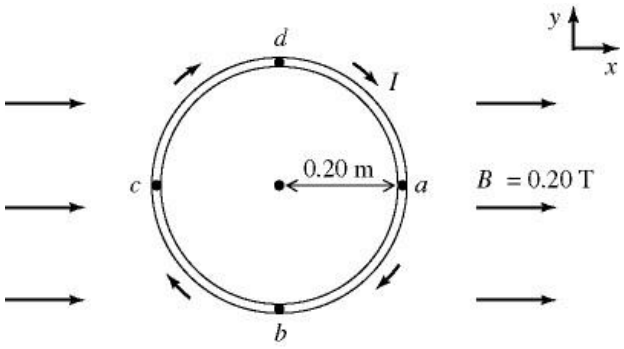
D1

A rigid circular loop has a radius of 0.20 m and is in the *xy*-plane. A clockwise current $I=5\ A$ is carried by the loop, as shown. A uniform external magnetic field, B = 0.20 T in the positive x-direction, is present.



What are the torque (value and direction) and magnetic potential energy of this circular loop at this moment?

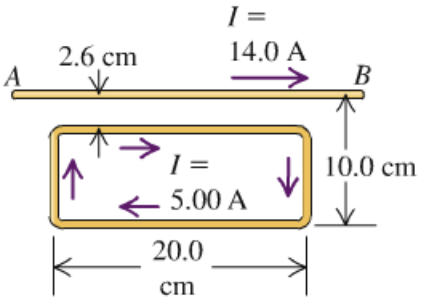
D2

Two identical circular, wire loops 48.0 cm in diameter each carry a current of 3.10 A in the same direction. These loops are parallel to each other and are 27.0 cm apart. Line *ab* is normal to the plane of the loops and passes through their centers. A proton is fired at 2950 m/s perpendicular to line *ab* from a point midway between the centers of the loops.

Find the magnitude of the magnetic force these loops exert on the proton just after it is fired.

28.72 • The long, straight wire *AB* shown in Fig. P28.72 carries a current of 14.0 A. The rectangular loop whose long edges are parallel to the wire carries a current of 5.00 A. Find the magnitude and direction of the net force exerted on the loop by the magnetic field of the wire.

Figure **P28.72**



28.77 • **CALC** A long, straight wire with a circular cross section of radius R carries a current I. Assume that the current density is not constant across the cross section of the wire, but rather varies as $J = \alpha r$, where α is a constant. (a) By the requirement that J integrated over the cross section of the wire gives the total current I, calculate the constant α in terms of I and R. (b) Use Ampere's law to calculate the magnetic field $B(r)$ for (i) $r \leq R$ and (ii) $r \geq R$. Express your answers in terms of I.