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DOE FUNDAMENTALS
MATHEMATICS



U.S. Department of Energy
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MATHEMATICS

ABSTRACT

Mathematics Fundamentals was developed to assist nuclear facility operating contractors provide operators, maintenance personnel, and the technical staff with the necessary fundamentals training to ensure a basic understanding of mathematics and its application to facility operation. The text includes a review of introductory mathematics, and the concepts and functional use of algebra, geometry, trigonometry, and calculus. Word problems, equations, calculations, and practical exercises that require the use of each of the mathematical concepts are also presented. This information will provide personnel with a foundation for understanding and performing basic mathematical calculations that are associated with various DOE nuclear facility operations.

Key Words: Training Material, Mathematics, Algebra, Geometry, Trigonometry, Calculus

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FOREWORD

Mathematics Fundamentals was prepared as an information resource for personnel who are responsible for the operation of the Department's nuclear facilities. A basic understanding of mathematics is necessary for DOE nuclear facility operators, maintenance personnel, and the technical staff to safely operate and maintain the facility and facility support systems. The information is presented to provide a foundation for applying engineering concepts to the job. This knowledge will help personnel more fully understand the impact that their actions may have on the safe and reliable operation of facility components and systems.

Mathematics Fundamentals consists of five modules. The following is a brief description of the information presented in each module.

Module 1 - Review of Introductory Mathematics

This module describes the concepts of addition, subtraction, multiplication, and division involving whole numbers, decimals, fractions, exponents, and radicals. A review of basic calculator operation is included.

Module 2 - Algebra

This module describes the concepts of algebra including quadratic equations and word problems.

Module 3 - Geometry

This module describes the basic geometric figures of triangles, quadrilaterals, and circles; and the calculation of area and volume.

Module 4 - Trigonometry

This module describes the trigonometric functions of sine, cosine, tangent, cotangent, secant, and cosecant. The use of the Pythagorean Theorem is also discussed.

Module 5 - Higher Concepts of Mathematics

This module describes logarithmic functions, statistics, complex numbers, imaginary numbers, matrices, and integral and derivative calculus.

The information contained in this textbook is by no means all encompassing. An attempt to present the entire subject of mathematics would be impractical. However, this *Mathematics* text does present enough information to provide the reader with a fundamental knowledge level sufficient to understand the advanced theoretical concepts presented in other subject areas, and to better understand basic system and equipment operations.