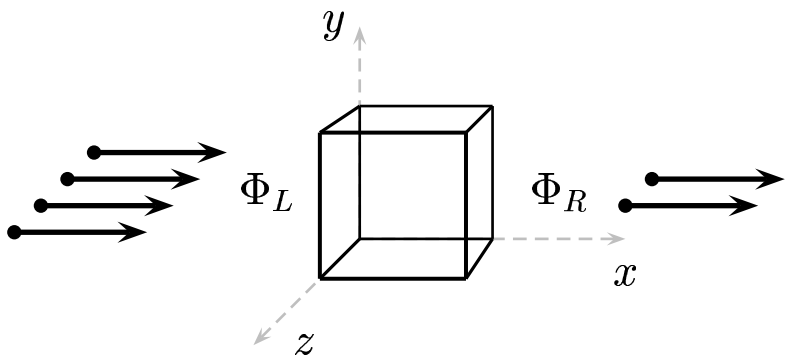
Consider the space of a cubic box.
The Electric field is parallel to the x-axis.

Flux entering from left: $|\Phi_L| = 4\,\mathrm{N\,m^2/C}$.

Flux leaving from right: $|\Phi_R| = 2\,\mathrm{N\,m^2/C}$.



Find Q_{encl}, the net charge enclosed.

A) $Q_{encl} = 4\,\epsilon_0$
B) $Q_{encl} = 2\,\epsilon_0$
C) $Q_{encl} = -2\,\epsilon_0$
D) $Q_{encl} = -4\,\epsilon_0$
E) $Q_{encl} = 0$

Gauss's Law states that $\Phi_S = \dfrac{Q_{encl}}{\epsilon_0}$.

Here Φ_S is the flux leaving the cubic region.

$$\begin{aligned}
\frac{Q_{encl}}{\epsilon_0} &= \Phi_S \\
&= -|\Phi_L| + |\Phi_R| \\
&= -4 + 2 \\
&= -2\,, \quad \text{so} \\
Q_{encl} &= -2\,\epsilon_0\,.
\end{aligned}$$

Answer **C**.

24.01-01˙A˙Cubic˙Box 2004-3-24