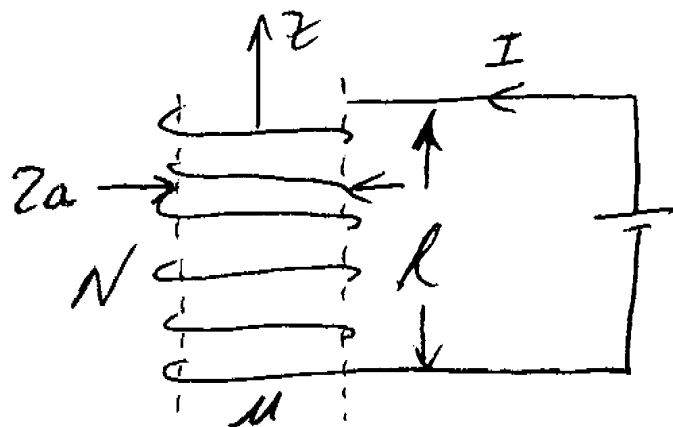


Solenoidal Inductor Example

For a long tightly-wound solenoid where $l \gg a$, $\vec{B} = \hat{a}_z \frac{\mu N I}{l}$



$$\Psi_m = \iint_S \vec{B} \cdot d\vec{s}$$

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

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

$$\lambda = N \Psi_m = \frac{\mu N^2 I S}{l}$$

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

↑ Good for many standard inductors