Electric Potential Quiz Questions and Answers PDF

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Which device uses potential difference to create current?

- ◯ Resistor
- ◯ **Battery ✓**
- ◯ Capacitor
- ◯ Inductor

> Devices such as batteries and generators use potential difference (voltage) to create an electric current by allowing charge carriers to flow through a circuit.

What is the unit of electric potential?

- ◯ Newton
- ◯ Joule
- ◯ **Volt ✓**
- ◯ Coulomb

> The unit of electric potential is the volt, which is defined as one joules per coulomb. It measures the potential energy per unit charge in an electric field.

Which of the following is a correct formula for electric potential due to a point charge?

- ◯ $V = Q/4\pi\varepsilon_0 r$
- ◯ **$V = kQ/r$ ✓**
- ◯ $V = W/F$
- ◯ $V = q/E$

> The electric potential (V) due to a point charge (Q) at a distance (r) from the charge is given by the formula $V = k * Q / r$, where k is Coulomb's constant.

In a uniform electric field, the potential energy of a charge is given by which formula?

- ◯ **U = qEd ✓**
- ◯ U = 1/2 mv²
- ◯ U = kQ/r
- ◯ U = qV

> In a uniform electric field, the potential energy (U) of a charge (q) is calculated using the formula U = qEd, where E is the electric field strength and d is the displacement in the direction of the field.

Electric potential is defined as the work done per unit charge in bringing a charge from where?

- ◯ A negative plate
- ◯ **Infinity ✓**
- ◯ A positive plate
- ◯ The ground

> Electric potential is defined as the work done per unit charge in bringing a charge from infinity to a specific point in an electric field. This concept is fundamental in understanding how electric fields influence charged particles.

Which of the following surfaces have constant electric potential?

- ◯ Magnetic field lines
- ◯ **Equipotential surfaces ✓**
- ◯ Electric field lines
- ◯ Gravitational field lines

> Surfaces of constant electric potential are typically equipotential surfaces, which can include planes parallel to the electric field lines or spherical surfaces around point charges. In electrostatics, these surfaces do not allow any electric field lines to cross them, indicating that the potential remains the same across the surface.

What role does electric potential play in the operation of a capacitor?

> **Electric potential determines the voltage across a capacitor, affecting its ability to store and release energy.**

Explain how the conservation of energy principle applies to electric potential energy in a closed system.

> **In a closed system, the total mechanical energy, including electric potential energy, remains constant unless external work is done.**

Explain the relationship between electric potential and electric field.

> **Electric potential is related to the electric field as the negative gradient of the potential. It indicates the potential energy per unit charge at a point, while the electric field represents the force per unit charge.**

Describe how electric potential energy changes when a charge is moved in an electric field.

Electric potential energy increases when a charge is moved against the electric field and decreases when moved along the field direction.

How is the concept of electric potential used in designing electrical circuits?

Electric potential helps determine the voltage across components, ensuring proper functioning and energy distribution in circuits.

Which of the following are examples of potential difference in practice? (Select all that apply)

- [x] **Voltage across a battery ✓**
- [x] **Voltage drop across a resistor ✓**
- [ ] Electric field strength
- [ ] CapacitANCE of a capacitor

Potential difference, also known as voltage, is a measure of the energy difference per unit charge between two points in an electric field. Examples include batteries, power supplies, and electrical outlets, which all provide a potential difference to drive current through a circuit.

What factors affect the electric potential at a point due to a point charge? (Select all that apply)

- [x] **The magnitude of the charge ✓**
- [x] **The distance from the charge ✓**
- [x] **The medium between the charge and the point ✓**
- [ ] The speed of the charge

The electric potential at a point due to a point charge is affected by the magnitude of the charge and the distance from the charge to the point in question. Additionally, the medium through which the electric field propagates can also influence the potential.

What are the characteristics of a conductor in electrostatic equilibrium? (Select all that apply)

- [x] **The electric field inside is zero. ✓**

- [x] **The electric potential is constant throughout. ✓**
- [x] **The surface is an equipotential surface. ✓**
- [ ] The electric field is strongest inside the conductor.

> In electrostatic equilibrium, a conductor has no net electric field inside it, excess charge resides on its surface, and the electric field just outside the surface is perpendicular to the surface.

Discuss the significance of equipotential surfaces in understanding electric fields.

> **Equipotential surfaces help visualize electric fields, indicating regions of constant potential where no work is needed to move a charge.**

Which of the following are true about equipotential surfaces? (Select all that apply)

- [x] **They are perpendicular to electric field lines. ✓**
- [x] **No work is done moving a charge along them. ✓**
- [ ] They can intersect each other.
- [x] **They have constant electric potential. ✓**

> Equipotential surfaces are surfaces where the electric potential is constant, meaning no work is done when moving a charge along the surface. They are always perpendicular to electric field lines and cannot intersect each other.

Which of the following statements about electric potential are true? (Select all that apply)

- [x] **It is a scalar quantity. ✓**
- [x] **It is measured in volts. ✓**
- [x] **It can be negative. ✓**
- [ ] It is a vector quantity.

> Electric potential is a scalar quantity that represents the potential energy per unit charge at a point in an electric field. It is important to note that electric potential can vary with position and is measured in volts.

In which scenarios is the electric potential energy of a system increased? (Select all that apply)

- [x] **Moving a positive charge closer to a positive charge ✓**
- [x] **Moving a negative charge closer to a positive charge ✓**
- [x] **Moving a positive charge away from a negative charge ✓**
- [ ] Moving a negative charge away from a positive charge

> The electric potential energy of a system increases when like charges are brought closer together or when opposite charges are moved further apart. Additionally, it can increase when work is done against an electric field to separate charges.

What happens to the electric potential as you move closer to a positive point charge?

- ◯ It decreases
- ◯ It remains constant
- ◯ **It increases ✓**
- ◯ It becomes zero

> As you move closer to a positive point charge, the electric potential increases. This is because electric potential is directly proportional to the distance from the charge, decreasing as you approach the charge.

What is the potential difference across a capacitor in a series circuit?

- ◯ Equal to the total voltage
- ◯ Zero
- ◯ The same for each capacitor
- ◯ **Divided among the capacitors ✓**

> In a series circuit, the potential difference across a capacitor is equal to the charge stored on the capacitor divided by its capacitances, and it can vary depending on the total voltage supplied and the arrangement of other components in the circuit.