Unit 4, Lesson 9

Testing Points to Solve Inequalities

Let's critique some people's reasoning.

9.1 Worked Example: Testing Points

Solve the inequality $-4x > 12$ and use a test point to check your answer.

Step 1:

$$\begin{array}{l} \div -4 \\ \\ \div -4 \end{array} \left(\begin{array}{c} -4x = 12 \\ \\ x = -3 \end{array} \right)$$

Step 2:

When $x = 0, -4(0) = 0$, and $0 < 12$.

$-4x > 12$, so 0 is not a solution.

Step 3:

$0 > -3$, so all solutions are $x < -3$.

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9.2 Character Chat

Andre is working on $\frac{5x}{3} - 1 < \frac{2}{3}$. He figured out that when $x = 1$, $\frac{5(1)}{3} - 1 = \frac{2}{3}$. He tested all these points:

- When $x = \text{-}1$, $\frac{5(\text{-}1)}{3} - 1 = \frac{\text{-}8}{3}$, $\frac{\text{-}8}{3} < \frac{2}{3}$
- When $x = 0$, $\frac{5(0)}{3} - 1 = \text{-}1$, $\text{-}1 < \frac{2}{3}$
- When $x = 2$, $\frac{5(2)}{3} - 1 = \frac{7}{3}$, $\frac{7}{3} > \frac{2}{3}$
- When $x = 3$, $\frac{5(3)}{3} - 1 = 4$, $4 > \frac{2}{3}$

Based on these results, Andre decides that solutions for x should include -1 and 0, but not 2 or 3.

1. Andre is frustrated with how much computation he had to do. What advice would you give him about how many numbers to test and which ones to test?

2. Mai was trying to solve $10 - 3x > 7$. She saw that when $x = 1$, $10 - 3(1) = 7$. She reasoned, "Because the problem has a greater than sign, I wrote $x > 1$." Mai skipped the step of testing points, and that led to an error.

   a. Help Mai test points to figure out the correct solution to the inequality.

   b. Explain to Mai what went wrong with her reasoning.

9.3 Error!

Each of these solutions has something wrong. Circle the place that is wrong and write a correction.

1.

$$2x + 3 = 5x - 4$$
$$5x = 5x - 4$$
$$0 = -4$$

2.

$$5x + 4 = 10 - 5x$$
$$4 = 10$$

3.

$$2x + 8 = 2x + 100$$
$$4x + 8 = 100$$
$$x + 2 = 50$$
$$x = 48$$

4.

$$5x + 50 = 20x$$
$$50 = 25x$$
$$2 = x$$

5.

$$2(x + 8) = 16$$
$$2x + 16 = 16$$
$$2x = 0$$
No solution

6.

$$(x + 3) + 5 = 5$$
$$x + 3 = 0$$
$$x = 3$$