

**A uniformly charged rod of length  $l$  is bent into the shape of a semicircle. it has uniform charge density  $\lambda$  and radius  $R$ . Find the electric potential at the center of the semicircle**

Electric potential from small part of semicircle:

$$d\varphi = \frac{1}{4\pi\epsilon_0} \frac{dq}{R} = \frac{1}{4\pi\epsilon_0} \frac{\lambda dl}{R}$$

Sum potential from all small parts:

$$\varphi = \int_0^l \frac{1}{4\pi\epsilon_0} \frac{\lambda dl}{R} = \frac{1}{4\pi\epsilon_0} \frac{\lambda l}{R}$$

**Answer:**  $\varphi = \frac{1}{4\pi\epsilon_0} \frac{\lambda l}{R}$