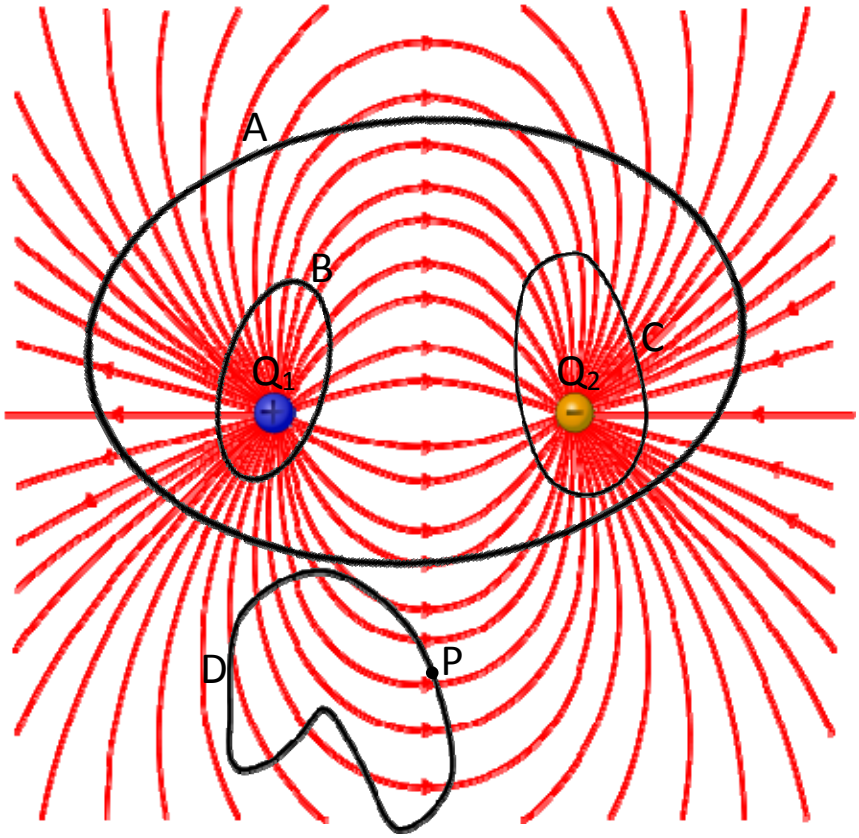
PHY 232 Summer 2016 Class Work

Class 6. Applications of Gauss's Law



(a) What are the electric flux through surfaces A, B, C, and D:

$\Phi_A = \dfrac{Q_1 - Q_2}{\varepsilon_0}$

$\Phi_B = \dfrac{Q_1}{\varepsilon_0}$

$\Phi_C = -\dfrac{Q_2}{\varepsilon_0}$

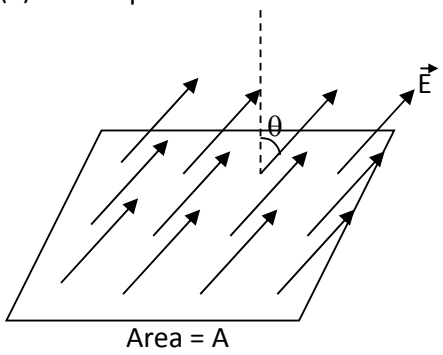
$\Phi_D = 0$

(b) Can you tell the electric field at point P easily from Φ_D? If yes, what is its value? If not, why?

Gauss's Law only allow us to calculate directly the flux over a closed surface. In this particular case, the electric field is not constant on surface D. So we cannot use Gauss's Law to calculate the E field at point P easily.

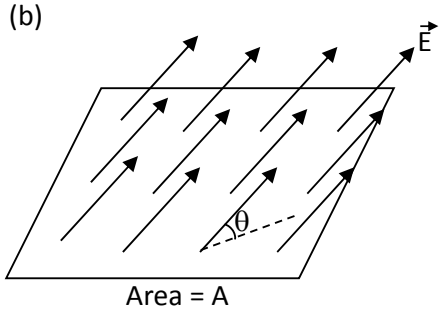
Write down the electric flux through the surface for each of the following casses:

(a) Perpendicular to flat area



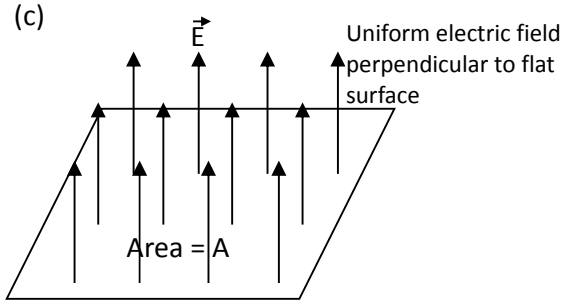
$\Phi_E =$ $|\vec{E}|\, A \cos\theta$

(b)



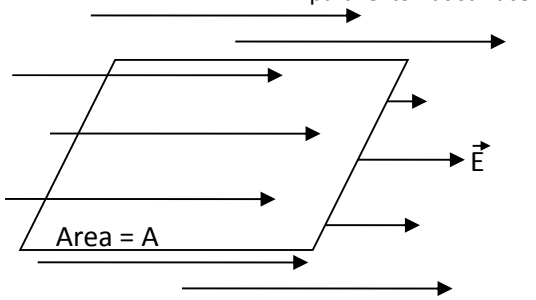
$\Phi_E =$ $|\vec{E}|\, A \sin\theta$

(c)



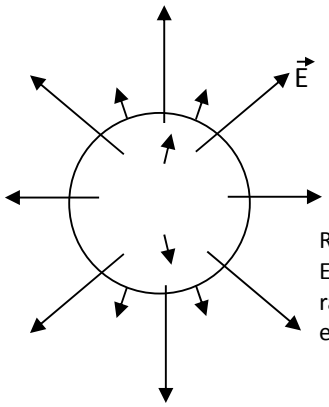
$\Phi_E =$ $|\vec{E}|\, A$

(d)



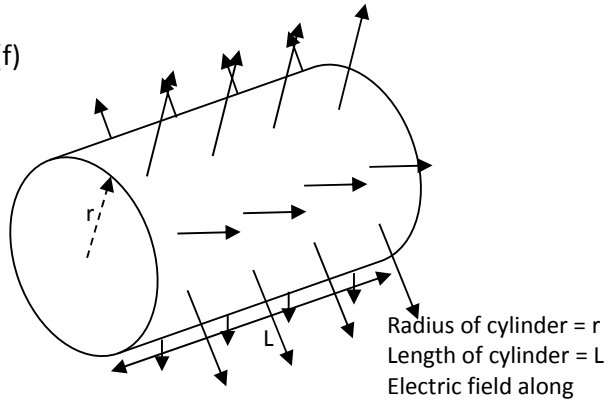
$\Phi_E =$ 0

(e)



$\Phi_E =$ $|\vec{E}| \cdot 4\pi\, r^2$

(f)



$\Phi_E =$ $|\vec{E}| \cdot 2\pi\, r\, L$