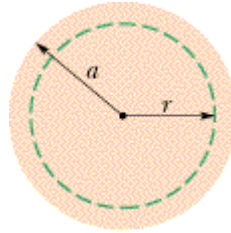


**Question #76460, Physics Other**

The figure shows a cross section across a long cylindrical conductor of radius  $a = 1.53$  cm carrying uniform current 58.8 A. What is the magnitude of the current's magnetic field at radial distance

- (a) 0,
- (b) 0.564 cm,
- (c) 1.53 cm (wire's surface),
- (d) 2.10 cm?

**Solution**

- (a)  $r = 0$

$$B = 0 \text{ T}$$

- (b)

$$\frac{i}{\pi r^2} = \frac{I}{\pi a^2}$$

$$i = I \left( \frac{r}{a} \right)^2$$

$$2\pi r B = \mu_0 i$$

$$B = \frac{\mu_0 r I}{2\pi a^2}$$

$$B = \frac{(4\pi \cdot 10^{-7})(0.00564)(58.8)}{2\pi(0.0153)^2} = 0.283 \text{ mT.}$$

- (c)

$$B = \frac{\mu_0 I}{2\pi a}$$

$$B = \frac{(4\pi \cdot 10^{-7})(58.8)}{2\pi(0.0153)} = 0.769 \text{ mT.}$$

- (d)

$$B = \frac{\mu_0 I}{2\pi r}$$

$$B = \frac{(4\pi \cdot 10^{-7})(58.8)}{2\pi(0.021)} = 0.560 \text{ mT}.$$

Answer provided by <https://www.AssignmentExpert.com>