

Physics 102-Rec
 Quiz#7-Sect.24
 Chapter 24

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Name: _____

Key

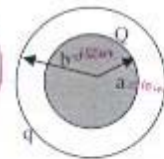
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Consider a conducting solid sphere of radius $a = 10$ cm and charge $Q = -20 \mu\text{C}$. Concentric with it a thin spherical shell of radius $b = 15$ cm and carrying a charge of $q = 5 \mu\text{C}$. Find the electric potential at the following locations;

(a) $r = 5$ cm from the center of the sphere

$$V = \frac{kQ}{a} + \frac{kq}{b} = 9 \times 10^9 \left(\frac{-20 \times 10^{-6}}{0.1} + \frac{5 \times 10^{-6}}{0.15} \right)$$

$$= \boxed{-1.5 \times 10^6 \text{ V}}$$



(b) $r = 10$ cm from the center of the sphere

$$V = \frac{kQ}{a} + \frac{kq}{b} = -1.5 \times 10^6 \text{ V}$$

(c) $r = 12$ cm from the center of the sphere

$$V = \frac{kQ}{r} + \frac{kq}{b} = \frac{9 \times 10^9 \times (-20 \times 10^{-6})}{0.12} + \frac{9 \times 10^9 \times (5 \times 10^{-6})}{0.15}$$

$$V = -1.5 \times 10^6 + 3 \times 10^5 = \boxed{-1.2 \times 10^6 \text{ V}}$$

(d) $r = 15$ cm from the center of the sphere

$$V = \frac{kQ}{b} + \frac{kq}{b} = \boxed{-9 \times 10^5 \text{ V}}$$

(e) $r = 25$ cm from the center of the sphere

$$V = \frac{kQ}{r} + \frac{kq}{r} = -7.2 \times 10^5 + 1.8 \times 10^5$$

$$= \boxed{-5.4 \times 10^5 \text{ V}}$$