10. Electric Force, Field, and Potential

Starter Quiz · 课前小测

AP Physics 2 Name: _____ Score: _____

1. Two negative charges are placed near each other. They will:

   ☐ attract

   ☐ repel

   ☐ do nothing

   ☐ combine into a positive charge

2. In ordinary charging, which particles actually move between objects?

   ☐ protons

   ☐ electrons

   ☐ neutrons

   ☐ whole atoms

3. A 2 C charge sits in a field of 5 $\frac{\text{N}}{\text{C}}$. What force does it feel, in N?

   _____ N

4. Two +1 C charges are 2 m apart ($k = 9 \times 10^9$). What is their potential energy, in J? (Give the coefficient of 10^9.)

   _____ $\times 10^9$ J

5. How much energy is needed to move a 2 C charge through a potential difference of 6 V? Answer in J.

   _____ J

6. A 2 F capacitor is charged to 3 V. How much charge does it store, in C?

   _____ C

7. A 2 C charge accelerates from rest through 9 V. How much kinetic energy does it gain, in J?

   _____ J

8. A positively charged object has:

   ☐ gained protons

   ☐ lost electrons

   ☐ gained neutrons

   ☐ lost protons

9. The electric field at a point is defined as:

   ☐ force times charge

   ☐ force per unit charge

   ☐ charge per unit force

   ☐ charge times distance

10. Electric potential energy between two point charges depends on distance as:

    ☐ $1/r^2$

    ☐ $1/r$

    ☐ r

    ☐ r^2

AP Physics 2

1. **repel**

   Like charges repel — two negatives push apart.

2. **electrons**

   Electrons transfer; protons stay locked in the nuclei.

3. **10 N**

   $F = qE = 2 \times 5 = 10$ N.

4. **4.5×10^9 J**

   $U = kq_1q_2/r = 9 \times 10^9/2 = 4.5 \times 10^9$ J.

5. **12 J**

   $W = q\Delta V = 2 \times 6 = 12$ J.

6. **6 C**

   $Q = CV = 2 \times 3 = 6$ C.

7. **18 J**

   $\text{KE} = q\Delta V = 2 \times 9 = 18$ J.

8. **lost electrons**

   A positive object has lost electrons, leaving more protons than electrons.

9. **force per unit charge**

   $E = F/q$ — the force a unit positive charge would feel.

10. $1/r$

    $U = kq_1q_2/r$ falls as $1/r$ — one power, unlike the $1/r^2$ force.