

1. Record Nr.	UNINA9910814944103321
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Titolo	The language of mathematics : utilizing math in practice // Robert L. Baber
Pubbl/distr/stampa	Hoboken, N.J., : Wiley, 2011
ISBN	9786613294616 9781283294614 1283294613 9781118061763 1118061764 9781118061770 1118061772 9781118061718 1118061713
Edizione	[1st ed.]
Descrizione fisica	1 online resource (438 p.)
Classificazione	MAT025000
Disciplina	510.1/4
Soggetti	Mathematical notation English language - Machine translating
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Includes index.
Nota di contenuto	THE LANGUAGE OF MATHEMATICS; CONTENTS; LIST OF TABLES; PREFACE; PART A INTRODUCTORY OVERVIEW; 1 Introduction; 1.1 What Is Language?; 1.2 What Is Mathematics?; 1.3 Why Use Mathematics?; 1.4 Mathematics and Its Language; 1.5 The Role of Translating English to Mathematics in Applying Mathematics; 1.6 The Language of Mathematics vs. Mathematics vs. Mathematical Models; 1.7 Goals and Intended Readership; 1.8 Structure of the Book; 1.9 Guidelines for the Reader; 2 Preview: Some Statements in English and the Language of Mathematics; 2.1 An Ancient Problem: Planning the Digging of a Canal 2.2 The Wall Around the Ancient City of Uruk2.3 A Numerical Thought Puzzle; 2.4 A Nursery Rhyme; 2.5 Making a Pot of Tea; 2.6 Combining Data Files; 2.7 Selecting a Telephone Tariff; 2.8 Interest on Savings Accounts, Bonds, etc.; 2.9 Sales and Value-Added Tax on Sales of Goods and Services; 2.10 A Hand of Cards; 2.11 Shear and Moment in a

Beam; 2.12 Forming Abbreviations of Names; 2.13 The Energy in Earth's Reflected Sunlight vs. That in Extracted Crude Oil; PART B MATHEMATICS AND ITS LANGUAGE; 3 Elements of the Language of Mathematics; 3.1 Values; 3.2 Variables; 3.3 Functions; 3.4 Expressions 3.4.1 Standard Functional Notation 3.4.2 Infix Notation; 3.4.3 Tree Notation; 3.4.4 Prefix and Postfix Notation; 3.4.5 Tabular Notation; 3.4.6 Graphical Notation; 3.4.7 Figures, Drawings, and Diagrams; 3.4.8 Notation for Series and Quantification; 3.4.9 Specialized Notational Forms for Certain Expressions; 3.4.10 Advantages and Disadvantages of the Different Notational Forms; 3.5 Evaluating Variables, Functions, and Expressions; 3.5.1 Complete (Total) Evaluation; 3.5.2 Partial Evaluation; 3.5.3 Undefined Values of Functions and Expressions; 3.6 Representations of Values vs. Names of Variables 4 Important Structures and Concepts in the Language of Mathematics 4.1 Common Structures of Values; 4.1.1 Sets; 4.1.2 Arrays (Indexed Variables), Subscripted Variables, and Matrices; 4.1.3 Sequences; 4.1.4 The Equivalence of Array Variables, Functions, Sequences, and Variables; 4.1.5 Direct Correspondence of Other Mathematical Objects and Structures; 4.1.6 Relations; 4.1.7 Finite State Machines; 4.2 Infinity; 4.3 Iterative Definitions and Recursion; 4.4 Convergence, Limits, and Bounds; 4.5 Calculus; 4.6 Probability Theory; 4.6.1 Mathematical Model of a Probabilistic Process 4.6.2 Mean, Median, Variance, and Deviation 4.6.3 Independent Probabilistic Processes; 4.6.4 Dependent Probabilistic Processes and Conditional Probabilities; 4.7 Theorems; 4.8 Symbols and Notation; 5 Solving Problems Mathematically; 5.1 Manipulating Expressions; 5.2 Proving Theorems; 5.2.1 Techniques and Guidelines for Proving Theorems; 5.2.2 Notation for Proofs; 5.2.3 Lemmata and Examples of Proofs; 5.2.4 Additional Useful Identities; 5.3 Solving Equations and Other Boolean Expressions; 5.4 Solving Optimization Problems PART C ENGLISH, THE LANGUAGE OF MATHEMATICS, AND TRANSLATING BETWEEN THEM

Sommario/riassunto

"The subject of this book is how to formulate a mathematical model from an English description of a problem. This book views mathematical notation as a language and develops the implications of this view for translating English text into mathematical expressions and mathematical models, i.e. for applying mathematics to problems described in English. In order to apply mathematics to a practical problem, one must first transform an English statement of the problem and the requirements for its solution into mathematical expressions. This book examines this process in detail, presents new insight into it, and develops explicit guidelines for this important step. This book identifies the basic elements (values, variables, and functions) of the language of mathematics and presents the grammatical rules for combining them into expressions and other structures. Different notational forms for expressions are described and defined. Correspondences between parts of speech and other grammatical elements in English and components of expressions in the language of mathematics are identified. These lead to useful guidelines for translating English into the language of mathematics. In addition, the book contains many examples of translating English into mathematics. The approach presented in this book makes mathematics accessible to many people who have been turned off from mathematics by their early exposure to it"--