$$dW_g = \vec{F}_g \cdot d\vec{\ell} \qquad d\vec{\ell} = dx\,\hat{x}$$

$$\vec{F}_g = mg(-\cos\theta\,\hat{y} + \sin\theta\,\hat{x})$$

$$dW_g = mg\sin\theta\,dx$$

$$\frac{dW_g}{dt} = mg\sin\theta\frac{dx}{dt} = mg\sin\theta\,v$$

$$\frac{dW_g}{dt} = mg\sin\theta \cdot \frac{mgR\sin\theta}{(Be)^2\cos^2\theta}$$

$$\boxed{\frac{dW_g}{dt} = \frac{(mg)^2}{(Be)^2} \cdot R\frac{\sin^2\theta}{\cos^2\theta} = P_{Joule}}$$

$$\boxed{\frac{dW_g}{dt} = P_{Joule} = \left(\frac{mg\,tg\theta}{Be}\right)^2 R}$$