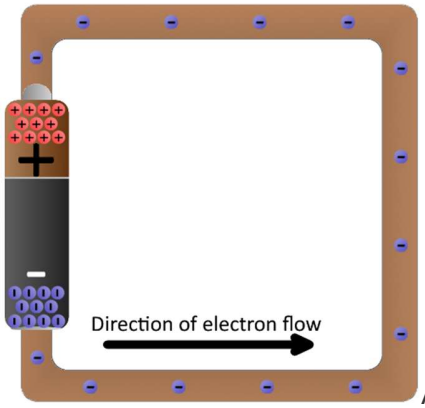
ARDUINO

1. ELEKTER
    a. **OVERALL *PRACTICAL*** https://learn.sparkfun.com/tutorials/what-is-electricity - Üldine, hea ja tutvustav
        i. ATOM
            1. ELECTRON –
            2. PROTONS +
            3. NEUTRONS 0
        ii. Potential/Kinetic
        iii. Current
        iv. FIELDS
        v. Voltage – The diference of potential energy between points in a electrical field.
        vi. Resistance
            1. Conductors
            2. Insulators
        vii. FIELDS
    b. **OVERALL *PRACTICAL***
    https://www.newark.com/wcsstore/ExtendedSitesCatalogAssetStore/cms/asset/images/americas/common/storefront/eaton_cutler_hammer/101-Elec-Basics.pdf
        i. Current – The number of electrond that flow through a cross section in one second. (Measured in Ampers.) (Notation I)
        ii. Voltage – The force, that is applied to conductor to free electrons. This causes the electrical current to flow. (Measured in Volts.)(Notation E)
        iii. Resistance – Based on length, material, temperature, width (Notation R)
        iv. Ohms Law – E=IR
    c. **OVERALL *THEORETICAL*** https://www.khanacademy.org/science/physics/electric-charge-electric-force-and-voltage Again a very high level tutorial from KHAN academy for theory of electricity. Also with some mathematics. Calculus, e.g integrals used.
    d. **GROUND** Ground in this Picture is the plus side, because it has the lowest potential energy. In terms of pushing from - side. Also there the electrons will be neutralized by the protons. In the case, we have no resistance inbetween the conductor and the source, bad things will happen..

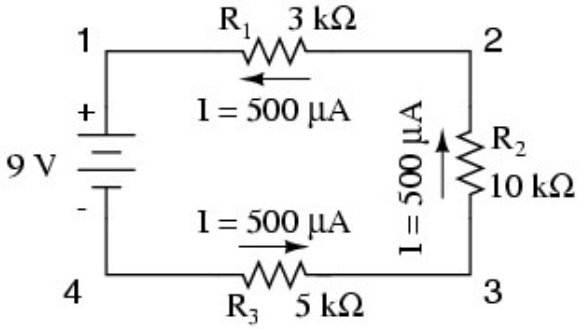


After a second of the current flow, the electrons have actually moved *very* little–fractions of a centimeter. However, the energy produced by the current flow is *huge*, especially since there's nothing in this circuit to slow down the flow or consume the energy. Connecting a pure conductor directly across an energy source is a **bad idea**. Energy moves very quickly through the system and is transformed into heat in the wire, which may quickly turn into melting wire or fire.

e. **OVERALL *THEORETICAL, PRACTICAL*** http://www.allaboutcircuits.com/textbook/direct-current/chpt-1/voltage-current/

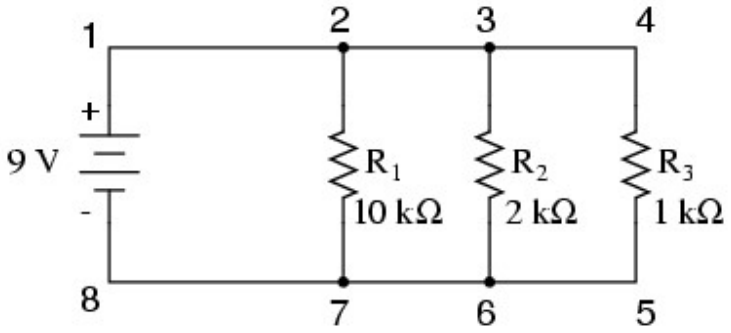
   i. **SINGLE CIRCUITS** http://www.allaboutcircuits.com/textbook/direct-current/chpt-5/simple-series-circuits/

   In the beginning we only have total voltage and resistance and also the resistances of each separate resistance. We add R1, R2, R3 up to get total resistance. Then based on total voltage and total resistance we calculate amps I=E/R. As I is the same everywhere, we can calculate the separate voltages based on I and separate Resistances. This adds up to nine.



	R1	R2	R3	Total	
E	1.5	5	2.5	9	Volts
I	500µ	500µ	500µ	500µ	Amps
R	3k	10k	5k	18k	Ohms
	Ohm's Law	Ohm's Law	Ohm's Law		

ii. **PARALLEL CIRCUITS**



	R_1	R_2	R_3	Total	
E	9	9	9	9	Volts
I	0.9m	4.5m	9m	14.4m	Amps
R	10k	2k	1k	**625**	Ohms

$$R_{total} = \frac{E_{total}}{I_{total}} = \frac{9\ V}{14.4\ mA} = 625\ \Omega$$

Ohm's Law

PROJECT 1 IN ARDUINO PROJECT BOOK.

PROJECT 2 IN ARDUINO PROJECT BOOK.

PROJECT 3 IN ARDUINO PROJECT BOOK.

PROJECT 4 IN ARDUINO PROJECT BOOK.