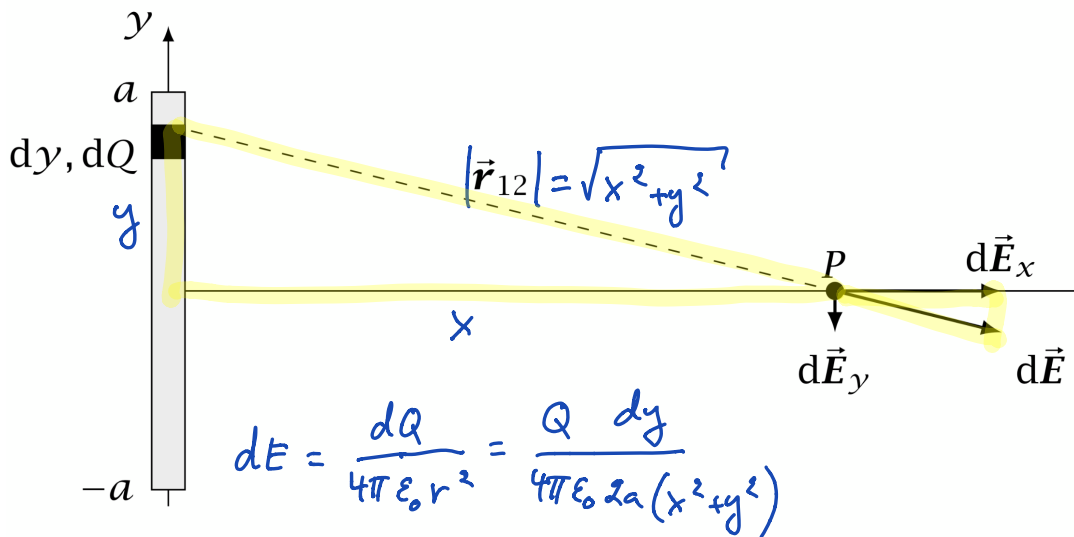


$$dQ = Q \frac{dy}{2a}$$



$$\frac{dE_x}{dE} = \frac{x}{\sqrt{x^2 + y^2}} \Rightarrow dE_x = \frac{Qx dy}{4\pi\epsilon_0 2a(x^2 + y^2)^{3/2}}$$

$$E_x = \int_{-a}^a dE_x = \frac{Qx}{4\pi\epsilon_0 2a} \int_{-a}^a \frac{dy}{(x^2 + y^2)^{3/2}}$$

$$= \frac{Qx}{4\pi\epsilon_0 2a} \int_{-a}^a \frac{y}{x^2 \sqrt{y^2 + x^2}}$$

[BETA]

$$\int \frac{dx}{(a^2 x^2 + c^2)^{3/2}} = \frac{x}{c^2 \sqrt{a^2 x^2 + c^2}}$$

$x \rightarrow y$
 $a = 1$
 $c \rightarrow x$

$$= \frac{Qx}{4\pi\epsilon_0 2a} \frac{2a}{x^2 \sqrt{a^2 + x^2}} = \frac{Q}{4\pi\epsilon_0 x \sqrt{x^2 + a^2}}$$