1.9 Greater Than?
A Solidify Understanding Task

For each situation you are given a mathematical statement and two expressions beneath it.

1. **Decide which of the two expressions is greater, if the expressions are equal, or if the relationship cannot be determined from the statement.**
2. **Write an equation or inequality that shows your answer.**
3. **Explain why your answer is correct.**

Watch out—this could be tricky!

Lets think about how we write some different things that use the word more and less and all that jazz. Write the following using mathematical symbols: **"4 more than x"** and **"4 is more than x"** What is the difference between the two statements?

Try it yourself:

1. Statement: $y < x$
   Which is greater? $x - y$ or $y - x$

2. Statement: n is an integer
   Which is greater? n or $-n$

3. Statement: $5 > 4$
   Which is greater? $5x$ or $4x$

4. Statement $x > y$
   Which is greater? $x + a$ or $y + a$

5. Statement: $5 > 4$
   Which is greater? $\dfrac{5}{x}$ or $\dfrac{4}{x}$

6. What do you need to consider when multiplying an inequality on both sides by the same number?

7. What do you need to consider when dividing an inequality on both sides by the same number?

Solve the equations and inequalities below. Plot your solution on a number line.

8. $2x + 3 = 17$

9. $2x + 3 < 17$

10. $5 - 3x = 32$

11. $5 - 3x \geq 32$

12. How many solutions are there to the equation on question #8?

13. Is 8 a solution to the inequality on #9? How do you know?

14. How many solutions are there to the inequality on question #9?

15. In general, how many solutions will there be to an INEQUALITY with ONE variable?

16. What is the solution to an equation or inequality?

1.9 Greater Than? – Teacher Notes
A Solidify Understanding Task

Purpose: The purpose of this task is to challenge students to think deeply about inequality relationships and to understand the properties of inequalities. Each of the problems in the require reasoning about numbers, including negative numbers and fractions, and thinking mathematically about the various possibilities in the given problem situation.

Core Standards Focus:

A.REI.1 Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution.
a. Construct a viable argument to justify a solution method.
b. Solve equations and inequalities in one variable.

A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

Mathematics I Note: *Extend earlier work with solving linear equations to solving linear inequalities in one variable and to solving literal equations that are linear in the variable being solved for.*

Launch (Whole Class):
Explain to students that this task is a big logic puzzle. All of the problems require thinking about all the different possibilities to decide which expression is greater. There are some that cannot be determined from the information given. You may choose not to tell students this in advance so that they have an opportunity to wrestle with the ideas and to justify their position. Start by asking students to read the example given. To confirm the instructions, ask how they see the 3 required parts of the explanation in the answer. Next, refer students to problem #1. Give them a few minutes to answer and write their own explanation. Ask the class for their answers and explanation and model how to write an answer with a complete explanation. You may also want to model thinking about possible value for x and y, like: "If x is a negative number, then y must also be a negative number because it is less than x."

Explore (Small Group or Pairs): Monitor students as they work. Encourage them to think about the various possibilities for x and y in each case. Be sure that their written explanations adequately communicate their logic. Watch for problems that generate disagreement or difficulty for the class discussion. Also look for students' explanations that demonstrate sound mathematical logic or good communication to be highlighted in the discussion. If you notice a common misconception occurring during the exploration, plan to raise it as an issue in the discussion.

Discuss (Whole Class): Start the discussion with problems 11-15. Ask previously-selected students to give their explanations for each of these problems. Highlight for the class that these three problems are asking them to justify the properties of inequalities. Write each of the properties of inequalities (addition, subtraction, multiplication, and division), and ask students to state them in their own words. After going

through each of these, turn the discussion to any misconceptions or provocative problems that were selected during the exploration phase.

Aligned Ready, Set, Go Homework: Getting Ready 1.9