BASIC ELECTRICITY AND ELECTRONICS 1

JIM PYTEL

Open Oregon Educational Resources

CONTENTS

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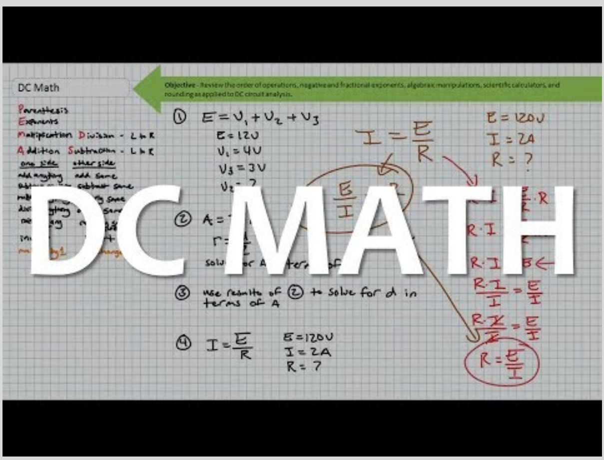
This course is the 1st in a three part series intended to support the flipped classroom approach for traditional basic electronics classes. Basic Electronics 1 covers the order of operations, algebraic manipulation, engineering prefixes, unit conversion, general industrial safety, energy, power, efficiency, capacity factor, basic electrical properties: voltage, current, resistance, fixed resistors, variable resistors, protoboards, ohmmeters, series resistors, parallel resistors, 4 band resistor color code, DC

Ohm's Law, DC power, voltmeters, ammeters, series DC circuit properties, DC Kirchhoff's Voltage Law, DC voltage divider rule, parallel DC circuit properties, DC Kirchhoff's Current Law, DC current divider rule, series-parallel DC circuit properties, instrument loading effects, DC current sources, source conversion, resistive delta-Y conversion, complex DC circuits, DC Superposition Theorem, DC Thevenin's Theorem, DC Maximum Power Transfer Theorem, and DC Norton's Theorem.

UNIT 1: PREREQUISITES

Objective: Demonstrate understanding of the order of operations, algebraic manipulation, negative and fractional exponents, scientific calculators, rounding, engineering prefixes, unit conversion, and general industrial safety.

DC MATH



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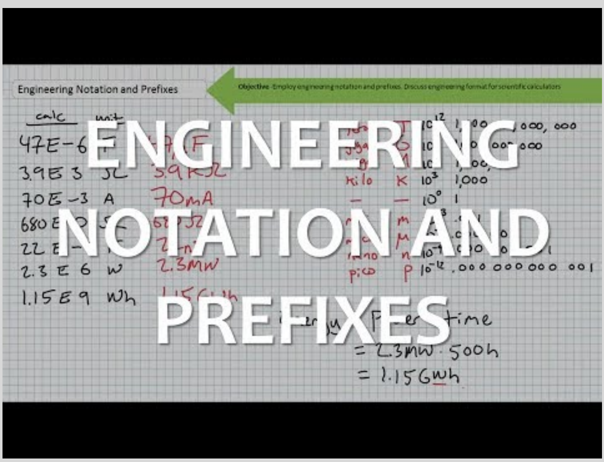
[DC Math Study Guide](#)

ENGINEERING NOTATION AND PREFIXES



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[Engineering Notation and Prefixes Study Guide](#)

GENERAL INDUSTRIAL SAFETY

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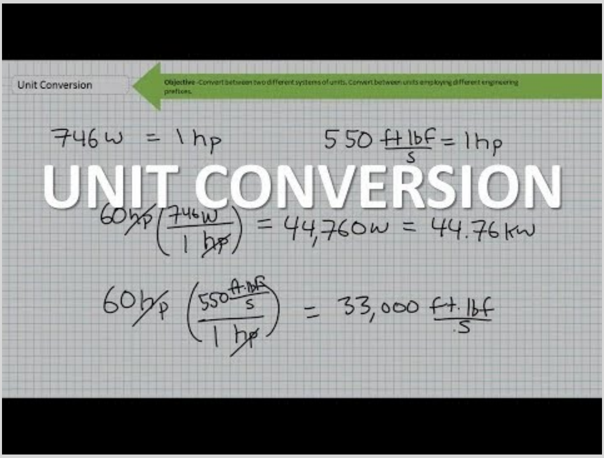
[General Industrial Safety Study Guide](#)

UNIT CONVERSION



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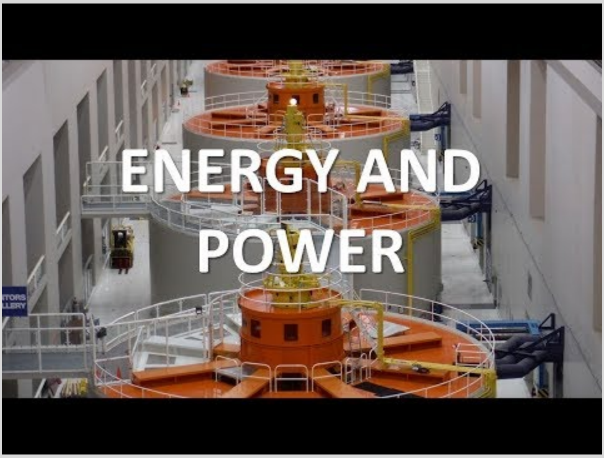
[Unit Conversion Study Guide]()

UNIT 2: BASIC ELECTRICAL PROPERTIES

Objective: Demonstrate understanding of energy, power, efficiency, capacity, voltage, current, and resistance.

ENERGY AND POWER



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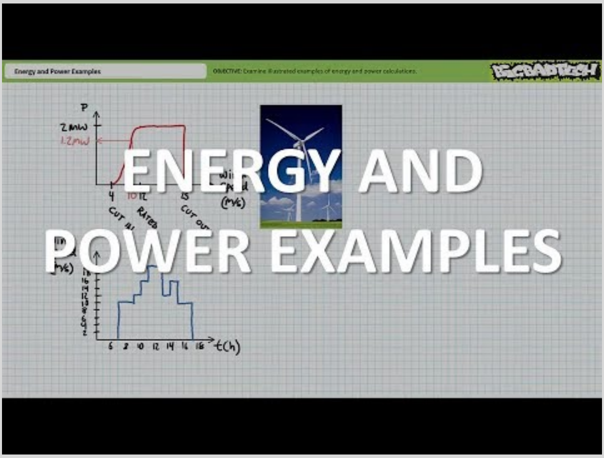
[Energy and Power Study Guide](#)

ENERGY AND POWER EXAMPLES



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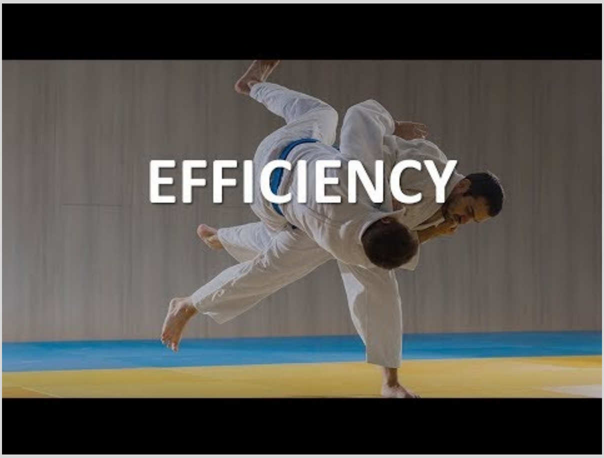
[Energy and Power Examples Study Guide]()

EFFICIENCY



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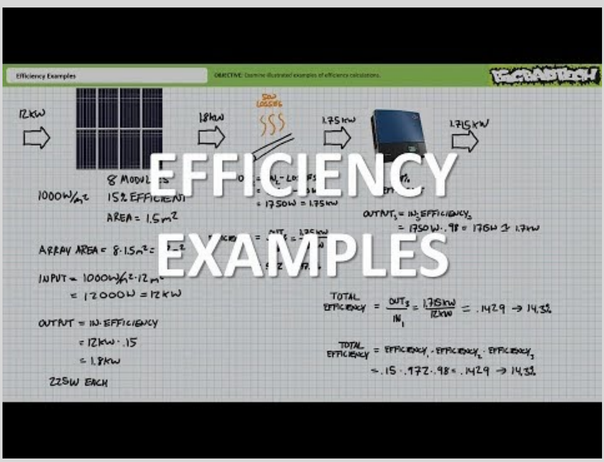
[Efficiency Study Guide]()

EFFICIENCY EXAMPLES



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[Efficiency Examples Study Guide]()

CAPACITY FACTOR

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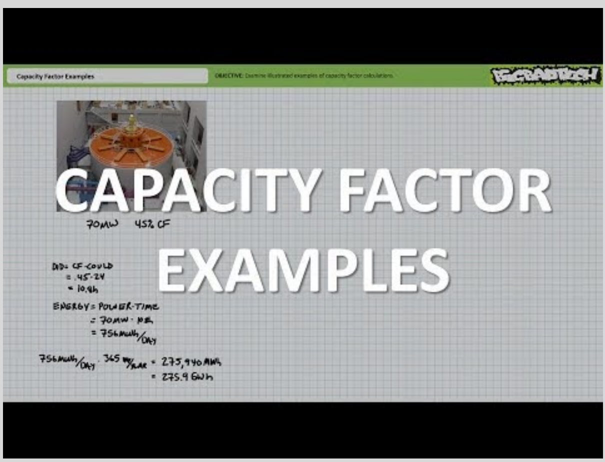
[Capacity Factor Study Guide]()

CAPACITY FACTOR EXAMPLES



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[Capacity Factor Examples Study Guide](#)

BASIC ELECTRICAL QUANTITIES

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[Basic Electrical Quantities Study Guide](#)

POWER GENERATION, TRANSMISSION, AND USE

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UNIT 3: RESISTANCE

Objective: Demonstrate understanding of resistance, differentiate between conductors and insulators, calculate resistance of conductors of various dimensions and material composition, interpret the 4 band resistor color code, calculate the total resistance of series and parallel combinations of resistors, learn to use potentiometers, protoboards, and ohmmeters.

RESISTANCE

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Resistance Study Guide

4 BAND RESISTOR COLOR CODE

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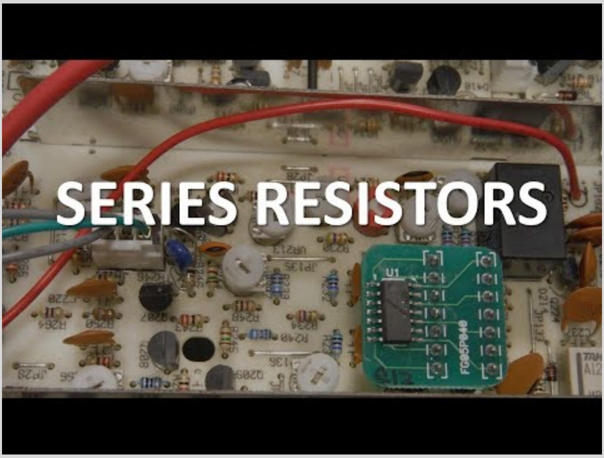
Resistor Color Code Study Guide

SERIES RESISTORS



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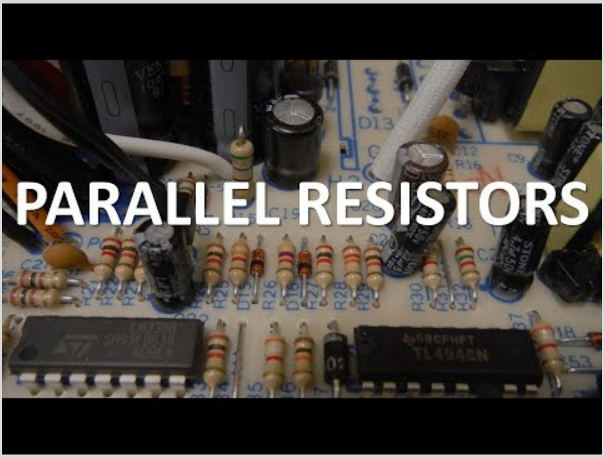
Series Resistors Study Guide

PARALLEL RESISTORS



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[Parallel Resistors Study Guide]()

OHMMETERS: BK PRECISION 2831E

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[Ohmmeters BK Precision 2831E Study Guide]()

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OHMMETERS: FLUKE 87

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Ohmmeters Fluke 87V Study Guide

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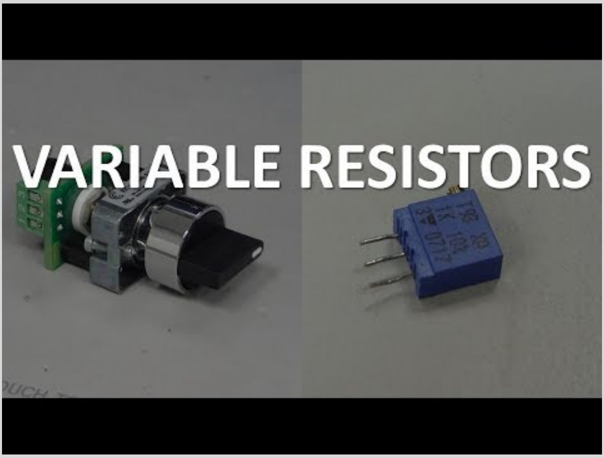
VARIABLE RESISTORS



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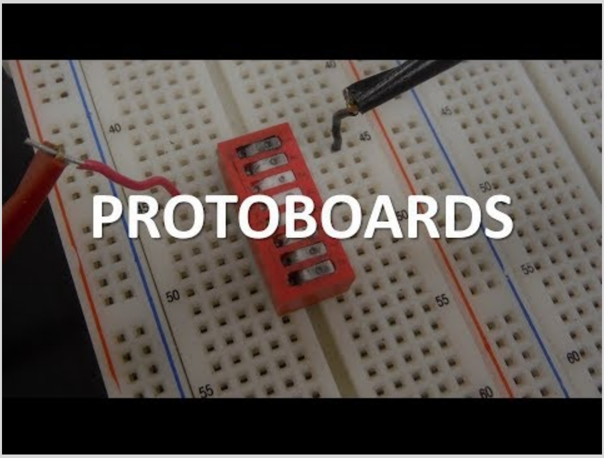
[Variable Resistors Study Guide]()

PROTOTYPING BOARDS



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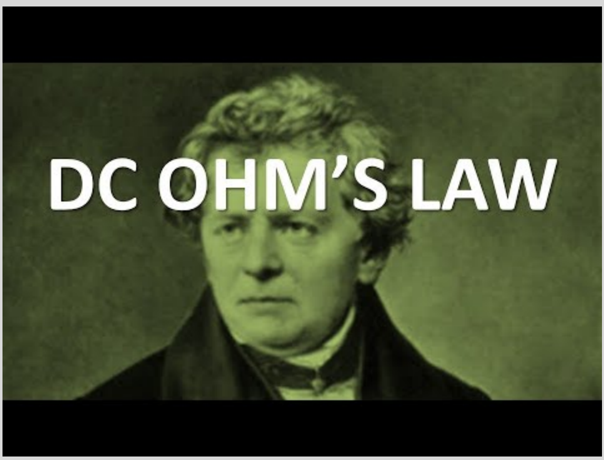
[Protoboards Study Guide]()

UNIT 4: DC OHM'S LAW

Objective: Demonstrate understanding of Ohm's Law and the power equations and use these relationships to calculate expected observations of desired electrical properties. Use a DMM in voltmeter and ammeter mode to measure voltage and current.

DC OHM'S LAW



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[DC Ohms Law Study Guide](#)

DC POWER

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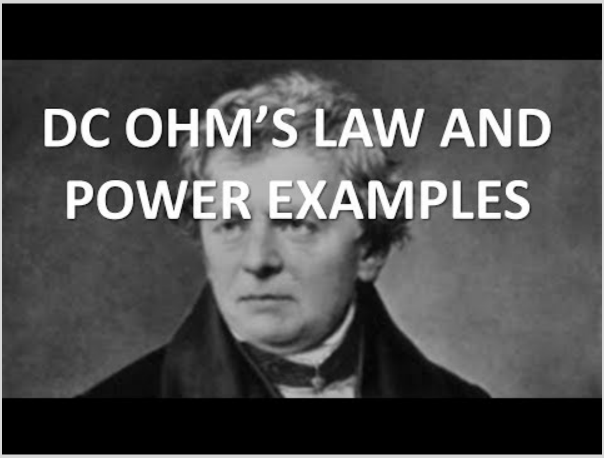
DC Power Study Guide

DC OHM'S LAW AND POWER EXAMPLES



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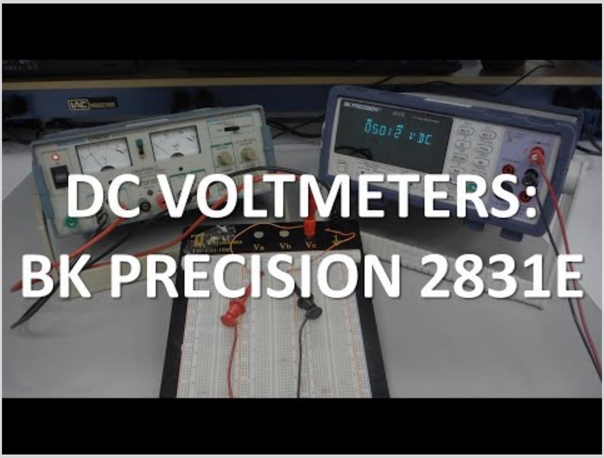
[DC Ohms Law and Power Examples Study Guide](#)

DC VOLTMETERS: BK PRECISION 2831E



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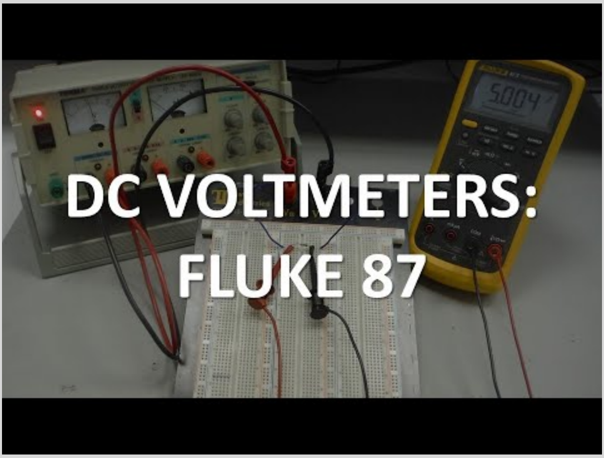
DC Voltmeters BK Precision 2831E Study Guide

DC VOLTMETERS: FLUKE 87 V



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[DC Voltmeters Fluke 87 Study Guide]()

DC POWER SUPPLIES

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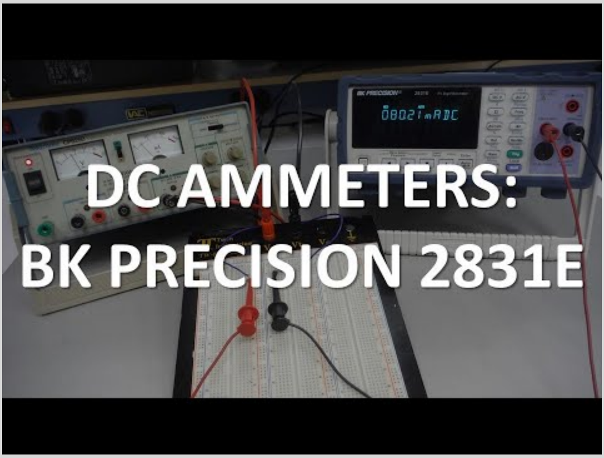
[DC Power Supplies Study Guide]()

DC AMMETERS: BK PRECISION 2831E



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DC Ammeters BK Precision 2831E Study Guide

VERIFYING DC OHM'S LAW

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[Verifying DC Ohms Law Study Guide]()

ELECTRICAL SAFETY AND OHM'S LAW

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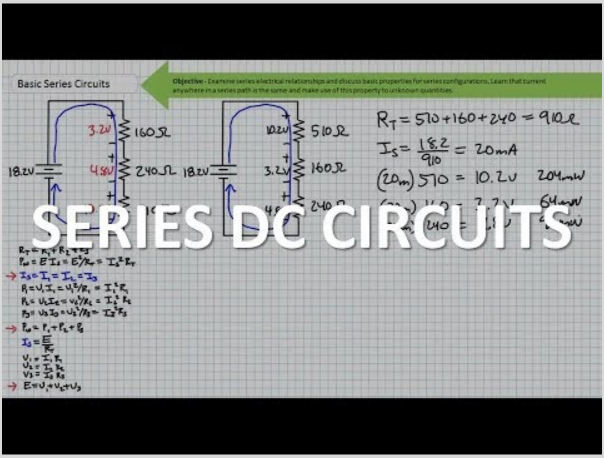
Electrical Safety and Ohm's Law Study Guide

UNIT 5: SERIES DC CIRCUIT ANALYSIS

Objective: Demonstrate understanding of basic series DC circuit properties and Kirchhoff's Voltage Law, make use of the DC voltage divider rule, understand the purpose of switches and circuit protection devices in series circuits, use circuit simulation software, and employ instrumentation in a series circuit to verify series circuit properties.

SERIES DC CIRCUITS



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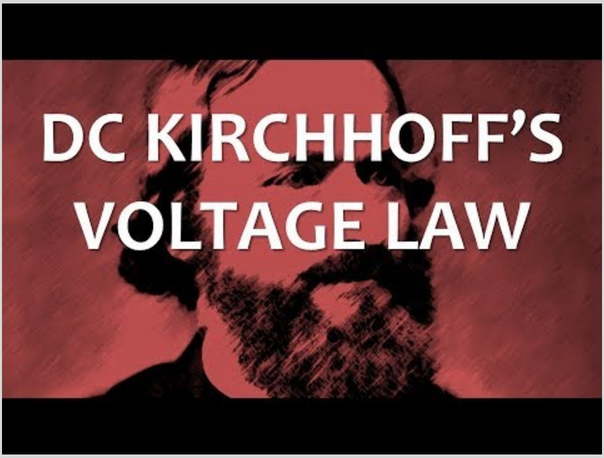
[DC Series Circuits Study Guide](#)

DC KIRCHHOFF'S VOLTAGE LAW



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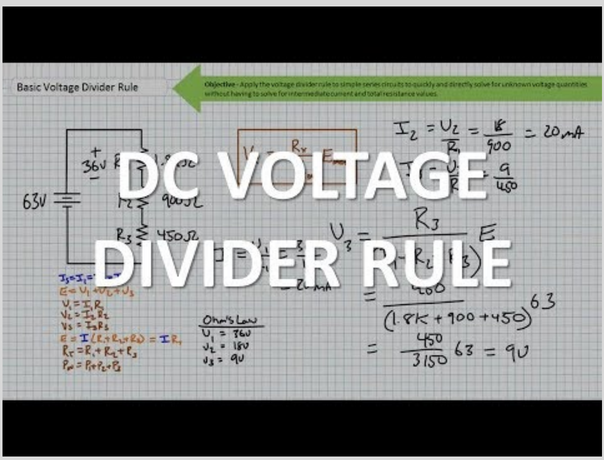
[DC Kirchhoffs Voltage Law Study Guide]()

DC VOLTAGE DIVIDER RULE



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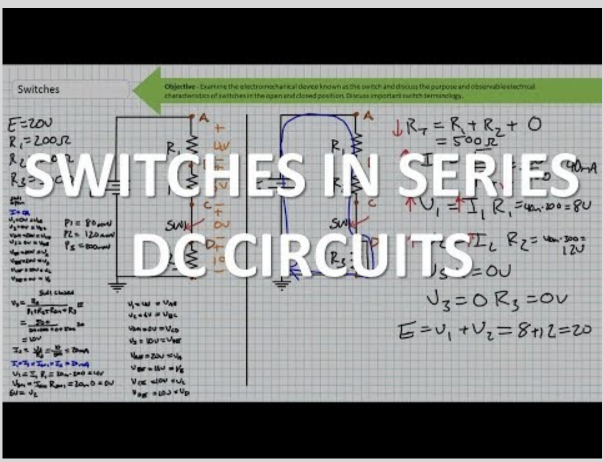
[DC Voltage Divider Rule Study Guide]()

SWITCHES IN SERIES DC CIRCUITS



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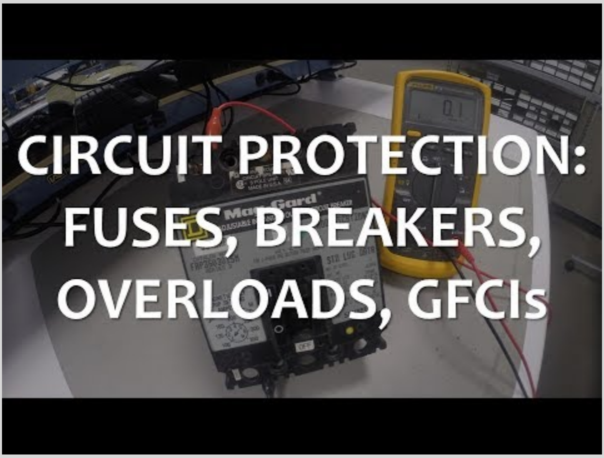
[Switches Study Guide]()

CIRCUIT PROTECTION DEVICES



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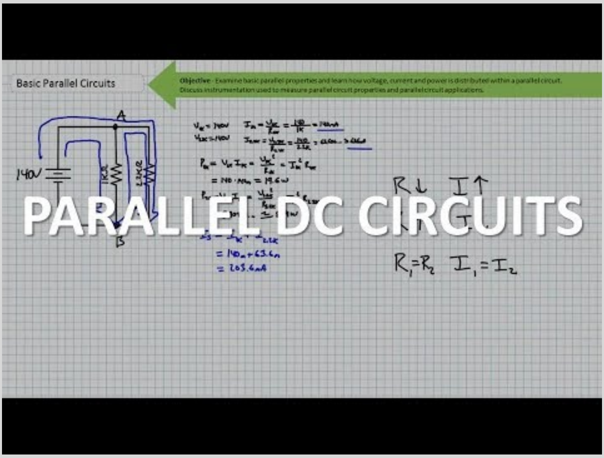
[Circuit Protection Devices Study Guide]()

UNIT 6: PARALLEL DC CIRCUITS

Objective: Demonstrate understanding of basic parallel DC circuit properties and Kirchhoff's Current Law, make use of the current divider rule, use circuit simulation software, and employ instrumentation in a parallel circuit to verify parallel circuit properties.

PARALLEL DC CIRCUITS



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[Parallel DC Circuits Study Guide]()

DC KIRCHHOFF'S CURRENT LAW

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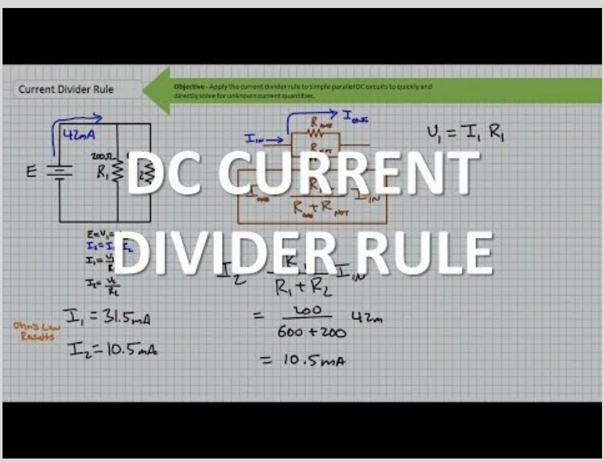
DC Kirchhoffs Current Law Study Guide

DC CURRENT DIVIDER RULE



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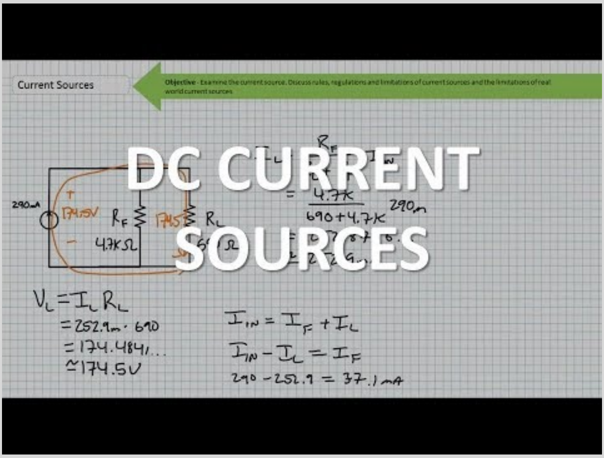
[DC Current Divider Rule Study Guide]()

DC CURRENT SOURCES



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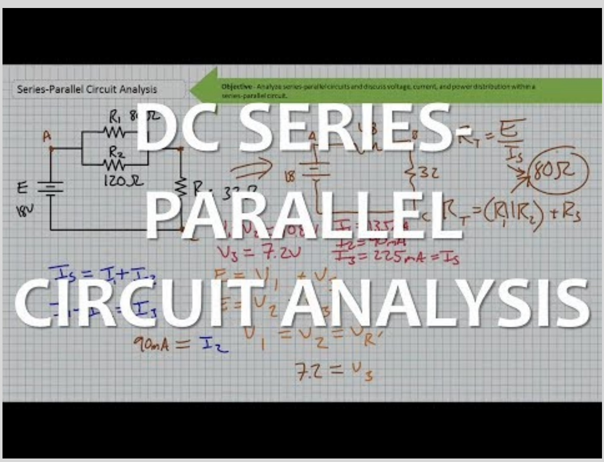
[DC Current Sources Study Guide](#)

UNIT 7: SERIES-PARALLEL DC CIRCUIT ANALYSIS

Objective: Demonstrate understanding of basic series-parallel DC circuit properties, analyze loaded and unloaded voltage dividers, convert sources, understand instrument loading effects, use circuit simulation software, and employ instrumentation in a series-parallel circuit to verify series-parallel circuit properties.

SERIES-PARALLEL DC CIRCUIT ANALYSIS



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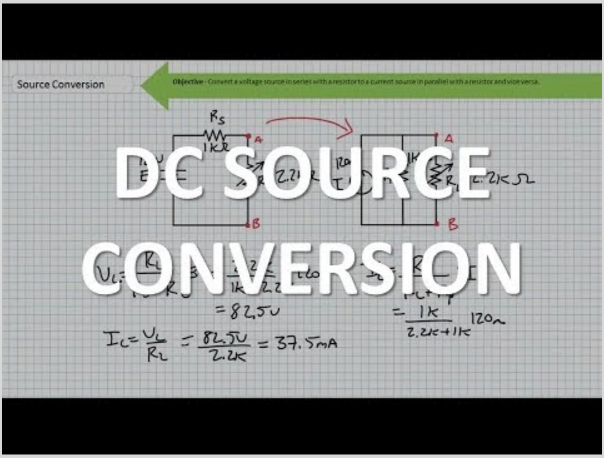
[Series Parallel DC Circuits Study Guide](#)

DC SOURCE CONVERSION



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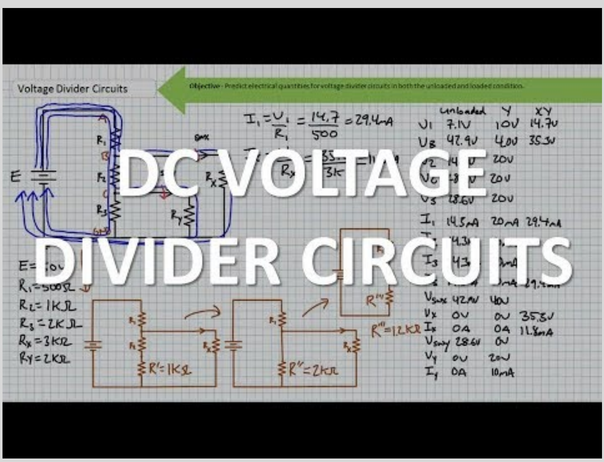
[Source Conversion Study Guide]()

DC VOLTAGE DIVIDER CIRCUITS



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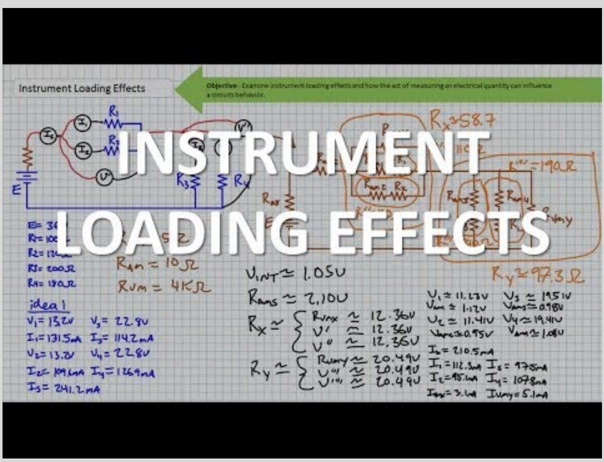
[DC Voltage Divider Circuits Study Guide](#)

INSTRUMENT LOADING EFFECTS



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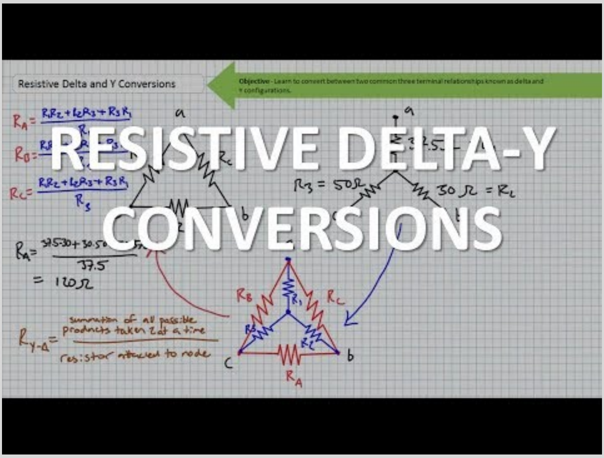
[Instrument Loading Effects Study Guide](#)

RESISTIVE DELTA-Y CONVERSIONS



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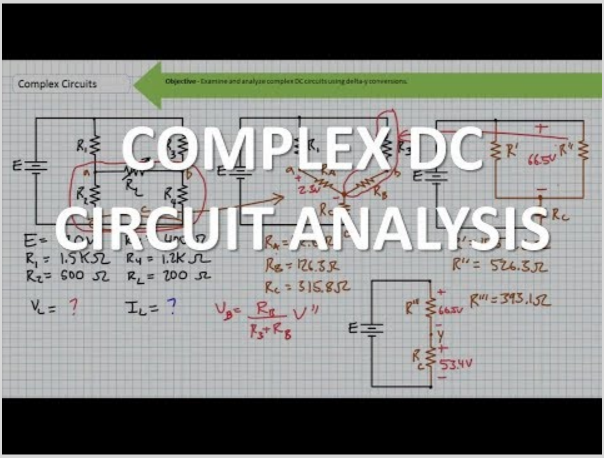
[Resistive Y Delta Conversion Study Guide](#)

COMPLEX DC CIRCUIT ANALYSIS



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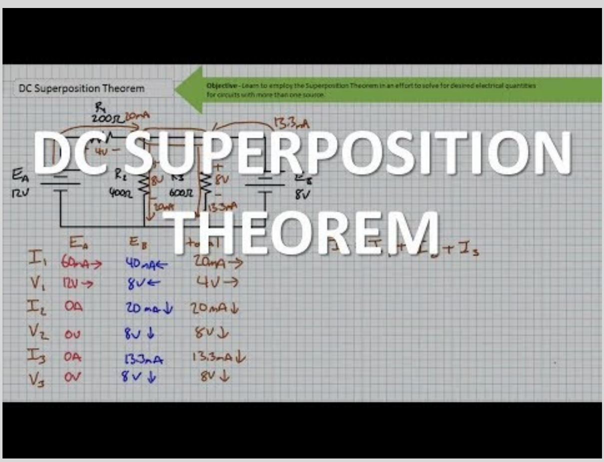
[Complex DC Circuit Analysis Study Guide](#)

UNIT 8: DC CIRCUIT ANALYSIS THEOREMS

Objective: Demonstrate understanding of the Super Position Theorem, Thevenin's Theorem, and the Maximum Power Transfer Theorem as applied to DC circuits.

DC SUPERPOSITION THEOREM



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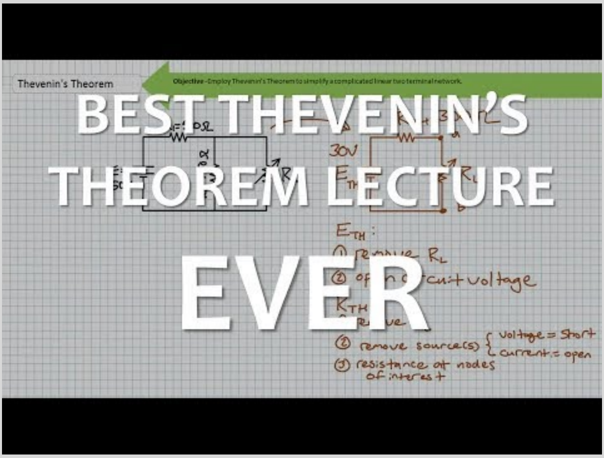
[Superposition Theorem Study Guide](#)

DC THEVENIN'S THEOREM



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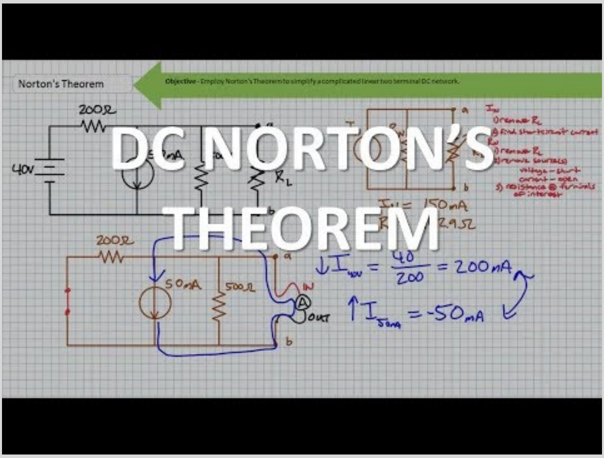
[Thevenins MPT and Nortons Theorem Study Guide]()

DC NORTON'S THEOREM



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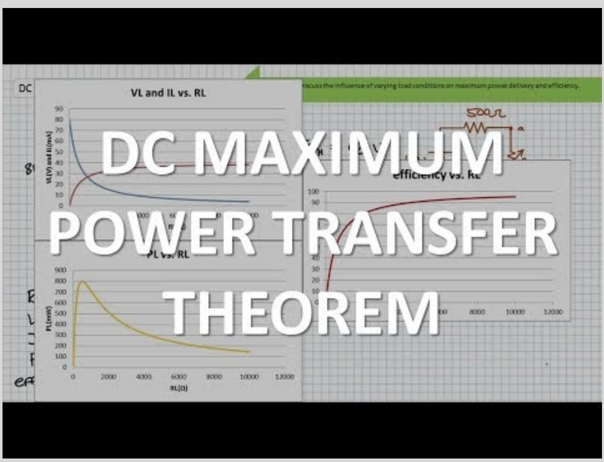
[Thevenins MPT and Nortons Theorem Study Guide]()

DC MAXIMUM POWER TRANSFER THEOREM



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[Thevenins MPT and Nortons Theorem Study Guide]()

This is where you can add appendices or other back matter.