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DC Circuits Formulas

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List of 17 DC Circuits Formulas

DC Circuits

1) Conductance given Current

$$\text{fx } G = \frac{I}{V}$$

[Open Calculator !\[\]\(a870788d6ed9b8fd294b7654a8c8526b_img.jpg\)](#)

$$\text{ex } 0.033333\text{S} = \frac{0.75\text{A}}{22.5\text{V}}$$

2) Conductance given Resistivity

$$\text{fx } G = \frac{A}{l \cdot \rho}$$

[Open Calculator !\[\]\(c50c8b7b2cc2cf9ff925edec0ee94c0d_img.jpg\)](#)

$$\text{ex } 0.033441\text{S} = \frac{91\text{mm}^2}{15.55\text{m} \cdot 0.000175\Omega^*\text{m}}$$

3) Conductance in DC Circuit

$$\text{fx } G = \frac{1}{R}$$

[Open Calculator !\[\]\(f60b7a900783ac3fd531bfd9c111be6d_img.jpg\)](#)

$$\text{ex } 0.033333\text{S} = \frac{1}{30\Omega}$$



4) Current Divider for Two Resistors

[Open Calculator !\[\]\(4729e517bc6a7cd81c8025b9646574fb_img.jpg\)](#)

$$fx \quad I_{R1} = I_s \cdot \left(\frac{R_2}{R_1 + R_2} \right)$$

$$ex \quad 2.333542A = 4.87A \cdot \left(\frac{11.5\Omega}{12.5\Omega + 11.5\Omega} \right)$$

5) Current Division in Two Capacitors

[Open Calculator !\[\]\(e474458956c9a37fbf9586ddb60a7fa1_img.jpg\)](#)

$$fx \quad I_C = I_s \cdot \left(\frac{C_1}{C_2} \right)$$

$$ex \quad 2.922A = 4.87A \cdot \left(\frac{1.5F}{2.5F} \right)$$

6) Current Division in Two Inductors

[Open Calculator !\[\]\(4fe57c3593bf1b21d272ae7ac8dfaf77_img.jpg\)](#)

$$fx \quad I_{L1} = I_s \cdot \left(\frac{L_2}{L_1 + L_2} \right)$$

$$ex \quad 1.623333A = 4.87A \cdot \left(\frac{0.15H}{0.3H + 0.15H} \right)$$

7) Current in DC Circuits

[Open Calculator !\[\]\(2bae76de5ebbd5c4d7d47162f1673734_img.jpg\)](#)

$$fx \quad I = \frac{V}{R}$$

$$ex \quad 0.75A = \frac{22.5V}{30\Omega}$$



8) Delta to Star Transformation

$$\text{fx } Z_A = \frac{Z_1 \cdot Z_3}{Z_1 + Z_2 + Z_3}$$

[Open Calculator !\[\]\(e78f798d4ea5c530c9db49e7d26e6b95_img.jpg\)](#)

$$\text{ex } 10.51136\Omega = \frac{37\Omega \cdot 25\Omega}{37\Omega + 26\Omega + 25\Omega}$$

9) Energy in DC Circuit

$$\text{fx } E = P \cdot T$$

[Open Calculator !\[\]\(05be7c7a8995decd503647c99211f7c2_img.jpg\)](#)

$$\text{ex } 0.027844\text{kW}\cdot\text{h} = 16.875\text{W} \cdot 1.65\text{h}$$

10) Maximum Power Transfer

$$\text{fx } P_m = \frac{V_{th}^2 \cdot R_L}{(R_L + R_{th})^2}$$

[Open Calculator !\[\]\(fe3aebe81acea8d45108cd2768939da7_img.jpg\)](#)

$$\text{ex } 21.08678\text{W} = \frac{(27.6\text{V})^2 \cdot 18\Omega}{(18\Omega + 7.5\Omega)^2}$$


11) Power in DC Circuit

$$\text{fx } P = V \cdot I$$

[Open Calculator !\[\]\(899d8b7697d64725bf017d3296cfcf1b_img.jpg\)](#)

$$\text{ex } 16.875\text{W} = 22.5\text{V} \cdot 0.75\text{A}$$



12) Resistance in DC Circuit 

$$\text{fx } R = \frac{V}{I}$$

Open Calculator 

$$\text{ex } 30\Omega = \frac{22.5V}{0.75A}$$

13) Star to Delta Transformation 

$$\text{fx } Z_1 = Z_A + Z_B + \left(\frac{Z_A \cdot Z_B}{Z_C} \right)$$

Open Calculator 


$$\text{ex } 37.16667\Omega = 10.5\Omega + 8\Omega + \left(\frac{10.5\Omega \cdot 8\Omega}{4.5\Omega} \right)$$

14) Voltage Divider for Two Resistors 

$$\text{fx } V_{R1} = V_s \cdot \left(\frac{R_1}{R_1 + R_2} \right)$$

Open Calculator 

$$\text{ex } 62.5V = 120V \cdot \left(\frac{12.5\Omega}{12.5\Omega + 11.5\Omega} \right)$$

15) Voltage Division for Two Capacitors 

$$\text{fx } V_C = V_s \cdot \left(\frac{C_2}{C_1 + C_2} \right)$$

Open Calculator 

$$\text{ex } 75V = 120V \cdot \left(\frac{2.5F}{1.5F + 2.5F} \right)$$



16) Voltage Division in Two Inductors

$$fx \quad V_{L1} = V_s \cdot \left(\frac{L_1}{L_1 + L_2} \right)$$

[Open Calculator !\[\]\(d3fb9f94af8b26d1c844efa9a98805b0_img.jpg\)](#)

$$ex \quad 80V = 120V \cdot \left(\frac{0.3H}{0.3H + 0.15H} \right)$$

17) Voltage in DC Circuit

$$fx \quad V = I \cdot R$$

[Open Calculator !\[\]\(e1d6102fe77919492c04879c8450f1f5_img.jpg\)](#)

$$ex \quad 22.5V = 0.75A \cdot 30\Omega$$



Variables Used













- **A** Area of Conductor (Square Millimeter)
- **C₁** Circuit Capacitance 1 (Farad)
- **C₂** Circuit Capacitance 2 (Farad)
- **E** Energy (Kilowatt-Hour)
- **G** Conductance (Siemens)
- **I** Current (Ampere)
- **I_C** Capacitor 1 Current (Ampere)
- **I_{L1}** Inductor 1 Current (Ampere)
- **I_{R1}** Resistor 1 Current (Ampere)
- **I_s** Source Current (Ampere)
- **l** Length of Conductor (Meter)
- **L₁** Circuit Inductance 1 (Henry)
- **L₂** Circuit Inductance 2 (Henry)
- **P** Power (Watt)
- **P_m** Maximum Power (Watt)
- **R** Resistance (Ohm)
- **R₁** Resistance 1 (Ohm)
- **R₂** Resistance 2 (Ohm)
- **R_L** Load Resistance (Ohm)
- **R_{th}** Thevenin Resistance (Ohm)
- **T** Time (Hour)
- **V** Voltage (Volt)



- V_C Capacitor 1 Voltage (Volt)
- V_{L1} Inductor 1 Voltage (Volt)
- V_{R1} Resistor 1 Voltage (Volt)
- V_S Source Voltage (Volt)
- V_{th} Thevenin Voltage (Volt)
- Z_1 Delta Impedance 1 (Ohm)
- Z_2 Delta Impedance 2 (Ohm)
- Z_3 Delta Impedance 3 (Ohm)
- Z_A Star Impedance A (Ohm)
- Z_B Star Impedance B (Ohm)
- Z_C Star Impedance C (Ohm)
- ρ Resistivity (Ohm Meter)



Constants, Functions, Measurements used

- **Measurement: Length** in Meter (m)
Length Unit Conversion 
- **Measurement: Time** in Hour (h)
Time Unit Conversion 
- **Measurement: Electric Current** in Ampere (A)
Electric Current Unit Conversion 
- **Measurement: Area** in Square Millimeter (mm²)
Area Unit Conversion 
- **Measurement: Energy** in Kilowatt-Hour (kW*h)
Energy Unit Conversion 
- **Measurement: Power** in Watt (W)
Power Unit Conversion 
- **Measurement: Capacitance** in Farad (F)
Capacitance Unit Conversion 
- **Measurement: Electric Resistance** in Ohm (Ω)
Electric Resistance Unit Conversion 
- **Measurement: Electric Conductance** in Siemens (S)
Electric Conductance Unit Conversion 
- **Measurement: Inductance** in Henry (H)
Inductance Unit Conversion 
- **Measurement: Electric Potential** in Volt (V)
Electric Potential Unit Conversion 
- **Measurement: Electric Resistivity** in Ohm Meter (Ω *m)
Electric Resistivity Unit Conversion 



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