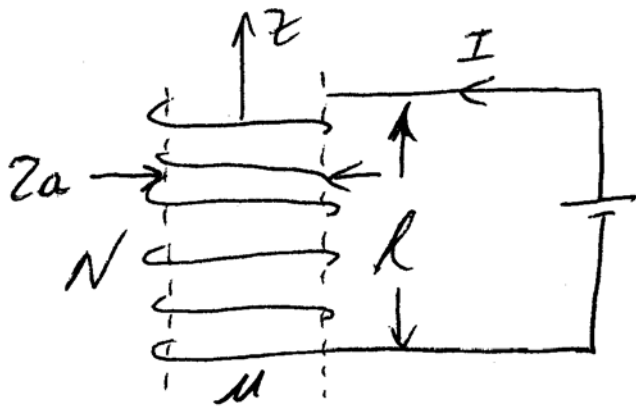


ex. For a long tightly-wound solenoid

$$\text{where } l \gg a, \quad \vec{B} = \hat{a}_z \frac{\mu N I}{l}$$



$$\Psi = \int_S \vec{B} \cdot d\vec{S}$$

$$= \frac{\mu N I}{l} \int dS$$

$$= \frac{\mu N I S}{l} \quad \leftarrow \text{cross-sectional area}$$

$$\Lambda = N \Psi = \frac{\mu N^2 I S}{l}$$

$$L = \frac{\Lambda}{I} = \frac{\mu N^2 S}{l} \quad (\text{H})$$

↑ Good for many standard inductors