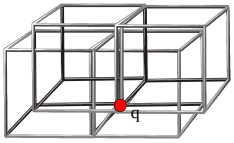
A point charge q is placed at one vertex of a cube. The electric flux through each of the cube faces is:

(A) $\frac{q}{8\in_0}$ (B) $\frac{q}{6\in_0}$ (C) $\frac{q}{2\in_0}$ (D) $\frac{q}{24\in_0}$

Solution

The vertex of a cube can be shared by 3 more cubes as shown below.

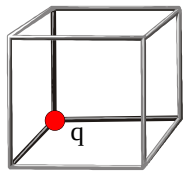


4 more cubes will be below the plane going through q.

The flux through q will completely pass through these 8 cubes.

So, $\frac{q}{\in_0} = \phi_{8\text{ Cubes}}$

$\therefore \phi_{1\text{ Cube}} = \frac{q}{8\in_0}$



Out of the 6 faces of this cube, 3 faces will not have any flux and the rest 3 faces will equally share the flux.

$\therefore \phi_{1\text{ Face}} = \frac{1}{3}\times\frac{q}{8\in_0}$

Hence, (D)