Warm Up

Solve this equation for x:

Solve for x
Isolate x
get x alone

$$2x - 5y = 12$$

(Get x alone on one side of the = sign)

$$2x - 5y = 12$$

$$+5y \quad +5y$$

$$\frac{2x}{2} = \frac{5y}{2} + \frac{12}{2}$$

$$x = \frac{5y}{2} + 6$$

For Friday's Quiz, you need to be able to:

- Write a linear equation given a graph
- Graph a linear equation in slope-intercept form
- Graph a linear equation in standard form
- Find the x-intercept, y-intercept, and slope given equations in slope-intercept and standard forms.
- Change an equation from slope-intercept to standard form and from standard form to slope-intercept form.
- Write a system of equations from text.
- Solve a system of equations by graphing or using equivalent expressions.

Homework Questions?

For each problem:

- Define your variables (Let x = , and Let y =)
- Write your equations (are there some totals involving both variables?)
- Use Desmos to solve your system of equations
- What does your solution mean in the context of the problem?

1. A theater production charges $21 for adult tickets and $15 for student tickets. If the production sold 102 tickets for its opening night and made $1,932 in ticket sales, how many of each type of ticket were sold?

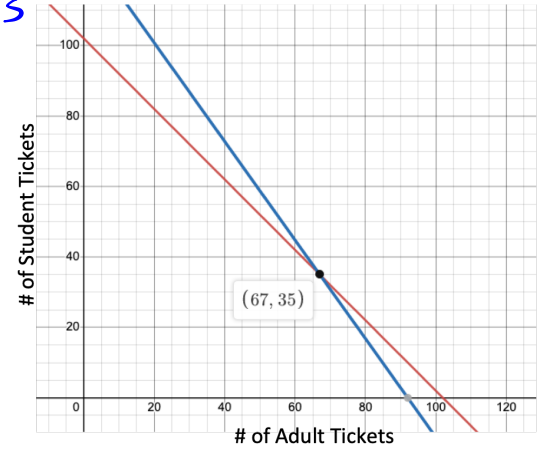
Totals

Let x = # of adult tickets
Let y = # of student tickets

x + y = 102
21x + 15y = 1932

Common Solution: (67, 35)

They sold **67** adult tickets and **35** student tickets.



2. The player of a trivia game receives 100 points for each correct answer and loses 25 points for each incorrect answer. Leona answered a total of 30 questions and scored a total of 2125 points. How many questions did she answer correctly?

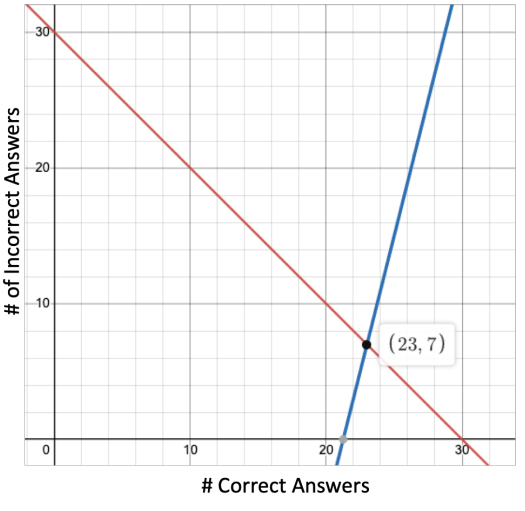
Let x = # of correct answers
Let y = # of incorrect answers

x + y = 30
100x - 25y = 2125

Totals

Common Solution: (23, 7)

They answered **23** questions correctly and **7** questions incorrectly.



3. At a restaurant the cost for a breakfast taco and a small glass of milk is $2.10. The cost for 2 tacos and 3 small glasses of milk is $5.15. How much does a breakfast taco cost? How much does a small glass of milk cost?

variables "How much"

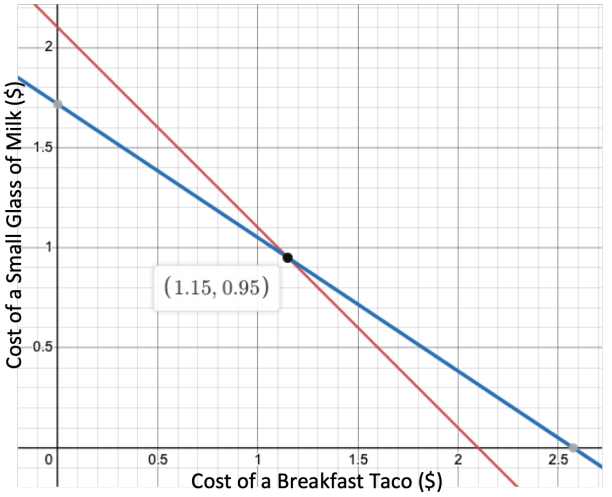
Let x = cost of a breakfast taco
Let y = cost of a small glass of milk

$x + y = 2.10$
$2x + 3y = 5.15$

Totals

Common Solution: (1.15, 0.95)

The breakfast taco costs **$1.15** and the small glass of milk costs **$0.95**.



4. The Frosty Ice Cream Shop sells sundaes for $2 and banana splits for $3. On a hot summer day, the shop sold 8 more sundaes than banana splits and made $156. How many banana splits did they sell?

variables

How many

Let x = # of sundaes sold
Let y = # of banana splits sold

$x = y + 8$
$2x + 3y = 156$

Common Solution: (36, 28)

They sold **28** Banana Splits.

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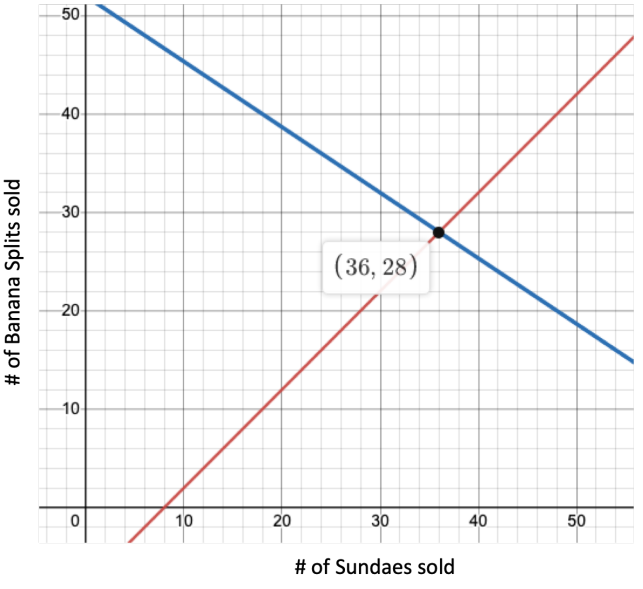


Investigation 2

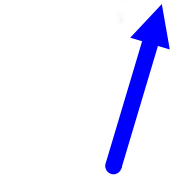
Solving Linear Systems Symbolically

→ solving algebraically (use variables)

Your work in Investigation 1 revealed key facts about solving linear equations.

- The solutions of equations in the form $Ax + By = C$ are ordered pairs of numbers.
- The graph of the solutions for an equation $Ax + By = C$ is a straight line.
- The solution of a system of two linear equations is the coordinates of the point where the lines intersect.

Finding an exact solution is not always easy to do from a graph of the pair of linear equations. In this Investigation, you will develop symbolic methods for solving systems of linear equations.



2.1 Shirts and Caps Again

Solving Systems With $y = mx + b$

Recall the T-shirt and cap sale from Investigation 1.

- What two equations represent the relationship between the number of shirts sold and the number of caps sold?
- How can you find the number of shirts and the number of caps sold? Explain your reasoning.

Let x = # of t-shirts

Let y = # of caps

System of Equations

$$\begin{cases} x + y = 18 \\ 5x + 10y = 125 \end{cases}$$

Nyla and Jimfa have different ways to solve this system of equations.

Let's check them out ...

The 2 methods

Nyla

Write a system of two linear equations.

$$\begin{cases} y + x = 18 \\ 10y + 5x = 125 \end{cases}$$

Write equivalent equations.

$y = -x + 18$

$y = -0.5x + 12.5$

set eq's = to y
S-I-form
solved for y
isolated y

Graph the two equations.
The solution of the system is the point where the graphs of the equations meet.

Jimfa

Write a system of two linear equations.

$$\begin{cases} y + x = 18 \\ 10y + 5x = 125 \end{cases}$$

Write equivalent equations.

$$\begin{cases} y = -x + 18 \\ y = -0.5x + 12.5 \end{cases}$$

Why?

Write one linear equation.

$-x + 18 = -0.5x + 12.5$

Solve the linear equation for x.
Then find the related value of y.

They both started the same way:

1. Write a system of equations:

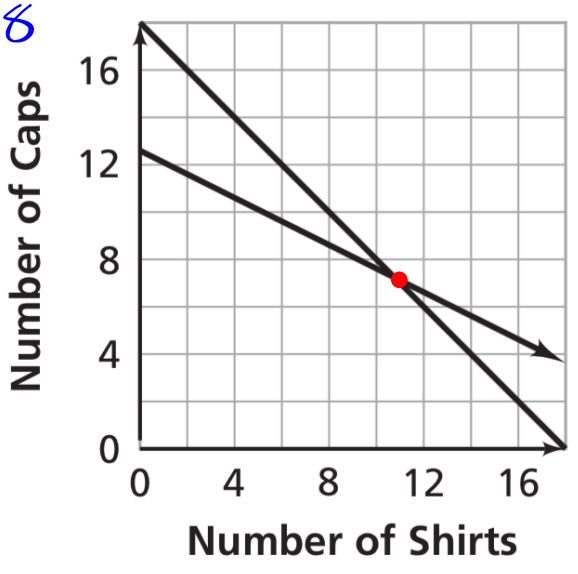
$$y + x = 18$$
$$10y + 5x = 125$$

2. Create equivalent equations in Slope-Intercept form:

Nyla graphed the equations.

$y = -x + 18$ → $x + y = 18$

$y = -0.5x + 12.5$



Solution: (11, 7)

11 shirts and 7 caps

What do you think of Nyla's method?

It worked well as long as I graphed carefully.

Graphing may not always be accurate due to many factors:

- size of graph
- accuracy of graph
- estimating decimals on a graph

Jimfa took the 2 equations and made one.

$y = -x + 18$

$y = -0.5x + 12.5$

$$-x + 18 = -0.5x + 12.5$$

Let's try B1 together?

B Use symbolic methods to find values of x and y that satisfy each system. Check your solution by substituting the values into the equations and showing that the resulting statements are true.

1. $\begin{cases} y = 1.5x - 0.4 \\ y = 0.3x + 5 \end{cases}$

$1.5x - 0.4 = 0.3x + 5$

Problem 2.1 B

B Use ~~symbolic methods~~ Algebra to find values of x and y that satisfy each system. Check your solution by substituting the values into the equations and showing that the resulting statements are true.

1. $\begin{cases} y = 1.5x - 0.4 \\ y = 0.3x + 5 \end{cases}$

2. $\begin{cases} x + y = 3 \\ x - y = -5 \end{cases}$

3. $\begin{cases} 3x - y = 30 \\ x + y = 14 \end{cases}$

4. $\begin{cases} x + 6y = 15 \\ -x + 4y = 5 \end{cases}$

5. $\begin{cases} x - y = -5 \\ -2x + 2y = 10 \end{cases}$

6. $\begin{cases} x - y = -5 \\ -2x + 2y = 8 \end{cases}$

Remember to solve all equations for one variable first.

Homework

Finish classwork, 2.1 A and B.