Use variables to represent quantities in a	4a. Solve word problems leading to	
real-world or mathematical problem, and	equations of the form $px + q = r$ and $p(x + q)$	
construct simple equations and	q) = r, where p, q, and r are specific	
inequalities to solve problems by	rational numbers. Solve equations of these	
reasoning about the quantities	forms fluently. Compare an algebraic	
	solution to an arithmetic solution,	
	identifying the sequence of the operations	
	used in each approach.	

For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?

4b. Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem.

➔ For example: As a salesperson, you are paid \$50 per week plus \$3 per sale. This week you want your pay to be at least \$100. Write an inequality for the number of sales you need to make, and describe the solutions.

The admission to a video game arcade is \$1.25 per person, and it costs \$0.50 for each game played. Latoya and Donnetta have a total of \$10.00 to spend. What is the greatest number of games they will be able to play? Use words to explain your steps.

Guided Instruction Essential Question: 7.EE.4b

How can you solve inequalities of the form px + q > r and px + q < r, where p, q, and r are specific rational numbers.

In this lesson students will extend what they know about **Solving Equations** to **Solve Inequalities**.

Beginning	Operation	Results	True
Inequality	Performed on Both		or
	Sides		Fals
			e?

Teacher(s): _____

Solve and Graph the solution. -3x + 2 > 17

-3x + 2 > 17	
3x + 2 -2 > 17 - 2	Add -2 to both sides.
-3x > 15	Simplify both sides
$\frac{-3x}{5} < \frac{15}{5}$	Divide both sides by -3
-3 -3	Reverse the direction of the inequality
	symbol – whenever you multiply or divide
	by a negative number.
X < -5	Simplify both sides

The solution x < -5 means that any number less than -5 would make the inequality true.



The solution is x < -5

The open circle at -5 shows that the number -5 is not part of the solution.

Lesson Objective(s): What mathematical skill(s) and understanding(s) will be developed? Which Mathematical Practices do you expect students to engage in during the lesson?

7.EE.B.4b Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

MP1: Make sense of problems and persevere in solving them.

- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.

Notes: Exactly how will you use the first five minutes of the lesson?	Notes: Exactly what summary activity, questions, and discussion will close the lesson and provide a foreshadowing of tomorrow? List the questions.
<u>Share</u>	
Explain the difference between these symbols.	Have students write an equation or inequality for the
How does it change the meaning of each	following questions:

Inequ	ualities Teacher(s):	
mat 3 + 3 + 3 +	thematical statement? $p > 7$ $3 + p \ge 7$ $p < 7$ $3 + p \le 7$ p = 7	 If Grant made \$15 profit, how many miles did he ride? How would your equation change if I said Grant needed to make at least \$15 a day, how many miles would he need to ride?
Les inve ind	sson Tasks, Problems, and Activities (attach i restigations, problems, questions, or tasks will s licate strategic connections to appropriate man	esource sheets): What specific activities, students be working on during the lesson? Be sure to thematical practices.
dev	velopment of group and whole-class discussion	n, depending on the grouping structure and n.
1. 2. 3.	 Introduce the scenario: Grant is trying to make Brian's Bike Taxis of Baltimore. He has an agr and will charge customers \$3.75 per mile her Task: Work with your group to determine how profit. Each group member must record all p their notebook. Record ALL attempts that yo out to be wrong. As a group, choose one str on chart paper to share with the class. (Look f Gallery Walk: As the students finish writing the the wall around the room. (Look for evidence) You will have 10 min to view all of the problem. It is your job to comment on their we comment and leave on each group's You need to make one accolade. The may have explained something reall You also need to make a suggestion Maybe something is not very clear or would strengthen the oxplanation of the problem. 	e money to help pay for college by taking a job with reement that he will rent the bike for \$35.00 a night ides. r many miles he needs to ride in order to make a roblem-solving strategies in the class work section of ur group explored; do not erase any even if they turn rategy that you used to solve the problem and post it for evidence of MP1.) eir solution on the chart paper, have them hang it on a of MP4.) me different ways that your classmates have solved the ork. Consider giving students post-it notes to s work. mey may have thought of something you did not, they y clearly, or some other positive thing you noticed. of one thing the group might want to consider. r you thought of something that they could add that a their strategy (I pok for avidence of MP3.)
4.	Once all groups have completed the gallery v accolades and suggestions and make any adju chance to share out their strategy. Once grou bring the class together for a whole group dis strategies. Which ones are easiest to underst students jot down their favorite method, the o	valk, have each group take some time to read the ustments they feel are necessary. Then give them a ups have had a chance to describe all their strategies, scussion. Have students compare the different and? Which ones are quickest to complete. Have the one they could see themselves using in the future and
5.	Pose the following question to the students: Why or why not? Use whatever strategy you v of MP6.)	ls it possible for Grant to make <u>exactly</u> 16 dollars? would like to solve this problem. (Look for evidence
6. 7.	After a few minutes have the students share the Once again bring the class together to discus real-world problems.	neir thoughts in their groups. s the importance of considering context in solving

Inequalities

Teacher(s):

8. Have the students apply their strategy to the following problem: A car rental agency charges Shae's family \$25.00 plus \$0.10 per mile that the car is driven. Shae wants to spend less than \$35.00 on the car rental. How many miles can she drive the rental car?

Evidence of Success: What exactly do I expect students to be able to do by the end of the lesson, and how will I measure student mastery? That is, deliberate consideration of what performances will convince you (and any outside observer) that your students have developed a deepened (and conceptual) understanding.

Students will be able to write equations or inequalities to represent real-world problems and utilize tables, graphs, equations, or inequalities to solve real-world problems. The students' success with the exit ticket will help the teacher to understand the students' comfort with the difference between equations and inequalities. The homework will give the teacher an idea of the level of confidence the students have with this concept.

Notes and Nuances: Vocabulary, connections, common mistakes, typical misconceptions, etc.

Key vocabulary: equation, inequality, at least, more than, exceed, profit

Connections: Students will need to connect to their prior understanding of writing and solving simple equations and inequalities from standards 7.EE.3 and 7.EE.4a.

Extension: There is a day 3 extensions on the ppt. At this time you will introduce graphing on the graphing calculator. **(Look for evidence of MP5.)**

Misconceptions: The students will have to address the concept of profit being any amount of money over the start up costs. In order for Grant to make money he will first have to pay his start-up costs

Since we are working with a real-world scenario, the students will have to consider the context of the problem to help them determine the reasonableness of their answer.

Resources: What materials or resources are	Homework: Exactly what follow-up homework tasks,	
essential for students to successfully complete	problems, and/or exercises will be assigned upon	
the lesson tasks or activities?	the completion of the lesson?	
Linear Equations PowerPoint	Create a new real-world scenario similar to the ones	
Chart paper	we completed in class today.	
Markers	a. Provide at least two different ways that you	
Graphing calculators	could solve it.	
	b. Rewrite the question that you posed so that the	
	solution results in an inequality not an equation.	

Lesson Reflections: How do you know that you were effective? What questions, connected to the lesson standards/objectives and evidence of success, will you use to reflect on the effectiveness of this lesson?

How successful are my students in writing equations or inequalities for real-world problems? Are students able to transfer understanding to different scenarios and mathematical problems? How will I use the homework and exit ticket to differentiate upcoming lessons to meet the needs of the various learners in my class?

7.EE.4b Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. For example, as a salesperson, you are paid \$50 per week plus \$3 per sale. This week you want your pay to be at least \$100. Write an inequality for the number of sales you need to make, and describe the solutions

Math Best Practices	Prior Knowledge
1. Make sense of problems and persevere in	In order for students to be successful, the
solving them.	following skills and concepts need to be
2. Reason abstractly and quantitatively.	maintained:
3. Construct viable arguments and critique the	• Creating inequality statements in order to
reasoning of others.	compare two values
4. Model with mathematics.	• How to solve one and two step equations
5. Use appropriate tools strategically	in order to transition the same process to
6. Attend to precision.	inequalities
	 An inequality shows a range of possible
	values not just a single value

Common Misconceptions

When working with inequalities, students struggle with the idea that the solution is a range of

numbers not just a single value. The first few problems may require a discussion about what

the graph is truly telling you and how you can choose possible values from the given solution

	Learning Tai	gets		
	• I can use inequalities to order and demonstrate all possible values that a solution can be			
	given in real life situation?			
	• I can display inequalities on a number line to provide a visual representation of a given			
	situation?			
١	Video Tutor 1. Video: PH Graphing Solutions to One Variable Inequalities			
		2. Video: PH Writing an Inequality from a Graph		
		3. Video: PH Writing Inequalities		

- 4. Video: PH Solving Inequalities by Addition
- 5. Video: PH Solving Inequalities by Subtraction

<u>Task</u> Notes

Worksheets

Inequalities

Teacher(s): __

Inequalities are used to show a range of possible values that meet a given criteria. In the following task, students will be creating a visual and algebraic solution to a given situation.

Review:

An inequality is a math sentence that compares two quantities. Often one of the quantities represented is a variable. Use the following symbols and descriptions to represent each type of inequality.

- < means "is less than." \leq _means "is less than or equal to."
- > means "is greater than." \geq _means "is greater than or equal to."
- ≠ _means "is not equal to."

Independent Activity

Learning Target: How could I represent inequality using a variable and a constant? Warm up....

Question

Answer

- 1. Nima will spend less than \$25
- 2. Derrick ran at least 30 miles last week
- 3. Emily needs at least \$200 to buy the TV she wants

 Marcia volunteers with some friends at a community center. While shopping online for a new television she decides she wants one with at least a 26 in. screen. Using the chart below, write an inequality to show how much money the center will have to spend.

Television Prices		
Screen	Price	

Teacher(s):

Inequalities

Size	
22 in.	\$300
26 in.	\$330
32 in.	\$370
40 in.	\$420

- a. Write the Inequality: _____
- b. Graph the inequality on the number line.



c. The center has a stand for the television that will hold up to 30 lb of weight. Draw a graph to show how much the television she buys can weigh.



Marcia plans to use money from the community center's savings account to buy a gaming system. There must be \$129 left in the savings account after she withdraws what she needs.

> Video Game System Sale This Month Only \$250.00 Selected Extra Games on Sale \$35.00 Each

- 5. Write and solve an inequality to represent the situation, where x represents the amount of money the center has in its savings account. What does your solution mean in terms of the problem?
- 6. Graph the possible values from the solution found in number seven

Teacher(s):

The community center rents rooms for an hourly rate, plus a set-up fee.

Room Rentals		
Room	Rental Rate Per Hour	Set-up-Fee
Main Hall	\$15	\$40
Dining Room	\$12	\$80

1. A school group has \$140 to spend. Write and solve an inequality that represents the cost to rent the main hall, where *h* represents the number of hours the group can rent the room.

2. The same group is also considering renting the dining room. Write and solve an inequality to represent this situation.

3. Use your solutions from 1 and 2 to justify your selection of which room the group should rent.

Teacher(s): _____

The community center has \$175 to spend on video games for its new gaming system. Games are on sale for \$35 each.

1. Write and solve an inequality to represent the number of games the center could buy. Explain your solution in reference to the problem.

2. Graph the solution on a number line.



The center is considering signing up for an online game-rental service rather than buying the games. The table shows equipment cost and monthly fees for two services.

Game Rental Services		
Services Equipment Cost I		Monthly Fee
Net Games	\$99	\$8
Anytime Games	\$19	\$19

1. Write and solve an inequality that represents the number of months the center could rent games from NetGames with its \$175. Explain the solution in terms of the problem.

2. Write and solve an inequality to represent the number of months the center could rent games from Anytime Games. Explain the solution in terms of the problem.

3. Use your answers from 1 and 2 to justify which service the community center should purchase.

Inequalities

Teacher(s): _____