Part E: Solving Circuit Equations Symbolically

Theoretical physicist are scientists and mathematicians who construct theories that explain how the universe functions. They rarely work with actual numbers, because to explain the universe you must use the most general methods. Thus, it is important to learn to how to solve physics problems algebraically, with *symbols* for numbers.

"In terms of"
This phrase is used very frequently when describing algebraic physics problems.

To solve for "A in terms of B and C" means you derive an equation
A = _____
in which the right side of the equation includes only B, C, numbers, operations (like plus, minus, square root, or log), and known constants (like the speed of light, the charge of an electron, the mass of a proton, etc.).

To solve for "J in terms of K, L ,and M" means you derive an equation
J = _____
in which the right side of the equation includes of K, L, M, numbers, operations, and known constants.

Solving Ohm's Law Algebraically

V = IR

E.1 Solve for current in terms of voltage and resistance.

E.2 Solve for resistance in terms of current and voltage.

Solving Ohm's Law and the power formula algebraically.

V = IR P = IV

Solve for each variable in terms of the known quantities. Two of the answers will be the equations themselves!

E.3 Variable: voltage Known quantities: current, power

E.4 Variable: voltage Known quantities: current, resistance

E.5 Variable: voltage Known quantities: resistance, power

E.6 Variable: power Known quantities: current, voltage

E.7 Variable: power Known quantities: current, resistance

E.8 Variable: power Known quantities: voltage, resistance

E.9 Variable: current Known quantities: voltage, resistance

E.10 Variable: current Known quantities: power, resistance

E.11 Variable: current Known quantities: voltage, power

E.12 Variable: Resistance Known quantities: voltage, power

E.13 Variable: Resistance Known quantities: voltage, current

E.14 Variable: Resistance Known quantities: current, power

E: Algebraic Circuit Formulas Name _____

Answers:

E.1 $I = \frac{V}{R}$	E.4 $V = IR$	E.7. $P = I^2R$	E.10. $I = \sqrt{\frac{P}{R}}$	E.13. $R = \frac{V}{I}$
E.2 $R = \frac{V}{I}$	E.5 $V = \sqrt{PR}$	E.8. $P = \frac{V^2}{R}$	E.11. $I = \frac{P}{V}$	E.14. $R = \frac{P}{I^2}$
E.3 $V = \frac{P}{I}$	E.6. $P = IV$	E.9. $I = \frac{V}{R}$	E.12. $R = \frac{V^2}{P}$	