Answer on Question #55885, Physics / Electromagnetism

One end of a simple rectangular wire-loop current balance is inserted into a solenoid. A force of 3.0×10^{-3} N is found to act on this end when a current of 2.0 A is flowing in it. If the length of the conductor forming the end of the wire-loop is 0.10m. What is the magnetic flux density in the solenoid?

a. 0.043T
b. 0.26T
c. 0.43T
d. 0.015T

Solution:

When the magnetic field, the current and the conductor are mutually at right angles then the force is:

$$F = BIl$$

Thus, the flux density of the field

$$B = \frac{F}{Il}$$

In our case:

$F = 3 \cdot 10^{-3}$ N,

$I = 2.0$ A,

$l = 0.10$ m

Thus,

$$B = \frac{3 \cdot 10^{-3}}{2.0 \cdot 0.10} = 0.015 \text{ T}$$

Answer: 0.015T