Problem 27.39. A thin, 50.0 cm long metal bar with mass 750 g rests on, but is not attached to, two metallic supports in a uniform 0.450 T magnetic field, as shown in Fig. 27.51. A battery and a 25.0 Ω resistor in series are connected to the supports. (a) What is the highest voltage the battery can have without breaking the circuit at the supports? (b) The battery voltage has the maximum value calculated in (a). If the resistor suddenly gets partially short-circuited, decreasing its resistance to 2.0 Ω, find the initial acceleration of the bar.

![Diagram of bar and magnetic field](image)

Problem 27.64. A particle of charge \( q > 0 \) is moving at speed \( v \) in the +z-direction through a region of uniform magnetic field \( \mathbf{B} \). The magnetic force on the particle is \( \mathbf{F} = F_0(3\hat{i} + 4\hat{j}) \), where \( F_0 \) is a positive constant. (a) Determine the components \( B_x \), \( B_y \), and \( B_z \), or at least as many of the three components as is possible from the information given. (b) If it is given in addition that the magnetic field has magnitude \( 6F_0/qv \), determine as much as you can about the remaining components of \( \mathbf{B} \).

Problem 27.68. A 3.00 N metal bar, 1.50 m long and having a resistance of 10.0 Ω, rests horizontally on conducting wires connecting it to the circuit shown in Fig. 27.62. The bar is in a uniform, horizontal, 1.60 T magnetic field and is not attached to the wires in the circuit. What is the acceleration of the bar just after the switch \( S \) is closed?

![Diagram of bar, battery, and wires](image)

Problem 27.73. A long wire carrying a 6.00 A current reverses direction by means of two right-angle bends, as shown in Fig. 27.64. The part of the wire where the bend occurs is in a magnetic field of 0.666 T confined to the circular region of diameter 75 cm, as shown. Find the magnitude and direction of the net force that the magnetic field exerts on this wire.

![Diagram of wire and magnetic field](image)