Project INSPIRE: Nemeth Code Symbols Used in the Middle Grades and Strategies for Supporting Math Learning; Course 5, Lesson 1

PENNY ROSENBLUM: Welcome to "Nemeth Code Symbols Used in the Middle Grades and Strategies for Supporting Math Learning". This is "Lesson 1: Nemeth Code Symbols Used in Middle Grades, Part 1". Slide 2 has the objectives. And you are going to learn how to read and write in Nemeth Code the following: problems containing variables; problems containing grouping symbols, including parentheses, brackets, and braces; problems containing negative numbers, ordered pairs. And you're going to be able to read and write math word problems that require our use of the opening Nemeth Code indicator and Nemeth Code terminator.

So let's get started on slide 3 with variables. Now, a variable is a letter that represents an unknown number. So I'll give you an example problem here: 6 + c equals 12. So your student would be solving for the value of c, which happens to be 6. You do not ever, ever, ever use an English letter indicator with a variable that's in a math problem. And the way I think of a math problem is it has signs of operation like plus, minus, multiplication, division, and/or signs of comparison, like equals, less than, or greater than. Often in print, variables are italicized. However, when we are preparing materials for a braille reader, we ignore any italicized variables and just treat them as if they were in the same print as the rest of the problem. The italics has no meaning for the braille reader. That's three sample problems here. 4 + x = 26. So of course, I begin with my numeric indicator, 4, my plus sign, and then the x comes right up against the plus sign just as if it would have been a number. And then I go on space, equals, space, 26 with my numeric indicator.

My second problem uses a decimal: 2.5 + m = 5.0. Again, numeric indicator, 2, decimal point, 5, plus sign. There is that m again, no English letter indicator, space, equals, space, numeric indicator, 5.0. My last problem starts with a variable, the letter t. So t is representing, in this case, the number 39. I again just start with that variable knowing this letter indicator. So t, minus, 9, space, equals, 30. Remember, space is on either side of a sign of comparison.

I'm going to go on to slide 4. And I want to introduce you to our first most common grouping symbols. And these are parentheses. In Nemeth Code, the opening or left parenthesis is dots 1-2-3-5-6. And our closing or right parenthesis is dots 2-3-4-5-6. And I like to think of parentheses as the basket that is going to be holding math inside. And so that missing dot in each one is facing towards what's inside. So I'm missing a dot 4, and the opening or left, and a dot 1 in the closing or right. And so they're both facing what's inside of those parentheses.

If I have a single number inside of parentheses, such as the number 7, I do not need a numeric indicator. The same thing with letters. If I have a single letter inside of parentheses in this case, but it also could be brackets or braces, other grouping symbols. So when I have a single letter or a single number inside of grouping symbols, then I do not need anything. No numeric indicator for numbers, no English letter indicators for letters.

And so I have a lot of examples here to show you: open parenthesis a, close parenthesis. So you can see just the letter a, no English letter indicator. Next, I have a capital B inside of parentheses. Open parenthesis, capital sign, B, close parenthesis. I've got a Nemeth 2. So open parenthesis, 2, close parenthesis. And again, no numeric indicator. Now, remember, I could also say left and right parentheses. I'll do that with the next two examples. So left parenthesis, 91, right parenthesis, my 91 non-numeric indicator.

Sometimes, especially when we're numbering problems, we only have the right parenthesis. So here, I have numeric indicator, 3, right parenthesis. Why do I have a numeric indicator in front of that 3? Because my 3 is not enclosed inside of grouping symbols. Notice there's no left grouping symbol. So therefore, I do need-- do need-- my numeric indicator.

Let's go on to slide 5 and look at some examples with parentheses. My first one is 2, open parenthesis, y minus 3, close parenthesis, equals 16. It's very important that I just follow along with the ink print. So numeric indicator, 2, open parenthesis, dots 1-2-3-5-6, my variable, y, minus 3, my close parenthesis, dots 2-3-4-5-6, my space, equals, space 16.

My second example is 8 plus, open parenthesis, z minus r, is less than 21. Begin the problem with my numeric indicator, 8, plus, now I'm opening my parenthesis, 1-2-3-5-6, z minus r, no English letter indicated in front of either of those variables. My close parenthesis, 2-3-4-5-6 my space, my less than sign, which is dot 5, dot 1-3, space. Remember, we treat our less than and greater than signs the same way as our equal sign, signs of comparison, a space on either side, numeric indicator, 21.

Third example is 6, open parenthesis, x divided by 3, close parenthesis equals 12. Numeric indicator is 6, open parenthesis, x, divided by 3, close parenthesis, space, equal sign, space, numeric indicator, 12. So you're really seeing I'm following exactly the print, and the same thing in the last problem. This time, I'm going to open with parenthesis 5 minus a, close parenthesis, plus 2 is greater than 15. So I open right away with the parenthesis, 1-2-3-5-6, 5 minus a, close parenthesis, 2-3-4-5-6, plus 2, space, my greater than sign, dots 4-5 dot 2, space, numeric indicator, 15.

Slide 6 lets you practice. So I'd like you to pause and braille the following problems, a through f. Notice how those problems are lettered. Don't get caught. When you're ready, please come on back. Alright, slide 7 is the answer key for Activity 1A. Check your work carefully. Make sure you brailled everything properly, including your variables, the letters enclosed within parentheses, and that you used the proper configurations for parentheses.

Let's go on to slide 8 and talk about some more grouping symbols. So I've got brackets and braces. These are very similar to parentheses. As a matter of fact, if you look at the opening or left bracket, you'll see it looks like a parenthesis, except it takes two cells. So all I'm doing is adding a dot 4 in front of the symbol. So to make my opening or left bracket, it's dot 4, 1-2-3-5-6. And to make my closing or right bracket, it's dot 4, 2-3-4-5-6.

Following the pattern for brace, to open a brace, it's dots 4-6, 1-2-3-5-6. And to close a brace, it's dots 4-6, 2-3-4-5-6. And just as we did with the parentheses, with grouping symbols, we just follow along in the ink print. Let's look at our first example. So I'm going to be following the ink print. 6 times open bracket, open parenthesis, n plus 2, close parenthesis, minus 3, close bracket, equals 12. So I'm following right along with numeric indicators 6 times open bracket, which is dot 4, 1-2-3-5-6, open parenthesis, n plus 2, close parenthesis, minus 3. And now I'm going to close the bracket with dot 4, 2-3-4-5-6 space, equals, space, 12.

My second problem on slide 8 is a really tricky one to start. And our student would have to work through the math. But what we have here is 5 plus open brace, open bracket, 3, open parenthesis, 8 minus 4, close parenthesis, close right bracket, and then close brace. So I said right bracket in there. Remember, you can either say right or close. You really don't need both. And then I have plus 9, equals, question mark. And the question mark, we're going to use the general omission symbol. So what's the answer here?

So let's look at the braille. Numeric indicator, 5, plus, then I have my left brace, dots 4-6, 1-2-3-5-6, my left bracket, dot 4, 1-2-3-5-6, 3, my open parenthesis or my left parenthesis, dots 1-2-3-5-6, 8 minus 4. Now, I'm going to do my close parenthesis, 2-3-4-5-6, my close bracket, dot 4, 2-3-4-5-6, and my close brace, 4-6, 2-3-4-5-6. Then my plus 9, space, equals, space, general omission symbol. Wow, that's a mouthful to say. But if you look carefully, you'll see I just followed the print and plugged in the right row configuration for each of the symbols that I came in contact with.

Alright, we switch gears here on slide 9 and talk about negative numbers. Now, a negative sign is dots 3-6. Yes, I know that looks just like the minus sign, doesn't it? That's because they are the same configuration. So it's how it's used in the math. The way I personally remember this is the numeric indicator was there before the negative sign. So the numeric indicator is always going to be up next to the number. So that means the negative sign has to come before the numeric indicator.

Let me show you some examples. I've got -8 + 2 = -6. So I'm going to braille the negative sign, dots 3-6, numeric indicator, 8, plus 2, space, equal sign. Now, I need to braille negative 6. So negative, numeric indicator, 6. My second example is -2x + 3 = -21. So I'm going to start with my negative sign, numeric indicator, 2, x, plus 3, space, equal, space, my negative sign, dots 3-6, numeric indicator, 21. Just as a reminder, remember, when I have a variable in a math problem, no English letter indicator.

Alright, so negative numbers are pretty easy. And we actually often use them in ordered pairs. So what is an ordered pair here on slide 10? An ordered pair is a set of numbers used for plotting points on a coordinate plane or a coordinate grid-- you'll also hear it called too. Coordinate pairs are written inside of parentheses. So we're going to be using that grouping symbols, and are separated by a mathematical comma and a space. And I really want to emphasize this mathematical comma and a space.

Sometimes in print, if you look at our examples actually that we have here in print that we're done with the program called MathType, visually it does not look like there is a space between the comma and the second number. Regardless of how this looks in print, when we're preparing braille materials for the Nemeth Code reader, we're going to do a mathematical comma, space, and then the second number. So we have a pattern here I want you to pay attention to.

So my first ordered pair is 2, comma, 9. I start out with my open parenthesis, 1-2-3-5-6, 2, comma, space, 9, and then dots 2-3-4-5-6, my closing parenthesis. Now, you're saying to me, okay, we have a comma here. We have a space. So my numbers aren't enclosed, Dr. Penny. What's going on here? Well, there's a rule that says, if my number is touching an opening or a closing sign of grouping, I don't need a numeric indicator.

Alright, so look at the ordered pair, negative 3, comma, 4. So I'm not going to tell you the dots for the open parenthesis, because you've had time to practice those. So we're going to open parenthesis, my negative sign, 3, comma, space, 4, closing parenthesis. I just keep following the pattern, folks. It doesn't matter whether my numbers are negative or positive. If I look at the third example, the ordered pair, negative 2, negative 6, open parenthesis, negative 2, so my negative sign, 2, comma, dot space, then I've

got my negative 6, and then my close parenthesis. My next example is the ordered pair 1, comma, negative 5. So open parenthesis, 1, comma, space, negative 5, close parenthesis. And the last example on the slide is an important one, the origin. Open parenthesis, 0, comma, 0, close parenthesis. So we call that the origin or the ordered pair of 0, 0.

Slide 11, it's your turn. I want you to interline the following. And I've got four things for you to interline here. So go ahead and pause and do the interlining activity. Alright, welcome back to slide 12, where it's time for you to check your work for Activity 1B. So please make sure you brailled the coordinate pair properly and the math problems that use the different grouping symbols. And when you've had capital letters inside of parentheses to label a problem, that you did that properly.

Slide 13 talks about word problems. And we are making the assumption that you are familiar with the switch indicators. The opening Nemeth Code indicator, which is dots 4-5-6, 1-4-6, and then Nemeth Code terminator, which is dots 4-5-6, 1-5-6. If you are not familiar with the rules around the switch indicators, I encourage you to stop this lesson and research these. You can go back to our previous courses, which are available for free, and take a look at Course 2 and Course 3, where we talk about the switch indicators.

So when we're dealing with word problems that include ordered pairs or negative numbers, the ordered pairs and the negative numbers are math. So we have to use our switch indicators. And as a reminder, you really want to keep all the math that is between two switch indicators on the same line. So I've got two word problems here for you. The first one says, "The coordinates for the origin are 0, 0." And those are included in the parentheses with the comma between them because they're an ordered pair. Well, ordered pairs mean math.

So I'm going to braille along starting in cell 1, braille out my words. The coordinates for the origin is-- I'm going to open up Nemeth Code. In this case, I went to the second line. So I begin in cell 3 with my opening Nemeth indicator, dots 4-5-6, 1-4-6. And then I've got my ordered pair after the space, which is open parenthesis, 0, comma, space, 0, close parenthesis, space. And then I have my terminator, 4-5-6, 1-5-6, and then my period. And that period goes after I terminate Nemeth Code. We said it had nothing to do with the math. It was ending the sentence.

Let's look at the second word problem which reads, "Which number is greater, colon, negative 6, negative 2, negative 8, question mark?" Okay, we've got negative numbers. Negative numbers need to go within switch indicators. So going to braille in UEB, which number is greater, colon-- going to open up Nemeth Code with my open Nemeth Code indicator, dots 4-5-6, 1-4-6, always put a space after that. And I need to braille negative 6. So my negative sign, dots 3-6, my numeric indicator is 6, my Nemeth, comma, space.

Got to braille negative 2, so my negative sign, numeric indicator, 2. And I've got a Nemeth comma, space. And then I've got negative 8 here. So get negative sign, numeric indicator, 8, space. Now, that question mark is ending the problem. So I'm going to first terminate Nemeth with dots 4-5-6, 1-5-6, and then put my question mark, my UEB question mark because this is grammar. So you have two word problems. If you're not familiar with brailling word problems, I encourage you to braille these examples before going on to slide 14.

And slide 14 let's you actually practice brailling problems, including number 6, which is a word problem. So you have many things to practice brailling here. When you are ready, please come back and check your work. Alright, slide 15 is the answer key to Activity 1C. So make sure that you check your work and

that you have brailled everything properly. Thank you so much for doing Lesson 1. If you're feeling comfortable with the material, please go on to lesson 2, where we will introduce more Nemeth symbols that are used in the middle grades. Thank you.