

**Math: Grade 7, Lesson 4, Inequalities**

**Objective:** Students will use order of operations to solve inequalities with a focus on special cases.

**Lesson Focus:** This lesson is over how to solve inequalities and special rules that apply.

**Practice Focus:** Students will be asked to solve inequalities and apply key principles.

**TN Standards:** 7.EE.B.4b

**Key Vocabulary:** Inequalities, Order of operations, Pattern, and Solution

**Teacher Materials:**

- Table (see below)

**Student Materials:**

- Student Handout (optional – can create during lesson)
- Student packet for math, grade 7, lesson 4

Teacher Do	Student Do
<p><b>Opening</b> (1 minute)</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 fourth 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 _____. 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 inequalities 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>• Student packet for math, grade 7, lesson 4, which can be found at <a href="http://www.tn.gov/education">www.tn.gov/education</a></li> <li>• Paper and a 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><b>Intro</b> (1 minute)</p> <p><b>Recall your previous learning when you discussed inequalities.</b></p> <p><b>Remember that <math>&lt;</math> means less than, <math>&gt;</math> means greater than, <math>\geq</math> means greater than or equal to, and <math>\leq</math> means less than or equal to.</b></p>	

<p>Today we will be talking about the properties of inequalities.</p> <p>You may recall that when solving inequalities sometimes the inequality sign stays the same and sometimes it is reversed. Let's look at some numeric examples to remind ourselves what this means.</p>	
<p><b>Teacher Model</b> (10 minutes)</p> <p>[*See the table below]</p> <p>As the teacher completes the table s/he explains each part.</p> <p><b>When complete:</b> Do you notice a pattern? Pause.</p> <p>When you add or subtract, the inequality sign does not change. When you multiply or divide by a positive number, the inequality sign does not change. When you multiply or divide by a negative number, the inequality sign is reversed.</p> <p>This knowledge will help us solve inequalities. Let's work on that now.</p> <p><math>x + 5 &lt; 8</math> Let's solve for <math>x</math>.  <math>x + 5 + (-5) &lt; 8 + (-5)</math></p> <p>[May want to remind students that solving an inequality is very similar to solving an equation.]</p> <p><math>x &lt; 3</math></p> <p>We can prove that this answer is correct by evaluating <math>x</math> at a number. Let's use some number less than 3 to see if it works. I'll use 2.          So  <math>x + 5 &lt; 8</math>  <math>2 + 5 &lt; 8</math>  <math>7 &lt; 8</math>          7 IS less than 8, so using a number, <math>x</math>, less than 3 worked!</p>	<p>Student will follow along and complete the table.</p> <p>Student looks for a pattern.</p> <p>Student solves for <math>x</math>.</p> <p>Student chooses a number less than 3 to verify the solution.</p>

<p><b>Guided Practice</b> (5 minutes)</p> <p><b>Let's try another.</b></p> $\begin{array}{r} 2x > 10 \\ \underline{2x > 10} \\ 2 \quad 2 \\ x > 5 \end{array}$ <p><b>What does this mean?</b></p> <p>[Allow think time.]</p> <p><b>This means that any number that is greater than 5 will satisfy the inequality.</b></p> <p><b>Remember what we discovered about multiplying and dividing by a negative number? How do you think that affects solving an inequality?</b></p> <p>[Allow think time.]</p> <p><b>Let's solve:</b></p> $\begin{array}{r} -2x > 10 \\ \underline{-2x > 10} \\ -2 \quad -2 \\ x < -5 \end{array}$ <p>← Remember that we must reverse the inequality sign. Did you remember that?</p> <p><b>What does this mean?</b></p> <p>[Allow think time.]</p> <p><b>This means that any number less than -5 will satisfy the inequality.</b></p> <p><b>What numbers will work here?</b></p> <p>-6, -7, etc.</p> <p><b>Now you can try some on your own.</b></p>	<p>Student solves the inequality.</p> <p>Student thinks about what <math>x &gt; 5</math> means.</p> <p>Student thinks about how multiplying and dividing by a negative number affects solving an inequality.</p> <p>Student solves the inequality.</p> <p>Student thinks about his/her solution.</p> <p>Student thinks about what it means to for a number to be less than -5.</p> <p>Student answers.</p>
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## PBS Lesson Series

<b><u>Independent Practice</u></b> (3 minutes)  Great work, boys and girls! Today, we reviewed how to solve inequalities. I hope you're seeing some connections to regular solving but also notice the special cases! You sure did a great job! After the video, you will have some problems to practice on your own. Good luck and do your best!	
<b><u>Closing</u></b> (1 minute) <ul style="list-style-type: none"><li>• Friends, I enjoyed doing some mathematics with you today! 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!</li><li>• Bye!</li></ul>	

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## PBS Lesson Series

Teacher Table

Inequality	Operation and New Inequality in which the inequality sign stays the same	Operation and New Inequality in which the inequality sign is reversed	Explanation
$2 < 5$	Add 4 to both sides. $2 < 5$ $2+4 < 5+4$ $6 < 9$ (Notice that the inequality sign is the same.)	Multiply both sides by -4 $2 < 5$ $2(-4) > 5(-4)$ $-8 > -20$ (Notice that the inequality sign is reversed.)	Adding a number to both sides of an inequality does not affect the inequality sign. Multiplying both sides of an inequality by a negative number reverses the inequality sign. (Now let's see if this is always true by doing some more examples.)
$-4 > -6$	Subtract 3 from both sides.	Divide both sides by -2.	
$-1 \leq 2$	Multiply both sides by 3.	Multiply both sides by -1.	
$-2+(-3) < -3-1$	Add 5 to both sides.	Multiply both sides by -1/2.	