

Math: Grade 2, Lesson 15, 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 subtract lengths using a number line.

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

Key Vocabulary: subtraction, difference, 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 fifteenth 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 subtract 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 15 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>Today we are going to be learning about subtraction using a number line, but first, let's think back to our last lesson for a</p>	

moment. Remember my friend Amelia? [Pause] That's right she lives in the city and loves to go for walks in the mornings And keeps track of how many city blocks she walks. To warm up, let's visit with Amelia again and solve an addition problem using a number line. Amelia is still walking, but today she is also going shopping. Here is the problem. Let's read it together.

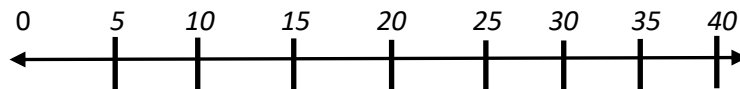
Today Amelia walked 9 blocks to the grocery store and then walked 9 more blocks to the hardware store. By the time she got to the hardware store, how many total blocks had she walked?

You work through this problem on your paper along with me.

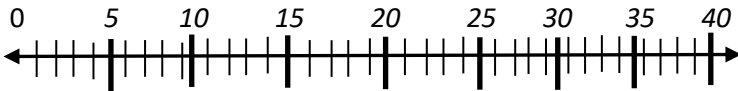
We first drew our number line. [Think aloud the steps you will go through to draw a number line.] We started with straight horizontal line, recalling that that line looks kind of like the top of a ruler or yardstick. Now, what was it we added to the end of the line? [Pause] That's right, arrow heads. What do these arrow heads remind us of? [Pause] These arrow heads remind us that we can move right or left on the 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, we added some numbers to our number line by drawing 8 hash marks, as evenly spaced as we could and then labeled these hash marks with numbers counting by 5s like I am doing here. [Label hash marks as you count by 5's to create the image below.] Remember 0 goes on the far left end and then the first hash mark is 5, then 10, 15, 20, 25, 30, 35, and 40. You can add your hash marks and numbers now too. [Pause for students to draw.]



Can you tell me what we added then? [Pause] Yes, we added 4 hash marks, as evenly spaced as we can, between our numbers so we have 5 spaces between each number. You do that to your number line as I do it to mine. [Draw and then pause for students to finish drawing.]

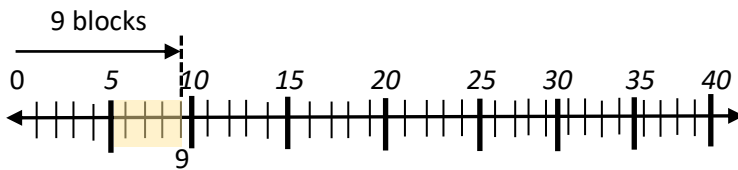


Does your number line look like mine? [Pause] Great job!
Now on to solving the problem.

We know Amelia walked 9 blocks to the grocery store so we draw a line over our number line and draw a dotted line to represent the 9 blocks she walked to the grocery store. [Draw the line over the number line similar to the image below and pause for students to draw.]

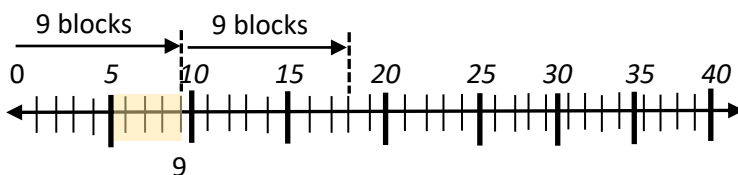


Do you remember why the line stops between 5 and 10?
[Pause] That's right! It stops between 5 and 10 because that is where 9 is. 9 is 4 spaces past 5 or 1 space before 10. [Shade the four spaces or draw a box around them and write the number 9 below similar to the image below.]



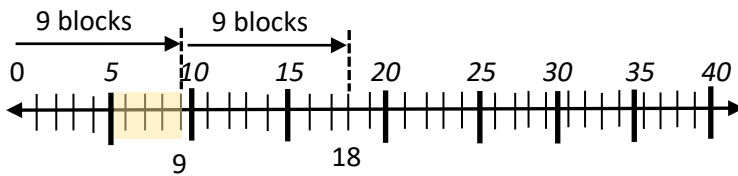
Now, we can draw a line that points to the right to represent the blocks Amelia walked to the hardware store. Why do we draw the line pointing to the right? [Pause] That's right. We move to the right on the number line, to show we are adding.

How many blocks did she walk to the hardware store? [Pause]
That's right, she walked 9 blocks. Count with me 9 spaces to the right on the number line starting at 9. We move to the right on the number line to show we are adding these blocks to the first 9 blocks. I wonder what it would mean if we moved to the left on the number line? [Pause] Well, we will come back to that in just a bit.



Let's count our spaces. [Point to the marks on the number line as you count out loud and then draw a dotted line at the 9th

mark.] Starting at 9, count 1, 2, 3, 4, 5, 6, 7, 8, and 9. We will draw a dotted line here. 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 18 under the last dotted line.] Starting at 9, count 10, 11, 12, 13, 14, 15, 16, 17, and 18. So, our sum or the total blocks Amelia walked to the grocery and hardware stores is? [Pause] You are so smart! That's right, Amelia walked a total of 18 city blocks to the grocery and hardware stores.



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

[Write the equation below.]

$$9 + 9 = 18$$

Do you remember how we connect our equation to the model? [Pause] Very good! We write 9 first because Amelia walked 9 blocks. Then you added 9 because she walked 9 more blocks. Here are the 9 additional blocks in the model. [Point]. 9 blocks plus 9 blocks is 18. This 18 [Point] shows us the total blocks Amelia walked.

Teacher Model (15 minutes)

Objective 1: Students will connect that subtracting on a number line is the opposite of adding by moving to the left on the number line (subtracting) instead of moving to the right (adding).

You did so well reviewing addition using a number line! Thank you for working so hard!

I am excited today to talk to you about subtracting using a number line. If we move to the right when adding using a number line what do you think we would do to subtract on a number line? [Pause] What? You remember me asking earlier, "I wonder what would happen if we moved to the left on the number line?" [Pause] Wow! You figured it out. To subtract on a number line you count moving to the left instead of moving to the right.

Let's practice counting to the left or backward on our number line.

Objective 1:

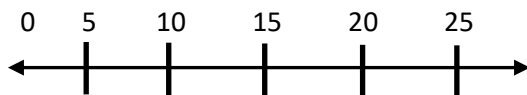
Students will connect that subtracting on a number line is the opposite of adding by moving to the left on the number line (subtracting) instead of moving to the right (adding).

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 and add arrow heads to each end of the line. I will give you a few seconds to draw this line with the arrow heads on your paper.** [Pause for students to draw.]

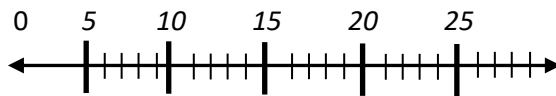


Next, we'll add some numbers to our number line. I draw 5 hash marks, as evenly spaced as I can on my line, but I won't spend a lot of time trying to get them perfect. You don't either. Just do your best. Now you draw the hash marks please. [Pause for students to draw.]

Now, we'll 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, and 25.**



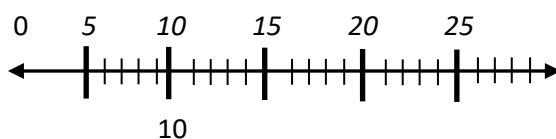
Now add 4 hash marks as evenly spaced as you can, between our numbers, so we have 5 spaces between each number. [Draw and then pause for students to finish drawing.]



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

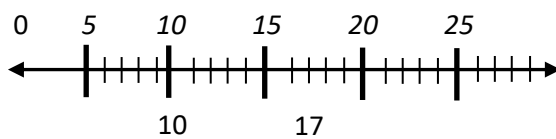
First, I want you to watch me do a few and then we will try some together.

Ok, I will start at the number 20 [Hold your pencil pointing at the number 20.] **and then count to the left 10 spaces. This would be like I am subtracting using my number line since I am counting to the left. Now starting at 20 I count 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10.** [Move your pencil point to the left each time you count.] [Pause] **What number did I land on?** [Pause] **Right again, I counted down 10 spaces to the number 10. Now, I will write the number 10 under that hash line. Now, I know I already have the number 10 on top, but this will just help me remember what I did.**

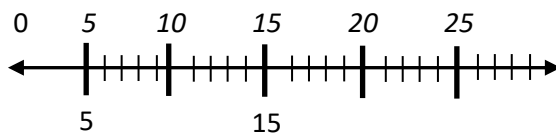


[Again, think aloud the process of counting up on the number line while pointing to the parts of the number line and mark your number line appropriately.]

Now, I am going to use the same number line and do one more. This time I will start at the number 25 [Hold your pencil pointing at the number 25.] **and then count to the left 8 spaces. Again, this would be like I am subtracting using my number line since I am counting to the left. Now starting at number 25, I count 1, 2, 3, 4, 5, 6, 7, and 8.** [Pause] **What number did I land on?** [Pause] **Yes, I counted down 8 spaces to the number 17. Now, I will write the number 17 under that hash line.**

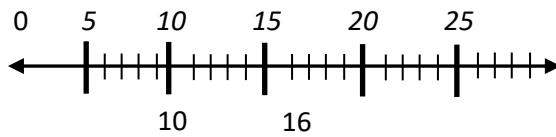


This time we will start at the number 15. [Hold your pencil pointing at the number 15.] **and then count to the left 10 spaces. Counting to the left would be just like we are doing what with our number line?** [Pause] **Right again! Counting to the left would be just like we are subtracting using our number line. Now starting at 15 I count 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10.** [Pause] **What number did I land on?** [Pause] **Yes, I counted down 10 spaces to the number 5. That was just like I was subtracting 10 from 15 to get 5 wasn't it? Now, I will write the number 5 under that hash line.**



[Again, think aloud the process of counting up on the number line while pointing to the parts of the number line and mark your number line appropriately.]

Using the same number line we will do one more. This time I will start at the number 22. Let's find 22 on our number line. It will be between 20 and 25 because why? [Pause] **Correct. It is between 20 and 25 because it is 2 spaces past 20. Did you find 22 on your number line?** [Pause for students to find number.] **Great! I found it on mine too.** [Hold your pencil pointing at the number 22.] **Let's count to the left 6 spaces. Now starting at number 22, I count 1, 2, 3, 4, 5, and 6.** [Pause] **What number did we land on?** [Pause] **Yes, we counted down 6 spaces to the number 16. Now, write the number 16 under that hash line.**



Did you notice how when we counted down from 22 to 16 it was like we were subtracting 6 from 22 to get 16? [Pause] Awesome! I thought you might catch that.

You did an awesome job practicing counting down on our number line.

Objective 2: Students will solve subtraction problems using a number line and writing an equation to match the model on the number line.

Let's look at our first subtraction problem.

Read this problem with me.

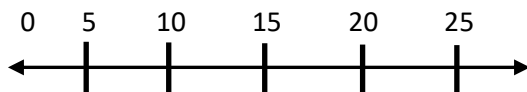
Amanda buys 17 feet of rope. She cuts off 8 feet to make a jump rope. How many feet of rope does she have left?

Once again we will use a number line to help us 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 and add my 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, I draw 5 hash marks, as evenly spaced as I can. Now you draw the hash marks please. [Pause for students to draw.]

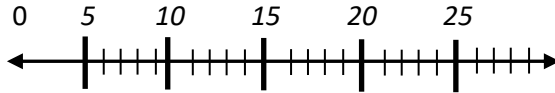
Now, we are going to label our numbers by skip counting by 5's. Let's count together. As I label my hash marks you label yours too, please. [Label hash marks as you count by 5's.] 5, 10, 15, 20, and 25.



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.]

Objective 2:

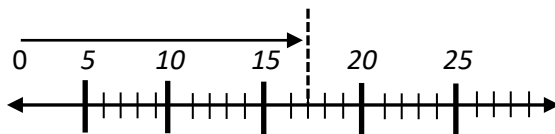
Students will solve subtraction problems using a number line and writing an equation to match the model on the number line.



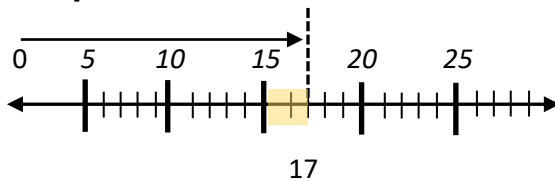
Does your number line look like mine? [Pause] Great job!

Now let's solve our subtraction problem.

Now, we know Amanda bought 17 feet of rope. So, let's draw a line over our number line to represent the 17 feet of rope she bought. [Draw the line over the number line similar to the image below and pause for students to draw.]

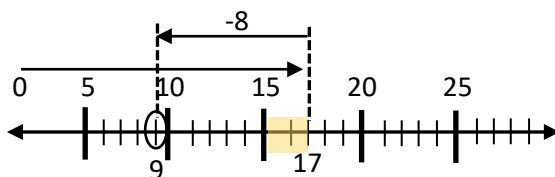


Why does the line stop between 15 and 20? [Pause] That's right! It stops between 15 and 20 because that is where 17 is. 17 is 2 spaces past 15. [Shade the two spaces or draw a box around them and write the number 17 below, similar to the image below.]

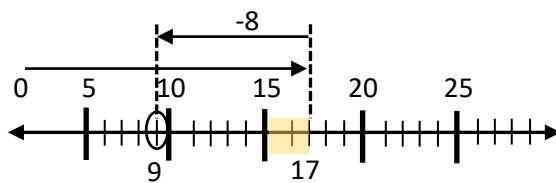


Now, we know Amanda cut off 8 feet of the rope for the jump rope. Let's draw a line to represent that. Here is where subtracting on a number line is a little different from adding on a number line. If we draw a line to represent the part of the rope Amanda cut off it will point to the left to represent taking away or subtracting from the rope.

Ok, how many feet did Amanda cut off? [Pause] That's right, she cut off 8 feet for the jump rope. Count with me 8 spaces to the left 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.] Again, we move to the left on the number line to show what? [Pause] You got it! Moving to the left on the number line shows that we are subtracting or taking away from the rope.



Now, I can count from the first dotted line back to the second dotted line. Hey remind me what the answer to a subtraction problem is called? [Pause] You are so good! The answer to a subtraction problem is called the difference. So, I can count from the first dotted line back to the second dotted line to find our difference. Let's count together. [Point to the dotted lines and marks as you count backwards and then write the number 9 under the last dotted line and circle the hash mark.] Starting at 17, count back to 16, 15, 14, 13, 12, 11, 10 and 9. So, how much rope does Amanda have left? [Pause] You are so smart! That's right, Amanda has 9 feet of rope left after cutting off 8 feet.



Now, let's write an equation for our problem.
[Write the equation below.]

$$17 - 8 = 9$$

[Point to the parts of the equation as you speak the next part.] I wrote 17 first because Amanda bought 17 feet of rope. Then I subtracted 8 because she cut off 8 feet of rope. This 8 [Point to model.] shows the 8 feet Amanda cut off of the rope. 17 minus 8 leaves us with 9 feet of rope.

Guided Practice (10 minutes)

Students will solve two more subtraction 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.

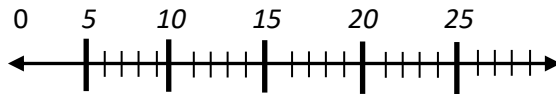
Amelio buys 25 feet of board. He uses 12 feet of board to build his little sister a sandbox. How many feet of board does Amelio have left over?

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

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

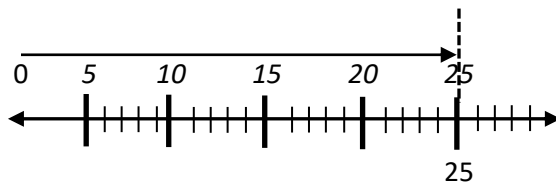
Now we will add 4 hash marks in between, creating 5 spaces.

[Pause and then compare number lines.] **Let's compare.**



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

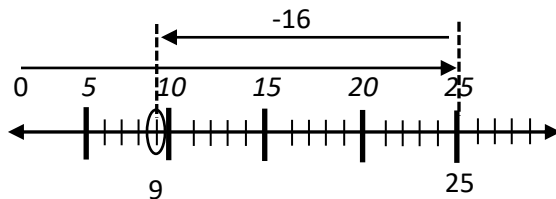
How many feet of board did Amelio buy? Look at our problem again. [Pause] **Awesome** you returned to the text and saw again that Amelio bought 25 feet of board. What do we do with that information? [Pause] **Right.** That is the first line we draw over our number line. **Let's do that now.** [Draw the line over the number line similar to the image below and pause for students to draw.]



How many feet of board did Amelio use to build the sandbox for his little sister? [Pause] **That's right,** he used 16 feet of board to build the sandbox. That was nice of Amelio to build that for his little sister, wasn't it? Now what do we do?

[Pause] **Oh yeah,** we are going to draw our second line above the number line to represent the 16 feet of board that Amelio used. Which direction will this line point? [Pause] **Yes!** It will point to the left to show we are subtracting. Count with me 16 spaces on the number line to the left starting at 25.

[Point to the marks on the number line as you count out loud and then draw a dotted line at the 16th mark.] **Count 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, and 16** and draw a dotted line.



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 marks as you count and then write the number 29 under the last dotted line.] **Starting at 25,**

count to the left 24, 23, 22, 21, 20, 19, 18, 17, 16, 15, 14, 13, 12, 11, 10, and 9. [Pause] Ok, we stopped on 9 after subtracting 8 feet on our number line. So, our difference or how many feet Amelio has left is what? [Pause] You are so smart! That's right, our difference is 9. Amelio has 9 feet of board left.

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

[Speak and point as you write the equation below.] 25 feet of board take away 16 feet is a difference of 9 feet.

$$25 - 16 = 9$$

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:

Susan has 17 pennies. She gives 12 pennies to her little brother. How many pennies does Susan have left?

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

[Pause] Right! We are going to subtract the pennies Susan gave to her little brother.

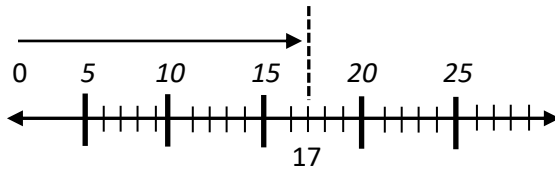
Start with your number line. Like before, 0 will be on the left end and then draw your 5 hash marks. Starting with the first hash mark as 5 label all of the hash marks by counting by 5s. I will draw mine here and you draw one on your paper. [Pause for the students to draw their number line then draw 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 numbers above the heavy hash marks? [Pause] Good. And did you add the four smaller hash marks between the skip counted numbers? [Pause] Awesome! As usual, you did a great job drawing your number line!

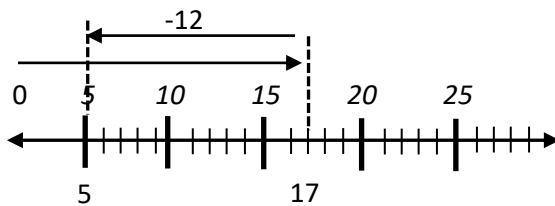
Ok now what will you do? [Pause] OK, you said you will draw a line over the number line to represent The number of pennies

Susan started with? [Pause] **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.]



Did you draw your dotted line at 17 to show the number of pennies Susan started with? [Pause] **Awesome.**

Now what will you do? [Pause] **You will draw the second line to represent the pennies Susan gave her little brother?** [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 as 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 left to show we are subtracting. Good. I also saw how your second dotted line ended up on 5. Now, tell me why that is.** [Pause] **You are rocking and rolling today. Right. 5 is where we end up on the number line after counting and subtracting the 12 pennies Susan gave her little brother. This means Susan has how many pennies left?** [Pause] **Boom! You got it! Susan has 5 pennies left after she gives her little brother 12 pennies.**

Now, will you write your equation that matches our model for me please? [Pause and write the equation below.] **Did you write your equation like mine?** [Pause] **You did? That's awesome!**

$$17 - 12 = 5$$

Now, please connect the equation to the model? [Pause] **Very good! You wrote 17 first because Susan started with 17**

pennies. Then you subtracted 12 for the pennies she gave her brother. Here are the 12 pennies given away in the model.

[Point] 17 pennies minus 12 pennies is 5 pennies. This 5

[Point] Shows us the pennies Susan has left over.

Additional Problems (if needed):

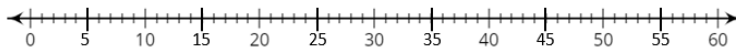
Let's try another problem together! We are going to help Sam with his science poster.

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

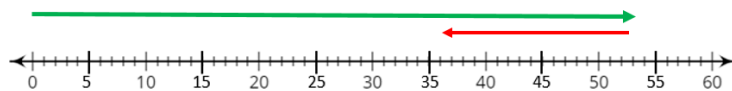
#1. Sam is making a poster for science class. His paper was 53 inches long. He had to cut some off, because the paper had to be 36 inches long. How many inches did Sam have to cut off?

We will make our number line first. On your paper, please draw a long line with arrows on either end. We will place 12 dash marks and label them counting by 5s. Our labels will be 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, and 60. [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.]



$$53 - 17 = 36$$

Let's compare! I drew my first line to 53 because Sam's paper was 53 inches long. I drew my second line back to 36 because Sam had to cut off that amount to get to 36 inches. The second line is 17 inches long, that means Sam had to cut off 17 inches of his paper so that it would be 36 inches long.

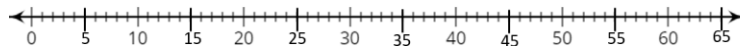
If your model and equation match, shout, "I got it!" [Pause and listen.] **You are working so hard!! Great job.**

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

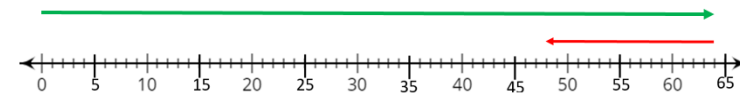
#2. Julio has 64 ounces of milk in the refrigerator. He uses 16 ounces for a recipe. How many ounces of milk is left?

We will make our number line first. On your paper, please draw a long line with arrows on either end. We will place 13 dash marks and label them counting by 5s. Our labels will be 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, and 65. [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.]



Let's compare! I drew my first line to 64 because there was 64 ounces of milk in the refrigerator. I drew the second line back 16 because Julio used 16 ounces of milk. If we have 64 ounces of milk and use 16 ounces, we end up with 48 ounces left. The second line ends at 48.

The equation $64 - 16 = 48$ matches our scenario. We started at 64 ounces and took 16 ounces away. There are 48 ounces left.

If your model and equation match, shout, "I can do this!" [Pause and listen.] You are working so hard!! Thank you.

Independent Practice (1 minute)

Boys and girls, 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".]

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

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shows student practice page under document camera or camera zooms in on student practice page.] Have fun and do your best!	
<u>Closing</u> (1 minute) Boys and Girls, I enjoyed subtracting 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! Bye!	

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