

**Quiz 8: more inductance ...**

1. At an instant of time during the oscillations of an  $LC$  circuit, the current is at its maximum value. At this instant, the voltage across the capacitor

- is identical to that across the inductor
- has half its maximum value
- is zero
- has its maximum value
- is impossible to determine

2. A switch controls the current in a circuit that has a large inductance. Is a spark more likely to be produced at the switch when:

- the switch is being closed
- the switch is being opened
- it doesn't matter?

3. If the current in an inductor is doubled, by what factor does the stored energy change?

- 1/4 (decrease)
- 1/2
- 2 (increase)
- 4

4. Suppose you are designing a high-fidelity system containing both large loudspeakers (woofers) and small loudspeakers (tweeters). If you wish to deliver low-frequency signals to a woofer, what device would you place in series with it?

- an inductor
- a capacitor
- a resistor

5. An  $LC$  circuit can be considered analogous to a mass-spring system. In fact, the equations are the same, with the appropriate substitution of symbols:

$$LC \text{ circuit: } L \frac{d^2 Q}{dt^2} + \frac{Q}{C} = 0 \qquad \text{Mass-spring: } m \frac{d^2 x}{dt^2} + kx = 0$$

Pushing this analogy, we would say that current and velocity are analogous variables between the two systems (that is, the current in an  $LC$  circuit behaves like the velocity of the mass in the mass-spring system), as are voltage and force, or charge and position. What then does the inductor correspond to in the mass-spring system?

- the mass
- the spring
- friction
- kinetic energy