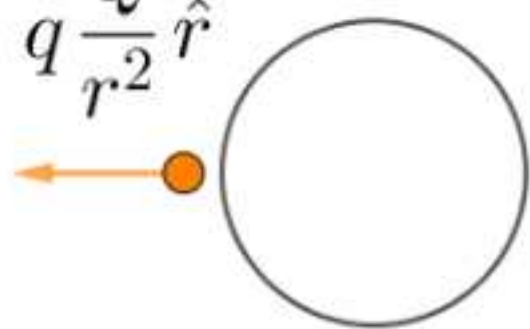
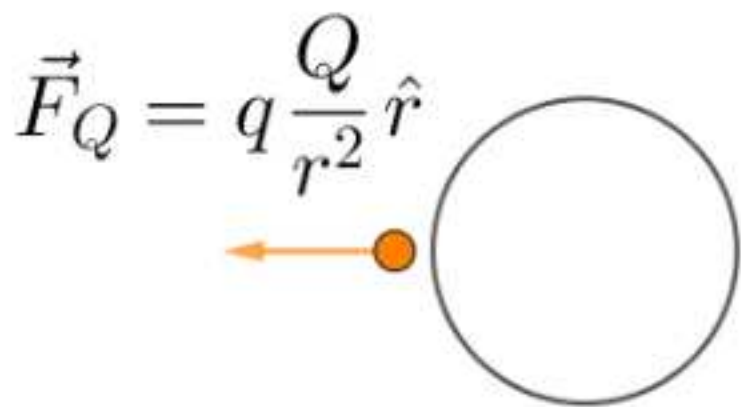


$$\vec{F}_Q = q \frac{Q}{r^2} \hat{r}$$
A diagram illustrating the force on a point charge. A large, empty circle represents a sphere. To its left, a small orange dot represents a point charge. An orange arrow points from the dot to the left, indicating the direction of the force vector.

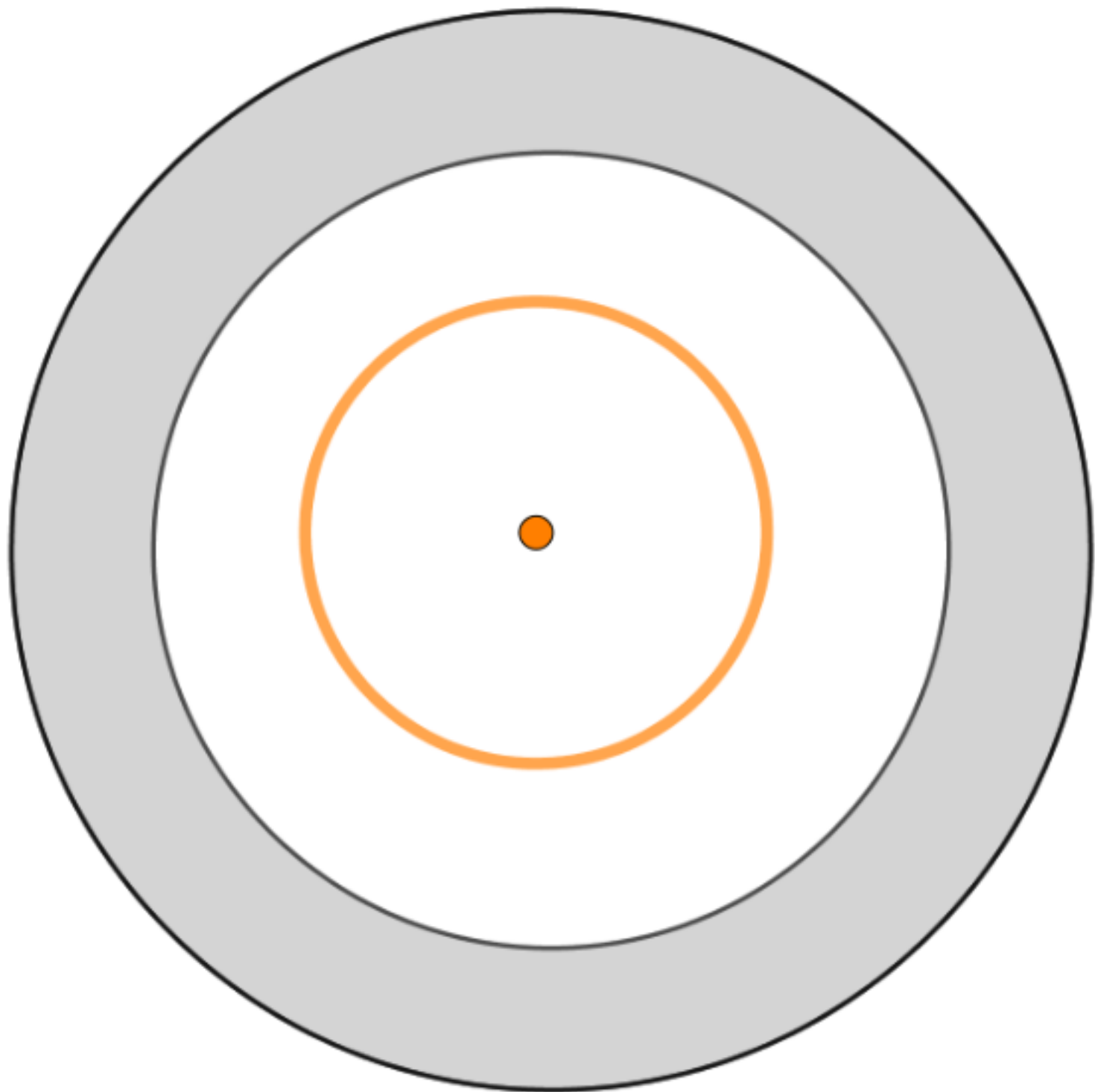


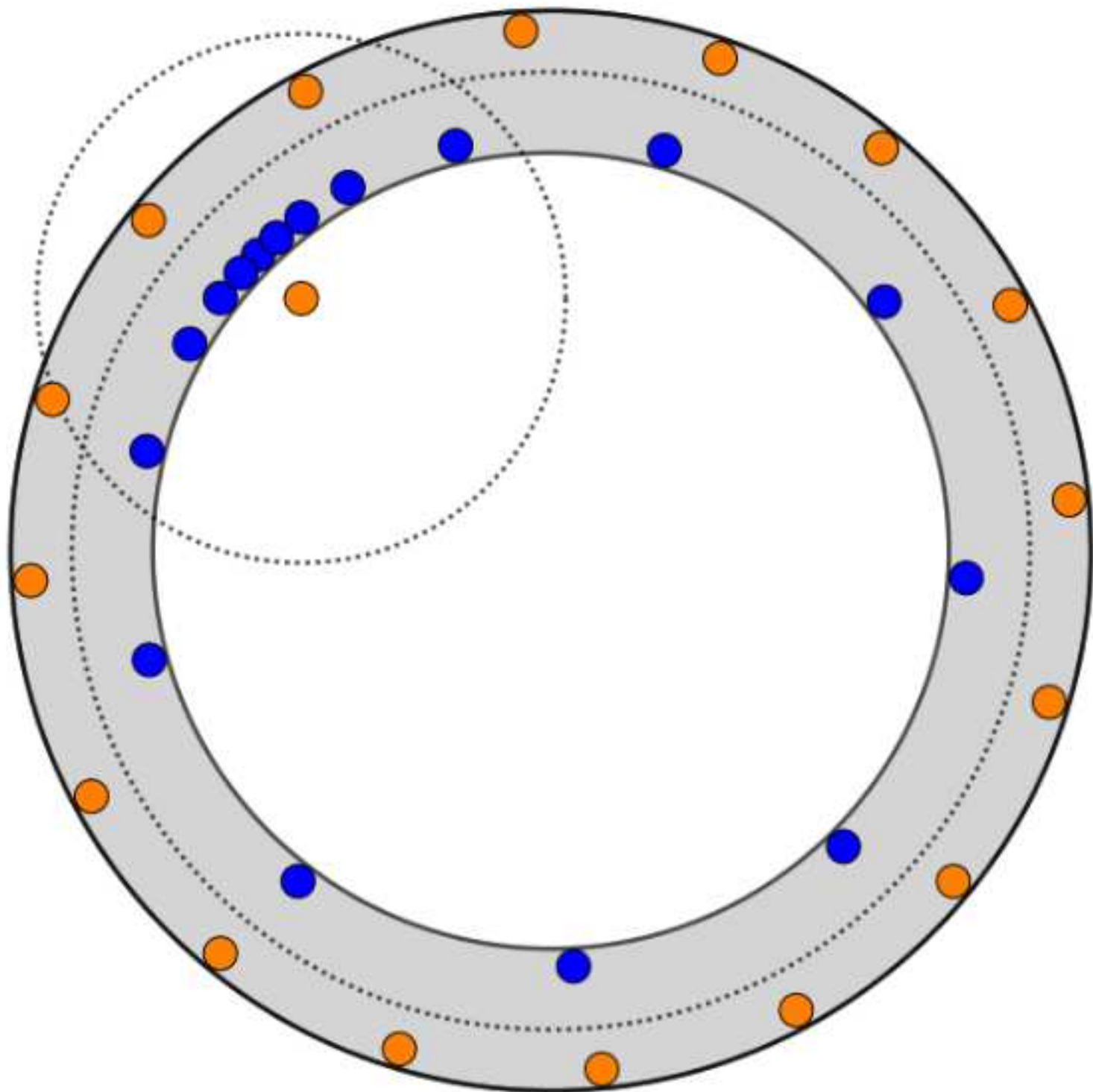
$$\vec{F}_Q = q\vec{E}_Q$$

$$\vec{F}_g = mg\hat{y}$$

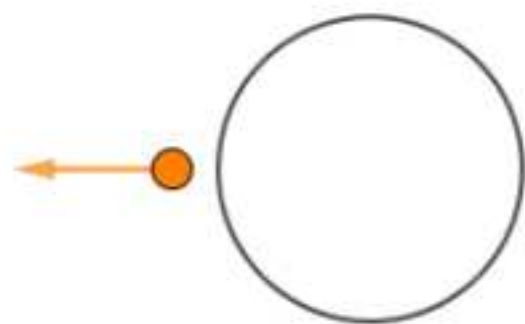
$$\vec{E}_Q = \frac{Q}{r^2} \hat{r}$$

$$\vec{E}_g = g\hat{y}$$



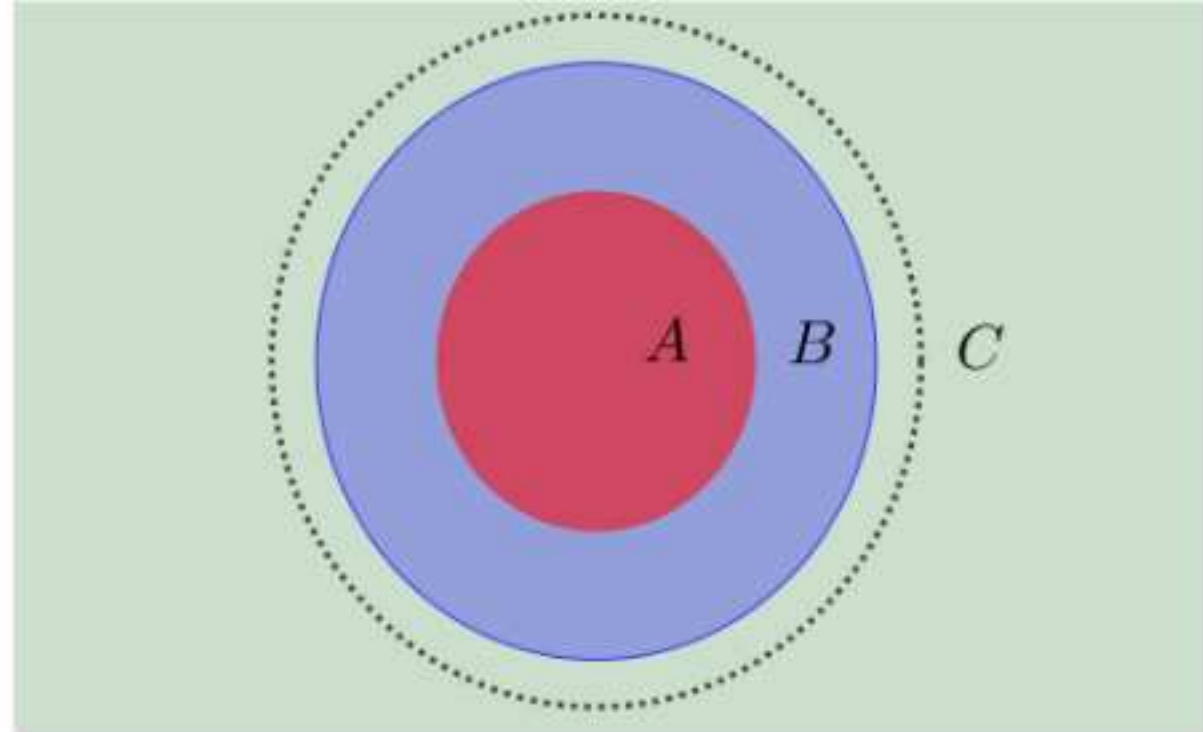


$$\vec{E}_Q = \frac{Q}{r^2} \hat{r}$$



$$U_{\vec{E}} = \int_0^\infty E_{(r)}^2 dv = \int_0^R 0^2 \cdot r^2 \cdot dr + \int_R^\infty \left(\frac{Q}{r^2}\right)^2 \cdot r^2 \cdot dr = \int_R^\infty \frac{Q^2}{r^2} \cdot dr$$

$$= Q^2 \int_R^\infty \frac{1}{r^2} \cdot dr = Q^2 \cdot \left|_R^\infty \left(-\frac{1}{r}\right) \right. = Q^2 \cdot \left|_\infty^R \left(\frac{1}{r}\right) \right. = Q^2 \cdot \left(\frac{1}{R} - \frac{1}{\infty}\right) = \frac{Q^2}{R}$$



$E_{(r)}$

A

0

B

$$\frac{Q_{AB}}{r^2}$$

C

$$\frac{Q_{AB} + Q_{BC}}{r^2}$$