Unit 1: Algebra—A New Angle

Video Overview

[Note: There are only Presentations in Unit 1. All other Units contain Warm Up, Presentations, Worked Examples, Practice, Review and Unit Activities.]

Unit 1: Algebra—A New Angle

Unit Table of Contents

Lesson 1: Algebra—What's it all about?

Topic 1: Algebra—Everyday and Extraordinary
Learning Objectives
- Define algebra and distinguish it from arithmetic.
- Understand algebraic symbols.

Topic 2: Algebra—Why and When
Learning Objectives
- Describe the role of algebra in a variety of fields.

Topic 3: Algebra—Approaching Problems
Learning Objectives
- Review the properties of real numbers and the order of operations.
- Develop a strategic approach to solving algebraic problems.

Unit 1

Lesson 1

Topic 1, Presentation - 3.5 minutes

Topic 2, Presentation - 2 minutes

Topic 3, Presentation – 4.5 minutes

Unit 1: Algebra – A New Angle

Instructor Notes

The Mathematics of Algebra

Unit 1 sets the tone for this course by answering the first question asked by many students entering Algebra 1, "Why should I learn this?" The unit relates the subject to the arithmetic students already know, and also to the even more familiar world around them.

After completing the three topics in Unit 1, students will have learned the definition of algebra, brushed up on key mathematical principles, and been introduced to basic problem solving strategies.

Teaching Tips: Conceptual Challenges and Approaches

Students won't have any algorithmic difficulties in Unit 1, because there are no problems to solve. The only challenges are conceptual—students tend to feel intimidated by the very idea of algebra, they often don't see it as having anything to do with their lives, and they aren't accustomed to thinking of values as variable rather than fixed. This unit will help ease them into an algebraic way of thinking.

Topic 1, *Algebra: Everyday and Extraordinary*, defines algebra and compares it to arithmetic. It also introduces variables, and the mathematical symbols the students will encounter in this course.

Topic 2, *Algebra: Why and When*, provides very specific examples of algebra being used in credible real-world situations, and also shows how arithmetic would be insufficient to produce meaningful results.

Topic 3, *Algebra: Approaching Problems*, helps prepare students for the nitty-gritty of the rest of the course. It takes them through a simple step-by-step approach for problem solving, and also reviews the properties of numbers and equality and the order of operations for simplifying expressions.

Summary

In many traditional approaches to algebra, students are plunged into working with abstract notation and symbols without having much idea why or what they are doing. In this course, Unit 1 helps students build a sense of why the mathematics they are about to study is relevant to them. It also links algebra to the arithmetic they already understand. Once they complete this unit, they'll be better prepared for the leap into solving algebraic equations.

Unit 1: Algebra—A New Angle

Glossary

algebra	the branch of mathematics that deals with operations on sets of numbers and relationships between them
equation	a statement that describes the equality of two expressions by connecting them with an equals sign
function	a kind of relation in which one variable uniquely determines the value of another variable
linear equation	an equation that describes a straight line
quadratic function	a function of the form $y = ax^2 + bx + c$ where a is not equal to zero
root	any number x multiplied by itself a specific number of times to produce another number, such that in $x^n = y$, x is the nth root of y – for example, because $2^3 = 8$, 2 is the 3rd (or cube) root of 8
variable	a symbol that represents an unknown value

NROC Algebra 1--An Open Course

Unit 1

Mapped to Common Core State Standards, Mathematics

Algebra 1	Algebra - A New Angle	Algebra - What's it all about?	Algebra - Everyday and Extraordinary

Common Core State Standards K-12

Mathematics
Grade: 9-12 - Adopted 2010

STRAND / DOMAIN	CC.M.	Modeling
CATEGORY / CLUSTER	M-1.	Identifying variables in the situation and selecting those that represent essential features

Algebra 1	Algebra - A New Angle	Algebra - What's it all about?	Algebra - Why and When

Common Core State Standards K-12

Mathematics
Grade: 9-12 - Adopted 2010

STRAND / DOMAIN	CC.F.	Functions
CATEGORY / CLUSTER	F-IF.	Interpreting Functions
STANDARD		Understand the concept of a function and use function notation.
EXPECTATION	F-IF.3.	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by $f(0) = f(1) = 1$, $f(n+1) = f(n) + f(n-1)$ for n greater than or equal to 1.

Algebra 1	Algebra - A New Angle	Algebra - What's it all about?	Algebra - Approaching Problems

Common Core State Standards K-12

Mathematics
Grade: **7** - Adopted **2010**

STRAND / DOMAIN	CC.7.MP.	Mathematical Practices
CATEGORY / CLUSTER	7.MP.1.	Make sense of problems and persevere in solving them.
STRAND / DOMAIN	CC.7.NS.	The Number System

CATEGORY / CLUSTER		Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.
STANDARD	7.NS.1.	Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.
EXPECTATION	7.NS.1.a.	Describe situations in which opposite quantities combine to make 0. For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.
EXPECTATION	7.NS.1.b.	Understand p + q as the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
STRAND / DOMAIN	CC.7.EE.	Expressions and Equations
CATEGORY / CLUSTER		Use properties of operations to generate equivalent expressions.
STANDARD	7.EE.2.	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."

Grade: **8** - Adopted **2010**

STRAND / DOMAIN	CC.8.MP.	Mathematical Practices
CATEGORY / CLUSTER	8.MP.1.	Make sense of problems and persevere in solving them.

Grade: 9-12 - Adopted 2010

STRAND / DOMAIN	CC.MP.	Mathematical Practices
CATEGORY / CLUSTER	MP-1.	Make sense of problems and persevere in solving them.