PBS Lesson Series

Math: Grade 7, Lesson 5, Using inequalities to solve problems

Lesson objective: Students will create inequalities to represent real-world problems, and solve them.
Lesson Focus: Use inequalities to solve problems.
Practice Focus: Create inequalities to solve real-world problems.
TN Standard: 7.EE.B.4
Key Vocabulary: inequalities, equations
Teacher Materials:
- White board or paper
- Pencil/pen/marker

Student Materials:
- Paper & Pencil
- Surface to write on
- Student packet for math, grade 7, lesson 5

Teacher Do	Student Do
Opening: (1 min) **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 fifth in our series.** **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!** **If you didn't see our previous lesson, you can find it on 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.** **Today we will be creating inequalities to solve real-world problems in mathematics! Before we get started, to participate fully in our lesson today, you will need:** • **Paper & Pencil** • **Student packet for math, grade 7, lesson 5, which can be found at www.tn.gov/education** • **And a surface to write on** **Ok, let's begin!**	Student gathers materials
Intro (1 minute) **Today our focus will be solving inequality word problems when presented in a real world scenario. Inequalities are similar to**	

equations but just will a little twist. What are the differences and similarities between an equation and an inequality? Remember equations show equality and use an equal sign. Inequalities represent quantities that are greater than or less than a given quantity. **≤, <, ≥, >, =** **Also recall that when solving inequalities, if we multiply or divide by a negative number, we must reverse the inequality sign.**	
<u>**Teacher Model**</u> (10 minutes) **Let's look at our first problem!** **The annual County Carnival is being held this summer and will last 5 ½ days. Use this information and the other given information to answer each problem.** **You are the owner of the biggest and newest roller coaster called The Gentle Giant. The roller coaster costs $6 to ride. The operator of the ride must pay $200 per day for the ride rental and $65 per day for a safety inspection. If you want to make a profit of at least $1,000 each day, what is the minimum number of people that must ride the roller coaster?** **Write an inequality that can be used to find the minimum number of people, _p_, which must ride the roller coaster each day to make a daily profit?** *P* **is our variable in this question. It will represent the number of people who ride the Gentle Giant. Let's start by picking out the most important information that the problem gives us.** **It costs everyone who rides the ride $6. Now let's see what all expenses are needed to keep the roller coaster running. How much does it cost to rent the coaster?** [Allow time between questions] **Right! It costs $200 per day to rent the Gentle Giant.** **How much does it cost for the safety inspection?** Pause. **Great job! The safety inspection costs $65 per day.** **How much do you want to profit daily?** Pause. **True! We are hoping to earn $1,000 per day.** **Now we are ready to set up an inequality according the information given!** **If it cost each person that rides the ride $6 then 6_p_ will be a term in our inequality. That will represent the amount of money the operator has coming in each day.**	 Students answer. Students answer. Students answer. Student thinks about the given information and how to use it to create an inequality.

Now we need to subtract all the daily expenses. **Currently our expression appears like this: 6p – 200 – 65.** **When we simplify the expression, it takes the form of 6p – 265.** **Do we need a greater than or equal to or less than or equal to sign next? We need to make a profit of AT LEAST $1,000. This means our profit must be greater than or equal to $1,000.** [Pause] **Recall how much of profit do you want to make daily?** **With this information our inequality is 6p – 265 ≥ 1000.** **We now have an inequity. We can solve it! What is the first step?** **We will add 265 to each side.** [Teacher writes: 6p – 265 ≥ 1000 +265 +265 6p ≥ 1265] **Now we have 6p ≥ 1265.** **What is the final step?** **Divide each side by 6.** **p ≥ 210.83** **Now we have to interpret our solution. How many people do we need in order to profit at least $1000?** **We will need AT LEAST 210.83 people. Since we cannot have a fraction of a person, the operator will need at least 211 people to ride the roller coaster.** **Guided Practice** (14 minutes) **Great job! Now let's look at another problem!** **A youth summer camp has budgeted $2,000 for the campers to attend the carnival. The cost for each camper is $17.95, which includes general admission to the carnival and two meals. The youth summer camp must also pay $250 for the chaperones to attend the carnival and $350 for transportation to and from the carnival. What is the greatest number of campers who can attend the carnival if the camp must stay within its budget?** **Help me pick out the key information from the text!** **How much is budgeted for the camp?** [Pause] **$2,000. Good!** **How much does it cost each camper to attend camp?** [Pause]	Student thinks about what kind of inequality sign to use. Students answer. Student solves the inequality. Students answer. Students answer. Student interprets the answer. Students answer. Students answer.

$17.95, yes! **How much, in total does it cost for the transportation and chaperones?** [Pause] **$250 for the chaperones and $350 for transportation, so that is a total of $600.** **So If the camp has budgeted $2000 let's start with that number!** **Since we can't exceed $2000 do we do need a less than or equal to or a greater than or equal to?** **We cannot spend more than $2000, so we will use less than or equal to, ≤.** **So right now our inequality looks like $2000 ≤. What does our variable represent in this problem? What is the unknown quantity?** [Pause] **We need to know the number of campers who can attend. Let's use p to represent the number of campers who can attend.** **Now let's finish out the inequality.** **We know that it will cost $600 and $17.95 per camper, so our inequality will be:** **$17.95p + 600 ≤ 2000$** **Now we have to solve!** **What would be the first step in solving this inequality?** [Pause.] **We will subtract 600 from both sides.** **$17.95p ≤ 1400$** **Now we divide by 17.95.** **$p ≤ 77.99$** **Now we must interpret our answer! Since we can't round up to 78 because that will put the camp over budget that means we must round down to 77 campers!**	Students answer. Students think about the given information and how to use it to create an inequality. Students answer. Student thinks about the kind of inequality. Student creates the inequality. Student solves the inequality. Student interprets the answer.
<u>**Independent Practice**</u> **(3 minutes)** **Today we have practiced using inequalities to solve problems. 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!**	
<u>**Closing**</u> **(1 minute)**	

• **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!** • **Bye!**	