Extra Practice Problems for Chapter 14

($k = 8.99\times10^9 \frac{N\cdot m^2}{C^2}$)

1. A 12.1-mC charged particle is placed in an electric field where the electric potential is -25.0 volts. What is the potential energy?

2. A charged particle is placed in an electric field where the electric potential is -7,500 volts. If it is 22 cm from the stationary charge generating the field, what is the value of the stationary charge, including its sign?

3. A particle ($q = -3.71\ \mu C$) is placed in an electric field that is generated by a stationary charge of 19.0 μC. It is initially 55.0 cm from the charge. If it is released from rest and travels 15.0 cm, what potential difference does it experience?

4. A particle ($q = 15.0$ mC, $m = 115.0$ g) is placed 33.0 cm from a stationary charge of 25.0 mC. If it is released from rest, how fast will it be traveling when it is 50.0 cm from that stationary charge?

5. A particle ($q = -35\ \mu C$, $m = 25$ g) is moving towards a stationary charge of -15 μC. If its speed is 22 m/s when it is 54 cm from the stationary charge, how fast will it be traveling when it is 41 cm from the stationary charge?

6. A parallel plate capacitor has plates that are 1.5 cm x 2.2 cm. If it uses a 0.155-mm-thick dielectric and has a capacitance is 14.5 μF, what is the electric permittivity of the dielectric?

7. A 15.0-μF capacitor stores 22.0 mC of charge. What is the potential difference between the plates?

8. You make a parallel plate capacitor that doesn't have a high enough capacitance. What three things could you do to increase the capacitance?

9. A parallel plate capacitor uses a 1.0-mm-thick dielectric with $\varepsilon = 1.5\times10^{-8}$ F/m. If each plate has an area of 0.25 m^2, what will be the potential difference between the plates when each holds 99 mC of charge?

10. Draw the direction in which electrons are flowing in the circuit shown on the right. Draw the direction in which conventional current flows.