

B-FIELDS  
PHYSICS 204  
JOHN JAY COLLEGE OF CRIMINAL JUSTICE  
THE CITY UNIVERSITY OF NEW YORK  
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**Treat this problem like an 'Open-Web' Board Meeting! All problems must always be solved fully with PICTURES, WORDS and COMPUTATION: You may use whatever resources you wish: your text, your colleagues, the internet, etc..**

**but be sure to vivid DIAGRAMS for all appropriate parts and CITE wherever knowledge has been acquired rather than derived... -->**

- a) According to Ampere's historic experimental finding, two light, straight, long wires carrying currents going in parallel directions will do WHAT to each other?
- b) Ampere's experimental finding is generally explained by a belief that moving charges create WHAT?
- c) Draw a magnetic field line diagram for a long straight current:
  - i. Head-On: As though the current is coming out of the whiteboard toward your eye.
  - ii. Side-View: As though the current is traveling in a straight line from one side of the whiteboard toward the other.
- d) Write down a clear and complete expression (EQUATION!) for the magnetic field as a function of charge, velocity and displacement from the charge.
- e) Write down a clear and complete expression (EQUATION!) for the magnetic field as a function current, length and displacement from the current.
- f) Write down a clear expression for the magnetic force as a function of current, length, and magnetic field.
- g) Write and illustrate a complete compare/contrast between the "Dot Product" and "Cross Product" for the multiplication of two vectors.
- h) Write and illustrate a complete compare/contrast between the behavior of electric field lines from charges and the behavior of magnetic field lines from charges.
- i) Put together all the above results in order to provide and illustrate a clear and complete EXPLANATION for Ampere's finding --

***IN TERMS OF Magnetic FORCES and FIELDS!***