

**MATH SERIES**

**ALGEBRA: A Piece of Cake, Part 2**

*13 Minutes*

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**FOR USE IN:** Mathematics

**LEVEL:** Grades 7-9, Advanced Grade 6

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**EDUCATIONAL OBJECTIVES:**

To help students understand these key mathematical concepts:

- **Terms, like terms, and expressions**
- **simplifying mathematical expressions**

**BACKGROUND INFORMATION:**

Since the sixteenth 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, solving equations, and so on -- are a cornerstone for the further study of mathematics.

**BEFORE SHOWING THE VIDEO:**

The video contains several optional pauses where the students are presented with calculations to complete, while the VCR may be placed on pause. After the pause, correct answers are given. If the teacher plans to use these pauses, the students may be requested to have paper and pens available before starting the video. For a more intensive interaction between students and parts of the video, the teacher may wish to pause the tape after the presentation of a particular concept to inquire if the students have understood it; and/or ask the students before starting the video to signal the teacher to stop at any point for clarification. The video may also be shown in its entirety without pause either as an introduction or a review of the subject. It is always helpful if teachers are able to view the video before showing it to the class.

Some questions that may be used to stimulate discussion:

This video is a continuation of Part I. Therefore, it is a good idea to review this concept presented in the first part: algebra is about finding patterns in numbers and writing them down in formulas.

A cooking recipe as was used in Part 1, might again be used to find number patterns and formulas. For example:

the ingredients for one smoothie are:  $\frac{3}{4}$  cup of yogurt, 1 cup of orange juice,  $\frac{3}{4}$  cup of diced strawberries, and 1 cup of ice cubes. Find the formulas for the number of cups of yogurt ( $y$ ), orange juice ( $o$ ), strawberries ( $s$ ), and ice cubes ( $i$ ) necessary to make several ( $n$ ) smoothies.

To answer this question students can fill in tables with some values of the given variables (as they did in part I) and end up with the resulting formulas. Then they can use these formulas to find some other values, such as the number of cups of yogurt required for 20 smoothies.

### **CONTENT OF THE VIDEO:**

The video explains these key concepts: **terms, like terms, expressions, and the simplification of mathematical expressions.**

Continuing on from Part 1, more formulas are induced from patterns, this time concerning the number of trays needed to serve varying slices of pastries, that are more complicated than those in the first part. Like terms are usually defined as terms with exactly the same variables raised to exactly the same powers. However, this general definition is not presented in the video because at this stage students are acquainted only with the most simple formulas. Some examples are provided instead:  $3N$  and  $2N$  or  $12T$  and  $9T$  are like terms. Formulas can often be simplified by writing, say,  $5N$  instead of  $3N+2N$ , or  $21T$  instead of  $12T+9T$ .

### **AFTER SHOWING THE VIDEO:**

It should be pointed out that in the last example shown in the video (when the expressions  $12T-1$  and  $9T-2$  are combined), equal numbers of trays are taken: the number of trays with coconut slices and the number of trays with cherry slices are both equal to  $T$ . Moreover, the same letters can be used in the problem only for representing the same values. This issue may be discussed by using the following example. Let  $x$  be the number of dimes in a wallet. Then the amount of money in dimes in the wallet is equal to  $\$0.1x$ . If we wanted to make up a formula for the amount of money in quarters, we would need to use another letter for the number of quarters (say,  $y$ ; then the amount of money would equal  $\$0.25y$ ). One can use  $x$  for the number of quarters only if it is known that this number is equal to the number of dimes.

Some other activities for further discussion can be suggested:

1. Explain which terms can be called "like terms" in the following expressions; name the constants that appear in them:

a)  $2x+4-3x+7$ ; b)  $6t-2t+4-5$ ; c)  $4-5v+6+5v$ ; d)  $3+5x+6-7y$ .

2. When we simplify the expression  $3N+1+2N+1$ , we are actually using the equalities

$$(3N+1)+(2N+1)=3N+(1+2N)+1=3N+(2N+1)+1=(3N+2N)+1+1=5N+2.$$

Explain which rules are used here (associative property of addition and commutative property of addition).

3. Solve the following problem:

One serving of canned fish contains 1 gram of saturated fat and 4 grams of other kinds of fat. Find a) the formula for the amount of saturated fat ( $S$ ) in several ( $n$ ) servings of this fish; b) the formula for the amount of other kinds of fat ( $O$ ) in several ( $n$ ) servings of this fish; c) combine these formulas and derive the formula for the total amount of fat ( $T$ ) in several ( $n$ ) servings of this fish.

4. Some exercises in simplifying expressions may be also suggested by the teacher.

**EXPLORING AND INVESTIGATING:**

Students may begin to explore these issues more deeply by discussing the following questions:

1. Anne has two types of notebooks. The first type has 64 pages, and the second has 96 pages. Anne decided to make up formulas for the numbers of pages. At first she wrote down the formula  $x=64n$  for the number of pages ( $x$ ) in  $n$  notebooks of the first kind. Then she wrote down the formula  $y=96n$  for the number of pages ( $y$ ) in  $n$  notebooks of the second kind. Then she combined these formulas and obtained a formula  $z=160n$  for the total number of pages ( $z$ ) in  $n$  notebooks. Do you agree with her reasoning?
2. Suggest your own problem involving the simplification of some formula.

**The Math Series consists of 10 videos:**

**ALGEBRA: A Piece of Cake Part 1**

**ALGEBRA: A Piece of Cake Part 2**

**SLOPES: That's a Bit Steep!**

**PERCENTAGES That Make Sense**

**LINEAR EQUATIONS and Their Graphs: Let's Get It Straight Part 1**

**LINEAR EQUATIONS and Their Graphs: Let's Get It Straight Part 2**

**INTEGER OPERATIONS: Into the Negative Zone Part 1 Adding and Subtracting**

**INTEGER OPERATIONS: Into the Negative Zone Part 2 Multiplying and Dividing**

**FACTORING IS FANTASTIC Part 1: Common Factors**

**FACTORING IS FANTASTIC Part 2: Quadratic Trinomials**

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