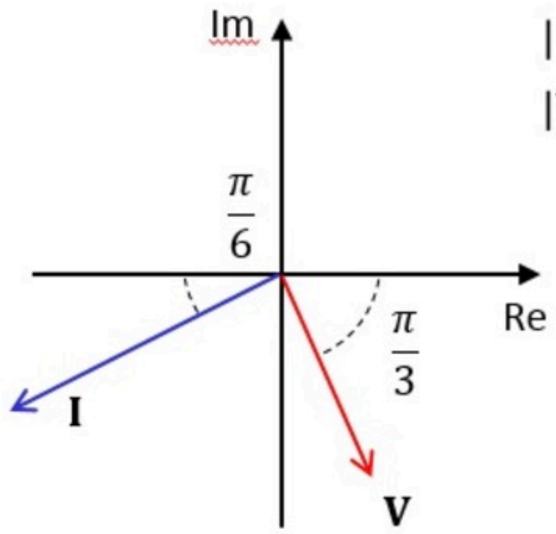
PP AC power 002

Unlimited Attempts.

In the diagram are the phasors of the voltage across an element and the current through that element (according to the passive sign convention).

What is the average power *P* received by the element?



$|\mathbf{I}| = 8$ A

$|\mathbf{V}| = 5$ V

Given Variables:

. : . .

Calculate the following:

P (W) :

0 ✓

Hint: Write average power as a function of the angle between the voltage and current.

$$I = 8\, e^{-j\frac{5\pi}{6}}$$

$$V = 5\, e^{-j\frac{\pi}{3}}$$

$$P = \frac{1}{2} \cdot I_m \cdot V_m \cos(\theta_v - \theta_i)$$

$$= \frac{1}{2} \cdot 8 \cdot 5 \cdot \cos\left(-\frac{\pi}{3} + \frac{5\pi}{6}\right)$$

$$= \frac{1}{2} \cdot 8 \cdot 5 \cdot \cos\left(\frac{\pi}{2}\right)$$

$$= \frac{1}{2} \cdot 8 \cdot 5 \cdot 0$$

$$\boxed{P = 0\ W}$$ ⇝ AS EXPECTED SINCE V & I ARE ORTHOGONAL

IN THIS CASE, "I LAGS V" BY 90° ⇒ THE ELEMENT IS AN INDUCTOR

$$I = \frac{V}{j\omega L} = \frac{V}{\omega L}\, e^{-j\frac{\pi}{2}}$$