Electric Flux: Application (4)

Consider a positive point charge Q at the center of a spherical surface of radius R.
Calculate the electric flux through the surface.

- $\vec{E}$ is directed radially outward. Hence $\vec{E}$ is parallel to $d\vec{A}$ everywhere on the surface.
- $\vec{E}$ has the same magnitude, $E = kQ/R^2$, everywhere on the surface.
- The area of the spherical surface is $A = 4\pi R^2$.
- Hence the electric flux is $\Phi_E \doteq \oint \vec{E} \cdot d\vec{A} = EA = 4\pi kQ$.
- Note that Φ_E is independent of R.