

Math: Grade 2, Lesson 14, Addition and Subtraction on a Number Line

Lesson Focus: Represent whole numbers as lengths from 0 on a number line and know that the points corresponding to the numbers on the number line are equally spaced. Use a number line to represent whole number sums and differences of lengths within 100.

Practice Focus: Students will use models and write equations to add lengths using a number line.

Objective: Students understand and can use a number line to solve addition problems involving measurements.

Key Vocabulary: addition, sum, total, equation, number line

TN Standards: 2.MD.B.6

Teacher Materials:

- Whiteboard
- Dry Erase Markers and Erasers
- Student Practice Packet

Student Materials:

- Paper
- Pencil

Teacher Do	Student Do
<p><u>Opening</u> (1 minute)</p> <p>Hello! Welcome to Tennessee's At Home Learning Series for math! Today's lesson is for all our 2nd graders out there, though all children are welcome to tune in. This lesson is the fourteenth in our series.</p> <p>My name is ____ and I'm a ____ grade teacher in Tennessee schools! I'm so excited to be your teacher for this lesson! Welcome to my virtual classroom!</p> <p>If you didn't see our previous lesson, you can find it on the TN Department of Education's website at www.tn.gov/education. You can still tune in to today's lesson if you haven't see any of our others. But, it might be more fun if you first go back and watch our other lessons since we'll be talking about things we learned previously.</p> <p>Today we will be learning about using a number line to add measurements of length. Before we get started, to participate fully in our lesson today, you will need:</p> <ul style="list-style-type: none">• Paper• Pencil• The student packet for Math, Grade 2, Lesson 14 which can be found at www.tn.gov/education <p>Ok, let's begin!</p>	<p>Students get materials ready for the lesson.</p>
<p><u>Intro</u> (4 minutes)</p>	

Do you remember in our last lesson, our plant that was 15 inches tall and then it grew and was then 22 inches tall?

[Pause.]

I knew you would. How did we solve that problem? [Pause.]

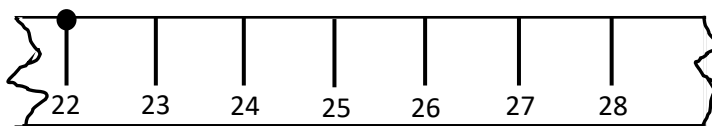
That's right. We modeled and solved that problem by counting on a yard stick.

Let's try another one of those problems. Read this one with me:

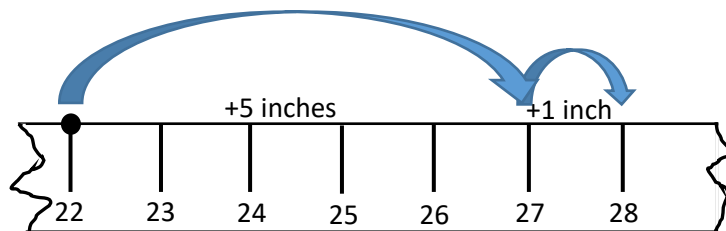
Tonya's little brother Bobby has a pet snake. When he brought the snake home from the pet store, it was 22 inches long. After three weeks the snake had grown 6 more inches. How long is Bobby's pet snake now?

Grab your pencil and paper and draw this model with me. We will draw a long rectangle first. Then place 7 hash marks across the top as evenly spaced as you can, but don't spend a lot of time trying to get them perfect. This is just a way to help us organize our thinking. [Model and pause.]

Let's graph 22, because we are beginning our model when the snake was 22 inches long.



Let's move 5 spaces at once. Remember we know how to count by 5s! Now, we need to move 1 more inch because $5 + 1 = 6$. Do this with me. [Pause.]



Please write the equation for this model along with me.

[Pause.]

I am going to write $22 + 6 = 28$. The snake grew 6 inches, so it is 28 inches long now.

Teacher Model (15 minutes)

Objective 1: Students will connect that the numbers equally spaced on a ruler or yard stick are just like the equal spaces and numbers on a number line.

You did so well reviewing adding measurements using a yard stick. Thank you for working so hard!

Did you know the numbers and spaces that are equally placed on a ruler or yardstick are just like the numbers and spaces that equally placed on a number line? [Pause.]
Yes, it's true.

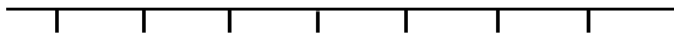
So, you can use a number line to add measurements just like you do using a ruler or yardstick.

[Draw this model on the whiteboard.]



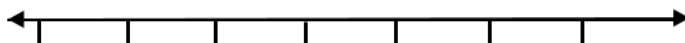
[Erase a portion of the ruler to create the image below as you speak the next part.]

Now let's remove everything but the whole number hash marks and the top line of the ruler or yardstick. Like I am doing here.



[Draw arrow heads on the line similar to the image below as you speak the next part.]

We draw arrow heads on to the top line. The arrow heads remind us that we can move forward or backward when we are counting on the number line.



[Extend the hash marks on the line like the image below while speaking the next part.] **Now, we will extend the hash marks that represent the spaces like this. We will label each of the hash marks by counting by 1s. Count with me. Starting at 0 we count 1, 2, 3, 4, 5, 6, and 7.** [Point to the shorter hash marks between the numbers as you speak the next part.] **The shorter hash marks represent the spaces between the numbers.**

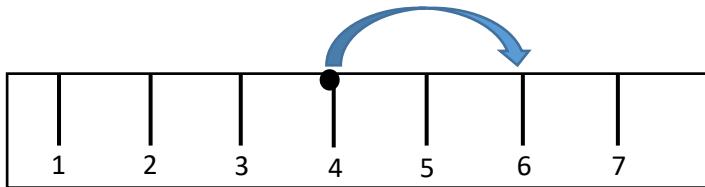


Objective 1:
Students will decompose a ruler/yard stick into a number line and then solve one addition problem using both the ruler and a number line.

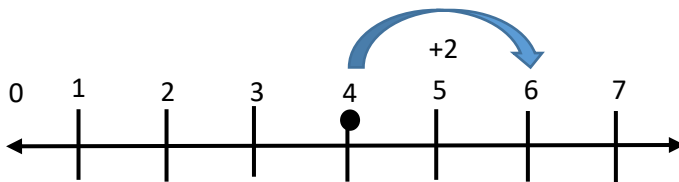
Let's use both of these models to solve this problem:

Eddie planted a small flower that was 4 inches tall. Over a month it grew 2 more inches. How tall, in inches, is Eddie's plant now?

If we use our ruler to solve this, we would first mark the 4 for 4 inches and then count how many? [Pause.] Correct. We would count over 2 to represent the 2 inches the flower grew.



If we use our number line to solve this, we would first graph the 4 for 4 inches and then count how many? [Pause.] Correct again. We would count over 2 to represent the 2 inches the flower grew.



How tall is Eddie's plant now? [Pause.] You are on a roll! That's right it is 6 inches tall.

We can write an equation that will work with either the ruler or the number line. Write the equation with me: [Write the equation below as you speak it.]

$$4 + 2 = 6$$

Using either the ruler or the number line we still come up with 6 inches because $4+2=6$. You did a great job!

Objective 2: Modeling and solving addition with a number line: Students will use a number line to add lengths and write an equation to match the model of the problem.

Read this problem with me:

Objective 2:

Students will use a number line to solve a word problem adding lengths and writing an equation to match the model of the problem.

I have a friend and her name is Amelia. Amelia lives in the city and loves to go for walks in the mornings. She likes to keep up with her walking distances by counting the number of city blocks she walks each time. Do you know what Amelia means by a city block? [Pause.] Right. A city block is a square or rectangular area of the city surrounded by streets, usually containing several buildings.



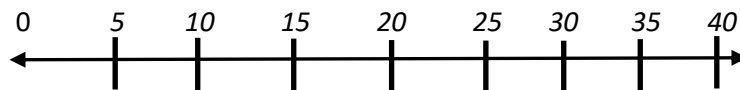
So, on Monday Amelia walked 18 blocks and walked 5 blocks on Tuesday. Amelia wants to know many blocks she walked in all?

This time we will use a number line to help Amelia figure this out. First, we draw our number line. [Think aloud the steps you will go through to draw a number line.] To start, I will draw a straight horizontal line. Notice, how that line looks like the top of a ruler or yardstick. Now, what was it I add to the end of my line? [Pause.] That's right, arrow heads. These arrow heads remind me that I can move right or left on my number line. I will give you a few seconds to draw this line with the arrow heads on your paper. [Pause for students to draw.]

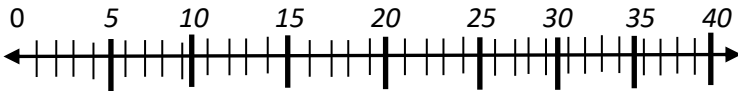


Next will add some numbers to our number line. I draw 8 hash marks, as evenly spaced as I can on my line, but I won't spend a lot of time trying to get them perfect. You don't either. Just do your best. Now you draw the hash marks please. [Pause for students to draw.]

Now, we are going to label our numbers by skip counting by 5's. Let's count together. As I label my hash marks you label yours too, please. [Label hash marks as you count by 5's.] 5, 10, 15, 20, 25, 30, 35, and 40.

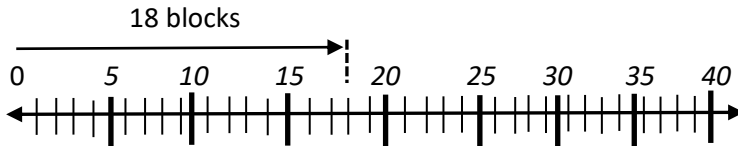


Now, let's add 4 hash marks as evenly spaced as you can, between our numbers so we have 5 spaces between each number. [Draw and then pause for students to finish drawing.]

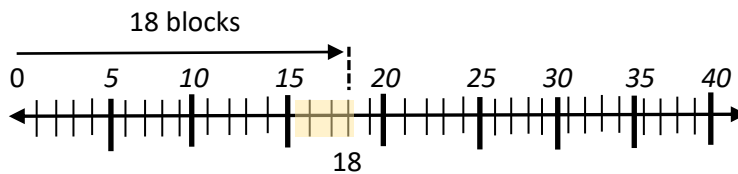


Does your number line look like mine? [Pause.] Great job!

Now, we know Amelia walked 18 blocks on Monday, so let's draw a line over our number line to represent the 18 blocks she walked on Monday. [Draw the line over the number line similar to the image below and pause for students to draw.]

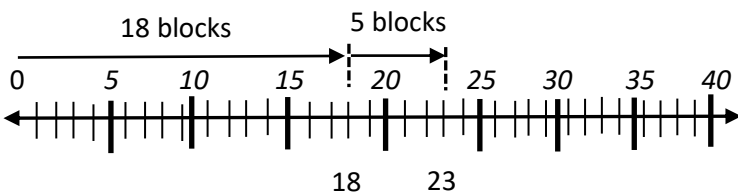


Why does the line stop between 15 and 20? [Pause.] That's right! It stops between 15 and 20 because that is where 18 is. 18 is 3 spaces past 15. [Shade the three spaces or draw a box around them and write the number 18 below similar to the image below.]



Now we can draw a line that goes to the right to represent the blocks Amelia walked on Tuesday. How many blocks did she walk on Tuesday? [Pause.] That's right, she walked 5 blocks. Count with me 5 spaces to the right on the number line starting at 18. We move to the right on the number line to show we are adding these blocks to the first 18 blocks. [Point to the marks on the number line as you count out loud and then draw a dotted line at the 5th mark.]

Count 1, 2, 3, 4, 5. Now, I can count from the first dotted line to the second dotted line to find my total. Let's count together. [Point to the dotted lines and marks as you count and then write the number 23 under the last dotted line.] Starting at 18, count 19, 20, 21, 22 and 23. So, our sum or the total blocks Amelia walked on Monday and Tuesday is? [Pause.] You are so smart! That's right, Amelia walked a total of 23 city blocks on Monday and Tuesday.



Now, let's write an equation for our problem.

[Write the equation below.]

$$18 + 5 = 23$$



[Point to the parts of the equation as you speak the next part.]

I wrote 18 first because Amelia walked 18 blocks. Then we added 5 because she walked 5 more blocks. Here are the 5 additional blocks in the model. [Point]. 18 blocks plus 5 blocks is 23 blocks. This 23 [Point.] shows us the total that Amelia walked.

Guided Practice (10 minutes)

[Students will solve two more addition problems using a number line. Utilizing the gradual release model, the student will begin owning more of the steps in the process.]

You are doing great. Now is a time for you to really shine and show all that you have learned as we practice a few more of these problems. Here we go!

Read this problem along with me.

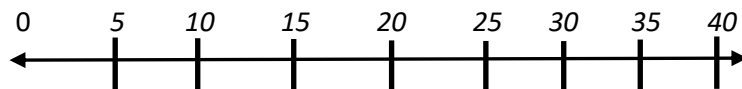
Tucker is on the high school swim team. He likes to use yards to measure how much he swims. Tucker swam 17 yards on Thursday. He swam 8 yards on Friday. How many yards did he swim in all?

Start with our number line. I will draw mine here and you draw one on your paper along with me. [Think aloud the steps you will go through to draw a number line.] Draw a straight horizontal line. What do I add? [Pause.] That's right, arrow heads. These arrow heads remind me of what? [Pause.] You are correct! They remind me I can count forward or backward on my number line.



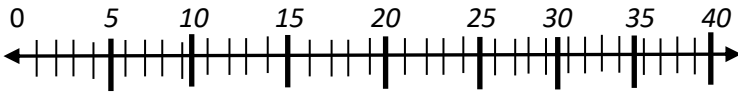
Now we add 8 hash marks and numbers to our number line. Remember, just do your best the hash marks don't have to be perfect. [Pause.]

Now, we label our numbers by skip counting by 5's. Let's count together. [Label hash marks as you count by 5's.] Start at 0 and move to the first hash mark and count 5, 10, 15, 20, 25, 30, 35, and 40.



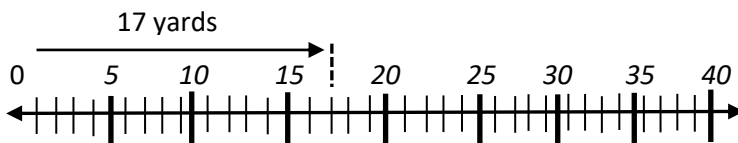
Students will solve two more addition problems using a number line. Utilizing the gradual release model, the student will begin owning more of the steps in the process.

We want hash marks between our numbers counted by 5 so we have 5 spaces between each number. How many hash marks do we add between the numbers? [Pause.] Super! We add 4 hash marks between the numbers so we have 5 spaces between each number. [Draw and then pause for students to finish drawing.]

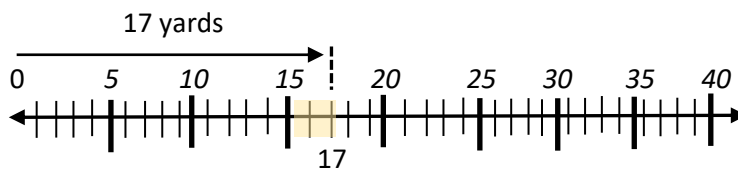


Does your number line look like mine? [Pause.] Great job!

How many yards did Tucker swim on Thursday? Look at your problem again. [Pause.] Awesome you returned to the text and saw again that Tucker swam 17 yards on Thursday. What do we do with that information? [Pause.] Right. That is the first line we draw over our number line. Let's do that now. [Draw the line over the number line similar to the image below and pause for students to draw.]



Why does the line stop between 15 and 20? [Pause.] Right again! It stops between 15 and 20 because that is where 17 is. 17 is how many spaces past 15? [Pause.] Correct! 17 is two spaces past 15. [Shade the two spaces or draw a box around them and write the number 17 below the line similar to the image below.]



How many yards did Tucker swim on Friday [Pause.] That's right, he swam 8 yards on Friday. Tucker is a good swimmer. Now what do we do? [Pause.] Oh yeah, we are going to draw our second line above the number line to represent the 8 blocks she walked after dinner.

Which direction will this line go? [Pause.] Yes! It will go to the right to show we are adding. Count with me 8 spaces on the number line starting at 17.

[Point to the marks on the number line as you count out loud and then draw a dotted line at the 8th mark.] Count 1, 2, 3, 4, 5, 6, 7 and 8. Now what do I do? [Pause.] Do you remember?

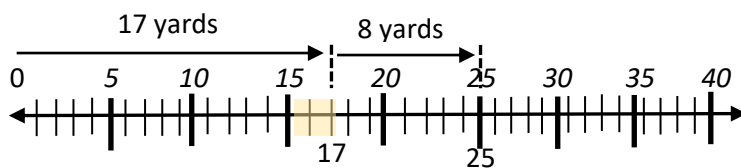
[Pause.] I knew you would. We can count from the first dotted line to the second dotted line to find the total.

[Point to the dotted lines and mark as you count and then write the number 23 under the last dotted line.] **Starting at 17, count 18, 19, 20, 21, 22, 23, 24, and 25. Hey remind me what the answer to an addition problem is called?** [Pause.]

You are so good! The answer to an addition problem is called the sum. [Pause.]

Ok, we stopped on 25 after adding 8 more yards on our number line. So, our sum or the total yards Tucker swam is?

[Pause.] **You are so smart! That's right, our sum is 25. Tucker swam a total of 25 yards.**



Now, let's write an equation for our problem.

[Write the equation below as you speak it.]

$$17 + 8 = 25$$

Ok, now we are going to do one more and let you really show what you have learned today about using a number line to add lengths.

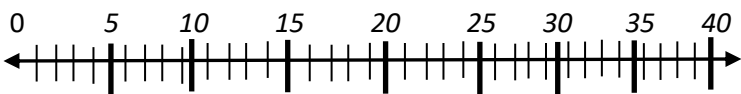
Read this problem on your own:

A football player runs 6 yards down the football field. Then the same player runs down the field 11 more yards. How many total yards has the football player run down the field?

Ok you know what we are go to do to solve this problem?

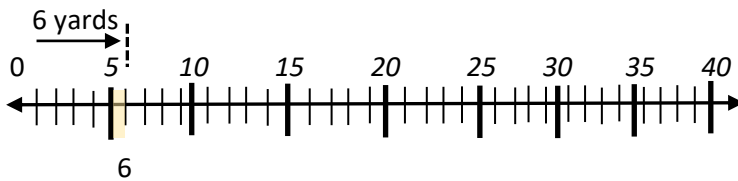
[Pause.] **Right! We are going to add the yards the player has run together.**

Start with your number line. Like before, 0 will be on the left end and then draw your 8 hash marks. Starting with the first hash mark as 5 label all of the hash marks by counting by 5s. I will draw mine here and you draw one on your paper. [Pause for the students to draw their number line then draw your number line and label the parts similar to the image below.]



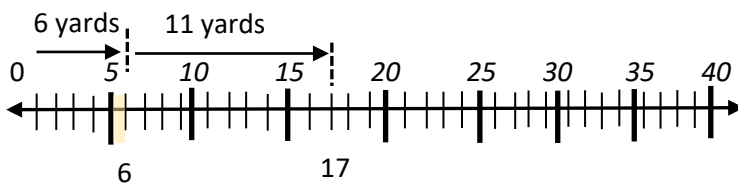
Does your number line look like mine? [Pause.] Did you remember to add the arrow heads to the line? [Pause.] Good. Did you skip count by 5 to label the number above the heavy hash marks? [Pause.] Good. And did you add the four smaller hash marks between the skip counted numbers? [Pause.] Awesome! You did a great job drawing your number line!

Ok now what will you do? [Pause.] OK, you said you will draw a line over the number line to represent the first set of yards run by the player. Great! Do that now. [Pause for the students to draw on their number line then draw the line over the number line and label the parts similar to the image below.]



Does your line look like mine? [Pause.] Did you draw your dotted line at 6 to show the first yards run by the player? [Pause.] Awesome.

Now what will you do? [Pause.] You will draw the second line for the second set of yards run? [Pause.] Cool. Do that now. [Pause for the students to draw on their number line then draw the line over the number line and label the parts similar to the image below.]



Let me see your number lines. Can you hold them up for me to see? [Pause and look into the camera like you're looking at their number lines.] [Point to the different parts of your number line as you speak the next part.] I saw some good work there on your number line. I saw how you drew the second line to the right to show we are adding. Good. I also saw how your second dotted line ended up two spaces past 15. Now, tell me why that is. [Pause.] You are rocking and rolling today. Right. Two spaces past 15 is 17 which is where we end up on the number line after counting and adding the 11 yards the player ran. This means our player ran a total of how many yards? [Pause.] Boom! You got it! Our football player ran a total of 17 yards down the football field.

Now, will you write your equation that matches our model for me please? [Pause.]

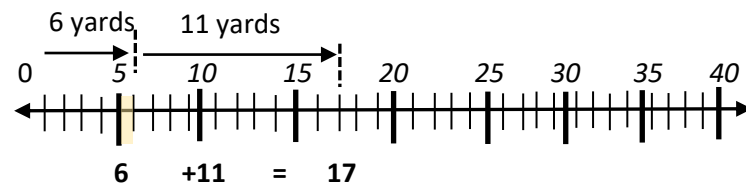
[Write the equation below.] Did you write your equation like mine? [Pause.] You did? That's awesome!

$$6 + 11 = 17$$

Do you remember how to connect the equation to the model?

[Pause.] Very good! You wrote 6 first because our player ran 6 yards. Then you added 11 because he ran 11 more yards.

Here are the 11 additional yards in the model. [Point.] 6 yards plus 11 yards is 17 yards. This 17 [Point.] shows us the total yards that our player ran.



Additional Problems if Needed for Time

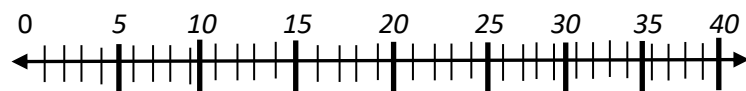
Let's try another problem together! We are going to help Sam with his science poster.

Read on your own, then read along with me. [Pause, then read the problem.]

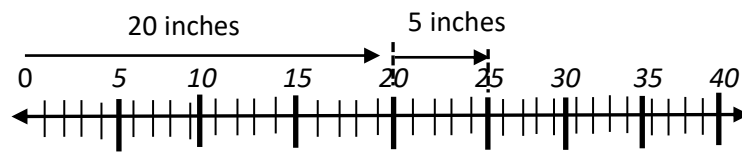
#1. Sam is making a poster for science class. His paper was 20 inches long. His partner taped a piece of paper at the end with a picture that is 5 inches long. How long in inches is Sam's paper now?

We will make our number line first. On your paper, please draw a long line with arrows on either end. We will place 8 hash marks and label them counting by 5s. Our labels will be 5, 10, 15, 20, 25, 30, 35, and 40. [Pause.]

Now we will add 4 hash marks in between, creating 5 spaces. Let's compare. [Pause and compare number lines.]



Please model Sam's problem from above. Draw both lines and write the equation. We will compare when you are finished. [Pause.]



$$20 + 5 = 25$$

Let's compare! I drew my first line to 20 because Sam's paper was 20 inches long. I drew my second line up to 25 because Sam's partner added 5 inches at the bottom.

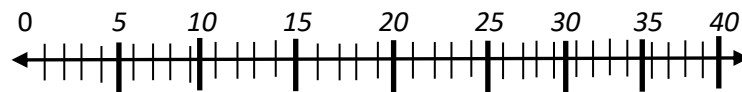
If your model and equation match, shout, "I got it!" [Pause and listen.] You are working so hard!! Great job.

Read on your own, then read along with me. [Pause, then read the problem.]

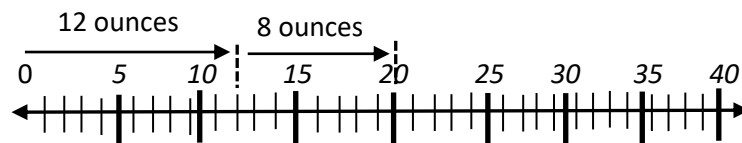
#2. Julio has 12 ounces of milk in the refrigerator. His mom bought a small carton of milk with 8 ounces in it and puts it in the refrigerator. How many ounces of milk are in the refrigerator?

We will make our number line first. On your paper, please draw a long line with arrows on either end. We will place 8 hash marks and label them counting by 5s. Our labels will be 5, 10, 15, 20, 25, 30, 35, and 40. [Pause.]

Now we will add 4 hash marks in between, creating 5 spaces. Let's compare. [Pause and compare number lines.]



Please model Julio's problem from above. Draw both lines and write the equation. We will compare when you are finished. [Pause.]



$$12 + 8 = 20$$

<p>Let's compare! I drew my first line to 12 because Julio had 12 ounces of milk in the refrigerator. I drew my second line up to 20 because Julio's mom added 8 ounces of milk.</p> <p>If your model and equation match, shout, "I can do this!" [Pause and listen.] You are working so hard!! Thank you.</p>	
<p><u>Independent Practice</u> (1 minute)</p> <p>You have done an awesome job working with me today! Pat yourself on the back right now and let's have some exploding fireworks celebrating the great job you did today! [Use your hands to mimic fireworks going up and exploding with sound effects ala "Marcia Tate".]</p> <p>After the video, you will have some problems to practice on your own. You can find the student practice for this lesson posted on our website, www.tn.gov/education. [Teacher shows student practice page under document camera or camera zooms in on student practice page.]</p> <p>Have fun and do your best!</p>	
<p><u>Closing</u> (1 minute)</p> <p>Boys and Girls, I enjoyed adding using a number line with you! Thank you for inviting me into your home. I look forward to seeing you in our next lesson in Tennessee's At Home Learning Series!</p> <p>Bye!</p>	

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