

## Grades\_2-5\_Lesson\_5 (31:22)

SPEAKER 1: Welcome to "An Introduction to Nemeth Code Symbols Used in Grades 2 to 5 and Strategies for Supporting Elementary Students in Building Math Skills." This is "Lesson 5: Supporting the Student in Learning Nemeth Code and Math Concepts." Slide 2 has the objectives. You're going to be able to describe the importance of pre-teaching both Nemeth symbols and new formats to your student, locate and use resources for teaching math concepts, and identify and use hands-on materials and manipulatives to support your student's learning.

Slide 3 reminds us that it's important to pre-teach Nemeth symbols, such as the multiplication cross, multiplication dot, divided by sign, and grouping symbols, such as parentheses, braces, and brackets, to your student before your student needs to use these in the math class. The same is true with new formats, such as headings and multiple choice problems. Now, when it comes to tables, your student needs to be familiar with what column headings are, how long dashes and guide dots are used, the top and bottom box line, and the placement of the Nemeth code switch indicators.

On slide 4, you're going to see a table that you have already viewed in a previous lesson, and this is the table titled, "Place Value Practice." So I would sit down with my student before they were asked to fill in the information in the three columns of standard form, expanded form, and word form and go over table formatting. Where is the title? Where are the directions? What is an upper box line or a top box line? How are the columns set up?

Now, in this particular table, after the column headings, everything else on the table is math. So we've made the decision to go into Nemeth code, which means that any of the words, such as thirty-three, are not going to have contractions. So if you look, after the opening Nemeth indicator, dots 4-5-6, 1-4-6, you'll see I have my first column.

How do I know I'm finishing one column? Well, there's a space. What are the guide dots, and how do they help me go across the row? How come there's no guide dots in the final column? So in Nemeth code, when something is missing, we use the long dash.

Let's go all the way to the bottom of the table. I need to close out of Nemeth. So notice I have my Nemeth terminator, 4-5-6, 1-5-6. And then I have my bottom box line. And I want to also point out to you that the length of the top box line and the length of the bottom box line are the same. So you want to make sure your student recognizes that the box lines are enclosing that table.

Let's go on to slide 5 and talk about organization. By the time your student's in second grade, your student really needs to begin to take responsibility for developing a system that works for the student. Not your system, but their system. So you may expose your student to sorting trays, storage boxes, baskets, labels, binders, folders, and even nonslip surfaces, such as rubber shelf liner, so that when they put something down it's not going to roll away.

In the picture, we have the famous green, yellow, and blue folders from APH. We also have notebooks from APH in these colors. And the nice thing about these folders is they are for 11 x 11 1/2 braille paper, as are the notebooks.

Slide 6 helps us think about building an understanding of number relationships. The first is the APH Hundreds Chart and the second are Base 10 Blocks and how I use these, and an Abacus, as well, to ensure my student has number concepts.

Let's take a look at adding with the APH Hundreds Chart. I have the problem 24 plus 28. So my student is going to find 24, going 1, 11, 21, and across to the right to 24. So my student's going to drop down to 34, drop down again to 44.

So my student's going to be moving to the right and counting to herself, 1, 2, 46, 3, 4, 5, and 6. So now she's on the 50. She's going to track back to the left. She's on 41, drop down to 51, and one more to the right is 8. And so her answer is 52.

Let's see how my student can round using the number chart. So I have the number 33, and my student needs to either round to 30 or 40. My student goes and finds 33. Moving to the left, -- it's not very far to move, so that's where 30 would be. Let's go find 40. She's got to move really far to the right. So this is letting her know that she's much closer to 30 than she is to 40, with the number 33. So she'll round to 30.

I'd like to show you a way that your student can use base 10 blocks and an abacus when working computational problems. So I have an APH tray with the divider on the left. I have my flats, or my one hundreds at the top. In the middle, I have my rods at the top. And in the right section, I have my units, or my ones, and I have 10 of those as well.

So my student has the problem 73 plus 44. So my student has this off to the side in braille, or I'm saying the problem to the student. But the important thing is the student is first going to start out by setting 73. So my student is going to pull down seven rods to represent 70, so pulling those down to the bottom of the tray. And now my student is going to pull down three units.

So if my student got the abacus, we can have the student set 73 and do this in parallel. So my student's going to set a 50 in the Tens column. And then two 10's. So 10 makes 60, and 10 more makes 70, and then three in the ones column. And now it's time to add 44. So we begin by adding 40.

So my student's going to start to pull down the rods one at a time. So 10, 20, 30, and now we ran out of rods. So we're going to do an exchange. Going to push the 10 rods up, bring down a flat. I only pulled down 30, so I need to bring down one more rod for 40. I can bring my abacus back, and let's go ahead and add 40 to the 70 on the abacus. So it's the same thing. I don't have four 10 beads, so I'm going to set 100.

I set 100. I was only trying to set 40, so I need to clear 60. So clearing the 50 and clearing the 10. So my abacus reads 113, and so do my base 10 blocks. And now I need to add 4. So my student's going to pull down 4 ones beads. And the same thing with the abacus. I need to add 4. I don't have 4 ones beads, so my student's going to pull down a 5 bead, set 5, clear 1. And we end up with 117.

On slide 7, we talk about numbers and algebraic reasoning. The 100's chart is available in consumable form so your student can have it right there with them. We also have the APH Feel 'n Peel stickers. There is a set that's braille print, numbers from 0 to 100. Really helpful when your student is making their own graphs or needs to add a number to a sheet.

We have the Hundreds Board and Manipulatives Kit, and we're going to take a look in a minute at a video, where I'm going to show you how I use that to set up an array with the Commutative Property to help my student understand multiplication. Similarly, I can use the Omnifix cubes. And in my picture, I have an array that shows 12 Omnifix cubes, representing the problem 4 times 3.

My student also could use their braille writer as a way to demonstrate number algebraic reasoning concepts. So that same array of 3 times 4 and 4 times 3 that I'm demonstrating with my Hundreds board in a second, I can also have the student do it with their braille writer. Let's take a look at that video.

In this example, I've set up two arrays, using red circles, to teach my student multiplication, and I want to really focus on the commutative property. So on the top left, I have set up the problem 3 times 4. I've got three rows with four circles in each row. On the top right, I've set up the problem 4 times 3. I've got four rows with three circles in each row.

So by exploring these two arrays, my student can see that either way, I get 12. And of course, it's going to be more helpful to many of our students if they're the ones who do the actual setting up so that they get that hands-on experience with really understanding 3 times 4 and 4 times 3 are equal.

On slide 8, we have some products that are used for basic operations. So three of them that I want to talk to you about, and I'll demonstrate in a minute, the first is the Math Drill Cards, and these come both in braille and large print combined. And you have addition, subtraction, multiplication, and division, so our four basic operations. The Quick-Picks are a lot of fun, and these also come in the four basic operations of addition, subtraction, multiplication, and division. We have Addition and Subtraction Tables, and we have Multiplication and Division Tables.

Let's take a look at how I can use the APH tray, divided into three sections, and my multiplication large print braille cards. So I've placed my cards at the top middle. When the student's ready to work, she's going to pull down the first card, read her problem in braille, which is 7 times 9 equals. Think for a minute. Oh! 63. So she's going to flip it over to check her work and see if it is indeed 63, which it is. So she's going to place the card to the right. Got it right, you place it to the right.

Let's check the next card. And she has the problem 6 times 4. And 6 times 4 she's thinking is 30. Let's flip it over to see if she's correct. And unfortunately, 6 times 4 is not 30. She's going to place it left. The nice thing about using a tray like this is then those cards that the student got incorrect, the student can go back and review and practice. You'll have a way to keep records of what problems the student didn't know.

Let's take a look at the Quick Pick division cards. These come in a case, so when I open up the case, I have a wooden stylus at the top, and I can use that to put in the hole for the problem and see if my answer is correct. So my first problem says 20 divided by 5 equals, got that question mark so my general omission symbol. My choices are 3, 4, 6, and 5.

My student thinks the answer is 5. So she's going to push the wooden stylus into the 5, and try pulling the card gently, and it doesn't come out. She's going to move her wooden stylus over to the 4 and pull out, and voila! She got it correct.

Let's look at how a student uses the multiplication and division table. So the next problem in the math book is 4 times 5. So my student reads the problem and then comes over to this tool, goes down to the row that says 4. And it's going to go across, counting five times. So 1, 2, 3, 4, 5, and it lands on the 20. Now, I want my student to make sure that we're really at 5, so I can have my student even go up to the top to make sure that she's in the column that says 5.

How would a student use this tool for division? Let's say that the division problem in the book is 72 divided by 8. So my student is going to go to the eighth row and go across until she finds the 72. But what is 72 divided by 8? She's going to go up to the top to find out. It's 9. So this is a great tool to help students get those multiplication and division facts down and a way for them to check their work.

Slide 9 talks about the Place Value Setter from APH. This is a new product. It was designed thinking about both print and braille readers. So it's high contrast for those with low vision, yellow background with black. It has columns that are labeled with the place value. So for example, a "T" for Tens, an "M" for Millions, and those labels are in print in braille. It also has the numeric indicator because our numbers start with the numeric indicator.

So what the student's going to do, you'll see in a second, is move the strips up and down to write their number. Whether they write from right to left or left to right is correct both ways, but you want to check with the person responsible for math instruction to see which way they're having students write numbers and how they're talking about number place value.

Let's look at how to set a number using the Place Value Setter. Now, this tool has seven columns. Each column has a window, and our columns are labeled. So going from the right, we have "O" for Ones. To the left of that is a "T" for Ten, and so on to the left until we get to the "M" for Millions.

There is a strip in each slot that has numbers on it from 0 to 9, and so you can pull those strips down to put the number in the window. There is an indentation at the bottom of each column that helps with orientation. So if I want my student to set 4,073, my student is first going to find the fourth column over from the right with the label "TH." Pull the strip down, feeling in the window, until she feels a 4.

Then she's going to move to the right. So she's going to pull and go all the way down to 0. To the right, she's going to the Tens column and she's going to set 70. And then in her Ones column, she needs a 3, so she'll be pulling down the strip until she feels the 3. So my student can go back. I

want her to touch my numeric indicator, all the way over on the left so she remembers that she's in a number. And then she can read her number, 4,073.

Slide 10 gives you some thoughts on Wikki Stix and where they're available from. These are quick and easy because you can cut them. You can bend them. There's a lot you can do with them. Students often use these for marking. They also are removable. So if they put them down on something, they can pull them away. I want to show you how a student would use Wikki Stix with a thermometer and with some graph paper.

Here I have the thermometer page from the Math Transcriber Kit. So on the left, I have a Fahrenheit thermometer in braille, and on the right I have a Celsius thermometer in braille. I've pre-cut some Wikki Stix for my student, and I'm asking my student to demonstrate where water boils. So we need 212 on the Fahrenheit.

So my student's going up the thermometer, feeling the different temperatures. They go up by 20's. She's gotten to 200. And so between 200 and 220, she's placing her Wikki Stick. And on the Celsius thermometer, it's going to be 100 degrees Celsius. She's starting down at the bottom, counting up. And then she's gotten to 100 and she's placing her Wikki Stick.

Now, at fourth grade, students are learning about decimals. They're also learning how to make picture models. So really hard concepts for our tactual learners. So what I've done is I've taken a piece of APH 3/4 inch square graph paper, and I've cut it down to be a 10 by 10 grid to represent decimals. So each column has 10 squares, and that represents a tenth of a whole.

So if my student has to do three-tenths,, she can take her Wikki Stick, count over to the third column, and place her Wikki Stick. And she can then explore and see that she has 30 hundredths, making up three-tenths.. So I'm going to have her remove that Wikki Stick, and now I want to have her show us .25.

In order to do that, she's first going to go over to the second column to represent the .2, but we're doing only half of the next column. So she's bending her Wikki Stick across the third column. And now she can look to the left of the Wikki Stick and see that she has 25 hundredths. And this is a great way to help a student understand that 25 hundredths is actually less than .3.

Slide 11 talks about graphing. Children begin to learn graphing skills in the early elementary grades, and they need opportunities to collect data and graph data throughout their education. So in third grade, a typical activity may be that each child is given a sheet of paper with the names of some desserts. In this case, it's mint, vanilla, strawberry, sherbet, and chocolate, so our flavors of ice cream and sherbet. They go around the room and they ask each child what flavor they like and they put a tally mark down.

So our braille reader did this using his braille writer. Then the children in the class go back and they need to make their graph. Other children are doing this with their crayons. Our student has his hundreds boards and manipulates, and he's making his graph.

So our student who is using a braille writer gets his materials out, his hundreds board and his manipulatives, and builds his bar graph. Keep in mind that you can't do labels on this tool, so our student needs to go back to his sheet and check. So in his first column, he is going to put 3 for "mint," because he put three tally marks there.

Then he goes to his second column, and he looks at his sheet and sees that he had six tally marks next to "vanilla," so six red circles going up. Back to his tally sheet, he sees that he had five classmates who liked "strawberries," so he's going to use five yellow stars to represent "strawberry." And then he had four classmates who liked "sherbet," so we've got four triangles.

And then finally, in his fifth column, the lower from the left, the most students in his class liked "chocolate," so he has eight blue squares. So other children are doing crayons to represent their graph. Our student, same concept, but using his manipulatives to show his understanding of graphing.

Slide 12 talks about the Math Window. This is a great tool that's available for purchase. It's not on APH quota. It comes in Braille Basic Math Kit with Nemeth code. There are also kits for algebra and geometry. So this really is a tool that students can begin to use in the elementary schools and use onward.

They need to be organized with how they set up their tiles. And you'll see in the video I'm about to show you that there is an optional palette you can purchase to organize your tiles. It's really important if somebody is supporting your student with the Math Window, -- so for example, in the general ed classroom, if there's problems up on the board and the paraprofessional is producing those on the Math Window for the student to solve, -- that the numeric indicator is included. Since we don't have a print equivalent, folks who are not real knowledgeable tend to leave that off.

There are several different kits that you can get, one for algebra, one for geometry. This is the basic kit that works well for our students in the elementary grades. The palette, which goes to the side and gives you a place to set up. My student has all the 0's going across and then all the 1's going across.

I want you to notice that all the tiles have the top right corner cut off. They have print and they have braille on them. I do want to point out, if you have an older kit, you need to be really careful with the decimal points and the multiplication dots to make sure that you're using the right symbol for the right function.

So I've got three problems set up here. In the top left is  $30 + 20$ . I have the separation line. I have it set up in spacial format. So my student could add 0 plus 0. In the ones column, they go to the right, they find their 0's, and they could set a 0 up underneath. Then my student looks in the tens column to see what number she has. She has a 3, 30, and a 2 for the 20. That's 50, so she goes over and finds her 5's and brings one over.

My second problem on the top, I'm actually using the carried number indicator so that the student has a place to carry their numbers. So my problem reads  $57 + 19$ . So my student's going to do

7 plus 9 is 16. And then she's going to carry the 1. And then 1, plus 5 plus 1 is 7. So she'll get her answer of 76.

My third problem, which is a linear problem, 78.5 times 32.9 equals. It's really important that this problem begins with a numeric indicator. In this particular problem, I would have my student go off and use an abacus or another tool to solve the problem. But I want to show you the setup for the math window. We can have students as young as kindergarten and first grade begin to be exposed to this, typically more in the second to fifth grade. And there are algebra and geometry sets as well, so this can really follow the student all the way up.

Slide 13 talks about the Pearson Nemeth Braille Code Curriculum. This is available at [accessibility.pearson.com](http://accessibility.pearson.com), and it teaches students to read and write Nemeth code within UEB context. There's prekindergarten, kindergarten, first grade, and second grade materials, and I'll show you some second grade materials in just a moment.

All the materials are aligned with the Common Core State Standards, and they are fun, hands-on activities for students. From your perspective, everything is ready for you. You've got scripts. You've got raw, ready files that you can emboss. You've got answer keys, ways to record data, review activities, and assessments that let you gauge your student's learning.

Let's take a look on slide 14 at the examples from the second grade games. On the left is Tic-Tac-Toe game card. So my student would play this with a peer, ideally. Might play it with me or the paraprofessional. There are three rows of math problems, all addition in this case.

If he gets the problem correct, then he gets to put his game piece, -- so it might be a Wikki Stick, it might be a sticker, -- on that problem. Next person goes, same thing. If they get it correct, they have a different texture game piece and they get to put it on. The first person who gets three in a row, Tic-Tac-Toe.

The Connect Four game card, it looks very similar to a table, doesn't it? We've got four columns and we've got five rows, so a great opportunity to practice table reading skills. First, the student becomes familiar with the monetary amounts on this table. This is another game that's played with another person, so that person also has a game card.

There are cards to draw. So the first person draws a card from the pile, reads the monetary amount, and then each person puts their game piece on that monetary amount on their card. The first person to connect four wins. Just as a reminder, when you have games with cards for your student, they need a way to keep those organized. So baskets, one on the left, one on the right, APH trays. But we want a way to be organized with those game pieces or cards.

Slide 15 talks about the Nemeth Code Focus Lessons, and these are also available through Pearson. And they are for grades 3 to 8. They're short lessons. They're available both in print and braille. They come with practice material so that the student who needs to review a concept can get information on that concept and then make sure that they really understand it.

Let's take a look on slide 16 at the Multiplication Focused Lesson. It's reminding students that multiplication is related to addition. We have a sample problem of 3 plus 3 plus 3 plus 3 plus 3 equals 15. And then it talks about, rather than writing out all those three pluses, you can do 3 times 5 equals 15.

On slide 17, we have the division-focused lesson card, so reminding the student that division is related to multiplication. So if I have question mark times 4 equals 12, my question mark means that something is missing. So something times 4 equals 12. I can approach this in a different way. I could write 12 divided by 4 equals my question mark. So multiplication and division are interchangeable in this sense.

On slide 18, which is the last one in this lesson, I want to talk about the Nemeth Symbol Library, which is available at [accessibility.pearson.com](http://accessibility.pearson.com). This library was initially developed for high school students, but so many teachers of students with visual impairments and students reported that it was helpful that it now goes from kindergarten on up.

When you go to the website, you can look up a term. So for example, if I type in "times," or I type in "multiplied by," I'm going to get the same link. And there are 240 terms. Each term that I find, or each has a symbol associated with it, and there are definitions for each symbol.

There are actually 136 symbols in the Nemeth code for which there is a definition that gives us a good explanation of how to write that symbol in Nemeth code so we know how to produce it. We open up a file and there are 600 plus examples. So there might be five or six for the particular term that I've looked up. And these examples are illustrative of how to use the symbol in context.

In this lesson, I'm going to show you a very brief video of how to look up the divided by sign to see how to braille that symbol, and then the examples that illustrate it. Under "Resources" in this course, you will find a more lengthy video, where NVDA, the screen reader, is being used to access the Nemeth Symbol Library, and more detail is provided. Let's watch that video.

SPEAKER 2: So let's look up "divided by."

COMPUTER: Divided by. Visited 102 of 691--

SPEAKER 2: When I hit "Enter" at this point, it's actually going to take me to a definition for "divided by." So I'm going to hit "Enter."

COMPUTER: Nemeth Symbol Library accessible assessed the divided by sign. Dots 4-6. Dots 3-4. Call the obelisk is a horizontal line with a dot above and below it in print. It is used between two numbers, variables, or other symbols to represent division. In a linear format, there should not be a space on either side of the divided by sign. Also, a numeric indicator is not used after the divided by sign if a number does follow it.

SPEAKER 2: I just used the arrow keys to have it read that definition to me, the down arrow. And at the end of each definition, there are links to examples of the division sign being used. The



first link is the Nemeth in EBAE, which is the old braille code. The second link is Nemeth within UEB context, the new braille code. And then the third is Nemeth in print and simbraille. And that's for those teachers and parents that do have sight so that they are able to look at the print at the same time that their students look at the braille.

So let's start by going to the braille file, and I can go to those links by just hitting the "Tab" key. The print file and the braille file are, say exactly the same thing. So I'll get out.

COMPUTER: Nemeth Symbol Library.

SPEAKER 2: I'm going to hit "Tab" to go to the print file.

COMPUTER: Nemeth in print and simbraille.

SPEAKER 2: Now in this file, remember that I'm someone who has vision for the print and simbraille file. And you'll be able to see that in this file, which, again, is the same as what it would be in the braille file, the problems are numbered. They start with the easiest examples for the youngest kids first and gets to the older examples later.

So this particular one starts with a basic one-digit division equation, 6 divided by 2 equals 3. The second example is a two-digit 48 divided by 12. The third example has money, \$8.20 divided by 4. And then there's a division of fractions and a division of fractions that have variables in it.

SPEAKER 1: So, as we wrap up Lesson 5, I hope that you have learned about at least one or two new tools that you can use or new ways that you can use tools that you're already familiar with. Thank you for watching this lesson.