

84. For a point on the axis of the ring the potential (assuming $V \rightarrow 0$ as $r \rightarrow \infty$) is

$$V = \frac{q}{4\pi\epsilon_0\sqrt{z^2 + R^2}}$$

where $q = 16 \times 10^{-6}$ C and $R = 0.030$ m. Therefore,

$$V_B - V_A = \frac{q}{4\pi\epsilon_0} \left(\frac{1}{\sqrt{z_B^2 + R^2}} - \frac{1}{R} \right)$$

where $z_B = 0.040$ m. The result is -1.92×10^6 V.