



Algebra: Introducing Algebraic Reasoning Course Overview and Schedule

In this course, you'll learn how to introduce algebraic reasoning to your students, and you'll experiment with strategies for teaching numeric patterns, relationships, and functions based on real-life situations. You'll also explore strategies to help students model quantitative relationships using graphs, tables, words, and equations. You will experience a variety of activities that you can adapt to your classroom.

Format: Scheduled, facilitated

Estimated Completion Time: 2-3 hours per week (12 hours total)

Contact: literacy@worlded.org

Course Objectives

By the end of course, you will be able to:

- Demonstrate strategies for introducing pre-algebra concepts to build algebraic reasoning
- Articulate and represent numbers using words, tables, rules, expressions, and equations
- Use algebraic notation to model mathematical and real-life situations
- Explore, identify, analyze, and extend patterns in mathematical and real-life situations
- Analyze and represent change using equations and graphs
- Use the College and Career Readiness Standards for Adult Education (CCRS) Mathematical Standards and Practices to enhance the focus, rigor, and coherence of algebraic reasoning in your instruction

Course Completion

To determine your successful completion of this course, the course instructor will assess your work based on whether and to what extent you have done the following:

- ✓ Participated in asynchronous discussions: 25%
- ✓ Completed the required assignments: total of 50%
 - Lesson 2: Post to *Lesson Review* forum (10%)
 - Lesson 3: Post to *Classroom Application* forum (10%)
 - Lesson 4: Post to *Classroom Application* forum (10%)
 - Lesson 5: Post to *Classroom Application* forum (10%)
 - Lesson 6: Post to *Classroom Application* forum (10%)
- ✓ Completed the Final Lesson Plan: 25%

If you score an 80% or above, you will successfully complete the course and earn a Certificate of Completion.

<http://edtech.worlded.org/professional-development/online-courses/>

Algebra: Introducing Algebraic Reasoning
©2017 World Education

COURSE SCHEDULE

LESSON 1

Getting Started

- | | |
|--|---|
| <input type="checkbox"/> Required Software and Course Features | <input type="checkbox"/> Planning for Learning |
| <input type="checkbox"/> Course Objectives | <input type="checkbox"/> Personal Learning Goals |
| <input type="checkbox"/> Course Overview & Schedule | <input type="checkbox"/> Course Goals |
| <input type="checkbox"/> Course Requirements | <input type="checkbox"/> Questions and Observations |
| <input type="checkbox"/> Classroom Application | <input type="checkbox"/> Lesson Summary |

LESSON 2

Introduction to Algebra

- | | |
|---|--|
| <input type="checkbox"/> Mind Map | <input type="checkbox"/> Mathematical Practices |
| <input type="checkbox"/> Mind Map 2 | <input type="checkbox"/> Mathematics Standards |
| <input type="checkbox"/> Mind Mapping and Your Students | <input type="checkbox"/> Importance of Algebraically in a Meaningful Context |
| <input type="checkbox"/> Reflecting on Algebra Mind Maps | <input type="checkbox"/> Algebra in Context |
| <input type="checkbox"/> What is Algebra? | <input type="checkbox"/> Stepping Back |
| <input type="checkbox"/> Four Student Outcomes | <input type="checkbox"/> Lesson Review |
| <input type="checkbox"/> College and Career Readiness Standards and Algebra | <input type="checkbox"/> Questions and Observations |
| <input type="checkbox"/> Instructional Shifts | <input type="checkbox"/> Lesson Summary |

LESSON 3

Pre-Algebraic Notation and Operations

- | | |
|--|--|
| <input type="checkbox"/> Algebraic Notation | <input type="checkbox"/> The Fraction Bar |
| <input type="checkbox"/> Operations and Properties | <input type="checkbox"/> Parentheses, Addition, and Subtraction |
| <input type="checkbox"/> Addition | <input type="checkbox"/> Parentheses, Multiplication, and Division |
| <input type="checkbox"/> Subtractions | <input type="checkbox"/> Exponents and Roots |
| <input type="checkbox"/> Multiplication | <input type="checkbox"/> Using Calculators |
| <input type="checkbox"/> Division | <input type="checkbox"/> Sample Problems |
| <input type="checkbox"/> Parentheses | <input type="checkbox"/> What Went Wrong? |
| <input type="checkbox"/> Exponents | <input type="checkbox"/> Reflection |
| <input type="checkbox"/> Squaring | <input type="checkbox"/> Order of Operations Activities |
| <input type="checkbox"/> Square Root | <input type="checkbox"/> Classroom Application |
| <input type="checkbox"/> Cubing | <input type="checkbox"/> Questions and Observations |
| <input type="checkbox"/> Number of the Day | <input type="checkbox"/> Lesson Summary |
| <input type="checkbox"/> Order of Operations | |
| <input type="checkbox"/> Order of Operations: PEMDAS | |

LESSON 4

Integers, Variables, and Solving Equations

- | | |
|--|--|
| <input type="checkbox"/> Integers | <input type="checkbox"/> Substituting Values |
| <input type="checkbox"/> Number Line | <input type="checkbox"/> Geometry Models |
| <input type="checkbox"/> Walk the Line | <input type="checkbox"/> Using Number Sense |
| | <input type="checkbox"/> Solving Equations |

<http://edtech.worlded.org/professional-development/online-courses/>

- Sample Problems
- Teaching Integers
- Equality/Inequality
- Remembering Symbols
- Equality
- Understanding Equations
- Balance Scale

- Algorithms
- Always, Sometimes, Never
- Classroom Application
- Questions and Observations
- Lesson Summary

LESSON 5

Patterns and Functions

- Patterns, Patterns, Patterns
- Presenting Pattern Problems
- Visual Patterns
- Numerical Patterns
- Descending Patterns
- Two-Step Numerical Patterns
- Facilitating Questions
- Visualizing Numerical Patterns

- Situational Patterns Problems
- Situational Patterns Problems 2
- In-Out Tables
- Visual, Numerical, and Algebraic
- Pattern and Function Practice
- Additional Exercises
- Classroom Application
- Questions and Observations
- Lesson Summary

LESSON 6

Communicating with Algebra

- Words into Algebraic Expressions
- Algebraic Expression
- Substituting Values
- Word Problems with Expression Answers
- Another Typical Problem
- Unknowns
- Algebraic Equations
- Equation as a Balanced Scale
- Bruno's Weights
- Bruno's Weights: Balance Scale
- Bruno's Weights: The Equation
- Bruno's Weights: Solving for n
- Checking the Answer
- Two Approaches
- Practice Activities

- Everyday Algebra
- Spreadsheets
- Calendar Puzzle
- Algebraic Tables and Graphs
- Graph of the Equation
- Linear Equations
- Back to Everyday Algebra
- Sports Magazines
- Telephone Plans
- Plan C
- Plan A
- Plan B
- Comparing Telephone Plans
- Classroom Application
- Questions and Observations
- Lesson Summary

LESSON 7

Course Summary

- Instructional Plan
- Reflections
- Evaluation
- Certificate

Course materials are available for one month from the course end date.

This course was produced by World Education and ProLiteracy and written by Barbara Goodridge and Christina Cronin, Lowell Adult Education Center, Lowell, MA, with Marilyn Moses, Brockton Adult Learning Center, Brockton, MA, and revised by Amy Vickers, Math/Numeracy Consultant, in 2014.