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Solving Systems Using Substitution

Unit 6 Lesson 2

SOLVING SYSTEMS USING SUBSTITUTION

Students will be able to:

Recognize the different types of linear systems of equations and find its solution using substitution.

Key Vocabulary:

- Solve Linear Systems using Substitution
- Linear Equations in two variables
- Point of Intersection between Linear Functions
- Independent System
- Dependent System
- Inconsistent System

SOLVING SYSTEMS USING SUBSTITUTION

LINEAR SYSTEM OF EQUATIONS

is a set of equations with the same pair of variables.

SUBSTITUTION METHOD

This method is used for systems of two equations with two unknown variables. The method consists in solving one of the equations for one of the unknowns, and then substitute the result into the other equation.

CLASSIFICATION OF LINEAR SYSTEMS

1. Independent System (One solution).
2. Dependent System (Infinite solutions).
3. Inconsistent System (No solution).

STEPS TO SOLVE LINEAR SYSTEMS USING SUBSTITUTION

- **Step 1:** Solve one of the equations for either x or y.
- **Step 2:** Substitute the solution from “step 1” into the other equation.
- **Step 3:** Solve this new equation.
- **Step 4:** Solve for the second variable.

Sample Problem 1: Find the solution of the following system using Substitution:

$$\begin{cases} 3X - Y = 3 & \text{(I)} \\ X + Y = -3 & \text{(II)} \end{cases}$$

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Sample Problem 1: Find the solution of the following system using substitution:

Step 1: Solve one of the equations for either x or y.

- From equation II , we solve for y

$$\boldsymbol{x + y = -3}$$

$$\boldsymbol{y = -3 - x}$$

Step 2: Substitute the solution from "step 1" into the other equation.

- **Substituting in I**

$$3x - (-3 - x) = 3$$

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Sample Problem 1: Find the solution of the following system using substitution:

Step 3: Solve this new equation:

$$3x + 3 + x = 3 \quad \rightarrow 4x = 0 \quad \rightarrow x = 0$$

Step 4: Solve for the second variable:

$$y = -3 - x \rightarrow \quad y = -3 - 0 = -3$$

Solution (0, -3). Independent System

Sample Problem 2: Find the solution of the following system using Substitution:

$$\begin{cases} 2X + 3Y = 14 & \text{(I)} \\ X + 2Y = 9 & \text{(II)} \end{cases}$$

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Sample Problem 2: Find the solution of the following system using substitution:

Step 1: Solve one of the equations for either x or y.

- From equation II , we solve for y

$$\boldsymbol{x + 2y = 9}$$
$$\boldsymbol{x = 9 - 2y}$$

Step 2: Substitute the solution from "step 1" into the other equation.

- **Substituting in I**

$$2(9 - 2y) + 3y = 14$$

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Sample Problem 1: Find the solution of the following system using substitution:

Step 3: Solve this new equation:

$$18 - 4y + 3y = 14 \quad \rightarrow y = 4$$

Step 4: Solve for the second variable:

$$\mathrm{x} = 9 - 2(4) \rightarrow \quad x = 1$$

Solution (1, 4). Independent System