

Arduino for Schools

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1 DISPLAY CONTROL THROUGH HARDWARE

1.1 Powering the Display

The breadboard can be divided into 5 segments. In each of the green segments, the pins are internally connected so as to have the same voltage. Similarly, in the central segments, the pins in each column are internally connected in the same fashion as the blue columns.

Problem 1.1. Plug the display to the breadboard in Fig. 1.1

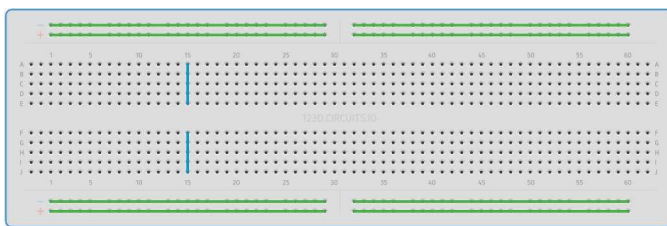


Fig. 1.1

The seven segment display in Fig. 1.2 has eight pins, *a, b, c, d, e, f, g* and *dot* that take an active LOW input, i.e. the LED will glow only if the input is connected to ground. Each of these pins

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is connected to an LED segment. The *dot* pin is reserved for the \cdot LED.

Problem 1.2. Connect one end of the 1K resistor to the COM pin of the display and the other end to an extreme pin of the breadboard.

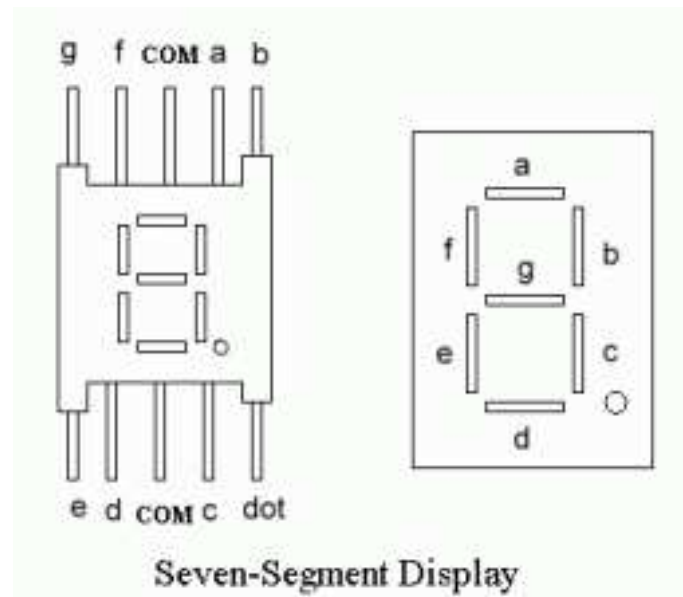


Fig. 1.2

The Arduino Uno has some ground pins, analog input pins A0-A3 and digital pins D1-D13 that can be used for both input as well as output. It also has two power pins that can generate 3.3V and 5V. In the following exercises, only the GND, 5V and digital pins will be used.

Problem 1.3. Connect the 5V pin of the arduino to an extreme pin that is in the same segment as the 1K resistor pin.

Problem 1.4. Connect the GND pin of the arduino to the opposite extreme pin of the breadboard

Problem 1.5. Connect the Arduino to the computer.

Problem 1.6. Connect the *dot pin of the display to a pin in the same segment as the GND pin. What do you observe?*

```
digitalWrite(6, e);
digitalWrite(7, f);
digitalWrite(8, g);
}
```

1.2 Controlling the Display

Problem 1.7. Generate the number 1 on the display by connecting the pins *a – g* to GND according to Table 1.7.

a	b	c	d	e	f	g	decimal
1	0	0	1	1	1	1	1

TABLE 1.7

Problem 1.8. Complete Table 1.7 for all numbers between 0-9.

Problem 1.9. Now generate the numbers from 1-9 on the display using the above table.

Problem 2.2. Now generate the numbers 1-9 by modifying the above program.

Problem 2.3. Suitably modify the above program to obtain a decade counter.

2 DISPLAY CONTROL THROUGH ARDUINO SOFTWARE

2.1 Driving the Segments

Open the arduino software. Check if the ports show Arduino Uno and click the appropriate button.

Problem 2.1. Type the following code and execute. What do you observe?

```
// the setup function runs once
// when you press reset or power
// the board
int a=1,b=0,c=0,d=1,e=1,f=1,g=1;
void setup() {
  pinMode(2, OUTPUT);
  pinMode(3, OUTPUT);
  pinMode(4, OUTPUT);
  pinMode(5, OUTPUT);
  pinMode(6, OUTPUT);
  pinMode(7, OUTPUT);
  pinMode(8, OUTPUT);
}

// the loop function runs over and
// over again forever
void loop() {

  digitalWrite(2, a);
  digitalWrite(3, b);
  digitalWrite(4, c);
  digitalWrite(5, d);
```