29.8

Datos

$R = 75 \cdot 10^{-2}\ m$

$B(t) = 1.4\, e^{-(0.057\ s^{-1})t}$

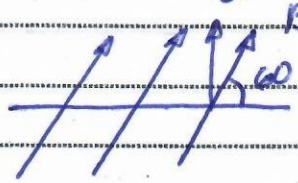
$\mathcal{E}_i = ?$

$t = ?$

$\mathcal{E}_i = -N \frac{d\Phi_B}{dt}$

Determinamos el Φ_B como primer paso

$\Phi_B = \int \vec{B} \cdot \vec{dA} = \int |B||dA| \cos\theta$



$\Phi_B = B \int dA \cos 30 = B \pi R^2 \cos 30°$

Ahora se deriva el flujo con respecto al tiempo

$\frac{d\Phi}{dt} = \pi R^2 \cos 30 \frac{dB}{dt} = \pi R^2 \cos 30 \frac{d}{dt}\left(1.4\, e^{(-0.057\ s^{-1})t}\right)$

$\frac{d\Phi}{dt} = (\pi R^2 \cos 30)(1.4)(-0.057)\, e^{-0.057t} = 0.12\, e^{(-0.057\ s^{-1})t}$

$\mathcal{E}_i = 0.12\, e^{(-0.057)(0)}$

$\mathcal{E}_i = 0.12\, e^{(-0.057)t}$ $\quad = \mathcal{E}_i = 0.12\ V$

$\mathcal{E}_f = \frac{\mathcal{E}_i}{10}$

$0.12\, e^{-0.057t} = \frac{0.12}{10}$; $e^{-0.057t} = \frac{1}{10}$

Aplicamos logaritmo en ambos miembros

$-0.057t = \ln \frac{1}{10}$

$\boxed{t = 40.1\ s}$