

MATH SERIES
FACTORING IS FANTASTIC
Part 1: Common Factors
18 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:

- **Factoring, terms, expressions**
- **Finding the greatest common factor(s)**
- **Factoring polynomial expressions that are the sums or differences of terms with common factors**

BACKGROUND INFORMATION:

The factoring of polynomials is closely connected both with the simplification of expressions and with solving equations. When we want to find the least common denominator of a fraction, we must factor numbers. The same procedure is used for algebraic expressions. At the same time, it is much easier to find the roots of a polynomial when it is written in factored form. That makes factoring one of the most valuable parts of algebra.

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.

It is a good idea to remind students that they have already worked with different formulas and have written them down in a variety of ways. Some examples can be given: $x^2 - 6x + 5 = 6x + x^2 + 5 = 5 + 6x + x^2$, etc. Students may be told that in this class they will learn about another new and important way of representing expressions. In particular, it may be emphasized that this new approach will help them to deal with many difficult problems. At this point the students have only had to deal with solving linear equations; however, much more challenging equations can appear in economics, in technology, and even in ordinary life. How can we solve equations such as $x^2 - 3x + 2 = 0$ or $x^3 - 4x = 0$? Factoring as explained in this video will help to answer this question.

CONTENT OF THE VIDEO:

The factoring of polynomials is the key concept explained in the video. At first, the Concept of factoring is demonstrated by labeling as 'factors' the separate ingredients in a milkshake and those in a sandwich. Their one common ingredient, a banana, becomes their 'common factor'. Terms and expressions are defined. The factoring of whole numbers is discussed, the concept of prime numbers -- numbers different from 1 and having no other factors except one and themselves -- is reviewed, and then prime factorization with the help of a factor tree is explained. The process of factoring algebraic terms is demonstrated. Some examples of finding common factors and the greatest common factors of several terms are given. Calculations are shown which change factored expressions back into their original expanded forms. Other kinds of expressions are factored (expressions that are sums or differences of terms with common factors). The video ends by posing the question: how can we factor the polynomial $x^2 - 5x + 6$? That question will be answered in the video, which is the sequel to this one, Factoring is Fantastic: Part 2, Quadratic Trinomials.

AFTER SHOWING THE VIDEO:

An integer is in factored form if it is expressed as a product of two or more integers. A polynomial is in factored form if it is expressed as a product of two or more polynomials. It is not necessary to give these definitions in a formal way, but it is important to emphasize that what we are doing is rewriting sums or differences as products. Some questions can be posed:

- Is the number 3 a factor of 10, 12, or 13?
- Name all the factors of the numbers 12, 13, 28.
- Name all prime numbers among the following: 2, 7, 12, 5, 13, 17, 62.
- Write the numbers 8, 26, 500 in a completely factored form.
- Find the GCF of the numbers:
 - a) 9 and 33
 - b) 60 and 24.
- Given the expression $6x+12$:
 - a) Write each of its terms as a product in a way that will help to factor this expression
 - b) Factor this expression.

Factor the expressions:

- a) $4t+12$
- b) $25-15c$
- c) $2x^2+3x$
- d) $-x^2-4x$
- e) $4xy-3x+2x^2$

EXPLORING AND INVESTIGATING:

Students may be asked to check whether the following expressions are factored correctly:

- a) $(x^2+x)=x(1+x)$
- b) $(6-2b)=3(2-b)$
- c) $2y^2-4y+yp=2y(y-2y+p)$.

Students may also be asked to give examples of expressions that cannot be factored.

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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