$$\frac{\partial \phi}{\partial t} = D\nabla^2\phi$$
$$\frac{\partial \phi}{\partial t} = D\frac{\partial^2 \phi}{\partial x^2}$$
$$\int_\Omega \frac{\partial \phi}{\partial t}\,d\Omega = D\int_\Gamma \frac{\partial \phi}{\partial x}\cdot \hat{n}\,d\Gamma$$
$$\int_\Omega \frac{\partial \phi}{\partial t}\,d\Omega = D\int_W \frac{\partial \phi}{\partial x}(-1)\,d\Gamma_W + D\int_E \frac{\partial \phi}{\partial x}(1)\,d\Gamma_E$$
$$\int_\Omega \frac{\partial \phi}{\partial t}\,d\Omega = D\left[\left(\frac{\partial \phi}{\partial x}\right)_E - \left(\frac{\partial \phi}{\partial x}\right)_W\right]\Delta y$$

Central diff $\frac{\partial \phi}{\partial x}$

$$\frac{\partial \phi}{\partial x} \approx \frac{\phi_{i+1} - \phi_i}{\Delta x}$$

$$\int_\Omega \frac{\partial \phi}{\partial t}\,d\Omega = D\left[\left(\frac{\phi_{i+1} - \phi_i}{\Delta x}\right)_E - \left(\frac{\phi_i - \phi_{i-1}}{\Delta x}\right)_W\right]\Delta y$$
$$\int_\Omega \frac{\partial \phi}{\partial t}\,d\Omega = D\left[\frac{\phi_{i+1} - 2\phi_i + \phi_{i-1}}{\Delta x}\right]\Delta y$$