



# RD412:SUMMATIVE



Christopher Muller

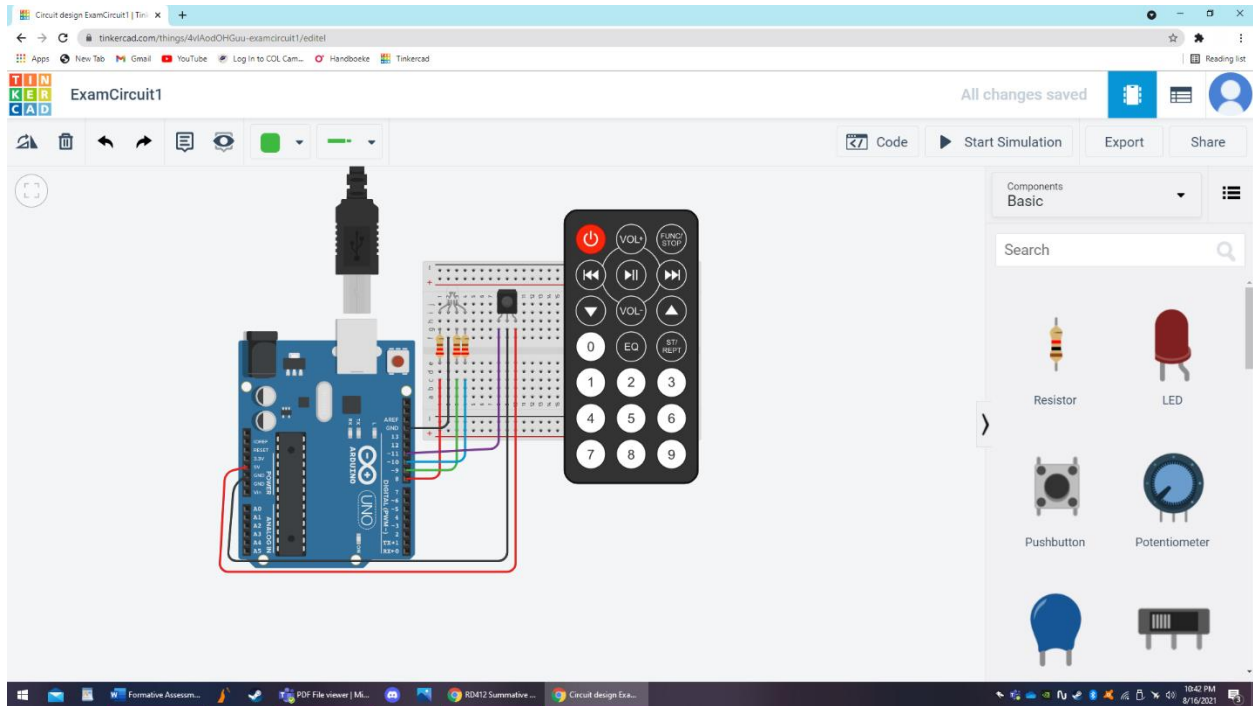
10395

## Contents

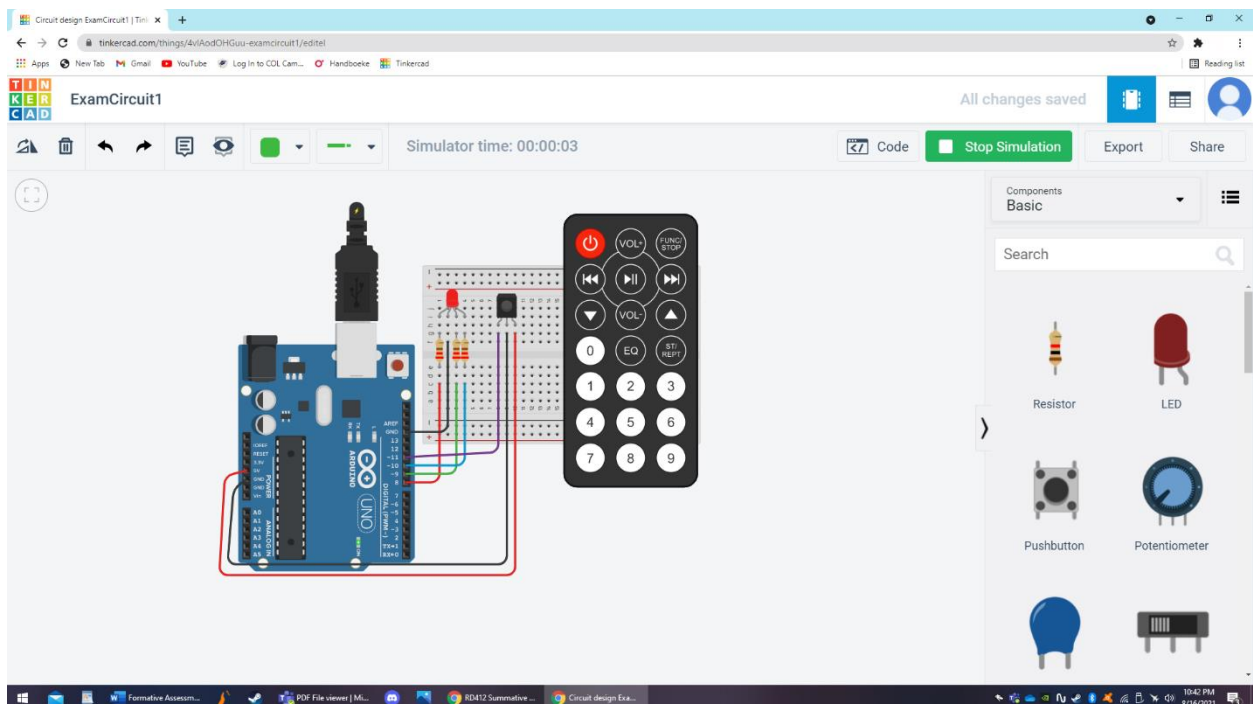
ExamCircuit1 .....	2
ExamCircuit2 .....	5
ExamCircuit3 .....	10

# ExamCircuit1

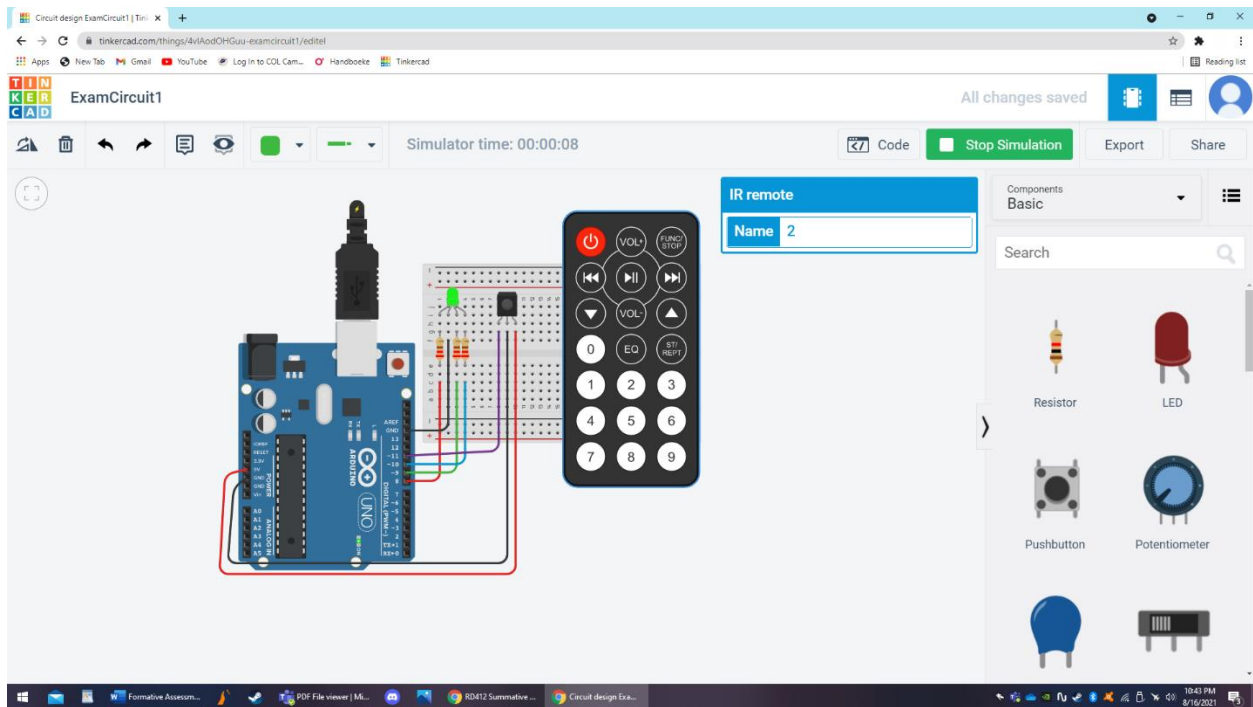
Format:



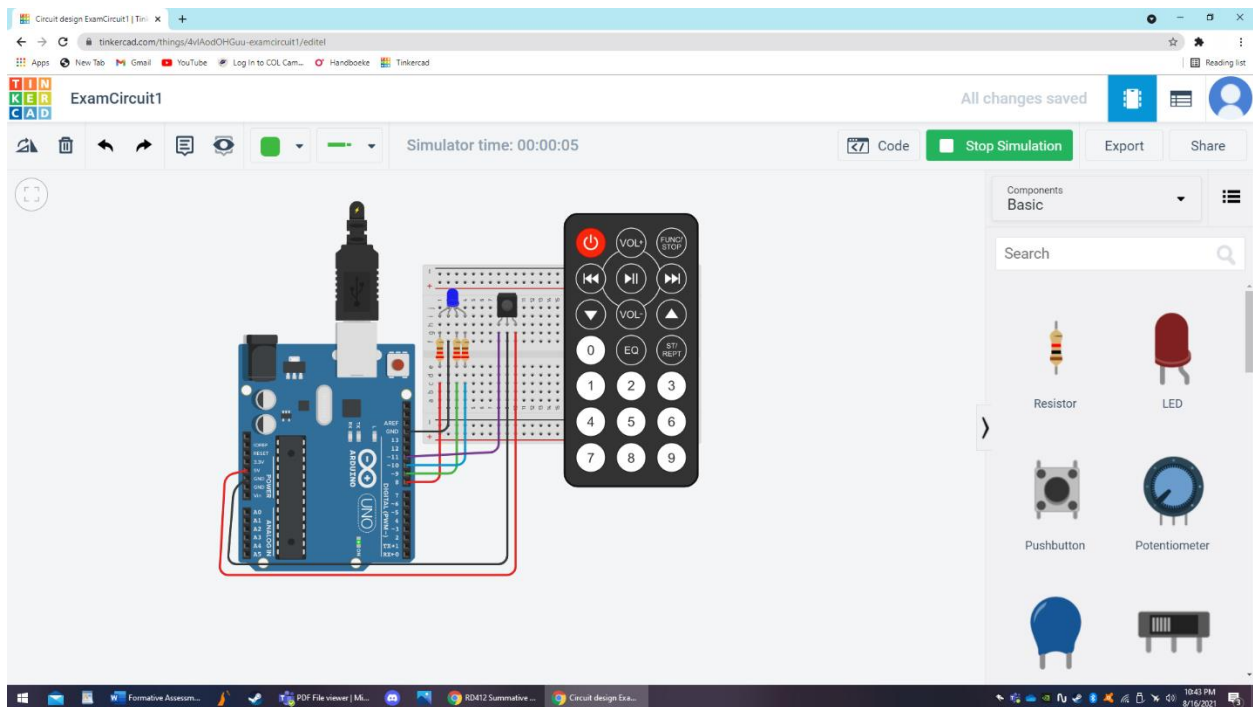
Pressing 1 on IR remote:



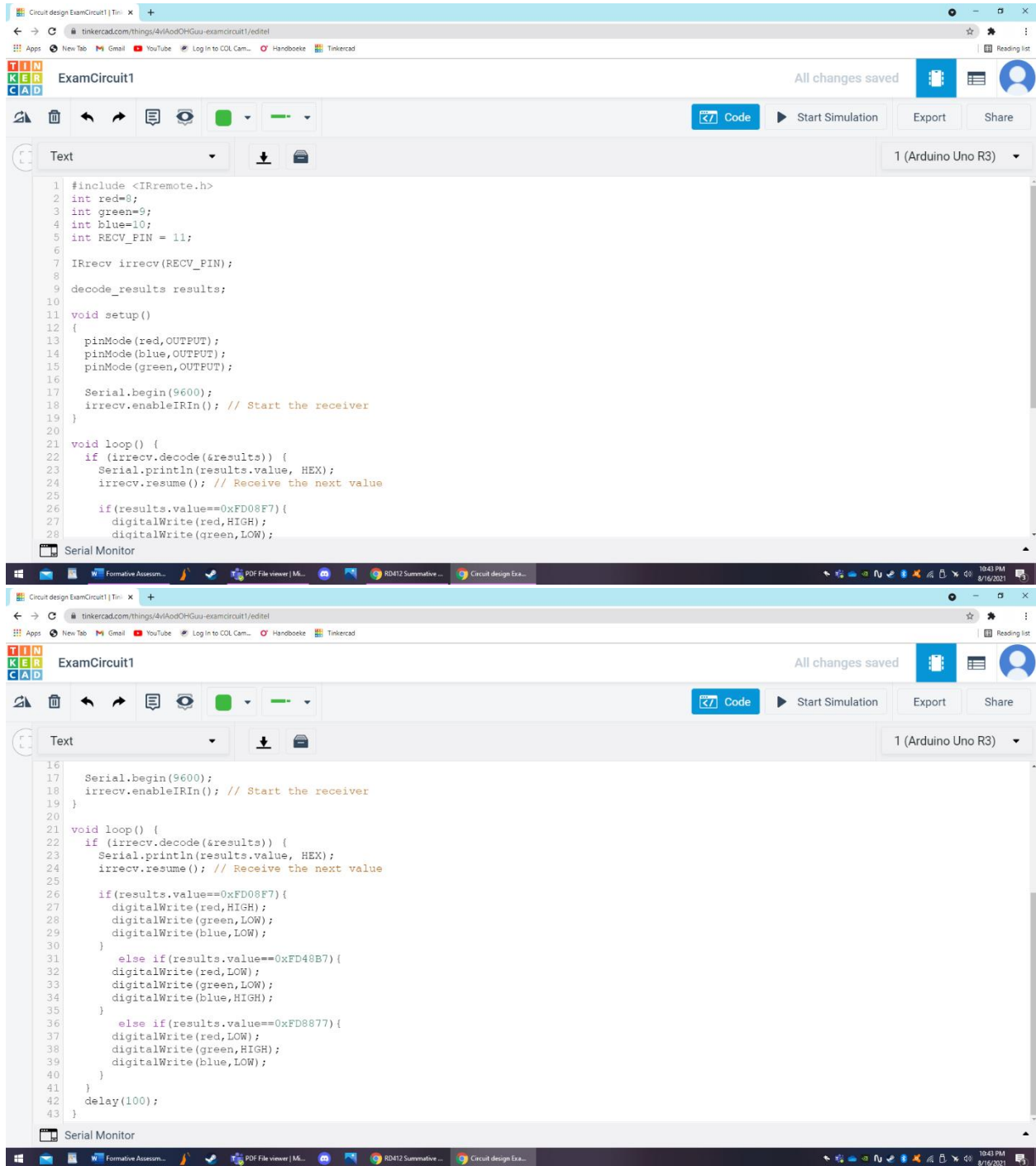
Pressing 2 on IR remote:



Pressing 3 on IR remote:



Code:

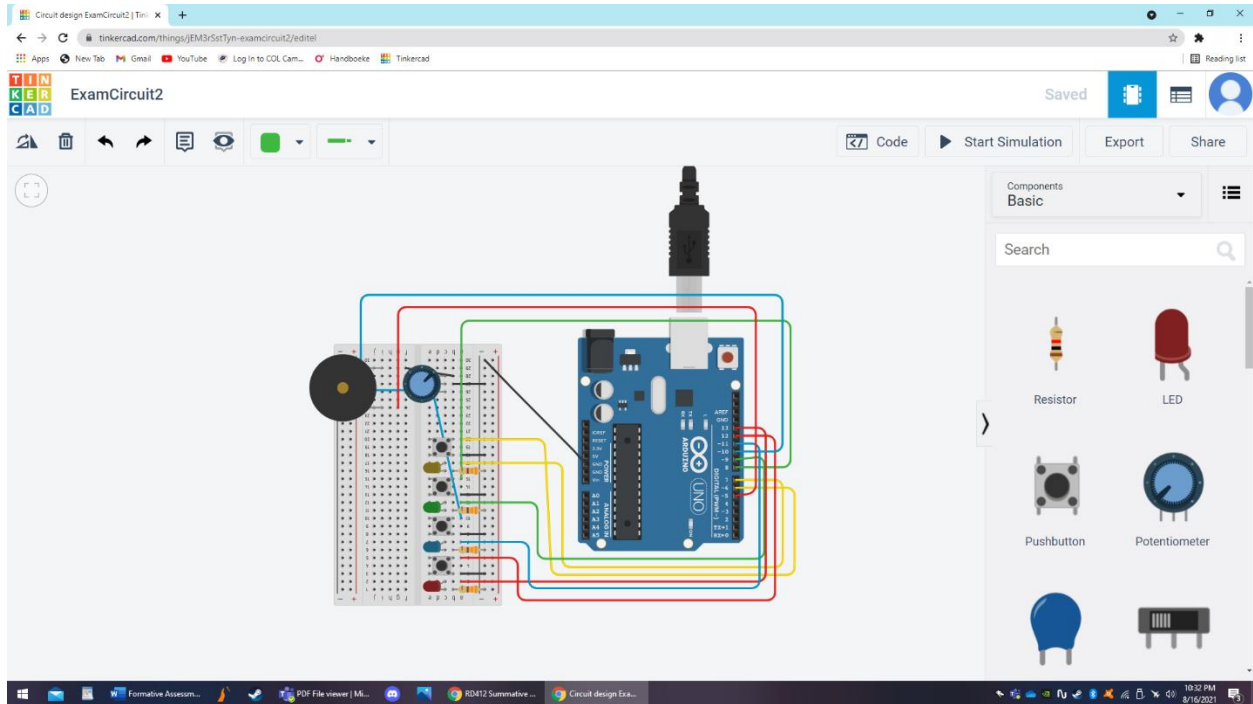


The screenshot displays the Tinkercad web interface for a project named 'ExamCircuit1'. The code is written in C++ for an Arduino Uno R3. It includes the `<IRremote.h>` library and defines pins for red, green, and blue LEDs. The `setup()` function initializes the LEDs as outputs and starts the serial monitor at 9600 baud. The `loop()` function uses an `IRrecv` object to receive IR signals. It checks for specific hex values: `0xFD08F7` (turns red LED on), `0xFD48B7` (turns red LED off), and `0xFD8877` (turns green LED on). A `delay(100);` is used between iterations.

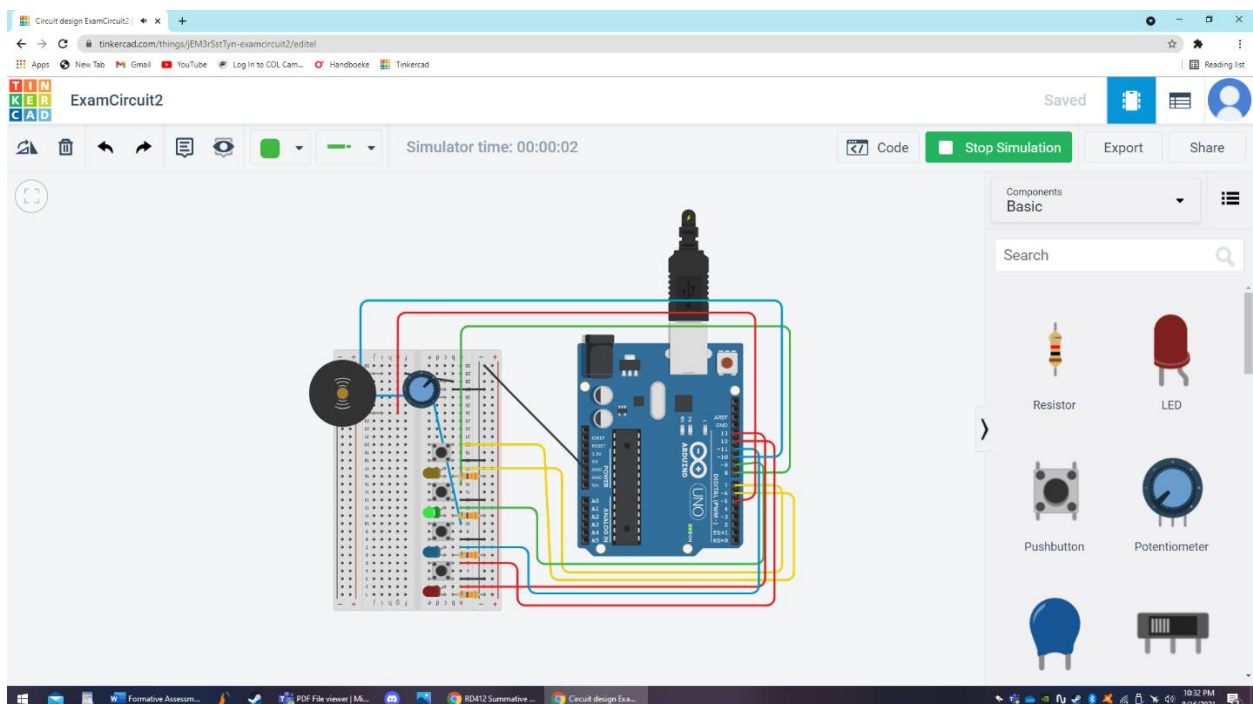
```
1 #include <IRremote.h>
2 int red=8;
3 int green=9;
4 int blue=10;
5 int RECV_PIN = 11;
6
7 IRrecv irrecv(RECV_PIN);
8
9 decode_results results;
10
11 void setup()
12 {
13     pinMode(red,OUTPUT);
14     pinMode(blue,OUTPUT);
15     pinMode(green,OUTPUT);
16
17     Serial.begin(9600);
18     irrecv.enableIRIn(); // Start the receiver
19 }
20
21 void loop() {
22     if (irrecv.decode(&results)) {
23         Serial.println(results.value, HEX);
24         irrecv.resume(); // Receive the next value
25
26         if(results.value==0xFD08F7){
27             digitalWrite(red,HIGH);
28             digitalWrite(green,LOW);
29             digitalWrite(blue,LOW);
30         }
31         else if(results.value==0xFD48B7){
32             digitalWrite(red,LOW);
33             digitalWrite(green,LOW);
34             digitalWrite(blue,HIGH);
35         }
36         else if(results.value==0xFD8877){
37             digitalWrite(red,LOW);
38             digitalWrite(green,HIGH);
39             digitalWrite(blue,LOW);
40         }
41         delay(100);
42     }
43 }
```

# ExamCircuit2

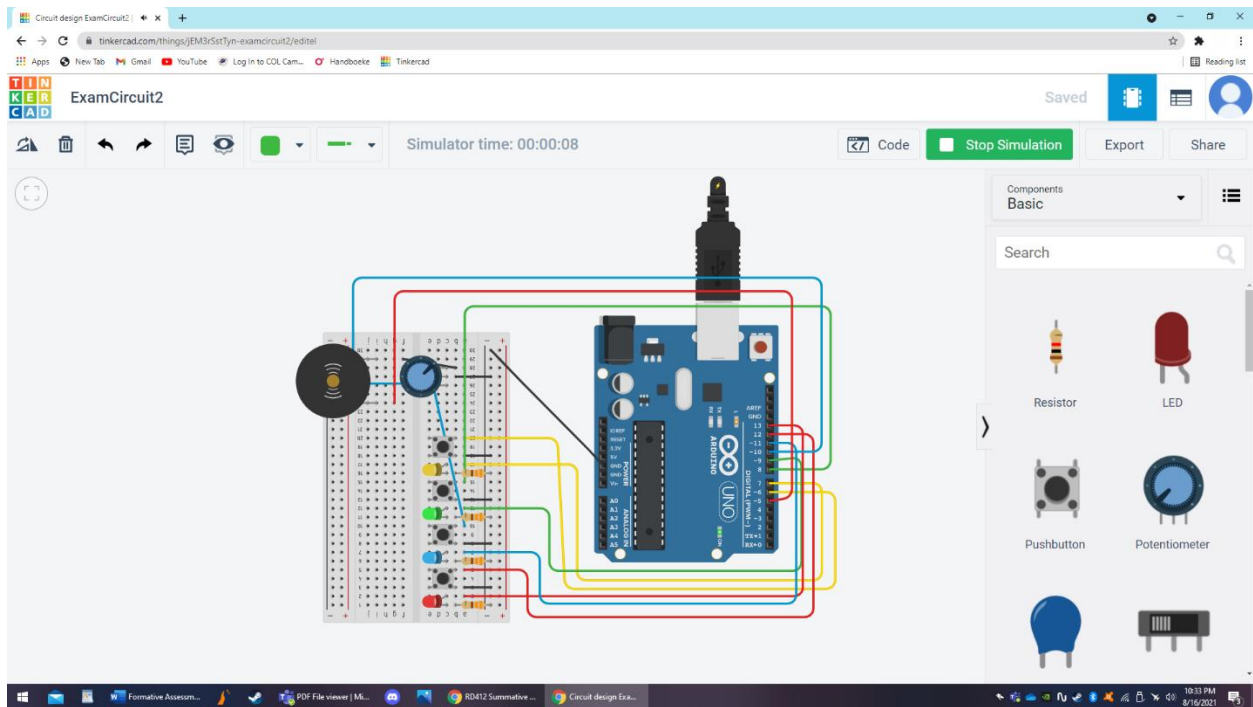
Format:



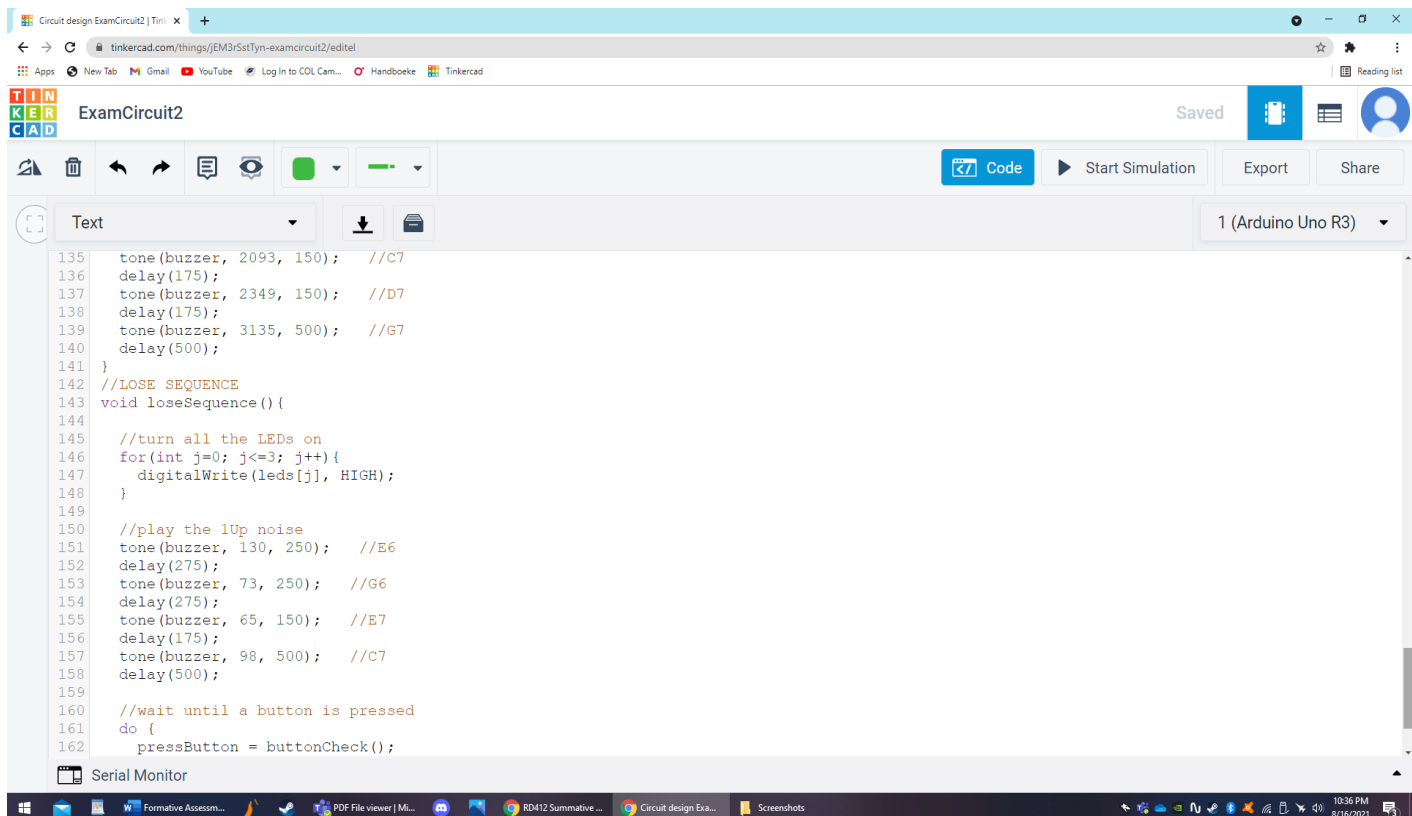
Follow pattern exactly:



If incorrect all LED's shine:



Code:



Circuit design ExamCircuit2 | Tinkercad

tinkercad.com/things/EM3rSstTyn-examcircuit2/editel

ExamCircuit2

Code Start Simulation Export Share

Text 1 (Arduino Uno R3)

```
107 buttonSeq[i]=round(random(0,4)); //Creates a random number between 0 and 3
108 }
109 for(int i=0;i<4;i++){
110   tone(buzzer, tones[i], 200);
111   digitalWrite(leds[0], HIGH);
112   digitalWrite(leds[1], HIGH);
113   digitalWrite(leds[2], HIGH);
114   digitalWrite(leds[3], HIGH);
115   delay(100);
116   digitalWrite(leds[0], LOW);
117   digitalWrite(leds[1], LOW);
118   digitalWrite(leds[2], LOW);
119   digitalWrite(leds[3], LOW);
120 }
121 }
122 void winSequence(){
123   //turn all the LEDs on
124   for(int j=0; j<=3; j++){
125     digitalWrite(leds[j], HIGH);
126   }
127   //play the 1Up noise
128   tone(buzzer, 1310, 150); //E6
129   delay(175);
130   tone(buzzer, 1567, 150); //G6
131   delay(175);
132   tone(buzzer, 2637, 150); //E7
133   delay(175);
134 }
```

Serial Monitor

Circuit design ExamCircuit2 | Tinkercad

tinkercad.com/things/EM3rSstTyn-examcircuit2/editel

ExamCircuit2

Code Start Simulation Export Share

Text 1 (Arduino Uno R3)

```
80 void allLedOff(){
81   digitalWrite(leds[0], LOW);
82   digitalWrite(leds[1], LOW);
83   digitalWrite(leds[2], LOW);
84   digitalWrite(leds[3], LOW);
85   noTone(buzzer);
86 }
87 int buttonCheck(){
88   if(digitalRead(buttons[0])==LOW)
89     return 0;
90   else if(digitalRead(buttons[1])==LOW)
91     return 1;
92   else if(digitalRead(buttons[2])==LOW)
93     return 2;
94   else if(digitalRead(buttons[3])==LOW)
95     return 3;
96   else
97     return 4;
98 }
99 void ledOn(int ledNumber){
100   digitalWrite(leds[ledNumber], HIGH);
101   tone(buzzer, tones[ledNumber]);
102 }
103 void startSequence(){
104   randomSeed(analogRead(A0)); //The random generator on
105   for(int i=0; i<no_of_rounds; i++)
106   {
107     buttonSeq[i]=round(random(0,4)); //Creates a random number between 0 and 3
108   }
109 }
```

Serial Monitor



Circuit design ExamCircuit2 | Tini x +

tinkercad.com/things/EM3rSstTyn-examcircuit2/edit#el

ExamCircuit2

Code Start Simulation Export Share

Text 1 (Arduino Uno R3)

```
54     if (pressButton == buttonSeq[i]) {
55         delay(250);
56         allLedOff();
57         break;
58     }
59     else {
60         loseSequence();
61         break;
62     }
63 }
64 else {
65     allLedOff();
66 }
67 if (millis() - startTime > time) {
68     loseSequence();
69 }
70 break;
71 }
72 }
73 }
74 roundIn++;
75 if (roundIn == no_of_rounds)
76     winSequence();
77 delay(500);
78 }
79 }
80 void allLedOff() {
81     digitalWrite(leds[0], LOW);
```

Serial Monitor

Circuit design ExamCircuit2 | Tini x +

tinkercad.com/things/EM3rSstTyn-examcircuit2/edit#el

ExamCircuit2

Code Start Simulation Export Share

Text 1 (Arduino Uno R3)

```
27 pinMode(leds[0], OUTPUT);
28 pinMode(leds[1], OUTPUT);
29 pinMode(leds[2], OUTPUT);
30 pinMode(leds[3], OUTPUT);
31 //Declaring the buzzer as OUTPUT
32 pinMode(buzzer, OUTPUT);
33
34 }
35 void loop() {
36     if (gameStart == false) {
37         startSequence();
38         roundIn = 0;
39         delay(1500);
40         gameStart = true;
41     }
42     for (int i = 0; i <= roundIn; i++) {
43         ledOn(buttonSeq[i]);
44         delay(500);
45         allLedOff();
46         delay(500);
47     }
48     for (int i = 0; i <= roundIn; i++) {
49         startTime = millis();
50         while (true) {
51             pressButton = buttonCheck();
52             if (pressButton < 4) {
53                 ledOn(pressButton);
54                 if (pressButton == buttonSeq[i]) {
```

Serial Monitor

Circuit design ExamCircuit2 | Tinkercad

tinkercad.com/things/EM3rSstTyn-examcircuit2/editel

ExamCircuit2

Code Start Simulation Export Share

Text 1 (Arduino Uno R3)

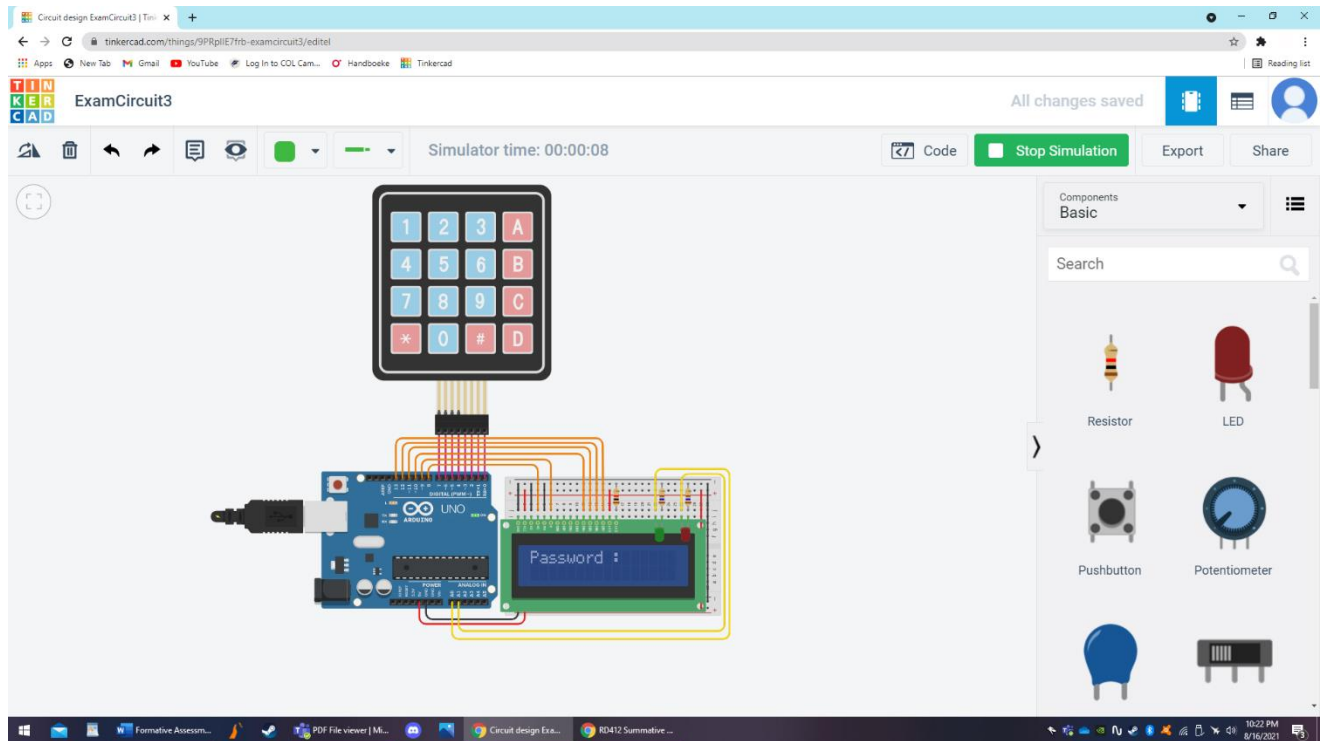
```
1 //Defining the Pushbuttons in the order Red,Blue,Green,Yellow
2 const int buttons[]={12,10,8,6};
3 //Defining the LEDs in the order Red,Blue,Green,Yellow
4 const int leds[]={13,11,9,7};
5 //the tones c,e,g,b
6 const int tones[]={262, 330, 392, 494};
7 const int buzzer=5;
8 //button pressed, 4 if none
9 int pressButton=4;
10 const int no_of_rounds=10;
11 int roundIn=1;
12 boolean gameStart=false;
13 //to store the sequence of the buttons
14 int buttonSeq[16];
15 //Time since button pressed
16 long startTime=0;
17 //The maximum time allotted for each round
18 const long time=2000;
19
20 void setup() {
21   //To use builtin pullup resistors
22   pinMode(buttons[0],INPUT_PULLUP);
23   pinMode(buttons[1],INPUT_PULLUP);
24   pinMode(buttons[2],INPUT_PULLUP);
25   pinMode(buttons[3],INPUT_PULLUP);
26   //Declaring the LEDs as OUTPUT
27   pinMode(leds[0],OUTPUT);
28   pinMode(leds[1],OUTPUT);
29 }
30
31 void loop() {
32   //check if game has started
33   if(gameStart){
34     //check if button is pressed
35     if(pressButton==4){
36       //button pressed, 4 if none
37       pressButton=buttonCheck();
38       //start time
39       startTime=millis();
40       //play the start sequence
41       playSequence();
42     }
43     //check if time is up
44     if(millis()-startTime>time){
45       //time is up
46       loseSequence();
47     }
48   }
49   //wait until a button is pressed
50   do {
51     pressButton = buttonCheck();
52   } while (pressButton > 3);
53   delay(200);
54   gameStart = true; //reset the game so that the start sequence will play again.
55 }
56
57 //LOSE SEQUENCE
58 void loseSequence() {
59   //turn all the LEDs on
60   for(int j=0; j<=3; j++){
61     digitalWrite(leds[j], HIGH);
62   }
63   //play the 10p noise
64   tone(buzzer, 130, 250); //E6
65   delay(275);
66   tone(buzzer, 73, 250); //G6
67   delay(275);
68   tone(buzzer, 65, 150); //E7
69   delay(175);
70   tone(buzzer, 98, 500); //C7
71   delay(500);
72 }
73
74 //buttonCheck function
75 int buttonCheck() {
76   int button=4;
77   for(int i=0; i<4; i++){
78     if(digitalRead(buttons[i])<1){
79       button=i;
80     }
81   }
82   return button;
83 }
84
85 //playSequence function
86 void playSequence() {
87   //play the sequence
88   for(int i=0; i<4; i++){
89     digitalWrite(leds[i], HIGH);
90     delay(200);
91     digitalWrite(leds[i], LOW);
92   }
93   //play the tones
94   for(int i=0; i<4; i++){
95     tone(buzzer, tones[i], 200);
96     delay(200);
97   }
98 }
```

Serial Monitor

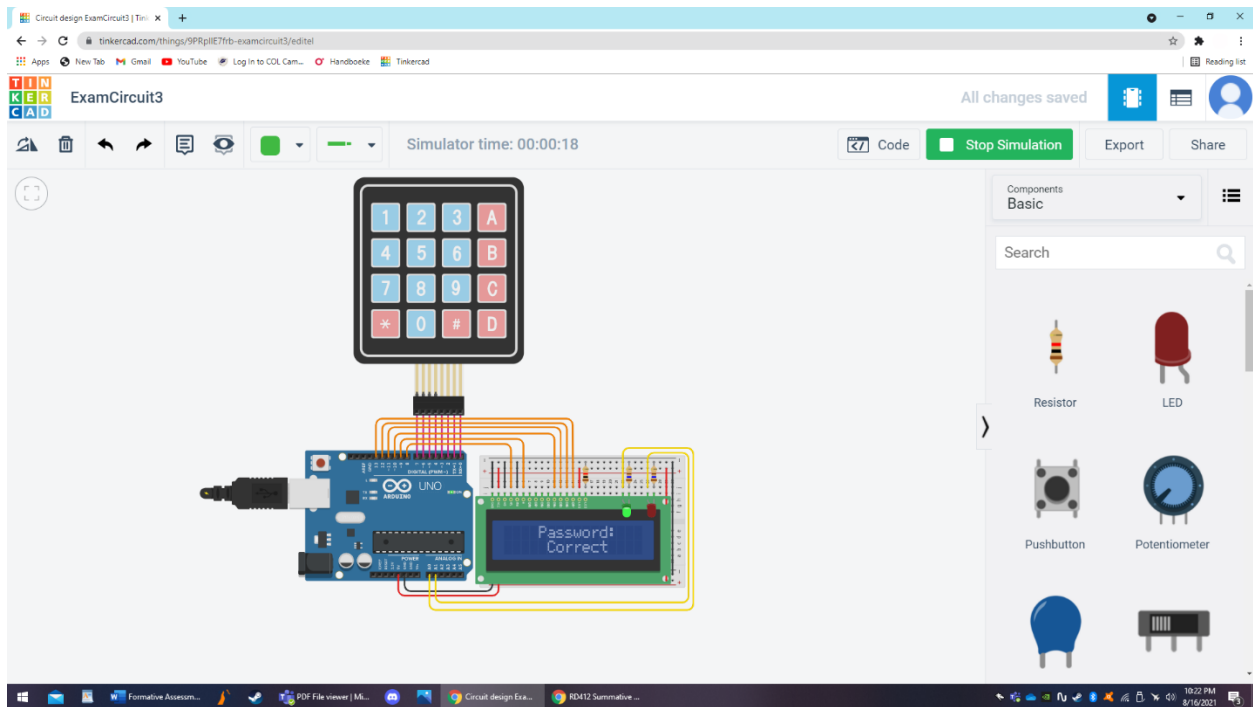
10:36 PM 8/16/2021

# ExamCircuit3

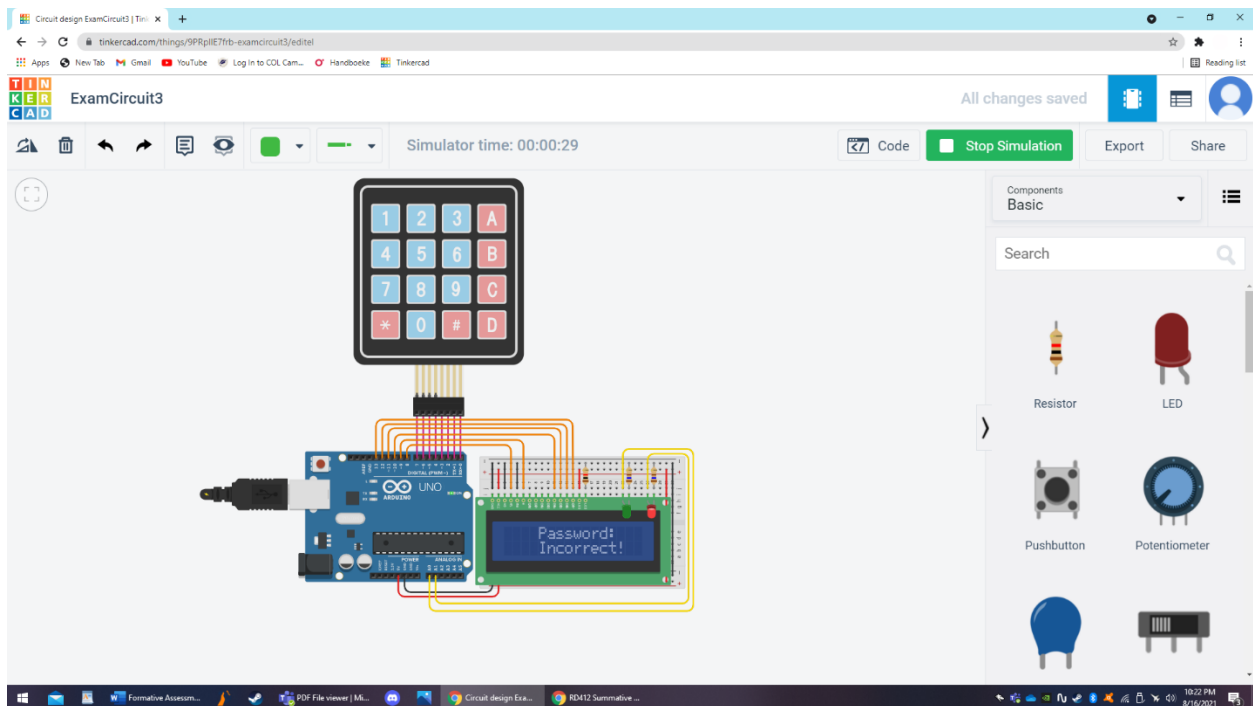
## Format:



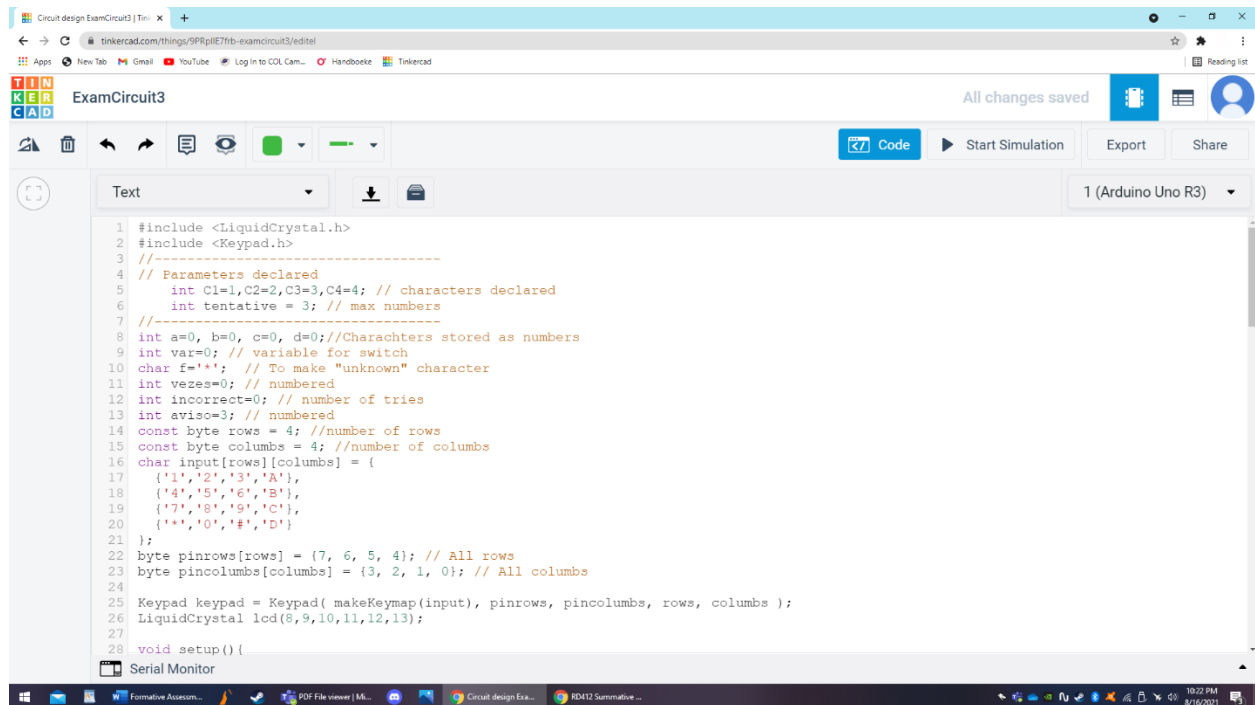
Correct Password:



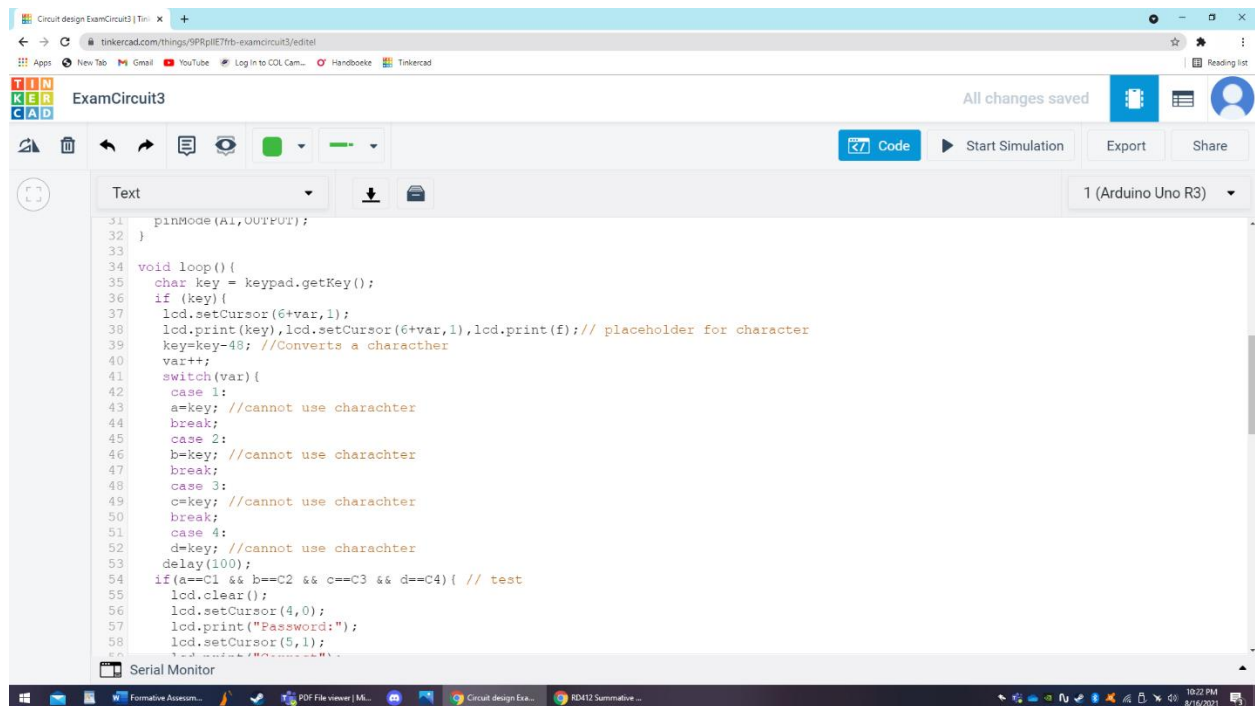
Incorrect Password:



Code:



```
1 #include <LiquidCrystal.h>
2 #include <Keypad.h>
3 //-----
4 // Parameters declared
5 int C1=1,C2=2,C3=3,C4=4; // characters declared
6 int tentative = 3; // max numbers
7 //-----
8 int a=0, b=0, c=0, d=0; //Characters stored as numbers
9 int var=0; // variable for switch
10 char f='*'; // To make "unknown" character
11 int vezes=0; // numbered
12 int incorrect=0; // number of tries
13 int aviso=3; // numbered
14 const byte rows = 4; //number of rows
15 const byte columns = 4; //number of columns
16 char input[rows][columns] = {
17   {'1','2','3','A'},
18   {'4','5','6','B'},
19   {'7','8','9','C'},
20   {'*','0','#','D'}
21 };
22 byte pinrows[rows] = {7, 6, 5, 4}; // All rows
23 byte pincolumns[columns] = {3, 2, 1, 0}; // All columns
24
25 Keypad keypad = Keypad( makeKeymap(input), pinrows, pincolumns, rows, columns );
26 LiquidCrystal lcd(8,9,10,11,12,13);
27
28 void setup() {
29   Serial Monitor
```



```
31 pinMode(A1,OUTPUT);
32 }
33
34 void loop() {
35   char key = keypad.getKey();
36   if (key){
37     lcd.setCursor(6+var,1);
38     lcd.print(key),lcd.setCursor(6+var,1),lcd.print(f); // placeholder for character
39     key=key-48; //Converts a character
40     var++;
41     switch(var){
42       case 1:
43         a=key; //cannot use character
44         break;
45       case 2:
46         b=key; //cannot use character
47         break;
48       case 3:
49         c=key; //cannot use character
50         break;
51       case 4:
52         d=key; //cannot use character
53     }
54     delay(100);
55     if(a==C1 && b==C2 && c==C3 && d==C4){ // test
56       lcd.clear();
57       lcd.setCursor(4,0);
58       lcd.print("Password:");
59       lcd.setCursor(5,1);
60     }
61   }
62 }
```

Circuit design ExamCircuit3 | Tini x +

tinkercad.com/things/9PRpIE7f6b-examcircuit3/editel

Apps New Tab Gmail YouTube Log in to COL Cam... Handbooke Tinkercad

**TINKERCAD** ExamCircuit3 All changes saved

Code Start Simulation Export Share

Text 1 (Arduino Uno R3)

```
62 lcd.clear();
63 digitalWrite(A0,LOW);
64 }
65 else{
66 lcd.clear();
67 lcd.setCursor(4,0);
68 lcd.print("Password:");
69 lcd.setCursor(4,1);
70 lcd.print("Incorrect!");
71 digitalWrite(A1,HIGH);
72 delay(1000);
73 lcd.clear();
74 digitalWrite(A1,LOW);
75 }
76 //----- Security measures -----//
77
78 if(a==C1 && b==C2 && c==C3 && d==C4){
79     vezes = 0; // number of tries
80     aviso = tentative; // tries available
81 }
82 else{
83     vezes ++;
84     aviso --;
85     //lcd.setCursor(2,0);
86     lcd.print("Reset ");
87     //lcd.setCursor(13,0);
88     lcd.print(aviso);
89     lcd.print("Test");
```

Serial Monitor

Windows Taskbar: Formative Asses..., PDF File viewer | M..., Circuit design E..., RD412 Summative...

System Tray: 10:23 PM 8/16/2021

Circuit design ExamCircuit3 | Tini x +

tinkercad.com/things/9PRpIE7f6b-examcircuit3/editel

Apps New Tab Gmail YouTube Log in to COL Cam... Handbooke Tinkercad

**TINKERCAD** ExamCircuit3 All changes saved

Code Start Simulation Export Share

Text 1 (Arduino Uno R3)

```
91 delay(1000);
92 if(aviso==0){
93     lcd.clear();
94     lcd.setCursor(5,0);
95     lcd.print("Alarm");
96     lcd.setCursor(4,1);
97     lcd.print("Active");
98 }
99 delay(300);lcd.clear();
100 }
101
102 while(vezes>=3){ // 3 tries
103     lcd.setCursor(0,0),lcd.print("Call police");
104     lcd.setCursor(0,1),lcd.print("! Intrusion !");
105     digitalWrite(A1,HIGH);
106     delay(500);
107     lcd.clear();
108     digitalWrite(A1,LOW);
109     delay(500);
110 }
111 var=0;
112 lcd.clear();
113 break;
114 }
115 }
116 if(!key){lcd.setCursor(0,0),lcd.print("Password :");}
117 delay(2);
118 }
```

Serial Monitor

Windows Taskbar: Formative Asses..., PDF File viewer | M..., Circuit design E..., RD412 Summative...

System Tray: 10:23 PM 8/16/2021