Project INSPIRE Course 5, Lesson 5

Transcript

SPEAKER 1: Welcome to Nemeth Code Symbols Used in the Middle Grades and Strategies for Supporting Math Learning. This is Lesson 5: Creating Materials for Students to Use in Middle School Math Classes and Preparing Them for High School. Slide two has our objectives. You are going to be able to recognize different types of graphs used at the middle school level and the concepts and terminologies that our students need to know. You're going to be able to describe the ways in which students can construct different types of graphs used in middle school. Third, you're going to be able to explain how a graphing calculator is used by a student. Next recognize the role of adults and students at the middle school level. And finally, we're going to talk about how you can describe ways to organize materials and work spaces for your student.

So, let's get started on slide three, talking about number lines. Now we use number lines in sixth to eighth grade. Often our students are going to use their braille writer, when they're creating and working with number lines. However, I want to talk a little bit with you about some of the APH products that your student can use with number lines. So we have the number line device. We have consumable number lines. We have graph paper.

So, let's start at the top right with my example in which I use a consumable number line from the American Printing House for the Blind, very easy to get on federal quota, friends, where I use my graphic art tape and I can use some textured circle stickers that you can get from MaxiAids. They're called bump dots. So I've got the problem 9 is less than or equal to x, which is less than or equal to 27. We're going to have my student use a consumable number line that I have put my Feel and Peel stickers on.
Now this is kind of small, So I actually use my Feel and Peel stickers and labeled my tick marks by 6. So 3, 9, 15, 21, 27, 33. My student needs to focus on how to demonstrate this problem to the teacher. My student can put a bump dot at 9, and another bump dot at 27, and then using graphics art tape, can show that the line goes between 9 and 27 to represent the value of x.

Let's look at my second problem. So I have x is less than 7 or x is greater than or equal to 14. Here I have realized that if I take the large thumbtacks and I use a hole punch in the middle of a large one, I can create a circle that's open. Very handy here when my student needs to do the graphic. So in this case, I've used the consumable number line that is already labeled in braille. My student has put an open circle at 7 and closed circle at 14. Then my student can use Wikki Stix to represent the lines to show the value of x.

Let's take a look now at the bottom photo where I'm using my number line device to have my student do two problems. First, let's talk about how I've set up this number line device. I want my student to find the number of lines that they need easily. So I provided the stack of number lines that comes with this product. And I've organized them, so that the top one is the one that goes 0, 1/2, 2/2, 3/2, et cetera. And if

I keep a consistent order for my student, they're going to be able to quickly find the number of line they need.

Also the number line comes with two different kinds of pegs, and depending on how you position the pegs in the number line, they feel differently. So you want to experiment with that, so that you and your student can see that you can use the pegs to represent open and closed circles.

So on my top number line my student is working the problem x is greater than 7/6. So my student takes one of the pegs, turning it upside down so it's an open hole, and puts it at 7/6. And then my student takes the other peg, which is pointy at the top, and puts it in at 10/6 to represent that x is greater than 7/6. in this case, my student draws the line by using a couple of the pegs laying on their side. Very convenient, so that the teacher again, can see their work.

On the second number line, my student is using the decimal number line, 0.1 0.2, et cetera up to 2.0. And my student is working the problem 0.3 is less than or equal to x, which is less than 1.2. So my student is going to take a peg and turn it so it's a closed circle at 0.3. They're going to take another peg and flip it, so it's the open circle at 1.2. And again my student can lay the pegs on their side to represent that line between 0.3 and 1.2.

Let's go on to slide 4, and we're going to talk about number line lessons from Pearson. Folks, the work has been done for you. The team that has put these together, which is part of our Project INSPIRE team Susan Osterhaus, Sara Larkin, and Tina Herzberg have created explanations and activities for you and your students around concepts such as number lines with no points, number lines with points, number lines with inequalities.

And they've included whole numbers, integers fractions, decimals, and time. Bookmark the link. We have it here in the slide, but we also have it in our resource list. I'm not going to go through these activities with you. I just really want to make you aware of them. Please take the time to take a look at them.
On slide 5, continuing along with the Pearson material about graphing and interpreting inequalities on a number line, I want to point out that they show you the way that your student may do the graphing versus the way a transcriber would do the graphing. And I think this is important for us when we're working with our students directly to recognize that our students must be able to read things that are done by the transcriber, but that they're going to come up with a more efficient method for themselves.
Let's go on to slide 6, and we're going to talk about statistics. Now this is a sixth, seventh grade skill where students are going to be doing concepts such as mean, median, mode quartiles, interquartile range. The students are given a list of numbers. In my example, there's 10 members so the first thing the students probably going to do is figure out the mean, and they can use a calculator to do that. When it comes time to do the other things that they need to do statistic wise, they're going to need to put the numbers in order.

So, in my example, I have 10 numbers, 1, 3, 3, 4, 5, 6, 6, 7, 8 and 8. So my student brailles those in order. I like my student to use Wikki Stix to show what needs to be shown. Really simple. So little pieces

of Wikki Stix. So when my student needs to do the median, which is to put the numbers in order and find that middle number, they can take and put a Wikki Stick once they find the median. In this case, my median falls between 5 and 6. So my student can place that Wikki Stick right between the numbers 5 and 6. And that's actually quartile 2.

All right, let's talk about the mode. Now for the mode the student doesn't inspection so if I'm looking at my numbers that I've put in order, my gosh I have three modes. I have the number 3, the number 6, and the number 8, which are all repeated twice. So how is the student going to do the quartile? All right I've already figured out that the median, and I'm looking at my brailled out numbers, goes between 5 and 6. I've got 5 numbers to the left of the median, or quartile 2, and 5 numbers to the right.

So, to find quartile 1, my student's going to say, wow, I've got 5 numbers. What's the one in the middle? It's the third number. In this case, it happens to be a 3, but it could be different numbers. We're not focusing on the three here. We're focusing on it's the third number. And that's my quartile 1, so the student is going to put a Wikki Stick under that 3. Same thing for finding quartile 3.

My student's going to look and say I've got 5 numbers to the right of the median, the third one is in this case is 7, so I'm going to put a Wikki Stick underneath that 7. To find the interquartile range, my student is going to examine with the braille writer to find out, let me look at my numbers, OK. Under a quartile 1, and under quartile 3, I've got those marks where the difference Q1 and Q3, in this case is 4.

We're going to go on to slide 7, and we're going to talk about mean absolute deviation. This is getting really exciting because this is a sixth, seventh grade skill. Now my student's going to use a braille writer and a calculator to do work here. My student's going to set up a table, and this table has three columns. My first column I labeled it x, and it's those same 10 numbers that we just used in our previous slides. So 1, 3, 3, 4, 5, 6, 6, 7, 8 and 8.

My second column is the label mean. For that my student is going to put 5.1 down because when they use their calculator, they found that the mean was 5.1. So every value in the column labeled mean is 5.1. My third column is the absolute difference, and I labeled this as abs period, diff period, for absolute difference. This is where my student needs to use their calculator, or they can do it in their head in this case because we're working with pretty simple numbers.

But what my student needs to do is to do a subtraction problem. So the mean minus the value. So if 1 is my value, and my mean was 5.1, again, so 5.1 minus 1 is 4.1. So my student is going to braille 4.1 in the third column. My second value is 3 get my need is 5.1 my student does the subtraction and they braille 2.1 in that third column. So they go through they do this for all 10 numbers in this particular data set. Then what my student is going to need to do is to total up all the numbers in the absolute difference column in that column 3, and my student can braille total equals 19. Remember what we're all about here is finding out the mean absolute deviation. So my student is going to need to take that 19. In this case, they have 10 numbers in their data set. So they're going to divide the total by the number of numbers in the data set, and my student is going to then braille out mean absolute difference equals 1.9.

So, on to slide 8 be talking about box and whisker plots for the next couple slides. And a box and whisker plot can be used to represent data sets graphically. I want to use a different data set, so we get experience with not just working with those single digit numbers we just used. So in the particular data set that we're going to work with, I've already figured out my medians and my quartiles. So this data set has a minimum of 70. My quartile 1 is 73. My median, or that quartile 2 is 77. My quartile 3 is 82 and my maximum is 85. So those are the five number I'm going to be using to represent in my box and whisker plot which is that graphical representation of a data set.

So, when I go on to slide 9, I want to show you how I use a consumable number line from APH, Wikki Stix, and dots for the student to be able to make their box and whisker plot. So creativity for you and your student is really the key here on how your student wants to represent those dots, but they need to be able to have those numbers on the number line. They need to have dots available to themselves, and they need to be able to represent that box. Once my students have placed those five dots down, my student can then use Wikki Stix to represent both the box and the whiskers. So they have this tactual representation of this graphical data set.

Let's go on to slide 10 and look at how my student would do the same thing with a Perkins braille writer. And some students are really going to prefer this method. So my student first needs to make their number line, and then when it comes time to put in the numbers, for each of those numbers, my student is going to place a full cell above that number. Look at my example. So when my student goes to create the box and whisker plot.

My student starts out by putting a full cell at 70 for the lowest. Then to show the whisker going from the lowest to quartile 1, have your student use dots 2 and 5 to represent that line. Full cell for quartile 1 at 73. Now we're in the box. So my student's going to use some x's until they get to 77, which is the median, or quartile 2, and again use a full cell. Continuing along with the box with x's until my student gets to quartile 3, which is 82. And then my student is going to go back to doing a whisker with dots 2 and 5 until they get to 85, which is the maximum.

Slide 11 talks about histograms, which is a sixth grade skill. I want you to think about when your students in that general ed math class, that this is an opportunity to really communicate with that general math teacher because for our blind students who are braille readers, we really want to consider decreasing the number of histograms that the student actually has to produce, and really putting the focus more on having the student read and understand histograms rather than the actual construction of them. But we obviously do want our students at times to prepare histograms. So they can do this with tachograph paper and stickers. They also can do it with the braille writer.

Let's actually look at the histogram I have pictured here, and then I'm going to show you how it's represented in braille actually in two ways. Now the title of the histogram is histogram of calories of hot dogs at various food trucks. And my y-axis goes from 0 to 8 and is labeled number of food trucks. My x-axis is labeled calories. I have basically 6 bars. The first one represents 299 calories, second 300 to 399 calories, and so on. And the last one 700 to 799 calories.

The height of my first bar which is 200 to 299 calories is 3, meaning that there are three values in that bar. My second bar which represents 300 to 399 is valued at 5, meaning that there are five values that fall between 300 and 399 and so on.

So, let's go on to slide 12 and see how I use a Perkins braille writer to represent the histogram, and even though it's a vertical histogram, remember, I said it's best for our braille users to represent that histogram in horizontal format. So, after my student brailles the title of the histogram, my student then goes ahead and goes into Nemeth Code. I do want to point out after that title of calories of hot dogs on food trucks, I have my open Nemeth indicator. I want my student to go ahead and put calories. So that would be that label that's on the x-axis.

Here's where the difference is for the braille reader. My student then brailles the category of 200 to 299, and rather than trying to get everything in the vertical format, my students simply browse three full cells to represent that the value on the y-axis is 3. Underneath my student brailles 300 to 399. The value on that y-axis is 5, so my student brailles 5 full cells, and so on.

We're going to go on to slide 13, and we're going to talk about dot plots, which are also called line plots, and we work with dot plots in grades 6 and 7. Line plots are a series of dots or x's above a number line that are representing data. Our student can use number lines and full cells for the dots for x's above the number line. For most of my students, doing this on the braille writer is the preferred method. Some students may prefer to use a consumable number line, and we've looked at several of those from APH already today, and you can glue this to the braille paper and then the student could choose stickers for example, to represent the X's. So let's take a look at our examples.

I have a box plot where my student needs some information from me. So, the transcriber notes as full cells are used to represent x's in print. I want to remind you -- we've talked about transcriber's notes in some of our lessons here at Project INSPIRE-- that my transcriber note comes before, in this case my line plot. It starts in cell 7 with run over in cell 5. I leave a blank line after that transcriber note, and then I'm simply representing in braille what the student has in print.

So everywhere in print there is an x, I have a full cell. In this case, I have a number line that goes 0, 5, 10, 15, and my student has the x's where they show in print. Underneath that number line I do have my years in town, which is the label for the x-axis or the number line here, and then a blank line, and then I'm going to be terminating Nemeth Code at the end of this line plot.

Let's go on to slide 15. And I just want to show you another example of a line plot. In this case, the title of the line plot is toss results. My number line underneath it, my x-axis, is sum of numbers. So I've done pretty much the same thing. My student has the number line. It goes 2, 3, 4, 5, et cetera up to 12, and each place in print there is an x, my student has a full cell. I wanted to point out that it says sum of numbers as that label for that number line or x-axis. And I just want to remind you that when we are in Nemeth Code, we do not use contractions.

Let's go on to slide 16, and talk about coordinate planes. These are so much fun for our students, and they begin working with them in sixth grade. Now there's a lot of concepts that come in here. We've got origins. So that's the 0, 0 point. We've got those four quadrants, which are labeled with Roman numerals. So, I is the top right quadrant, and then we go counterclockwise II, III, and IV. We have to understand the term axis, the x-axis and the y-axis. And the distance when the x or y-coordinates are the same.

Lots of options for our students to work with coordinate planes. They could use the APH Graphic Aid for Mathematics, which I have pictured in the top right. A lot of us just think of this as that rubber board from APH. Your student can have the x and y-axis represented with rubber bands, and then use pushpins or thumbtacks to represent the points. They also could use the graph paper from APH. So we have the tactile graph paper. Comes in lots of different sizes. And if you have your student put that on a corkboard. Again, they can use push pins or tacks to represent their coordinates. They also could use Wikki Stix is another option for the x and y-axis.

Let's go on to slide 17. I want to point out, because it really applies also to what we were just talking about with graphing on slide 16, and that's when we're using corkboard and graph paper, if the students, using the graphic aids for mathematics. That origin that we just talked about a moment ago, you really need to make that tactually distinct for your student. In this case in my picture, I used a triangle push pin versus a round push pin. So that triangle push pin I'm using for the origin in this example, and the round push pins I'm using for all my points.

Over here on slide 17 I talk about scatter plots which, is an eighth grade skill. So we have a lot of concepts. We have clustering points. How close are those together? Outliers. In my picture there is one push pin that happens to be colored white that's really far away from the other pushpins. So we would consider that push pin an outlier.

Positive correlation means that the points are going generally in and up and to the right orientation, which is what's happening in this particular one. A negative correlation would mean that my points are falling as they go to the right. So in my example, I have a positive correlation. My example also is what we call a nonlinear because the points aren't going in a line and linear of course is that the points are going in a line.

All right, let's go on to slide 18 and talk about linear equations. Now I have an equation here. In the video, we're going to show you how to graph it, and that's y equals negative 1/3 x plus 2. In eighth grade students are learning to graph this type of linear equation. Visually, our print readers are going to be drawing lines to connect their points. Our braille readers, or our tactile readers are going to be using rubber bands to connect the points. And again, those can be push pins or tacks.

There's a lot of terminology. First off, that equation for slopes y equals mx plus b, where in the equation m is the slope and b is the y-intercept. We're also having the student learn about slope, which is the rate of change, and the student has to be able to demonstrate this by counting up and over or down and over.

And y-intercept where the student is going to place where the line crosses that y-axis. So let's go ahead and go to the video and see how we're going to graph y equals negative 1/3 plus 2.

SPEAKER 2: So to graph this equation y equals negative 1/3 x plus 2, I have a corkboard, a, piece of tactile graph paper. I've actually already marked off the axes with graphic art tape. Where those cross is the center. Again, we could put a push in there or a tack so that it's different than the points that I have. In this case, it's pretty easy for me to find that origin by coming down to the axis and going over until I find that other axis.

So now I'm going to graph the y-intercept of 2 first. I'm going to go up. My finger should actually be a little bit to the right or a little bit to the left of that axis so that I can easily feel where those grid lines cross it. So I'm going to go up 1 grid line, 2 grid lines, and right on the axis is where I'm going to place that first point. Now from that point, I'm going to use my slope of negative 1/3. So I'm going to go down one, and then to the right 3 to continue graphing the next points. So from where I left off at 2, I'm going to go down 1, and then right 2 and they should be focusing on where those grid lines cross, not in between, but right at those intersections. So I went down 1, right 1, 2, 3. I'm going to place a point there. Then same thing from that point. I'm going to go down 1 right 1, 2, 3. And I'm going to place another point right at that intersection. And then down 1 right 1, 2, 3, and I'll put one more point.

So we like to get a few points on there instead of just 2. This is linear because they're in a straight line. Now I could put a rubber band just around two points, but it's really loose. I like to just take that rubber band and stretch it from that first point to that last point, and now I have a tactual line-- y equals negative 1/3 x plus 2.

SPEAKER 1: All right, we're going to go on to slide 19, which is about table of values. And students do this in the sixth grade, so there's some concepts they need to have, x-coordinates and y-coordinates. Now we want our students to prepare their table using their braille writers so they can go back and review their work. They're also going to see table of values prepared by transcribers. We wanted to take a moment to talk about how a transcriber prepares this type of a table versus how your student may. So let's look at the transcriber example.

I have two columns that are labeled x and y. Underneath each column, my transcriber has used the separation line dot 5 and cells of 2 5 for the width of the line. And then my transcriber has very carefully lined up their numbers. So in this example it's negative 3 for the x, 5 for the y. Second line is negative 2 for the x, 1 for the y, and so on.

When a student is brailling this type of table on their own, again, we want them to do two columns, x and y, but unlike the transcriber that needs to leave two spaces between columns, most of our students are going to just put one space. And they may not line up their numbers exactly because they're not going to use the separation line. You need to as a TVI really make that value judgment on are we into braille perfection or are we into getting the concept. And if your student can read their table of values back accurately, if they're off by a cell, don't penalize them folks.

All right, we're going to slide 20 and we're going to start talking about graphs for systems of equations. Our students are going to be doing this in eighth grade. Again, we can use the Graphic Aid for Mathematics which was already looked at before with a different type of push pins or tacks. They can use lots of different APH tactile graph paper. And I really like to give my students a variety of dots to choose from. In my example here, I have used APH graph paper, and my student is going to use foam dots for one line and felt dots for the other line.

We have concepts that my student is looking for on this graph. One is the intersection. So where do my two lines intersect? In this particular example it's on the x-axis of positive 1. We want to have the student understand the concept of same line that there are infinitely many solutions, and the idea that parallel lines have no solutions.

Now you're going, I'm not quite up on that infinitely many solutions type of concepts. As the TVI, folks this is where you again need to really get with that math teacher and make sure you understand the math concepts your students are learning. Primarily your job is to ensure your student has the Nemeth skills or the UEB technical skills and the materials that they need to produce and understand the concepts. So check in with that math teacher, we cannot stress that enough.

All right, slide 21. So our students in eighth grade are also going to be working with systems of equations solved algebraically. So they have to be able to do it both ways. The actual hands on producing the graph, but then also the algebraic writing it out. You cannot not, not, not have your student use a braille note taker here. Your student absolutely needs to use the Perkins braille writer. And that's because your student really needs to go back and look at multiple lines. And you cannot do that on a note-taker, folks. Now I'm not here to focus on the math with you, but I do want to just go over briefly three types of algebraic systems of equations that your students are going to see. So one for example is intersection, where there is one solution. And what I really want to stress here is having your braille reader line things up. So my two equations here are 2x plus 3y equals 5, and 2x minus 3y equals 7.

And when you look at the way we've brailled this, notice my 2x is lined up right under the 2x on the second equation are lined up. My plus the first equation is lined up with my minus in the second equation. My three y's are lined up. My equal signs are lined up. And from the first equation my 5 is lined up with the 7 in the second equation.

As my student then draws their separation line, and does their work where they're actually adding, so 2x and 2x is 4x. Their 4x is lining up under those 2x's. The 3 and minus 3 is 0, so they leave it blank. Those equal signs line up, and then the 12 when I add 5 plus 7 line up. And then my student is going to go ahead and do the next line, which is x equals 3, which again, lines up perfectly. This is what you really need to stress with your student, going back and reading the prior line and making sure as they do their computation that everything is lining up.

Slide 22 gives you two more examples of systems of equation algebraically. Parallel where there's no solution because those two lines are parallel to each other. And when we have same line with infinitely

many solutions. So I'm not going to walk you through these, but again, I want you to really focus on the fact that our responsibility is to ensure our students are brailling these accurately and lining up their columns so that they can do the work and get the right solution.

We're going to go on to slide 23, and we're going to look at graphing calculators. So that our students can graph these equations that they are working with. Now we're not going to show you the Desmos graphing calculator in this video. We did a demo of it in lesson 4, and in a future course, we're going to have a whole lesson on the Desmos. But we do want to do a video with the Orion TI-84 Plus Graphing Calculator, and we have two equations that you'll see graph and the intersection found. So let's go to that video.

SPEAKER 2: So the first equation that we're going to graph is y equals negative 1/2x plus 3. Now the student just learns to memorize these if they aren't sure there is a help. So if I press the second button—

CALCULATOR: [INAUDIBLE]

SPEAKER 2: Three times, press it three times, the help mode goes on. So then if I'm pressing a button—

CALCULATOR: 8.

SPEAKER 2: --it does not register on the screen. So if I need to find a button, that help menu will help. So I'm going to go ahead and go off of help for now.

CALCULATOR: [INAUDIBLE]

SPEAKER 2: Assume I've had a chance to learn my different keys. And I go to the y equals—

CALCULATOR: y equals. y1, clear. y2-- y1—

SPEAKER 2: I'm going to clear out anything that's already in there.

CALCULATOR: y3 equals equation disabled. y1 equals equation disabled.

SPEAKER 2: Notice it's telling me I'm on y1. It says it's disabled because there's no equation in there yet. Then for negative 1/2, I'm just going to enter negative 0.5. So negative 0.5.

CALCULATOR: Negative 0.5.

SPEAKER 2: By the way, just make sure you do-- it doesn't always like that 0 before the decimal. And then we'll go ahead and do x plus 3.

CALCULATOR: x plus 3.

SPEAKER 2: That noise was just because I was ignoring it for the time. So let's go ahead and graph just that equation first. So I'm going to go to the graph.

CALCULATOR: Graph.

[BEEPING SOUND]

SPEAKER 2: This is just telling me it's graphing.

CALCULATOR: Graph screen. Graph precursor.

SPEAKER 2: So when that noise stops, that tells the student that it's on the screen now. It's done graphing it. So then there's a playback. The top part-- we like to call it the helmet on the TI-84-- is the talking part of the calculator. And up there in the Preferences, above Preferences, in blue, that says Playback.

So the student actually has to hit the blue key, which for them is just going to be-- I like to call it dot 6. So notice how there's a braille cell up there. dot 1, dot 2, dot 3, dot 4, dot 5, dot 6. So I usually just tell the student, hold down the dot 6 and hit the dot 4 for playing it. So I'm going to do that.

CALCULATOR: --available for graph trace screen only.

SPEAKER 2: I always do this. So I have to trace and get on the graph before I can play it. So we're just going to do that. Hit the Trace key.

CALCULATOR: Trace. Weighing equation 1.

[BEEPING SOUND]

y1 equals negative 0.5x plus 3 graph stylus line.

SPEAKER 2: So notice that it went down in pitch. Because the graph is going down as it goes to the right. Now it also told me the point that my cursor is on right now. Now it-- above the x-axis, it's a clearer sound. When it gets below the x-axis, there's a-- if you think about underground, it—

[BEEPING SOUND]

Notice it gets below the x-axis, it actually is going to have a static to it. So let's go ahead and play it again so you can hear the clear. And then towards the end of the graph, it's going to get to static. Because the last end of the graph is below the x-axis. So I'll play it back, dot 6 and dot 4.

SPEAKER 2: Weighing equation 1.

[BEEPING SOUND]

SPEAKER 2: So there was a little bit of static at the end where it went below the x-axis. Now let's go ahead and go back to our y equals.

CALCULATOR: y equals-- y1 equals negative 0.5x plus 3 equation enable graph stylus line.

SPEAKER 2: Notice it said enabled this time because there's an equation in there. Now I'm going to arrow down to the second line.

CALCULATOR: y3 equals equation disabled.

SPEAKER 2: Type in x - 3.

CALCULATOR: X - 3.

SPEAKER 2: Go ahead and go back to my graph.

CALCULATOR: Graph. Graph precursor.

SPEAKER 2: Now I can trace again.

CALCULATOR: Trace. Weighing equation 1.

[BEEPING SOUND]

y1 equals—

SPEAKER 2: Now that's—

CALCULATOR: --negative 0.5x plus 3 graph stylus line.

SPEAKER 2: That said y1. That was my first graph. I'm going to actually arrow down.

CALCULATOR: Blank. y3 equals x minus 3 graph stylus line.

SPEAKER 2: Using under-- the arrow-- using the arrow keys under the screen. And that sends me to my other graph. Now I can play that other graph, which is actually going to rise instead, dot 6 with dot 4.

CALCULATOR: Weighing equation 2.

[BEEPING SOUND]

SPEAKER 2: That one started with static and then got clear at the end. So that one was rising. Now to find the intersection point, I'm going to actually go into my Calculate menu. And this teacher is going to talk about this. That's going to be the same for any student. So I'm going to go to 2nd Calc.

CALCULATOR: Second dot calculate.

SPEAKER 2: Arrow down to intersection.

CALCULATOR: --intersect.

SPEAKER 2: Hit Enter.

CALCULATOR: y1 equals negative 0.5x plus 3.

[ERROR SOUND]

SPEAKER 2: Now I'm just going to hit Enter for the first curve, Enter for the second curve, and then Enter for the intersection point, so three Enters.

[BEEPING SOUND]

CALCULATOR: Intersection.

SPEAKER 2: Now it said intersection. But it didn't tell me what the intersection was. So on those voice keys up above the screen, I'm going to hit the down arrow.

CALCULATOR: Intersection. x equals 4. y equals 1.

SPEAKER 2: So now it told me the x-coordinate is 4 and the y-coordinate is 1. So 4, 1 is where that intersection is for the two graphs.

SPEAKER 1: I hope you appreciated having a demonstration of the TI-84 Plus graphing calculator and how you can have your student learn to use this tool.

Let's go on to slide 24. And I just-- as we get ready to close-- wanted to mention some other resources from Pearson. And they have these great radical lessons, since radicals are a skill our students use in sixth to eighth grade. And so that curriculum includes radical expressions, radical expressions with index, adding and subtracting radical expressions, of course, multiplying and simplifying radical expressions, and division with radical expressions.

So again, you don't have to invent the wheel for your student. That wheel has been created for you. So we really encourage you to check out the website and the resources.

Slide 25 is, again, focusing on the Pearson curriculum with reading and writing radical expressions. So, when you use the curriculum, your student is going to get practice both with reading and writing radical expressions, which include whole numbers, decimals, fractions, and variables. So we want you to check out this resource and use it with your students.

As we get ready to wrap up Lesson 5, we are with middle school students, folks. And so our last three slides really talk about how you can help your student prepare for high school. It's really important that by the time our students are in the middle grades, that they understand the roles of the different adults that are involved in their education.

Who is my math teacher? Who is my TVI? Who is my braillist? If there's a paraprofessional involved, who is my paraprofessional? And what are each of these person's roles? At the same time, if there is a paraprofessional who is supporting your student, this is the time to really start decreasing your students dependency and having your student really begin to self-advocate.

They also need to be responsible for their own decisions and the natural consequences. You or the paraprofessional cannot be running to the math teacher to say your student needs more time. Your student a) needs to do this and in the real-world, you don't always get more time. So, we need to let our students have that natural consequence.

And they need to be a problem-solver. If they're out of tactile dots in their supplies, what are they going to do? Are they just not simply going to make the graph? Do they have a backup plan? So we really want them to have those natural consequences. And you might actually have to create some opportunities for them to problem-solve so they really are ready for high school.

Slide 27 talks about the reality of middle school math classes. These are fast-paced classes. So we really need to be sure our students are independent. We cannot be the magic fairies dropping things on their desks and taking things away. That's not helping them prepare for the future.
They need to know where their materials are kept. And they need to be responsible for getting those and putting them away. I also want them to monitor when they're running low on material, so they can communicate that and get the supplies they need so they're ready. In middle school, there are going to be fewer manipulatives.

But they are going to have things they're responsible for, like their graphing calculator. We want that responsibility to be on the student.

And finally on slide 28, we want our students at this point to be organized in their own workspaces. So they need to develop a system that works for them, not your system that you're making them use.
So your student might want to experiment with milk crates, with hanging folders, for example, to keep things like their one-inch graph paper in, containers or bags with tactile dots, graphics tape, their corkboard, the types of things they're going to need when they have to graph equations.

They might want to have a tactile box or a craft organizer type of box where they can put different things. Also, some students really want to have a spiral bound set of index cards with braille print numbers on those.

So that when they do graph an equation, let's say, on their corkboard-- and that's their answer to problem 7-- they can quickly flip to the index card that has 7 in print in braille, take a picture, and then that's what they're submitting to the teacher. And then they move on to problem 8, finish graphing that, and then they take a picture. And so what they're going to submit is a series of pictures to that general ed math teacher. All right. We've covered a lot of information here in Lesson 5. We hope that you've gotten a lot of ideas on how to support your student and increase your student's independence and participation. You're ready to go on to Lesson 6, where we have two guests who I think are going to give you some really great ideas on how to tie literacy with math content. So thank you very much. And enjoy the next lesson.