

**Math: Grade 7, Lesson 10, Adding and Subtracting Positive and Negative Numbers**

**Lesson Focus:** Adding and subtracting positive and negative numbers

**Practice Focus:** Students will focus on practicing adding and subtracting positive and negative numbers in order to solve problems.

**Objective:** Students will use addition and subtraction strategies to simplify expressions and solve problems with a focus on reasonableness of their answers.

**Key Vocabulary:**

**TN Standards:** 7.NS.A.1d

**Teacher Materials:**

- Paper or white board
- Pen/pencil/markers
- All the problems written out or typed (to save time and for student reference)
- Student Practice Packet

**Student Materials:**

- Paper and a pencil, and a surface to write on

Teacher Do	Student Do
<p><u>Opening</u> (1 min)</p> <p><b>Hello! Welcome to Tennessee's At Home Learning Series for math! Today's lesson is for all our 7th graders out there, though all children are welcome to tune in. This lesson is the tenth in our series.</b></p> <p><b>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!</b></p> <p><b>If you didn't see our previous lesson, you can find it on the TN Department of Education's website at <a href="http://www.tn.gov/education">www.tn.gov/education</a>. If you don't already have the student packet for this lesson, you can find it online at <a href="http://www.tn.gov/education">www.tn.gov/education</a>. 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.</b></p> <p><b>Today we will be learning about adding and subtracting positive and negative numbers in mathematics! Before we get started, to participate fully in our lesson today, you will need:</b></p> <ul style="list-style-type: none"><li>• Paper, pencil and a surface to write on</li></ul> <p><b>Ok, let's begin!</b></p>	<p>Students get materials ready for the lesson.</p>
<p><u>Intro</u> (3 minutes)</p> <p><b>Let's review using the strategy of using a number line to subtract.</b></p>	

<p><b>What is <math>2.5 - 4.5</math>?</b> [Pause] <b>Take a minute, draw a number line, and come up with your answer.</b> [Pause]</p> <p>[Draw a number line and mark 2.5] <b>Did you start at 2.5?</b> <b>Great! Did you remember that subtracting on a number line means to move to the left? How many places? That's it. We are moving 4.5 spaces.</b></p> <p><b>Did you land at -2? Great Job!</b></p>	<p>Student thinks about how to find the difference on a number line.</p>
<p><u>Teacher Model</u> (8 minutes) <b>Let's practice the strategies that we have learned to add and subtract positive and negative numbers.</b></p> <p><u>Objective 1:</u> Review adding and subtracting rational numbers.</p> <p><b>What is <math>-8.6 - (-5.4)</math>? Show your work.</b> [Pause. Provide students time to find their answer.]</p> <p><b>I am going to add the opposite.</b> <b><math>-8.6 + 5.4</math></b> <b>We can decompose -8.6 and combine opposite numbers.</b> [Pause] <b><math>-8.6</math> equals <math>-5.4 + -3.2</math></b></p> <p><b>So, <math>-5.4 + (-3.2) + 5.4 = -3.2</math></b></p> <p><b>What was the benefit of this strategy? That's right. It made the addition simpler much like when you first were adding and subtracting whole numbers.</b></p> <p><b>Let's try another one!</b></p> <p><b>What strategy that we've learned this week could we use to solve <math>-\frac{1}{4} + 2\frac{1}{2} - (-\frac{3}{8})</math>?</b></p> <p><b>Great! First, we could add the opposite. Write the new expression.</b> [Pause]</p> $-\frac{1}{4} + 2\frac{1}{2} + \frac{3}{8}$ <p><b>What do we need next? Yes! A common denominator of 8!</b></p> $-\frac{2}{8} + 2\frac{4}{8} + \frac{3}{8}$ <p><b>What strategy could we use now? Could we use properties and add 2 and 4-eighths and 3-eighths to get 2 and 7-eighths.</b></p>	<p>Students will be reviewing using strategies for adding and subtracting positive and negative rational numbers. Student works the problem using their chosen strategy.</p> <p>Student compares their answer to the teacher's answer.</p>

**Great Job! Now our expression looks like this:** [write the expression as you say it]

$$-\frac{2}{8} + 2\frac{7}{8}$$

**What would our final answer be?** [Pause] **Yes! 2 and 5-eighths. Good work.**

Objective 2: Instruction focuses on assessing the reasonableness of answers

**Let's think about determining the sign of an answer without working the problem. This will help us know if our answers are reasonable.**

**Without calculating, explain how you can tell if the value of the expression  $-9.45 - (-1.72) - 2.53$  is positive or negative.** [Pause]

**How can we decide?** [Pause]

**We can rewrite the expression by adding the opposite. Let's do that and see if that gives us any insight on the sign of the answer. Rewrite the expression on your paper.** [Pause]

**Did you get  $-9.45 + 1.72 + (-2.53)$ ? Great job!**

**If we start at zero on a number line, we will go left (negative) more than 11 units (because the two negative terms,  $-9.45$  and  $-2.53$  are more than 11 units). We will move right less than 2 units. This tells us that the answer should be negative.**

**Determining if our answer is reasonable will help us check answers!**

**Let's try one with fractions**

**Would the answer to  $2\frac{1}{4} - 3\frac{1}{8} - (-4\frac{1}{2})$  be positive or negative? Write down your guess.** [Pause to give students time to answer]

**Did you say positive? Let's think about why. If we add the opposite, 4 and 1-half becomes positive. If we use properties of addition and add the positive numbers 2 and 1-fourth and**

Student will determine if an answer is reasonable in order to provide a method to check their solutions.

Student thinks about how they can determine the sign of the answer.

Student follows along as the teacher explains how changing all operations to addition may help determine the sign of the answer.

Student thinks about how the sign of the number moves the sum along the number line.

<p>4 and 1-half together. That gives us more than 6. <math> 6 </math> is greater than <math> -3\frac{1}{2} </math> so the answer will be positive!</p>	
<p><u>Guided Practice</u> (16 minutes)</p> <p>Let's use our strategies and what we know about determining reasonableness to solve some problems! I want you to try each step on your own, then we will work the step together. Don't be afraid of making a mistake! That's how we learn! Also before you start the problem, let's think about whether we expect the answer to be positive or negative!</p> <p>(I do )</p> <p>Here's our first problem:</p> $-3\frac{1}{2} + 4 - \frac{1}{3}$ <p>Let's think about the sign of the answer to this expression.</p> <p>Without calculating, determine if the answer is positive or negative. [Pause]</p> <p><math>-3\frac{1}{2}</math> would be <math>3\frac{1}{2}</math> units to the left of 0. [Pause]</p> <p>Adding 4 would move us 4 units to the right, so we are now on the positive side of 0. How far to the right? [Pause]</p> <p>We would be at <math>+\frac{1}{2}</math>. [Pause]</p> <p>Subtracting <math>\frac{1}{3}</math> will move us back toward 0. Do we go below 0? [Pause]</p> <p>How do you know? [Pause]</p> <p>Since <math>\frac{1}{3}</math> is less than <math>\frac{1}{2}</math>, we will still be on the positive side of 0! Our answer will be positive!</p> <p>You are getting really good at reasoning with signs and with numbers! What would your answer be? Take a minute to finish calculating it! [Pause]</p>	

$$\frac{1}{2} - \frac{1}{3} = \frac{3}{6} - \frac{2}{6} = \frac{1}{6}$$

Did you get 1-sixth too? Awesome!

(We do)

Let's try another! Remember, make a prediction of is the answer is positive or negative and then work the problem to get the answer.

$$-2.6 - (-3.5) - 4.7$$

All right! Go ahead and get started. [Pause]

Let's think through the problem. First is our answer positive or negative? Negative? That's right! On a number line we would start at -2.6 then cross over 0 when we added 3.5 and then cross back over 0 when subtracting 4.7.

Next what was your answer?

$$-2.6 + 3.5 = 0.9$$

$$0.9 + (-4.7) = -3.8$$

How did you do? Awesome!

Let's try this one. Remember, make a prediction of is the answer is positive or negative and then work the problem to get the answer.

$$3\frac{1}{2} + 1 - 2\frac{1}{2} - 2$$

[Pause]

Did you guess positive or negative? What? Neither? How does that happen? The answer is 0? Let's do a think aloud to check your work.

$3\frac{1}{2}$  is to the right of 0. Adding 1 puts us farther to the right.

How far?

[Pause]

Right! Now we are at  $+4\frac{1}{2}$

$-2\frac{1}{2}$  takes us to the left. Where are we now?

[Pause]

You got it! Now we are at 2.

-2 takes us two places left. Where are we?

[Pause]

**YES! We are at 0! Good job! You were right! It is neither positive nor negative. Let's look at the math!**

$$3\frac{1}{2} + 1 - 2\frac{1}{2} - 2 = 4\frac{1}{2} + \left(-2\frac{1}{2}\right) + (-2)$$

**This gives us:  $4\frac{1}{2} + \left(-4\frac{1}{2}\right)$  which equals 0! Don't forget that properties of operations are very helpful when adding and subtracting rational numbers.**

(You do)

**I'm going to give you 2 problems to try all on your own and then we will check your work.**

1.  $-1.4 - (-2.6) - (1.2) - (-1.8)$

2.  $2\frac{3}{4} - 3\frac{3}{4} + 4 + \left(-4\frac{1}{4}\right)$

[Pause and give students time to work both problems]

**Let's check your work!**

**For number 1, did you get positive and then 1.8? Great work!**

**For number 2, did you get negative and  $-1\frac{1}{4}$ ? Fantastic work!**

Additional Problems (if Needed):

**$-8.3 + 5 + 3 - 2.75$**

**$3\frac{1}{6} - 4 + \left(-5\frac{1}{2}\right) - \left(-2\frac{5}{6}\right)$**

Independent Practice (1 minute)

**Great work, 7<sup>th</sup> grade! Today, we reviewed addition and subtraction strategies to simplify expressions and solve problems with a focus on checking the reasonableness of our answers. You sure did a great job! After the video, you will have some problems to practice on your own. I will show you the independent practice problems now, or you can find them in the student practice for this lesson posted on our website, [www.tn.gov/education](http://www.tn.gov/education).**

## PBS Lesson Series

[Teacher shows student practice page under document camera or camera zooms in on student practice page.]	
<b>Good luck and do your best!</b>	
<u>Closing (1 min)</u> <b>I enjoyed reviewing addition and subtraction strategies to simplify expressions and thinking about the reasonableness of answers 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!</b>	

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