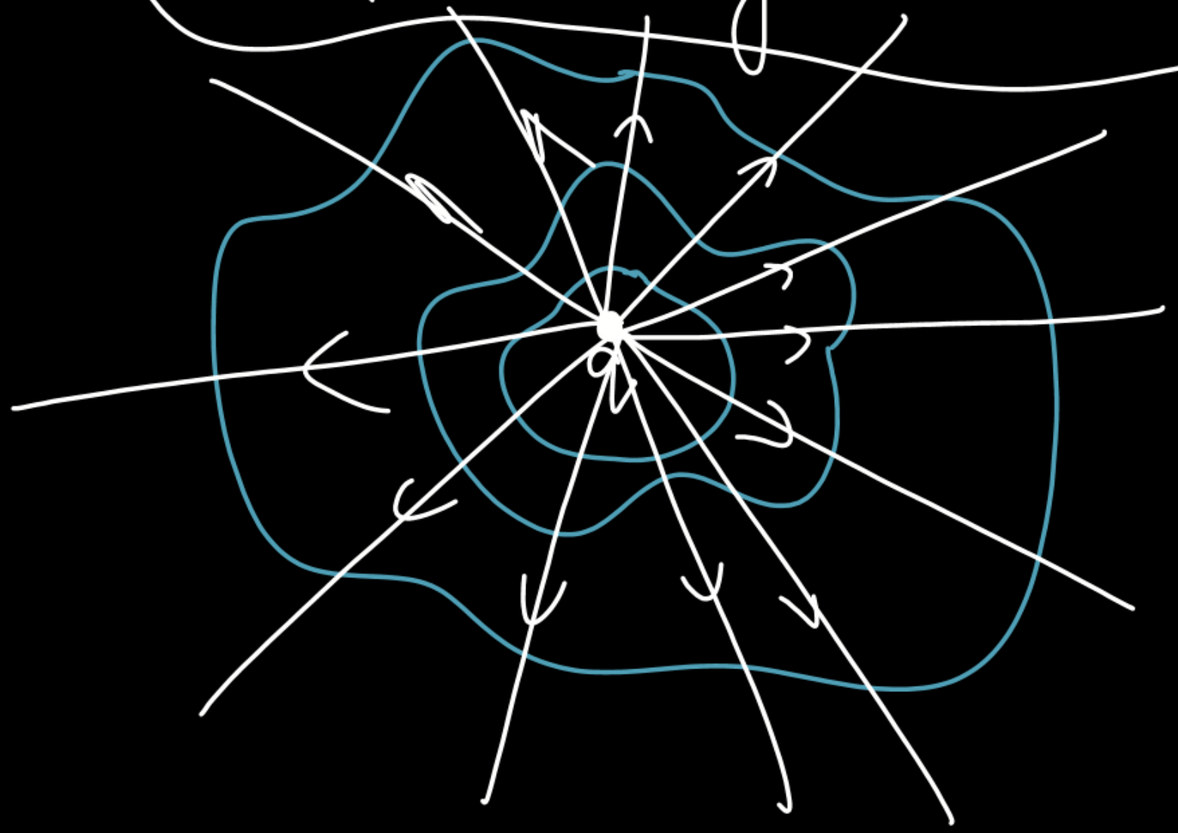
Gauss Law

Presented by
Er. Rohit Gupta (RG Sir)

Gauss law

$$\phi_{\text{closed surface}} = \frac{1}{\varepsilon_0}(q_{in})$$

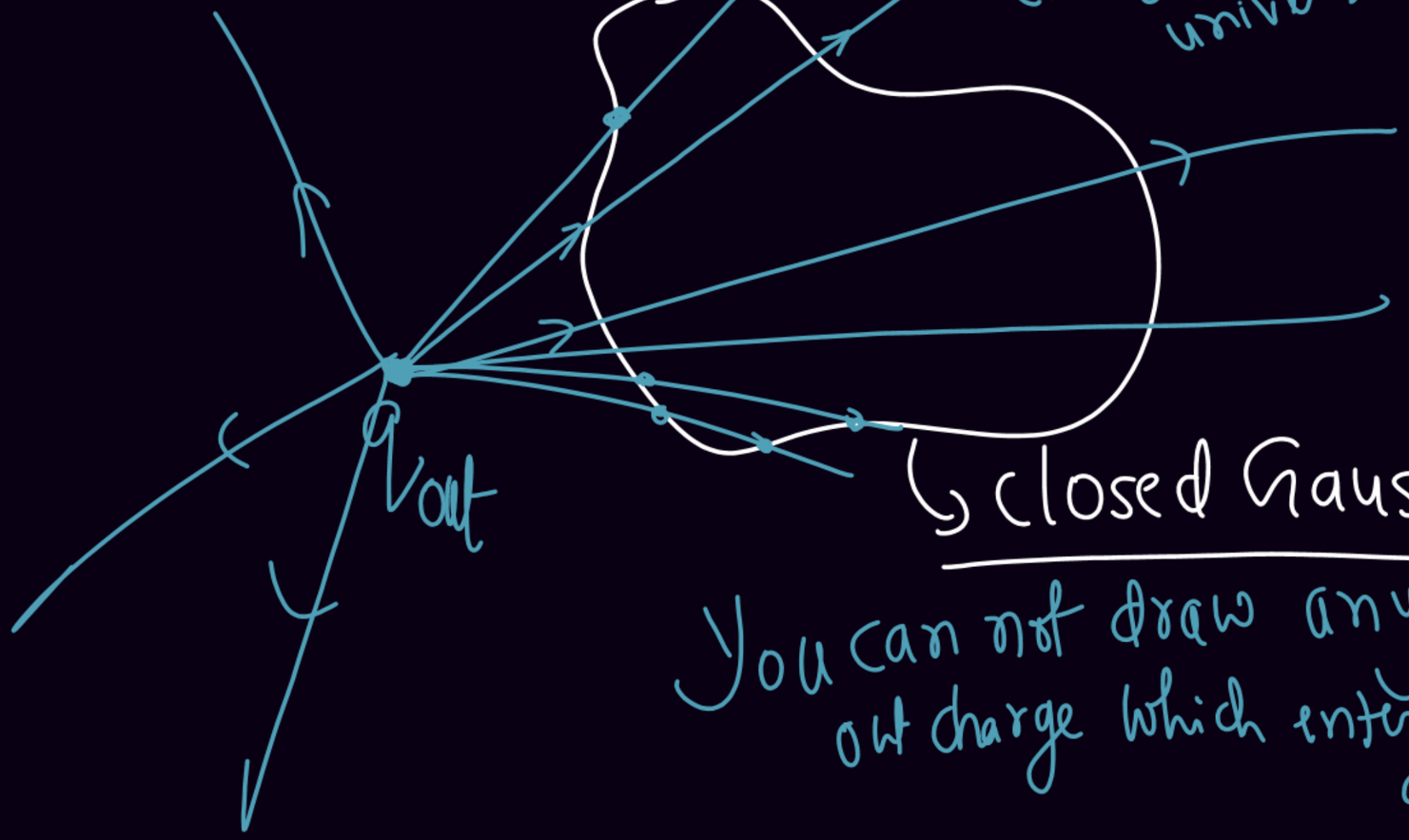


$$\phi = \oint \vec{E} \cdot d\vec{s}$$

$\phi \propto$ no. of field lines crossing the surface.

$$\phi_{\text{closed surface}} = \oint \vec{E} \cdot d\vec{s} = \frac{q_{in}}{\varepsilon_0}$$

$\vec{E}$ → net field due to all the charges in the universe.



ϕ_{enter} = -ve

ϕ_{exit} = +ve.

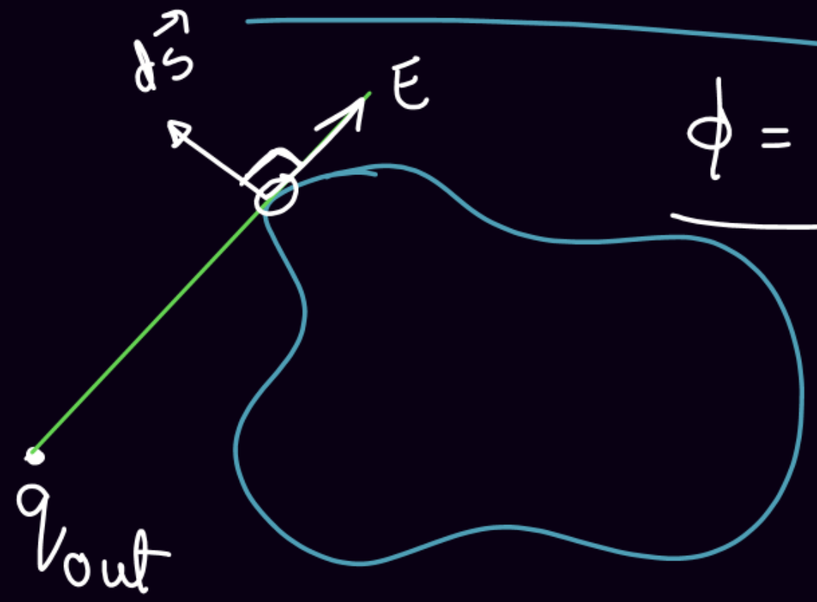
$\phi_{net} = 0$

↳ closed Gaussian surface

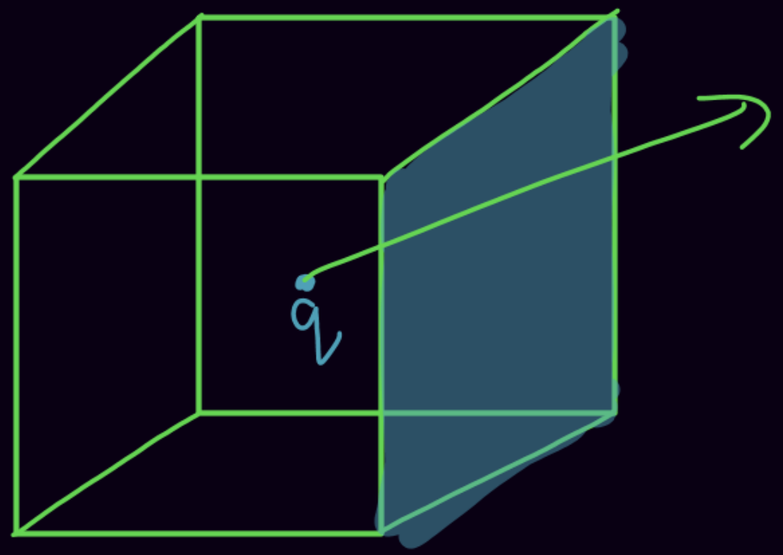
You can not draw any field line from a out charge which enters but don't exit from a closed surface.

$$\Phi_{\text{closed surface}} = \oint \vec{E} \cdot d\vec{s} = \frac{q_{in}}{\varepsilon_0}$$

$$\vec{E}_{net} = \vec{E}_{q_{in}} + \vec{E}_{q_{out}}$$



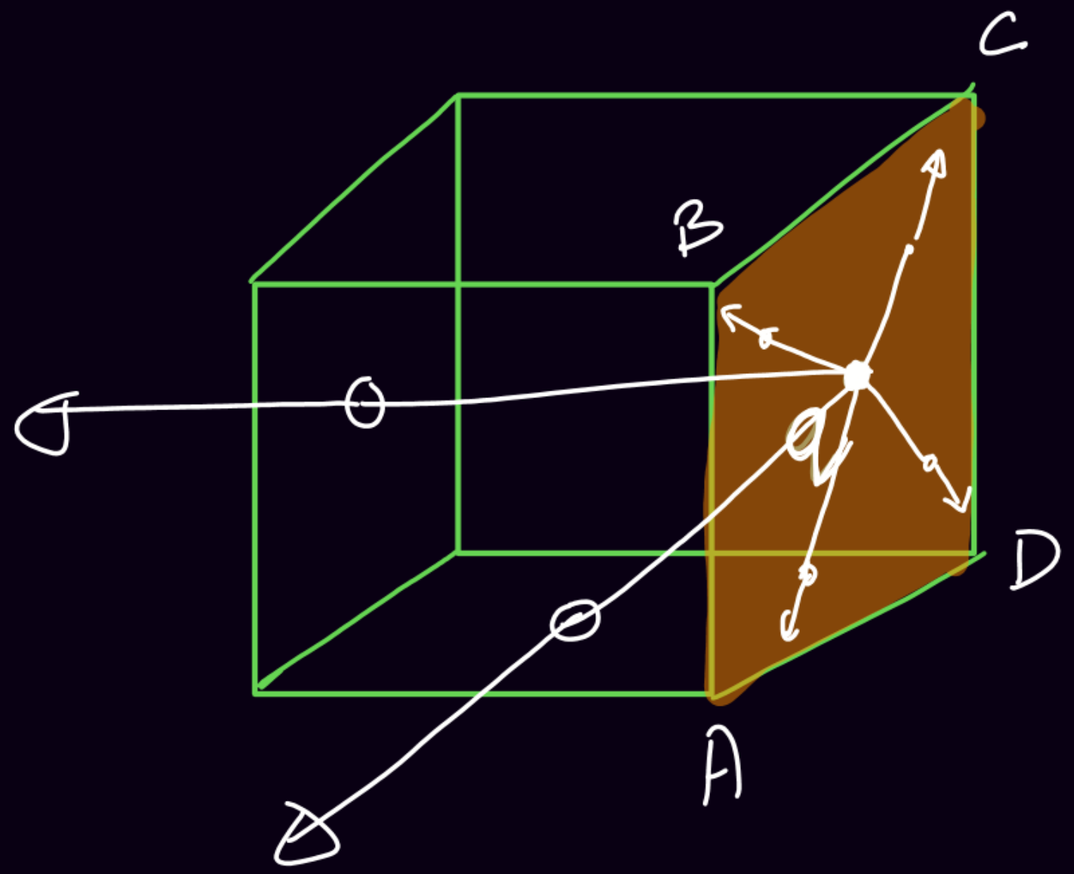
$$\Phi = E\, ds \cos 90^\circ = 0$$



$$\phi_{cube} = \frac{q}{\varepsilon_0}$$

$$\phi_{face} = \frac{q}{6\varepsilon_0}$$

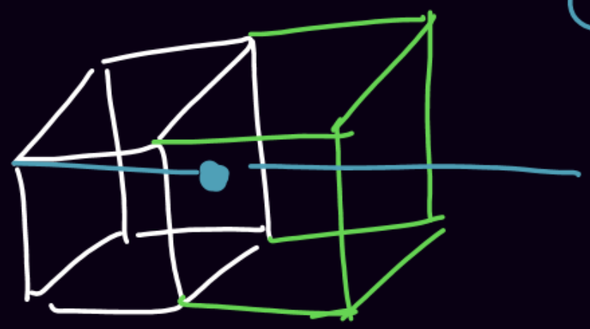
Charge is at centre of the cube.



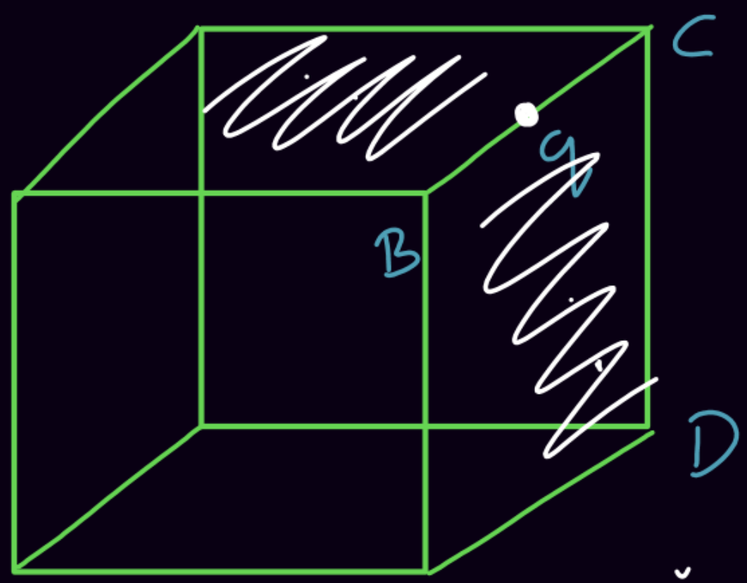
$$\phi_{cube} = \frac{q}{2\varepsilon_0}$$

ϕ_{ABCD} =

$$\phi_{cuboid} = \frac{q}{\varepsilon_0}$$

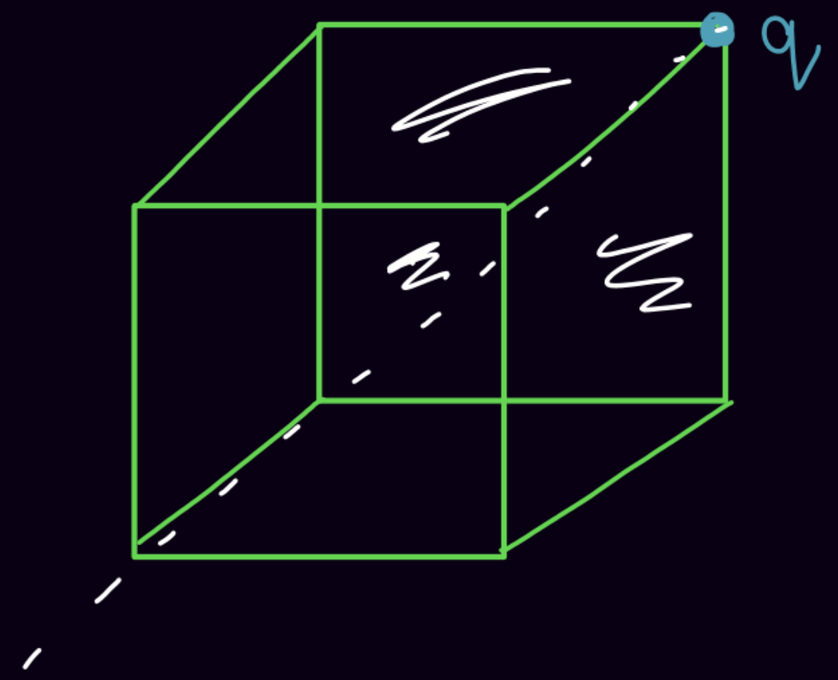


Jab ek point charge kisi plane surface ko touch karta hai tab us plane se flux zero ho jata hai.



$$\phi_{cube} = ? = \frac{q}{4\varepsilon_0}$$

$$\phi_{ABCD} \stackrel{?}{=} 0$$



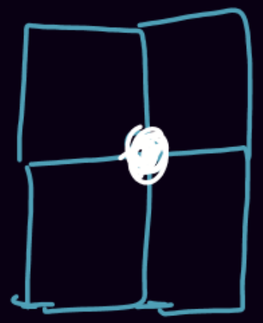
$$\phi_{cube} = \frac{q}{8\varepsilon_0}$$

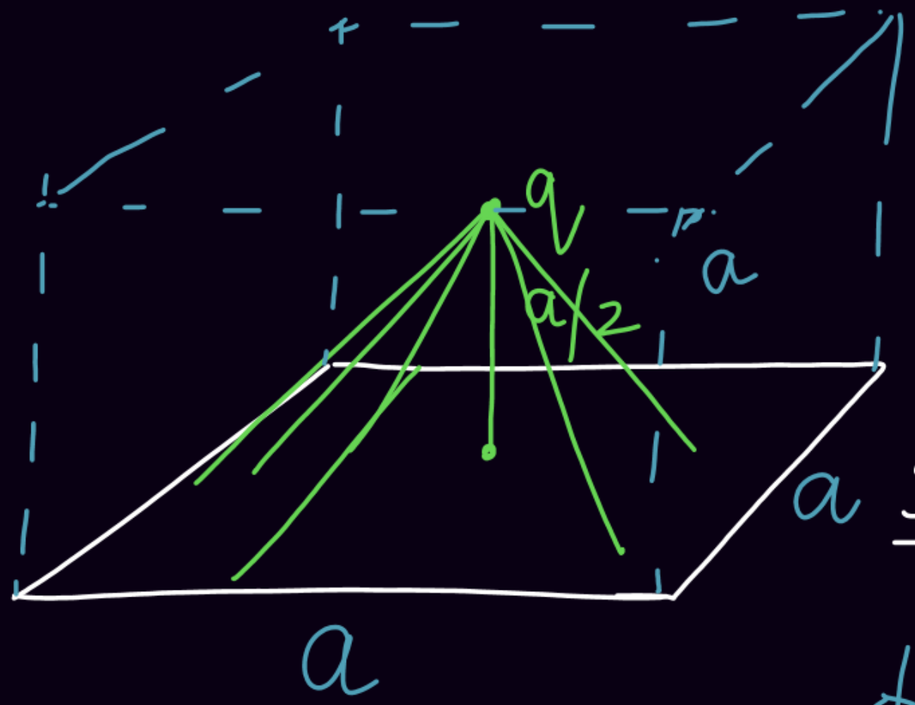
how many face will have zero flux?

$$\phi_{adjacent\ faces} = 0$$

* $\phi_{Non\ adjacent\ face} = \frac{1}{3}\left(\phi_{cube}\right)$

$$= \frac{q}{24\varepsilon_0}$$



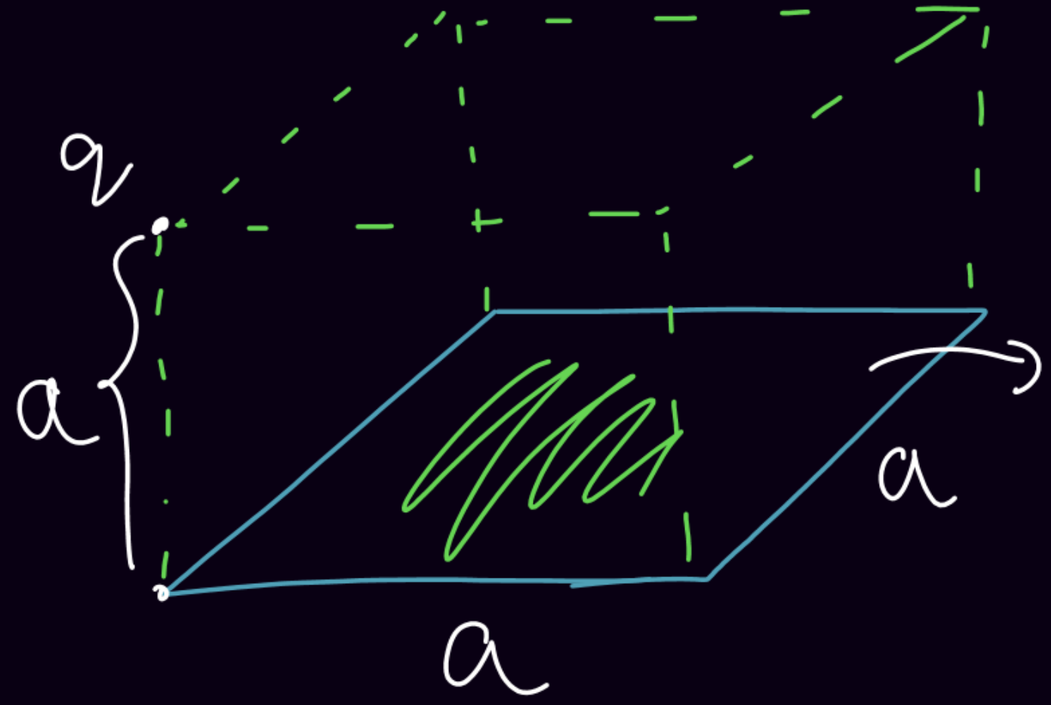


square

$$\phi_{square} = \frac{a}{6\varepsilon_0}$$

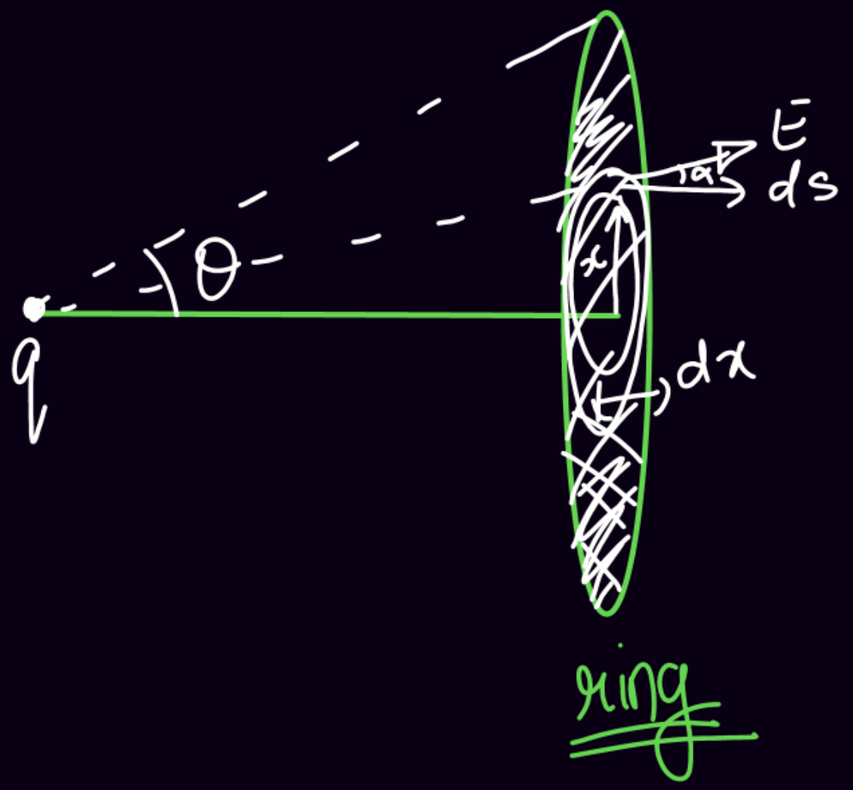
ϕ_{square} =

$$\phi = \int \vec{E} \cdot d\vec{S}$$



$\phi_{square} = ?$

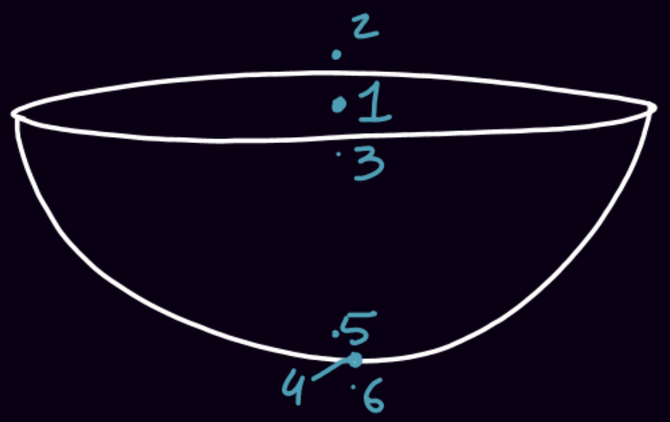
$\phi = \frac{q}{24\varepsilon_0}$



$$\int \vec{E} \cdot d\vec{s}'$$

$$\Phi_{ring} = \frac{q}{2\varepsilon_0}(1 - \cos\theta)$$

(9)



Position	Φ_{flat}	Φ_{curved}	$\Phi_{closed\ hemisphere}$
1			
2			
3			
4			
5			
6			

Don't stop when you're tired.
Stop when you're done!

THANK YOU!!