#9750

ALGEBRA: THE BASICS

CEREBELLUM CORP., 2002
Grade Levels: 9-13+
26 minutes
1 Instructional Graphic Enclosed

DESCRIPTION

What is algebra? Does its terminology mean anything special? What are domain and range? In this parody of Indiana Jones, Idaho Bones explores the mysteries of algebra's basic vocabulary and functions. Program 1 of 7.

ACADEMIC STANDARDS

Subject Area: Mathematics

★ Standard: Understands and applies basic and advanced properties of functions and algebra

- Benchmark: Understands that a variable can be used in many ways (e.g., as a placeholder for a specific unknown, such as $x + 8 = 13$; as a representative of a range of values, such as $4t + 7$) (See Instructional Goals #1 and 3.)

- Benchmark: Understands appropriate terminology and notation used to define functions and their properties (e.g., domain, range, function, composition, inverses) (See Instructional Goals #2, 4, 5, 6, and 7.)

INSTRUCTIONAL GOALS

1. To explain the meaning of algebra.
2. To point out some of the properties of functions.
3. To define terms, variables, and constants.
4. To differentiate monomials, binomials, and trinomials.
5. To define domain and range.
6. To show how ordered pairs are plotted on a graph.
7. To define independent variable and dependent variable.

VOCABULARY

1. binomial
2. constant
3. degree of a polynomial
4. dependent variable
5. domain
6. equation
7. function
8. independent variable
9. inequality
10. monomial
11. ordered pair
12. polynomial
13. range
14. real numbers
15. standard form
16. term
17. trinomial
18. variable

BEFORE SHOWING

1. Review the themes and plots of the Indiana Jones movies. (*Raiders of the Lost Ark*, *The Temple of Doom*, *The Last Crusade*)
   a. Using the name Indiana Jones, create other names substituting other states and words that rhyme with Jones.
   b. Explain that the video is a spoof of the Indiana Jones movies.
2. Make a list of the different branches of mathematics and discuss what each studies. (algebra, geometry, trigonometry, calculus, discrete mathematics)
3. Discuss the importance of learning algebra and how it can be applied to real life situations.

DURING SHOWING

1. View the video more than once, with one showing uninterrupted.
2. Pause at several sections of the video that are characteristic of the Indiana Jones movies. Discuss the similarities.
3. Pause at the section showing y appearing by itself on one side of the equation. Explain the importance of this.
4. Pause at the section that includes "a polynomial may appear in disguise". Discuss what this means.
5. Pause at the section explaining the meaning of range. Explain the reason for including the cowboy singing, "Where the buffalo and dependent variables play".

AFTER SHOWING

► Discussion Items and Questions

1. What is algebra? Why was algebra developed? Which civilizations were the first to develop algebra?
2. What is the origin of the word algebra and what does the word mean?
3. What is the core of algebra?
4. What is the basic building block for college algebra?
5. What is a function?
6. What are the two kinds of relations?
7. What are three ways to state the beginning of a function?
8. What is meant by the standard form of a function?
9. What are terms?
10. What are constants and variables? Give examples of each.
11. What are two examples where the number 1 is understood but not written?
12. What are some examples of monomials, binomials, and trinomials?
13. What is a polynomial?
14. Why is (3x-3) (x+4) considered a polynomial?
15. How is the degree of a polynomial determined?
16. What is a coefficient? Give an example.
17. What is the set of numbers substituted for the variable in a function called?
18. What is the set of numbers that represents the value or answer of the function called?
19. What is an ordered pair?
20. Which values are plotted on the x-axis? On the y-axis?
21. Why is x considered the independent variable and y the dependent variable?
22. What are real numbers?

► Applications and Activities

1. Research and report on the history of algebra.
2. Design a time line that shows the emergence of the various branches of mathematics over time.
3. Write the following functional equations in word form:
   a. $f(x) = x + 5$
   b. $f(x) = x^2 - 4x + 6$
   c. $g(x) = 3^x$
4. Research to find functional equations for practical applications such as:
   a. the relationship between the number of karats in gold and the percentage of gold in a piece of jewelry
   b. the relationship between the number of times a cricket chirps in one hour and the temperature in Celsius
   c. the relationship between the volume of water and the corresponding volume of ice
5. Complete a worksheet that summarizes the content of the video. (See Instructional Graphic.)

RELATED RESOURCES

- Algebra: A Piece of Cake! Part One #9544
- Algebra: A Piece of Cake! Part Two #9545
- Algebra: Functions #9745
- Algebra: Linear Equations #9746
- Algebra: Polynomials #9747
- Algebra: Quadratic Equations #9748
- Algebra: The Quadratic Formula #9751
- Algebra: Quadratic Roots #9749

World Wide Web

The following Web sites complement the contents of this guide; they were selected by professionals who have experience in teaching deaf and hard of hearing students. Every effort was made to select accurate, educationally relevant, and "kid safe" sites. However, teachers should preview them before use. The U.S. Department of Education, the National Association of the Deaf, and the Captioned Media Program do not endorse the sites and are not responsible for their content.

- **MATH FORUM**

http://www.mathforum.com/

Includes links to math resources by subject and a question/answer section by Dr. Math.

- **ALGEBRA RELATED WEBSITES**

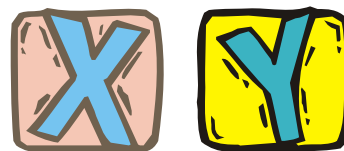http://www.oaklandcc.edu/kpchiass/Algebra%20related%20websites.htm

Contains links to algebra sites, some of which are interactive.

INSTRUCTIONAL GRAPHICS

- THE BASICS OF ALGEBRA

The Basics of Algebra

FUNCTIONS   Find y when the values for x are given:

1. $y = x + 6$ $(x = -4, -3, -1, 2, 4)$

2. $y = 2x - 3$ $(x = -5, -2, 0, 4, 5)$

3. $y = 2^x$ $(x = -2, -1, 0, 2, 3)$

SOLVING FOR y   Solve the following equations for y:

1. $x + y = 12$

2. $2x + y = 9$

3. $3x - 4y = 7$

4. $x (y + 1) = 16$

SUBSTITUTION   Find the value:

1. $f(x) = 2x - 9$ $f(6) = ?$

2. $h(x) = x^2 - 4x + 9$ $h(-3) = ?$

3. $g(x) = x^2 - 2x$ $g(-4) = ?$

MONOMIALS, BINOMIALS, TRINOMIALS, POLYNOMIALS

1.   Identify the following as a monomial, binomial, or trinomial:

        a. $11d - 6$ b. $3n^2$ c. $4x^2 - 3x + 2$

2.   Write as a polynomial:

        $(2x - 6) (x + 4)$

3.   Find the degree of each polynomial:

        a. $16a^3$ b. $15 + x^3 y^2$ c. $x^2 y^3 + 4 x^3$

DOMAIN AND RANGE   Find the range:

1. $f(x) = 3x - 1$ Domain = $(-3, -4, 0, 1)$

2. $f(x) = x^2 - 2x + 3$ Doman = $(-4, -2, 0, 2, 4)$

PLOTTING ORDERED PAIRS ON A GRAPH   Find the range; then plot the ordered pairs on a graph:

        $f(x) = 3x - 6$ Domain = $(-4, -2, 0, 2, 4)$

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