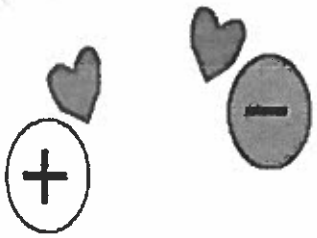
PHYSICS 12

Examples that connect the electric field, force, and energy



Opposites Attract

1. A 1.0g particle with a charge of 1.0μC is placed in a 1000N/C electric field. The particle is initially at rest. When released, the particle travels 0.010 m before it strikes a metal plate. What is its impact speed?

2. A proton travelling at 3.0×10^6m/s enters an area where the electric field has a magnitude of 3.0×10^5N/C. Determine the distance the proton will travel before coming to rest. Assume that the electric field is created by a positively charged plate.

3. a)Consider an electron that is initially at rest. What is the electron's speed after 48ns when an electric field of 520N/C is created at the location of the electron?

b) What would be the speed of a proton after 48 ns if the proton was initially at rest at the same location and the same electric filed was then created?

4. How strong and at what direction does one need to create an electric field in order to keep an electron above ground and at rest? Assume that the source of the electric field is above the electron.

5. How strong and at what direction does one need to create an electric field in order to keep a proton above ground and at rest? Assume that the source of the electric field is above the proton.

6. a)How much will a proton accelerate if placed in an electric field of 640N/C?

b)What will be the proton's speed if it were initially at rest? t= 10 ns.

c) How far will it move relative to its initial position?

d) What is the proton's kinetic energy?

7. What electric field is required to hold a charged plate with mass 5.00×10^{-2}kg and charge +3.0 μC above ground and at rest? Assume that the source of the electric field is above the plate.

b) Is the source of the field positively or negatively charged? Explain.

c) How would your answer in a) and b) change if the source of the field was placed below the plate?

8. a) How much would a 300.0-N/C electric field accelerate an electron that was initially at rest?

b) What would be the speed of the electron after 10ns?

c) What would be the kinetic energy of the electron after 10ns?

d) How far would the electron travel in 10ns?