Lesson 26: Testing Points to Solve Inequalities

- Let's critique some peoples' reasoning.

26.1: Math Talk: Solving Equations

Solve each equation mentally.

$3x + 5 = 14$

$3(x - 1) + 5 = 14$

$3x - 3 + 5 = 14$

$3(1 - x) + 5 = 14$

26.2: 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 determines 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 determine the correct solution to the inequality.

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

26.3: Error!

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

1.
$$\begin{aligned} 2x + 3 &= 5x - 4 \\ 5x &= 5x - 4 \\ 0 &= -4 \end{aligned}$$

2.
$$\begin{aligned} 5x + 4 &= 10 - 5x \\ 4 &= 10 \end{aligned}$$

3.
$$\begin{aligned} 2x + 8 &= 2x + 100 \\ 4x + 8 &= 100 \\ x + 2 &= 50 \\ x &= 48 \end{aligned}$$

4.
$$\begin{aligned} 5x + 50 &= 20x \\ 50 &= 25x \\ 2 &= x \end{aligned}$$

$2(x + 8) = 16$

5. $2x + 16 = 16$

$2x = 0$

No solution

$(x + 3) + 5 = 5$

6. $x + 3 = 0$

$x = 3$