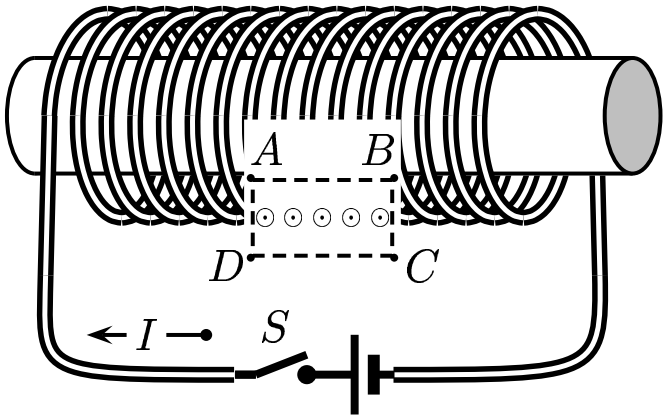
For a long solenoid with a current I, we assume the field inside B_{in}, is uniform and constant and the field outside B_{out} is 0.

To evaluate the magnetic field inside consider a rectangular Amperian loop (dashed line in cut-away view) of a height $\overline{AB}$ and a width $\overline{AC}$. Let the number of wires enclosed by the loop be ΔN.



Determine the magneto-motive force (mmf) M along the loop $ABCDA$ and the current enclosed: I_{encl}.

A) $M = +B\,\Delta L$ and $I_{\text{encl}} = I$.

B) $M = -B\,\Delta L$ and $I_{\text{encl}} = I$.

C) $M = +B\,\Delta L$ and $I_{\text{encl}} = I\,\Delta N$.

D) $M = -B\,\Delta L$ and $I_{\text{encl}} = I\,\Delta N$.

The total magneto-motive force is given by $M = M_{AB} + M_{BC} + M_{CD} + M_{DA}$.

Since $B \perp \Delta S$, $M_{BC} = M_{DA} = 0$.

Since the magnetic field outside is 0, $M_{CD} = 0$.

So, $M = M_{AB} = +B\,\Delta L$.

By inspection $I_{\text{encl}} = I\,\Delta N$.

Answer **C**.

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