

Force on a Current Carrying Wire

1. What is the force on 1 m of wire carrying a current of 9.8 A perpendicular to a magnetic field of 0.80 T? How would you orient the wire in order for the wire to experience no force?
2. A 1.5 m length of vertical wire has a current of 2 A toward the top of the page. What is the magnitude of the force if the magnetic field of 1 T is directed to the left? What is the direction of the force?
3. A 0.25 m wire carrying 3.4 A of current to the left experiences a 2 N force toward the bottom of the page.
 - a. Sketch the situation.
 - b. What is the direction of the magnetic field?
 - c. What is the magnitude of the magnetic field?
 - d. Would the magnitude of the force increase, decrease or stay the same if the wire is placed at an angle of 45° ? Explain.
 - e. Sketch two ways to orient the wire so that it experiences zero force.
4. A 0.20 m long wire carrying 3 A current to the left is placed in a 2.5 T magnetic field that points to the left. What is the force on the wire?

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5. A 10 cm long wire experiences 4 N of force to the right when placed in a 3.5 T magnetic field directed toward the bottom of the page.
- What is the magnitude and direction of the current?

 - If the current is doubled, what is the force on the wire?
6. A wire carrying 0.55 A current into the page is placed in a 2 T field that points to the right. A force of 0.45 N is exerted on the wire.
- What is the direction of the force?

 - What is the length of wire in the field?

 - If the wire has 2.5Ω of resistance, what is the voltage of the wire?

Answers:

- 1) 7.84 N 2) 3 N, out of the page 3. b) into the page c) 2.35 T d) decrease
e) into or out of the page (so that it is parallel to the wire) 4) 0 N
5. a) 11.4 A, out of the page b) 8 N, same direction
6. a) bottom of the page b) 0.41 m c) 1.38 V