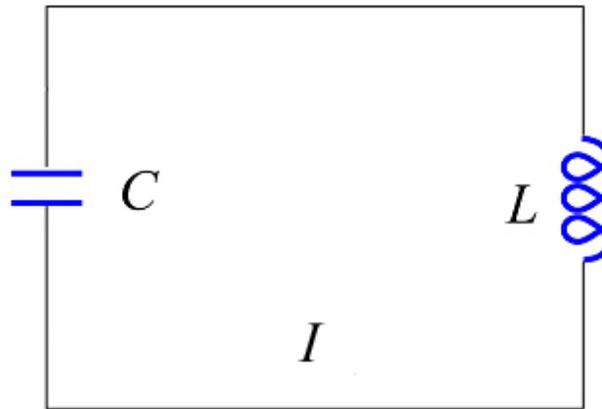


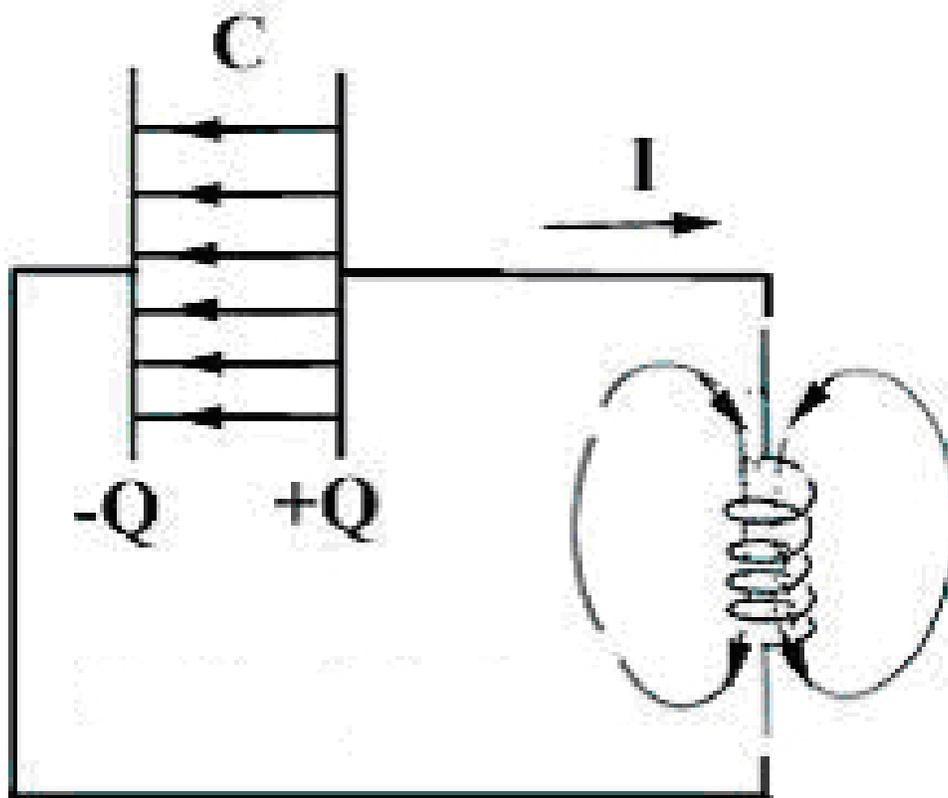
Consider the above LC circuit. At the time shown the current has its maximum value. At this time

- 1. The charge on the capacitor has its maximum value**
- 2. The magnetic field is zero**
- 3. The electric field has its maximum value**
- 4. The charge on the capacitor is zero**
- 5. Don't have a clue**



Answer: 4. The current is a maximum when the charge on the capacitor is zero.

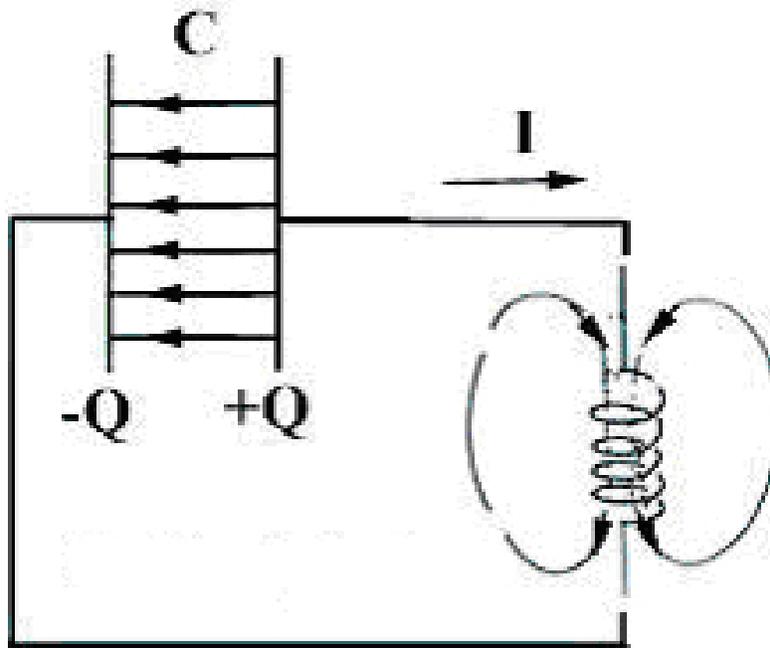
Current and charge are exactly 90 degrees out of phase in an ideal LC circuit (no resistance), so when the current is maximum the charge must be identically zero.



In the above LC circuit the current is in the direction shown and the charges on the capacitor have the signs shown.

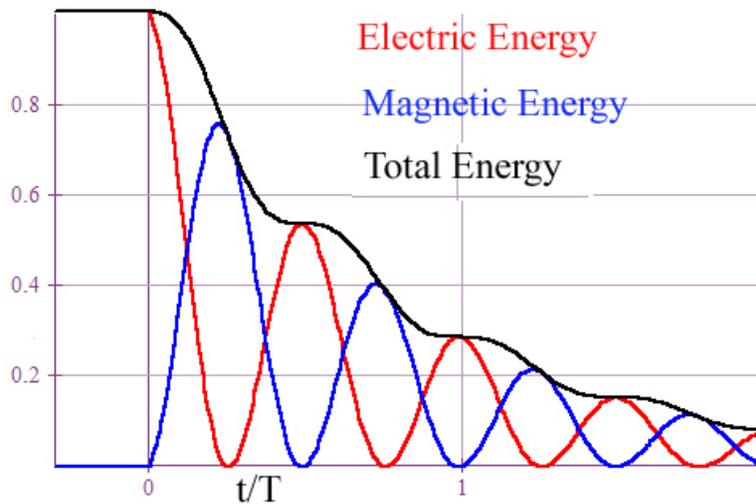
At this time,

- 1. I is increasing and Q is increasing**
- 2. I is increasing and Q is decreasing**
- 3. I is decreasing and Q is increasing**
- 4. I is decreasing and Q is decreasing**
- 5. Don't have a clue**



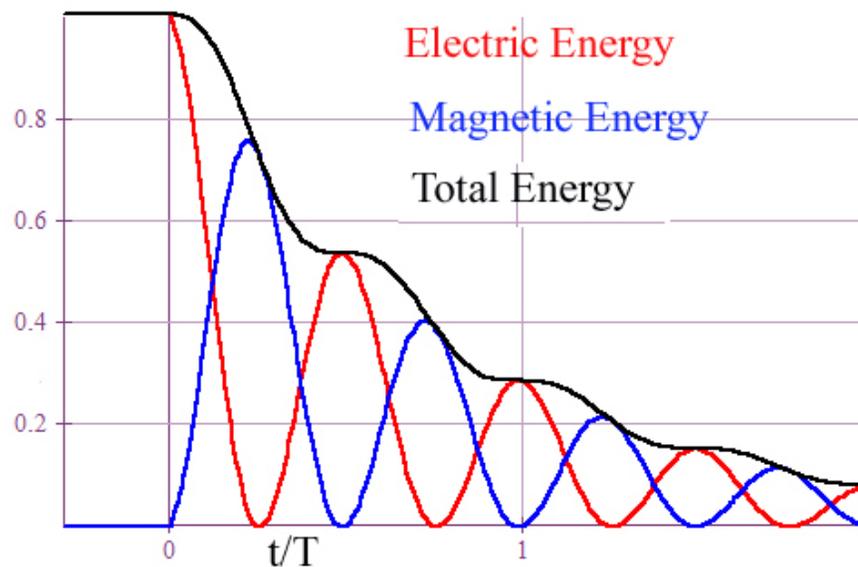
Answer: 2. I is increasing and Q is decreasing.

If the current is positive in the direction shown, then the capacitor must be discharging. Therefore Q is decreasing. But since Q on the right plate is positive, I must be increasing, since we are in the first quarter period of the discharge of the capacitor, when Q is decreasing and positive and I is increasing and positive.



At $t = 0$, a fully charged capacitor begins discharging through an inductor and a resistor. The plot shows the time behavior of the electric and magnetic energies in the circuit, and their sum. The total energy in the circuit decreases most rapidly when

- 1. The absolute value of the current is a maximum**
- 2. The current is zero**
- 3. Neither, since the current decreases at an exponential rate.**
- 4. Don't have a clue**



Answer: 1. The total energy decreases most rapidly when the absolute value of the current is at a maximum.

The rate at which energy is dissipated is I^2R , which is maximum when the absolute value of I is a maximum. Since the magnetic energy is equal to $L I^2/2$, this is also when the magnetic energy is at a maximum, as seen in the plot above.