print("Mosh")

```
print('*' * 10)
```
multiplies by 10

```
name = input('What is your name? ')
print(' Hi '+ name)

color = input('What is your fav colour? ')
print(name + ' likes ' + color)

birth = input('Birth year: ')

age = 2024 - int(birth)
print(age)
```

can use ' or " for strings, up to user
can use '''
for the use of multilength string
and multiple lines
'''

```
-------------------------------------------------
course = 'Python for beginners'
          012345
print(course[0:3])

-------------------------------------------------------
output: Pyt (so basically from 0 to 3)
-------------------------------------------------------

first = 'John'
last = 'Smith'
message = first + ' [' + last '] is a coder'
msg = f'{first} [{last}] is a coder'
print(msg)
-----------------------------------------------------------

course = 'Python for Beginners'
print(len(course))
print(course.lower())
print(course.upper())
```

```
const int ledR = 2;
const int ledG = 4;

void setup(){
   Serial.begin(9600);
   pinMode(ledR, OUTPUT);
   pinMode(ledG, OUTPUT);
}



void loop(){
   if (Serial.availabe()> 0){
       String msg = Serial.readString();
       if (msg == "ON"){
         digitalWrite(ledG, HIGH);
       }
       else if (msg == "OFF"){
          digitalWrite(ledG, LOW);
       }
        else {
            for (int i = 0; 1 < 5; i++){
                 digitalWrite(ledR, HIGH);
                 delay(100);
                 digitalWrite(ledR, LOW);
                 delay(100);
            }
         }
}



import seria
```

TO SHOW VALUES ON PYTHON FROM SERIAL MONITER

```
int x= 1;
int y= 2;
int z= 3;

void setup(){
 Serial.begin(9600);
}

void loop(){
 x=x+2;
y=y+5;
z=z+4;
Serial.print(x);
Serial.print(",");
Serial.print(y);
Serial.print(",");
Serial.println(z);
delay(1000);
}
```

#looks for data (keeps looping till data is found)
#reads from serial monitor then decodes and strips it

```
import time
import serial
ser = serial.Serial('COM3',9600)
time.sleep(1)
try:
   while True:
      while (ser.inWating()==0):
         pass
      dataPacket = ser.readline()
      dataPacket = str(dataPacket, 'utf-8')
      dataPacket = dataPacket.strip('\r\n')
      splitPacket = dataPacket.split(",")
      x=float(splitPacket[0])
      y=float(splitPacket[1])
      z=float(splitPacket[2])
      print("X= ",x,"Y= ",y,"Z= ",z)
```

TO VISUALIZE POT VALUES USING A CYLINDER

```
int potPin = A0;

void setup(){
 pinMode(potPin, INPUT);
Serial.begin(9600);
}

void loop() {
 int potVal = analogRead(potPin);
Serial.println(potVal);
delay(100);
}
```

```
import serial
import time
from vpython import *
ser = serial.Serial('COM7',9600)
time.sleep(1)
tube=cylinder(color=color.blue,radius=1,length=5,axis=vector(0,1,0))
lab=label(text='5 volts',box=False,position=vector(0,0.2,0))
try:
    while True:
        while ser.in_waiting==0:
            pass
        dataPacket=ser.readline()
        dataPacket=str(dataPacket,'utf-8')
        dataPacket=int(dataPacket.strip('\r\n'))
        vol=(5/1023)*dataPacket
        if vol==0:
            vol=0.001
        tube.length=vol
        vol=round(vol,1)
        lab.text=str(vol)
```

TO VISUALIZE POT VALUES USING A NEEDLE

```
int potPin = A0;

void setup(){
 pinMode(potPin, INPUT);
Serial.begin(9600);
}

void loop() {
 int potVal = analogRead(potPin);
Serial.println(potVal);
delay(100);
}
```

```
import serial
import time
from vpython import *
import numpy as np

myArrow=arrow(Length=1,shaftwidth=0.02,color=color.red,axis=vector(-1,0 ,0))
myCase=box(color=color.white,size=vector(2.5,1.5,0.1)position=vector(0,0.65,-0.1))
for theta in np.linspace(5*np.pi/6,np.pi/6,6)
    tickMajor=box(position=vector(arrowLength*np.cos(theta),arrowLength*np.sin(theta),0),size=vector(0.1,0.05,0,05))


ser = serial.Serial('COM7',9600)
time.sleep(1)

try:
    while True:
        while ser.in_waiting==0:
            pass
        dataPacket=ser.readline()
        dataPacket=str(dataPacket,'utf-8')
        potVal=int(dataPacket.strip('\r\n'))
        theta=-2*np.pi/3069*potVal+5*np.pi/6
        myArrow.axis=vector(arrowLength*np.cos(theta),arrowLength*np.sin(theta),0)
```

TO VISUALIZE 3D THERMOMETER USING DHT11

```
#include <DHT.h>
#define dhtPin 2
#define DHTTYPE DHT11

DHT TH(dhtPin,DHTTYPE);

void setup(){
  Serial.begin(9600);
  TH.begin();
  delay(500);
}

void loop(){
  float tempC = TH.readTemperature();
  float tempF = TH.readTemperature(true);
  float humidity = TH.readHumidity();

  Serial.print(tempF);
  Serial.print(",");
  Serial.println(humidity);

  delay(1000);
}
```

```
import serial
import time
from vpython import *

ser = serial.Serial('COM7',9600)
time.sleep(1)

bulb=sphere(radius=1,color=color.red)
cyl=cylinder(radius=0.6,color=color.red,axis=vector(0,1,0),length=6)
bulbglass=sphere(radius=1.2,color=color.white,opacity=0.25)
cylglass=cylinder(radius=0.8,color=color.white,opacity=0.25,axis=vector(0,1,0),length=6)

try:
    while True:
        while ser.in_waiting==0:
            pass
        dataPacket=ser.readline()
        dataPacket=str(dataPacket,'utf-8')
        dataPacket=dataPacket.split(',')
        temp = float(dataPacket[0])
        hum = float(dataPacket[1])
        len=(4.5/115)*temp+1.5
        cyl.length=len
```

PASSING DATA FROM PYTHON TO ARDUINO

```
import pyserial
arduino=serial.Serial('COM7',9600)

try:
   while True:
        cmd=input('Please enter command: ')
        cmd=cmd+'\r'
        arduio.write(cmd.encode())
```

```
String mycmd;

void setup(){
 Serial.begin(9600);
 pinMode(13,OUTPUT);
}

void loop(){
 while(Serial.available()==0){

  }

 mycmd=Serial.readStringUntil('\r');
 if (mycmd=="ON"){
  digitalWrite(13,HIGH);
  }

 if (mycmd=="OFF"){
  digitalWrite(13,LOW);
  }
}
```

COTROLLING AN LED USING PYTHON

```
const int R=11;
const int G=10;
const int B=9;

void setup(){
 Serial.begin(9600);
 pinMode(R,OUTPUT);
 pinMode(G,OUTPUT);
 pinMode(B,OUTPUT);
}

void loop(){
 while(Serial.available()==0){
  }
 String cmd=Serial.readStringUntil('\r');
 if(cmd=="RED"){
  analogWrite(R, 255);
  analogWrite(G, 0);
  analogWrite(B, 0);
 }
 if(cmd=="GREEN"){
  analogWrite(R, 0);
  analogWrite(G, 255);
  analogWrite(B, 0);
 }
 if(cmd=="BLUE"){
  analogWrite(R, 0);
  analogWrite(G, 0);
  analogWrite(B, 255);
 }
 if(cmd=="CYAN"){
  analogWrite(R, 0);
  analogWrite(G, 255);
  analogWrite(B, 255);
 }
 if(cmd=="OFF"){
  analogWrite(R, 0);
  analogWrite(G, 0);
  analogWrite(B, 0);
 }
}
```

```
import serial
arduino=serial.Serial('COM7',9600)

try:
  while True:
    mycmd=input('Please input your color: ')
    mycmd=mycmd+'\r'
    arduino.write(mycmd.encode())
```

```
const int R=11;
const int G=10;
const int B=9;
int redVal;
String greenVal;
String blueVal;

void setup(){
  Serial.begin(9600);
  pinMode(R,OUTPUT);
  pinMode(G,OUTPUT);
  pinMode(B,OUTPUT);
}

void loop(){
  while(Serial.available()==0){
    }
  redVal=Serial.readStringUntil(':').toInt;
  greenVal=Serial.readStringUntil(':').toInt;
  blueVal=Serial.readStringUntil('\r').toInt;

    analogWrite(R, redVal);
    analogWrite(G, greenVal);
    analogWrite(B, blueVal);
}
```

```
import serial
from vpython import *

arduino=serial.Serial('COM7',9600)
orb=sphere(color=color.black)

try:
   while True:
      mycmd=input('Please input your R:G:B ')
      mycmd=mycmd+'\r'
      arduino.write(mycmd.encode())
      mycolor=mycmd.split(':')
      red=int(mycolor[0])
      green=int(mycolor[1])
      blue=int(mycolor[2])
      orb.color=vector(red/255,gree/255,blue/255)
```