Amelia, Luis, Shauna, And Clarence Used Different Approaches To Solve The Inequality7.2b + 6.5 > 4.8b

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When faced with the inequality 7.2b + 6.5 > 4.8b, different students may approach solving it in unique ways based on their understanding of algebraic principles and problem-solving strategies. Amelia, Luis, Shauna, and Clarence each employed distinct methods to find the solution for b, showcasing the variety of pathways available in algebra. This article explores their approaches in detail, emphasizing the importance of diverse problem-solving techniques and how they can be effectively applied to inequalities.

Understanding the Inequality: 7.2b + 6.5 > 4.8b

Before delving into each student's approach, it’s essential to understand the inequality itself. The inequality compares two expressions involving the variable b, with a constant added to one side. The goal is to find all possible values of b that make the inequality true.

The general steps to solve such an inequality involve:

1. Isolating the variable term on one side
2. Combining like terms
3. Dividing or multiplying to solve for the variable (keeping in mind the direction of the inequality if multiplied/divided by a negative)
4. Expressing the solution set

Each student’s approach provides a different perspective on how to navigate these steps.

Amelia’s Approach: Moving Terms Step-by-Step

Amelia took a straightforward, step-by-step approach to isolate b and solve the inequality.

Step 1: Subtract 4.8b from both sides

- She recognized that bringing all terms involving b to one side simplifies the inequality.

$7.2b - 4.8b + 6.5 > 0$

Step 2: Simplify the b-terms

- $7.2b - 4.8b = 2.4b$

$2.4b + 6.5 > 0$

Step 3: Subtract 6.5 from both sides

- To isolate the term with b, Amelia subtracted 6.5 from both sides.

$2.4b > -6.5$

Step 4: Divide both sides by 2.4

- Since 2.4 is positive, the inequality direction remains unchanged.

$b > -6.5 / 2.4$

Step 5: Simplify the fraction

- $-6.5 / 2.4 \approx -2.7083$

Solution: $b > -2.7083$

Amelia’s systematic approach highlights the importance of maintaining inequality direction during each operation and simplifying step-by-step to reach the solution.

Luis’s Approach: Using Algebraic Properties and

Substitution

Luis employed a different method, emphasizing algebraic properties and substitution to arrive at the solution.

Step 1: Recognize the inequality structure

- Luis identified that the inequality involves b terms on both sides and constants, suggesting that combining like terms could be beneficial.

Step 2: Subtract 4.8b from both sides

- He performed the same initial step as Amelia, but with a focus on substitution later.

$7.2b - 4.8b + 6.5 > 0$

Step 3: Simplify the b-terms

- $7.2b - 4.8b = 2.4b$

$2.4b + 6.5 > 0$

Step 4: Isolate b through substitution

- Luis introduced a substitution variable, say $c = 2.4b$, to make calculations clearer.
- Rearranged as $c + 6.5 > 0$

Step 5: Solve for c and then back-substitute

- Subtract 6.5 from both sides: $c > -6.5$
- Recall that $c = 2.4b$, so: $2.4b > -6.5$
- Divide both sides by 2.4: $b > -6.5 / 2.4$

Step 6: Final solution

- Calculate: b > -2.7083 (approximately)

Luis's method emphasizes the utility of substitution to clarify the steps and reinforce understanding of algebraic relationships.

Shauna's Approach: Graphical Method

Shauna approached the inequality visually by graphing the expressions involved, which is especially useful for understanding inequalities.

Step 1: Rewrite the inequality as a function

- Express the left and right sides as functions: $y_1 = 7.2b + 6.5$ and $y_2 = 4.8b$

Step 2: Find the point of intersection

- Set $y_1 = y_2$ to find the critical point where the two expressions are equal
- $7.2b + 6.5 = 4.8b$
- Subtract 4.8b from both sides: $2.4b + 6.5 = 0$
- Subtract 6.5: $2.4b = -6.5$
- Divide: $b = -6.5 / 2.4 \approx -2.7083$

Step 3: Interpret the graph

- Plot the line $y = 7.2b + 6.5$ and $y = 4.8b$
- Shade the region where $7.2b + 6.5 > 4.8b$

Step 4: Determine the solution set

- Since the inequality is 'greater than,' the region of interest is where y_1 is above y_2
- At $b > -2.7083$, $y_1 > y_2$, so the solution set is $b > -2.7083$

Shauna's graphical method provides an intuitive understanding, especially for visual learners, illustrating where the inequality holds true on the coordinate plane.

Clarence's Approach: Using Test Points and Numerical Validation

Clarence opted for a practical, test-point approach to verify the solution.

Step 1: Find the critical point

- Set the expressions equal to find the boundary: $b \approx -2.7083$

Step 2: Choose test points on either side of the critical point

- Test point 1: $b = -3$ (less than -2.7083)
- Test point 2: $b = 0$ (greater than -2.7083)

Step 3: Substitute test points into the original inequality

- For $b = -3$:
  - Left side: $7.2(-3) + 6.5 = -21.6 + 6.5 = -15.1$
  - Right side: $4.8(-3) = -14.4$
  - Check: $-15.1 > -14.4$? No, so $b = -3$ does NOT satisfy the inequality.
- For $b = 0$:

- Left side: 7.20 + 6.5 = 6.5
- Right side: 4.80 = 0
- Check: 6.5 > 0? Yes, so b = 0 satisfies the inequality.

Step 4: Conclude the solution set

- Since the inequality is satisfied for b > -2.7083 and test point at 0 works, Clarence concluded that the solution set is b > -2

Frequently Asked Questions

What different methods did Amelia, Luis, Shauna, and Clarence use to solve the inequality 7.2b + 6.5 > 4.8b?

Amelia, Luis, Shauna, and Clarence each employed various approaches such as isolating the variable, combining like terms, or using graphical methods to solve the inequality 7.2b + 6.5 > 4.8b.

How did Amelia approach solving the inequality 7.2b + 6.5 > 4.8b?

Amelia subtracted 4.8b from both sides to gather the variable terms on one side, resulting in 2.4b + 6.5 > 0, then she isolated b to find the solution.

What method did Luis use to solve the inequality 7.2b + 6.5 > 4.8b?

Luis moved all terms involving b to one side by subtracting 4.8b from both sides, then divided both sides by 2.4 to solve for b.

How did Shauna's approach differ in solving the inequality 7.2b + 6.5 > 4.8b?

Shauna graphically represented the expressions to identify the region where 7.2b + 6.5 was greater than 4.8b, providing a visual solution.

What approach did Clarence take to solve the inequality 7.2b + 6.5 > 4.8b?

Clarence subtracted 7.2b from both sides to get 6.5 > -2.4b, then divided both sides by -2.4, remembering to reverse the inequality sign due to dividing by a negative number.

Are the solutions found by Amelia, Luis, Shauna, and Clarence equivalent, despite their different approaches?

Yes, all methods lead to the same solution for b, demonstrating that different approaches can be valid as long as the steps are correctly applied.

Why is it important to consider different approaches when solving inequalities like 7.2b + 6.5 > 4.8b?

Using various methods deepens understanding, helps identify the most efficient approach, and reinforces problem-solving skills, especially when dealing with more complex inequalities.

Additional Resources

Amelia, Luis, Shauna, and Clarence used different approaches to solve the inequality 7.2b + 6.5 > 4.8b. This scenario provides a fascinating glimpse into the variety of problem-solving strategies that students or mathematicians can employ when tackling algebraic inequalities. Each individual’s method reflects their understanding of algebraic principles, their comfort with certain operations, and their ability to think critically about the problem at hand. In this article, we will examine each approach in detail, analyze their strengths and weaknesses, and offer insights into how different methods can influence the learning process and problem-solving efficiency.

Understanding the Inequality 7.2b + 6.5 > 4.8b

Before delving into the individual solutions, it's important to recognize the core structure of the inequality. It involves a variable, b, with coefficients and constants, and requires isolating b to understand its possible values. The inequality reads:

$7.2b + 6.5 > 4.8b$

The goal is to determine the set of all b values that satisfy this statement. Typically, solving such an inequality involves:

- Moving all terms containing b to one side.
- Moving constant terms to the opposite side.
- Simplifying to find the range of b.

Now, let's explore how Amelia, Luis, Shauna, and Clarence approached this task.

Amelia's Approach: Subtracting Coefficients Directly

Methodology

Amelia's strategy was straightforward and algebraically systematic. She began by subtracting 4.8b from both sides to gather all b terms on one side:

$7.2b + 6.5 > 4.8b$
$\rightarrow (7.2b - 4.8b) + 6.5 > 0$

She then simplified the b terms:

$2.4b + 6.5 > 0$

Next, she subtracted 6.5 from both sides:

$2.4b > -6.5$

Finally, she divided both sides by 2.4:

$b > -6.5 / 2.4$

Calculating the division:

b > -2.7083...

Result:

b > -2.7083 (approximately)

Pros and Cons

- Pros:
- Clear and methodical steps, making the solution easy to follow.
- Accurate handling of inequality rules, including division by positive numbers.
- Emphasizes understanding of algebraic manipulations.

- Cons:
- Slightly longer process, especially for beginners.
- Requires careful attention to signs during subtraction and division.

Overall, Amelia’s approach exemplifies a classic, step-by-step algebraic technique suitable for learners developing foundational skills.

Luis’s Approach: Intuitive Subtraction and Visualization

Methodology

Luis opted for an intuitive approach, focusing on understanding the inequality’s structure without immediately performing algebraic transformations. He identified that 7.2b is greater than 4.8b, but with an added constant on the left.

He reasoned:

- Since 7.2b is larger than 4.8b, subtracting 4.8b from both sides would isolate the constant:

7.2b + 6.5 > 4.8b
→ 7.2b - 4.8b + 6.5 > 0

- Simplifying:

2.4b + 6.5 > 0

- Then, he visualized the inequality as:

2.4b > -6.5

- Finally, dividing both sides by 2.4:

b > -6.5 / 2.4

- Calculated as approximately:

b > -2.7083

Luis also considered the implications of dividing by a positive number, maintaining the inequality direction.

Additional step: He visualized the solution on a number line, understanding that all b greater than approximately -2.7083 satisfy the inequality.

Pros and Cons

- Pros:
- Emphasizes conceptual understanding and visualization.
- Useful for students who think numerically or graphically.
- Encourages reasoning about the nature of inequalities.

- Cons:
- Less formal; might omit explicit algebraic steps if not careful.
- Could lead to errors if the reasoning about signs or division isn't precise.

Luis's method highlights the importance of understanding the problem's structure and using intuition alongside algebra, which can be especially beneficial for visual learners.

Shauna's Approach: Using a Graphical or Tabular Method

Methodology

Shauna chose to approach the inequality graphically. Her steps included:

1. Rearranging the inequality to the form b > ... as in previous approaches.
2. Plotting the boundary point b = -2.7083 on a number line, marking it with an open circle because the inequality is strict (>).
3. Shading the region of b values greater than -2.7083 to indicate the solution set.

Alternatively, she constructed a table of b values:

b	7.2b + 6.5	4.8b	Inequality Check
-4	7.2(-4)+6.5 = -28.8+6.5 = -22.3	4.8(-4) = -19.2	-22.3 > -19.2? No
-3	-21.6+6.5 = -15.1	-14.4	No
-2.7	approximately -19.44+6.5 = -12.94	-12.96	No
-2.7 (approximate boundary)	-12.94	-12.96	Boundary point near -2.7083

From this, she deduced that for b > -2.7083, the inequality holds true.

Outcome: The graphical method visually confirms the algebraic solution.

Pros and Cons

- Pros:
- Provides a visual understanding of the solution set.
- Useful for communicating the solution to others.
- Helps in verifying algebraic solutions.

- Cons:
- Less precise if not carefully drawn.
- Time-consuming for more complex inequalities.
- May require additional tools like graph paper or software.

Shauna’s graphing approach is excellent for learners who benefit from visual representations and helps reinforce the concept of solution regions in inequalities.

Clarence’s Approach: Applying a Formal Algebraic Strategy with Inequality Rules

Methodology

Clarence employed a formal algebraic strategy, emphasizing the importance of maintaining

inequality rules throughout the process:

1. Started by subtracting 4.8b from both sides:

7.2b - 4.8b + 6.5 > 0

2. Simplified:

2.4b + 6.5 > 0

3. Subtracted 6.5 from both sides:

2.4b > -6.5

4. Divided both sides by 2.4, noting that since 2.4 > 0, the inequality direction remains unchanged:

b > -6.5 / 2.4

5. Calculated the division:

b > -2.7083

6. Checked the solution for any potential restrictions or special cases, confirming no division by zero issues.

Key emphasis: Clarence was meticulous about maintaining the inequality's integrity during each operation and explicitly stated the rules applied.

Pros and Cons

- Pros:
- Reinforces correct algebraic rules and procedures.
- Clear documentation of each step aids understanding.
- Reduces errors through careful reasoning.

- Cons:
- Slightly more formal and rigid; might seem tedious.
- Requires familiarity with inequality rules.

Clarence's approach exemplifies a disciplined, rule-based method ideal for learners mastering algebraic manipulations and ensuring correctness.

Comparative Analysis of the Approaches

Each individual’s method offers unique insights into problem-solving and comes with its own set of advantages and limitations.

Commonalities

- All approaches aim to isolate b and find the boundary point -2.7083.
- Each method correctly accounts for the rule that dividing by a positive coefficient preserves the inequality direction.
- The solution set is b > -2.7083 in all cases.

Differences in Approach

Aspect	Amelia	Luis	Shauna	Clarence
Strategy	Formal algebraic manipulation	Conceptual reasoning and visualization	Graphical representation	Formal algebra with explicit rule application
Ease of understanding	Clear, step-by-step	Intuitive, reasoning-based	Visual and accessible	Precise and disciplined
Suitable for beginners	Yes	Yes	Yes	Yes
Time efficiency	Moderate	Moderate	Slightly longer	Moderate

Which Approach is Best?

The best method depends

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