

**Study Guide for
Reteaching and Practice**

by Kay Thompson

Algebra ***and Trigonometry***

Structure and Method

Book 2

***Brown
Dolciani
Sorgenfrey
Kane***

McDougal Littell
A HOUGHTON MIFFLIN COMPANY
EVANSTON, ILLINOIS
BOSTON ♦ DALLAS ♦ PHOENIX

Contents

Symbols

Table of Measures

1 Basic Concepts of Algebra

1-1	Real Numbers and Their Graphs	1-2
1-2	Simplifying Expressions	3-4
1-3	Basic Properties of Real Numbers	5-6
1-4	Sums and Differences	7-8
1-5	Products	9-10
1-6	Quotients	11-12
1-7	Solving Equations in One Variable	13-14
1-8	Words into Symbols	15-16
1-9	Problem Solving with Equations	17-18

2 Inequalities and Proof

2-1	Solving Inequalities in One Variable	19-20
2-2	Solving Combined Inequalities	21-22
2-3	Problem Solving Using Inequalities	23-24
2-4	Absolute Value in Open Sentences	25-26
2-5	Solving Absolute Value Sentences Graphically	27-28
2-6	Theorems and Proofs	29-30
2-7	Theorems About Order and Absolute Value	31-32

3 Linear Equations and Functions

3-1	Open Sentences in Two Variables	33-34
3-2	Graphs of Linear Equations in Two Variables	35-36
3-3	The Slope of a Line	37-38
3-4	Finding an Equation of a Line	39-40
3-5	Systems of Linear Equations in Two Variables	41-42
3-6	Problem Solving: Using Systems	43-44
3-7	Linear Inequalities in Two Variables	45-46
3-8	Functions	47-48
3-9	Linear Functions	49-50
3-10	Relations	51-52

4 Products and Factors of Polynomials

4-1	Polynomials	53-54
4-2	Using Laws of Exponents	55-56
4-3	Multiplying Polynomials	57-58
4-4	Using Prime Factorization	59-60
4-5	Factoring Polynomials	61-62
4-6	Factoring Quadratic Polynomials	63-64
4-7	Solving Polynomial Equations	65-66
4-8	Problem Solving Using Polynomial Equations	67-68
4-9	Solving Polynomial Inequalities	69-70

5 Rational Expressions

5-1	Quotients of Monomials	71-72
5-2	Zero and Negative Exponents	73-74
5-3	Scientific Notation and Significant Digits	75-76
5-4	Rational Algebraic Expressions	77-78
5-5	Products and Quotients of Rational Expressions	79-80
5-6	Sums and Differences of Rational Expressions	81-82
5-7	Complex Fractions	83-84
5-8	Fractional Coefficients	85-86
5-9	Fractional Equations	87-88

6 Irrational and Complex Numbers

6-1	Roots of Real Numbers	89-90
6-2	Properties of Radicals	91-92
6-3	Sums of Radicals	93-94
6-4	Binomials Containing Radicals	95-96
6-5	Equations Containing Radicals	97-98
6-6	Rational and Irrational Numbers	99-100
6-7	The Imaginary Number i	101-102
6-8	The Complex Numbers	103-104

7 Quadratic Equations and Functions

7-1	Completing the Square	105-106
7-2	The Quadratic Formula	107-108
7-3	The Discriminant	109-110
7-4	Equations in Quadratic Form	111-112
7-5	Graphing $y - k = a(x - h)^2$	113-114
7-6	Quadratic Functions	115-116
7-7	Writing Quadratic Equations and Functions	117-118

8 Variation and Polynomial Equations

8-1	Direct Variation and Proportion	119-120
8-2	Inverse and Joint Variation	121-122
8-3	Dividing Polynomials	123-124
8-4	Synthetic Division	125-126
8-5	The Remainder and Factor Theorems	127-128
8-6	Some Useful Theorems	129-130
8-7	Finding Rational Roots	131-132
8-8	Approximating Irrational Roots	133-134
8-9	Linear Interpolation	135-136

9 Analytic Geometry

9-1	Distance and Midpoint Formulas	137-138
9-2	Circles	139-140
9-3	Parabolas	141-142
9-4	Ellipses	143-144
9-5	Hyperbolas	145-146
9-6	More on Central Conics	147-148
9-7	The Geometry of Quadratic Systems	149-150
9-8	Solving Quadratic Systems	151-152
9-9	Systems of Linear Equations in Three Variables	153-154

10 Exponential and Logarithmic Functions

10-1	Rational Exponents	155-156
10-2	Real Number Exponents	157-158
10-3	Composition and Inverses of Functions	159-160
10-4	Definition of Logarithms	161-162
10-5	Laws of Logarithms	163-164
10-6	Applications of Logarithms	165-166
10-7	Problem Solving: Exponential Growth and Decay	167-168
10-8	The Natural Logarithm Function	169-170

11 Sequences and Series

11-1	Types of Sequences	171-172
11-2	Arithmetic Sequences	173-174
11-3	Geometric Sequences	175-176
11-4	Series and Sigma Notation	177-178
11-5	Sums of Arithmetic and Geometric Series	179-180
11-6	Infinite Geometric Series	181-182
11-7	Powers of Binomials	183-184
11-8	The General Binomial Expansion	185-186

12 Triangle Trigonometry

12-1	Angles and Degree Measure	187-188
12-2	Trigonometric Functions of Acute Angles	189-190
12-3	Trigonometric Functions of General Angles	191-192
12-4	Values of Trigonometric Functions	193-194
12-5	Solving Right Triangles	195-196
12-6	The Law of Cosines	197-198
12-7	The Law of Sines	199-200
12-8	Solving General Triangles	201-202
12-9	Areas of Triangles	203-204

13 Trigonometric Graphs; Identities

13-1	Radian Measure	205-206
13-2	Circular Functions	207-208
13-3	Periodicity and Symmetry	209-210
13-4	Graphs of the Sine and Cosine	211-212
13-5	Graphs of the Other Functions	213-214
13-6	The Fundamental Identities	215-216
13-7	Trigonometric Addition Formulas	217-218
13-8	Double-Angle and Half-Angle Formulas	219-220
13-9	Formulas for the Tangent	221-222

14 Trigonometric Applications

14-1	Vector Operations	223-224
14-2	Vectors in the Plane	225-226
14-3	Polar Coordinates	227-228
14-4	The Geometry of Complex Numbers	229-230
14-5	De Moivre's Theorem	231-232
14-6	The Inverse Cosine and Inverse Sine	233-234
14-7	Other Inverse Functions	235-236
14-8	Trigonometric Equations	237-238

15 Statistics and Probability

15-1	Presenting Statistical Data	239-240
15-2	Analyzing Statistical Data	241-242
15-3	The Normal Distribution	243-244
15-4	Correlation	245-246
15-5	Fundamental Counting Principles	247-248
15-6	Permutations	249-250
15-7	Combinations	251-252
15-8	Sample Spaces and Events	253-254
15-9	Probability	255-256
15-10	Mutually Exclusive and Independent Events	257-258

16 Matrices and Determinants

16-1	Definition of Terms	259-260
16-2	Addition and Scalar Multiplication	261-262
16-3	Matrix Multiplication	263-264
16-4	Applications of Matrices	265-266
16-5	Determinants	267-268
16-6	Inverses of Matrices	269-270
16-7	Expansion of Determinants by Minors	271-272
16-8	Properties of Determinants	273-274
16-9	Cramer's Rule	275-276

Symbols

		Page			Page
$\{ \}$	set	1	f^{-1}	inverse function of f	159
\in	is an element of		$\log_b N$	logarithm base b of N	161
$=$	equals or is equal to	1	$\ln x$	natural logarithm of x or logarithm base e of x	169
$>$	is greater than	1	t_n	n th term of a sequence	171
$<$	is less than	1	Σ	summation sign	177
$ a $	absolute value of a	1	∞	infinity	177
$-a$	additive inverse of a or opposite of a	1	S_n	sum of the first n terms of a series	179
$\stackrel{?}{=}$	is equal to?	13	$!$	factorial	185
\neq	does not equal	13	$^\circ$	degree	187
\therefore	therefore	13	$'$	minute	187
\emptyset	empty set or null set	13	$"$	second	187
\geq	is greater than or equal to	21	\overrightarrow{AB}	vector AB	223
\leq	is less than or equal to	21	$\ \mathbf{v}\ $	norm of vector \mathbf{v}	223
$a < x < b$	x is greater than a and less than b or x is between a and b	21	\cos^{-1}	inverse cosine or Arc cosine	233
$P(a, b)$	point P with coordinates (a, b)	35	σ	standard deviation	241
x_1	x sub 1	37	r	correlation coefficient	245
$f(x)$	f of x or the value of f at x	47	${}_nP_r$	number of permutations of n elements taken r at a time	249
a^n	n th power of a	55	${}_nC_r$	number of combinations of n elements taken r at a time	251
\approx	is approximately equal to	75	$P(E)$	probability of event E	255
\pm	plus-or-minus sign	89	\cap	intersection	257
$\sqrt[n]{b}$	n th root of b	89	\cup	union	257
i	imaginary unit ($i^2 = -1$)	101	\bar{A}	complement of event A	257
$b^{1/n}$	n th root of b	155	$A_{m \times n}$	matrix A with m rows and n columns	259
$b^{p/q}$	q th root of the p th power of b	155	$\det A$	determinant of matrix A	267
			A^{-1}	inverse of matrix A	269

Greek letters: $\alpha, \beta, \gamma, \theta, \pi, \sigma, \phi, \omega$ alpha, beta, gamma, theta, pi, sigma, phi, omega

Table of Measures

Metric Units

Length	10 millimeters (mm) = 1 centimeter (cm)
	$\left. \begin{array}{l} 100 \text{ centimeters} \\ 1000 \text{ millimeters} \end{array} \right\} = 1 \text{ meter (m)}$
	1000 meters = 1 kilometer (km)
Area	100 square millimeters (mm ²) = 1 square centimeter (cm ²)
	10,000 square centimeters = 1 square meter (m ²)
Volume	1000 cubic millimeters (mm ³) = 1 cubic centimeter (cm ³)
	1,000,000 cubic centimeters = 1 cubic meter (m ³)
Liquid Capacity	1000 milliliters (mL) = 1 liter (L)
	1000 cubic centimeters = 1 liter
Mass	1000 milligrams (mg) = 1 gram (g)
	1000 grams = 1 kilogram (kg)
Temperature in degrees Celsius (°C)	0°C = freezing point of water
	100°C = boiling point of water

United States Customary Units

Length	12 inches (in.) = 1 foot (ft)
	$\left. \begin{array}{l} 36 \text{ inches} \\ 3 \text{ feet} \end{array} \right\} = 1 \text{ yard (yd)}$
	$\left. \begin{array}{l} 5280 \text{ feet} \\ 1760 \text{ yards} \end{array} \right\} = 1 \text{ mile (mi)}$
Area	144 square inches (in. ²) = 1 square foot (ft ²)
	9 square feet = 1 square yard (yd ²)
Volume	1728 cubic inches (in. ³) = 1 cubic foot (ft ³)
	27 cubic feet = 1 cubic yard (yd ³)
Liquid Capacity	16 fluid ounces (fl oz) = 1 pint (pt)
	2 pints = 1 quard (qt)
	4 quarts = 1 gallon (gal)
Weight	16 ounces (oz) = 1 pound (lb)
Temperature in degrees Fahrenheit (°F)	32°F = freezing point of water
	212°F = boiling point of water

Time

60 seconds (s) = 1 minute (min)
60 minutes = 1 hour (h)