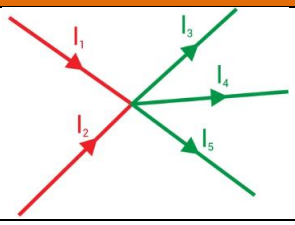
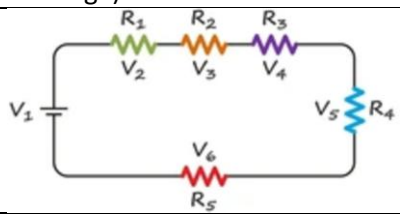
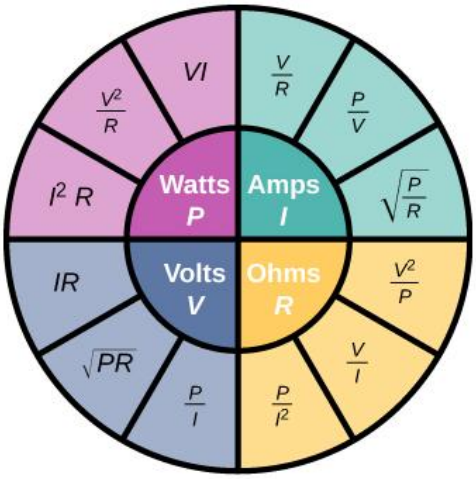
Harold's DC Circuits
Cheat Sheet
20 May 2026

Circuit Laws

Circuit Law	Formula	
Kirchhoff's Current Law (KCL)	$\sum_{i=1}^{n} I_i = 0$ $I_{in1} + I_{in2} = I_{out1} + I_{out2} + I_{out3}$	
	The total current flowing into a node or junction must equal the total current flowing out of the node or junction. (conservation of charge)	
Kirchhoff's Voltage Law (KVL)	$\sum_{i=1}^{n} V_i = 0$ $V_1 = V_2 + V_3 + V_4 + V_5 + V_6$	
	The sum of all voltages around a circuit loop is equal to zero. (conservation of energy)	
Ohm's Law	$V = IR$	
Power	$P = VI$ $P = I^2R$ $P = \frac{V^2}{R}$ $P = \frac{W}{t}$	An across (V) times a through (I) variable. $Watt\ (W) = \frac{Volt\ (V)}{Ampere\ (A)}$
Electrical Energy	$E = QV$ $E = VIt$ $E = I^2Rt$ $E = Pt$	$Joule\ (J) = \frac{Watt\ (W)}{second\ (s)}$

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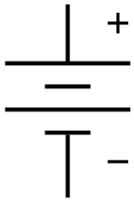
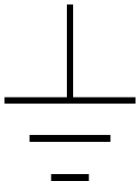
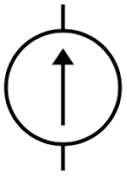
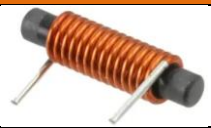
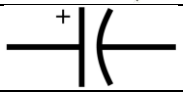
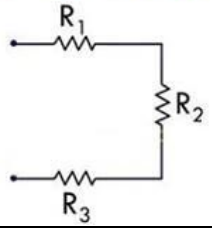
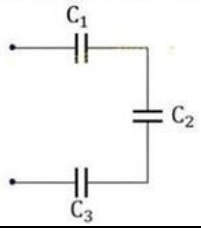
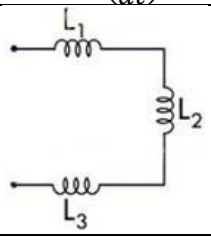
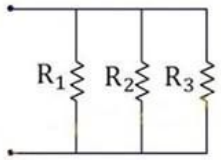
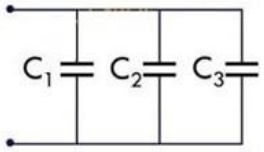
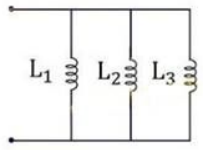
Components

Element	Battery	Ground	Current Source
Component			
Symbol			
Denoted by	V	GND	I
Units	V (Volt)	$0\ V$	A (Ampere)
Series	$V_{EQ} = V_1 + V_2$	NA	$I_{EQ} = I_1 + I_2$
Parallel	$V_1 = V_2 = V_3$	NA	$I_{EQ} = I_1 + I_2$

Element	Resistor	Capacitor	Inductor
Component			
Symbol			
Denoted by	R	C	L
Units	Ω (Ohm)	F (Farad)	H (Henry)
Equation	$R = \frac{V_R}{I}$	$C = \frac{Q}{V_C}$	$L = \frac{V_L}{\left(\frac{di}{dt}\right)}$
Series			
	$R_T = R_1 + R_2 + R_3$	$\frac{1}{C_T} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}$	$L_T = L_1 + L_2 + L_3$
Parallel			
	$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$	$C_T = C_1 + C_2 + C_3$	$\frac{1}{L_T} = \frac{1}{L_1} + \frac{1}{L_2} + \frac{1}{L_3}$

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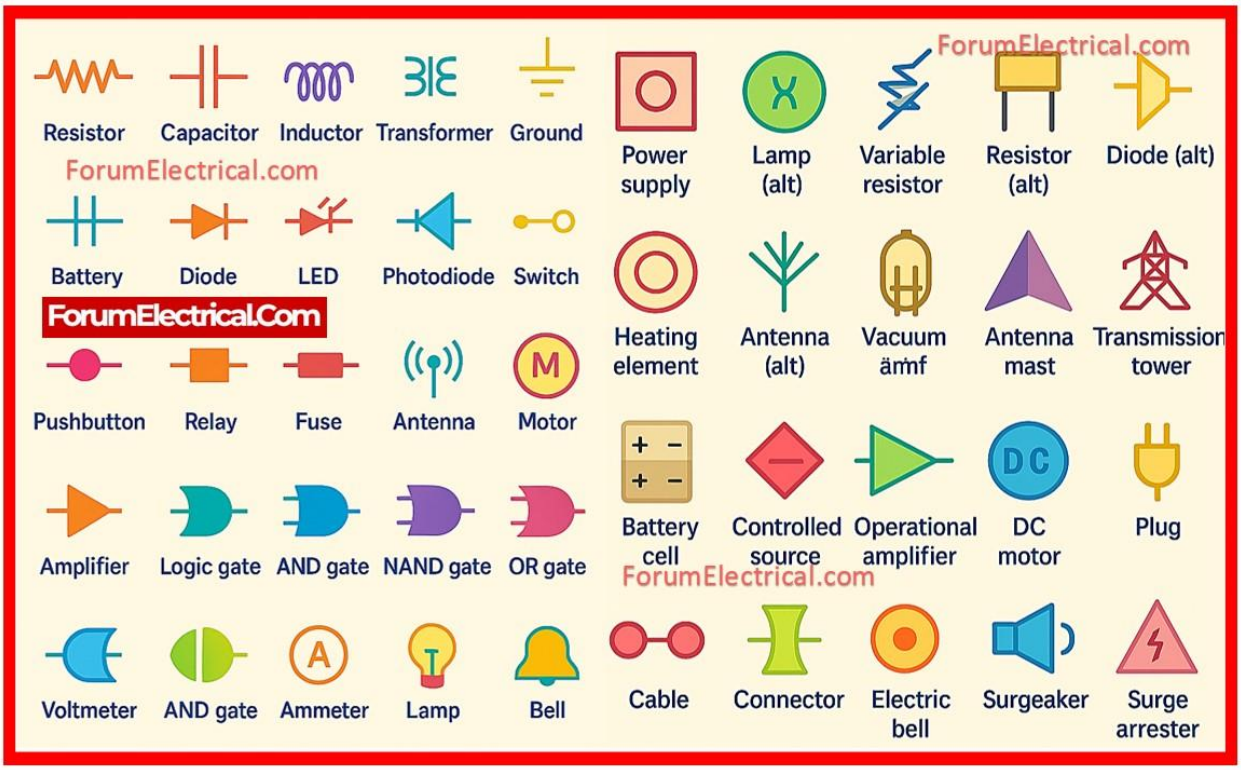
Electrical Symbols



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