Question 30905

The magnetic field is directed along the axis of solenoid. General formula for Amperes law is $d\vec{F} = I \cdot [\vec{dl}, \vec{B}]$, but for given wire $\vec{F} = I[\vec{l}, \vec{B}]$ since wire is straight ($\vec{l}$ is directed along the wire, and $|\vec{l}| = l$). Opening the cross product gives sine of the angle, which is equal to 1 because angle between $\vec{l}$ and $\vec{B}$ is 90 degrees.

Hence, the magnitude of the force is $|F_A| = B\,I\,l \sin 90 = 0.27\,T \cdot 10\,A \cdot \frac{3}{100}\,m = 0.081\,N$.