pathways to SUCCESS
Excellence in Career, College and Life Preparation
SERIES RCL Circuit

- When the circuit combines R,C,L in series, all series reactance $X_C$ and $X_L$ combines to the net reactance $X$ that means the difference between $X_C$ and $X_L$, $X = X_C - X_L$ or $X = X_L - X_C$.
- If $X_C$ greater than $X_L$ the circuit is capacitive reactance circuit.
- If $X_L$ greater than $X_C$ the circuit is inductive circuit.
- For the circuit shown $X = X_C - X_L = 60 - 20 = 40 \text{ ohm}$ the new circuit is capacitive circuit.
- Now we are working to the new RC circuit
  1. Calculate the total impedance $Z_T$
  2. Calculate total current $I_T$
  3. Calculate voltage across R: $V_R$
  4. Calculate voltage across C: $V_C$
SERIES RCL Circuit (continue)
5. Calculate voltage across L: VL

6. Calculate phase angle $\theta$ between VT and IT

More Series RCL circuit calculation
1. Calculate the net reactance circuit $X$

2. Calculate total impedance $Z_T$

3. Calculate total current $I_T$

4. Calculate voltage across R: $V_R$

5. Calculate voltage across C: $V_C$

6. Calculate voltage across L: $V_L$

7. Calculate phase angle $\theta$ between VT and IT
PARALLEL RCL Circuit

- When the circuit combines R,C,L in parallel reactive branch currents can be combined to obtain one net current, designated by Ix then the net reactive current IX can be combined using phasors with the resistor current IR to obtained total current IT
  - \( IT = \sqrt{IR^2 + Ix^2} \)
- If IC greater than IL the circuit is capacitive circuit.
- If IL greater than IC the circuit is inductive circuit.
- Calculate inductive branch current \( IL = \frac{VT}{XL} = \frac{12V}{2} = 6A \)
- Calculate capacitive branch current \( IC = \frac{VT}{XC} = \frac{12V}{6} = 2A \)
- Since IL > IC the net circuit is inductive circuit with the new value of inductive reactance X is \( X = \frac{VT}{Ix} = \frac{12V}{4A} = 3 \text{ Ohm} \)
RCL Series and Parallel Circuits

PARALLEL RCL Circuit
1. Calculate the current IR

2. Calculate the total current IT

3. Calculate total impedance ZT

4. Calculate the phase angle $\theta$ difference between VT and IT
More Parallel RCL circuit calculation

1. Calculate current $I_R$

2. Calculate current $I_L$

3. Calculate current $I_C$

4. Calculate net current $I_x$

5. The net circuit is capacitive or inductive?

5. The new value for reactance $X$

6. Calculate total current $I_T$

7. Calculate total impedance $Z_T$

8. Calculate phase angle $\theta$