

MATH 6 CLASS WORK 21

April 14, 2024

Solving System of Linear Equations

$$\begin{cases} 3x - y = 72 \\ x + 3y = 1 \end{cases}$$

$$\begin{cases} ax + by = p \\ cx + dy = q \end{cases}$$

- **Is it always two equations?** And two unknown variables?
 - o NO you can have N equations
 - o Number of equations should be = to Number of variables
- **Why they are called Linear?**
 - o You can solve system of 2 equation graphically construction one line and another line.
- **Why do we call them system?**
 - o They make sense only when grouped together

Two ways of solving:

1. Express one variable via another and substitute:

$$\begin{cases} 3x - y = 72 \\ x = 1 - 3y \end{cases} \Rightarrow \begin{cases} x = 1 - 3y \\ 3(1 - 3y) - y = 72 \end{cases}$$

Solve for y, then find x

2. Multiply one of the equations by a number to exclude one of the variables, i.e., multiply by 3 the second equation:

$$\begin{cases} 3x - y = 72 \\ x + 3y = 1 \times 3 \end{cases} \Rightarrow \begin{cases} 3x - y = 72 \\ 3x + 9y = 3 \end{cases}$$

Subtract one equation from another:

$$- \begin{cases} 3x - y = 72 \\ 3x + 9y = 3 \end{cases} \Rightarrow -y - 9y = 72 - 3$$

Solve for y, then find x.

3. Five cats and four dogs weigh 43 kg, and four dogs and three cats weigh 41 kg. How much cat and dog weight?

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1. Simplify:

$$a) \frac{1}{(x+1)} - \frac{1}{(x-1)}$$

$$b) \left(1 + \frac{1}{x}\right) \div (x+1)$$

$$c) \left(1 + \frac{1}{x}\right) \div \left(1 - \frac{1}{x}\right)$$

2. Solve system of equations: $\begin{cases} 6x - 5y = -3 \\ x + y = 5 \end{cases}$

3. Solve system of equations: $\begin{cases} 5x + 2y = 16 \\ 2x + 3y = 13 \end{cases}$

[Hint: you can multiply one equation by one number and another equation by another number]

4. John takes 15 min to walk from school to the bus station. Jim takes 20 min to walk from the school to the bus station. If the difference in their speeds is 2 km/h, how far is the station from the school?

5. The difference between two numbers is $\frac{5}{12}$. If $\frac{3}{4}$ of the larger number is $\frac{3}{8}$ more than $\frac{1}{2}$ of the smaller, find the larger number.

6. A motorboat can travel 45 miles downstream in 3 hours and 22 miles upstream in 2 hours. Find is the speed of the boat in still water and find the speed of the current.

[Hint: speed=distance/time]