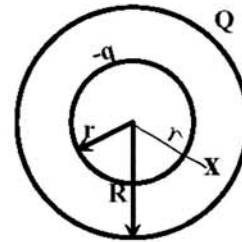


KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
PHYSICS DEPARTMENT
QUIZ #8- CHAPTER 24

NAME: Key ID# _____ SECTION# _____

In the figure, a hollow sphere, of radius $r = 10$ cm carries a negative charge $q = -10$ nC, is put inside another hollow sphere, of radius $R = 20$ cm that carries a positive charge $Q = 20$ nC. Calculate the electric potential at point x a distance of 15 cm from the center of the spheres.



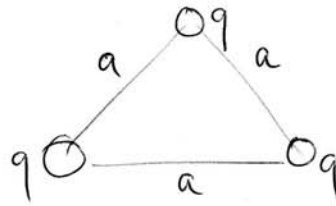
$$V_x = \frac{kQ}{R} - \frac{kq}{r}$$
$$= 9 \times 10^9 \left(\frac{20 \times 10^{-9}}{0.2} - \frac{10 \times 10^{-9}}{0.15} \right)$$

$$V_x = 300 \text{ V}$$

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
PHYSICS DEPARTMENT
QUIZ #8- CHAPTER 24

NAME: Key ID# _____ SECTION# _____

What is the external work required to bring three 2.0 nC point charges from infinity and to place them at the corner of an equilateral triangle of side 14 cm?



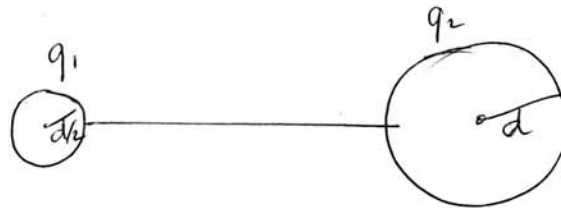
$$U = W = 3 \frac{kq^2}{a} = \frac{3 \times 9 \times 10^9 \times (2 \times 10^{-9})^2}{0.14}$$

$$\boxed{W = 7.7 \times 10^{-7} \text{ J}}$$

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
 PHYSICS DEPARTMENT
 QUIZ #8- CHAPTER 24

NAME: Key ID# _____ SECTION# _____

In the figure, two conducting spheres, one having twice the diameter of the other, are separated by a distance large compared to their diameters. Initially, the smaller sphere (1) has charge $q = 10 \text{ nC}$ and the larger sphere (2) is uncharged. If the spheres are then connected by a long thin conducting wire what is the charge on each sphere? Take $d = 10 \text{ cm}$.



$$q_1 + q_2 = q$$

$$V_1 = V_2 \Rightarrow \frac{kq_1}{d/2} = \frac{kq_2}{d}$$

$$q_2 = 2q_1$$

$$q_1 + 2q_1 = q \Rightarrow 3q_1 = q$$

$$q_1 = \frac{q}{3} = 3.3 \text{ nC}$$

$$q_2 = 6.6 \text{ nC}$$