Date: 28 April 2002

Name: _____Key_____   Id: _____   Sect: _____

Consider a metallic spherical shell of inner radius 5.0 cm and outer radius 8.0 cm. A point charge $q_1 = 5$ µC rests at the center of the shell. The metal shell carries a net charge $q_2 = -10$ µC. Determine:

(a) The electric field 3.0 cm from the center of the shell

$$E = \frac{K q_1}{r^2} = \frac{9 \times 10^9 \times 5 \times 10^{-6}}{(0.03)^2} = \boxed{5 \times 10^7 \ \frac{N}{C}}$$

(b) 6.0 cm from the center of the shell

Inside the Conductor $\boxed{E = 0}$

(c) 10 cm from the center of the shell

$$E = \frac{K(q_1 + q_2)}{r^2} = \frac{9 \times 10^9 \times 5 \times 10^{-6}}{(0.1)^2} = \boxed{4.5 \times 10^6 \ \frac{N}{C}}$$

(d) The inner and outer charges on the metal sphere.

Because $E = 0$ inside the Conductor

$\Rightarrow$ $\boxed{q_{in} = -5 \mu C}$

and $q_{in} + q_{out} = -10 \mu C \Rightarrow$ $\boxed{q_{out} = -5 \mu C}$