# What is Impedance?

Worksheet

Impedance Z = R + jX combines resistance R and reactance X; its magnitude is |Z| = (R + X), measured in ohms ().

**Z = @sqrt{R^2 + X^2}**

## Questions

1. Impedance combines resistance with:

A) Reactance
B) Current
C) Power
D) Voltage

2. The magnitude of impedance is given by:

A) R + X
B) (R + X)
C) R X
D) R / X

3. The formula for inductive reactance XL is:

A) 2fL
B) 1/(2fC)
C) R + X
D) C

4. As frequency increases, capacitive reactance XC:

A) Increases
B) Decreases
C) Stays the same
D) Becomes zero

5. A circuit has R = 30 and capacitive reactance X = 40 . Find |Z|.

6. An inductor L = 0.2 H is driven at f = 60 Hz. Find its reactance XL.

7. A capacitor C = 50 F is driven at f = 60 Hz. Find its reactance XC.

8. Define: What is impedance?

9. Define: Unit of impedance?

10. Define: What is reactance?

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# Answer Key

1. A) Reactance - Impedance Z = R + jX combines resistance R and reactance X.
2. B) (R + X) - Since R and X are perpendicular in the phasor plane, the Pythagorean formula applies.
3. A) 2fL - XL = 2fL = L, increasing with frequency.
4. B) Decreases - XC = 1/(2fC), which decreases as f increases.
5. |Z| = (R + X) = (30 + 40) = (900 + 1600) = 2500 = 50
6. XL = 2fL = 2 60 0.2 = 75.4
7. XC = 1/(2fC) = 1/(2 60 0.00005) = 1/0.01885 53.05
8. The total opposition an AC circuit offers to current: Z = R + jX, combining resistance and reactance.
9. Ohms (), same as resistance.
10. The opposition to current from inductors and capacitors, which depends on frequency.

**Bounlu**

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