Project INSPIRE: Course 5, Lesson 2

Transcript

SPEAKER: Welcome to Nemeth Code Symbols Used in the Middle Grades and Strategies for Supporting Math Learning. This is "Lesson 2: Nemeth Code Symbols Used in the Middle Grades, Part 2." Slide two has the objectives. You are going to be able to read and write problems containing a lot of different things: absolute value, inequalities, the Greek letter pi, approximately equal to, subscripts, superscripts, and square roots. You'll also be able to read and write math word problems that require use of the opening Nemeth Code indicator, the Nemeth code terminator, and the single word switch indicator.
So let's get going on slide 3 and talk about those switch indicators.

The symbol for the opening Nemeth Code indicator is dot 4-5-6, 1-4-6 and the terminator is dot 4-5-6, 1-5-6. We also have a single word switch indicator, which is dot 6,3. So I want to go over the rules you will use when using Nemeth Code switch indicators.

First, the Nemeth Code opening indicator, you can place that at the end of a line of literary text, or on its own line. And so you have choice here as the person preparing the materials. What we really encourage you to do is once you make a decision on where you're going to put that opening Nemeth indicator, that you're consistent throughout the document. You follow that same process.

For example, if you're going to put that indicator on a line by itself, then with your Nemeth Code terminator I would recommend that you also put it on a line by itself. Again, you have the choice. You can either put that Nemeth Code terminator when the math ends, or on its own line. Consistency is the most important thing for our braille readers, folks.

Now, let's talk about the one-word switch indicator, that dot 6, dot 3. You use this if you are breaking away from math and you just have one word to write. When you do write that word, you are going to write it in contracted braille if it has a contraction. And this is a change that was made by BANA in 2021. So, we used to be able to choose contractions, no contractions. Now BANA has told us that you're going to use UEB contractions.

When deciding where to place your indicators, as I said, consistency for the braille reader is our number one rule. And the next rule is that we want to keep all mathematical content on the same line whenever possible. So, if you need to go to the next line to start the mathematical content so you can get it all on one line, that's perfectly permissible, folks.

All right, so I want you to keep these rules about the Nemeth Code switch indicators in mind as we move on to slide 4, where we're going to talk about absolute value. And that's two vertical bars that have some stuff inside. And of course that stuff is mathematic, right? How do we write those two vertical bars? Dots 1-2, 5-6. So, when you have mathematical material inside of the two vertical bars representing absolute value, you are not going to need a numeric indicator.

I've got some examples here for you. The first one is my vertical bar, 1-2, 5-6, -5. So, dots 3-6-5, and then my vertical bar again, 1-2-5-6. And I would read this as, "absolute value of -5." My next example is the negative sign, that vertical bar 1-2-5-6, -2, another vertical bar 1-2-5-6, and I read this as "negative absolute value of -2."

I've got a problem here. I've got the absolute value, -14 - 7= blank. And that blank is shown with four cells of dots 3-6, so my line. Okay? So to braille in the absolute value of -14, I'm going to do my vertical bar, 1-2-5-6, -1-4, another vertical bar, 1-2-5-6. That minus sign comes right after that vertical bar, so that's 3-6 and my 7, "space", "=", "space", and then four cells of dots 3-6.

Then I have a math problem, 24. "Is -|-8| positive?" So we want the student to answer the question. Now, notice that I start with a UEB number. It's a numeric indicator, "24." space "is". Now I'm going to need to start Nemeth code to do the -|-8|.

After the word "is", put a "space", my opening Nemeth indicator 4-5-6, 1-4-6, "space", "negative", "vertical bar", "-8", "vertical bar", "space", my Nemeth Code terminator 4-5-6, 1-5-6, "space". And then I have the word "positive", "?" So you see that absolute value is mathematical, and therefore it needs to be enclosed within the Nemeth code indicators.

Slide 5 talks about inequality signs. We've already learned less than, greater than, and equals. Now, what we're going to do is we're going to do less than or equal to, which takes three cells, dot 5, dot 1-3, dot 1-5-6, greater than or equal to, which is dots 4-6, dot 2, dots 1-5-6, or not equal to, which is 3-4 and then my equals sign, 4-6, 1-3.

I use less than or equal to, greater than or equal to, or not equal to, these signs of inequality, the same way that I use other signs of comparison. So these are signs of comparison. My first example for you is, 4 is less than or equal to x. I want to point out we've talked about this in lesson 1, but you notice that x looks like it is italicized, which it is. Remember, in preparing materials for braille readers, we're just going to ignore the italics that often is part of the print for math symbols, especially when we're talking about variables like x.

All right, so going back to my example here. 4 is less than or equal to x. Going to do numeric indicator "4", "space", my less than or equal sign, which takes me three cells to do, dot 5, dot 1-3, dot1-5-6, "space", x. Next example, 2y is greater than or equal to 4x minus 8. So I'm going to be giving my numeric indicator "2y", "space", I'm going to do my greater than or equal to sign, so dots 4-6, dot 2, dot 1-5-6, "space", and then my numeric indicator, "4x-8".

My last example is 32 is not equal to -|-32|. So I'm going to begin with numeric indicator "32", "space", my not equal to sign, which is dots 3-4, 4-6, 1-3 "space", then I'm going to do my negative sign, my vertical bar, which is 1-2-5-6, my "-32", and a second vertical bar, 1-2-5-6. Make sure that you're comfortable with these examples. You might even want to practice brailling them.

Let's take a look at slide 6. It may be March 14th when you happen to be doing this lesson. If so, happy Pi Day. Pi is a Greek letter. In braille, we represent it with dots 4-6 which is the Greek letter indicator, and then "p", which represents pi. So to braille pi, takes me two cells, 4-6 p We often use Greek letters in math and science. And in the middle grades, the first Greek letter that our students learn is pi. I want to point out to you that even though the lowercase form of pi in Nemeth Code, which is what we're doing here, is identical to the lowercase form of pi in UEB, when we're in a mathematical context, folks, we're always going to use our Nemeth Code switch indicators.

We're treating pi mathematically when we're using it in a mathematical context. All right, so let's take a look and see what happens here when I talk to you about "approximately equal to", and then I'll show you an example of using that and pi together. Ooh, we're going to combine here.

So approximately equal to are kind of those little wiggly tilde-looking things. And those are brailled as four cells, dot 4, 1-5-6, dot 4, 1-5-6. So two numbers are approximately equal to each other when they are almost equal to each other. They're really, really close. But they're not exactly equal. OK? And this is a math concept. If that is not a concept you are comfortable with, that's when you check in with the general ed math teacher.

Now, in print the approximately equal sign looks like two wavy equal signs, or two tildes, one on top of each other. When we do this in Nemeth for our students, we're going to do two tilde signs written together with no space between them. And so a tilde sign is dot 4, 1-5-6, so that's why I'm doing two of those together to represent "approximately equal to". Now, I want to remind you, that single word switch indicator we talked about early in the lesson is dot 6, dot 3, and it's showing us just one single word. And if that word happens to have a contraction, we must contract the word.

So let's look at our example problem that's going to bring pi and approximately equal to and our one word switch indicator altogether for you. So get ready. We are rocking and rolling here with problem number two: If pi is approximately equal to 3.14, and C = 2 pi r, then C is approximately equal to 6.28 r. Oh my gosh, that's a lot of math. All right, we're not circumferences and radius solving right now. We are into preparing this material in Nemeth.

So as I look at this statement, I want to make sure that I know what's the math part, and what's the word part. So obviously the "pi is approximately equal to 3.14" is math, the "C = 2 pi r" is math, and the "C is approximately equal to 6.28 r" is math. So I'm going to be doing a lot of switching, folks. So let me walk you through what I'm doing here.

So I start out in UEB "2", "period", "if". I'm going to turn on Nemeth with my dots 4-5-6, 1-4-6, my pi, which, remember, we said is 4-6 p Approximately equal to takes four cells, dot 4, dot 1-5-6, dot 4, dot 1-5-6. "3.14", let's look carefully at the print. I only have the word "and" between "pi is approximately equal to 3.14" and "C equals 2 pi r". Just one word. So this is where my one-word switch indicator comes in, my single word switch indicator, and where I'm going to use dot 6, dot 3, and contract the "and". So take a quick look at that.

I'm still in Nemeth, so on the next line, because I want to keep my math together, I have "C = 2" notice that pi again, 4-6 p r comma. Wow, that's a lot. OK. I used my Nemeth comma, dot 6. Then I've got the word "then". So that's just one word. I'm going to use my single word switch indicator. So dot 6. Then contracted, "C" I've got my approximately equal to, dot 4, dot 1-5-6, dot 4, 1-5-6, 6.28 r.
Math has stopped, but I still have a period. So I'm going to go to the next line and do my Nemeth Code terminator, dots 4-5-6, 1-5-6, and then my period. The period wasn't part of the math. So it follows the Nemeth Code terminator, because I'm back in UEB.

I really encourage you to consider brailling this example and making sure you really understand not just how to use approximately equal to and pi, but also the Nemeth switch indicators.

We're going to go on to slide 8, and it's your turn to do activity 2A. So once you've interlined the three items I have here, I want you to come back, and you'll be checking your work.

Slide 9 is the answer key for activity 2A. Make sure you check carefully, and if there's anything that you've brailled incorrectly, I encourage you to go back and review that information in the lesson.

All right, slide 10. We're going to put you to work again. This time I have five things for you to braille. So I want you to pause, and I want you to braille the material that you see on the screen.

All right, slide 11 is the answer key for activity 2B. Again, ensure that you have brailled all five items correctly before you move on in the lesson.

We're going to go on to slide 12, and we're going to talk about superscripts. And you may think, superscript, hmm, this looks like an exponent to me in the example she has. And you're right. In math we're talking about exponents, in Nemeth Code we're talking about superscripts. We're talking about how to represent those exponents. And the way I do that is I use my superscript indicator, dots 4-5, and I think about the fact that an exponent is up in the air. And I'm using the upper part of the cell, dot 4-5 for my superscript indicator.

And then I'm going to use my baseline indicator, which is dot 5. And this is going to return me from being up in the air, back to the baseline. I'm going to need to use a baseline indicator. A space terminates a superscript. But if there's something that follows it mathematical, let's say a minus sign or a plus sign, then I have to use a baseline indicator. It's really important that I pay attention to what comes after my exponent, or my superscript.

So let's look at this first example: y to the second, or y squared. I can say either way. Going to do "y", then my superscript indicators, dot 4-5, and then my superscript, "2". My next one is 4 to the third, or 4 cubed, = 64. So I'm going to start out with numeric indicator "4", superscript indicators dots 4-5-3, "space", because I put a space before an equal sign, a sign of comparison.

Now folks, because I've put that space after "4 to the third," I've automatically terminated, or ended, my superscript. So I do not-- DO NOT-- need a baseline indicator. The space says to the braille reader, hey I'm done with this exponent. So going back to my example here of "4 to the third = 64", again, numeric indicator "4", superscript indicator, which is dot 4-5, my "3", "space", "=", "64".

My next example is "3 squared - 8". Numeric indicator "3", superscript indicator, which is dot 4-5 2. Now, wow, I go to the minus sign. And there's no space. So notice how I put that dot 5, that baseline indicator right after I did "3 squared" to tell the braille reader, hey I'm returning to baseline for my -8.
Now, this next example is one that often tricks folks when they're preparing braille material. So let's look at it carefully. I have open parentheses, 5 squared minus 6 to the third, close parentheses. So I'm going to start with that open parentheses, dots 1-2-3-5-6, "5", superscript indicator, which is dot 4-5, my squared, and that dot 5, again, because the minus sign comes right away. So that dot 5 is saying, hey, I'm done with my exponent. Now I'm going back to baseline. So -6, now I'm going to the third power, so 4-5 3.

Notice what comes next, folks, look carefully. I have my dot 5. I have to return to baseline for that closing parentheses. That closing parentheses is not up in the air with the cubed. It's at the same level as that 6. So I have to stop the exponent, in this case it's a 3 in 6 to the third. I have to stop it before I put my closing parentheses.

Wow, that was a tricky one. Ooh. All right, let's go on to slide 13. Now, we have superscripts up in the air, we have subscripts down below. We're going to talk about subscripts without indicators. So a variable with a numeric subscript does not use a subscript indicator. So what does that mean? Hmm. It means that if I have a variable, like x or y, and it's, like, x sub 1, I do not need a subscript indicator. I also don't need a baseline indicator.

Wow, so this is a little bit different than the exponents. I'm not going to have a subscript indicator, and I don't need a baseline indicator. So let me show you one that our students often use when they're learning to do slope. Open parentheses x sub 1 comma y sub 1. And notice, for those of you who are looking at the print, it doesn't look like there's a space between the "x sub 1 comma" and the "y sub 1 comma". Remember, when we have items separated by commas, in Nemeth Code we're always going to put a space. So just remember that rule. So how do I braille this? Open parentheses, 1-2-3-5-6, "x", my number one, which uses dot 2, my comma, which is Nemeth dot 6, "space", my "y", my sub one, which is again dot 2, and then my closing parentheses, dots 2-3-4-5-6. So I did not use any type of indicators in brailling "x sub 1 comma y sub 1 enclosed within parentheses.

All right, I've got a word problem for you here. Here's the formula: A = h/2 (b sub 1 + b sub 2), to find the area of the trapezoid. So of course I'm going to start out in UEB. With 3, use the formula.

I'm going to open up Nemeth, 4-5-6, 1-4-6. Now I'm going to braille, "a", "space", "=", "space", open fraction indicator, h over 2, close fraction indicator, open parentheses. B sub one. So I'm going to do my "b", the number "1", going to do the "+", my b, number "2" for the sub, close parentheses. And close

nemesis with "space", 4-5-6, 1-5-6. And then I continue along in UEB to find the area of the trapezoid. So I'm following the imprint here, being careful with my scripts.

Let's go on to slide 14 and talk about square roots. A square root is what we call a radical. So I'm going to use my radical symbol, dots 3-4-5, to open up my square root. And I'm going to use my termination symbol, dots 1-2-4-5-6 when I'm done with my square root.

So my example here is the square root of 81. So I'm going to open with a radical symbol, dots 3-4-5, 81, no numeric indicator, because we're enclosed here, inside of the radical symbol and the termination symbol. So I'm going to do, again, radical symbol, 3-4-5, 81, and then the terminator 1-2-4-5-6 for the square root of 81.

I actually can have fractions inside of square root symbols. So to braille the square root of 1/16, I'm going to use my radical symbol 3-4-5; open fraction indicator, 1; my fraction line, 3-4; then my denominator, 16; going to close my fraction, and then I'm going to use my termination symbol, 1-2-4-5-6 so that my braille reader knows that my square root has ended.

Also can have decimals inside of square roots. So the square root of .36, I'm going to, again, open with dots 3-4-5, my radical symbol. I'm going to do my "0.36" for the square root of 36, with the terminator of 1-2-4-5-6. On slide 15, we're going to continue talking about square roots. And I have a couple more examples here where you're going to need to say, "end root" to tell the braille reader when your radicand ends. Okay, your radicand is what's inside.

I want you to know that you're going to need to use your baseline indicator with a radicand as needed. For example, to end a square root. So let me show you in this first example, what I mean. So I have the square root of y cubed, and I'm going to say to the braille reader, this is the square root of y cubed end root. What do I want the braille reader to be reading? Well, we're starting out with "the square root of", which means I need to use my radical symbol, dots 3-4-5. What's inside? What's my radicand? It's y, and now I've got my superscript indicator dots 4-5 3, because I've got "cubed" here.

I need to now tell the braille reader, hey, I'm done with this square root. So I want to say, end root. And that's cue me, folks, to use my dot 5, because I need to go put my terminator in. So I have to get back to baseline for the terminator. So after my y to the third, I put my dot 5, and then my terminator 1-2-4-5-6. I happen to have in my next example, it's getting more tricky, the square root of y, end root, cubed.

I want the braille reader to know that that cube, that three, which is in the exponent position is referring to the whole square root. So for this one I'm going to start my square root as usual, dots 3-4-5, "y". I'm going to terminate with dots 1-2-4-5-6. So I've told braille reader that the y is the radicand. But now I want to cube the entire square root. So I'm going to do my superscript indicator, dots 4-5, and my 3. The space that follows will automatically terminate that cubed. And so the Braille reader will know that we have ended. It's a little tricky.

All right, it's your turn, though. We're going on to slide 16. And you are going to do activity 2C and braille the problems. When you're ready, please come on back.

Slide 17 is the answer key for activity 2C. So see how you did for me. And when you're ready, we're going to go ahead and go on.

All right we are getting near the end of this lesson. Activity 2D on slide 18, let's you braille. I have three things for you to braille here. When you're ready, come on back.

And slide 19 is the answer key to activity 2D. If you brailled everything correctly on this slide, I am so proud of you. You are ready to move on to lesson 3, where we are going to talk about formatting. Thank you.