

# DOINGWHATWORKS



## Presentation

FULL DETAILS AND TRANSCRIPT

### Teaching Symbols and Expressions

Twin Groves Middle School, Illinois • November 2008

Topic: National Math Panel: Major Topics of School Algebra

Practice: Topics of Algebra

#### Highlights

- Approach to teaching the concept of simplifying expressions
- Prerequisite skills for combining like terms
- Importance of understanding terminology
- Teacher modeling of simplified expressions
- Solving equations
- Role of practice during and after a lesson
- Student errors and misunderstandings
- How to assess student learning during a lesson
- Options for helping students who struggle with mathematics concepts

#### About the Site

Twin Groves Middle School

Buffalo Grove, IL

#### Demographics

83% White

15% Asian

2% Hispanic

1% Black

1% Free or Reduced-Price Lunch

2% English Language Learners

Staff from Twin Groves Middle School have been active participants in the district's processes of vertical alignment of standards, development of power standards, and enhancement of algebra instruction.

Features:

- Vertical alignment process to identify overlaps and gaps in curriculum;
- Development of power standards to guide curriculum and assessment, specific standards for advanced and honors math;
- Analysis of power standards to develop well-aligned formative assessments;
- Use of computerized assessment and reporting system;
- Variety of types of formative assessments, including observation during in-class lessons;
- Intervention options for struggling students;
- Emphasis on student understanding of the major topics of algebra and connections among them;
- Improving student proficiency in solving algebra problems, including problem translation, transformation of equations, and explanation of solutions;
- Teaching quadratic functions, including graphing functions by hand and using a graphing calculator; and
- Teaching students about symbols and expressions, including understanding terminology, simplifying expressions, using teacher modeling effectively, and providing opportunities for practice during and after lessons.

## Full Transcript

Slide 1

Welcome to Teaching Symbols and Expressions.

Slide 2

I am Terri Porto. I teach seventh grade Honors Algebra and eighth grade Algebra at Twin Groves Middle School in Buffalo Grove, Illinois.

## Slide 3

In the sequence of instruction, we start really back in the basic math classes where, in addition of integers, we will have multiple numbers being added together, and we stress to add the positives together and add the negatives together. And we say let's add the like numbers, so that the vocabulary is established early. In pre-algebra, we advance to combining single variable problems like  $2x+x$ ,  $3y-2y$ , so that in algebra, we can advance to problems that have multiple variables and powers.

## Slide 4

There's many necessary math concepts that are involved in teaching symbols and expressions. Some of them are adding and subtracting integers, the distributive property, and actually understanding what a variable is and how there are many different variables.

## Slide 5

The objective for my lesson was that students would be able to simplify expressions by combining like terms. I start my class off by doing a review of the distributive property, making sure that they remember how to distribute not only a positive number but also a negative number and including the subtraction. After that, we go into a discussion about what is an expression and when would we write them. A very important part is that they understand the different parts to an expression like the coefficient, terms, like terms, and constants.

## Slide 6

The way that I approached the lesson was to model for them how they would go about combining the like terms. I would put the problem on the board, and I personally would circle like terms so that they could see which terms should be combined together. We talked about how you should add only the coefficients together, and we also demonstrated to them how the final answer should be in the alphabetical order.

## Slide 7

I start with problems that only have one like variable to kind of warm them up and make them feel comfortable. Then, I will throw in a second variable. Then, I will put in a problem with different variables and constants, making sure that I include the coefficient of 1 and -1 in both the problems and in answers. Then, we put in the distributive property, only one distributive, and simplify. Then, I throw at them two distributive properties in simplifying. And then, if things are going well, we'll throw in the problems that

have the same base but different exponents. And to conclude, we will do an application problem with perimeter so that they can see that this was all done with a purpose.

#### Slide 8

The questions that I asked off the students as we were going through them was I would ask them, “Which of these terms are alike?” After they found some, then I would say, “Are there any other terms that are alike?” so that they could show me that they’re understanding what like terms were. There are times when I will put an answer in an incorrect order, and then I will ask the students if this is a correct answer to see if they have picked up on the rules for the correct way to write their answer.

#### Slide 9

The type of practice that I provide for the students during the lesson is I will put a problem on the board, and I will have them show me on their whiteboards what they are doing, and then they hold their whiteboards up so that I can get a quick feeling as to how things are going. Also, I will have students go to the board and explain to the class what steps they went through to get the answer. And then, I also have students work on a worksheet in pairs so that it gives me an opportunity to listen to how the students are communicating between themselves and also answering any questions that they may have. And then, at the end of the lesson, I provide them with additional practice in a worksheet that they can take home.

#### Slide 10

In the lesson, most of the students were able to do the beginning problems, and they were moving along quite easily and pretty happy with themselves. But I noticed as it got a little more complicated, they were slowing down and having to discuss. But once they saw that they were able to get the correct answer, you could see that they were very pleased with themselves again. When they got to the problems where they had the same base but with the different exponents, that’s where I could sense that there were some frustration coming from the students because they didn’t have necessarily a clear understanding about the difference between those variables. So, I would go back in the future and make sure that they’re understanding that  $x$  is  $x$ ,  $x$  to the second power is  $x$ -squared and that means something totally different, so that they can have a better understanding that you can’t have the  $x$ ’s and the  $x$ -squareds together.

#### Slide 11

Some of the skills that students are weak in that can cause errors or misunderstanding are their basic adding and subtracting integer rules and also the distributive property. Obviously, if they can’t add and subtract

accurately, then they are not going to be able to combine their like terms. What I found helps them to understand is by modeling with different color ink or by using shapes to circle the like terms. They, many times, don't understand that the  $x$  and the  $y$  can't be put together. So, what I will do is I will take let's say a red pen and I will circle all my  $x$  terms, a blue pen to circle all my  $y$  terms to show the like terms, and then I can, in my answer, show how they end up coming together.

#### Slide 12

For the visual learners, I will bring in pretzels and I show them on an overhead that a problem like two of the rod pretzels plus three of the twist pretzels, we have to keep them as different types. It shows them that we are only putting like things together. So, when we are looking at our variables, we only combine the terms that have the  $x$ 's, the  $y$ 's and so on.

#### Slide 13

For the next lesson, what I would do is I am going to plan on working on more problems with the exponents, and then to challenge them, I am going to add in terms that have several variables in them like  $2ab+3ac$ , and see if they can figure out what they would do with problems that have different types of variables than what they are used to seeing.

#### Slide 14

To learn more about teaching symbols and expressions, please explore the additional resources on the Doing What Works website.