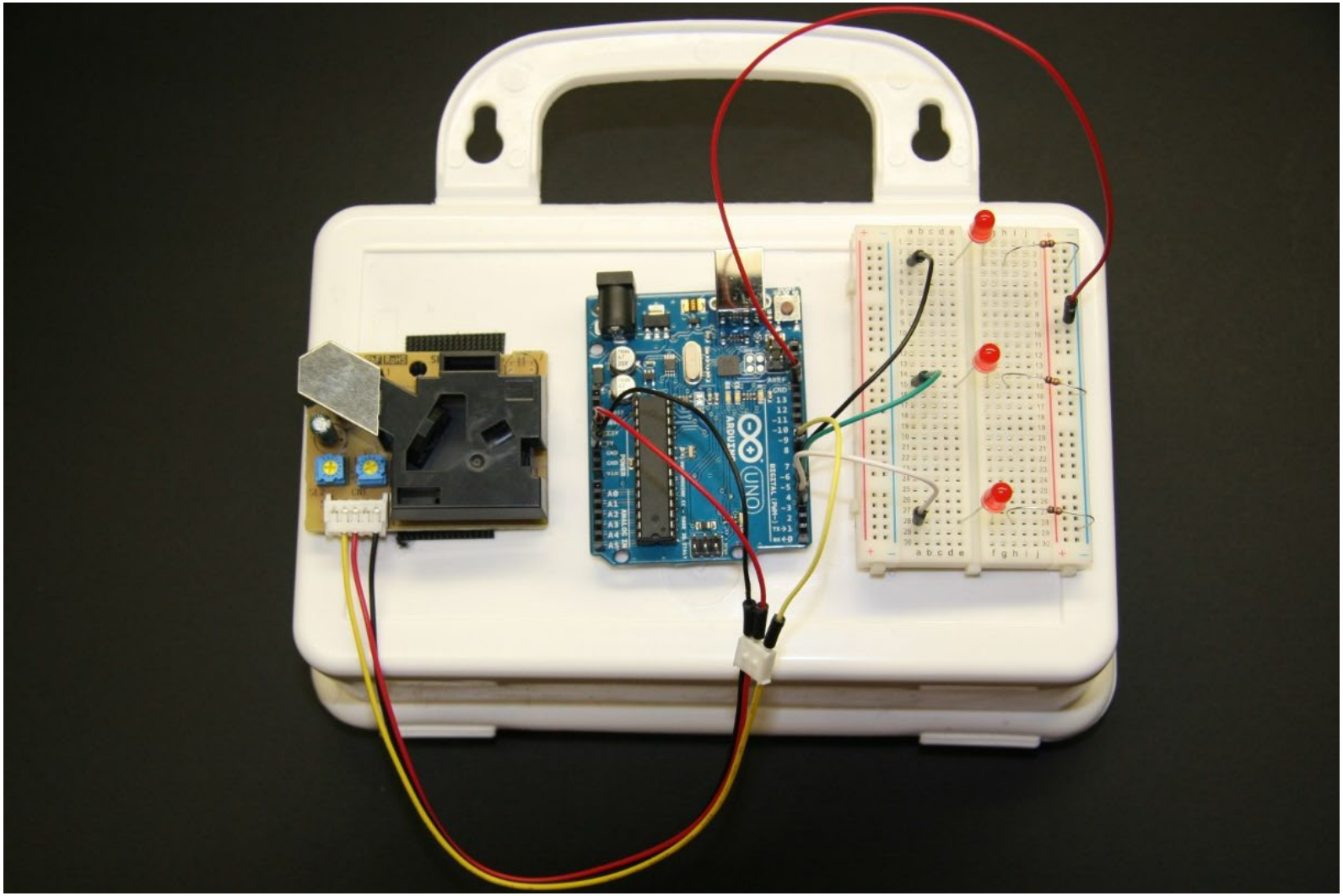
Follow the wiring diagram on the next page to attach all 7 wires.



Wiring Diagram

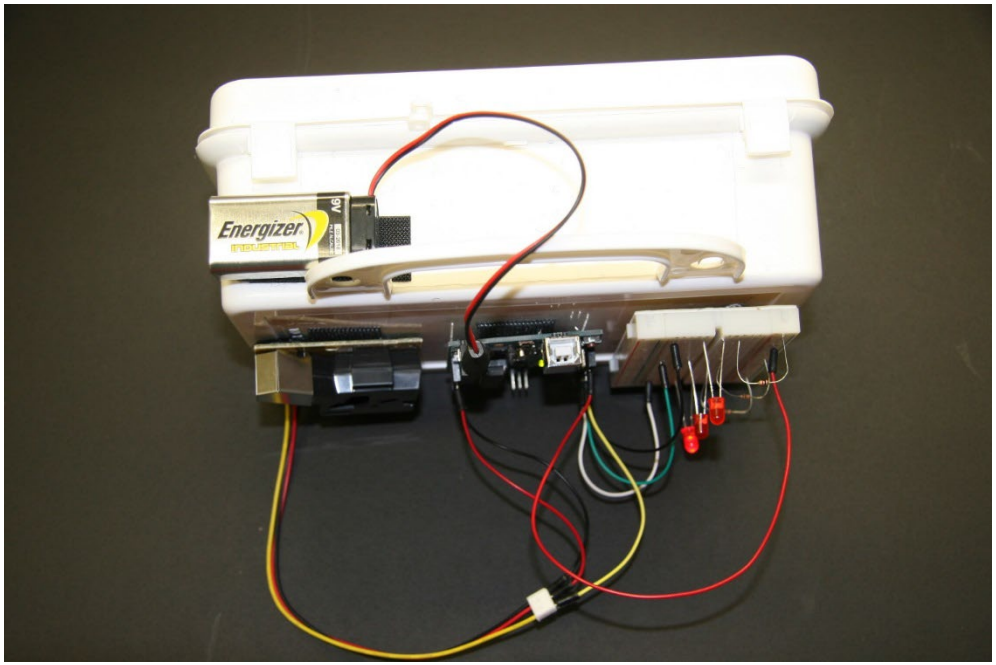


Velcro the parts to the box like this:

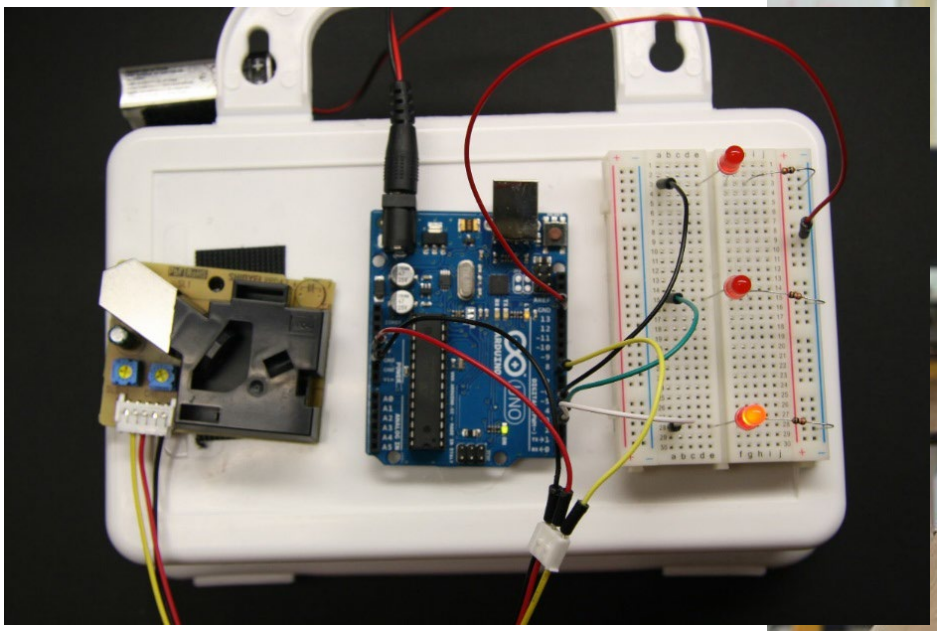


Ask your teacher to help you check the wiring. If everything is correct you will get a battery to plug into the Arduino.

Unplug the battery before changing any wiring to prevent damage



Try out the sensor around by creating particles in the air. Rip paper, shake fabric, or stomp the carpet to make dust near the sensor.



When the sensor detects more particulate matter (PM), the computer tells more lights to turn on: 1, 2, 3!