Electrotechnology Lab report #1

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Introduction:

Kirchhoff's voltage law states that the voltage drop across each part of the circuit will add to give you the supply voltage of that circuit.

Kirchhoff's current law states that the current entering into a point on a circuit will be equal to the current leaving that same point on the circuit.

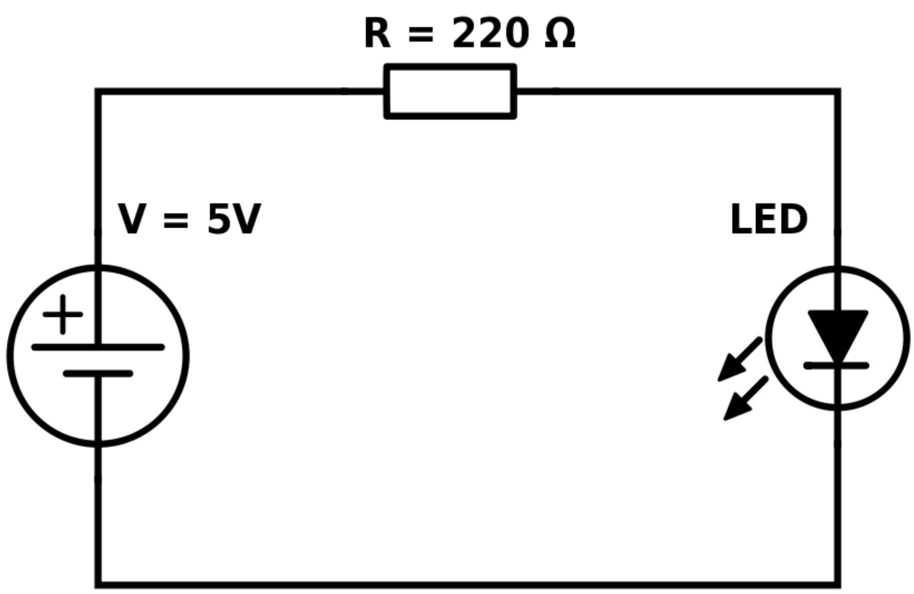
To verify these laws two different circuits were set up, one which was in series and another which was in parallel, the voltages and amperes were measured and the results were compared to the laws stated above

Part one: Verifying Kirchhoff's voltage law

Method:

1. I measured the Voltage drop across the resistor (R1 in diagram 1), this was done by first connecting the voltmeter in parallel with the resistor.
2. Next the voltage drop across the LED was measured, in the same way as the resistor I put the voltmeter in parallel with the LED
3. The current was also taken across the resistor (R1), this was done by putting the multimeter in series with the resistor, this forces the current to pass through the multimeter so It can be measured
4. The current was also found across the LED in the same manner, by wiring the multimeter in series with the LED.
5. With the measurements that were taken I could now find the resistance across the LED through the R = V/I formula.

Circuit Diagram:



Results:

Resistance across the LED = V/I

Resistance = 3.6 / 0.0063

Resistance = 571 Ohms

	Voltage	**Current**	**Resistance**
LED	3.6 V	6.3 mA	571 Ω
Resistor	1.4 V	6.3 mA	220 Ω
Power Output	5 V	6.3 mA	

Interpretation:

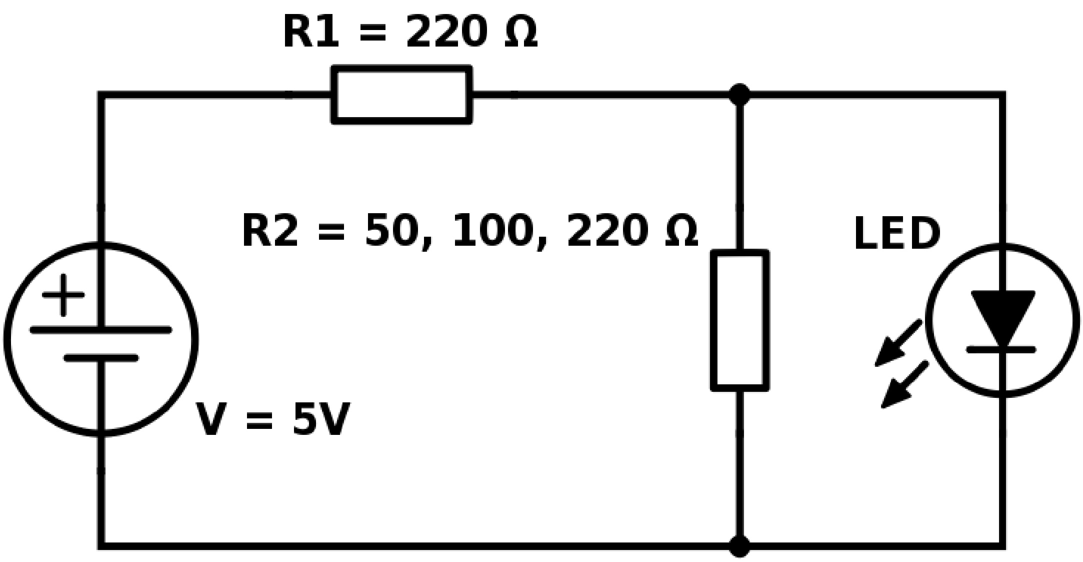
These results verify Kirchhoff's voltage law as the total voltage drop is equal to the supply voltage, i.e. the LED (3.6V) and the Resistor (1.4V), when added give the voltage supplied, 5V.

Part two: Verifying Kirchhoff's current law

Method:

1. The circuit was set up as shown with the diagram, I first selected one of the three resistors (R2 at 220 Ω, 100 Ω and 50 Ω) and started to measure the voltage drop and current through different parts of the circuit
2. I measured the voltage drop across the resistor (R1) by putting the multimeter in parallel
3. The total voltage drop was then measured for the LED and the resistor (R2) by putting it in parallel with that segment of the circuit
4. The current of the resistor (R1) was measured by putting the multimeter in series with that resistor
5. Finally the current across the LED was measured by putting the multimeter in series with it
6. This was repeated for the other two resistor

Circuit Diagram:



Results:

	Voltage	Current	Resistance
Resistor (R1)	2.7 V	12 mA	220 Ω
Resistor (R2)	2.3 V	10.3 mA	220 Ω
LED	2.3 V	1.7 mA	571 Ω
Power Output	5 V	12 mA	

	Voltage	Current	Resistance
Resistor (R1)	3.4 V	12 mA	220 Ω
Resistor (R2)	1.6 V	12 mA	100 Ω
LED	1.6 V	0 mA	571 Ω
Power Output	5 V	12 mA	

	Voltage	Current	Resistance
Resistor (R1)	4.05 V	12 mA	220 Ω
Resistor (R2)	0.95 V	12 mA	50 Ω
LED	0.95 V	0 mA	571 Ω
Power Output	5 V	12 mA	

Interpretation:

These results verify Kirchhoff's current law as the resistor (R2) and LED are wired in parallel, according to the law their combined current should equal the current in the rest of the circuit. Therefore the law holds true to this circuit. The reason I believe the LED didn't light up is because the operating voltage did not provide sufficient power to the LED.