FORMULAS

The following formulas and information are meant to go with the online lesson found here:
http://www.pyroelectro.com/edu/sensors/infrared_encoder/

LESSON 7 ARDUINO PROGRAM

This program is rather long so we've put it in a format that is easily copied and pasted into the Arduino IDE. The main components of the lesson 7 program are the initial pin descriptions, the setup function, the loop function and the updateLEDs() function.

```cpp
int trigPin = 3;
int echoPin = 2;
long duration, cm, inches;

const int led1Pin = 11;
const int led2Pin = 10;
const int led3Pin = 9;
const int led4Pin = 8;
const int led5Pin = 7;
const int led6Pin = 6;
const int led7Pin = 5;
const int led8Pin = 4;


void updateLEDs();


void setup() {
  //Serial Port begin
  Serial.begin (9600);
  //Define inputs and outputs
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);

  pinMode(led1Pin, OUTPUT);
  pinMode(led2Pin, OUTPUT);
  pinMode(led3Pin, OUTPUT);
  pinMode(led4Pin, OUTPUT);
  pinMode(led5Pin, OUTPUT);
  pinMode(led6Pin, OUTPUT);
  pinMode(led7Pin, OUTPUT);
  pinMode(led8Pin, OUTPUT);
}
```

```cpp
void loop()
{

  // The sensor is triggered by a HIGH pulse of 10 or more
microseconds.
  // Give a short LOW pulse beforehand to ensure a clean
HIGH pulse:
  digitalWrite(trigPin, LOW);
  delayMicroseconds(5);
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);

  // Read the signal from the sensor: a HIGH pulse whose
  // duration is the time (in microseconds) from the sending
  // of the ping to the reception of its echo off of an object.
  pinMode(echoPin, INPUT);
  duration = pulseIn(echoPin, HIGH);

  // convert the time into a distance
  cm = (duration/2) / 29.1;
  inches = (duration/2) / 74;

  updateLEDs();

  Serial.print(inches);
  Serial.print("in, ");
  Serial.print(cm);
  Serial.print("cm");
  Serial.println();

  delay(200);
}
```

```
void updateLEDs(void){

  if(cm > 80)
    digitalWrite(led8Pin, HIGH);
  else
    digitalWrite(led8Pin, LOW);

  if(cm > 70)
    digitalWrite(led7Pin, HIGH);
  else
    digitalWrite(led7Pin, LOW);

  if(cm > 60)
    digitalWrite(led6Pin, HIGH);
  else
    digitalWrite(led6Pin, LOW);

  if(cm > 50)
     digitalWrite(led5Pin, HIGH);
  else
    digitalWrite(led5Pin, LOW);

  if(cm > 40)
    digitalWrite(led4Pin, HIGH);
  else
    digitalWrite(led4Pin, LOW);

  if(cm > 30)
    digitalWrite(led3Pin, HIGH);
  else
    digitalWrite(led3Pin, LOW);

  if(cm > 20)
    digitalWrite(led2Pin, HIGH);
  else
    digitalWrite(led2Pin, LOW);

  if(cm > 10)
    digitalWrite(led1Pin, HIGH);
  else
    digitalWrite(led1Pin, LOW);
}
```

ADDITIONAL INFORMATION

If you have any questions about the formulas or information found in this document, please feel free to head on over to the forums and ask us some questions!
http://www.pyroelectro.com/forums/viewforum.php?f=27