Review– Electricity Unit

Name: Key Date: _____ Block: _____

Please use all your labs and practice sheets, plus this unit review to help you study for the Electricity Unit test.

How do electrical charges behave?

- **I can understand that charges can transfer from one object to another**
- **I can understand and provide evidence that the law of electric charge describes how charges interact**

1. What is the law of electric charge? Draw a diagram to help with your explanation.

- Like (same) charges - REPEL ⊕← ⊕→ ⊖← ⊖→
- Unlike (different) charges - ATTRACT ⊕→ ←⊖
- Charged objects and neutral objects - ATTRACT ⊕→○ ⊖→○

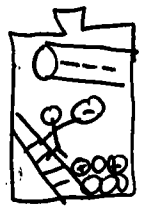
2. Describe and explain 2 demos from the static electricity day. Provide a title, labels, and a caption for each demo. ⇝ See Static electricity demo sheet (online)

How do charges flow through the components of a circuit?

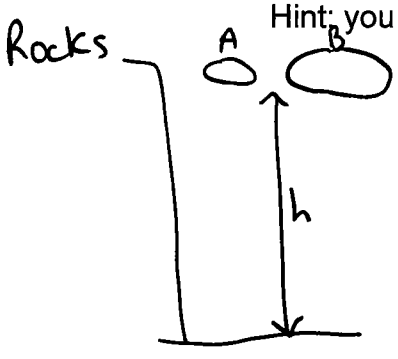
- **I can understand through investigation that batteries and cells work by separating charges**
- **I can understand that charges can move more easily through some materials than others**
- **I can identify that each component in a circuit plays a specific role.**
- **I can understand and provide evidence that loads can be connected in different ways in a circuit.**

3. a. Explain the difference between potential energy and kinetic energy.

Potential energy is stored energy and kinetic energy is energy of motion.



b. Provide an example from real-life to explain potential difference (voltage). Hint: you can use a battery or examples from INB notes.



The bigger rock has more potential energy. The height of rock is the separation of charge and the mass of the rock is the amount of charge separated.

Ladder in battery
- work takes up ⊖ charges from neutral atoms, leaving ⊕ charges at one end. (separating charge). The amount the worker moves is the amount of charge.

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4. a) Name two examples of conductors. wires made of metals (Cu, Gold, aluminum, silver)

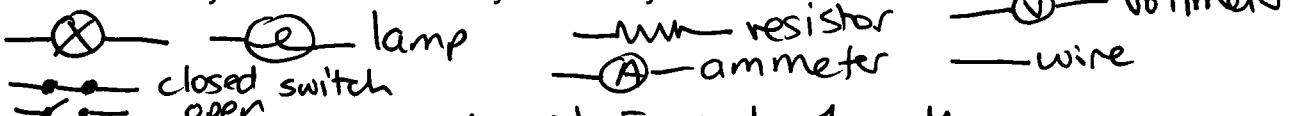
   b) Name two examples of insulators. plastic, glass, styrofoam, wood, rubber

5. Define the following terms:

Voltage Potential Difference	Amount of electrical potential energy per unit of charge (→ separation of charge). * Source of energy *
Current e- flow from ⊖ terminal to ⊕ terminal.	Flow of charged particles (e-) in a complete circuit
Electrical resistance ← Slows down the flow of e-	Any material that transforms electrical E into other forms of E (sound, light, mechanical)
Electric load	Any device that transforms electrical energy into other forms of energy.

6. What are the four parts that make up a circuit? load, switch, source (cell/battery), conductor (wire)

7. Draw as many schematic/circuit symbols as you can.

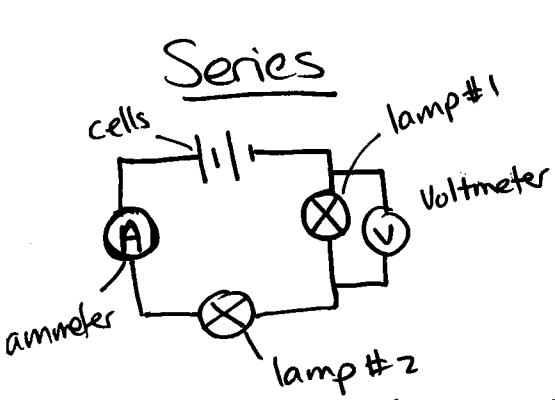


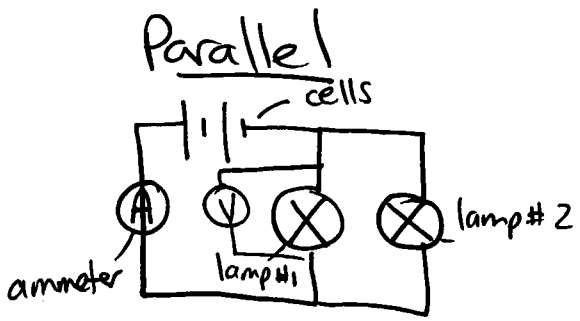
8. a) What is a series circuit? circuit w/ only 1 pathway

   b) What is a parallel circuit? circuit w/ more than 1 pathway/branch

   c) Draw an example of both a series and parallel circuit. Include 2 cells in series, 2 lamps, an ammeter, and a voltmeter measuring the voltage across the first lamp. Provide a title, labels, and caption for the diagrams.

Title: Series and Parallel Circuits



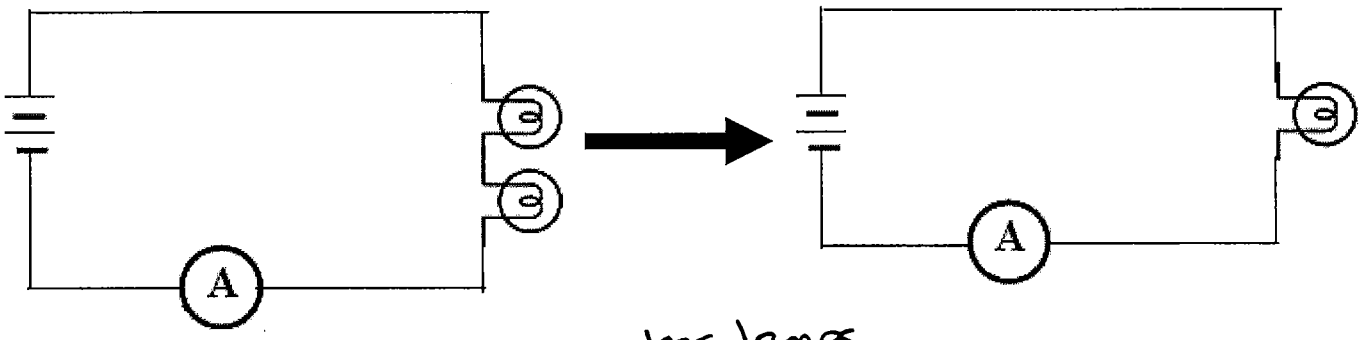


Both circuits contain 2 cells, 2 lamps, an ammeter, and a voltmeter. The series circuit only has 1 pathway and the parallel circuit contains 2 branches/pathways.

9. a) In a **series circuit**, if there are two loads, how does the *current* through a second load compare to the current through the first load? the SAME

   b) In a **parallel circuit**, if there are two loads, how does the *total current* compare to the current through the first load? It will be more. $I_T > I_1$

10. Two identical loads are connected to a battery in series. If one of the identical loads are taken away,

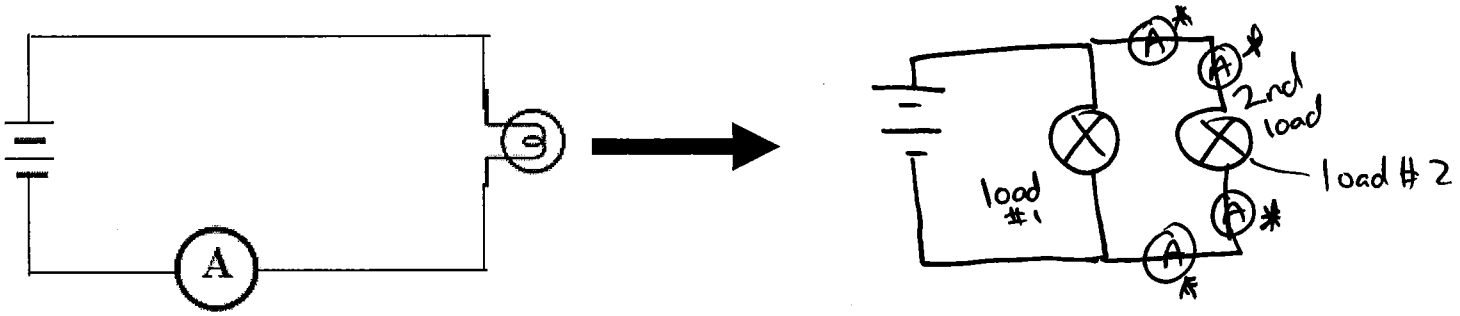


→ less lamps

   a) What happens to the total resistance of the circuit? Decreases

   b) What happens to the current leaving the battery? Increases

11. A load is connected to a battery. Draw a second identical load that is parallel to the first.



   a) What happens to the total resistance of the circuit when the second load is added? Decreases (more pathways ∴ ↓ resistance)

   b) What happens to the current leaving the battery? Increases

   c) **Draw an ammeter** that will measure only the current of the second load added in.

(A) - can be in any of the spots indicated by *

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How are circuits used in practical applications?

- **I can use mathematical formulas to understand Ohm's law and how it describes the relationship between voltage, current, and resistance in a circuit.**

12. What is electrical resistance? Describes the amount that current is hindered (slows down) by a load or specific resistor

13. a) Write the three forms of the equation for **Ohm's Law.**

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

b) Fill in the following information:

Symbol	Name	Unit	Measured using what device?
R	Resistance	Ohms (Ω)	
V	Voltage	Volts (V)	Voltmeter
I	Current	Amperes, amps (A)	ammeter

14. A certain light bulb has a resistance of 100 Ω. If a current of 1.2 A is going through it, calculate the **voltage** applied.

$V = R \times I$

$V = 100\,\Omega \times 1.2\,A$

$V = 120\,V$

Answer 120 volts

15. A voltage of 120 volts is applied to a 200 Ω resistor. Calculate the **current** through the resistor.

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

$I = \frac{120\,V}{200\,\Omega} = 0.6\,A$

Answer 0.6 A

×1000 or 600 mA

16. A voltage of 80 volts is applied to a resistor and the current going through is found to be 200 mA.

↳ ÷1000

a) Convert the current to Amperes. Answer 0.2 A

b) Calculate the **resistance** of the resistor.

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

$R = \frac{80\,V}{0.2\,A} = 400\,\Omega$

Answer 400 Ω

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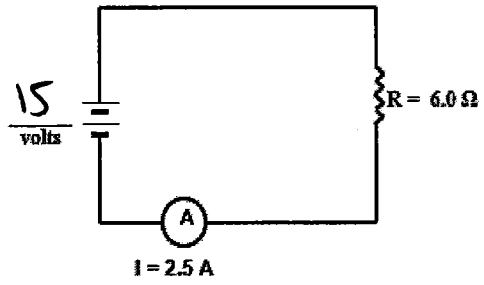
17. Given the following circuits, solve for the unknown in each case. Remember to convert mA into A.

a)

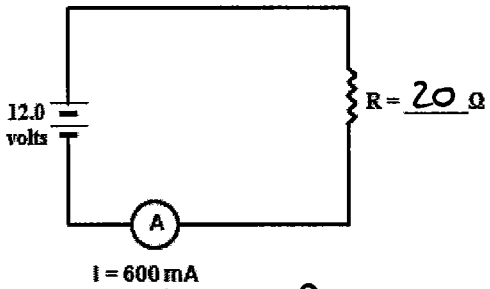


$V = R \times I$

$V = 6\Omega \times 2.5A$

$V = 15\,V$

b)

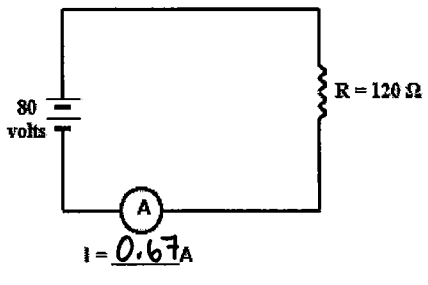


↳ 0.6A

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

$R = \frac{12V}{0.6A} = 20\Omega$

c)



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

$I = \frac{80V}{120\Omega}$

$I = 0.667\ldots$

18. a) Using the graph below, what is the voltage at 0.8 A?

20.0 V

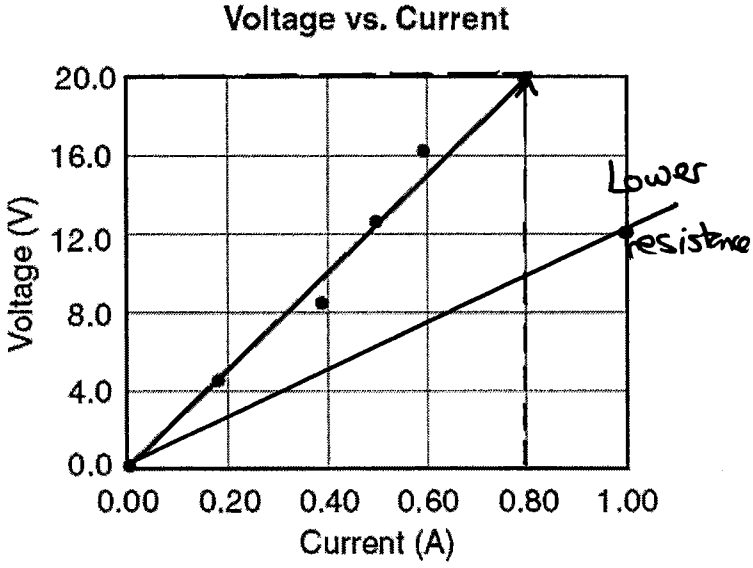
b) Using the graph below, what is the resistance? Show all work and units.

$R = \frac{V}{I}$ $R = \frac{20V}{0.8A} = 25\Omega$

c) Draw a straight line on the graph which would indicate a load with a lower resistance than the line shown. Calculate the resistance of that load. Show all work and units.

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

$R = \frac{12.0}{1.0A} = 12\Omega$



Self-reflection:

1. What are the areas about electricity that you feel confident you know quite well? State what they are.

2. What are the areas about electricity you feel you are struggling with? State what they are and then: look through your notes and practice sheets to help clarify; ask a friend how to do/answer; talk to the teacher.