5.1 An electron with a speed of 8×10^6 m/s is projected along the positive x direction into a medium containing a uniform magnetic flux density $\mathbf{B} = (\hat{\mathbf{x}}4 - \hat{\mathbf{z}}3)$ T. Given that $e = 1.6 \times 10^{-19}$ C and the mass of an electron is $m_e = 9.1 \times 10^{-31}$ kg, determine the initial acceleration vector of the electron (at the moment it is projected into the medium).

5.3 The circuit shown in Fig. P5.3 uses two identical springs to support a 10-cm-long horizontal wire with a mass of 20 g. In the absence of a magnetic field, the weight of the wire causes the springs to stretch a distance of 0.2 cm each. When a uniform magnetic field is turned on in the region containing the horizontal wire, the springs are observed to stretch an additional 0.5 cm each. What is the intensity of the magnetic flux density **B**? The force equation for a spring is $F = kd$, where k is the spring constant and d is the distance it has been stretched.

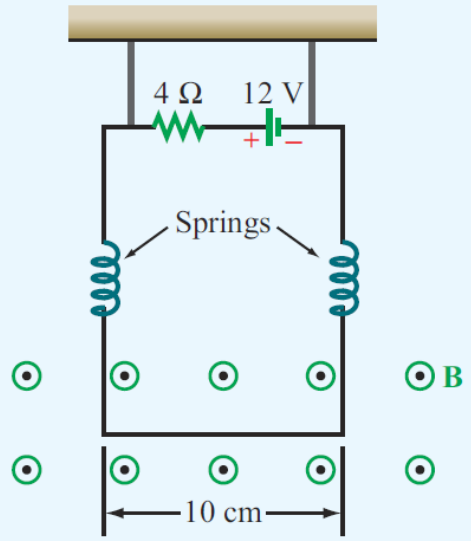

Figure P5.3 Configuration of Problem 5.3.

5.16 The long, straight conductor shown in Fig. P5.16 lies in the plane of the rectangular loop at a distance $d = 0.1$ m. The loop has dimensions $a = 0.2$ m and $b = 0.5$ m, and the currents are $I_1 = 20$ A and $I_2 = 30$ A. Determine the net magnetic force acting on the loop.

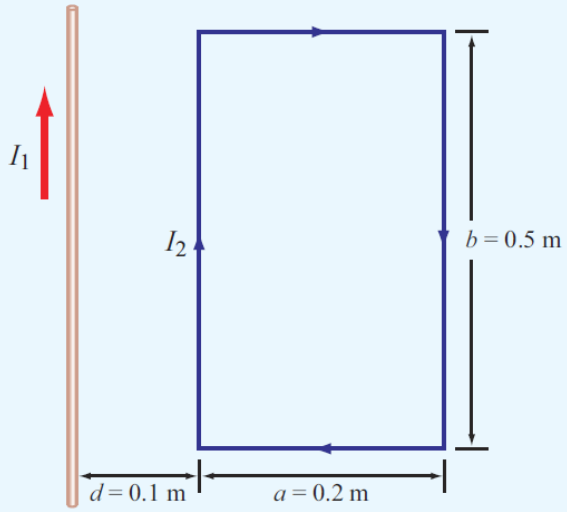

Figure P5.16 Current loop next to a conducting wire (Problem 5.16).