



#9544

ALGEBRA: A PIECE OF CAKE! PART ONE

BENCHMARK MEDIA, 2001

Grade Levels: 7-9

19 minutes

1 Instructional Graphic Enclosed

DESCRIPTION

While making a cake, a teenage cook teaches the algebraic concepts of a variable numerical substitution, omission of the multiplication sign, and other basic terms. Pauses for viewer problem-solving.

ACADEMIC STANDARDS

Subject Area: Mathematics

- ★ Standard: Understands and applies basic and advanced properties of functions and algebra
 - Benchmark: Knows that an expression is a mathematical statement using numbers and symbols to represent relationships and real-world situations (e.g., equations and inequalities with or without variables) (See Instructional Goal #4.)
 - 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 2.)
 - Benchmark: Understands various representations (e.g., tables, graphs, verbal descriptions, algebraic expressions, Venn diagram) of patterns and functions and the relationships among them (See Instructional Goal #4.)
 - Benchmark: Understands the basic concept of a function (i.e., functions describe how changes in one quantity or variable result in changes in another) (See Instructional Goal #4.)

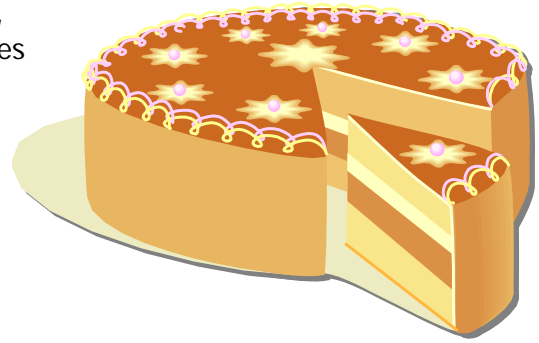
INSTRUCTIONAL GOALS

1. To explain the concept of a variable.
2. To show how numbers can be substituted for variables.
3. To point out several algebraic conventions such as the omission of the multiplication sign and the writing of division as a fraction.
4. To develop algebraic formulas from number patterns.

BACKGROUND INFORMATION

Since the 16th century, variables and formulas have been the key concepts and instruments of algebra. Formulas offer an easy example of connected variables and therefore provide a helpful preparation for the further study of functions. In this video, mathematical formulas are

represented through some real-life situations. Formulas, together with the related concepts of introducing variables and solving equations, are a cornerstone for the further study of mathematics.



VOCABULARY

1. patterns
2. formula
3. convention
4. input
5. output
6. variable
7. kilogram
8. quarter

BEFORE SHOWING

1. Distribute three pieces of candy to each student.
 - a. If there were only two students in the class, how many pieces of candy would each receive?
 - b. How many pieces would each receive if there were three students?
 - c. How many pieces would each receive if there were 15 students?
2. Write this problem on the board or overhead. John rode his bicycle 18 miles during the first day of his journey and then covered 15 miles every day after that.
 - a. How many miles did he travel during the first two days?
 - b. How many miles did he cover during the first three days?
 - c. How many miles did he cover during the first six days?
3. Discuss sales taxes and their importance. The sales tax in one state is \$8.75 on a \$100 purchase.
 - a. How much sales tax is paid on a \$200 purchase?
 - b. How much sales tax is paid on a \$500 purchase?
4. Write the following number sequences on the board or overhead and find the next three numbers. Determine the pattern.
 - a. 1, 2, 3, 4, __, __, __
 - b. 1, 3, 5, 7, __, __, __
 - c. 2, 4, 6, 8, __, __, __
 - d. 7, 6.3, 5.6, 4.9, __, __, __
 - e. 5, 13, 21, 29, __, __, __
 - f. 24, 12, 6, 3, __, __, __
5. Review the rules for the order of operations.

DURING SHOWING

1. View the video more than once, with one showing uninterrupted.
2. Stop the video at each segment that displays a pausing prompt. Calculate and discuss the answers.



AFTER SHOWING

► Discussion Items and Questions

1. Why are formulas usually more convenient and precise than words for explaining rules and patterns?
2. Why is "x" not used to show multiplication in algebra?
3. Why is the number placed in front of the variable when writing algebraic expressions?
4. What is a better way to show division than using the division sign?
5. Which of the following formulas are written in the preferable form? If they are not, rewrite them.
 - a. $p = t \times 2$
 - b. $y = x3$
 - c. $s = 4k - 1$
 - d. $z = 2x(y - 4) - (1)$
 - e. $n = m ? 4 + 7$
6. Discuss the correct way to write the following rules as formulas using variables:
 - a. Output equals input times 3 plus 7
 - b. To get the output, subtract 1 from the input and then multiply the difference by 4.
 - c. Output equals input divided by 2 then increased by 5
 - d. To get the output, add 4 to the input and then multiply the sum by 8.
7. Will the answers to $8x - 4$ and $8(x - 4)$ be the same? Why or why not?
8. Refer to the questions in the Before Showing section of this guide. What formulas can be used to find the answers?
 - a. How many pieces of candy will be given to 12 students?
 - b. The teacher distributed 48 pieces of candy. How many students received the candy?
 - c. The sales tax on a purchase was \$33. How much was paid for the purchase?

► Applications and Activities

1. Suggest some situations that can be described using the formula $y = 4t$.
2. Write a rule for an output-input situation on an index card. Put the cards in a pile and select one. Use the ages of family members or classmates as the input.
3. Create a chart that has four columns and label them as addition, subtraction, multiplication, and division. List as many words and phrases as possible that suggest each operation.
4. Bring a copy of a favorite recipe to class. Exchange recipes with other students.
 - a. Design a computer-generated input-output table with a format similar to the one in the video.
 - b. Determine how many times the recipe is to be increased. (1 ½ times, 2 times, 3 times, 100 times)
 - c. Calculate the amount of each ingredient for that increase.
5. Obtain a recipe that serves a large number of people. Calculate the amounts of each ingredient needed to serve smaller groups.
6. Complete the worksheet "Applications of Algebra". (See Instructional Graphics.)

SUMMARY

Algebra is indeed useful in everyday life. The hostess in the video uses algebra as she calculates the amounts of recipe ingredients needed to cook for and then serve a sizable party. Formulas were developed to help calculate the amounts needed for the cake. When writing a

formula, she left out the multiplication symbol and put the constant in front of the number. She also wrote division as a fraction instead of using the usual division sign. To find answers, she took an input, applied a rule, and produced an output. Variables which are symbols such as letters were used to represent numbers. They make rules shorter and neater.

RELATED RESOURCES



- [Algebra: A Piece of Cake! Part 2 #9545](#)



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.



Contains a Java calculator which can simplify and evaluate an expression using order of operations, substitution, and combining like terms.

- **ALGEBRA.HELP**

<http://www.algebrahelp.com/calculators/expression/substitution/>



- **ASK DR. MATH**

<http://mathforum.org/dr.math/>

Includes archives with questions pertaining to different topics including variables, expressions, and equations.

- **COOL MATH; FUNCTIONS**

Contains a three-page lesson that explains the concept of a function. Includes input-output boxes.



<http://www.coolmath.com/func1.htm>

INSTRUCTIONAL GRAPHICS

- **APPLICATIONS OF ALGEBRA**

Applications of Algebra

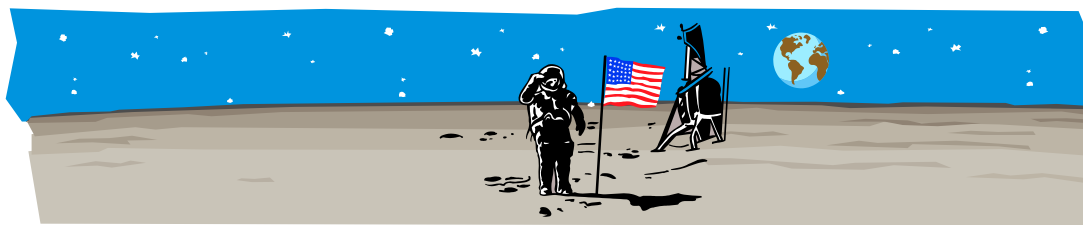
1. In a certain rectangle, the length is 10 inches more than the width. Complete the table below:

w



w + 10

width (in.)	5	11		15	w		x + 21
length (in.)			34			n	



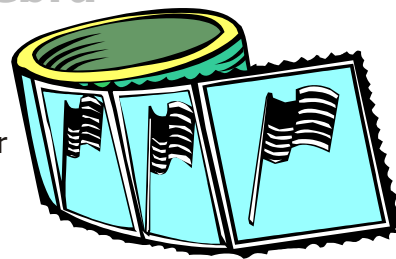
2. Astronauts who travel to the moon weigh six times as much on Earth as they weigh on the moon. Complete the table below:

Weight on the moon (pounds)	10		50	n	2n	
Weight on Earth (pounds)		180				x

3. An apartment rents for \$800 a month. The monthly rent is expected to increase \$15 each year. What will be the rent at the end of 9 years?



Applications of Algebra



4. In 2002, the first class rate was changed to 37¢ for the first ounce of mail and 23¢ for each additional ounce. A chart showing the postage for weight up to 5 ounces is shown below. What is the cost for an 8 ounce letter?

Weight	1 oz.	2 oz.	3 oz.	4 oz.	5 oz.	6 oz.	7 oz.	8 oz.
Postage	\$.37	\$.60	\$.83	\$1.06	\$1.29			

5. The input and output values are listed in the table below. What is the rule for this set of values?

Input	3	4	5	6	7
Output	12	14	16	18	20

