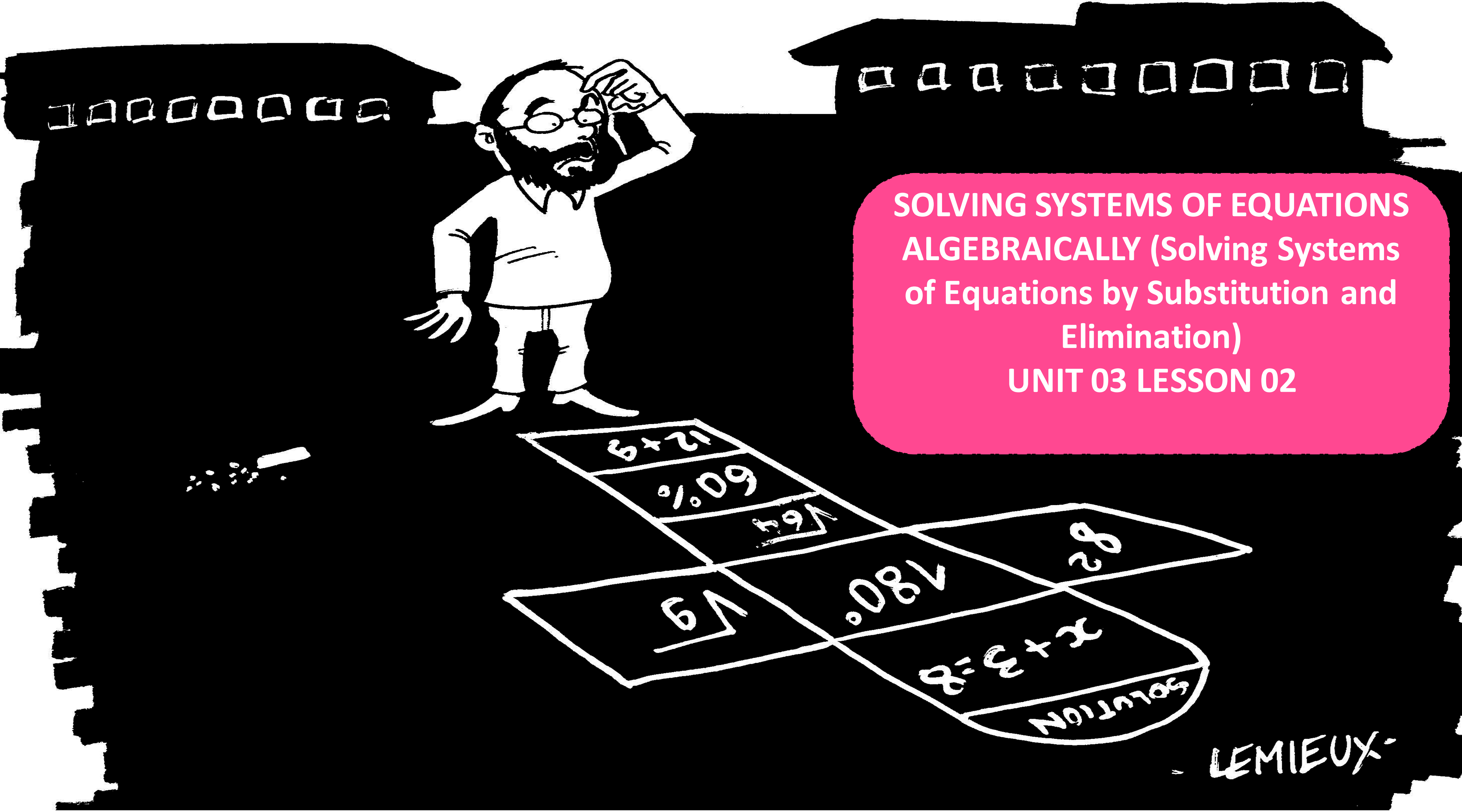

SOLVING SYSTEMS OF EQUATIONS ALGEBRAICALLY (Solving Systems of Equations by Substitution and Elimination)

UNIT 03 LESSON 02

OBJECTIVES

STUDENTS WILL BE ABLE TO:

Understand how liner system equations are solved by elimination and substitution method

KEY VOCABULARY:

- Solve linear equation and simultaneous equations.
- Apply methods of substitution and elimination to solve system of equations.

INTRODUCTION

By system of equation we mean the system having more than one equation.

A system of simultaneous equations is a group of equations that must be all true at the same time.

By solution of equation we mean the values which satisfy the given system of equations.

SOLVING SYSTEMS OF EQUATIONS ALGEBRAICALLY (BY SUBSTITUTION AND ELIMINATION)

INTRODUCTION

consider two linear equations in two variables, *x* and *y*, such as

$$5x - 3y = 4$$
$$3x + 3y = 1$$

Instead of one equation in one unknown, we have here two equations and two unknowns. In order to find a solution for this pair of equations, the unknown numbers *x* and *y* have to satisfy **both** equations.

Hence, we call this system or pair of equations or **simultaneous equations**. We now focus on various methods of solving simultaneous equations.

METHODS TO SOLVE

Basically there are three methods to solve system of equations:

a. By substitution
b. By elimination
c. By comparison

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PROBLEM 01

Solve the system of equation by elimination method.

$$7x + 2y = 47$$
$$5x - 4y = 1$$

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PROBLEM 01

7x+2y=47……………………(i)
5x-4y=1……………………..(ii)

Multiply equation (i) by 2 then it becomes

14x+4y=94 ………………..(iii)

Now adding eq (ii) and (iii)

$$\begin{array}{l} 5x-4y=1 \\ \underline{14x+4y=94} \\ 19x \;=\; 95 \end{array}$$

$$x = \frac{95}{19} = 5$$

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PROBLEM 01

By putting x=5 in eq ii

$$5(5) - 4y = 1$$

$$-4y = 1 - 25$$

$$4y = 24$$

$$y = 6$$

Solution Set= {(5,6)}

SOLVING SYSTEMS OF EQUATIONS ALGEBRAICALLY (BY SUBSTITUTION AND ELIMINATION)

PROBLEM 02

Solve the system of equation by elimination method.

$$\frac{x+1}{y+1}=2$$

$$\frac{2x+1}{2y+1}=\frac{1}{3}$$

SOLVING SYSTEMS OF EQUATIONS ALGEBRAICALLY (BY SUBSTITUTION AND ELIMINATION)

PROBLEM 02

Simplify eq i and ii

$$x + 1 = 2(y + 1)$$

$$x = 2y + 2 - 1$$

$$x - 2y = 1 \text{....................(iii)}$$

$$3(2x + 1) = 2y + 1$$

$$6x + 3 = 2y + 1$$

$$6x - 2y = -2 \text{................(iv)}$$

SOLVING SYSTEMS OF EQUATIONS ALGEBRAICALLY (BY SUBSTITUTION AND ELIMINATION)

PROBLEM 02

Substring eq iii from iv we get

$$\begin{array}{l} 6x-2y=-2 \\ \underline{\pm x \mp 2y=\pm 1} \\ \quad 5x=-3 \end{array}$$

$x=-3/5$

Substituting x=-3/5 in eq iii we get

$-3/5-2y=1$

$-2y=1+3/5$

$y=2/5$

Solution Set= {(-3/5,2/5)}

SOLVING SYSTEMS OF EQUATIONS ALGEBRAICALLY (BY SUBSTITUTION AND ELIMINATION)

PROBLEM 03

Solve the system of equation by substitution method

$$x + y = 2$$

$$2x - y = 1$$

SOLVING SYSTEMS OF EQUATIONS ALGEBRAICALLY (BY SUBSTITUTION AND ELIMINATION)

PROBLEM 03

Solving equation (i)

$y = 2 - x$.....................(iii)

Substituting the value of y in equation (ii) we get,

$$2x - (2 - x) = 1$$

$$2x - 2 + x = 1$$

$$3x = 3$$

$$\mathbf{x = 1}$$

Substituting the value of x in eq. iii.

$$y = 2 - 1$$

$$\mathbf{y = 1}$$

Solution set: {(x,y)}= {(1,1)}