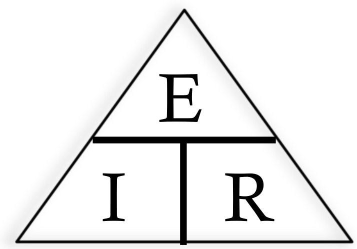
General Exam Formulae



Ohms Law: Voltage

$E = I \times R$

where E = voltage,
I = current in amperes, and
R = resistance in Ohms.

Ohms Law: Resistance

$R = E/I$

where E = voltage,
I = current in amperes, and
R = resistance in Ohms.

Ohms Law: Current

$I = E/R$

where E = voltage,
I = current in amperes, and
R = resistance in Ohms.

Ohms Law: Power

$P = E \times I$

where E = voltage,
I = current in amperes, and
P = power in watts.

RMS Voltage of a Sine Wave

$V_{RMS} = V_p \times 0.707$

where V_{RMS} = RMS Voltage, and
V_p = peak voltage.

RMS Voltage From Peak-To-Peak Voltage

$V_{RMS} = V_{p-p} / 2 \times 0.707$

where V_{RMS} = RMS Voltage, and
V_{p-p} = peak-to-peak voltage.

Peak-To-Peak Voltage of AC Signal

$V_{peak} = V_{RMS} \times 2.828$

where V_{RMS} = RMS Voltage, and
V_{peak} = peak voltage.

Power of AC Signal When Voltage and Current are in Phase

$P\ (watts) = V_{RMS} \times I$

where V_{RMS} = RMS Voltage,
I = current, and
$P\ (watts)$ = power.

Ohm's Law Extensions for Power of AC Signal

$P\ (watts) = V^2{}_{RMS} \div R$

where V_{RMS} = RMS Voltage,
R = resistance in ohms, and
$P\ (watts)$ = power.

$P\ (watts) = I^2{}_{RMS} \times R$

where I_{RMS} = RMS current,
R = resistance in ohms, and
$P\ (watts)$ = power.

DC Circuits Equations

$P\ (watts) = V \times I$

where V = voltage,
I = current, and
$P\ (watts)$ = power.

$P\ (watts) = V^2/R$

where V = voltage,
R = resistance in ohms, and
$P\ (watts)$ = power.

$P\ (watts) = I^2 \times R$

where I^2 = current,
R = resistance in ohms, and

$P\ (watts)$ = power.

RMS Voltage From Power and Resistance

$V_{RMS} = \sqrt{P \times R}$

where P = power in watts,
R = resistance in ohms, and
V_{RMS} = voltage.

Power Ratios in dB

$A\ (dB) = 10\ x\ log_{10}\ (P_2 \div P_1)$

where P_1 = base power measurement,
P_2 = power of interest, and
$A\ (dB)$ = dB ratio.

Power Loss in dB

$P_2 \div P_1 = 10^{(A(dB) \div 10)}$

where P_1 = base power measurement,
P_2 = power of interest, and
$A\ (dB)$ = dB ratio.

Resistors in Series

Total Resistance = Sum of All Resistors

Resistors in Parallel

$R_{total} = 1\ /\ (1/R_1 + 1/R_2 + 1/R_{3\ldots})$

where R_1 = first resistor in ohms,
R_2 = second resistor in ohms and so on, and
R_{total} = total resistance.

Note that if all resistors are equal, simply divide the value of one resistor by the number of resistors in parallel.

Inductors in Parallel

Work the same way as resistors.

Capacitors in Parallel

Increases total capacitance.

Capacitors in Series

Decreases total capacitance.

$C_{total} = 1 / (1/C_1 + 1/C_2 + 1/C_{3\ldots})$

where C_1 = first capacitor in microfarads,
C_2 = second capacitor in microfarads and so on, and
C_{total} = total capacitance.

Note that if all capacitors are equal, simply divide the value of one capacitor by the number of capacitors in series.

Turns Ratio of Impedance Transformer

$Turns\ Ratio = \sqrt{Output\ Impedance/Input\ impedance}$

Secondary Voltage of Transformer

$V_{secondary} = V_{primary} \times (secondary\ turns/primary\ turns)$

where $V_{primary}$ = Primary voltage,
$Primary\ Turns$ = number of primary turns,
$Secondary\ Turns$ = number of secondary turns, and
$V_{secondary}$ = Secondary voltage.

Efficiency of an RF Power Amplifier

$\eta_{RF} = RF/DC$

where RF = RF output power,
DC = DC input power, and
η_{RF} = efficiency of RF power amplifier.

Frequency Deviation for 12 MHz Signal to 2 Meters

$F_{Dev} = F_{kHz} \times (1/12)$

where F_{kHz} = deviation of modulated oscillator in kHz, and
F_{Dev} = frequency of the frequency modulation for 2 meters.

Bandwidth of an FM Signal

$BW = 2(\Delta f + fm)$

where Δf = deviation frequency,
fm= modulating frequency, and
BW = total bandwidth (for 98% power).

Relationship of Isotropic Antenna to a Dipole

$dBi = dBd + 2.15$

where dBd = dB gain for a dipole antenna, and
dBi = dB gain for an isotropic antenna.

Note that dBi overstates the dB gain.