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1 Ampere is 1 Coulomb per Second = $6.25 \cdot 10^{18}$ Elektrons per Second.
Please write down that number with all its zeros $6.25 \cdot 10^{18}$!

A dry cell battery has 1.5 Volt. A 12 Volt Battery has cells?

A lead acid accumulator has a nominal voltage per cell of 2.1 Volts. A 24 Volt accumulator has got how many cells ?

A NiCad-Accumulator has a nominal voltage per cell of 1.25 Volts. A 12 Volt-Accumulator has got how many cells ?

A NiCad-Accumulator has a constant discharge of 90% of its capacity. A 50Ah Aaccumulator has got how many Ah left?

Ohms law is $I = \frac{E}{R}$ and the power law is $P = E \cdot I$,
A 115V light with 30Ω has got a current of A and a power of W.

Power is measured in Watt. 1 HP has 746 Watts. 1kW has HP!

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One Watt is one Joule per Second. 500J/s are ____ Watts and ____ Amperes at 10V.

Voltages in a series circuit: $V_t = V_1 + V_2 + V_3 + ...$
V_t is 115V, V_1 is 28V , V_2 is 55V V_3 is ____ Volt.

Resistances in a series circuit: $R_t = R_1 + R_2 + R_3 + ...$
R_t is 234Ω, R_1 is 19Ω, R_2 is 123Ω, R_3 is ____ Ω.

Currents in a series circuit: $I_t = I_1 = I_2 = I_3 = ...$

Voltages in a parallel circuit are everywhere the same!

Currents in a parallel circuit: $I_t = I_1 + I_2 + I_3 + ...$

Resistances in a parallel circuit: $1/R_t = 1/R_1 + 1/R_2 + 1/R_3 + ...$
In a parallel circuit R_1 is 5Ω, R_2 is 12Ω, R_3 is 12Ω. R_t is ____ Ω?
In a parallel circuit R_t is always smaller than the smallest resistor!!!

Capacitors in a series circuit: $1/C_t = 1/C_1 + 1/C_2 + 1/C_3 + ...$
apacitors in a series circuit: C_1 is 8μF, C_2 is 7μF, C_3 is 12μF. C_t ist ____
In a capacitiv series circuit C_t is always smaller than the smallest capacitor!!!

Capacitors in a parallel circuit: : $C_t = C_1 + C_2 + C_3 + ...$
C_1 is 5μF, C_2 is 7μF, C_3 is 22μF. C_t is ____

Inductors in a series circuit: $L_t = L_1 + L_2 + L_3 + ...$

Inductors in a parallel circuit: $1/L_t = 1/L_1 + 1/L_2 + 1/L_3 + ...$
Inductors in a parallel circuit: L_1 is 5mH, L_2 is 3mH, L_3 is 12mH. L_t is ____
Inductors in a parallel circuit C_t is always smaller than the smallest inductor!!!

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Transformers

Voltages E of transformers behave like windings N: $\frac{E_1}{E_2} = \frac{N_1}{N_2}$
The currents of transformers are inversely proportional to their windings N: $\frac{I_1}{I_2} = \frac{N_2}{N_1}$

Altenating Current

Peak Voltage = 1.414 x effective Voltage
115V Effektive-Voltage has a peak of ____ V
Average Voltage = 0.636 x peak Voltage
100V average Voltage has a peak of ____ V
Effective Voltage = RMS value = 0.707 x peak Voltage
100V has a Peak of ____ V

Angular frequency "Omega" of an alternating current $\omega = 2\ \pi$ f oder $\omega = \frac{2\pi}{T}$ Frequency f = 1/T

The energy of a magnetic field of an inductor $E_{p,m} = \frac{1}{2}$ B · H · V or $E_{p,m} = \frac{1}{2}$ L · I^2

Induced voltage of a moving conductor E_{ind} equals magnetic density B in Teslar times length of the conductor l in Meter times velocity ν in m/s . E_{ind} = B · l · ν

Alternating Current: Impedance consists of Resistance and Reactance.
P = E x I is Apparent Power in an A/C circuit P = E x I x cos Φ is Real Power
P = E x I x sin Φ is Reactive Power
500W Apparent Power at cos Φ 0,9 has how much Real Power?
500W Apparent Power at sin Φ 0,1 has how much Reactive Power?

Power factor in % is the ratio of Real Power to Apparent Power.
Apparent Power KVA ; Real Power in KW ; KVAR Reactive Power = Loss.
500kVA with a **power factor** of 75% has how much Real Power.

3-Phase Altenating Current

Voltage Phase to Phase is 1.73 times Voltage Phase to Line $E = \sqrt{3} \cdot E_{Str}$

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Capacitors

The charge of a capacitor is Capacity x Voltage. Q = C · E
The capacity of a Capacitor is permittivity x area/distance between plates = $C = \epsilon_D \frac{A}{d}$
A capacitor is blocking Direct Current DC!
English-language power engineering students are advised to remember: "ELI the ICE man" or "ELI on ICE" – the voltage E leads the current I in an inductor L, the current leads the voltage in a capacitor C.
Another common mnemonic is CIVIL – in a capacitor (C) the current (I) leads voltage (V), voltage (V) leads current (I) in an inductor (L).

Calculating Charging/Discharging of a Capacitor

The Charging Time of a Capacitor depends of Capacitance C and the Resistance R. Therefore the product of Capacitance C and Resistance R is considered as time constant τ (tau). τ = R · C
Within that time constant τ (tau) charges or discharges a capacitor about 63% of its applied voltage.
After only 0,69 τ a capacitor has reached 50% of its final or starting voltage.
After 5 time constants a capacitor is almost fully charged or discharged!
`The Charging od Discharging time` 5 τ(tau) or `5 times Resistance times Capacity`.

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