Errata Nelson Physics 12 Chapter 7

Section 7.1 – pg. 321 (Law of Conservation of Charge stated incorrectly in certain textbooks)

Law of conservation of Charge (Correct Version)

Charge can be transferred from one object to another, but the total charge of a closed system remains constant.

Law of conservation of Charge (Incorrect Version)

~~In the transfer of any charge from one object to another, charge can be created or destroyed, but the total charge of a closed system remains constant.~~ Charge can be transferred from one object to another, but the total charge of a closed system remains constant.

Section 7.4 – Review #6 – pg. 354 (electric field missing a negative sign)

$$\varepsilon = -\frac{\Delta V}{\Delta d}$$

$$\Delta V = -\varepsilon \Delta d$$

$$\Delta V = -4.52 \times 10^5\ V$$

Section 7.6 – Review #5 – pg. 365 (incorrect answer)

5. (a) Given: $m = 5.2 \times 10^{-15}$ kg; $\Delta d = 0.21$ cm $= 2.1 \times 10^{-3}$ m; $\Delta V = 220$ V; $g = 9.8$ m/s^2
Required: q

Analysis: $q = \frac{mg\Delta d}{\Delta V_b}$. The bottom plate is positively charged, so the field between the plates points upward. However, the electric force is balancing the gravitational force, so the particle is moving against the ~~electric~~ gravitational field. Therefore the charge will be positive.

Chapter 7 – Review #15 – pg. 371 (incorrect answer)

Answer is a) and not b)

Chapter 7 – Review #86 – pg. 374 (spelling error in answer key)

86. Given: $N = 1.5 \times 10^{12}$; $r = 1.2$ m; $k = 8.99 \times 10^9$ N·m²/C²

Required: V; ε

Analysis: Determine the charge on the sphere using $q = Ne$. Then determine the magnitude of the electric field using $\varepsilon = \dfrac{kq}{r^2}$. Finally, calculate the electric potential, $\varepsilon = -\dfrac{\Delta V}{\Delta d}$; $\Delta V = -\varepsilon \Delta d$

Solution: Charge on the sphere:

$$q = Ne$$
$$= \left(1.5\times10^{12}\right)\left(-1.6\times10^{-19}\text{ C}\right)$$
$$q = -2.4\times10^{-7}\text{ C}$$

Magnitude of the electric field:

$$\varepsilon = \frac{kq}{r^2}$$
$$= \frac{\left(8.99\times10^{9}\ \dfrac{\text{N}\cdot\text{m}^2}{\text{C}^2}\right)\left(-2.4\times10^{-7}\text{ C}\right)}{(1.2\text{ m})^2}$$
$$\varepsilon = -1.5\times10^{3}\text{ N/C}$$

Electric potential:

$$\Delta V = -\varepsilon\,\Delta d$$
$$= -\left(-1.5\times10^{3}\text{ N/C}\right)(1.2\text{ m})$$
$$\Delta V\ \cancel{\varepsilon} = 1.8\times10^{3}\text{ V}$$

Statement: At a point 1.2 m from the sphere, the electric potential is 1.8×10^3 V, and the magnitude of the electric field is 1.5×10^3 N/C.