

Starter #01

Chapter 22

1) **What is the definition of electricity?**

Name given to wide range of electrical phenomena

2) **Explain the two possibilities of electrical forces.**

Opposite kinds attract & Same kinds repel

3) **What 4 facts do we need to know about atoms?**

- + charged Nucleus, surrounded by – charged Electrons
- Electrons are identical in mass and charge
- Protons and Neutrons are in the nucleus, Protons are 1800x more massive than Electrons with the opposite charge +, Neutrons are slightly more massive than Protons with 0 charge
- Atoms have no net charge, so the # of Protons = # of Electrons

4) **What is the law of conservation of charge?**

Electrons cannot be created or destroyed, only moved from atom to atom

5) **What is the formula for Coulomb's Law?**

$$F = k \frac{q_1 q_2}{d^2}$$

6) **What is the difference between a conductor and an insulator?**

- Conductors = Allow electrons to wander around freely
- Insulators = Do not allow electrons to wander around freely

Quiz #01

Chapter 22

1) **Two point charges are separated by 6 cm. The attractive force between them is 20 N. The charges will be moved to where they will be separated by 12 cm.**

a) **What can you say about the types of the two charges? Explain your answer.**

One is + and the other is -. The force is attractive, so they must be opposite.

b) **Without knowing the charges, what law do we need to use to solve this?**

Inverse-Square Law. The only thing changing is the distance

c) **What is the force between them when they are moved to 12 cm apart?**

If distance is doubled, force goes down by factor of 2^2 . So $\frac{20\text{ N}}{4} = 5\text{ N}$

2) **Two pellets, each with a charge of 1 C are located 3 m apart.**

a) **What formula needs to be used to determine the force between them?**

$$F = k \frac{q_1 q_2}{d^2}$$

b) **What is the value of the constant used in this formula?**

$$k = 9 \times 10^9 \text{ N} \frac{\text{m}^2}{\text{C}^2}$$

b) **What is the force between the two charges?**

$$F = k \frac{q_1 q_2}{d^2} = (9 \times 10^9) \frac{(1)(1)}{3^2} = 9 \times 10^9 \frac{1}{9} = 1 \times 10^9 \text{ N} = 1 \text{ Billion N!}$$

Starter #02

Chapter 22

1) **What does it mean to be electrically polarized?**

When an atom or molecule has one side that becomes more + or – than the other side

2) **What is an electric field?**

An energetic aura that extends through space around every electrically charged body

3) **What direction do all arrows point in an electric field?**

From the + to the –

4) **What is the formula for an electric field?**

$$\text{Electric Field} = \frac{\text{electric force}}{\text{charge}} \quad E = \frac{F}{q}$$

5) **What is electrical potential energy?**

Electric energy a particle possesses by virtue of its location

6) **What is the formula for Electric Potential?**

$$\text{Electric Potential} = \frac{\text{electric potential energy}}{\text{charge}} \quad EP = \frac{PE_e}{q}$$

7) **What are the units for a volt?**

Energy (J) divided by charge (C), so Joules/Coulomb

8) **What is a capacitor?**

Anything that can store electric energy

Quiz #02

Chapter 22

1) A drop of ink in an ink-jet printer carries a charge of 1.6×10^{-10} C and is deflected onto paper by a force of 3.2×10^{-4} N.

a) Instead of using the numbers above, use 0.0016 C and 3200 N. What is the strength of the electric field?

$$E = \frac{F}{q} = \frac{3200 \text{ N}}{0.0016 \text{ C}} = 2,000,000 \frac{\text{N}}{\text{C}} = 2 \text{ million } \frac{\text{N}}{\text{C}}$$

2) What is the voltage if an electric field does 12 J of work on a 0.0001 C charge?

$$EP = \frac{PE_e}{q} = \frac{12 \text{ J}}{0.0001 \text{ C}} = 120,000 \text{ V}$$

3) What is the actual physics word for all batteries?

Capacitor

4) You take a charged object and hold it close to another object until the other object has charges. What type of “charging” is this?

Induction or Induced Charge or Charging by Induction

5) You take a charged object and touch another object until the other object has charges. What type of “charging” is this?

Contact or Contact Charge or Charging by Contact

6) What word do we use to describe an object that has different charges on opposite sides of the object?

Polar or Polarized or Electrically Polarized