

Note: This formula sheet is provided as a resource. The sheet may not include all necessary formulas and may contain formulas not required for this exam. Apprentices must apply the formulas to demonstrate their understanding.

Powerline Technician (2026) – Level 1 - 4 Formula Sheet

Measurement Unit Abbreviations	
A	adjacent
C	capacitor/capacitance
E	voltage
f	frequency
H	height
H	hypotenuse
I	current
KVA	kilo-volt amperes
L	inductor/inductance
L	length
O	opposite
P	power
pp	pole pairs
R	resistor/resistance
rpm	revolutions per minute
X	reactance
Z	impedance

Constants

π	3.14
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Formulas

#	Description	Full Formula	Abbreviated
1.	Compressive force	tension x $\frac{\text{height}}{\text{length}}$	
2.	Conductor tension	$\frac{\text{conductor weight} \times \text{span}^2}{8 \times \text{sag}}$	

3.	Conductor weight	$\frac{\text{span A} + \text{span B}}{2} \times \text{weight per unit}$	
4.	kVA	$\frac{(E1 \times I1) + (E2 \times I2)}{1\,000}$	
5.	Pull	$\frac{\text{weight} + (10\% \text{ weight} \times \# \text{ of sheaves})}{MA}$	
6.	Ratio	$\frac{\text{primary voltage}}{\text{secondary voltage}}$	
7.	Ruling span	$\text{average span} + \frac{2}{3} (\text{maximum span} - \text{average span})$	
8.	Average span	$\frac{\text{span} + \text{span} + \text{span}}{\# \text{ of spans}}$	
9.	WYE phase-to-phase voltage	$\text{phase-to-ground voltage} \times 1.73$	
10.	Voltage root-mean-square		$VRMS = \text{Voltmax} \times 0.707$
11.	Effective value		$IRMS = I_{\text{max}} \times 0.707$
12.	Voltage	$\text{resistance} \times \text{current}$	$E = R \times I$
	Voltage	$\frac{\text{power}}{\text{current}}$	$E = \frac{P}{I}$
	Voltage	$\sqrt{\text{power} \times \text{resistance}}$	$E = \sqrt{P \times R}$
13.	Inductors in parallel	$\frac{1}{\frac{1}{\text{inductor}_1} + \frac{1}{\text{inductor}_2} + \frac{1}{\text{inductor}_3} + \dots}$	$L_T = \frac{1}{\frac{1}{L_1} + \frac{1}{L_2} + \frac{1}{L_3} + \dots}$
14.	Resistance	$\frac{\text{voltage}}{\text{current}}$	$R = \frac{E}{I}$
	Resistance	$\frac{\text{voltage}^2}{\text{power}}$	$R = \frac{E^2}{P}$

	Resistance	$\frac{\text{power}}{\text{current}^2}$	$R = \frac{P}{I^2}$
15.	Resistors in parallel	$\frac{1}{\frac{1}{\text{resistor}_1} + \frac{1}{\text{resistor}_2} + \frac{1}{\text{resistor}_3} + \dots}$	$R_T = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots}$
16.	Resistors in series	$\text{resistor}_1 + \text{resistor}_2 + \text{resistor}_3, + \dots$	$R_T = R_1 + R_2 + R_3 + \dots$
17.	Cos Θ	$\frac{\text{adjacent}}{\text{hypotenuse}}$	$C = \frac{A}{H}$
18.	Total current	$\frac{\text{voltage}}{\text{resistance}}$	$I_T = \frac{E}{R}$
19.	Resistors in parallel		$\frac{R_1 \times R_2}{R_1 + R_2}$
20.	Sin Θ	$\frac{\text{opposite}}{\text{hypotenuse}}$	$S = \frac{O}{H}$
21.	Tan Θ	$\frac{\text{opposite}}{\text{adjacent}}$	$T = \frac{O}{A}$
22.	Neutral conductor current	$\text{line current}_1 - \text{line current}_2$	$I_N = I_{L1} - I_{L2}$
23.	Current	$\sqrt{\frac{\text{power}}{\text{resistance}}}$	$I = \sqrt{\frac{P}{R}}$
	Current	$\frac{\text{power}}{\text{voltage}}$	$I = \frac{P}{E}$
	Current	$\frac{\text{voltage}}{\text{resistance}}$	$I = \frac{E}{R}$
24.	Total voltage in series	$\text{voltage}_1 + \text{voltage}_2 + \text{voltage}_3, + \dots$	$E_T = E_1 + E_2 + E_3 + \dots$

25.	Frequency	revolutions per minute x pole pairs	$F = \text{rpm} \times \text{pp}$
26.	Total current	$\text{current}_1 + \text{current}_2 + \text{current}_3 + \dots$	$I_T = I_1 + I_2 + I_3 + \dots$
27.	Power	voltage x current	$P = E \times I$
	Power	resistance x current ²	$P = R \times I^2$
	Power	$\frac{\text{voltage}^2}{\text{resistance}}$	$P = \frac{E^2}{R}$
28.	Capacitors in series	$\frac{1}{\frac{1}{\text{capacitor}_1} + \frac{1}{\text{capacitor}_2} + \frac{1}{\text{capacitor}_3} + \dots}$	$C_T = \frac{1}{\frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \dots}$
29.	Capacitors in parallel	$\text{capacitor}_1 + \text{capacitor}_2 + \text{capacitor}_3 + \dots$	$C_T = C_1 + C_2 + C_3 + \dots$
30.	Instantaneous voltage		$V_{\text{inst}} = V_{\text{MAX}} \times \sin \theta$ $E_{\text{inst}} = E_{\text{PEAK}} \times \sin 65^\circ$ $E_{\text{inst}} = E_{\text{PEAK}} \times \sin \theta$
31.	Guy tension	$\frac{\text{line tension}}{\text{anchor distance}} \times \text{guy length}$	
32.	Guy length	$\sqrt{\text{Length}^2 + \text{height}^2}$	$\text{Guy length} = \sqrt{L^2 + H^2}$
33.	Inductive reactance	$2 \times 3.14 \times \text{frequency} \times \text{inductance}$	$X_L = 2\pi fL$
34.	Power factor	$\frac{\text{true power}}{\text{apparent power}} \times 100$	$\text{PF} = \frac{P}{VA} \times 100$
35.	Inductors in series	$\text{inductor}_1 + \text{inductor}_2 + \text{inductor}_3 + \dots$	$L_T = L_1 + L_2 + L_3 + \dots$
36.	Capacitive reactance	$\frac{1}{2 \times \pi \times \text{frequency} \times \text{capacitance}}$	$X_C = \frac{1}{2\pi fC}$

37.	Total impedance of a series circuit	$\sqrt{\text{resistance}^2 + (\text{inductive reactance} - \text{capacitive reactance})^2}$	$Z = \sqrt{R^2 + (X_L - X_C)^2}$
38.	Pythagorean theorem		$a^2 + b^2 = c^2$
39.	Power factor	cos theta	PF = cos Θ
40.	Turn ratio	$\frac{\text{number of primary turns}}{\text{number of secondary turns}} =$ $\frac{\text{primary voltage}}{\text{secondary voltage}} =$ $\frac{\text{current in the secondary}}{\text{current in the primary}}$	$\frac{N_p}{N_s} = \frac{E_p}{E_s} = \frac{I_s}{I_p}$
41.	Fuse replacement rating		$\frac{\text{KVA}}{\text{KV primary}} \times 1 \frac{1}{2}$
42.	Total voltage		$E_T = \sqrt{E_R^2 + E_L^2}$
43.	Impedance in series		$Z = \sqrt{R^2 + X_C^2}$
44.	Capacitive reactance in series		$X_{CT} = X_{C1} + X_{C2} + X_{C3}$
45.	RLC parallel circuits (Impedance)	$\frac{1}{\sqrt{\left(\frac{1}{\text{resistance}}\right)^2 + \left(\frac{1}{\text{inductive reactance}} - \frac{1}{\text{capacitive reactance}}\right)^2}}$	$Z = \frac{1}{\sqrt{\left(\frac{1}{R}\right)^2 + \left(\frac{1}{X_L} - \frac{1}{X_C}\right)^2}}$
46.	Total current parallel cut	$\sqrt{\text{resistive current}^2 + (\text{inductive current} - \text{capacitive current})^2}$	$I_T = \sqrt{I_R^2 + (I_L - I_C)^2}$
47.	Power factor	$\frac{\text{resistance}}{\text{impedance}} \times 100$	$PF = \frac{R}{Z} \times 100$
48.	Power factor	$\frac{\text{resistor current}}{\text{total current}} \times 100$	$PF = \frac{I_R}{I_T} \times 100$

49.	Volt-ampere	voltage x current	$VA = E \times I$
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