BCS, Jan2023

COMPUTER ARCHITECTURE AND ORGANIZATION

Section: D, Group: 2, Sujal Ratna Tuladhar, 22013230

Practical 1: Introduction to Tinker CAD and Basic Circuits

1. INTRODUCTION

As a part of Autodesk's 123D toolkit of free applications available online. They're the ideal introduction to Autodesk, a global leader in design and making technology. It's used by teachers, kids, hobbyists, and designers to design, and make anything! Tinker CAD is a super easy-to-use, versatile, and powerful browser-based free web app for the creation of models, and the ability to use designs as input to 3D design and printer tools, electronics, and coding tools. With Tinker CAD we can create 3D printable items. Users can quickly learn how to use the Tinker CAD software through a resource that provides users with basic tutorial lessons focusing on the basics of the tool. Additional lessons help users create artistic objects of increasing complexity by tinkering with existing designs-, and working collaboratively on features to support the extended application of the tool. To create new designs.

2. AIM

- Empowered Learner: understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies.
- Innovative Designer: use a deliberate design process for generating ideas, testing theories. Use digital tools to plan and manage a design process that considers design constraints and calculated risks. Develop, test and refine prototypes as part of a cyclical design process.
- Creative Communicator: choose the appropriate platforms and tools for meeting the desired objectives of their creation or communication. Create original works or responsibly repurpose or remix digital resources into new creations.

3. COMPONENTS

- Breadboard

A breadboard (plugboard/protoboard) is foundation to use and constructs for building prototype electronics circuits. It is useful to designers because it allows components to be removed and replaced easily in creations of temporary circuits. It is useful to the person who wants to build a circuit to demonstrate its action, then to reuse in another circuits. The developers easily connect components or wires; in rows and columns of internally arranged in matrices; springs and wires underneath plastic enclosure.

- LED

A Light Emitting Diode (LED) is a widely used standard source of light in electrical equipment, it had a wide range of applications ranging. It is a semiconductor device that emits light when an electric current flows through it. They have heavily doped PN junctions.

- Resistor

A 2 terminal (double ended) passive linear device that has electrical resistance and is used for protections/limiting, operations, or current controls/regulating the flow of electrical current in circuit and provide specific voltage for active devices. It is made up of copper wires wrapped around in ceramic rod and painted with insulating paint.

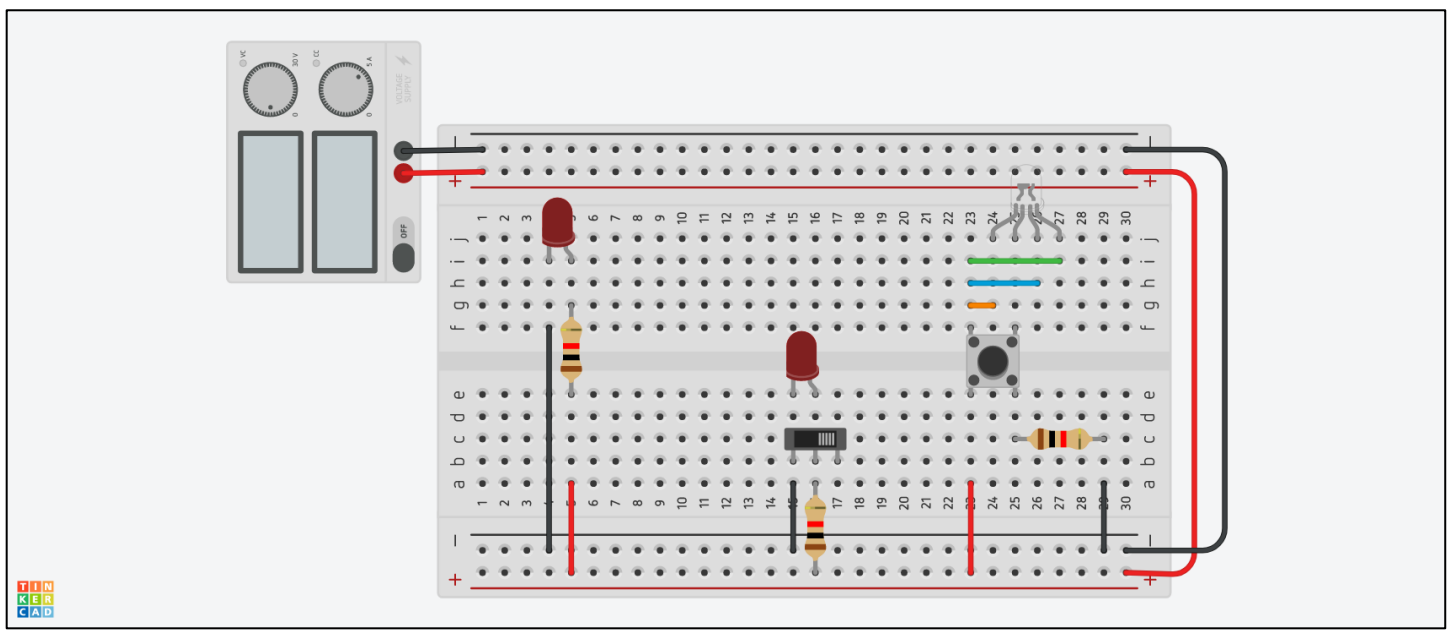
- Switch

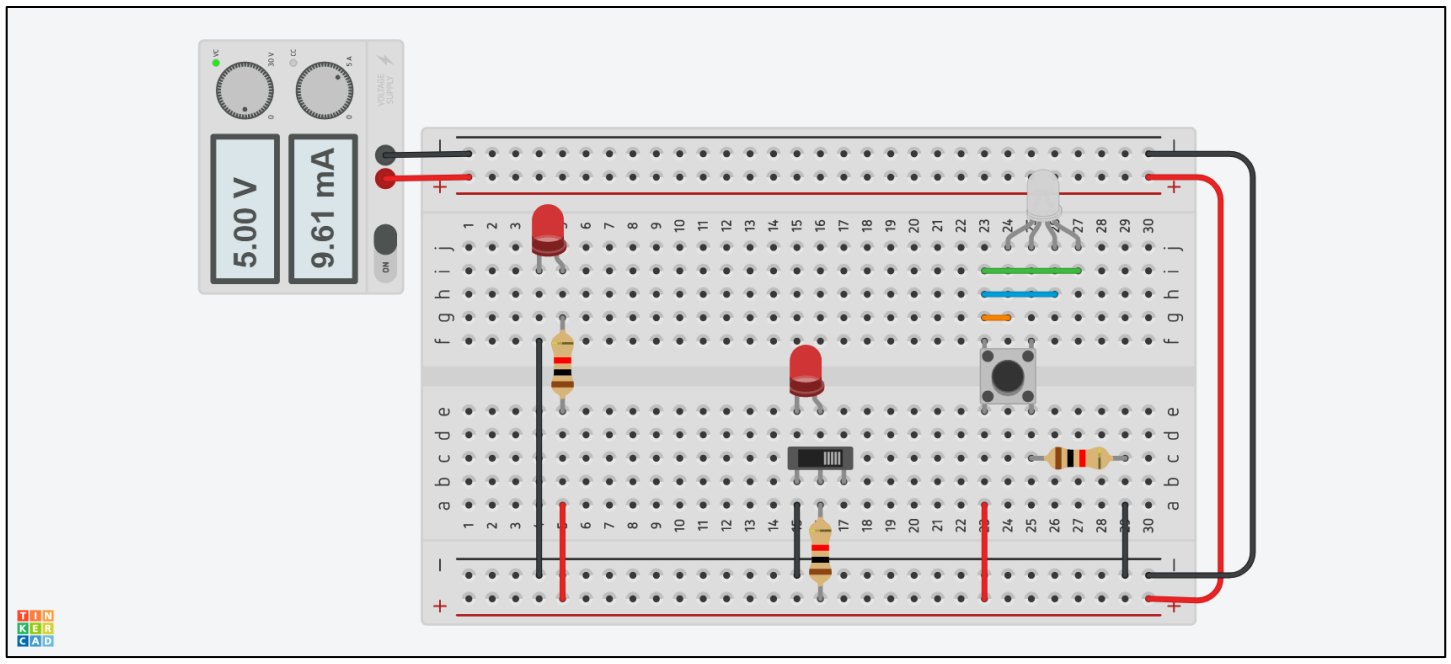
An electromechanical device that respond to external mechanical force to use to interrupt (make or break) the flow of electrons in a circuit. They are essential binary devices: either on or off

4. PROCEDURE

- We opened our Tinker Cad account.
- On the dashboard (home), we were told click on new then on circuit on the design tab. An open building area was created to design circuits.
- We observed the basic circuit design put forward by our instructor on the whiteboard and followed the instructions on constructing the circuit below.
- We were told the necessary components and processes that was required to make a simple circuit with the guidance of our teacher.
- First, we put down the breadboard at the center of the workspace.
- Then, we selected a power supply and connected the breadboard with wires.
- We first tested the different resistance values and power supply value and observed how the LED is affected
- We added slide switch to adjust the value. Along with push switch to observe how different it worked. Also checked how changing the common to anode/cathode affected the whole working of the circuit.
- Then we noted down the Boolean values on the table.
- At the end we saved our work by changing the name of the project.

5. CIRCUIT DIAGRAM: **With Resister, Slide Switch and Push Switch**





Simple to memorize and use in general. Good animations and graphics, we can undo/redo and resize to fit the entire circuit. We were able to find out about different gates. But it required internet connections and devices which could be a problem. having only resistor the LED turns on whenever the power is on but with inclusion of switch it now is controlled.

6. RESULTS

- Resister

Power	LED
1	1
0	0

- Switch

Power	Button	LED
0	0	0
1	0	0
0	1	0
1	1	1

Practical 2: Output

SECTION 1-1

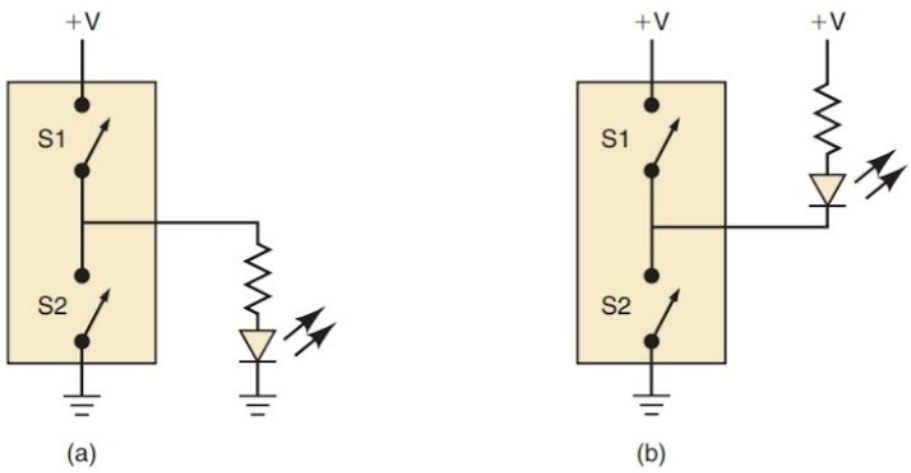
1-1. In Figure 1-22a, what is the logic level that must be output to turn on the LED?

1-2. In Figure 1-22b, what is the logic level that must be output to turn on the LED?

1-3. In Figure 1-22a, which switch must be closed to turn on the LED?

1-4. In Figure 1-22b, which switch must be closed to turn on the LED?

1-1.

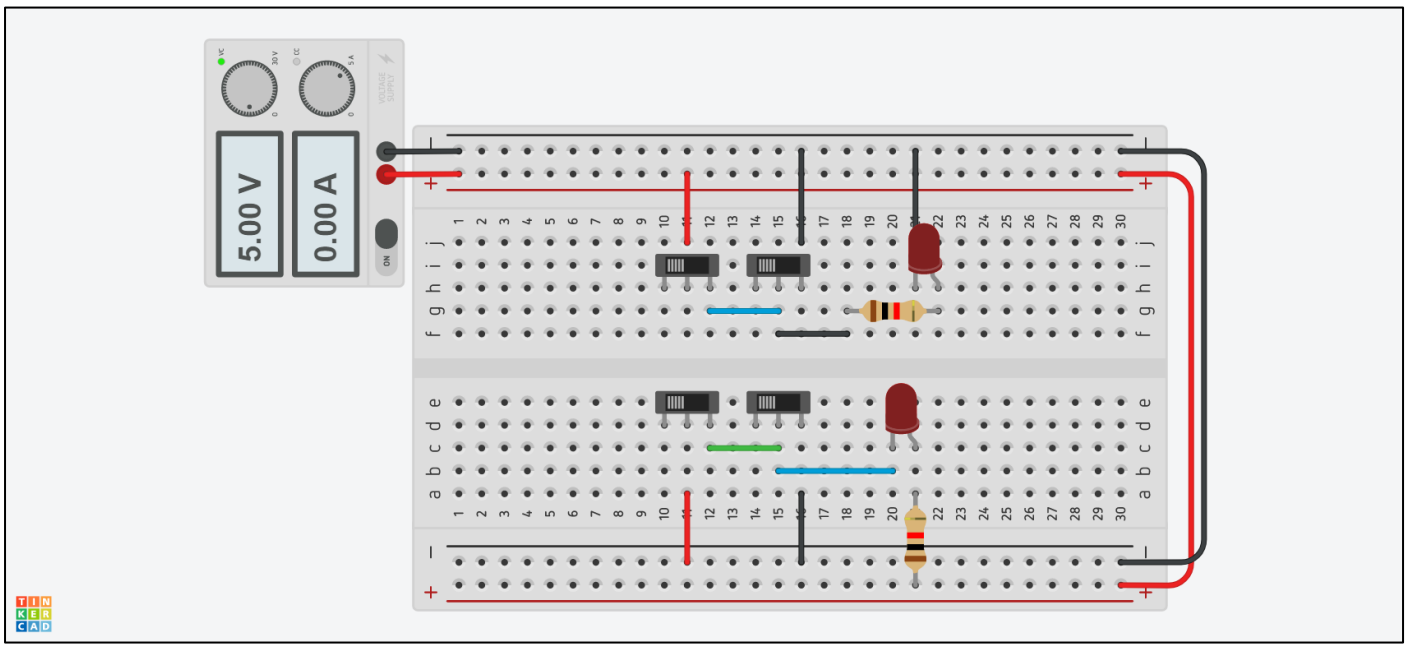


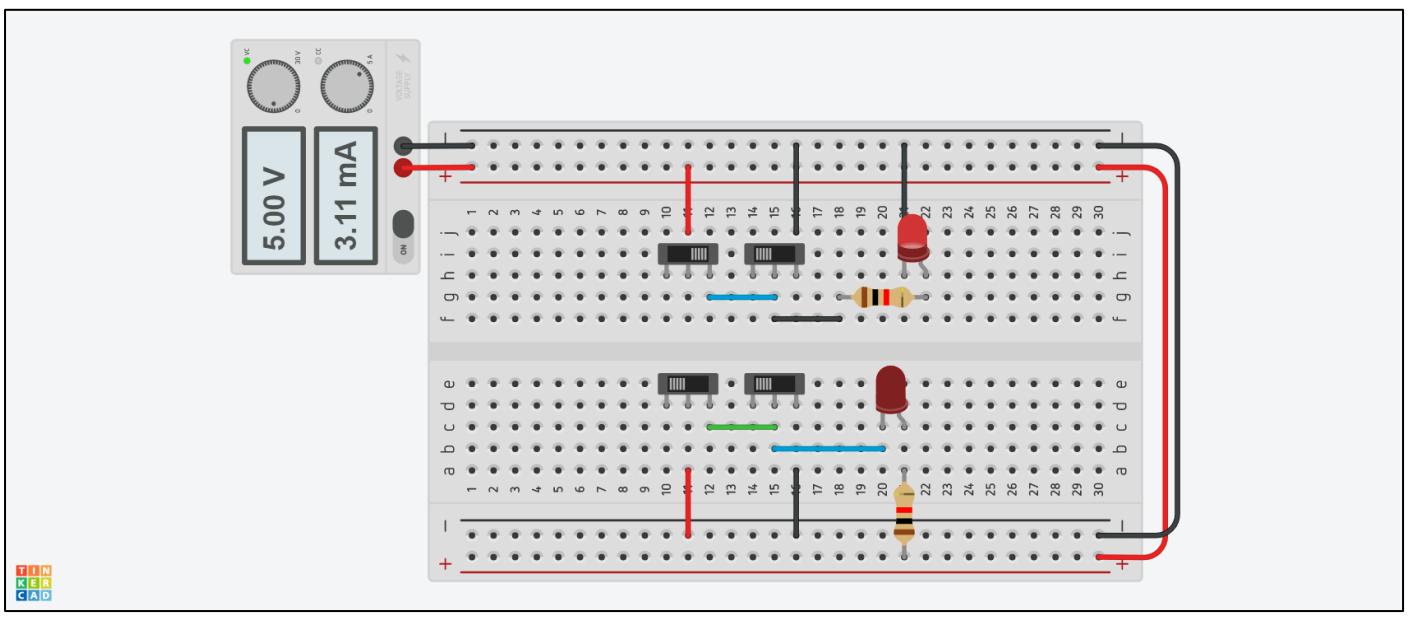
7. PROCEDURE

- We opened our Tinker Cad account.
- On the dashboard (home), we were told click on new then on circuit on the design tab. An open building area was created to design circuits.
- We observed the basic circuit design for a circuit put forward by our instructor on the whiteboard and followed the instructions on constructing the circuit below.
- We were told the necessary components and processes that was required to make a simple circuit with the guidance of our teacher.
- First, we put down the breadboard at the center of the workspace.
- Then, we selected a power supply and connected it to the breadboard with wires.
- A rough idea was created for making the 2 circuits
- It was kept in place for a test
- We read the questions to be answered
- Then we noted down the Boolean values on the table for when the led is on/off
- At the end we saved our work by changing the name of the project.

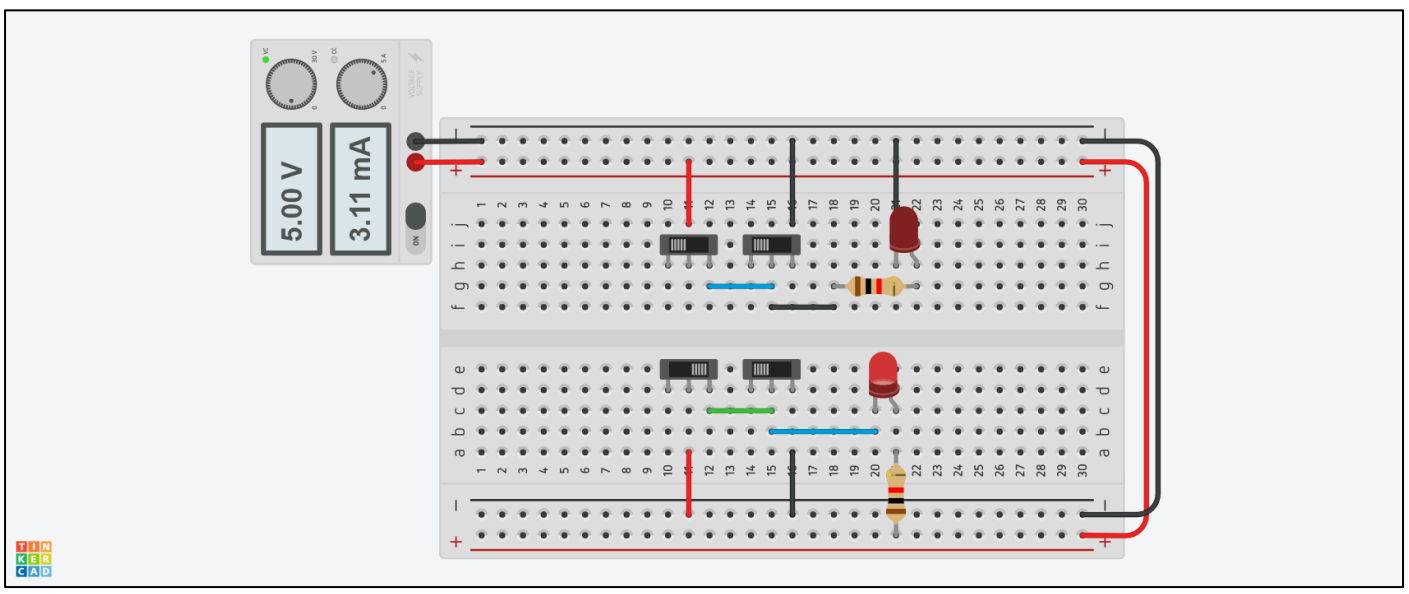
8. CIRCUIT DIAGRAM:

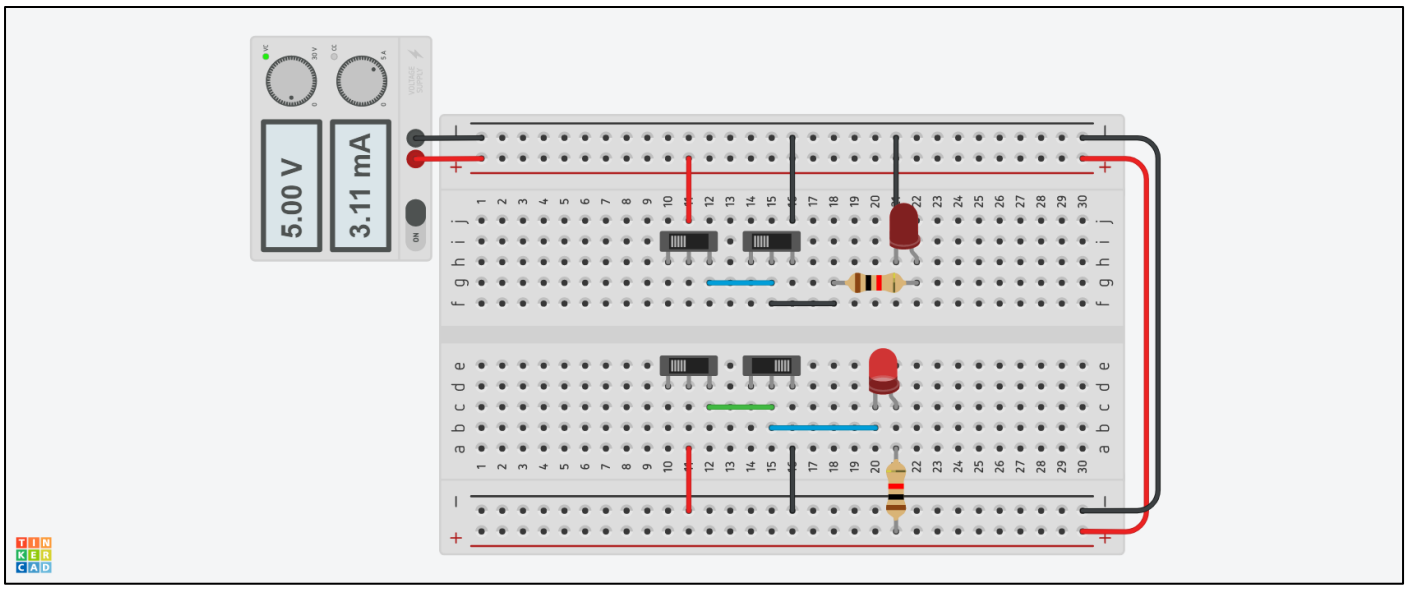
1.22a

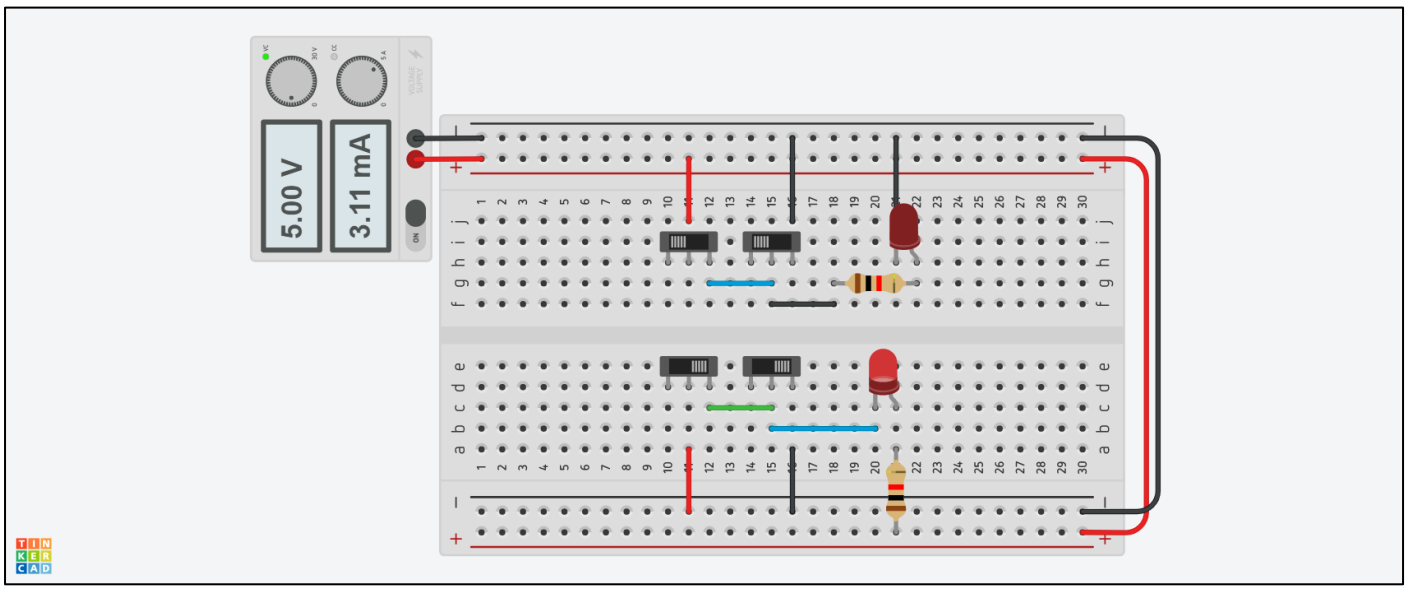




1.22b







9. RESULTS

INPUT		OUTPUT
0	0	0
0	1	0
1	0	1
1	1	0

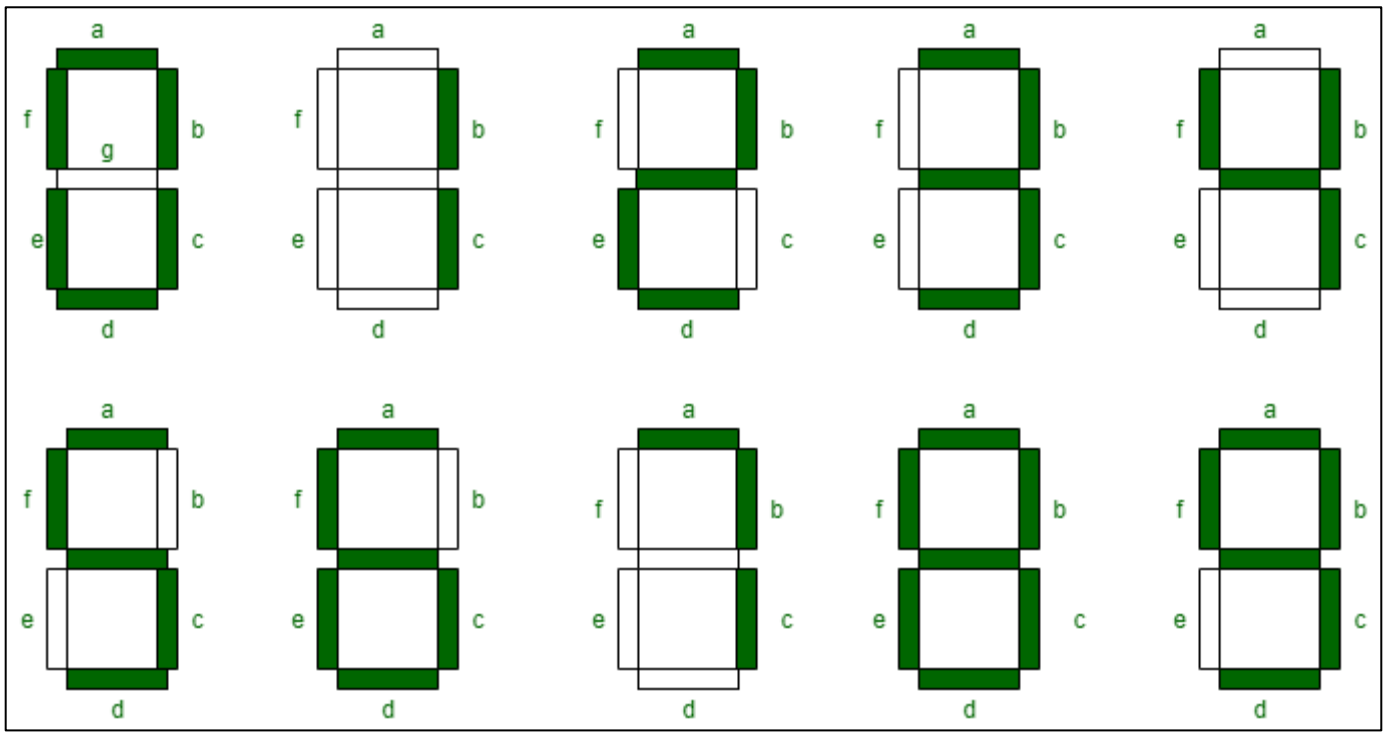
In figure 1-22a the logic level that must be 1 at least for the output to turn on the LED. or the switch 1 should be closed. Rest of the switch will be open/closed

INPUT		OUTPUT
0	0	0
0	1	1
1	0	1
1	1	1

In figure 1-22b the logic level must have 1 of all for the output to turn on the LED.

At least 1 switch should be closed. Both should be open to turn off the lights

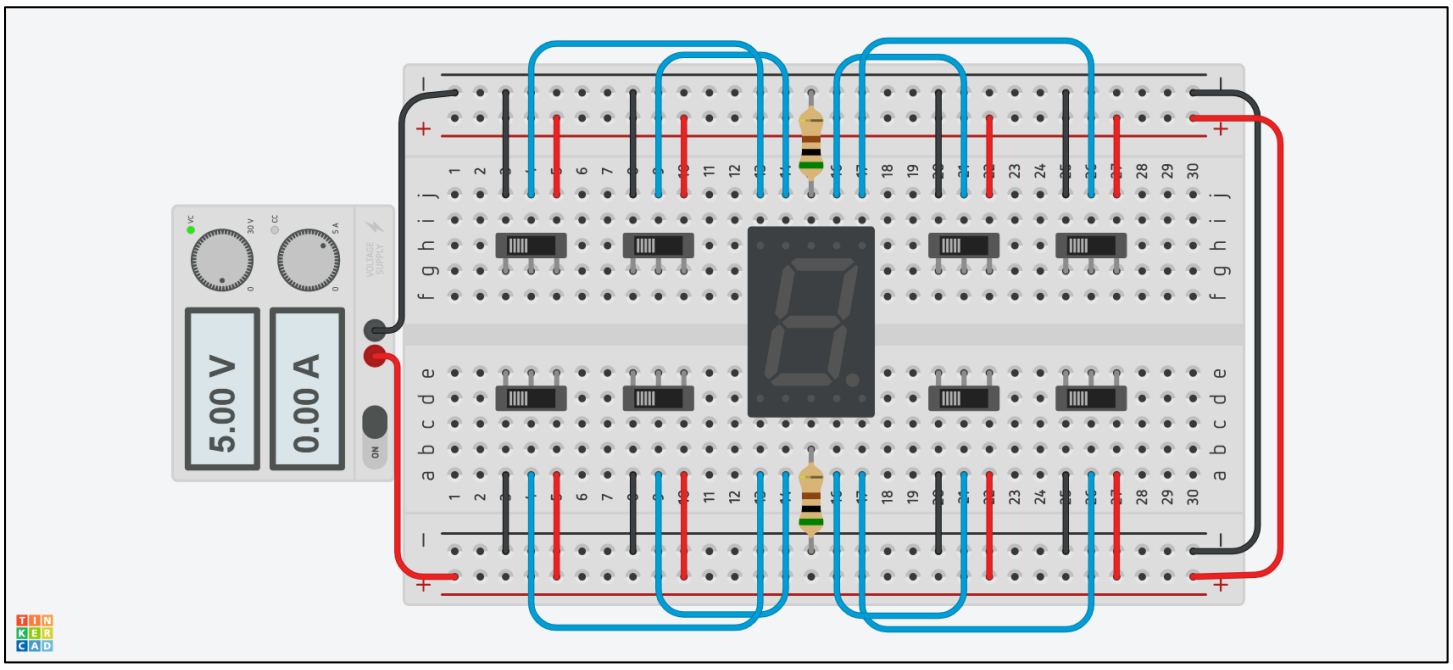
Practical 3: 7-Segment Display to Represent Single-Digit Numbers

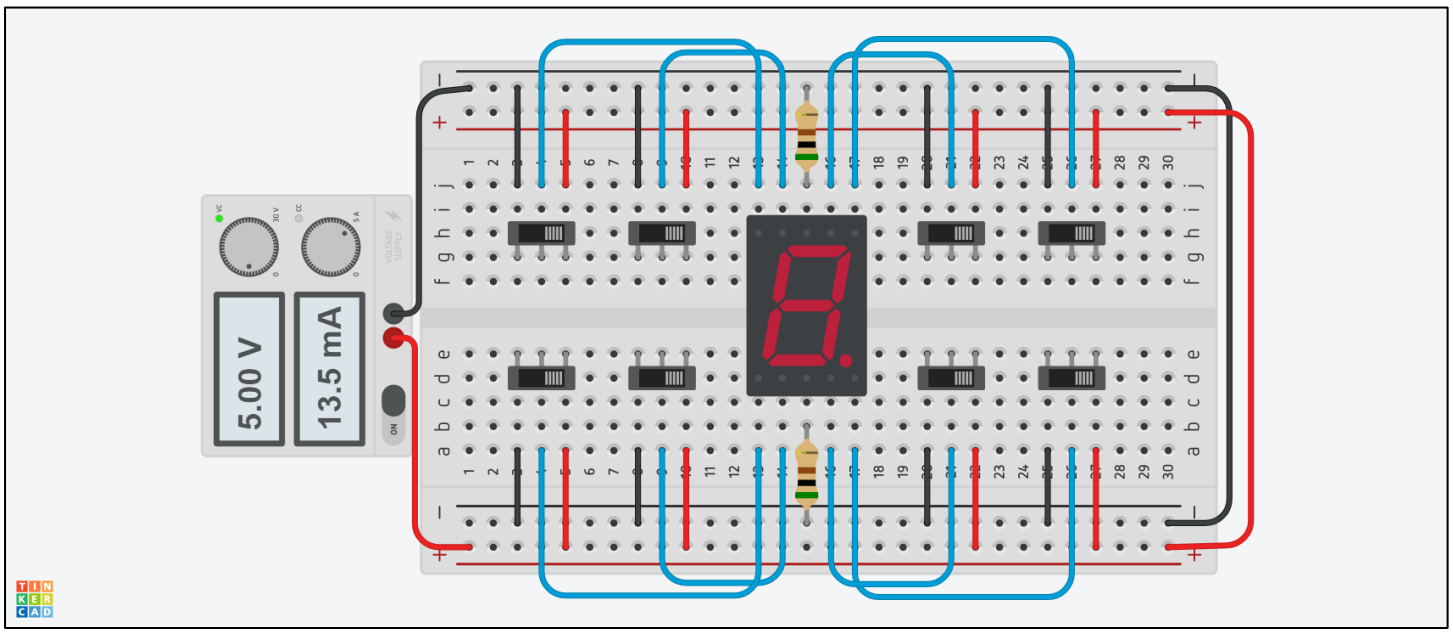


10. PROCEDURE

- We opened our Tinker Cad account.
- On the dashboard (home), we were told click on new then on circuit on the design tab. An open building area was created to design circuits.
- We observed the basic circuit design for a 7-segment display put forward by our instructor on the whiteboard and followed the instructions on constructing the circuit below.
- We were told the necessary components and processes that was required to make a simple circuit with the guidance of our teacher.
- First, we put down the breadboard at the center of the workspace.
- Then, we selected a power supply and connected it to the breadboard with wires.
- A 7-segment display was chosen then placed at the center with commons connected to resistors which is connected to the +ve for anode and -ve for cathode.
- After learning about the 2 common in the 7-segment display tested the different resistance values and power supply value and observed how the display is affected.
- We added slide switch to adjust the value of each particular segments (a to g). Also checked how changing the common to anode/cathode affected the whole working of the circuit.
- Then we noted down the Boolean values on the table for when the segment is lit to display the numerals 0 to 9.
- At the end we saved our work by changing the name of the project.

11. CIRCUIT DIAGRAM: **7-Segment Display**





Simple to use in general but hard to memorize at first. Good animations and graphics, we can undo/redo and resize to fit the entire circuit. We were able to find out about different segments and there working. But it required internet connections and devices which could be a problem.

12. RESULTS

Output required to Display Number

Decimal Digit	Individual Segments							
	a	b	c	d	e	f	g	DP
0	1	1	1	1	1	1	0	1
1	0	1	1	0	0	0	0	1
2	1	1	0	1	1	0	1	1
3	1	1	1	1	0	0	1	1
4	0	1	1	0	0	1	1	1
5	1	0	1	1	0	1	1	1
6	1	0	1	1	1	1	1	1
7	1	1	1	0	0	0	0	1
8	1	1	1	1	1	1	1	1
9	1	1	1	1	0	0	1	1

Link:

https://www.tinkercad.com/things/aoY4iAfsUSU?sharecode=Boo_L--0N1XNTHk8z38C9t9NBYwBV5--j-Nh0P4NE_Q

(You can simulate the circuit with the given link above.)

13. CONCLUSION

Tinker Cad is a self-learning platform and doesn't need any assistance or demo if we know our electrical components. It facilitates individual and collaborative work. It is engaging lesson to learn how to create and simulate circuits with available tools. We were able to work on others circuit and help each other. A simple and accurate 7-segment display is constructed

14. REFERENCES

- "TINKERING WITH TINKERCAD A Beginner's Guide to Creating 3D Printer Designs" Michael Hibben & Sarah Holmes
- Electronic Circuit Basics with Tinker ad By Alex Reyes
- Getting Started in Tinker ad By Bonnie Roskes, 3Dvinci
- Tutorial Tinker CAD Electrical Series Circuit By: Matthew Jourden Brighton High School, Brighton, MI