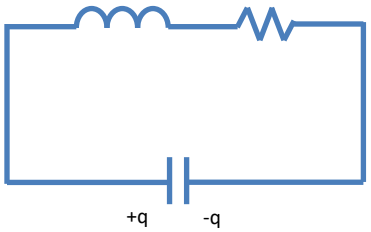
CONCEPT: LRC CIRCUITS

● As the name implies, an LRC circuit contains _____, _____, and _____

● In and LRC circuit, with the capacitor initially charged, we have:

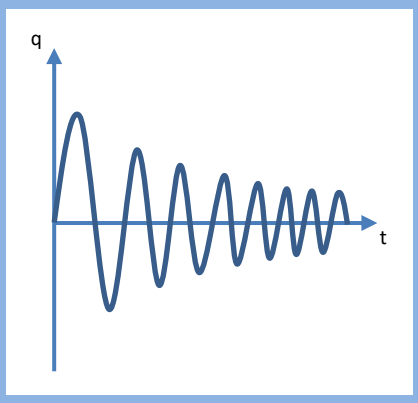
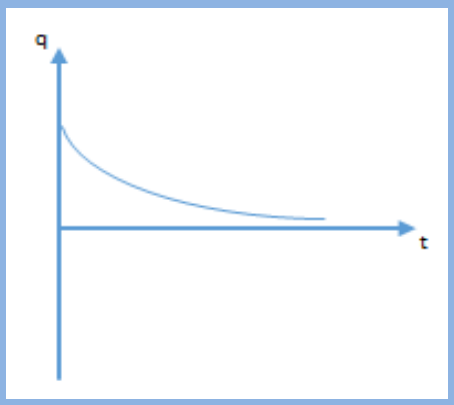
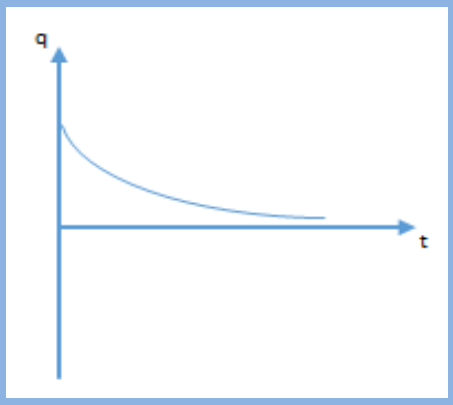


- $\Sigma V =$ _____ $= 0$

→ _____ $= 0$

→ _____ $= 0$

● There are 3 solutions to the equation above: the UNDERDAMPED, CRITICALLY DAMPED, and OVERDRAMPED

UNDERDAMPED	CRITICALLY DAMPED	OVERDAMPED
- $q(t) = Qe^{-(R/2L)t}\cos(\omega' t + \phi)$	- $q(t) = Qe^{-(R/2L)t}$	- No simple equation
		
- Occurs for small ***R*** - Looks almost like an LC circuit - But ***R*** is sapping energy	- Occurs when $R^2 = 4L/C$ - Looks like an RC Circuit	- Occurs for large ***R*** - Looks like an RC Circuit

● The new angular frequency is

- $\omega' = \sqrt{\frac{1}{LC} - \frac{R^2}{4L^2}}$

EXAMPLE: AMPLITUDE DECAY IN AN LRC CIRCUIT

An LRC circuit has an inductance of 10 mH, a capacitance of 100 μF, and a resistance of 20 Ω. What type of LRC circuit is this? How long will it take for the maximum charge stored on the capacitor to drop by half?