

Answer on question #59310, Physics / Electric Circuits

Question A certain inductor has an inductance of 0.50H and a resistance of 2.0. It is placed in series with a switch, a 12.0-V battery and a 4.0 ohms resistor. Find the time constant of the circuit and the energy stored in the inductor.

0.83s and 100J

0.032s and 20J

0.47s and 5J

0.083s and 1J

Solution Time constant is

$$\tau = \frac{L}{R} = \frac{0.5}{2+4} = \frac{1}{12} \approx 0.083 \text{ s}$$

Energy store is

$$E = \frac{1}{2}LI^2 = \frac{1}{2}L\frac{U^2}{R^2} = \frac{1}{2} \cdot 0.5 \cdot \frac{12^2}{6^2} = 1 \text{ J}$$

Answer is 0.083s and 1J