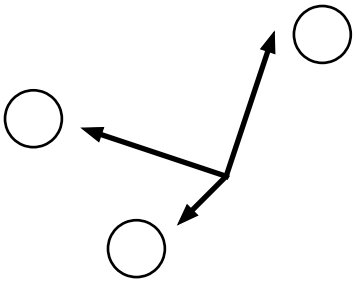
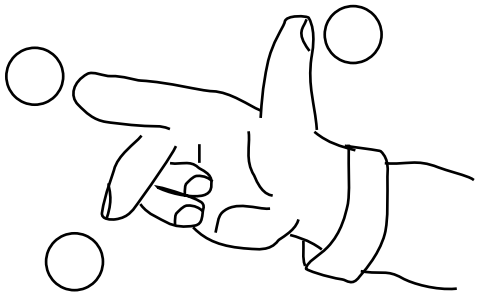
Magnetic Force Direction

Relationship between Force (F), Magnetic Field (B) and Electric Current (I)

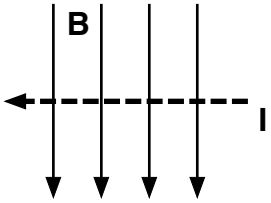
Charges moving in a magnetic field experience a force on them; likewise, an electric current in a magnetic field will experience a force on the current. Mathematically, one finds the force on a current in a magnetic field with something called a *cross product*, which is actually a way of multiplying vectors together and getting a vector for the result. What it means to you is that this is a three-dimensional problem, and Force, Current and Magnetic Field are all perpendicular to each other. It turns out, there is a right hand rule to remember this relationship:

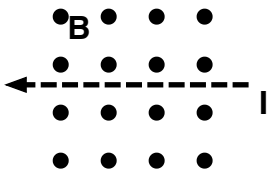


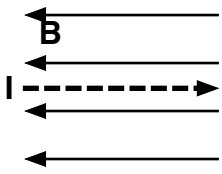


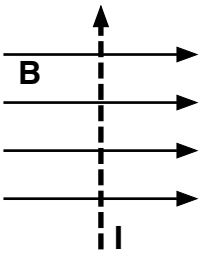
The one tricky thing with this relationship is that if the current and magnetic field are *parallel* to each other, then there is no force. (We will look at how to calculate the amount of force on a current in a magnetic field on another sheet.)

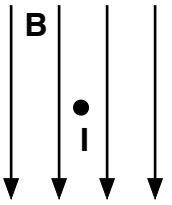
1. Find the direction of the force for the following situations:

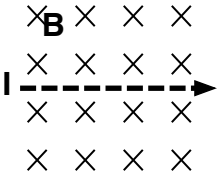
a. 

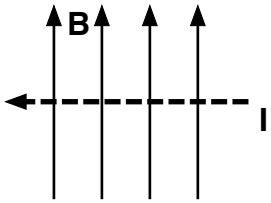
b. 

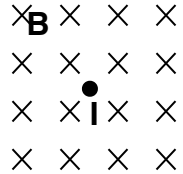
c. 

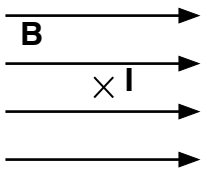
d. 

e. 

f. 

g. 

h. 

i. 

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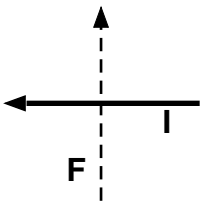
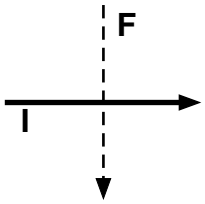
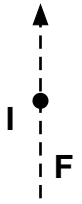
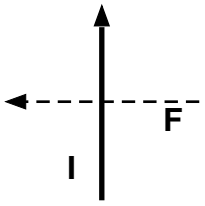
2. Find the direction of the magnetic field that would cause the force for each given current:

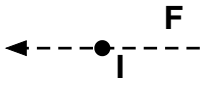
a. 

b. 

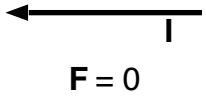
d. 

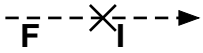
d. 

e. 

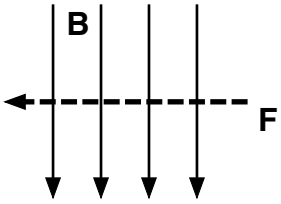
f. 

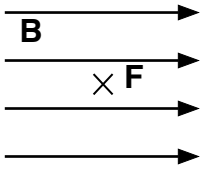
g. 

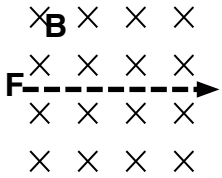
h. 

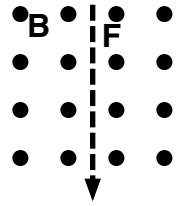
i. 

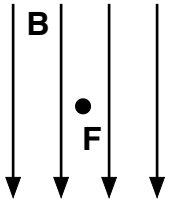
3. Find the current that would experience the force shown in the given magnetic field:

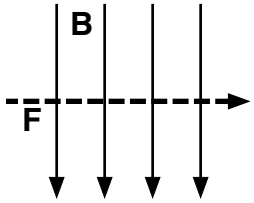
a. 

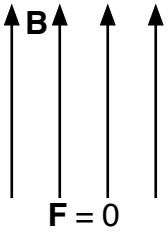
b. 

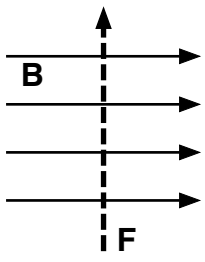
c. 

d. 

e. 

f. 

g. 

h. 

i.