

Electric Potential of a Uniformly Charged Spherical Shell



- Electric charge on shell: $Q = \sigma A = 4\pi\sigma R^2$

- Electric field at $r > R$: $E = \frac{kQ}{r^2}$

- Electric field at $r < R$: $E = 0$

- Electric potential at $r > R$:

$$V = - \int_{\infty}^r \frac{kQ}{r^2} dr = \frac{kQ}{r}$$

- Electric potential at $r < R$:

$$V = - \int_{\infty}^R \frac{kQ}{r^2} dr - \int_R^r (0) dr = \frac{kQ}{R}$$

- Here we have used $r_0 = \infty$ as the reference value of the radial coordinate.

