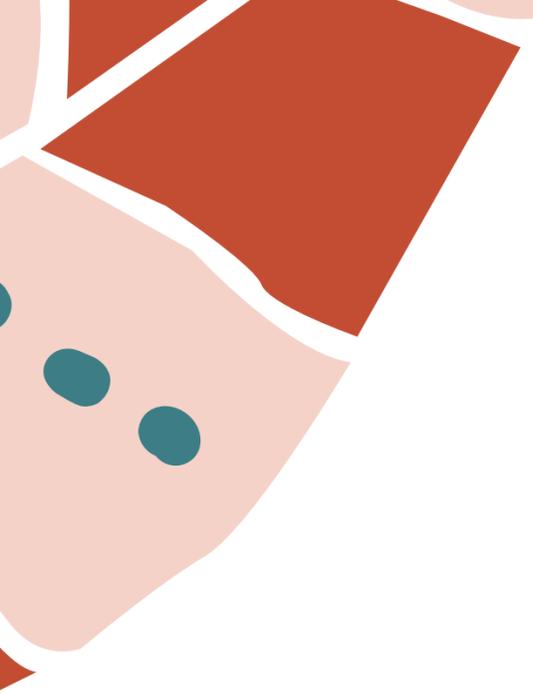


Lesson 1 – SYSTEM OF
LINEAR EQUATIONS
(two unknowns)

Grade 10

WWW.INTOMATH.ORG





The general form of the system of two linear equations with two unknowns is

where $a_1, b_1, c_1, a_2, b_2, c_2$ are given numbers and x, y are unknowns

$$\begin{cases} a_1 x + b_1 y = c_1, \\ a_2 x + b_2 y = c_2, \end{cases}$$

To solve the system of two linear equations with two unknowns means to determine the values of the unknowns, that satisfy BOTH linear equations in the system or show that the solution does not exist.

The System Solution = **Point of Intersection** of the two lines
If two lines are parallel, the system will have no solutions

Ways of Solving the System of Two Linear Equations

Graphically

Graph each linear equation from the system separately (express y in terms of x).

Locate the Point of Intersection of the two lines and state its coordinates as an ordered pair (x,y) .

$$\begin{cases} x + 2y = 7 \\ 3x + y = 1. \end{cases}$$

Ways of Solving the System of Two Linear Equations

Substitution

Rearrange one of the equations to isolate for either x or y .

Then substitute the expression representing the isolated variable into the second equation for the same variable. This will result in having an equation with only one unknown.

Solve the equation with one unknown.

Substitute the value of the unknown into the rearranged equation from step 1 and find the value of the other unknown.

State the answer as a Point of Intersection with the coordinates (x, y) .

$$\begin{cases} x + 2y = 7 \\ 3x + y = 1. \end{cases}$$

Ways of Solving the System of Two Linear Equations

Elimination

Multiply one or each one of the equations by multiples, that would make one set of coefficients of x or y identical or identical opposites (positive and negative).

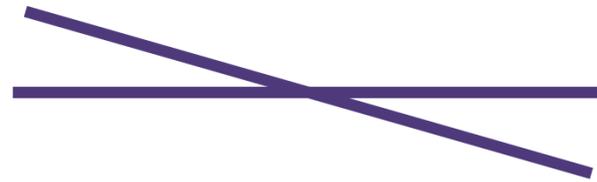
Add or subtract the equations, to eliminate one of the unknowns. Solve for the other unknown.

Substitute the unknown that was found into one of the equations, to determine the value of the other unknown.

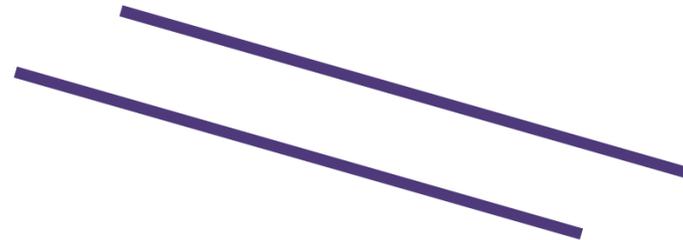
$$\begin{cases} x + 2y = 7 \\ 3x + y = 1 \end{cases}$$

Number of Solutions

One Solution – Two lines intersect



No Solutions – Two lines are parallel



Infinitely Many Solutions – Two lines overlap (coincide)



Word Problems Involving Systems

Introduce the variables and create the system of equations.

Solve the system of equations.

Go back to the question of the problem and answer it.

2 notepads and 3 boxes of pencils cost \$18. And 3 notepads and 2 boxes of pencils cost \$17. What is the total cost of 5 notepads and 7 boxes of pencils?



Now It's Your Turn

Prove that the following system of two linear equations has infinitely many solutions

$$\begin{cases} x + y = 2, \\ 2x + 2y = 4 \end{cases}$$



MOVE ON TO GRADE 10 LESSON 2

**GREAT
WORK!**