
समस्त बिहार, भरेगा हुंकार
HUNKAR
2025
में आपका स्वागत हैं

HUNKAR 2025

VIDYAKUL

PHYSICS

JP UJALA Sir

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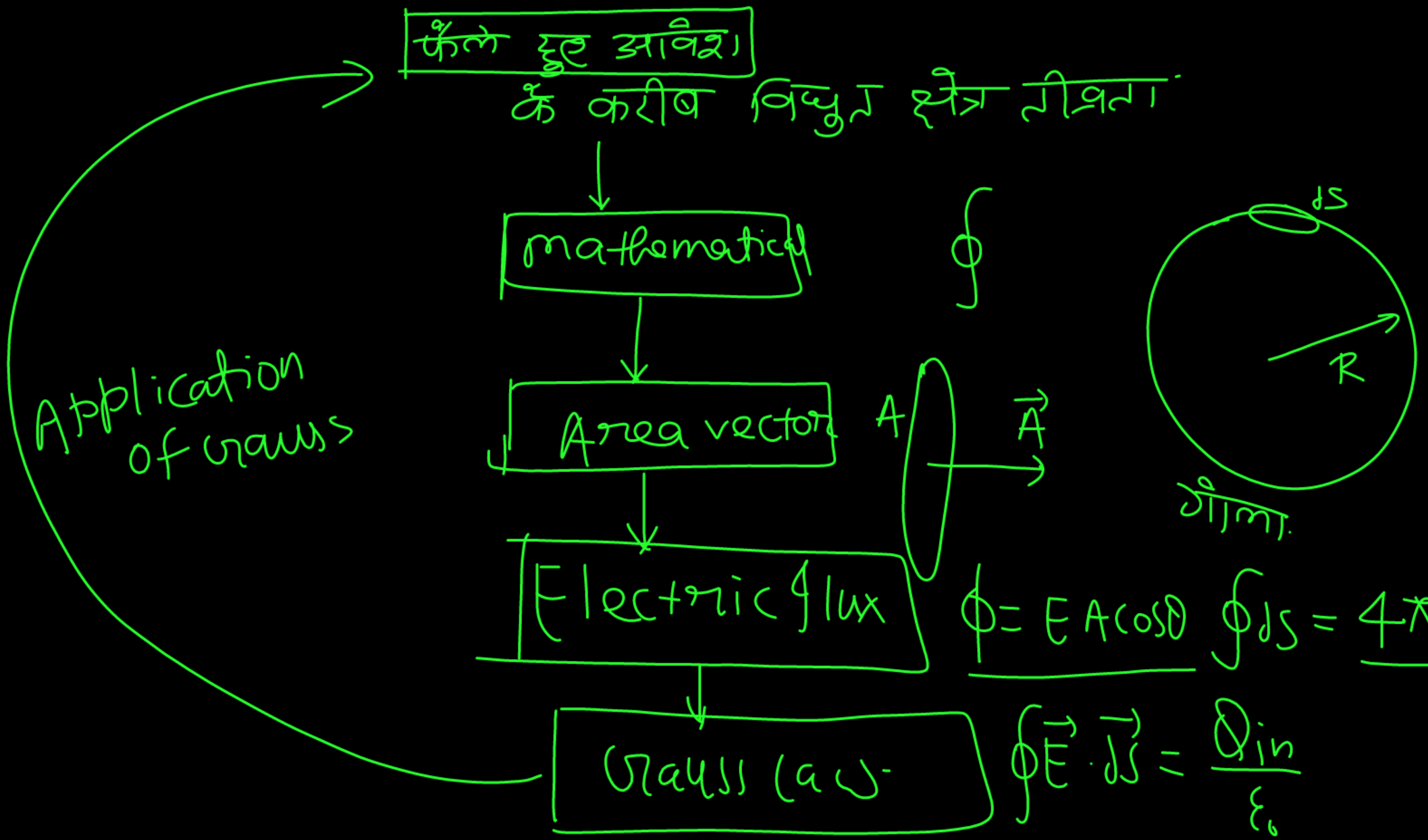
अध्याय 01

Applications of Gauss law

गॉस के नियम का अनुप्रयोग

आज का टॉपिक

फैले हुए आवेश के करीब विद्युत क्षेत्र तीव्रता



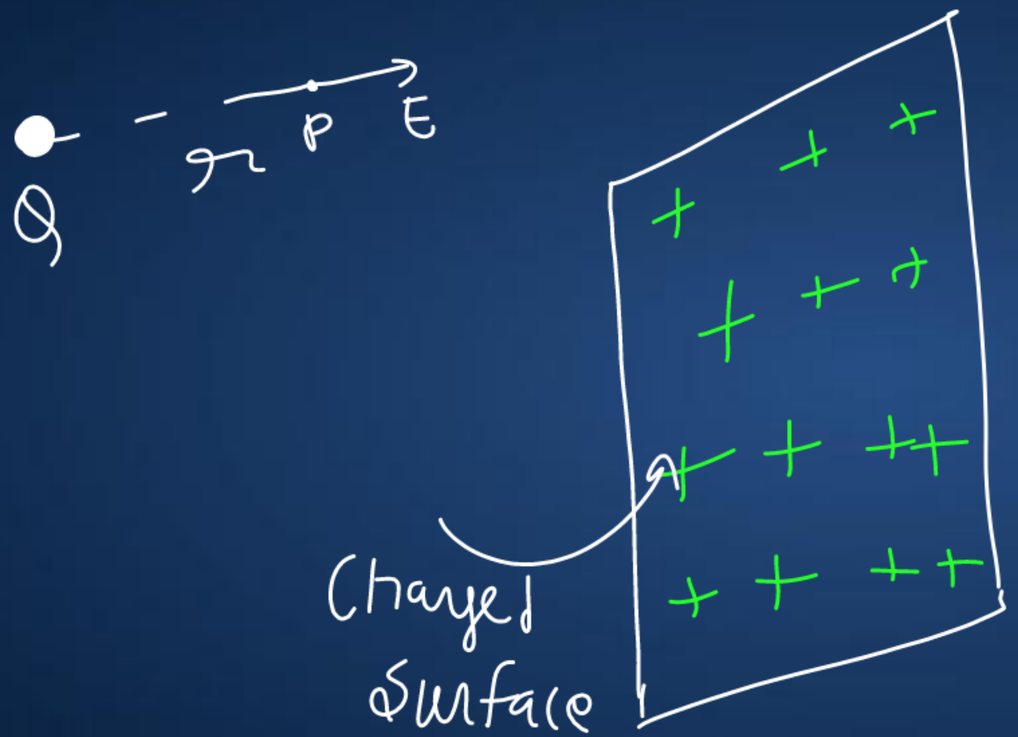
$$\lambda = \frac{Q}{L}$$ unit → C/m

$$\sigma = \frac{Q}{A}$$ unit → C/m^2

$$\rho = \frac{Q}{Volume}$$ unit → C/m3

Application of Gauss's law

गॉस के नियम का अनुप्रयोग



Gauss law

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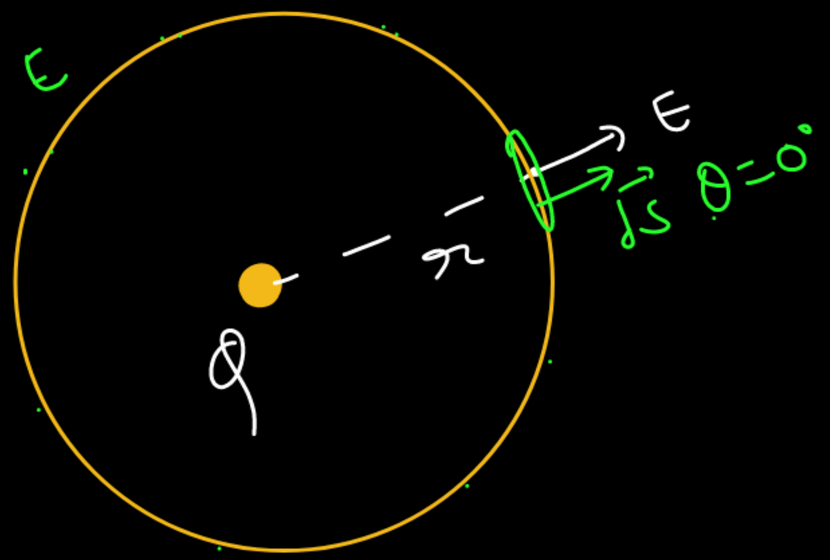
(K)

$$\oint \vec{E} \cdot \vec{ds} = \frac{Q_{in}}{\varepsilon_0}$$

$$E = \frac{Q_{in}}{\varepsilon_0 \oint ds}$$

$\varepsilon_0 = 8.854 \times 10^{-12} \ C^2/Nm^2$



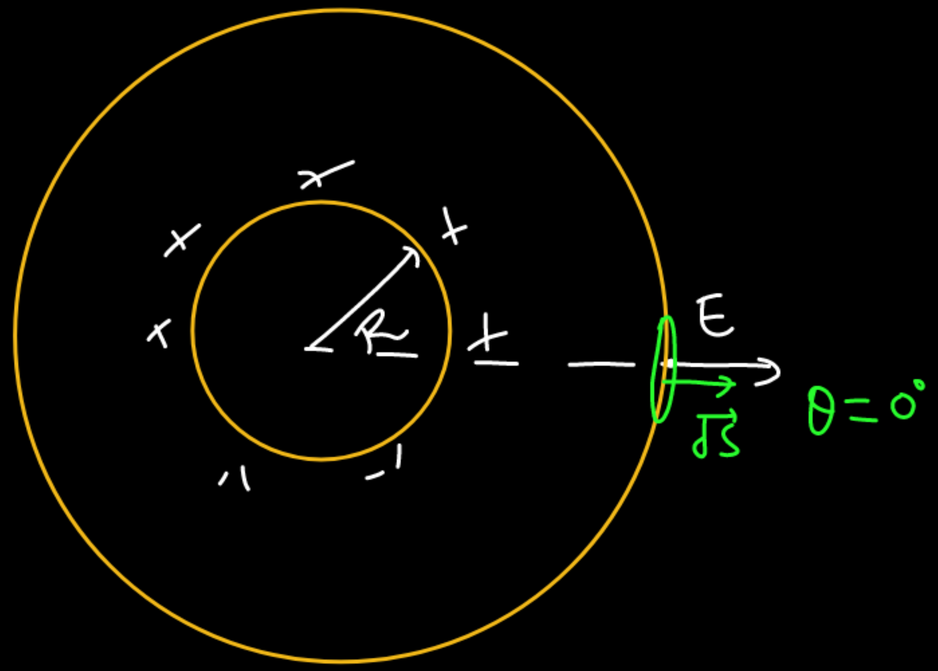
$$\oint \vec{E} \cdot \vec{ds} = \frac{Q_{in}}{\epsilon_0}$$

$$\oint E\, ds \cos\theta = \frac{Q_{in}}{\epsilon_0}$$

$$\oint E\, ds = \frac{Q_{in}}{\epsilon_0}$$

$$E \oint ds = \frac{Q}{\epsilon_0}$$

$$E = \frac{Q}{4\pi r^2 \epsilon_0} = \frac{1}{4\pi\epsilon_0} \cdot \frac{Q}{r^2} = \frac{kQ}{r^2}$$



$$\vec{A}\cdot\vec{B} = AB\cos\theta$$

$$\oint \vec{E}\cdot\vec{ds} = \frac{Q_{in}}{\varepsilon_0}$$

$$\oint E\,ds\cos\theta = \frac{Q_{in}}{\varepsilon_0}$$

$$E\oint ds = \frac{Q}{\varepsilon_0}$$

$$E = \frac{Q}{4R\pi^2\varepsilon_0} \Rightarrow \boxed{E = \frac{1}{4\pi\varepsilon_0}\cdot\frac{Q}{\pi^2}}$$

$$\boxed{E = \frac{kQ}{\pi^2}}$$

⊛ यदि 80 Litre दूध में 10 kg चीनी है तो 12 Litre दूध में कितना चीनी होगा?

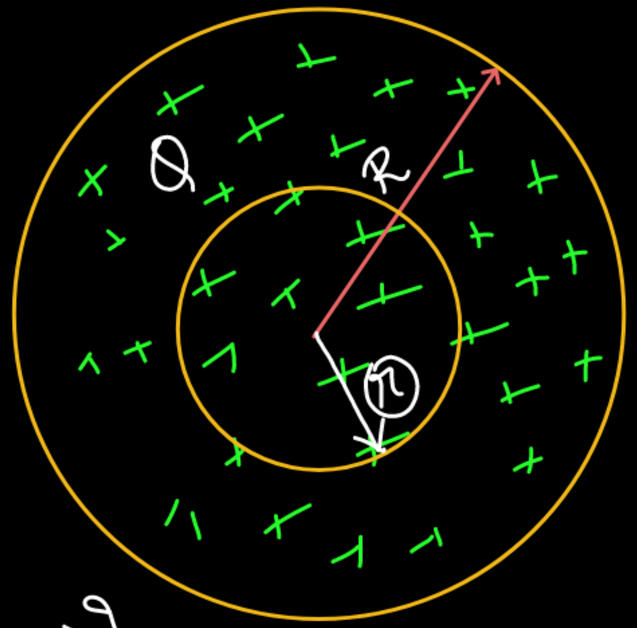
$\frac{4}{3}\pi R^3$

∴ 80 Litre में ---- 10 kg चीनी है

∴ 1 Litre --- $\frac{10}{80}$ kg

∴ 12 Litre -- $\frac{10}{80} \times 12 = 1.5$ kg

$\frac{4}{3}\pi r^3$



गोला sphere.

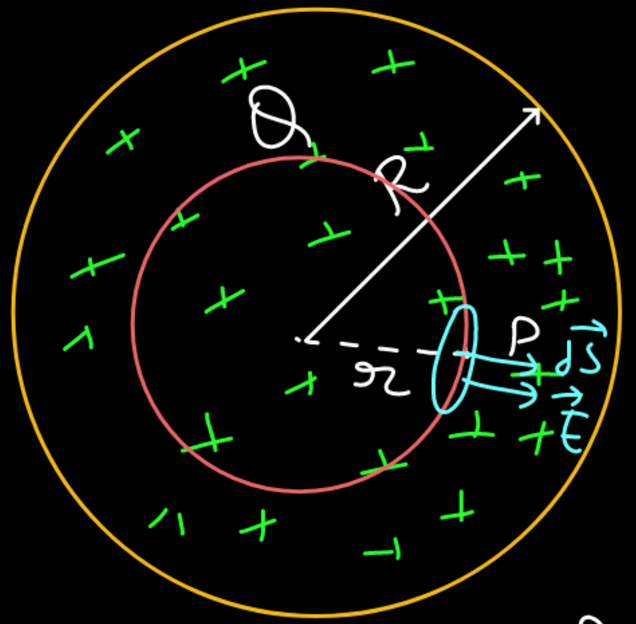
$\because \frac{4}{3}\pi R^3 \quad ----- \quad Q$

$\therefore \quad 1 \quad ----- \quad \frac{Q}{\frac{4}{3}\pi R^3}$

$\therefore \quad \frac{4}{3}\pi r^3 \quad ---- \quad \frac{Q}{\frac{4}{3}\pi R^3} \times \frac{4}{3}\pi r^3$

$= \frac{Q r^3}{R^3}$

(*)



ठोस कुचालक गोला
Solid insulating sphere.

① $\oint \vec{E} \cdot \vec{ds} = \frac{Q_{in}}{\varepsilon_0}$

$\oint E\, ds \cos 0° = \frac{Q_{in}}{\varepsilon_0}$

$E \oint ds = \frac{Q_{in}}{\varepsilon_0}$

$E \cdot 4\pi r^2 = \frac{(Q_{in})}{\varepsilon_0}$

② ∵ $\frac{4}{3}\pi R^3$ ---- Q

∴ 1 ---- $\frac{Q}{\frac{4}{3}\pi R^3}$

∴ $\frac{4}{3}\pi r^3$ ---- $\frac{Q}{\frac{4}{3}\pi R^3} \times \frac{4}{3}\pi r^3$

$$Q_{in} = \frac{Q r^3}{R^3}$$

③ $E \cdot 4\pi r^2 = \frac{Q r^3}{R^3 \varepsilon_0}\, r$

$$E = \frac{Q r}{4\pi \varepsilon_0 R^3}$$

$E = \frac{1}{4\pi\varepsilon_0} \cdot \frac{Q r}{R^3}$

$$E = \frac{K Q r}{R^3}$$

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Fastrack Revision

$$E = \frac{KQ}{r^2} \quad \text{point}$$

$$E = \frac{KQ}{r^2} \quad \text{Sphere.}$$

$$E_{in} = \frac{KQr}{R^3}$$

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Home work

तीनों को खुद से try करें बिना देखे