

Answer on Question #41186, Physics, Electromagnetism

The electric flux from a cube of edge l is ϕ . What will be its value if edge of cube is made $2l$ and charge enclosed is halved-

A) 4ϕ

B) 2ϕ

C) ϕ

D) $\phi/2$

Solution

According Gauss's law the net flux from a cube is

$$\phi = \frac{Q}{\epsilon_0},$$

where Q is a charge enclosed by a cube, ϵ_0 is the vacuum permittivity.

If edge of cube is made $2l$ and charge enclosed is halved the net flux from a cube is

$$\phi_1 = \frac{\frac{Q}{2}}{\epsilon_0} = \frac{1}{2} \frac{Q}{\epsilon_0} = \frac{1}{2} \phi.$$

Notice that the edge length of the cube did not enter into the calculation.

Answer: D) $\frac{1}{2} \phi$.