

Developmental Math—An Open Program

Version 1.1

Developed by: The NROC project, with generous funding from the Bill and Melinda Gates Foundation

Audience: Community College and Secondary Schools

Why NROC?

NROC's high-quality courses are **media-rich**, **adaptable** and **affordable**, a combination of features not readily available from commercial providers. With rich content mapped to state and federal standards, NROC courses can be used with or without a textbook to enhance online, blended and face-to-face learning environments.

Teaching with the Power of Digital Media



Program Description

NROC's Developmental Math Program is designed to be used with students striving to meet college entrance requirements. This multi-modal program allows learners to create their own pace and path through developmental mathematics.

Each learner may begin a unit by taking an adaptive pre-assessment that directs them to a customized path through the content needed to close their proficiency gaps. The program offers video, audio, interactive simulations, puzzles, and other instructional approaches that engage a variety of learning styles and attitudes.

Topically organized, this program offers flexible modules that address concepts and skills taught in the traditional developmental math sequence of Arithmetic, Beginning and Intermediate Algebra. In keeping with AMATYC's proposal for a new developmental mathematics, this program includes topics that provide a high-level, basic introduction to Statistics, Geometry and Trigonometry.

For more details about this program, visit NROCmath.org

Media Rich and Diverse Components Help Students Gain Mastery

- **Warm-up:** a series of problems to assess prior knowledge, resulting in customized recommendations for review.
- **Presentation:** a rich, media presentation introducing the topic concept with illustrated examples and optional closed caption [CC] script.
- **Worked Examples:** narrated, step-by-step presentation of problems being solved.
- **Practice Problems:** symbolic and word problems designed in adaptive sets, offering students practice and feedback.
- **Topic Text:** integrated textbook provides comprehensive coverage of topics with additional explanations and examples.
- **Review:** self-test understanding prior to moving to the next topic.
- **Project:** collaborative assignments in the project-based learning tradition based on real-world problems.
- **Tutor Simulation:** provides students directed guidance in solving a multifaceted problem.
- **Puzzles:** simple activities offer learners an opportunity to practice what they have learned in a fun, no-fault environment.
- **Topic/Unit Assessments:** formative and summative assessments are designed to guide a learner's progress.
- **Pre-Assessments (available Spring 2013):** diagnostic pre-assessments identify a learner's mastery of particular concepts, resulting in a personalized path through each Unit.

Arithmetic Modules <i>Limited distribution of Beta release available now.</i>	Beginning Algebra Modules <i>Limited distribution of Beta release available now.</i>	Intermediate Algebra Modules <i>Limited distribution of Beta release available now.</i>	Geometry, Statistics & Trigonometry Topics <i>Limited distribution of Beta release available now.</i> <i>(Trigonometry coming Fall 2013.)</i>
<p>Unit 1: Whole Numbers Introduction to Whole Numbers Place Value and Names for Whole Numbers Rounding Whole Numbers Comparing Whole Numbers Adding and Subtracting Whole Numbers Adding Whole Numbers and Applications Subtracting Whole Numbers and Applications Estimation Multiplying and Dividing Whole Numbers Multiplying Whole Numbers and Applications Dividing Whole Numbers and Applications Properties of Whole Numbers Properties and Laws of Whole Numbers The Distributive Property Exponents, Square Roots and the Order of Operations Understanding Exponents and Square Roots Order of Operations</p> <p>Unit 2: Fractions and Mixed Numbers Introduction to Fractions and Mixed Numbers Introduction to Fractions and Mixed Numbers Proper and Improper Fractions Factors and Primes Simplifying Fractions Comparing Fractions Multiplying and Dividing Fractions and Mixed Numbers Multiplying Fractions and Mixed Numbers Dividing Fractions and Mixed Numbers Adding and Subtracting Fractions and Mixed Numbers Adding Fractions and Mixed Numbers Subtracting Fractions and Mixed Numbers</p> <p>Unit 3: Decimals Introduction to Decimals Decimals and Fractions Ordering and Rounding Decimals Decimal Operations Adding and Subtracting Decimals Multiplying and Dividing Decimals Estimation with Decimals</p> <p>Unit 4: Ratios, Rates and Proportions Ratio and Rates Simplifying Ratios and Rates Proportions Understanding Proportions</p> <p>Unit 5: Percents Introduction to Percents Convert Percents, Decimals, and Fractions Solving Percent Problems Solve Percent Problems</p> <p>Unit 6: Measurement U.S. Customary Units of Measurement Length Weight Capacity Metric Units of Measurement The Metric System Converting within the Metric System Using Metric Conversions to Solve Problems Temperature Temperature Scales</p>	<p>Unit 9: Real Numbers Introduction to Real Numbers Variables and Expressions Integers Rational Real Numbers Operations with Real Numbers Adding Integers Adding Real Numbers Subtracting Real Numbers Multiplying and Dividing Real Numbers Properties of Real Numbers Associative, Commutative, and Distributive Properties Simplifying Expressions Order of Operations</p> <p>Unit 10: Solving Equations and Inequalities Solving Equations Solving One-Step Equations Using Properties of Equality Solving Multi-Step Equations Special Cases and Applications Formulas Solving Inequalities Solving One-Step Inequalities Multi-Step Inequalities Compound Inequalities and Absolute Value Compound Inequalities Equations and Inequalities and Absolute Value</p> <p>Unit 11: Exponents and Polynomials Integer Exponents Exponential Notation Simplify by Using the Product, Quotient and Power Rules Products and Quotients Raised to Powers Scientific Notation Polynomials with Single Variables Introduction to Single Variable Polynomials Adding and Subtracting Polynomials Multiplying Polynomials Multiplying Special Cases Dividing by a Monomial Dividing by Binomials and Polynomials Polynomials with Several Variables Simplifying and Evaluating Polynomials with More than One Term Operations with Polynomials</p> <p>Unit 12: Factoring Introduction to Factoring Greatest Common Factor Factoring Polynomials Factoring Trinomials Factoring: Special Cases Special Cases: Cubes Solving Quadratic Equations Solve Quadratic Equations by Factoring</p> <p>Unit 13: Graphing Graphs and Applications The Coordinate Plane Graphing Linear Equations Slope and Writing the Equation of a Line Finding the Slope of a Line Writing the Equation of a Line Parallel and Perpendicular Lines Graphing Linear Inequalities</p> <p>Unit 14: Systems of Equations and Inequalities Graphing Systems of Equations and Inequalities Graphing Systems of Linear Equations Graphing Systems of Inequalities Algebraic Methods to Solve Systems of Equations The Substitution Method The Elimination Method Systems of Equations in Three or More Variables Solving Systems of Three Variables</p>	<p>Unit 15: Rational Expressions Operations with Rational Expressions Introduction to Rational Expressions Multiplying and Dividing Rational Expressions Adding and Subtracting Rational Expressions Complex Rational Expressions Rational Equations Solving Rational Equations and Applications Formulas and Variation Rational Formulas and Variation</p> <p>Unit 16: Radical Expressions and Quadratic Equations Introduction to Roots and Rational Exponents Roots Squares, Cubes, and Beyond Rational Exponents Operations with Radicals Multiplying and Dividing Radical Expressions Adding and Subtracting Radicals Multiplication of Multiple Term Radicals Rationalizing Denominators Radical Equations Solving Radical Equations Complex Numbers Complex Numbers Operations with Complex Numbers Solving Quadratic Equations Square Roots and Completing the Square The Quadratic Formula</p> <p>Unit 17: Functions Introduction to Functions Identifying Functions Using Functions Evaluating Functions Graphing Types of Functions Finding Domain and Range Operations with Functions Arithmetic Operations with Functions</p> <p>Unit 18: Exponential and Logarithmic Functions Exponential Functions Introduction to Exponential Functions Logarithmic Functions Introduction to Logarithmic Functions Properties of Logarithmic Functions Natural Logarithms Introduction to Natural and Common Logarithms Logarithmic and Exponential Equations Solving Exponential and Logarithmic Equations Mathematical Modeling with Exponential and Logarithmic Functions</p>	<p>Unit 7: Geometry Basic Geometric Concepts and Figures Figures in 1 and 2 Dimensions Properties of Angles Triangles They Pythagorean Theorem Perimeter, Circumference, and Area Quadrilaterals Perimeter and Area Circles Volume of Geometric Solids Solids</p> <p>Unit 8: Concepts in Statistics Statistical Graphs and Tables Graphing Data Other Types of Graphs Measures of Center Measures of Center Graphical Representations Use and Misuse of Graphical Representations Probability Probability</p> <p>Unit 19: Trigonometry (FALL 2013) Introduction to Trigonometric Functions Identifying the Six Trigonometric Functions Right Triangle Trigonometry Unit Circle Trigonometry</p> <p>Graphing Trigonometric Functions Degree and Radian Measure Graphing the Sine and Cosine Function Amplitude and Period</p>