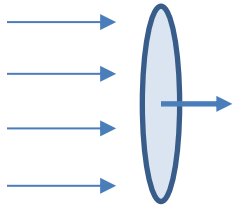
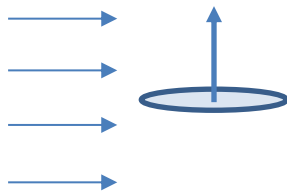


CONCEPT: ELECTRIC FLUX

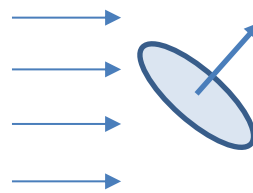
- Flux is a measure of HOW MUCH of a field passes through a surface.
- ELECTRIC FLUX is how much of the ELECTRIC FIELD passes through a surface.



[ALL | NONE | SOME]

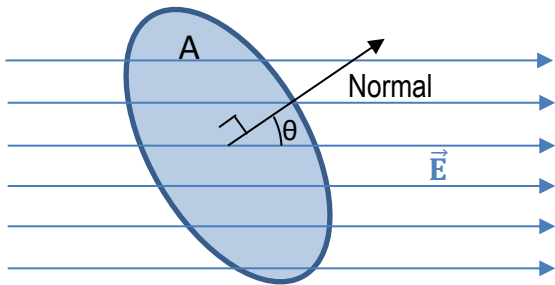


[ALL | NONE | SOME]



[ALL | NONE | SOME]

- ELECTRIC FLUX depends upon the ANGLE of the surface



- Normal → _____ to the surface

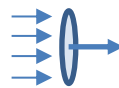
- θ → between the Electric Field and the _____ of the surface

→

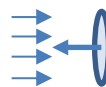
$$\Phi_E = \text{_____} - \text{Units: } \frac{\text{N} \cdot \text{m}^2}{\text{C}}$$

- The TOTAL FLUX through a closed surface is the _____ of fluxes through each individual surface.

- **Positive** fluxes: when $\vec{E}$ and the normal point in the [**SAME** | **OPPOSITE**] direction.



- **Negative** fluxes: when $\vec{E}$ and the normal point in the [**SAME** | **OPPOSITE**] direction.



EXAMPLE: The electric flux through each surface of a cube is given below. What is the total flux through the cube?

$$\Phi_1 = 100 \text{ Nm}^2/\text{C}$$

$$\Phi_2 = 20 \text{ Nm}^2/\text{C}$$

$$\Phi_3 = 0 \text{ Nm}^2/\text{C}$$

$$\Phi_4 = 0 \text{ Nm}^2/\text{C}$$

$$\Phi_5 = -40 \text{ Nm}^2/\text{C}$$

$$\Phi_6 = -80 \text{ Nm}^2/\text{C}$$

PRACTICE: TOTAL ELECTRIC FLUX

The electric flux through each surface of a cube is given below. Which surfaces of the cube does the electric field run parallel to?

$$\Phi_1 = 100 \text{ Nm}^2/\text{C}$$

$$\Phi_2 = 20 \text{ Nm}^2/\text{C}$$

$$\Phi_3 = 0 \text{ Nm}^2/\text{C}$$

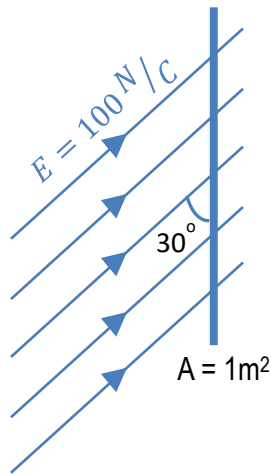
$$\Phi_4 = 0 \text{ Nm}^2/\text{C}$$

$$\Phi_5 = -40 \text{ Nm}^2/\text{C}$$

$$\Phi_6 = -80 \text{ Nm}^2/\text{C}$$

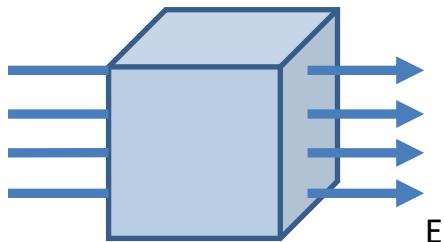
EXAMPLE: FLUX THROUGH ANGLED SURFACE

What is the magnitude of the electric flux through the surface depicted below?



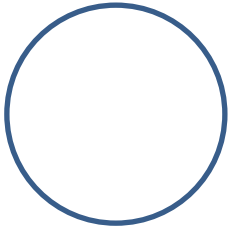
EXAMPLE: FLUX THROUGH CUBE

A cube of side length 2 cm is placed in an electric field of magnitude 100 N/C as shown below. What is the electric flux through each side of the cube?



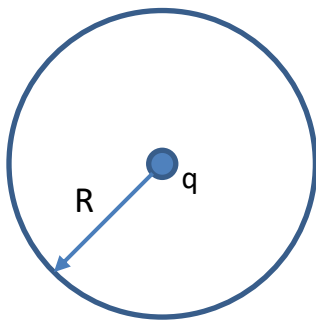
PRACTICE: NORMAL OF A SPHERICAL SHELL

Where does the normal vector point for a spherical shell?



EXAMPLE: FLUX THROUGH SPHERICAL SHELL BY POINT CHARGE

What is the electric flux through a spherical shell of radius R due to a point charge, q , at the center?



PRACTICE: FLUX THROUGH TWO SURFACES

What is the total flux through the two surfaces depicted in the following figure? Note that surface 1 has an area of 50 cm^2 and surface 2 has an area of 100 cm^2 , and $E = 500 \text{ N/C}$.

