Unit 4, Lesson 18

Asking about Solving Systems

Let's figure out some systems.

18.1 Math Talk: Find the Slope

Mentally find the slope of each linear equation.

- $y = 4 + 2x$
- $2y = 6 - 9x$
- $9x - 3y = 12$
- $\frac{1}{3}y + 5x = \frac{3}{5}$

18.2 One, Zero, Infinitely Many

Here is an equation: $5x - 2y = 10$.

Create a second equation that would make a system of equations with:

1. One solution
2. No solutions
3. Infinitely many solutions

18.3 Information Gap: Linear Systems

Your teacher will give you either a problem card or a data card. Do not show or read your card to your partner.

If your teacher gives you the problem card:

1. Silently read your card, and think about what information you need to answer the question.
2. Ask your partner for the specific information that you need. "Can you tell me _____?"
3. Explain to your partner how you are using the information to solve the problem. "I need to know _____ because . . . ."

   Continue to ask questions until you have enough information to solve the problem.
4. Once you have enough information, share the problem card with your partner, and solve the problem independently.
5. Read the data card, and discuss your reasoning.

If your teacher gives you the data card:

1. Silently read your card. Wait for your partner to ask for information.
2. Before telling your partner any information, ask, "Why do you need to know _____?"
3. Listen to your partner's reasoning and ask clarifying questions. Give only information that is on your card. Do not figure out anything for your partner!

   These steps may be repeated.
4. Once your partner has enough information to solve the problem, read the problem card, and solve the problem independently.
5. Share the data card, and discuss your reasoning.

Lesson 18 Summary

When looking at a system of equations, it is often helpful to first determine how many solutions it has. We can use the slopes of the lines to determine whether there is exactly 1 solution or not. If the slopes are different, that means the lines aren't parallel and don't coincide, so they must intersect. If the slopes are the same, we still have to figure out if they are parallel or coincide. To determine whether there are infinitely many or zero solutions, substitute an x-value in each equation to see if they have the same associated y-value or not. The vertical intercept, where $x = 0$, is an easy point to check.

Although these checks can be done in any form that the linear equations take, it can be helpful to arrange them into similar forms to make the comparison easier. For example, if each equation is rearranged into slope-intercept form, $y = mx + b$, the slope, m, and vertical intercept, $(0, b)$, are immediately available.