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Rapid Learning Center Presents …

Teach Yourself Algebra 2 in 24 Hours

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Introduction to Algebra 2

Algebra 2 Rapid Learning Series

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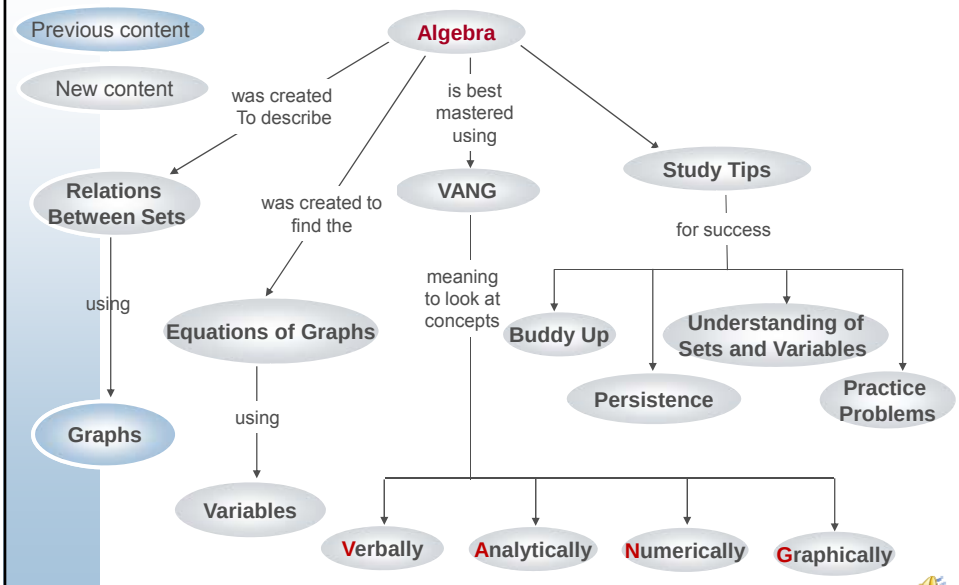
Learning Objectives

By completing this tutorial, you will learn:

- The definition and scope of the study of Algebra.
- Similarities and differences between Algebra and other math courses.
- Topics to be covered in this series.
- Tips for mastering Algebra.

3/34

Concept Map



4/34

Algebra Basics

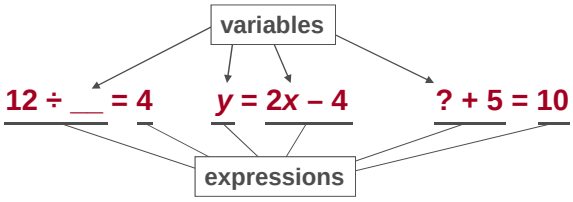
Definition: Algebra

Algebra – A branch of mathematics in which symbols, usually letters of the alphabet, represent numbers or quantities and express relationships that hold for all members of a set.

6/34

Equation, Variable, and Expression

Equation – Two expressions joined by an equal sign.



Variable – A symbol or letter used to represent an unknown quantity.

Expression – A combination of constants, operators, and variables representing numbers or quantities.

7/34

Definitions: Relation and Function

Relation – Any set of ordered pairs.

Function – A relation where each element of the first set corresponds to exactly one element of the second set.

Example: {(2, 5), (3, 6), (4, 1), (5, 4)}

8/34

Algebraic Equation

An algebraic equation is a method to describe the relationship between natural events in mathematical form.

Example: Your total pay for a day of work includes $50 in base pay plus 20% of your daily sales.

Total Pay = Base Pay + 20% of Sales

$T(s) = \$50 + 0.2s$

where T is total pay and s is daily sales.

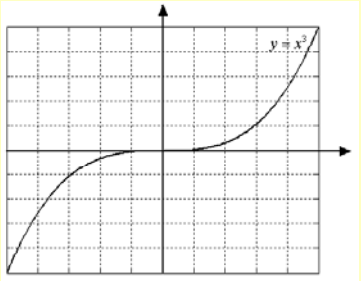
9/34

Graph of a Relation

A graph is a method to describe the relationship between natural events by analyzing curves in a coordinate system.

Example:

The values of x^3 for any x are shown.



10/34

Relation, Equation and Graph

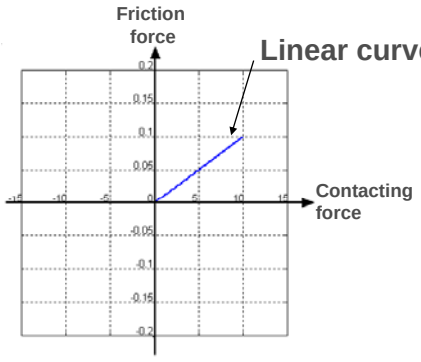
Natural events can be described using **relations**, **equations**, and **graphs**.

In Algebra, relations, equations, and graphs can be used to express equivalent relationships!

11/34

Example: Graph of Relations

Friction force exists between contacting objects. The friction force is proportional to the contacting force between the objects.



12/34

Analyzing Graphs

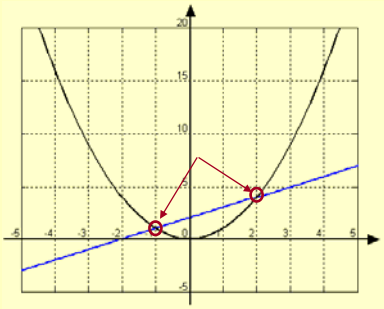
We can find where two curves intersect using algebraic methods.

Given: $f(x) = x + 2$ and $g(x) = x^2$

The points of intersection are where the two curves have the same value.

$x + 2 = x^2$

$x = -1$ or 2



Points of Intersection: (-1, 1) and (2, 4)

13/34

Algebra and Other Math Courses

Similarities: Algebra and Other Math

Some basic similarities between Algebra and other math courses include:

- Material is rigidly structured
- What you have learned in the past is built upon
- What you learn now will be used later

15/34

Prerequisite Knowledge

Algebra builds on past math courses. The following basic skills are required for this course:

- number systems (integers, fractions, decimals, percents)
- basic computational skills (adding, subtracting and multiplying polynomials, factoring polynomials, solving linear equations)

16/34

Learning Algebra

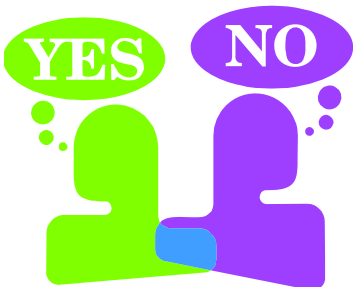
Algebra is a branch of mathematics that builds on itself. Like links in a chain, later concepts will build on concepts from earlier in the course. Your goal, therefore, must be mastery!

17/34

Differences: Algebra and Other Math

Some differences between algebra and other courses include:

- Algebra is more abstract than previous courses.
- Algebra might require more practice than previous courses.
- Algebra is the basis for all future courses involving mathematics.



18/34

Course Topics

Algebra Topics

Some of the topics that appear in Algebra are:

- Solving Quadratic, Radical, and Rational Equations
- Working with Exponential and Logarithmic Equations
- Conic Sections
- Probability and Statistics
- Sequences and Series
- Trigonometric Functions

20/34

Quadratic, Radical, and Rational

Quadratics equations have one variable where the highest degree of the variable is 2.

$2y^2 + 5 = 0$ $\quad$ $17 + n + n^2 = 0$

Radical equations have the variable under a square root symbol called a "radical sign".

$\sqrt{2x + 5} = 7$ $\quad$ $\sqrt{3x^2} + 27 = 4$

Rational equations are equations with the variable in the denominator of a rational expression.

$$\frac{3}{2x + 5} = 7 \qquad \frac{8}{x + 3} = \frac{4x + 1}{x^2 - 9}$$

21/34

Exponential and Logarithmic

Exponential equations have the variable in the exponent.

$5^x = 125$ $\quad$ $12 - 3^{x+4} = 7$

Logarithmic equations have the variable in the value of the log.

$\log_7 (x + 5) = 3$ $\quad$ $\log x^2 = 4$

Note: Exponential functions are the inverse of logarithmic functions.

22/34

Conic Sections

A **conic section** is a curve created from the intersection of a double right cone and a plane.

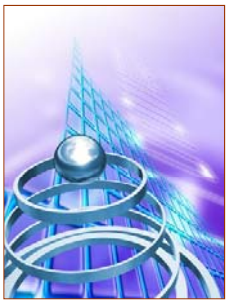
The conic sections are:

Parabola

Circle

Ellipse

Hyperbola



23/34

Probability and Statistics

Probability is the likelihood that an outcome occurs. Probability is always between 0 and 1.

Statistics is the analysis and interpretation of numerical data.

Probability and statistics are used to predict and explain real-world phenomenon.

24/34

Sequences and Series

A **sequence** is an ordered set of elements that can be put into a one-to-one correspondence with the set of positive integers.

A **series** is the sum of the terms of a sequence of real numbers $\{a_n\}$.

Example:

Sequence $\rightarrow a_n = {}^1/_n$

Series $\rightarrow \Sigma\, a_n = 1 + ½ + ⅓ + ¼ + \ldots$

25/34

Trigonometric Functions

Trigonometry is defined as the "measurement of triangles."

The trigonometric functions are:

Sine and Cosecant

Cosine and Secant

Tangent and Cotangent

26/34

Algebra Tips

Algebra Study Methods

Basic tips for studying and mastering Algebra include:

- Represent relationships between natural events verbally, analytically, numerically and graphically (VANG)
- Strive to understand the meaning of variables and basic mathematical principles
- Work on Algebra problems with others
- Expect and embrace challenging problems that require a deeper understanding and multiple steps
- Do not just read – DO!

28/34

VANG

Verbal
Analytical / algebraic
Numerical
Graphical

29/34

Example: VANG

Consider the function $y = x^3$.

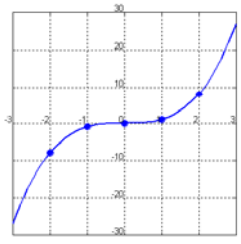
Verbally: "*y* equals the cubic of *x*"

Algebraically: $y = x^3$

Numerically:

x	*y*
-2	-8
-1	-1
0	0
1	1
2	8

Graphically:



30/34

Algebra Study Tips

Keep the following ideas in mind as you study Algebra:

- Be patient while learning fundamental algebra skills – you'll value them later.
- Find 2 – 5 people who are reliable and study weekly with them.
- Focus on understanding variables and key features of the basic functions.
- Continue to solve practice problems!

31/34

Learning Summary

When studying concepts, understand them verbally, algebraically, numerically, and graphically.

Algebra is used to describe natural events mathematically.

Algebra can be mastered through patience, building a study group, and dedication.

Algebra requires an understanding of variables and functions.

Algebra is like prior math courses in that it has material that builds on previous courses.

32/34

Congratulations

You have successfully completed the tutorial

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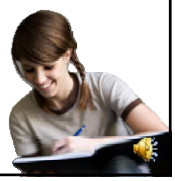
What's Next …

Step 1: Concepts – Core Tutorial (Just Completed)

→ **Step 2: Practice – Interactive Problem Drill**

Step 3: Recap – Super Review Cheat Sheet

Go for it!



34/34

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