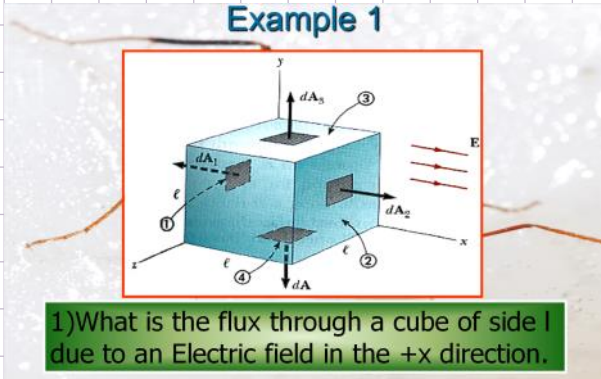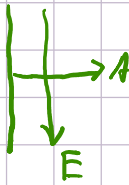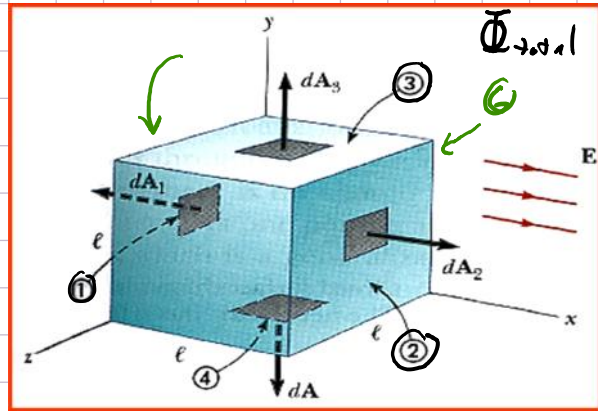Example 1

Example 1

1) What is the flux through a cube of side l due to an Electric field in the +x direction.

③

$$\Phi_3 = A_3 \, E \, \cos(90°) = 0$$
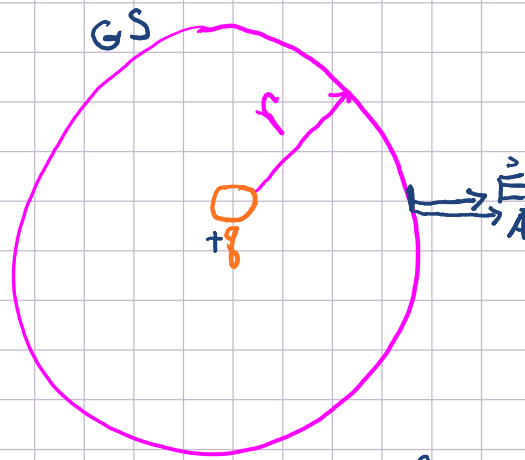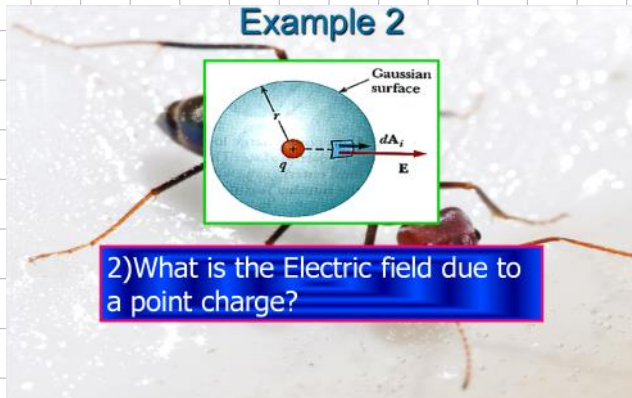
$$\Phi_4 = 0$$

$$\Phi_5 = 0$$

$$\Phi_6 = 0$$

① $\theta = 180°$

$$\Phi_1 = A_1 \, E \, \cos(180°) = -AE$$

② $\theta = 0$

$$\Phi_2 = AE$$

$$\Phi_{tot} = \Phi_1 + \Phi_2 + \Phi_3 + \Phi_4 + \Phi_5 + \Phi_6$$

$$\Phi_{tot} = 0$$

Example 2

Example 2

Gaussian surface

q

dA_i

E

2)What is the Electric field due to a point charge?

GS

r

$+q$

$\theta = 0 \quad \cos\theta = 1$

$\vec{E}$
$\vec{A}$

$$\Phi = \frac{q_{enc}}{\epsilon_0}$$

$$E \, A_s \, \cos\theta^{\,1} = \frac{q_{enc}}{\epsilon_0}$$

$$E(4\pi r^2) = \frac{q}{\epsilon_0}$$

$$E = \frac{q}{4\pi r^2 \epsilon_0}$$

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

$$\boxed{E = k \, \frac{q}{r^2}}$$