AC Power Triangle

Electrical Engineering

Real, reactive and apparent power as one right triangle, cosine the power factor.

Apparent power is the vector sum of real power and reactive power, ninety degrees apart.

$$S = VI \cdot P = S \cos \varphi \cdot Q = S \sin \varphi$$

10 kVA at pf 0.8 — **P = 8 kW**

S cos φ.

The same load — **Q = 6 kvar**

S sin φ.

pf 0.8 raised to 0.95 — **Current falls 16%**

Same real power.

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× **Adding kW and kvar arithmetically**

✓ **Adding them as perpendicular vectors**

Real and reactive power are ninety degrees apart, so 8 kW with 6 kvar is 10 kVA, not 14 kVA.

Educational reference. Correcting power factor in a real installation is design work governed by local electrical regulations.