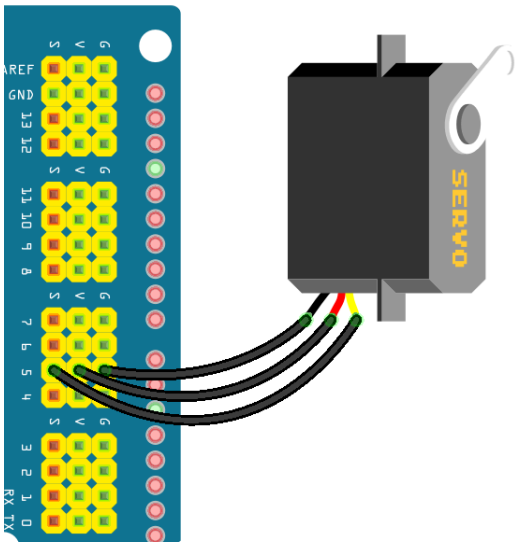
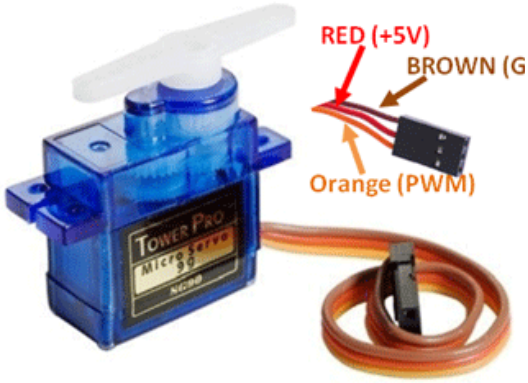
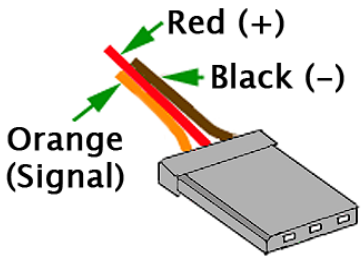
Task 1. Connect the circuit as shown in the picture:





Arduino	Servo
Gnd	brown
+5V	red
DIO5	orange



Code example:

```
#include<Servo.h>
#define SERVO1_PIN  5

Servo myservo;

void setup() {
      myservo.attach(SERVO1_PIN); }

void loop() {
      myservo.write(0);
      delay(1000);
      myservo.write(90);
      delay(1000);
      myservo.write(180);
      delay(1000); }
```

What's new:

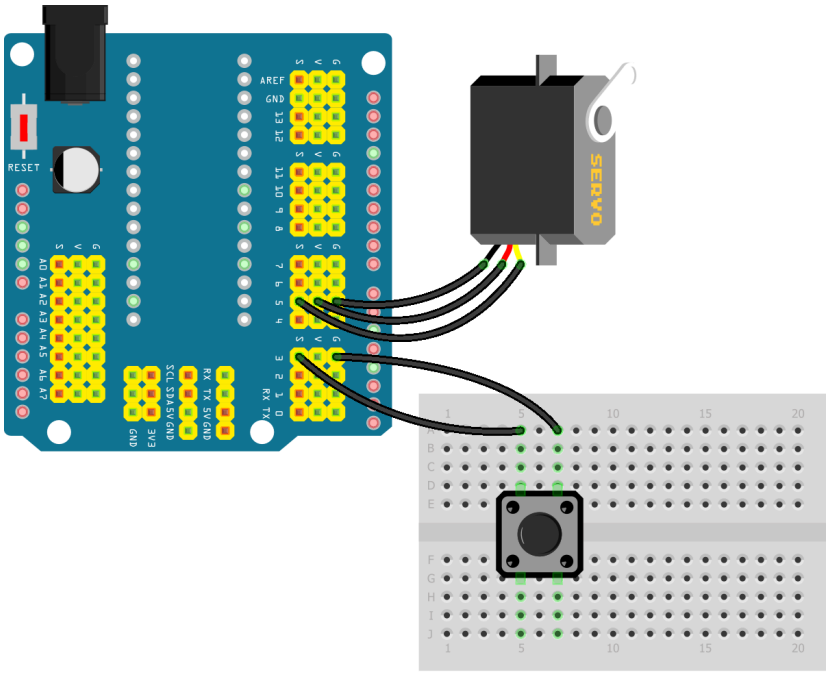
including library - ***#include<Servo.h>***

Reference:

www.arduino.cc/en/reference/servo

Reduce the rotation step to 15 degrees and cover the range of movement from 0 to 180 degrees. A servo shaft should move in a cycle from 0 to 180 degrees, and then back to 0.

Task 2. Connect the circuit as shown in the picture.



After switching on the power, the servo should be in the 0-degree position. Pressing the button should cause rotation of the servo shaft by 45 degrees. After reaching the position corresponding to 180 degrees, the next press of the button should force the rotation to position 0.

```
#define BUTTON1_PIN 3
#define SERVO1_PIN 5
#define BAUDRATE 115200
#define STEP 45
#include <Servo.h>

Servo myservo;
int position=0;

void setup() {
 myservo.attach(SERVO1_PIN);
 myservo.write(position);
 pinMode(BUTTON1_PIN,INPUT_PULLUP);
 Serial.begin(BAUDRATE); }

void loop() {
 while(!buttonclick(BUTTON1_PIN));
 position+=STEP;
 if(position>180) position = 0;
 myservo.write(position); }

bool buttonclick(int buttonpin) {
 int buttonstate = digitalRead(buttonpin);

if(buttonstate == HIGH)
  return false;
 else {
  Serial.println("Button is: DOWN");
  delay(200);
  do {
   buttonstate = digitalRead(buttonpin);
  } while(buttonstate == LOW);
  Serial.println("Click complete");
  return true;
 }
}
```

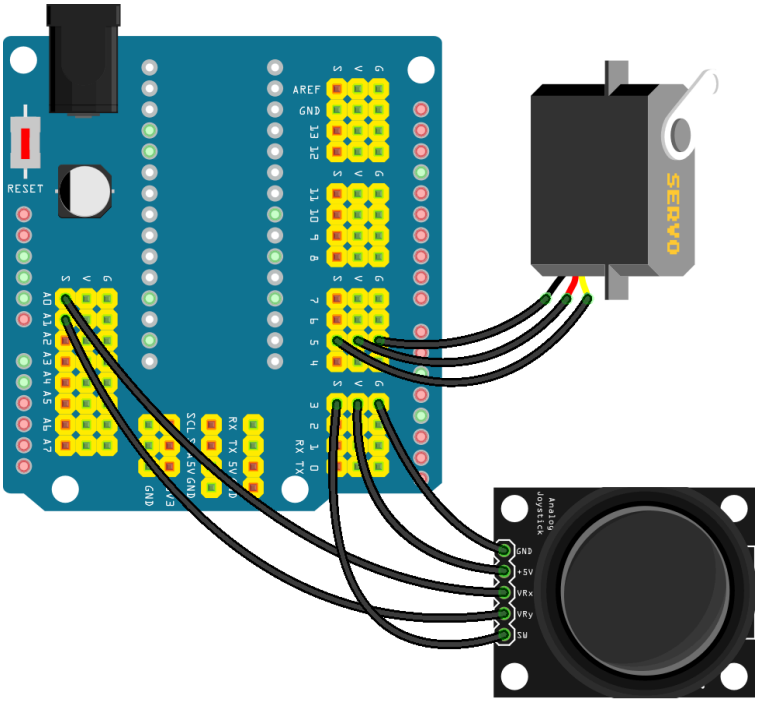
How to use *buttonclick* function:

```
while(!buttonclick(BUTTON1_PIN)); //wait for click
// BUTTON1_PIN button was clicked
```

What's new:

bool function, ***do-while*** statement.

Task 3. Connect the circuit as shown in the picture. The position of the servo shaft should be set according to the joystick inclination in the X axis, in the full range of motion.



Arduino	Joystick board
Gnd	Gnd
+5V	+5V
A0	VRx
A1	VRy
3	SW

Hint:

```
#define VRX A0
int Vrx;
Vrx = analogRead(VRX);
```

What's new:

map function

```
int servo_postion;
```

Loop implementation no 1:

```
void loop() {
 Vrx = analogRead(VRX);
 servo_position = map(Vrx,0,1023,0,180);
 myservo.write(servo_position); }
```

Loop implementation no 2:

```
void loop() {
 Vrx = analogRead(VRX);
 myservo.write(map(Vrx,0,1023,0,180)); }
```

Loop implementation no 3:

```
void loop() {
 myservo.write(map(analogRead(VRX),0,1023,0,180)); }
```

Reference:

www.arduino.cc/reference/en/language/functions/math/map/

Task 4. Use the circuit from the previous task. The position of the servo shaft should be set according to the joystick inclination in the Y axis, in the full range of motion. Pressing the joystick button should freeze the current shaft angle.

Task 5. Write a program to control the servomechanism using two buttons. Pressing one of the buttons forces CW rotation. The other button makes the servo rotate CCW.

For those interested:

1. SparkFun servo tutorial:

   learn.sparkfun.com/tutorials/hobby-servo-tutorial/all

2. lastminuteengineers.com web page:

   lastminuteengineers.com/servo-motor-arduino-tutorial/