Project_INSPIRE_Course_5_Lesson_4

SPEAKER: Welcome to Nemeth Code Symbols Used in the Middle Grades and Strategies for Supporting Math Learning. This is "Lesson 4: Materials and Strategies for Middle Grades." Slide two has our objectives. You are going to be able to understand what math concepts can be approached using a braillewriter, braille notetaker, or abacus. You're also going to be able to understand how to use APH products with your student to increase their concept development.

And our third objective is for you to recognize the importance of having knowledge about the use of braille notetakers for math class and when students might find it efficient to use them.

Slide three, our title here is "The Oh So Important Braillewriter!" Now, I know by the middle grades that we are really focusing on technology. And we absolutely should be with our students. However, folks who are print readers will still pull out a pencil and paper. And our braille readers need to be able to do the same. And their pencil and paper is a Perkins braillewriter.

So there are times when using a braillewriter is appropriate. For example, when we're doing factors and the greatest common factor, which is a 6th grade skill. Now, let me show you how this works with having to find the greatest common factor for the numbers 24 and 18.

So my student takes on their braillewriter. And they're going to factor the number 24. So they're going to create two columns here; four rows, two columns. In the first row, they're going to write 1 and 24 because 1 x 24 = 24. Okay, next factor they're going to try is 2. How many 2s go into 24? 12, so they're going to do 2 and 12 on the second line, 3 and 8 on the third line, and 4 and 6 on the fourth line, so our factors of 24 that we've now figured out.

Now, let's do the same thing for 18. So my student does 1 and 18 on the first line. How many times does 2 go into 18? 9, so 2 and 9 on the second line, and 3 and 6 on the third line. Now that my student has written out the factors for 24 and the factors for 18, my student is able to compare and find out which factor is the largest.

In this case, it's 6. So my student has circled 6. They could put a pushpin next to 6, a mark, Wikki Stix, whatever works for them to show that the greatest common factor between 24 and 18 is 6.

Another way my student can use their braillewriter is to do multiples and the least common multiple, which is also a 6th grade skill. So, for example, if my student is working with 2 and 5, my student, first, can take and braille the number 2, go across and count by 2s: 2, 4, 6, 8, 10, 12. So they braille those.

Below the 2, they're going to braille a 5 because we're looking at the multiples of 2 and 5. So braille by 5: 5, 10, 15, 20. What's the multiple that is the least that they have in common? So that least common multiple is 10. And you can see my student has circled this.

Also, we could practice working with proportions here as a 7th grade skill using a braillewriter. So my point here, guys, is fancy isn't necessarily needed. We can go back to the basics of a Perkins braillewriter.

Slide four talks about when do you use a braillewriter versus a notetaker. And so you want to work with your students so they can make these decisions. Some math problems really do lend themselves to be solved on a braillewriter. And others lend themselves to be done with either a braillewriter or a braille notetaker.

So what I want you to think about, and then help your students think about, is whether a problem takes a single line of braille or if they need to refer back to multiple lines, such as when they're doing simplifying expressions, using the distributive property, solving equations, and solving problems using the order of operation. When we're doing those types of things that involve multiple lines, then using a Perkins braillewriter really makes sense.

Slide five talks a little bit more about these braille notetakers. They are great when you're doing simple types of brief problems that take just one line. And what we want is the student to be able to use technology in the sense of, hey, I've done my work on my braille notetaker.

Now I'm going to email it to my teacher. I'm going to put it in the Google Drive, whatever the teacher has given us instructions to do. Problems that lend themselves well to this include ratios, fractions, integers, absolute value, exponents, and radicals. Alright, lots of great ways to use the braille notetaker.

Slide six talks about long division with multi-digit numbers. This is a 6th grade skill. Our braille reader has three options here that we're going to go over.

The first is the algorithmic method, which is what I learned as a child. The next is what we call the Hangman, or the Hang 7, or the Big 7 method. And we're going to give you some resources. So if you're old like me, you can see how kids do these kinds of problems today. And then we're also going to do a demo in just a moment about doing this type of a problem on the abacus.

Let's start out by looking at my example for the algorithm method and this is my example on the left side of the slide. So I set up my problem: 11 goes into 3,765. When I'm working the algorithm method on my braillewriter, there are a couple of things to keep in mind. I have to keep my columns lined up so that I'm doing my computation properly. A braille user is going to have to roll the paper. So this can make it a little tricky for some of our students.

I'm going to walk you through this problem very quickly. So I need to see how many 11s are in 37. There are 3. So I'm going to put my 3, 3 x 11 = 33. Going to take 33 away from 37. I get 4. Going to bring down the 6, going to see how many 11s are in 46. There are 4.

So again, I'm going to go roll my paper up and put my 4. 4 x 11 = 44. Going to do my subtraction and get 2, bringing down that 5. How many 11s are in 25? There are 2. 2 x 11 = 22. And I'm going to have my remainder of 3, then go up to the top.

And I'm going to braille my "R" for remainder and then a dot 5. Folks, that is not a dot 1. That is a dot 5, which is my multi-purpose indicator that lets the braille reader know, "Hey, we've got a remainder here." R dot 5 means remainder. So my remainder is 3. It is not 13. Very important that you understand this and your student understands this.

Let's look at the Hangman method here. Now, the advantage of the Hangman method when I do the problem 3,765 divided by 11, is my student is not going to have to do any back and forth rolling with the braillewriter. And as my student does their computation to the right of the problem, it's not imperative that their columns line up.

So I start out going, how many 11s are in 37? 3. I've got two digits to the right of the 37. So I'm going to add two zeros. So I'm going to braille 300. I'm going to do 11 x 300 = 3,300. Going to do my subtraction and get 465.

How many 11s are in 46? There are 4. So I'm going to go ahead, add one digit to the right of the 46. So I'm going to braille 40. So I'm going to do my math. 11 x 40 = 440, do my subtraction, I have 25.

How many 11s are in 25? There are 2. So I'm going to braille 2. Now what my student needs to do is they need to add up 300 plus 40 plus 2, and they're going to get 342. And they did that subtraction of 25 - 22, they have 3 remaining. So they're going to do that R, multi-purpose indicator dot 5, 3.

At the bottom, they have brailled equals 342, space, R, multi-purposes indicator, 3. And they didn't have to do any rolling of their braillewriter going back up and down. So we've seen how to do the algorithm method and the Hangman method using the braillewriter.

What I'd like to do is a brief demonstration video for you of how a student would solve the problem 3,765 divided by 11 using an abacus. And I'll point out to you that the dividend goes on the right. In this case, the dividend is 3,765. And the divisor, or what you are dividing by, goes on the left. So make sure we set it up right. Let's watch that video.

[VIDEO PLAYBACK]

For long division, we're going to use 3,765 divided by 11. So on the right side of the abacus, starting with the thousands column, I'm going to start setting 3,000, 700, 65. On the left side of the abacus, I'm going to set the 11. And I'm going to begin by taking 11 into the 3, which is in the thousands place. It's obviously too large. So then 11 into the 37, which is in the thousands and hundreds. That's going to go in there 3 times.

So I'm going to move to the left from that 7 in the hundreds column, three columns: one, two, three. Set that answer of 3. Now, that 3 times 11 is 33. So I'm going to subtract 33 from the 37. That's going to leave me with 4.

And by the way, the reason I'm moving to the left 3 columns is it's always one more than the number of digits in the divisor. I have two digits in the divisor, so I'm moving to the left three columns as I'm placing the answer.

So now 11 into the 4 is going to be too large. 11 into the 46, now, my right index finger is on 6 and 46. That's going to go in there 4 times. So from the 6 and 46, I'm going to move to the left three columns and place that answer of 4. 4 times that 11 is 44,

so I'm going to subtract 44 from the 46. Students just tend to do that in their head at this point and place the answer 2 in that tens column. Now, 11 into 20. Into 2 is going to be too large, so 11 into 25 is going to go in there 2 times. So from the 5 in the ones column, I'm going to move left three columns and place that answer of 2. 11 x 2 = 22, subtracting that from the 25, which is going to leave me with the remainder of 3.

Now what's going to happen is because I have a two-digit divisor, those last three columns-- because I always moved over three columns for my answer-- is going to be left for the remainder. Everything before those three columns is now going to be my answer part, minus the remainder. So my answer is 342, remainder of 3.

[END PLAYBACK]

SPEAKER: Let's move on from long division to slide seven where we're going to start to talk about decimals and fractions. Now, a braillewriter and abacus can be used by the student when they're working with decimals and fractions. So you want to help them find what tool is most efficient for them.

On an abacus, if your student is working with decimals, any unit marker can be used to represent the decimal place. And when the student is working with fractions, they can use the abacus to keep track of numbers while making mental math computation. So as we saw in the demonstration of the long division using the abacus, by this level, our students are really good at mental math.

Let's go on to slide eight and talk about decimal operations using the abacus, which is a 6th grade skill. So we're going to have our students being able to add and subtract. And it's going to be very important that they pay attention to place value.

So for example, 3.04 + 12.795 - 8.6. My student has to be aware of those decimal points and make sure that they're accurately representing the problem, whether they're using the braillewriter or the abacus so that they actually get the answer of 7.235.

When our student is doing multiplication, they're going to ignore the decimal point and place that decimal point at the end of their computation based on the total number of decimal places in the original problem. Similarly, when they're dividing, we want to make sure that there's no decimal places in the divisor before beginning. So our student is going to need to account for that.

Now, I'd like to show you a video where you're going to see how to set up and compute the first problem with decimals. And then, we'll show you the setup for the one with multiplication and division.

[VIDEO PLAYBACK]

Next, we're going to look at decimals. We'll start with adding and subtracting in a single problem. I have 3.04+12.795-8.6. I have placed a rubber band on my abacus at that unit marker between the hundreds and the thousands column

and that's going to represent my decimal. So now everything to the left of that rubber band is going to be my ones, tens, hundreds, thousands, and so forth. To the right of that rubber band is going to be my tenths, hundredths, and thousandths.

So we're going to do 3.04. That's going to be a 3 to the left of my rubber band, and then 0, 4, to the right of the rubber band. I'm adding 12.795. So I'll add 1 in the tens column, 2 in the ones column. I already have three. So I'm just going to do 3 + 2 in my head and replace that with a 5. And I'm going to add 7 in the tenths column. I'm going to add 9 in the hundredths column. I already have 4, so 4 and 9 is going to be 13.

So I'll carry that 1 in the tenths column and then replace that 4 with 3 in my hundredths column. And then I'm going to add 5 in my thousandths column. Now, I'm going to subtract 8.6. Right now, I have 15 to the left of the rubber band. I'm subtracting 8, so I'm going to replace that 15 with a 7. Then I'm going to subtract 6/10, which would be a 5 bead up and a 1 bead down, leaving me with an answer of 7.235.

Now, to do multiplication, I'm going to get rid of that rubber band. I don't really need it. I'm going to clear out everything that I currently have on the abacus. I'm going to do 3.49 x .5. So I'll place the 349 on the left side of the abacus. And then I'm going to count over to see where that 5 should land. So 349 x 5, that 5 is going to be placed in the ten thousands column, that fifth column to the right.

Now, that answer is going to end up appearing to the right of where that 5 is currently. And I'm going to do 41.275 divided by .25. And we always want to have no decimal places in the divisor. So I'll move both of those decimals over two places to the right. That's going to have 25 for my divisor. And instead, I will have 4,127.5.

So I'm going to use that rubber band again, mark off where my decimal is at that first unit marker on the right. To the left of that rubber band, I will place the 4,000, 100, 27. And to the right of that rubber band will be my .5. That 5 is just to the right of the rubber band.

[END PLAYBACK]

SPEAKER: Alright, now, that you've gotten a chance to see how we do decimals using an abacus, on slide 9, we're going to turn our attention to how a student can work with fractions using an abacus. Fractions go across 6th and 7th grade as far as skills go.

Now, you're going to find that most of your students do prefer to use the braillewriter and mental math when they're doing fractions. But there are some students who will really appreciate doing this using an abacus. So it's a tool you should introduce to your students.

[VIDEO PLAYBACK]

To add 3 and 4/5 + 2 and 3/5, we're actually going to just use the different periods on the abacus to represent the different parts of those mixed numbers. So I'm going to use the period all the way to the right as my denominator, the next period over for my numerator, and then that millions period as my whole number.

So to set up 3 and 4/5, I would just place 3 in the millions place, 4 in the thousands place, and 5 in my ones place. So then I'm going to add 2 and 3/5. So I'm going to add my whole number of 2 to the 3 that's already there. That's just going to give me 5. Then I'm adding 3/5.

So my numerator, I'm going to add 3 to the 4 that's already there. So I'll replace the 4 with a 7. And of course, the denominator stays that like denominator, so it will stay 5. Now, in this case, my numerator of 7 is larger than my denominator of 5. So I have to change that into a mixed number,

so 7/5 would actually be 1 and 2/5. So I'm going to add one more to my whole number and then change my numerator to 2. So now, I have a whole number of 6, a numerator of 2, and a denominator of 5, for an answer of 6 and 2/5.

[END PLAYBACK]

SPEAKER: Let's go on to slide ten and talk about hands-on fractions. Some of our students really do need to be hands on, especially our students who have some additional learning challenges. So I really encourage you to go to your APH MathBuilder's unit 7, that's the decimals, mixed numbers, and fractions materials that are very hands on. And you can use these with your students, for example, to teach equivalent fractions and also adding, subtracting, multiplying, and dividing fractions.

Keep in mind, the number of manipulatives you have to represent fractions are pretty limited, but you can definitely get the concept across. So let me show you real quick how I can show 1/3 = 2/6.

[VIDEO PLAYBACK]

The MathBuilder's Fraction Kit comes with a nice tray and fraction tiles that include both braille and print on the tiles. We're going to look at a couple of problems using these tiles. The first one is equivalent fractions.

So if I want to find equivalent fractions for one third, I can take, for instance, the sixths and see how many of those I need to be equal to one third or go the same distance as one third. So I've placed one third on my first row and two sixths on my second row to show they go the same distance, and they are equivalent. 1/3 is equal to 2/6.

The other thing I can do is add fractions. So for instance, if I wanted to add 1/2 and 1/6, I could place the half tile in the first row and just, after that, place 1/6, and then see how many 1/6 does it take to be equivalent to 1/2 + 1/6. Place in the second row 1/6 until I reach the end of the 1/2 + 1/6. And it takes four of them. So 1/2 + 1/6 is equal to 4/6.

And then I can, again, find an equivalent fraction to 4/6. So I can place two of the 1/3s in that third row. Notice that these all land me to the same distance to the right. So 1/2 + 1/6 is equal to 4/6, which is also equal to 2/3.
[END PLAYBACK]
SPEAKER: Slide eleven is another way for us to have our student work with equivalent fractions, again, a 6th grade skill. So my student could use their braillewriter, very simple. They can make a table. So let's say I'm working on, what are the equivalent fractions for 1/3?
My student brailles 1, couple spaces, 3. Underneath the 1, they braille a 2. And they're going to multiply by 3 so 2/6. So they'll braille a 6 under the 3, and 3 and 9 so that 3/9 is equivalent to 2/6, which is equivalent to 1/3, and so on with 4/12 and 5/15.
Another thing I could do is give my student the multiplication table that comes from APH. So let me show you a quick video on how my student can get equivalent fractions for 1/3 using the multiplication table.
[VIDEO PLAYBACK]
The multiplication chart can also be used to find equivalent fractions. I can let one row be equal to my numerator, another row be equal to my denominator. So in this case, I'm going to use my right hand to work on my numerators and my left hand to look at my denominators.
So in this case, I, first, have the fraction 1/3, using the one row and the three row. Then, going to the right, I have 2/6, 3/9, 4/12, and 5/15, and so forth.
[END PLAYBACK]
SPEAKER: Let's move on to algebra on slide twelve with our hands-on materials, which are APH Tactile Algebra Tiles. And I really like these for helping our students learn things like the distributive property, adding and subtracting integers, simplifying expressions, and solving equations. And this can be one-step equations, two-step equations, or multi-step equations.
What I'd like to do is we're going to go to the video, I'm going to name a problem, and then we're going to see how you actually use the algebra tiles to work that problem.
[VIDEO PLAYBACK]
Now let's look at solving some equations. I have on my magnetic board, that vertical bar is going to represent the equals sign. To the left of the equals sign, I have x - 4. So I have a rectangular and four small squares that have the dots on them. And then to the right of the equals sign, I have a positive 3. So x - 4 = positive 3.
Now, to solve this equation, to get rid of a minus 3, I would then add 3. So I'm going to put four positive x's on the left side. If I add four x's on the left side, I have to add four x's on the right side. Now, what happens is that then forms some zero pairs on the left side. So each of those zero pairs can come off of the left. That leaves me with x = 7.
Now, let's solve a problem involving multiplication. I have this time, 2x = negative 6. So all I do is divide those x's into two groups basically. Same thing on the right side, I'm going to divide it into two groups. And each group is going to be x = negative 3. And that's my solution. x is on the left. Negative 3 is on the right for each group.
Now, let's look at a 2-step equation. So for this problem, I have 3x + 1 = 7. And I could add a negative x to each side and take out those zero pairs. Or since they're both positive anyway, I can just take one from each side of the equals sign. Now I have three x's. So I would then divide it into three parts. And I'm going to have two in each part. So x = a positive 2.

The last one actually has a parenthesis in it. I have two, open parenthesis, x - 2, close parenthesis. So in this case, I have two groups of x - 2's on the left of the equals sign and a negative 8 on the right of the equals sign. So that two, open parenthesis, x - 2 actually gives us two x's minus 4 on the left side.
To get rid of my minus 4 on the left, I would go ahead and add 4, or I could then take off my zero pairs. Or I could just take away 4, negative 4 from the left, take away a negative 4 from the right, and then since I have two x's, I would divide it into two groups and each x would equal negative 2.
[END PLAYBACK]
SPEAKER: I told you you would really like those tactile algebra tiles, didn't I? Lots of great things you can do with them. Let's go on to slide thirteen and talk about other ways that your students can add integers. And these are quick and easy ways, folks. So when we're in seventh grade, and we're working on these adding integers, the very first thing you could have your student do is use a braillewriter.
So for example, if I'm doing negative 6 + 4 = 2, my student can take on one line and braille six negative signs. On the next line, right underneath, they can braille four positive signs. And just as you saw in the video with pairing up and getting zero, we can do the same thing. A negative and a positive, a negative and a positive, a negative and a positive, a negative and a positive, what's left? Two negatives. So the answer is negative 6 + 4 = negative 2.
My student could use tactile tokens. In the picture, you'll see I have six blue tokens or circles representing the six negatives. And I've got four yellow circles that are representing the positives. And my student can take and match those up. And they will be left with the blue two, meaning negative 2. Of course, I want to make sure that these tokens do have tactile representation for my student who can't see the blue and the yellow.
Also, I can have my student use their abacus. So if you look at the picture I have of the abacus, you'll see on the very far left, I've set six, and on the very far right, I've set my positive four. So my negative 6 is on the left, and my positive 4 is on the right.
And again, my student can pair up. So if I take 1 away from 6, I have 5 on the left and 3 on the right. And I continue. If I take 1 away from 5, I'm going to have 4 on the left and 2 on the right. And eventually, I'm going to just end up with two on the left, which is my negative side. So my student knows that the answer to minus 6 + 4 is negative 2.
Slide fourteen talks about absolute value, a sixth grade skill. When we're talking about absolute value, we mean the value of a number on the number line with its distance from zero. So it doesn't matter if it's negative or positive, we're looking at the distance from zero.
So I'm asking my student for the absolute value of negative 3. So my student is able to use their braillewriter to create a number line and then count over to the left three from our zero. And they're going to get 3, whether they go negative or positive. I can have my student use an APH number line as you see in the photo and a Wikki Stix to mark the negative 3.
Slide fifteen talks about ratios, which is a 6th grade skill. Now, our student can easily use a braillewriter to represent the symbols used in ratios. So for example, in the book, the student has eight rectangles and three of them are colored in yellow. And we're seeing that there is a bracket showing us that the value of those three colored in rectangles is 12. The value of all eight of the rectangles is 32.
So how's our student going to represent this in braille and figure out what one shaded section equals or an unshaded section equals? So I want my student to first start out by doing "What equals 12?" They're going to use a full cell for each shaded section.

So they're going to do three full cells equals 12. Now, they can do eight full cells equals 32. Now, this is where they actually have to figure out, well, what is the value of one full cell? And it's four. So that's the answer that they need to get to give to the teacher.

Another example here is when I have a student who needs a different way to show what's missing here, what is each unshaded rectangle equal, my student can use an x. So for example, we have three out of five, and the student needs to figure out what's going on here. They can do their three full cells to represent the three that are shaded in. And then they can use the x to represent the two that are not shaded in.

So our role here is to give them a way to represent these pictures that the math teacher is using. The math teacher will teach them how to figure out the ratios.

Let's go onto slide sixteen. And I'm going to get my ratios even a bit more complicated by introducing a problem from the math book about boys and girls. Now, your student might want to opt to represent boys with a B and G's for girls. The important thing is that they have a way to represent what this picture is showing us in the book. So first, let me read you the prompt:

"The ratio of boys to girls is 3 to 5. Draw a tape diagram that represents the ratio. Extend the tape diagram to find out how many boys if there are 10 girls and how many girls if there are 9 boys?" So we've got to really get going here on our math, folks.

My student starts off by writing "boys" and there are three rectangles in the diagram, so they're going to use three B's. And right underneath, they're going to write "girls", and they're going to represent the five rectangles we have for girls with five G's. That's my first set.

Now, my student has to extend. So they've been told that they have to extend the number of boys to nine. So they're going to go ahead and do a second set of three B's with five G's underneath it because we know three B's and five G's are equal and then another set because they need to get up to nine boys. Add five G's underneath that.

So my student can see that when I have 9 boys, I have 15 girls. And when I have 10 girls, I have 6 boys. So this is a way, using the braillewriter, my student can represent tape diagrams for ratios.

Slide seventeen talks about order of operation. Do you remember "Please Excuse My Dear Aunt Sally?" Wow, that came back to me when I thought about 6th to 8th grade. And this is a mnemonic to help our students remember what order we do operations in, which are parentheses, then exponents, then do multiplication and division, and finally, do your addition and subtraction.

I really like to have my student use a braillewriter as opposed to a notetaker because you're going to have multiple lines, and you want your student to go back and look. So if I start out with the problem, 2 x 8 - (9 + 5) + 6 squared 3. Okay, what do I do first?

Well, I do things inside the parentheses first. So (9 + 5) I can replace with 14. So on my second line, I'm going to braille 2 x 8 - 14 + 6 squared 3. Going in order, the next thing I need to do is to address the exponents. Well, I can replace my 6 to the second power, or my 6 squared, with 36.

So my third line of braille reads 2 x 8 - 14 + 36 3. Going along in my order of what to do, I get up to "my dear" at multiply and divide. So I'm going to say 2 x 8 = 16, and 36 3 = 12. So now my problem reads 16 - 14 + 12. And my student can now do the addition and subtraction. And 16 - 14 = 2. 2 + 12 = 14. And that is my answer.

So you want your student, just as the sighted students, the print readers, in the class are learning this order of operations, you want your student doing the same thing. But they're going to be using a braillewriter.

Let's start talking about scientific calculators here on slide eighteen. Now, as peers who are print readers begin to use handheld calculators, we want our students who are braille readers to also use some type of calculator. Now, what calculator should your student use? That really depends on a lot of things.

If you have an Orion TX-30XS already available to you, this is a really great multi-view talking scientific calculator that you can introduce to your students. These calculators used to be available through APH on federal quota, but they no longer are available on quota. So they do cost money. See our resource list on where you can purchase the Orion TI-30XS.

We suggest if you don't have an Orion TI-30XS that you consider having your student use the Demos Scientific Calculator. This is a free online calculator. But keep in mind, your student really is going to need to have keyboarding skills to be successful using this calculator. We highly recommend that all students at this level are strong keyboarders because there's a lot more than using calculators that we use our keyboarding skills for.

But that is an important consideration. Let's go to a short video and see how we use the Desmos Scientific Calculator to solve the problem 5 squared minus the square root of 9.

[VIDEO PLAYBACK]

So I actually have the Desmos calculator open. There's two ways I can get to that calculator. I can just go to desmos.com and then use the "Find" command, "Control-F," type up "scientific" and hit "Enter." And it'll take me to this calculator. The other thing I can do is type the whole address desmos.com/scientific. And it will also take me to the same calculator.

Now what's really nice about this calculator is I can literally just type in the problems. So I'm going to use, for the exponent, a Shift-6, which is a caret for exponents. I'm going to use the right arrow to come out of the exponent. And then I'm going to SQRT for the square root. So 5 squared - 9. I'll type in my 5--

(electronic voice) 5.

- --Shift-6, my caret.

(electronic voice) Caret, superscript, baseline 5, superscript, baseline, superscripts can not be empty.

- So notice it said the superscript cannot be empty. That's because I still have to type what that exponent is. And it's a 2.

(electronic voice) 2 5 squared = 25.

- So it's telling me what I have so far, 5 squared is 25. But I'm not done with my problem. So I'm going to right arrow to get out of the exponent.

(electronic voice)- After superscript to baseline.

- And it told me. After superscript, now I'm on baseline. So minus--

(electronic voice) Dash minus, 5 squared minus-- you need something on both sides of the apostrophe, apostrophe symbol.

- It says apostrophe, but it's just saying I need something after that minus sign. I'm going to do the square root of 9. So that's SQRT.

(electronic voice) SQRT, 5 squared minus start root-- end root radical can not be empty.

- It says my radical can't be empty. But on the screen, it actually shows me a visual radical as soon as I typed that T of the SQRT. So I'm going to type in 9 because that's what's inside my radical.

(electronic voice) 9, 9, 5 squared minus start root, 9, end root, = 22.
- And notice it read the problem. And it told me what the answer is. And that is a scientific calculator following the order of operations, any parentheses, then exponents, then multiplication, division, then addition, subtraction.
[END PLAYBACK]
SPEAKER: So you got to see a very quick demonstration of the Desmos calculator. We are planning here at Project INSPIRE in a future course to have a full lesson about the Demos calculator, but we encourage you to check it out if you have a student who needs to use a scientific talking calculator.
Let's go on to slide nineteen, which is our last slide in this lesson and I just want to go back to using braille notetakers in math class. And we've talked throughout this lesson about when a problem is just a linear problem that a notetaker may be a very appropriate tool for your student to use. But when we have problems that are multiple lines, we really encourage your student to use a braillewriter.
I want you to think about the fact that braille notetakers have lots of great functions in them. For example, that scientific calculator is built into the braille notetakers. So your student wouldn't need to learn how to use another program or have to have another tool.
One great thing about a braille notetaker is your student can do their math, just like they do other assignments, on their notetaker, and then they can email or put into the course sharing platforms, such as Google Classroom, their work for the teacher. Thus, eliminating needing to have you or another person take and transcribe their braille.
We're not even going to begin in this lesson to talk about the different kinds of notetakers that are out there or the function keys that you need to press to do certain things because I think we all recognize that things are continually changing and new tools are coming on the market.
As a teacher of visually impaired students, it really is important that you stay current on the math capabilities available on different notetakers. And when you're working to decide which notetaker to purchase for your student-- these are hefty purchases-- you want to look at the math capabilities of the specific devices and compare these, thinking about what your student is going to need over the next one, two, three years.
Take advantage of what the manufacturers have to offer. Go to their websites, read up on the notetakers, take a look at videos or tutorials that they have. If there's a conference, and they're doing a session where they're demonstrating how to do something specific with a notetaker-- even if your district doesn't own that notetaker currently, go get yourself informed.
Talk to the vendors. Are they willing to come to the school and do a demonstration for you, your administrator, or your students so that you all can get informed? If you've already purchased a notetaker, will they come out to the school and troubleshoot? You want to ask these questions ahead of time before you make this investment.
And we really encourage you to go to YouTube. There are a lot of videos out there-- some made by the manufacturers, some made by users-- that can help inform you and your students of the capabilities when it comes to using braille notetakers for math class.
We have covered a lot of information here in lesson 4. We look forward to having you join us for lesson 5 where we're going to continue looking at ways that your student who is a braille reader can engage in math learning. Thank you.