**Worksheet- Coulomb’s Law**

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| Unit/Topic:  | Coulomb’s Law | Grade Level: | 12 | Date: | 26-09-2021 |

**These sheets are for revision purposes and the Test questions will not be solely from these documents.**

A- In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question.

 B 1. What happens when a rubber rod is rubbed with a piece of fur, giving the rod a negative charge?

 a. Protons are removed from the rod.

 b. Electrons are added to the rod.

 c. Electrons are added to the fur.

 d. The fur is left neutral.

 B 2. A repelling force occurs between two charged objects when the charges are of

 a. unlike signs. c. equal magnitude.

 b. like signs. d. unequal magnitude.

 A 3. An attracting force occurs between two charged objects when the charges are of

 a. unlike signs. c. equal magnitude.

 b. like signs. d. unequal magnitude.

 A 4. When a glass rod is rubbed with silk and the rod becomes positively charged,

 a. electrons are removed from the rod.

 b. protons are removed from the silk.

 c. protons are added to the silk.

 d. the silk remains neutral.

 B 5. Electric charge is

 a. found only in a conductor. c. found only in insulators.

 b. conserved. d. not conserved.

 B 6. Charge is most easily transferred in

 a. nonconductors. c. semiconductors.

 b. conductors. d. insulators.

 D 7. Which of the following is not true for both gravitational and electric forces?

 a. The inverse square distance law applies.

 b. Forces are proportional to physical properties.

 c. Both are field forces.

 d. Forces are either attractive or repulsive.

 A 8. Electric field strength depends on

 a. charge and distance.

 b. charge and mass.

 c. Coulomb constant and mass.

 d. elementary charge and radius.

 D 9. What occurs when two charges are moved closer together?

 a. The electric field doubles.

 b. Coulomb’s law takes effect.

 c. The total charge increases.

 d. The force between the charges increases.

 B 10. Resultant force on a charge is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ sum of individual forces on that charge.

 a. scalar

 b. vector

 c. individual

 d. negative

**B- Solve the following problems**

I- a) What is the electric force between an electron and a proton that are separated by a distance

 of 2.0 × 10−20 m? (e = 1.6 × 10−19 C, *kC* = 9.0 × 109 N•m2 /C2)

Given :

R=2 x 10^-20 m

K=9 x 10^9 N/m^2/C^2

Q1=1.6 x 10^-19 C

Q2=1.6 x 10^-19 C

F= k q1 q2 /r^2

= 9 x 10^9 (1.6 x 10^-19)(1.6 x 10^-19) / (2 x10^-20)^2 =5.76 x 10^11 N

 b) Is the force attractive or repulsive? Justify

unlike signs attract

II- a) What is the electric force between two protons that are separated by a distance of

 1.0 × 10−10 m? (e = 1.6 × 10−19 C, *kC* = 9.0 × 109 N•m2 /C2)

Given :

R=1 x 10^-10 m

K=9 x 10^9 N/m^2/C^2

Q1=1.6 x 10^-19 C

Q2=1.6 x 10^-19 C

F= k q1 q2 /r^2

=9 x 10^9 (1.6 x 10^-19)(1.6 x 10^-19) / (1 x 10^-10)^2 = 23 x 10^-9N

 b) Is the force attractive or repulsive? Justify

Repulsive

III- A nucleus (charge 19*e*) is separated from an electron by a distance of 1.0 × 10−10 m. What is the electric force between these particles?

Given :

R=1 x 10^-10 m

K=9 x 10^9 N/m^2/C^2

Q1=19 (1.6 x 10^-19 )C

Q2=1.6 x 10^-19 C

F= k q1 q2 /r^2

=9 x 10^9 (19 x 1.6 x 10^-19) (1.6 x 10^-19) / (1 x 10^-10)^2= 4.3776 x 10^-7 N

 IV- A nucleus (charge 20*e*) is separated from an electron by a distance of 2.0 × 10−10 m. What is the electric force between these particles?

Given :

R=2 x 10^-10 m

K=9 x 10^9 N/m^2/C^2

Q1=20 (1.6 x 10^-19 )C

Q2=1.6 x 10^-19 C

F= k q1 q2 /r^2

 = 9 x 10^9 (20 x 1.6 x 10^-19)(1.6 x 10^-19) / (2 x 10^-10)^2 = 1.152 x 10^-7 N

V- Consider five charged particles: P1, P2, P3, P4, and P5. P1 attracts P2, P3 attracts P4, P2

 repels P3, and P4 repels P5. If P3 is positive, what is the charge of the other particles?

 Explain

P1 negative

P2 positive

P3 positive

P4 negative

P5 negative

VI- Consider five charged particles: P1, P2, P3, P4, and P5. P1 attracts P2, P3 attracts P4, P2

 repels P3, and P4 repels P5. If P3 is negative, what is the charge of the other particles?

 Explain

P1 positive

P2 negative

P3 negative

P4 positive

P5 positive