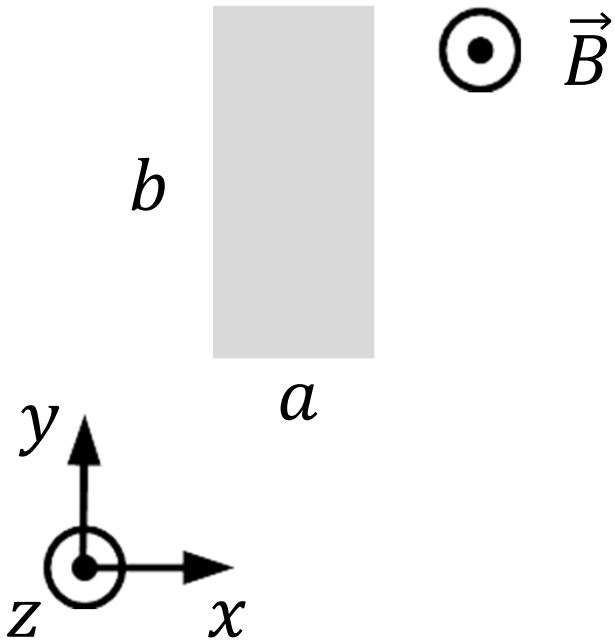
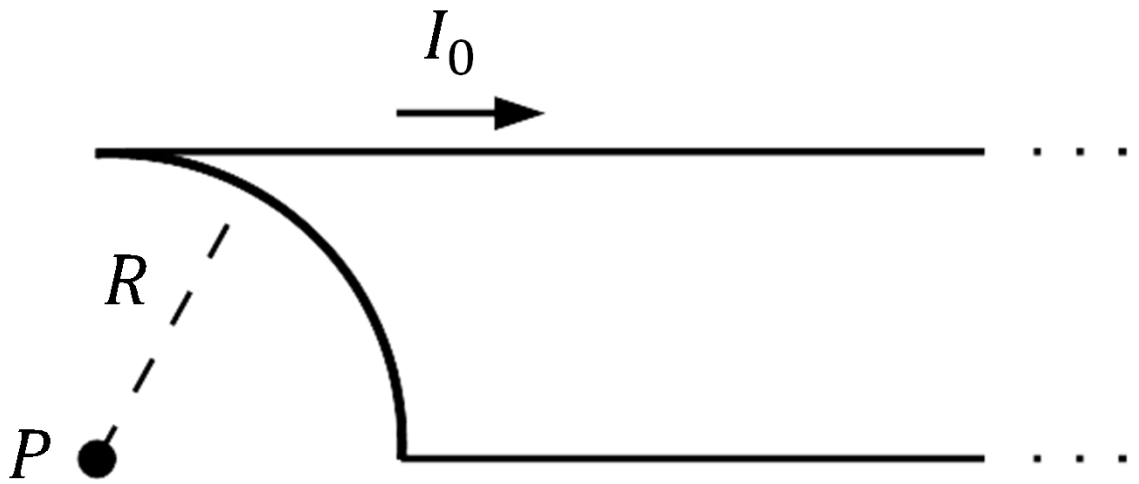
Example: A thin silver rectangular plate of dimensions $a \times b$ $(a < b)$ is in a region of uniform magnetic field $\vec{B} = \mathrm{B}_0\hat{\mathrm{k}}$. The plate is to be moved with $\vec{v} = \mathrm{v}_0\hat{\mathrm{i}}$, $\vec{v} = \mathrm{v}_0\hat{\mathrm{j}}$ or $\vec{v} = \mathrm{v}_0\hat{\mathrm{k}}$. (a) Which direction yields the greatest $\mathcal{E}$ in the plate? (b) What is the $\mathcal{E}$ induced in the plate? (c) Identify the location and sign of any induced charges in the plate.

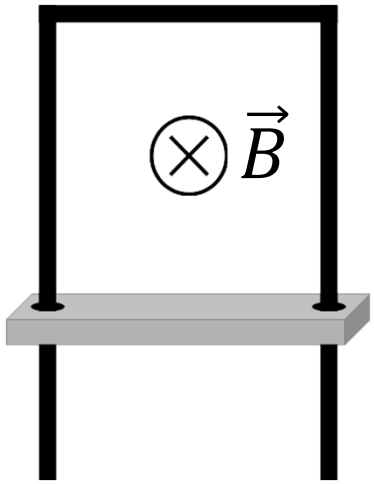


Example: A long wire lies along the x-axis carrying a current I_0 in the positive x direction. A proton passes through the point (0, $3a$, 0) with a constant velocity $\vec{v}$. Determine $\vec{v}$ if the magnetic field at (0, a, 0) is 0 at the moment the proton passes through (0, $3a$, 0).

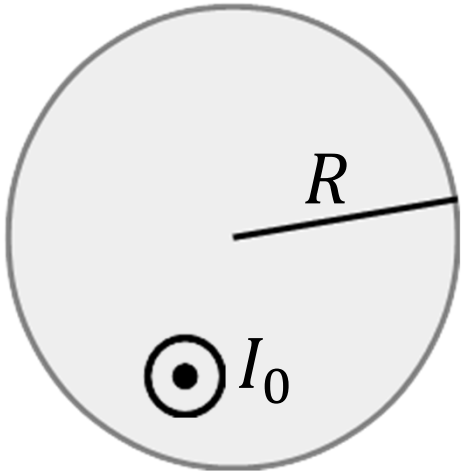
Example: The loop carries a current I_0. Determine the magnetic field at point P.



Example: A conducting rod of mass m and length L is attached to a U-shaped conductor such that it can slide without friction. The apparatus with the rod has resistance R and is located in a uniform magnetic field $\vec{B}$. Determine the terminal velocity for the rod.



Example: A wire carries a current I_0. Determine the magnetic field everywhere.



Example: A transmitter emits a 5kW signal towards a circular antenna of radius 0.20m that is located 20km away. The signal is uniformly distributed within a narrow cone such that it passes through $\frac{1}{64}$ the area of a sphere centered on the transmitter.

Example: $\mathrm{P}_0 = 5\mathrm{kW}$, $x_A = 20\mathrm{km}$, $R_A = 0.20\mathrm{m}$ and $A_{\mathrm{signal}} = \frac{1}{64} A_{\mathrm{sphere}}$. (a) Determine the energy density of the signal at the location of the antenna.

Example: $\mathrm{P}_0 = 5\mathrm{kW}$, $x_A = 20\mathrm{km}$, $R_A = 0.20\mathrm{m}$ and $A_{\mathrm{signal}} = \frac{1}{64} A_{\mathrm{sphere}}$. (b) Determine force on the antenna.

Example: $\mathrm{P}_0 = 5\mathrm{kW}$, $x_A = 20\mathrm{km}$, $R_A = 0.20\mathrm{m}$ and $A_{\mathrm{signal}} = \frac{1}{64} A_{\mathrm{sphere}}$. (c) How would the force be different if the signal were reflected?

Example: $\mathrm{P}_0 = 5\mathrm{kW}$, $x_A = 20\mathrm{km}$, $R_A = 0.20\mathrm{m}$ and $A_{\mathrm{signal}} = \frac{1}{64} A_{\mathrm{sphere}}$. (d) Determine the amplitude of the magnetic field at the location of the antenna.