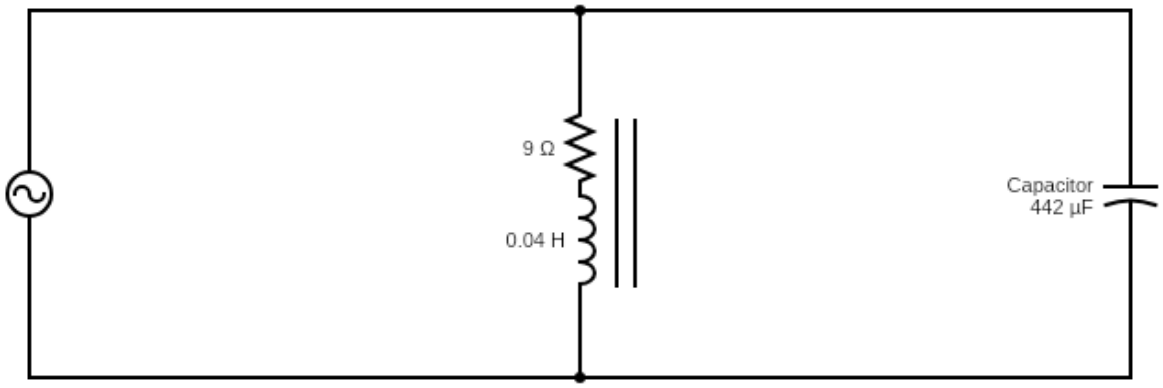
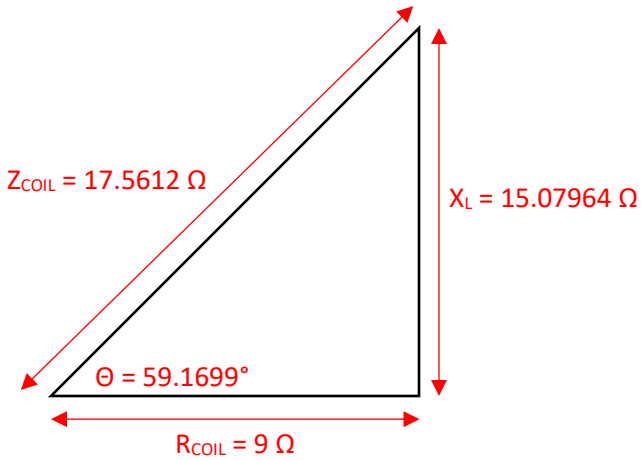
The circuit represented below consists of a coil and a capacitor connected in parallel.



Calculate the following:

a)	Z_{COIL}	17.561 Ω
b)	pf of the coil	0.512
c)	I_{COIL}	6.8332 A
d)	I_{CAP}	19.9957 A
e)	I_T	14.556 A
f)	pf of the circuit	0.2416 (lead)
g)	P_T	422.008 W
h)	Q_T	1,695.360 VAR
i)	Q_{XL}	704.112 VAR
j)	Q_{XC}	2,399.484 VAR

COIL



Calculate Current in Coil

$$I_{COIL} = \frac{E}{ZCOIL}$$

$$I_{COIL} = \frac{120}{17.5612}$$

$$I_{COIL} = 6.8332$$

Convert Inductance to Inductive Reactance

$$XL = 2\pi fL$$

$$XL = 2\pi(60)(0.04)$$

$$XL = 15.07964$$

Calculate Power Factor

$$pf = \frac{R_{COIL}}{Z_{COIL}}$$

$$pf = \frac{9}{17.5612}$$

$$pf = 0.5125\ (lag)$$

$$pf \angle = cos^{-1}(0.5125)$$

$$pf \angle = 59.1699$$

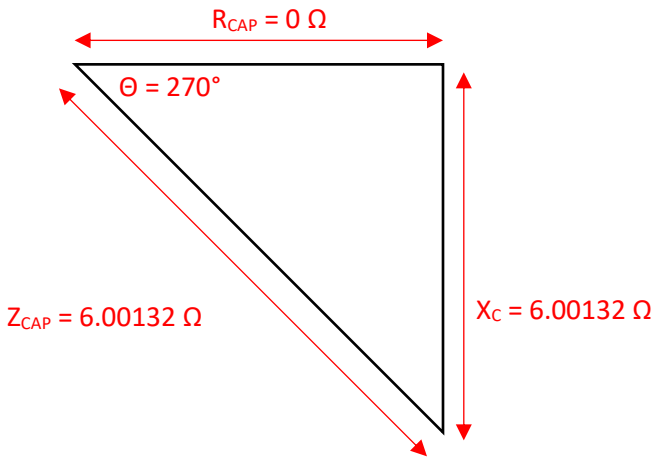
Calculate Coil Impedance

$$Z_{COIL} = \sqrt{9^2 + 15.07964^2}$$

$$Z_{COIL} = \sqrt{308.3955}$$

$$Z_{COIL} = 17.5612$$

Capacitor



Note that this would not actually appear as a triangle as there is no horizontal value.

Calculate Current in Capacitor

$$I_{CAP} = \frac{E}{Z_{CAP}}$$

$$I_{CAP} = \frac{120}{6.0013}$$

$$I_{CAP} = 19.9957\ A$$

Calculate Power Factor
Capacitors have a Power Factor of 0

$$pf = 0$$

$$pf \angle = cos^{-1}(0)$$

$$pf \angle = 90\ (lead)$$

Convert Capacitance to Capacitive Reactance

$$XC = \frac{1}{2\pi \int C}$$

$$XC = \frac{1}{2\pi(60)(442\ x\ 10^{-6})}$$

$$XC = 6.0013\ \Omega$$

Coil has no resistance
Impedance = Capacitive Reactance

$$Z_{CAP} = XC$$

$$Z_{CAP} = 6.0013\ \Omega$$

Circuit Current Totals

Item	Horizontal Values	Vertical Values
Coil = 6.8332 A @ 59.1699°	I_{COIL} x cos(Θ) 6.8332 x cos(59.1699) **3.50197 A**	I_{COIL} x sin(Θ) 6.8332 x sin(59.1699) **5.8676 A**
Capacitor = 19.9957 A @ 270°	I_{COIL} x cos(Θ) 6.8332 x cos(270) **0 A**	I_{COIL} x cos(Θ) 6.8332 x cos(270) **-19.9957 A**
Total:	3.50197	-14.1281

Calculate Current

$$I_{CCT} = \sqrt{3.50197^2 + -14.1281^2}$$

$$I_{CCT} = \sqrt{211.867}$$

$$I_{CCT} = 14.556\ A$$

Current Power Factor Angle

$$pf = \frac{3.50197}{14.556}$$

$$pf = 0.2416$$

$$pf \angle = cos^{-1}(0.2416)$$

$$pf \angle = 76.019°$$

Calculate Total Capacitive Reactance

$$Q_{XC} = E\ x\ I_{CAP}$$

$$Q_{XC} = 120\ x\ 19.9957$$

$$Q_{XC} = 2{,}399.484\ VAR$$

Calculate Total Inductive Reactance

$$Q_{XL} = E\ x\ I_{XL\ (COIL)}$$

$$Q_{XL} = 120\ x\ 5.8676$$

$$Q_{XL} = 704.112\ VAR$$

Calculate Total Power

$$P_T = E\ x\ I\ x\ pf$$

$$P_T = 120\ x\ 14.556\ x\ 0.2416$$

$$P_T = 422.008$$

Calculate Total Reactance

$$Q_T = Q_{XL} + Q_{XC}$$

$$Q_T = 704.112\ x - 2399.4719$$

$$Q_T = 1{,}695.360$$