Booklet # 80 (Electricity)

Unit # 1: Electricity || March 21

Name: (I will collect this booklet tomorrow)

1	**10 minutes**
	Read the passage to answer the questions below: There are four fundamental forces in the universe: (1) Gravity; (2) Electricity; (3) Strong Nuclear Force and (4) Weak Nuclear Force. The main focus of Trimester # 3 is Electricity, which is similar to gravity. In fact, we will use GPE and Coulomb's Law to make a connection between gravity and electricity. Electric current is nothing but the electron in motion within a closed circuit. Perhaps one of the most beautiful accomplishments of recent centuries is the development of electrical circuits. The flow of charge through the wires allows us light bulbs. The main goal of this trimester is to create a circuit to produce voltage to light up bulbs using series and parallel circuit. **Q #1 : Tulai drops a 0.1 kg apple from 1 meter high. Find work done by gravity.** **Q #2: How many fundamental forces in the universe?** **Q # 3: What is an electric circuit. Can you draw one?**

2	**10 minutes**
	Charge (Q) Charge is the fundamental quantity that underlies all electrical phenomena. The symbol for charge is q and SI unit is Coulomb (C). The fundamental carrier of negative charge is electron, with a charge of -1.6 X 10^-19 C. Proton also carries the same charge but its positive. When you make the battery, keep one thing in mind -- the transfer of charges means the transfer of electrons. When an object has a surplus of electron, we say it's negatively charged and a deficiency of electron means positively charge. Like Energy, charge is conserved during the transfer-taking place so any charge lost by one object (in your case it will be zinc) will be gained by another object (Copper). The law of charge tells us that like charges repel each other and unlike charges attract each other. **Q# 1: Let's say there are four charges (A, B, C, D) on Mr. Bari's Table. Charge A attracts B but B repels C, and C repels D and D is positively charged. What is the sign of charge A?** **Q # 2: Let's say two charged sphere of equal size carry a charge of +6 C and -4 C respectively. The two spheres are brought in contact with one another for time sufficient to allow them to reach equilibrium. They are then separated. What is the final charge of each sphere?**

3	**10 minutes**
	Coulomb's Law We now know that two charges exert either attractive or repulsive charges on each other. But what is the nature of this force? It turns out that force between any two charge follow the same basic Newton's Law of Gravitation: $F = K Q q/r^2$ $(K = 9 X 10^9 Nm^2/C^2$ **Q # 1:** **Two points, charge Q and q are separated by a distance r. What happens to force q if Q is doubled? What happens to q, if Q doubled and distance between charges is also doubled?**

4	**10 Minutes**
	Electric Fields exist in the region of space around a charged object. When another charged object enters this electric field, you get electric forces. Let's say that you have a small positive charge q0 that is placed near a second charge that is larger and positive Q. The strength of the electric field E, at the location of q0 is defined as the magnitude of the electric force acting on q0 divided by the charge of q0 This is the electric field at the location of q0 produced by the charge of Q, NOT THE FIELD PRODUCED BY q0. We sometimes call q0 a test charge. Key Equation: E = F(electric)/ q (the units are in Newtons/Coulombs The electric field is a vector quantity Drawings of positive charges and negative charges and the direction of the electric field are done on the chalkboard. The Electric field lines directions depends on the sign of the charge producing the field. It depends on Q. Why? Show how the charges cancel out using algebra. **Q #1: A charge of +6 X 10^-6C is brought near a negative charge in a region where the electric field strength due to the negative charge is 20N/C. What are the magnitude and directions of the force acting upon the positive charge?**

#5	**Quiz: 10 Minutes**

Let's say there are four charges (q1, q2, q3, q4) on my table here. Charge q1 attracts q2 but q2 repels q3, and q3 repels q4 and q4 is positively charge. What is the sign of charge q1?	
Two point charge Q and q separated by distance r. What happen to force q if Q is double? What happen to q, if Q doubled and distance between charges also doubled?	
A charge of +6 X 10^-6C is brought near a negative charge in a region where electric field strength due to the negative charge 20N/C. What are the magnitude and direction of the force acting on the positive charge?	
What is the relationship between GPE and Voltage?	

#6	**10 minutes film (If time allowed)**

Introduction to Electricity Video:

https://www.youtube.com/watch?v=EJeAuQ7pkpc

Write the main idea of the film.