

Learning Intentions

- Learn how to make circuits with resistors, LEDs, and switches
- Learn how to measure and calculate current and voltage through resistors
- Learn how to build an electric toy

The board game "Operation" operates on the principal of completing an electric circuit.

https://www.youtube.com/watch?v=_6MAkJ79LE

For this project, you will make a board game similar to "Operation".

Procedure

1. Choose a group of 1 to 3 people.
2. Design a game that uses the electric components we have available in class.
3. The minimum requirements depend on the number of people in the group:

Number of People in Group	1	2	3
USB power cables	1	1	1
Switches	2	4	6
LED's	3	6	9
Resistors	3	6	9
Motor	1	2	3
Series Circuits	1	2	3
Parallel Circuits	1	2	3
Something Extra	1	2	3

4. Draw a circuit schematic that uses all of the needed components. The more complex the circuit, the higher the mark.
 1. Extending: Come up with something extra to add to the circuit.
5. Measure the resistance of your resistors.
6. Make the circuit using the materials available in class.
7. Have the teacher approve your circuit (i.e. make sure there are no short circuits), and show you how to use the DC power supply to provide 5V for the circuit.
8. Attach the power supply to the circuit with a supply voltage of 5V.
9. Using a multimeter, measure the voltage across each resistor.
10. Using a calculator, calculate the current through each resistor.

Data, Calculations, and Schematic

Draw the schematic for your circuit using all of the required components.

Pretend the USB cable is a 5V battery.

Because we are using 5V, every LED must have a resistor (with a resistance of at least 100Ω) in series.

Record the resistance, voltage, and current for each of your resistor in the table below.

Resistor	Resistance (Ω)	Voltage (V)	Current (A)
R1			
R2			
R3			
R4			
R5			
R6			
R7			
R8			
R9			

Assessment

	Required Components	Multimeter Measurements	Calculations
1. Beginning	Missing a lot	Lots of Mistakes	Lots of Mistakes
2. Developing	Missing a bit	Some Mistakes	Some Mistakes
3. Applying	✓	✓	✓
4. Extending	Something Extra		