# Electricity Unit Review Answers

1. a) acetate (+), silk (-)
   b) ebonite (-) , human hair (+)
   c) silk (+), cotton(-)

2. There is less moisture in the air in the winter so there are fewer water molecules to remove charges from charged surfaces. Water acts as a conductor moving electrons away from the individual.

3. Source – cell or battery (provides the energy)
   Load – toaster, light bulb (is given the energy)
   Connecting wires – copper, aluminum (connects the various parts of the circuit)
   Control device – switch, thermostat (controls if the load is on or off)

4. a) Static electricity stays in one place on an object and current electricity is an electric charge that is moving in one or more paths.
   b) A series circuit is when the parts of the circuit are wired to one another in a single path. A parallel circuit is when the parts of the circuit are each on their own separate branch.
c)A closed circuit is one in which electricity is flowing. An open circuit is one in which there is a break in the flow of electricity.

5. a)

b)

c)

d)
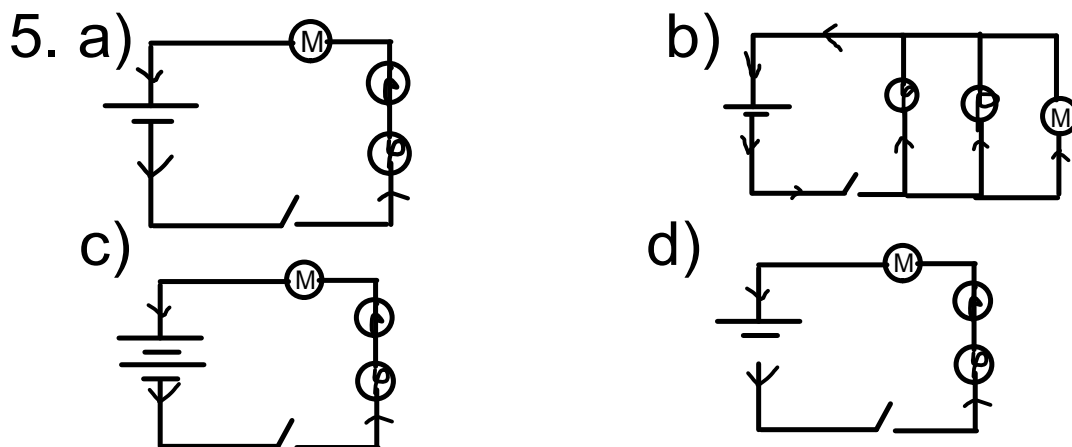
e) b) The parallel circuit would have the least amount of resistance, there are multiple paths through which current can flow, so the resistance of the overall circuit is lower than it would be if only one path was available as it is in a) the series circuit

f) c) would have the greatest amount of voltage because it contains two light bulbs, circuit d) is wired using the same components but has only 1 source to provided voltage to the circuit. The batteries provide the voltage to the circuit therefore more batteries equates to more voltage.

6. a.   electrical potential/voltage V , volts
b.   electric current A , amps
c.   electric resistance R, Ω

7. a) The relationship between current and resistance is an inverse relationship. The greater the resistance the less the current is. Resistance slows down the flow of electrons and current measures the flow, so every time you add a resistor the flow is slowed even less.

b) The relationship between voltage and current is a direct relationship. When voltage increases current also increases. Voltage is the amount of electrons available and current measures the flow of electrons if you increase the amount of electrons you in turn increase the flow of them.

c) The relationship between voltage and resistance is also a direct relationship the voltage must increase as resistance increases for there to be enough electrons flowing through the circuit to create electricity.

8 a) How much current is running through a circuit which has a voltage of two1.5V batteries and a resistance of 35Ω.

V = 2 x 1.5V = 3V   I = $\underline{V}$ = $\underline{3V}$ = 0.086A
 R = 35Ω   R   35Ω

   b) How many 2V batteries would be required to power a circuit with a current of 4A and a resistance of 8Ω?

I = 4A   V = I x R
R= 8Ω   V = 4A x 8Ω
                                V = 32V
32V ÷ 2V = 16 batteries
It would take 16 2V batteries to power the circuit.

   c) What is the voltage running through a circuit that contains a resistance of 450Ω and a current of 4.2 amps running through it.

R = 450Ω   V = I   x   R
I = 4.2amps   V = 4.2A x 450Ω
                                V = 1890 volts

   d) Calculate the resistance flowing through a circuit with 120V and 0.5A of current.
V = 120V   R = $\underline{V}$ = $\underline{120V}$ = 200Ω
I = 0.5A   I   0.5A
R = ?

   e) Calculate the resistance flowing through a circuit with three 1.5V batteries and 2A of current.

V = 3 x 1.5 V = 4.5V   R = $\underline{V}$ = $\underline{4.5V}$ = 2.25Ω
I = 2A   I   2A