

BERKELEY HEIGHTS PUBLIC SCHOOLS
BERKELEY HEIGHTS, NEW JERSEY

**COLUMBIA MIDDLE SCHOOL
MATHEMATICS DEPARTMENT**

**PRE-ALGEBRA
Regular and Intro**

Curriculum Guide

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This curriculum may be modified through varying techniques,
strategies, and materials, as per an individual student's
Individualized Educational Plan (IEP).

Approved by the Berkeley Heights Board of Education
at the regular meeting held on 9/23/04.

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PHILOSOPHY/RATIONALE

Pre-Algebra focuses on a broad range of mathematical tasks intended to prepare a student for Algebra I. The course employs inductive and deductive approaches in the development of content. It promotes student communication, critical thinking, and problem solving through the refinement and extension of mathematical processes.

Pre-Algebra links math skills and attributes to basic algebra skills and applications dealing with integers, order of operations, equation solving, and graphing. Much attention is devoted to applying different problem solving strategies in a variety of applications. Emphasis is placed on making connections between general math, algebra, geometry, probability, and real-life situations.

Pre-Algebra is intended for students in grades 6 and 7. The Introduction to Pre-Algebra is a two-year course intended for students in grades 7 and 8. National and state standards are integrated throughout the curriculum.

COURSE PROFICIENCIES

COURSE OBJECTIVES

To increase the student's ability to:

1. Identify, simplify, and compute with algebraic and numerical expressions. (4.1/A1,4, B1; 4.3/A1, D1)
2. Perform operations with rational numbers. (4.1/A1,2, B1, C1; 4.5/F4)
3. Perform operations with numerical and algebraic fractions. (4.1/A1,5,6, B1; 4.5/F4)
4. Solve multi-step equations and inequalities involving addition, subtraction, multiplication, and/or division. (4.3/B1, D2)
5. Compute with exponents, including scientific notation. (4.1/A1, B1,2)
6. Represent, compute, and solve problems with ratios, proportions, and percent. (4.2/A2, B1; 4.4/B1)
7. Understand and apply basic concepts of probabilities. (4.4/A1, B1,3; 4.5/E1, F4)
8. Use the Metric and Customary Systems of Measure. (4.2/D1,2)
9. Apply formulas for area, surface area, and volume of two-and three-dimensional figures. (4.2/E1; 4.5/E1)
10. Identify congruent and similar figures. (4.2/A2)
11. Specify locations and describe spatial relationships using coordinate geometry. (4.2/C1; 4.5/E1)
12. Describe sizes, positions, and orientation of shapes under various transformations. (4.2/B1)
13. Present data in various forms: bar graphs, histograms, line graphs, circle graphs, box-and-whisker plots, stem-and-leaf plots, and scatter plots. (4.4/A1,2, B1; 4.5/F1,4)
14. Choose from and use a variety of appropriate methods to solve problems. (4.3/A1; 4.5/A1,2,3, B2,4, C1,2, F1,3,4; 8.1/B6)

STUDENT PROFICIENCIES

The student will be able to:

1. Evaluate and simplify numerical and algebraic expressions. (4.1/B1,3)
2. Perform order of operations. (4.1/B1,3)
3. Add, subtract, multiply, and divide integers. (4.1/A1, B1)
4. Represent, analyze, and generalize a variety of patterns. (4.3/A1; 4.5/A1,2, C1)
5. Use properties of numbers to simplify computations and understand relationships. (4.3/D3,4)
6. Solve equations of the form: $x + a = b$, $x - a = b$, $a - x = b$, $ax = b$, $ax + b = c$, $ax + b = cx + d$. (4.3/D2,3,4,5)
7. Solve multi-step inequalities. (4.3/D4,5)
8. Round and estimate decimal numbers. (4.1/A1, C1,2,3)
9. Compute mean, median, and mode. (4.4/A1)
10. Name units, measure, and convert within the Customary System of Measurement. (4.2/D1,2)
11. Name units, measure, and convert within the Metric System of Measurement. (4.2/D1,2)
12. Compute with exponents, including scientific notation. (4.1/A1, B1,2; 4.3/D3)
13. Apply divisibility rules. (4.1/A1)
14. Find the prime factorization of a number. (4.1/A1)
15. Calculate the Greatest Common Factor and the Least Common Multiple. (4.1/A1)
16. Add, subtract, multiply, and divide fractions and mixed numbers. (4.1/B1)
17. Represent, compare, compute, and solve problems with ratios and proportions. (4.1/A3, B4; 4.2/A2; 4.5/C4)
18. Compute and solve problems with percent. (4.1/A4, B4; 4.5/F4)

STUDENT PROFICIENCIES (continued)

19. Describe, classify, and use relationships among two-dimensional figures (i.e.; points, lines, angles, polygons). (4.2/A1,3)
20. Calculate the area of squares, rectangles, parallelograms, trapezoids, triangles, and circles. (4.2/E1,2; 4.5/F4)
21. Compute surface area of prisms and cylinders. (4.2/E3; 4.5/F4)
22. Calculate the volume of prisms and cylinders. (4.2/E3; 4.5/F4)
23. Perform a translation and a rotation of a pre-image. (4.2/B1)
24. Recognize and describe symmetries within objects and figures. (4.2/B1)
25. Apply basic concepts of probability. (4.4/B1,2)
26. Select and use appropriate statistical methods to analyze data (i.e.; frequency tables, box-and-whisker plots). (4.4/A1,2; 4.5/F4)

METHODS OF EVALUATION

1. Homework and class work.
2. Class participation.
3. Teacher observation.
4. Math folders: portfolios.
5. Cooperative learning assignments.
6. Quizzes and tests.

SCOPE AND SEQUENCE
COURSE OUTLINE/STUDENT OBJECTIVES

The student will be able to:

N. J. Core Curriculum Standards	Indicators	Course Outline/Student Objectives *(see note at end of outline)
4.1 4.1 4.2 4.3 4.3 4.5 9.1	A,B A1 B1,3 D1,3 B1 C1 A,C,D A1 C2 D1,3 A1,2 C1 D5 A3,4	I. Algebraic Expressions and Integers A. Variables and Expressions 1. Identify variables, numerical and variable expressions 2. Write variable expressions for word phrases B. Order of Operations 1. Use order of operations 2. Use grouping symbols C. Evaluating Expressions 1. Evaluate variable expressions 2. Solve problems by evaluating expressions D. Integers and Absolute Value 1. Represent, graph, and order integers 2. Find opposites and absolute values E. Adding Integers 1. Use models to add integers 2. Use rules to add integers F. Subtracting Integers 1. Use models to subtract integers 2. Use rules to subtract integers G. Inductive Reasoning 1. Write rules for patterns 2. Make predictions and test conjectures H. Look for a Pattern 1. Find number patterns I. Multiplying and Dividing Integers 1. Multiply integers using repeated addition, patterns, and rules 2. Divide integers using rules J. The Coordinate Plane 1. Name coordinates and quadrants in the coordinate plane 2. Graph points in the coordinate plane
4.1 4.3 4.5	A,B A2 A,C,D D1,3,4 A3	II. Solving One-Step Equations and Inequalities A. Properties of Numbers 1. Identify properties of addition and multiplication 2. Use properties to solve problems B. The Distributive Property 1. Use the distributive property with numerical expressions

		<p>II. Solving One-Step Equations and Inequalities (continued)</p> <ol style="list-style-type: none"> 2. Use the distributive property with algebraic expressions <p>C. Simplifying Variable Expressions</p> <ol style="list-style-type: none"> 1. Identify parts of a variable expression 2. Simplify expressions <p>D. Variables and Functions</p> <ol style="list-style-type: none"> 1. Classify types of equations 2. Check equations using substitution <p>E. Solving Equations by adding or subtracting</p> <ol style="list-style-type: none"> 1. Solve one-step equations using subtraction 2. Solve one-step equations using addition <p>F. Solving Equations by Multiplying or Dividing</p> <ol style="list-style-type: none"> 1. Solve one-step equations using division 2. Solve one-step equations using multiplication <p>G. Try, Test, Revise</p> <ol style="list-style-type: none"> 1. Solve a problem using the try, test, revise strategy <p>H. Inequalities and Their Graphs</p> <ol style="list-style-type: none"> 1. Graph inequalities 2. Write inequalities <p>I. Solving One-Step Inequalities by Adding or Subtracting</p> <ol style="list-style-type: none"> 1. Solve one-step inequalities using subtraction 2. Solve one-step inequalities using addition <p>J. Solving One-Step Inequalities by Multiplying or Dividing</p> <ol style="list-style-type: none"> 1. Solve one-step inequalities using division 2. Solve one-step inequalities using multiplication
4.1	C	<p>III. Decimals and Equations</p> <p>A. Rounding and Estimating</p> <ol style="list-style-type: none"> 1. Round decimals 2. Estimate sums and differences <p>B. Estimating Decimal Products and Quotients</p> <ol style="list-style-type: none"> 1. Estimate products 2. Estimate quotients <p>C. Mean, Median, and Mode</p> <ol style="list-style-type: none"> 1. Find the mean, median, and mode of a set of data 2. Choose the best measure of central tendency <p>D. Using Formulas</p> <ol style="list-style-type: none"> 1. Substitute into formulas 2. Use the formula for the perimeter of a rectangle <p>E. Solving Equations by Adding or Subtracting Decimals</p> <ol style="list-style-type: none"> 1. Solve one-step decimal equations involving addition 2. Solve one-step decimal equations involving subtraction <p>F. Solving Equations by Multiplying or Dividing Decimals</p> <ol style="list-style-type: none"> 1. Solve one-step decimal equations involving multiplication 2. Solve one-step decimal equations involving division
	A1	
4.2	C1,2,3	
	D	
	D1,2	
	E1	
4.3	D	
	D3	
4.4	A	
	A1	
4.5	A	
	A2	

		<p>III. Decimals and Equations (continued)</p> <p>G. Using the Metric System</p> <ol style="list-style-type: none"> 1. Identify appropriate metric measures 2. Convert metric units <p>H. Simplify the Problem</p> <ol style="list-style-type: none"> 1. Solve complex problems by first solving simple cases
<p>4.1</p> <p>4.3</p> <p>4.5</p>	<p>A1</p> <p>B1,2</p> <p>A1</p> <p>D3</p> <p>A1</p> <p>C6</p> <p>F4</p>	<p>IV. Factors, Fractions, and Exponents</p> <p>A. Divisibility and Factors</p> <ol style="list-style-type: none"> 1. Use divisibility tests 2. Find factors <p>B. Exponents</p> <ol style="list-style-type: none"> 1. Use exponents 2. Use order of operations with exponents <p>C. Prime Factorization and Greatest Common Factor</p> <ol style="list-style-type: none"> 1. Find the prime factorization of a number 2. Find the GCF of two or more numbers <p>D. Simplifying Fractions</p> <ol style="list-style-type: none"> 1. Find equivalent fractions 2. Write fractions in simplest form <p>E. Account for All Possibilities</p> <ol style="list-style-type: none"> 1. Find all possibilities when you solve a problem <p>F. Rational Numbers</p> <ol style="list-style-type: none"> 1. Identify and graph rational numbers 2. Evaluate fractions containing variables <p>G. Exponents and Multiplication</p> <ol style="list-style-type: none"> 1. Multiply powers with the same base 2. Find a power of a power <p>H. Exponents and Division</p> <ol style="list-style-type: none"> 1. Divide expressions containing exponents 2. Simplify expressions with integer exponents <p>I. Scientific Notation</p> <ol style="list-style-type: none"> 1. Write and evaluate numbers in scientific notation 2. Calculate with scientific notation
<p>4.1</p>	<p>A1,5,6</p>	<p>V. Operations with Fractions</p> <p>A. Comparing and Adding Fractions</p> <ol style="list-style-type: none"> 1. Find the least common multiple 2. Compare fractions <p>B. Fractions and Decimals</p> <ol style="list-style-type: none"> 1. Write fractions as decimals 2. Write terminating and repeating decimals as fractions

Note: The New Jersey Core Curriculum Standards can be accessed at www.state.nj.us

RESOURCES/ACTIVITIES GUIDE

Text:

Charles, R.J., D. M. Davison, M. S. Landau, L. McCracken, and L. Thompson. Pre-Algebra. Upper Saddle River, NJ: Pearson Prentice Hall, 2004.

Prentice Hall Pre-Algebra iText

Activities and videos providing instant self-check, tutorial, and activities
Reading support with audio
Instant feedback assessments

Prentice Hall Pre-Algebra Workbooks

Practice workbook
Reading and Math Literacy Masters
Guided Problem Solving Masters
Hands-On Activities
Technology Activities
MathNotes Folders
Skills Intervention Kit

Prentice Hall Assistant Plus!

Examples/Quiz Transparencies
Presentation Pro CD-ROM

Prentice Hall Assessment System

Computer Test Generator CD-ROM
Quiz/Chapter Tests
Diagnostic Tests
Test-Taking Strategies with Transparencies

SUGGESTED AUDIO VISUAL/COMPUTER AIDS

1. Texas Instruments TI-34II scientific and TI-83 graphing calculator.
2. Overhead projector/transparencies.
3. Manipulatives.
4. Internet support from publisher: www.PHSchool.com provides interactive text online with activities and videos.

SUGGESTED MATERIALS

Resources for Students

Text:

Charles, R. J., D. M. Davison, M. S. Landau, L. McCracken, and L. Thompson. Pre-Algebra. Upper Saddle River, NJ: Pearson Prentice Hall, 2004.

Computer Support: www.PHSchool.com

Resources for Teacher

Text:

Charles, R. J., D. M. Davison, M. S. Landau, L. McCracken, and L. Thompson. Pre-Algebra. Upper Saddle River, NJ: Pearson Prentice Hall, 2004.

Prentice Hall Activity/Workbooks

Computer: Prentice Hall Presentation Pro CD-ROM

Prentice Hall Test Generator CD-ROM