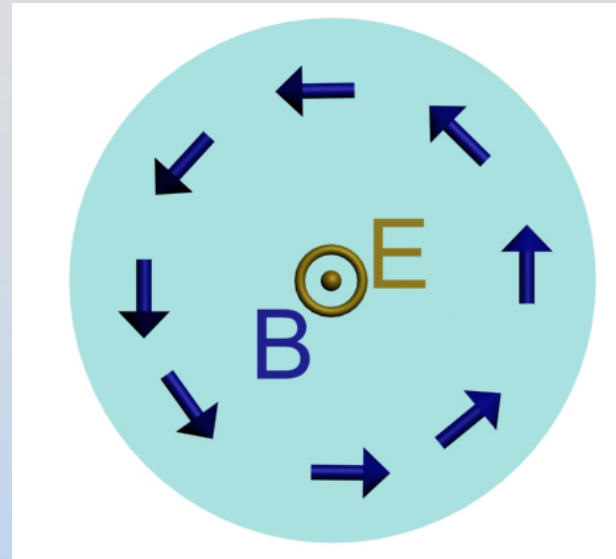


# Concept Question: Capacitor

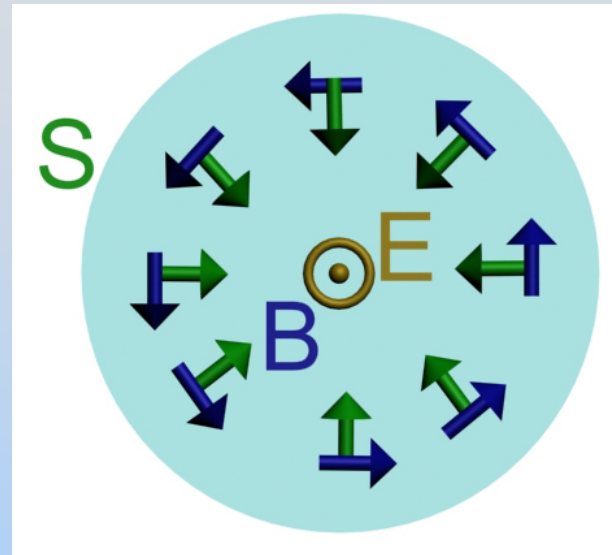


The figures above show a side and top view of a capacitor with charge  $Q$  and electric and magnetic fields  $E$  and  $B$  at time  $t$ . At this time the charge  $Q$  is:

1. Increasing in time
2. Constant in time.
3. Decreasing in time.
4. I don't know

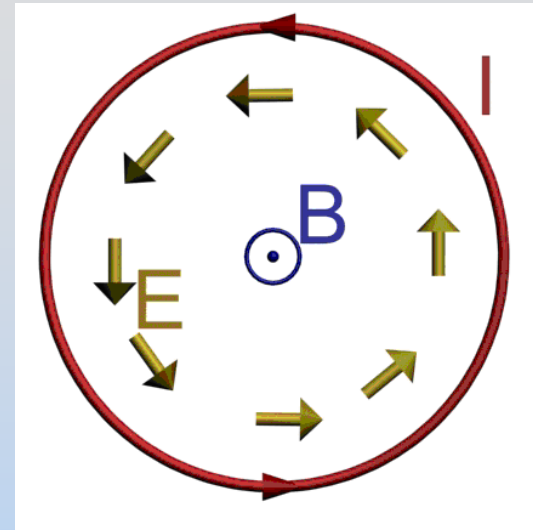
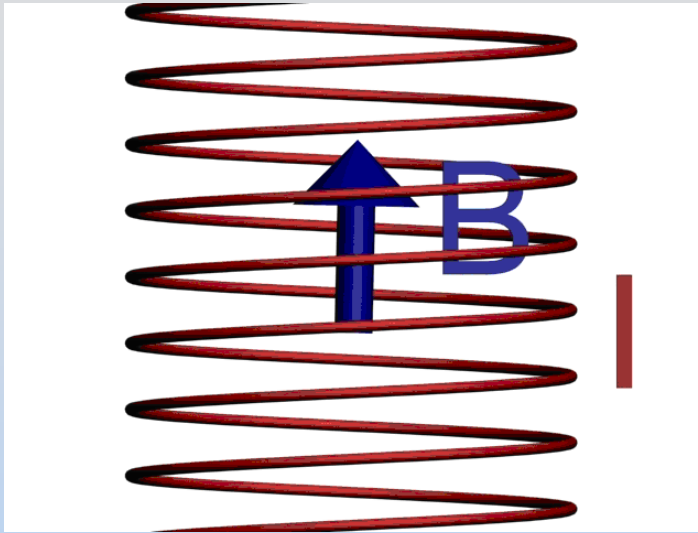
# Concept Q. Answer: Capacitor

Answer: 1. The charge  $Q$  is increasing in time



The direction of the Poynting Flux  $\mathbf{S}$  ( $= \mathbf{E} \times \mathbf{B}$ ) inside the capacitor is inward. Therefore electromagnetic energy is flowing inward, and the energy in the electric field inside is increasing. Thus  $Q$  must be increasing, since  $E$  is proportional to  $Q$ .

# Concept Question: Inductor

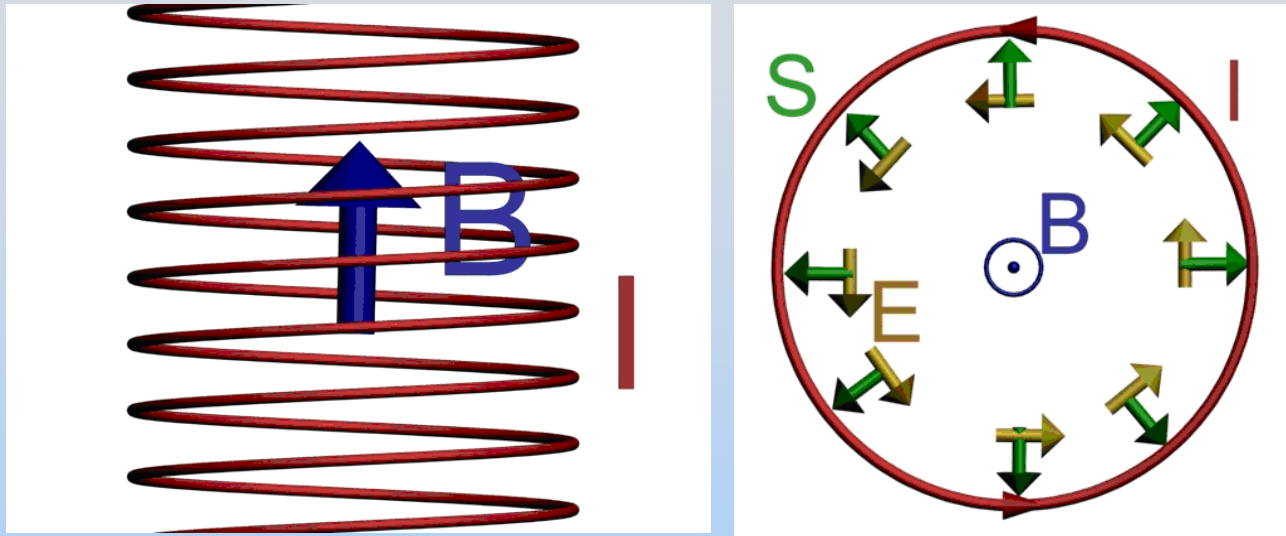


The figures above show a side and top view of a solenoid carrying current  $I$  with electric and magnetic fields  $E$  and  $B$  at time  $t$ . In the solenoid, the current  $I$  is:

1. Increasing in time
2. Constant in time.
3. Decreasing in time.
4. I don't know

# Concept Question Answer: Inductor

Answer: 3. The current  $I$  is decreasing in time



The Poynting Flux  $\mathbf{S}$  ( $= \mathbf{E} \times \mathbf{B}$ ) inside the solenoid is outward from the center of the solenoid. Therefore EM energy is flowing outward, and the energy in the magnetic field inside is decreasing. Thus  $I$  must be decreasing, since  $B$  is proportional to  $I$ .

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