5.7

Current I flows down a wire (length L) with a square cross section (side *a)*
If it is uniformly distributed over the entire wire area, what is the magnitude of the volume current density *J*?

A) $J = I/a^2$ B) $J = I/a$

C) $J = I/4a$ D) $J = a^2 I$

E) None of the above !

5.6

Current I flows down a wire (length L) with a square cross section (side *a)*
If it is uniformly distributed over the outer surfaces only, what is the magnitude of the surface current density *K*?

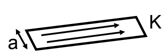
A) $K = I/a^2$ B) $K = I/a$

C) $K = I/(4a)$ D) $K = aI$

E) None of the above

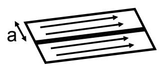
5.8

A "ribbon" (width a) of surface current flows (with surface current density K)
Right next to it is a second identical ribbon of current.
Viewed collectively, what is the new total surface current density?



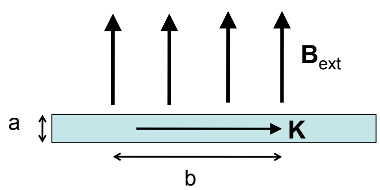
5.8 A "ribbon" (width a) of surface current flows (with surface current density K)
Right next to it is a second identical ribbon of current.
Viewed collectively, what is the new total surface current density?

A) K
B) 2K
C) K/2
D) Something else



ERK5-1 A "ribbon" (width a) with uniform surface current density K passes through a uniform magnetic field $\mathbf{B}_{ext}$. Only the length b along the ribbon is in the field. What is the magnitude of the force on the ribbon?

A) KB
B) aKB
C) abKB
D) bKB/a
E) KB/(ab)



5.10 Which of the following is a statement of charge conservation?

$$\frac{\partial \rho}{\partial t} =$$

5.10 Which of the following is a statement of charge conservation?

A) $\frac{\partial \rho}{\partial t} = -\nabla \vec{\mathbf{J}}$

B) $\frac{\partial \rho}{\partial t} = -\iint \vec{\mathbf{J}} \bullet d\vec{\mathbf{A}}$

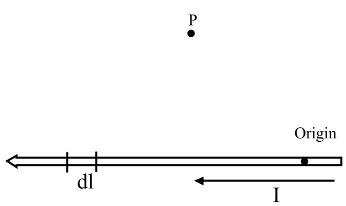
C) $\frac{\partial \rho}{\partial t} = -\iiint (\nabla \bullet \vec{\mathbf{J}})\, d\tau$

D) $\frac{\partial \rho}{\partial t} = -\nabla \bullet \vec{\mathbf{J}}$

E) Not sure

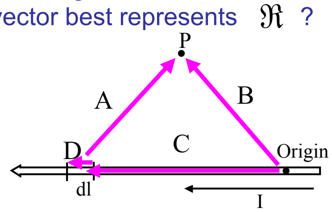
5.11 To find the magnetic field B at P due to a current-carrying wire we use the Biot-Savart law, $\vec{B}(\vec{r}) = \frac{\mu_0}{4\pi} I \int \frac{d\vec{l} \times \hat{\mathfrak{R}}}{\mathfrak{R}^2}$

In the figure, with "dl" shown, what is $\vec{\mathfrak{R}}$?



5.11 To find the magnetic field B at P due to a current-carrying wire we use the Biot-Savart law, $\vec{B}(\vec{r}) = \frac{\mu_0}{4\pi} I \int \frac{d\vec{l} \times \hat{\mathfrak{R}}}{\mathfrak{R}^2}$

In the figure, with "dl" shown, which purple vector best represents $\mathfrak{R}$?



E) None of these!