

UNIT 1

Electrician's Math and Basic Electrical Formulas

INTRODUCTION TO UNIT 1—ELECTRICIAN'S MATH AND BASIC ELECTRICAL FORMULAS

In order to construct a building that will last into the future, a strong foundation is a prerequisite. The foundation is a part of the building that isn't visible in the finished structure, but is essential in erecting a building that will have the necessary strength to endure.

The math and basic electrical concepts of this unit are very similar to the foundation of a building. The concepts in this unit are the essential basics that you must understand, because you'll build upon them as you study electrical circuits and systems. As your studies continue, you'll find that a good foundation in electrical theory and math will help you understand why the NEC contains certain provisions.

This unit includes math and electrical fundamentals. You'll be amazed at how often your electrical studies return to the basics of this unit. Ohm's law and the electrical formulas related to it are the foundation of all electrical circuits.

Every student begins at a different level of understanding, and you may find this unit an easy review, or you may find it requires a high level of concentration. In any case, be certain that you fully understand the concepts of this unit and are able to successfully complete the questions at the end of the unit before going on. A solid foundation will help in your successful study of the rest of this textbook.

PART A—ELECTRICIAN'S MATH

Introduction

Numbers can take different forms:

Whole numbers: 1, 20, 300, 4,000, 5,000

Decimals: 0.80, 1.25, 0.75, 1.15

Fractions: $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$, $\frac{1}{8}$

Percentages: 80%, 125%, 250%, 500%

You'll need to be able to convert these numbers from one form to another and back again, because all of these number forms are part of electrical work and electrical calculations.

You'll also need to be able to do some basic algebra. Many people have a fear of algebra, but as you work through the material here you'll see there's nothing to fear.

1.1 Whole Numbers

Whole numbers are exactly what the term implies. These numbers don't contain any fractions, decimals, or percentages. Another name for whole numbers is "integers."

1.2 Decimals

The decimal method is used to display numbers other than whole numbers, fractions, or percentages such as, 0.80, 1.25, 1.732, and so on.

1.3 Fractions

A fraction represents part of a whole number. If you use a calculator for adding, subtracting, multiplying, or dividing, you need to convert the fraction to a decimal or whole number. To change a fraction to a decimal or whole number, divide the numerator (the top number) by the denominator (the bottom number).

► Examples

$\frac{1}{6}$ = one divided by six = 0.166

$\frac{2}{5}$ = two divided by five = 0.40

$\frac{3}{6}$ = three divided by six = 0.50

$\frac{5}{4}$ = five divided by four = 1.25

$\frac{7}{2}$ = seven divided by two = 3.50

Electrician Math Guide

Ray Holder



Electrician Math Guide:

New Jersey 2020 Master Electrician Exam Questions and Study Guide Ray Holder, 2020-06-22 The New Jersey 2020 Master study guide will help you prepare for the exam by providing 12 practice open book exams and 2 Final Closed Book Exams Includes New Jersey License Forms and Sample Applications This book also covers most topics that are included on all Master Electricians exams such as conductor sizing and protection motors transformers voltage drop over current protection and residential and commercial load calculations The text contains the most widely used electrical calculations and formulas the reader needs to pass the Master electrical competency exam About the Author Ray Holder has worked in the electrical industry for more than 40 years as an apprentice journeyman master field engineer estimator business manager contractor inspector and instructor He is a graduate of Texas State University and holds a Bachelor of Science Degree in Occupational Education A certified instructor of electrical trades he has been awarded a lifetime teaching certificate from the Texas Education Agency in the field of Vocational Education Mr Holder has taught thousands of students at Austin Community College Austin Texas Odessa College at Odessa Texas Technical Vocational Institute of Albuquerque New Mexico Howard College at San Angelo Texas and in the public school systems in Fort Worth and San Antonio Texas He is currently Director of Education for Electrical Seminars Inc of San Marcos Texas Mr Holder is an active member of the National Fire Protection Association International Association of Electrical Inspectors and the International Brotherhood of Electrical Workers

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journeyman master field engineer estimator business manager contractor inspector and instructor He is a graduate of Texas State University and holds a Bachelor of Science Degree in Occupational Education A certified instructor of electrical trades he has been awarded a lifetime teaching certificate from the Texas Education Agency in the field of Vocational Education Mr Holder has taught thousands of students at Austin Community College Austin Texas Odessa College at Odessa Texas Technical Vocational Institute of Albuquerque New Mexico Howard College at San Angelo Texas and in the public school systems in Fort Worth and San Antonio Texas He is currently Director of Education for Electrical Seminars Inc of San Marcos Texas Mr Holder is an active member of the National Fire Protection Association International Association of Electrical Inspectors and the International Brotherhood of Electrical Workers

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Electrician's Exam Preparation Guide John E. Traister,2005 A question and answer study guide for students and apprentices preparing to take the journeyman s or master s electrician s exam based on the 2005 National Electrical Code

Maine 2020 Journeyman Electrician Exam Questions and Study Guide Ray Holder,2020-05-18 The Maine 2020 Journeyman study guide will help you prepare for the exam by providing 12 practice open book exams and 2 Final Closed Book Exams Includes Maine License Forms and Sample Applications This book also covers most topics that are included on all Journeyman Electricians exams such as conductor sizing and protection motors transformers voltage drop over current protection and residential and commercial load calculations The text contains the most widely used electrical calculations and formulas the reader needs to pass the Journeyman electrical competency exam About the AuthorRay Holder has worked in the electrical industry for more than 40

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Introduction to Electrician Handbook Ram Babu Sao, 2025-05-16 This book Introduction to Electrician Handbook is a practical guide to Electrical Techniques employed by an Electrician or a tradesperson engaged in the repair of electric machines and domestic wiring of buildings Building electrification maintenance of electrical control systems of home appliances or another kind of repairing job Electricians install domestic wiring and control electrical equipment through which electricity flows They also install and maintain electrical equipment and machines in factories and a wide range of other businesses related to electrical Electricians generally focus on either construction or maintenance although many of them do both An electrician is a tradesperson specializing in electrical wiring of buildings stationary machines and related equipment Electricians may be employed in the installation of new electrical components or the maintenance and repair of existing electrical infrastructure

They join an electrician apprenticeship program sponsored by the International Brotherhood of Electrical Workers IBEW National Electrical Contractors Association NECA Independent Electrical Contractors IEC or Industrial Training Institute ITI as electricians through a Government Institution These programs include both classroom courses and on the job training and take about 2 4 years to complete Construction electricians read blueprints of circuit diagrams install wiring and electrical controls in residential or commercial buildings and follow the state and local building regulations They might also dictate and train workers who are learning the skills It is a practical guide for ITI apprentices preparing for service interview or already employed Electricians may be employed in the installation of new electrical components machines and equipment or the maintenance and repair of existing electrical infrastructure All electricians should expect to maintain current knowledge of the National Electric Code throughout their careers Additional training may also be required to cover specific topics that apply to individual branches of the electrical trade

Oregon 2020 Journeyman Electrician Exam Questions and Study Guide Ray Holder, 2020-06-12 The Oregon 2020 Journeyman study guide will help you prepare for the exam by providing 12 practice open book exams and 2 Final Closed Book Exams Includes Oregon License Forms and Sample Applications This book also covers most topics that are included on all Journeyman Electricians exams such as conductor sizing and protection motors transformers voltage drop over current protection and residential and commercial load calculations The text contains the most widely used electrical calculations and formulas the reader needs to pass the Journeyman electrical competency exam About the Author Ray Holder has worked in the electrical industry for more than 40 years as an apprentice journeyman master field engineer estimator business manager contractor inspector and instructor He is a graduate of Texas State University and holds a Bachelor of Science Degree in Occupational Education A certified instructor of electrical trades he has been awarded a lifetime teaching certificate from the Texas Education Agency in the field of Vocational Education Mr Holder has taught thousands of students at Austin Community College Austin Texas Odessa College at Odessa Texas Technical Vocational Institute of Albuquerque New Mexico Howard College at San Angelo Texas and in the public school systems in Fort Worth and San Antonio Texas He is currently Director of Education for Electrical Seminars Inc of San Marcos Texas Mr Holder is an active member of the National Fire Protection Association International Association of Electrical Inspectors and the International Brotherhood of Electrical Workers

Electrical Safety Code Manual Kimberley Keller, 2010-07-19 Safety in any workplace is extremely important In the case of the electrical industry safety is critical and the codes and regulations which determine safe practices are both diverse and complicated Employers electricians electrical system designers inspectors engineers and architects must comply with safety standards listed in the National Electrical Code OSHA and NFPA 70E Unfortunately the publications which list these safety requirements are written in very technically advanced terms and the average person has an extremely difficult time understanding exactly what they need to do to ensure safe installations and working environments Electrical Safety Code Manual will tie together the various regulations and practices

for electrical safety and translate these complicated standards into easy to understand terms This will result in a publication that is a practical if not essential asset to not only designers and company owners but to the electricians who must put compliance requirements into action in the field Best practice methods for accident prevention and electrical hazard avoidance Current safety regulations including new standards from OSHA NEC NESC and NFPA Information on low medium and high voltage safety systems Step by step guidelines on safety audits Training program how to s from setup to rescue and first aid procedures Guide to the Evaluation of Educational Experiences in the Armed Services American Council on

Education,1978 **Illinois 2020 Journeyman Electrician Exam Questions and Study Guide** Ray Holder,2020-05-18

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