$$(\nabla \times F) = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\ y^2 & x^2 & -(x+2z) \end{vmatrix}$$

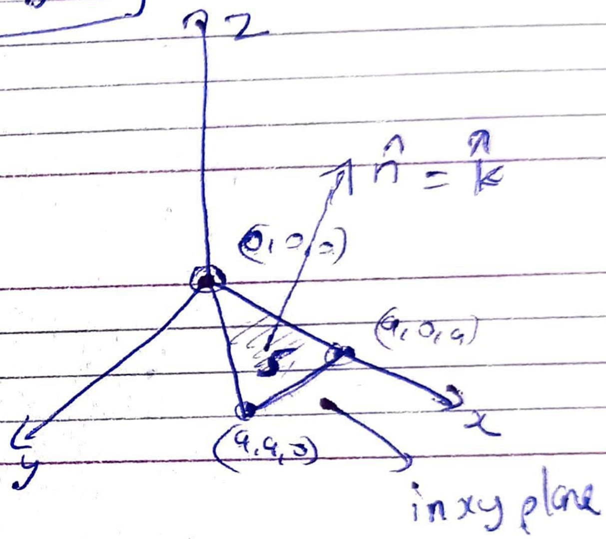
$$= \hat{i}(0) - \hat{j}(-1-0) + \hat{k}(2x-2y)$$

$$= \boxed{\hat{j} + \hat{k}(2x-2y)}$$

Using stoke theorem

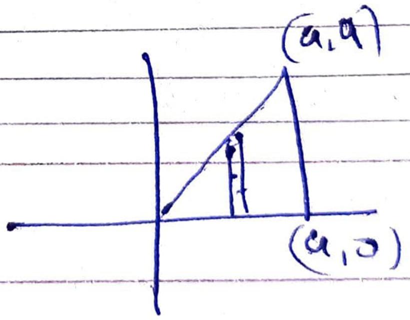
$$\int F \cdot dr = \iint_S (\nabla \times F) \cdot \hat{n}\, dS$$

S: triangle →



$$\iint_S [\hat{j} + \hat{k}(2x-2y)] \cdot \hat{k}\, dS$$

$$\Rightarrow \iint 2x - 2y\, dS$$



$$\Rightarrow 2 \int_{x=0}^{a} \int_{y=0}^{x} (x-y)\, dy\, dx$$

$$\Rightarrow 2 \int_{x=0}^{a} \left[xy - \frac{y^2}{2}\right]_0^x dx \Rightarrow 2 \int_0^a x^2 - \frac{x^2}{2}\, dx$$

$$\Rightarrow \left[\frac{x^3}{3}\right]_0^a = \boxed{\frac{a^3}{3}}$$ & option (a)