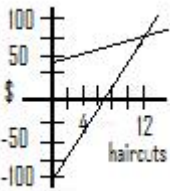


M²=Math Mediator Lesson 16: Systems of Equations

<p>Direct Instruction (15 minutes approx.)</p>	<p>Hairstylists typically have options of how they partner with others:</p> <ol style="list-style-type: none"> Option 1: \$15.00 per haircut they charge customers; and they pay \$100.00 per day for chair rental in another person's salon. Option 2: The salon hires a worker for \$10k per year and they get 20% of each haircut they give. <p>Which of these options would be the best to choose from? Today, we will develop equations for both options, graph them, find the point where they intersect, which is a solution for both equations or this system of equations. This point is the crossover point where below this number of haircuts, you are better off choosing one option, but above this number of haircuts, the other option is preferable.</p> <ol style="list-style-type: none"> Option 1 equation is: $y = \text{total daily earnings}; x = \# \text{ haircuts};$ a. $y = 15x - 100$ Option 2 equation: $\\$10k/52/5$ (yearly earnings/weeks per year/work days per week = earnings per day = \$38.50) $y = .2(15x) + 38.5$ <div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> $y = 15x - 100$ $y = 3x + 38.5$ <p>Subtract the 2 equations:</p> $0 = 12x - 138.5$ $x = 11.5$ </div> </div> <p>Notice the breakeven point for option 1 is 7 haircuts. The point where the two lines intersect is 11.5, so if this hairstylist thought that on average, they could cut over 12 haircuts a day, option 1 would be better, and the payoff is much better if they cut a bunch over 12 a day. Less than 12 per day, option 2 would be better. Which option is safer? Which option provides more reward, but you have to risk more?</p>
<p>Review (5 minutes approx.)</p>	<p>The point where the two lines intersect is the solution to both equations. For lines or linear equations, there can be one of 3 possibilities:</p> <ol style="list-style-type: none"> Consistent and Dependent: exactly 1 solution; lines intersect at one point. Consistent and Independent: infinite solutions; both equations represent the same line Inconsistent: No solutions; both lines are parallel to each other.
<p>Direct Instruction and Practice (15 minutes approx.)</p>	<p>Solve each system of equations and identify the solution if any. Determine what classification each is (consistent, inconsistent, dependent, independent).</p> <ol style="list-style-type: none"> $3x + 4y = 12; 6x + 8y = -16$ (A: Parallel lines, no solution, inconsistent) $9x - 6y = 24; 6x - 4y = 16$ (A: ∞ solutions; same line, Consistent and independent.) $2x + y = 5; x - y = 1$ (A: One solution (2,1); consistent and dependent). Have

M²=Math Mediator Lesson 16: Systems of Equations

	students check this answer by substituting back into the equation.
Direct Instruction; practice and assessment: (15 minutes approx.)	<p>Two options to ride the city bus:</p> <ol style="list-style-type: none">1. Monthly pass for \$30.00 and 50 cents per ride.2. \$2.00 per ride <p>Write two equations to express the conditions above. Graph the solutions to the equations and identify which option is best if you ride 30 times a month?</p> <p>A: 1. $y = 0.5x + 30$ 2. $y = 2x$ $1.5x = 30$; $x = 20$; $y = 40$</p> <p>Have student show work on board if time allows.</p>
Wrap-up and tidbit (5 minutes approx.)	<p>Wrap up closing comments and housekeeping.</p> <p>Other uses are for determining home loan plans, deciding between a 30 year mortgage at 5%, or a 15 year, 3.5% option. One has higher payments, for a shorter period; the other has lower payments over a longer period and you pay more overall.</p>