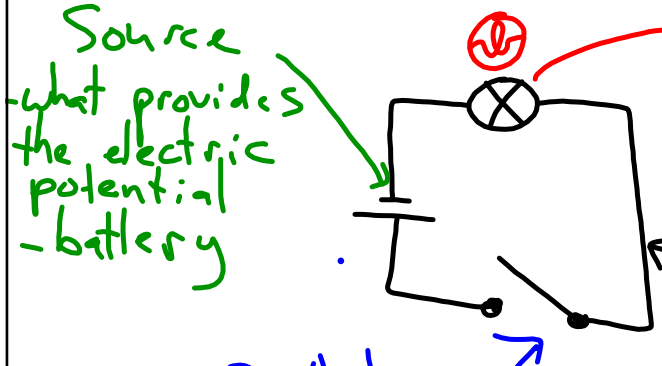
1) Explain the difference between static and current electricity.

- Static stays in one place while current in continuous, contained in circuits.
- static is generated by friction
  current is generated by a source (batteries/outlets).

2) Define the four parts of a circuit, providing examples for each.



Source
- what provides the electric potential
- battery

electric load
↳ what is using the electricity.
↳ lightbulb, conveyor belt

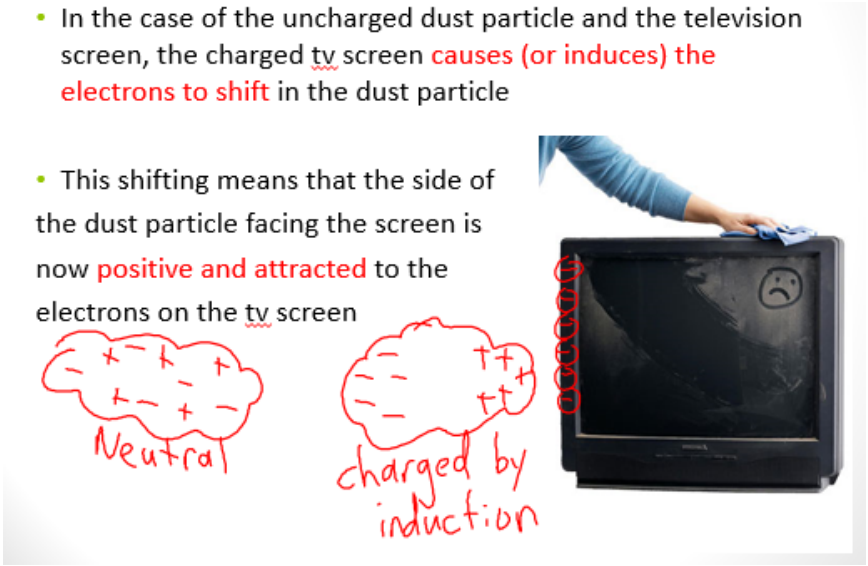
connector
↳ connects the circuit together, provides a path for e^- to travel.

Switch
turns on/off
closed/open
light switch

2) a) Charging by Friction - by rubbing two objects together, electrons move from one substance to another. Ex - When rubbing your hair with a balloon, the electrons move from your hair to the balloon, charging the balloon.

b) Charging by contact - when a buildup of electrons charges (shocks) a positive or neutral object. Ex - you can touch the charged balloon to another person and shock them.

c) Charging by induction - when electrons move, creating a charge, without any contact made. Ex - as a dust particle gets close to a tv screen, the electrons move away from the negatively charged tv screen.

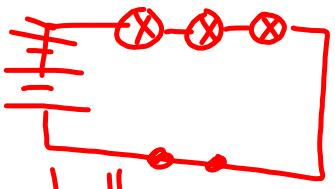
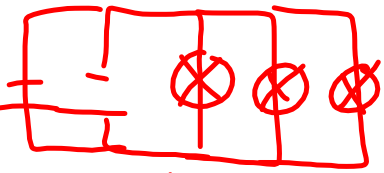


3) Explain the difference between conductors and insulators.

conductors lets electrons through easily
↳ metals, copper

insulators do not let electrons through
↳ rubber, wood

4) Compare/contrast series circuits and parallel circuits

Series	Parallel
- one path	- more than one path
	
ex. batteries in series for more power. (add the Voltage/Resistance)	ex. christmas lights batteries will last longer (do not add voltage or resistance)
• One goes out, they all go out.	• One light goes out, the rest stay on.
• Add a load, the current drops	• Add a load, current stays the same.

5) List the variables we used in our formulas, including units for each.

$V = I \times R$ $E = I \times V \times \Delta t$ $P = E \div \Delta t$ $P = V \times I$

V = voltage (electric potential), V

I = current, A

R = resistance, Ω

P = Power rating, Watts

E = electrical energy, J

6) Explain how lightning works.

Lightning is a big static shock.

- Due to friction in a cloud, a negative charge builds up at the bottom. Lightning is this charge balancing out by a rush of electrons hitting Earth.

7) Fill in the following table:

Formula	List of variables and units	Formulas rearranged to find each factor
Ohm's Law $V = I \times R$	V: voltage, Volts (V) I: current, Amps (A) R: Resistance, Ohms (Ω)	$I = \frac{V}{R}$ $R = \frac{V}{I}$
Electrical Energy $E = V \times I \times t$	E: Energy, Joules (J) V: Voltage, Volts (V) I: Current, Amps (A) t: time (seconds)	$V = \frac{E}{I \times t}$ $I = \frac{E}{V \times t}$ $t = \frac{E}{V \times I}$
Power $P = V \times I$	P: power (watts, W) V: voltage, volts (V) I: current, Amps (A)	$V = \frac{P}{I}$ $I = \frac{P}{V}$

8) A stereo with 40 Ω of resistance draws 3.0 A. Determine the electrical potential (Voltage) of this circuit.

$R = 40\Omega$
$I = 3.0A$
$V = ?$

$V = I \times R$
$V = 3.0A \times 40\Omega$
$\boxed{V = 120V}$

9) A 100 watt guitar amp is plugged into a 120V socket. How much current does it draw?

$P = 100W$
$V = 120V$
$I = ?$

$I = \frac{P}{V}$
$I = \frac{100W}{120V}$
$\boxed{I = 0.83A}$

10) Mr. Glenwright plays nintendo, drawing 4.5 A from a 120V socket, for 2.5 hours. How much energy does he use?

$I = 4.5A$

$V = 120V$

$t = 2.5$ hours

$E = ?$

$E = V \times I \times t$

$E = 120V \times 4.5A \times 9000sec$

$E = 4860000J$

$2.5hr \times \frac{3600sec}{1hr} = 9000sec$

11) Two 9V batteries in series provide 6A for a flashlight. Draw a schematic diagram of this flashlight in the "off" position. Is this an open or closed circuit? Also, determine the resistance of the flashlight.

$V = 9V + 9V = 18V$

$I = 6A$

$R = ?$

$R = \frac{V}{I}$

$R = \frac{18V}{6A}$

$R = 3\Omega$