

General Mathematics

for Senior High School
Revised Edition

**Lynie Dimasuay
Jeric Alcala
Jane Palacio**
Authors

Alleli Ester Domingo
Coordinator

General Mathematics

**for Senior High School
Revised Edition**

Lynie Dimasuay

Jeric Alcala

Jane Palacio

AUTHORS

Alleli Ester Domingo

COORDINATOR



**C & E Publishing, Inc.
2021**



**C & E
Publishing, Inc.**

*C & E Publishing, Inc.
was established in 1993
and is a member of ABAP, PBAI,
NBDS and PEPA.*

**General Mathematics
for Senior High School
Revised Edition**

**Published by C & E Publishing, Inc.
839 EDSA, South Triangle, Quezon City
Tel. No.: (02) 8929-5088
E-mail: info@cebookshop.com**

**Copyright © 2021 by C & E Publishing, Inc.,
Lynie Dimasuay, Jeric Alcala, and Jane Palacio**

**All rights reserved. No part of this publication may be reproduced,
stored in a retrieval system, or transmitted in any form or by any
means—electronic, mechanical, photocopying, recording, or
otherwise—without the prior written permission of the publisher.**

**Editing: Jericho Gatbonton
Jose Dante Dela Merced
Louie Camral**

Cover Design: Raymond C. Ariola

**Layout: Analyn C. Sumang
Maricar L. Sanchez**

ISBN: 978-971-98-1521-1

Table of Contents

List of Figures	viii
List of Tables	x
Preface	xi

CHAPTER 1 Functions and Their Graphs

Diagnostic Test	
Lesson 1 Concept of Functions	
Lesson 2 Operations on Functions	
Lesson 3 Functions as Mathematical Models	12
Lesson 4 Concept of Rational Functions	1
Long Test 1	2
Lesson 5 Solving Rational Equations	27
Lesson 6 Solving Rational Inequalities	30
Lesson 7 Graphs of Rational Functions	32
Lesson 8 Concept of Inverse Functions	36
Long Test 2	42
Chapter Summary	44
Chapter Test	46

CHAPTER 2 Exponential and Logarithmic Functions

Diagnostic Test	49
Lesson 1 Concept of Exponential Functions	52
Lesson 2 Graphs of Exponential Functions	54
Lesson 3 Concept of Logarithmic Functions	59
Lesson 4 Graphs of Logarithmic Functions	62
Long Test 3	65

Lesson 5	Solving Exponential and Logarithmic Equations	66
Lesson 6	Solving Exponential and Logarithmic Inequalities	71
Lesson 7	Applications of Exponential and Logarithmic Functions	74
	Long Test 4	82
	Chapter Summary	84
	Chapter Test	86

CHAPTER 3 Business Mathematics

	Diagnostic Test	89
Lesson 1	Simple Interest	91
Lesson 2	Compound Interest	98
Lesson 3	Effective Rate of Interest	108
Lesson 4	Future Value of Annuities	112
Lesson 5	Present Value of Annuities	118
	Long Test 5	124
Lesson 6	Sinking Funds and Loan Amortization	126
Lesson 7	Deferred Annuities	135
Lesson 8	Bonds	145
Lesson 9	Stocks and Stock Markets	151
Lesson 10	Valuation of Stocks and the Efficient Market Hypothesis	156
	Long Test 6	160
	Chapter Summary	162
	Chapter Test	166

CHAPTER 4 Logic

	Diagnostic Test	169
Lesson 1	Propositions	173
Lesson 2	Simple and Compound Propositions	176
Lesson 3	Truth Value of Compound Propositions	184
Lesson 4	Logical Equivalence	188
Lesson 5	Categorical Propositions	191
	Long Test 7	197
Lesson 6	Validity and Soundness of Deductive Arguments	199
Lesson 7	Determining Validity of Arguments Using Truth Tables	204
Lesson 8	Rules of Inference and the Direct Proof	207
Lesson 9	Indirect Proofs	212
Lesson 10	Informal Proofs and Disproofs	2
Lesson 11	Informal Fallacies	2
	Long Test 8	234
	Chapter Summary	236
	Chapter Test	237
Glossary		241
Index		245
References		248
About the Authors		

List of Figures

Figure 1	Function as a Machine	2
Figure 2	Mathematical Model of Distance between Emma and Brandon	12
Figure 3	Rectangular Field along the Bank of a River	13
Figure 4	Solution of $\frac{x+3}{x-2} > 0$	30
Figure 5	Solution of $\frac{x+3}{x-2} \leq 0$	30
Figure 6	Solution of $\frac{2}{3-x} \geq \frac{3}{x+2}$	31
Figure 7	Vertical Asymptote	32
Figure 8	Horizontal Asymptote	33
Figure 9	Graph of $f(x) = \frac{2x}{1-x}$	35
Figure 10	Graphs of One-to-One Functions	36
Figure 11	Graphs of $f(x) = \frac{4x-3}{5}$ and $f^{-1}(x) = \frac{5x+3}{4}$	38
Figure 12	Graphs of $f(x) = 1 + \sqrt{x-2}$ and its Inverse	39
Figure 13	Graphs of $g(x) = x^2 - 4$, $x \geq 0$ and its Inverse	40
Figure 14	Graph of $f(x) = 2^x$	54
Figure 15	Graph of $f(x) = \left(\frac{1}{2}\right)^x$	55
Figure 16	Graph of $f(x) = 3^{x-1}$	56
Figure 17	Graph of $f(x) = \left(\frac{1}{3}\right)^{1-x} - 1$	56
Figure 18	Graph of $f(x) = 3 - 2 \cdot 3^{2x-1}$	57
Figure 19	Graphs of $f(x)$, $g(x)$, and $h(x)$ in One Cartesian Coordinate Plane	57
Figure 20	Graph of $f^{-1}(x) = 2^x$	62
Figure 21	Graphs of $f^{-1}(x)$ and Its Inverse	62
Figure 22	Graph of $f(x) = \log_4(x-5)$	63
Figure 23	Graph of $f(x) = \log_6(3-2x) + 1$	64
Figure 24	Behavior of Exponential Functions	71
Figure 25	Behavior of Logarithmic Function	72

Figure 26	Logarithmic Number Line	78
Figure 27	Common Decibel Levels	87
Figure 28	Graph of $A(t) = 1,000 + 25t$	96
Figure 29	Graphs of Simple and Compound Interests in Example 2.3	101
Figure 30	Stock Market Flow	153
Figure 31	Sample Market Index	154
Figure 32	If P , then Q	178
Figure 33	All S are P	191
Figure 34	No S are P	192
Figure 35	Some S are P	192
Figure 36	Some S are not P	192
Figure 37	Categorical Syllogism 1	199
Figure 38	Categorical Syllogism 2	200
Figure 39	Categorical Syllogism 3	201
Figure 40	Categorical Syllogism 4	202
Figure 41	Categorical Syllogism 5	202
Figure 42	Subjectivism	224
Figure 43	Ignorance	224
Figure 44	Limited Choice	225
Figure 45	Emotion	225
Figure 46	Inappropriate Appeal to Authority	226
Figure 47	Personal Attack	227
Figure 48	Circular Reasoning: Begging the Question	228
Figure 49	Weak Analogy	230
Figure 50	Popularity	231
Figure 51	Appeal to Numbers	231
Figure 52	Hasty Generalization	231
Figure 53	False Cause	232

List of Tables

Table 1	Sample Balance Sheet of a Sinking Fund	129
Table 2	Sample Balance Sheet of an Amortization Schedule	131
Table 3	Types of Compound Propositions	176
Table 4	Truth Table for Negation	184
Table 5	Truth Table for Conjunction	184
Table 6	Truth Table for Disjunction	184
Table 7	Truth Table for Conditional	184
Table 8	Truth Table for Biconditional	184

Index

Annuity, 112

Amortization, 129

Annuity-due, 112

Deferred annuity, 135

Future value, 92

Ordinary annuity, 112

Period of deferral, 135

Present value, 94

Sinking fund, 126

Exponential function, 52

Applications, 74

Exponential decay, 76

Exponential growth, 74

Half-life, 77

Newton's Rate of Cooling, 77

Exponential equation, 52

Exponential inequality, 52

Graphs, 54

Properties, 55

Fallacy, 202

Formal fallacy, 205

Informal fallacy, 223

Fallacy of numbers, 230

Appeal to numbers, 231

Appeal to popularity, 231

False cause, 232

Hasty generalization, 231

Fallacy of relevance, 224

Appeal to emotion, 225

Appeal to force, 226

Begging the question
(circular reasoning), 228

Ignorance, 224

Inappropriate appeal
to authority, 226

Limited choice, 225

Non sequitur, 228

Personal attack, 227

Red herring, 229

Straw man, 229

Subjectivism, 224

Weak analogy, 230

Function, 3

Composite function, 8

Difference function, 8

Domain, 3

Inverse function, 36

Mathematical modeling, 12

Constant of proportionality, 15

- Directly proportional, 15
- Inversely proportional, 15
- Jointly proportional, 16
- One-to-one Function, 36
 - Horizontal line test, 36
- Piecewise function, 6
- Product function, 8
- Quotient function, 8
- Range, 3
- Relation, 2
- Sum function, 8
- Interest, 91
 - Compound interest, 98
 - Compounding period, 102
 - Continuous compounding, 104
 - Present value, 105
 - Effective rate, 108
 - Nominal rate, 108
 - Simple interest, 91
 - Future value, 92
 - Present value, 94
- Logarithmic function, 59
 - Application, 74
 - Decibel scale, 79
 - Richter scale, 78
- Graphs, 62
- Logarithmic equation, 59
- Logarithmic inequality, 59
- Logical equivalence, 188
 - Contraposition, 189
 - Laws of equivalence (rules of replacement), 190
- Proposition, 173
 - Categorical proposition, 191
 - Compound proposition, 176
 - Biconditional, 176
 - Conditional proposition, 178
 - Inverse, 179
 - Contrapositive, 179
 - Converse, 179
 - Conjunction, 177
 - Disjunction, 177
 - Negation, 176
 - Paradox, 173
 - Simple proposition, 176
 - Truth value, 184
 - Contingency, 185
 - Contradiction, 185
 - Tautology, 185

Rational function, 18

Graph, 32

Asymptote, 32

Horizontal, 33

Vertical, 32

Rational equation, 18

Rational inequality, 18

Critical number, 30

Security, 145

Bond, 145

Coupons, 145

Zero-coupon bond, 145

Face value, 145

Maturity date, 145

Yield-to-maturity, 146

Efficient Market Hypothesis, 159

Forms, 159

Stock, 151

Capital gain, 151

Common stock, 152

Dividend, 151

Constant Growth Model, 157

Zero Growth Model, 157

Equity, 154

Market index, 153

Preferred stock, 152

Stockholder, 151

Stock market, 153

Syllogism, 201

Categorical syllogism, 201

Constructive proof of existence, 202

Validity of argument, 199

Conditional Proof, 210

Direct proof, 207

Indirect proof, 212

Rules of inference, 207

Using Truth Tables, 204