

Quiz 3: Electrical Energy

Constant electric fields / capacitors:

$$\Delta V = |\vec{E}||\Delta\vec{x}| \quad \Delta PE = q\Delta V \quad KE = \frac{1}{2}mv^2 \quad Q = C\Delta V \quad C = \frac{\epsilon_0 A}{d}$$

1. If you place a positively charged particle in an electric field, the charge will move
 - from higher to lower electric potential and from lower to higher potential energy.
 - from higher to lower electric potential and from higher to lower potential energy.
 - from lower to higher electric potential and from lower to higher potential energy.
 - from lower to higher electric potential and from higher to lower potential energy.

2. You have five capacitors, each with a rated value of $C = 1 \times 10^{-6}$ F. What is the equivalent capacitance when they are all combined in parallel? In series?

3. Calculate the speed of a proton that is accelerated from rest through a potential difference of 130 V. The charge of a proton is $e = 1.6 \times 10^{-19}$ C, and its mass is $m_p = 1.67 \times 10^{-27}$ kg.
 - 3.21×10^4 m/s
 - 7.9×10^4 m/s
 - 6.76×10^6 m/s
 - 1.58×10^5 m/s

4. Suppose that near the ground directly below a thundercloud, the electric field is of a constant magnitude of 2.0×10^4 V/m and points upward. What is the potential difference between the ground and a point in the air, 50 m above ground?