

Electric Charge Quiz Answer Key PDF

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What is the SI unit of electric charge?

- A. Ampère
- B. Volt
- C. Coulomb ✓**
- D. Ohm

Describe how electric potential is related to electric field and work done.

Electric potential (V) is related to the electric field (E) by the equation $E = -\nabla V$, where the electric field is the negative gradient of the electric potential. The work done (W) in moving a charge (q) in an electric field is given by $W = qV$, showing that work is related to the potential difference.

Explain the principle of conservation of charge and provide an example.

An example of the conservation of charge is when two charged objects come into contact; the total charge before and after they touch remains the same, as charge is redistributed between them.

Which materials are typically used as conductors?

- A. Silver ✓**
- B. Rubber
- C. Aluminum ✓**
- D. Glass

What are characteristics of insulators?

- A. Allow free movement of electrons
- B. Do not conduct electricity well ✓**
- C. Have tightly bound electrons ✓**

D. Are typically metals

What is the charge of a proton?

- A. Negative
- B. Positive ✓**
- C. Neutral
- D. Variable

What is the smallest unit of electric charge?

- A. Proton
- B. Neutron
- C. Electron
- D. Elementary charge ✓**

Which of the following is a conductor?

- A. Rubber
- B. Glass
- C. Copper ✓**
- D. Wood

Which methods can charge an object?

- A. Friction ✓**
- B. Conduction ✓**
- C. Induction ✓**
- D. Polarization

Which type of charge do electrons possess?

- A. Positive
- B. Negative ✓**
- C. Neutral
- D. Variable

What role did Benjamin Franklin play in the study of electric charge?

Benjamin Franklin conducted experiments that led to the identification of positive and negative electric charges, and he introduced the terms 'positive' and 'negative' to describe them.

Which law describes the force between two point charges?

- A. Ohm's Law
- B. Newton's Law
- C. Coulomb's Law ✓**
- D. Faraday's Law

Explain how Coulomb's Law can be used to calculate the force between two charges and provide a sample calculation.

Coulomb's Law is given by the formula $F = k \cdot |q_1 \cdot q_2| / r^2$, where F is the force between the charges, k is Coulomb's constant (approximately $8.99 \times 10^9 \text{ N m}^2/\text{C}^2$), q_1 and q_2 are the magnitudes of the charges, and r is the distance between the centers of the two charges. For example, if we have two charges, $q_1 = 1 \text{ C}$ and $q_2 = 2 \text{ C}$, separated by a distance of 1 m , the force can be calculated as follows: $F = (8.99 \times 10^9 \text{ N m}^2/\text{C}^2) \cdot |1 \text{ C} \cdot 2 \text{ C}| / (1 \text{ m})^2 = 17.98 \times 10^9 \text{ N}$.

What are the effects of static electricity?

- A. Lightning ✓**
- B. Magnetic fields
- C. Static cling ✓**
- D. Electric currents

How does polarization occur in an insulator when exposed to an electric field?

When an electric field is applied to an insulator, it causes the positive and negative charges within the material to shift slightly, creating dipoles and resulting in polarization.

Which process involves charging an object by direct contact?

- A. Induction
- B. Conduction ✓**
- C. Friction

D. Polarization

What happens when two like charges are brought close to each other?

- A. They attract
- B. They repel ✓**
- C. They neutralize
- D. They remain unaffected

Discuss the process of charging an object by induction and provide a real-world example.

Charging an object by induction occurs when a charged object is brought near a neutral conductor, causing the charges in the conductor to rearrange. If the conductor is then grounded, electrons can either flow in or out, resulting in the conductor acquiring a net charge. A real-world example is when a negatively charged rod is brought close to a neutral metal sphere; the sphere becomes positively charged after grounding.

Which of the following statements about Coulomb's Law are correct?

- A. The force is inversely proportional to the square of the distance ✓**
- B. The force is directly proportional to the product of the charges ✓**
- C. It applies only to stationary charges
- D. It is a vector quantity ✓**

Which of the following are true about electric fields?

- A. They are scalar quantities
- B. They exert forces on charges ✓**
- C. They have direction and magnitude ✓**
- D. They can be represented by field lines ✓**