



#9745

ALGEBRA: FUNCTIONS

CEREBELLUM CORP., 2002

Grade Levels: 11-13+

26 minutes

DESCRIPTION

College algebra becomes clearer as this Indiana Jones parody defines and illustrates practical examples of function and inverse function. Explores linear equations and identifies six algebraic properties with examples. Program 2 of 7.

ACADEMIC STANDARDS

Subject Area: Mathematics

- ★ Standard: Understands and applies basic and advanced properties of functions and algebra
 - Benchmark: Understands appropriate terminology and notation used to define functions and their properties (e.g., domain, range, function, composition, inverses) (See Instructional Goals #2 and 3.)
 - Benchmark: Uses a variety of models (e.g., written statement, algebraic formula, table of input-output values, graph) to represent functions, patterns, and relationships (See Instructional Goals #1, 6, and 8.)
 - Benchmark: Understands the basic concept of inverse function and the corresponding graph (See Instructional Goals #4, 5, and 7.)

INSTRUCTIONAL GOALS

1. To illustrate how functions can be used to solve problems.
2. To point out that the domain is restricted in some practical word problems.
3. To demonstrate the use of the vertical line test in determining if a graph is a function or not.
4. To explain the meaning of inverse functions.
5. To relate inverse functions to word problems.
6. To list six properties that are used to simplify equations.
7. To show how inverse operations are used to solve equations.
8. To show a step-by-step solution of an equation using algebraic properties.

VOCABULARY

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|--------------------------|------------------------|
| 1. additive identity | 7. domain |
| 2. additive inverse | 8. factoring |
| 3. associative property | 9. finite decimal |
| 4. closure property | 10. inverse function |
| 5. commutative property | 11. inverse operations |
| 6. distributive property | 12. mirror images |

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| 13. multiplicative identity | 18. reflection |
| 14. multiplicative inverse | 19. relation |
| 15. polynomials | 20. repeating decimal |
| 16. real numbers | 21. standard form |
| 17. reciprocals | 22. vertical line test |

BEFORE SHOWING

- Review the themes and plots of the Indiana Jones movies. (*Raiders of the Lost Ark, The Temple of Doom, The Last Crusade*)
 - Using the name Indiana Jones, create other names substituting other states and words that rhyme with Jones.
 - Explain that the video is a spoof of the Indiana Jones movies.
- Discuss the importance of learning algebra and how it can be applied to real-life situations.
- Show examples of word problems having strategies for solutions similar to those mentioned in the video.
 - Eric needs \$500 for a trip to Chicago. He already has \$50 and plans to save \$2 each day until he reaches his goal. How many days will he need to save money before he has \$500?
 - A football player weighs 375 pounds. His goal is to weigh 225 pounds. He lost five pounds this week and hopes to lose two pounds a day. In how many days will he attain his goal?

DURING SHOWING

- View the video more than once, with one showing uninterrupted.
- Pause at the section about the bullwhip sales. Discuss other strategies that could be used to solve this problem. (using a table, drawings, diagrams, role-playing)
- Pause at the section showing the vertical line test. Discuss what other method can be used to show if an equation is a function or not. (make a table of solutions)
- Pause at the section on inverse functions. On an overhead graph grid, discuss where to plot points to illustrate the meaning of reflection and mirror image.
- Pause at the section explaining that inverting a graph does not always result in a function. Discuss how to illustrate an example of this on a graph grid.
- Pause at the scene showing the properties sign and the real estate office. Discuss the different meanings of the word *properties*. What is its meaning in the video?
- Pause after each explanation of the six properties. Give two examples of each, one using numbers only and one using variables only.

AFTER SHOWING

Discussion Items and Questions

- How are functions used to solve word problems?
- In what form should functions be written?
- In the bullwhip sales problem, what is the restriction on the domain?
- What is the vertical line test used for?
- What is the general rule for determining whether a graph is a function or not?
- What are inverse functions?

7. What do the graphs of two inverse functions look like?
8. Suppose a function is used to compute the number of dollars saved over a given number of days. What would the inverse of that function solve?
9. Explain why the inverse of a function may not necessarily be a function itself.
10. What are real numbers?
11. What are examples of finite decimals?
12. What are examples of repeating decimals?
13. What is an example of an infinite decimal that does not repeat?
14. What are the six properties used to help solve equations? Give examples of each.
15. How are inverse operations used to solve equations?
16. Why is the distributive property very important in algebra?

Applications and Activities

1. As a group, create word problems and use functions to solve them.
2. Generate a worksheet with the goal of deciding whether a pair of functions are also inverse pairs. Plug in values as shown in the video to determine the answer.
3. Use a graphing calculator to determine if a pair of functions are also inverse pairs. (The graphs of the functions should be mirror images of each other.)
4. Make a list of real-life situations where there are restrictions on the domain:
 - a. $0 \leq \text{hours a day} \leq 24$
 - b. $0 \leq \text{age} \leq 110$
 - c. $0 \leq \text{number of hours} \leq \text{time allowed to do a task}$
 - d. $0 \leq \text{amount of money earned} \leq \text{maximum amount possible}$
5. Make illustrations or visual aids for the six properties mentioned in the video.
 - a. posters
 - b. animations or cartoons
 - c. matching exercises
 - d. notebook of algebraic properties
 - e. slide show presentation
 - f. bookmarks
 - g. mobiles
6. Make a list of real-life examples that relate to the properties of algebra. Examples include:
 - a. After getting up in the morning, Juan brushes his teeth, combs his hair, and washes his face. (commutative)
 - b. Angie does her algebra homework, reviews the chapter, and takes the test. (not commutative)
7. Divide into six groups. Pass out multi-colored algebra tiles. Each group will determine how to use the tiles to illustrate one of the six properties mentioned in the video.
8. Make a chart or table showing the step-by-step simplification of phrases or equations and list the property that is used for each step. An example could be:
 - a. $3x + 5(2 + x) = 3x + 5(2) + 5x$
 - b. $= 3x + 5x + 5(2)$
 - c. $= 3x + 5x + 5(2)$
 - d. $= (3 + 5)x + 5(2)$
 - e. $= 8x + 10$

RELATED RESOURCES

- Algebra: A Piece of Cake! Part One #9544
- Algebra: A Piece of Cake! Part Two #9545
- Algebra: The Basics #9750
- 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. Topics related to the video are included.

• INVERSE FUNCTIONS

<http://mss.math.vanderbilt.edu/~pscrooke/MSS/inversefunction.html>

Includes a tool that calculates the inverse of a function that is typed into the box.

• EXERCISES FOR INVERSE FUNCTIONS

<http://www.ohaganbooks.com/StudentSite/calctopic1/invex.html>

Includes interactive activities such as sketching the graph of the inverse of a given function and verifying that given pairs of functions are inverse pairs.

• PROPERTIES OF REAL NUMBERS

<http://www.math.com/school/subject2/lessons/S2U2L1GL.html>

Includes explanations and examples of the properties mentioned in the video.