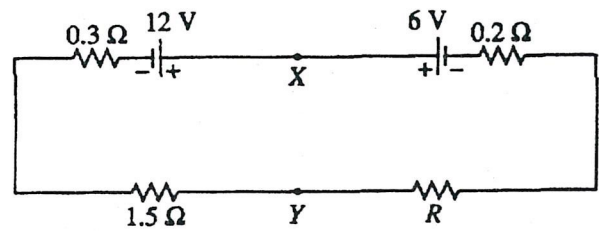


43. A cross section of a long solenoid that carries current  $I$  is shown above. All of the following statements about the magnetic field  $\mathbf{B}$  inside the solenoid are correct EXCEPT:
- (A)  $\mathbf{B}$  is directed to the left.
  - (B) An approximate value for the magnitude of  $\mathbf{B}$  may be determined by using Ampère's law.
  - (C) The magnitude of  $\mathbf{B}$  is proportional to the current  $I$ .
  - (D) The magnitude of  $\mathbf{B}$  is proportional to the number of turns of wire per unit length.
  - (E) The magnitude of  $\mathbf{B}$  is proportional to the distance from the axis of the solenoid.
44. The power dissipated in a wire carrying a constant electric current  $I$  may be written as a function of  $I$ , the length  $\ell$  of the wire, the diameter  $d$  of the wire, and the resistivity  $\rho$  of the material in the wire. In this expression, the power dissipated is directly proportional to which of the following?
- (A)  $\ell$  only
  - (B)  $d$  only
  - (C)  $\ell$  and  $\rho$  only
  - (D)  $d$  and  $\rho$  only
  - (E)  $\ell$ ,  $d$ , and  $\rho$

Questions 45-47



In the circuit above, the emf's and the resistances have the values shown. The current  $I$  in the circuit is 2 amperes.

45. The resistance  $R$  is
- (A) 1  $\Omega$
  - (B) 2  $\Omega$
  - (C) 3  $\Omega$
  - (D) 4  $\Omega$
  - (E) 6  $\Omega$
46. The potential difference between points  $X$  and  $Y$  is
- (A) 1.2 V
  - (B) 6.0 V
  - (C) 8.4 V
  - (D) 10.8 V
  - (E) 12.2 V
47. How much energy is dissipated by the 1.5-ohm resistor in 60 seconds?
- (A) 6 J
  - (B) 180 J
  - (C) 360 J
  - (D) 720 J
  - (E) 1,440 J