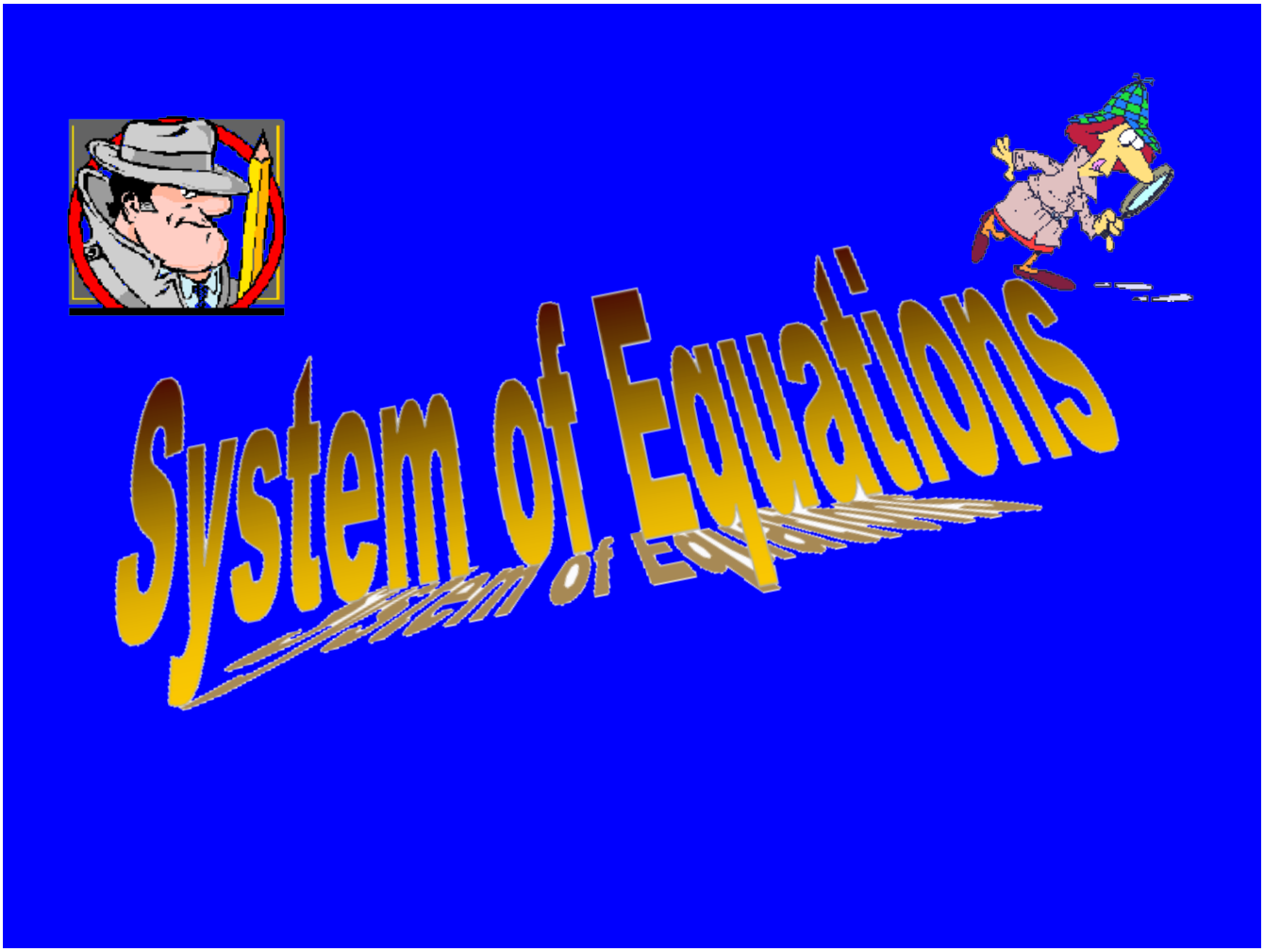
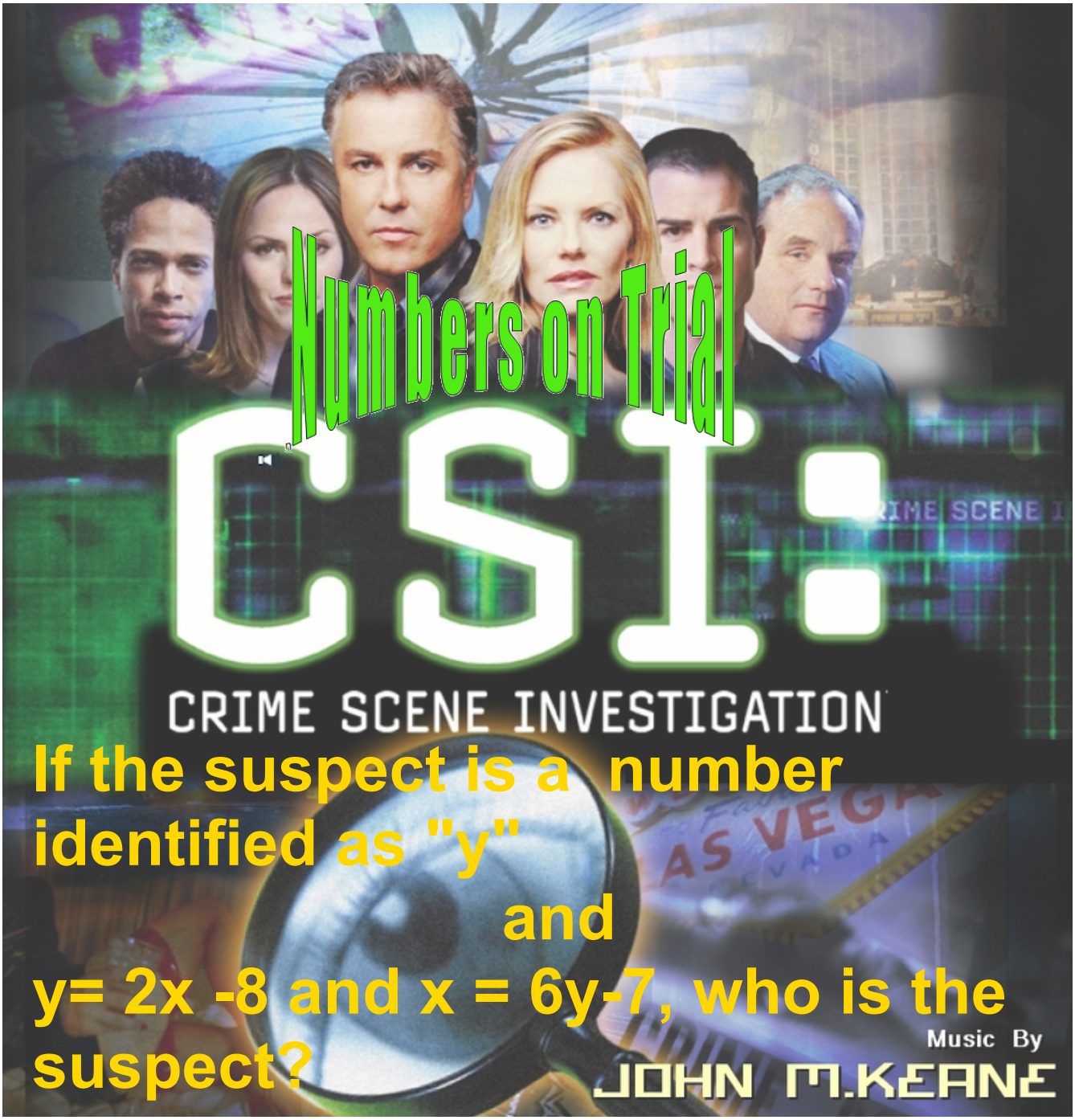
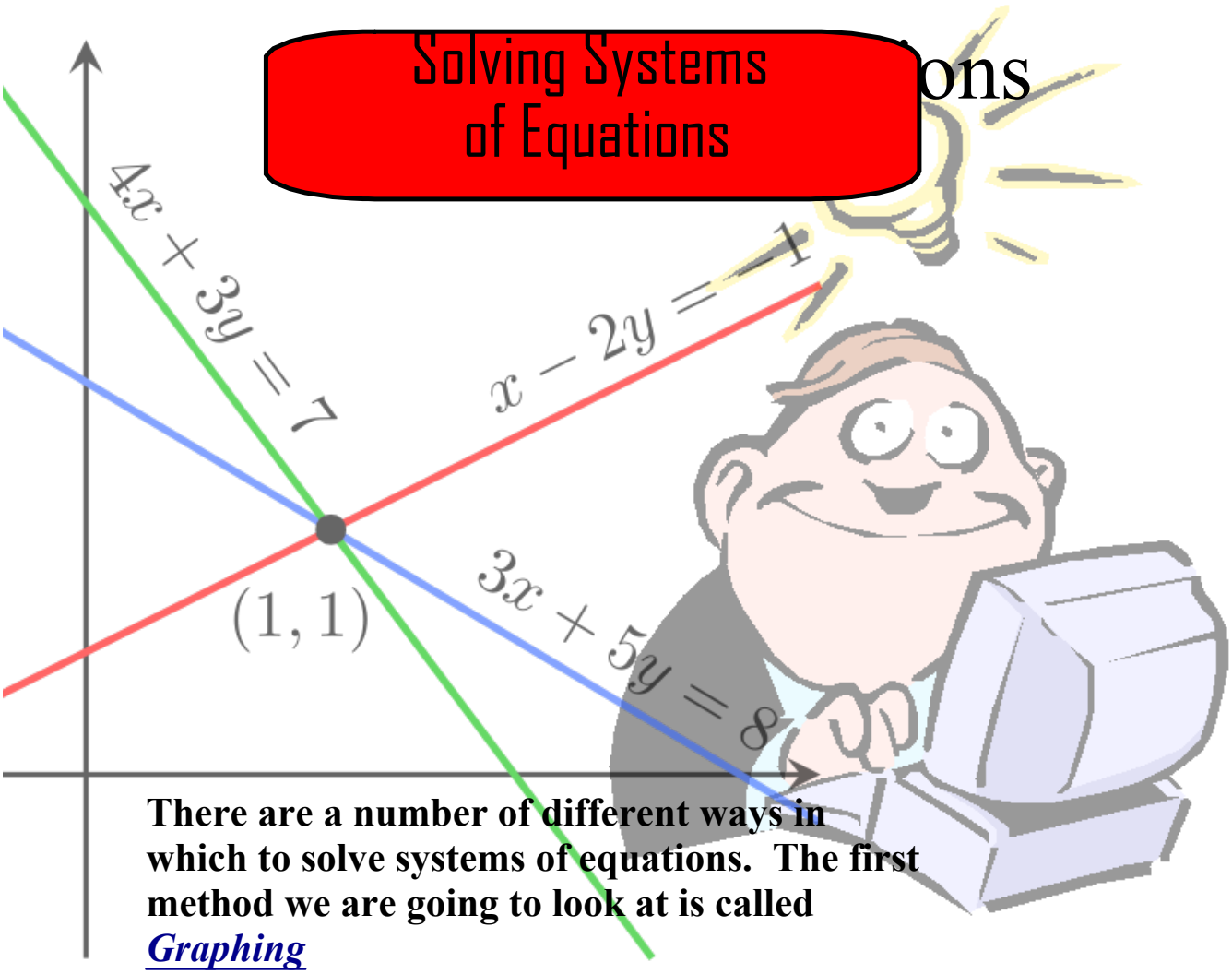

System of Equations


Numbers on Trial
CSI:
CRIME SCENE INVESTIGATION
If the suspect is a number identified as "y"
and
y= 2x -8 and x = 6y-7, who is the suspect?
Music By
JOHN M.KEANE

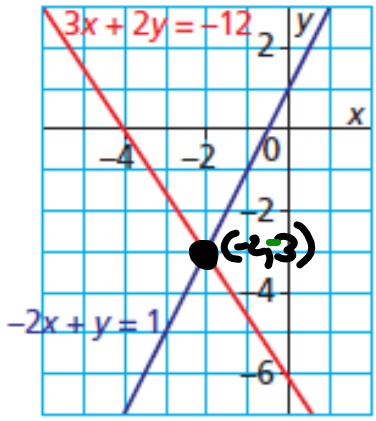
Solving Systems of Equations



There are a number of different ways in which to solve systems of equations. The first method we are going to look at is called *Graphing*

The solution of a linear system can be estimated by graphing both equations on the same grid. If the two lines intersect, the coordinates (x, y) of the point of intersection are the solution of the linear system.

$$3x + 2y = -12 \quad ①$$
$$-2x + y = 1 \quad ②$$



Point of intersection
$(-2, -3)$
x, y

We can use the graphs to estimate the solution of the linear system.
The set of points that satisfy equation ① lie on its graph.
The set of points that satisfy equation ② lie on its graph.
The set of points that satisfy both equations lie where the two graphs inter
From the graphs, the point of intersection appears to be

Read off graph

Check LHS to RHS in Both Equation

① $3x + 2y = -12$
LHS RHS
$3(-2) + 2(-3)$
$-6 + -6$
-12

② $-2x + y = 1$
$-2(-2) + (-3)$
$4 + (-3)$
1

How to Solve System of Equations Using Graphing?

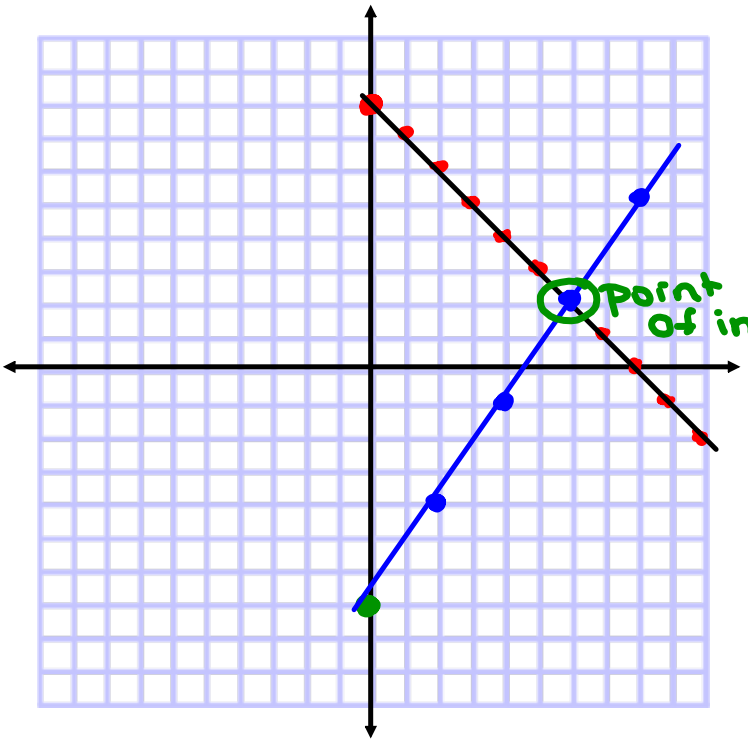
Step 1 Rearrange each equation to $y = mx + b$ form

Step 2 Graph the y intercep "b" and use $m = \frac{\text{rise}}{\text{run}}$ to plot each line by it self.

① $x + y = 8 \Rightarrow y = -x + 8$ $m = \frac{-1}{1}$ $b = +8$

② $3x - 2y = 14 \Rightarrow \frac{-2y}{-2} = \frac{-3x}{-2} + \frac{14}{-2} \Rightarrow y = \frac{3}{2}x - 7$

here $m = \frac{3}{2}$ $b = -7$



$m = -\frac{1}{1}$ $b = 8$

$y = -x + 8$

$y = \frac{3}{2}x - 7$

$m = \frac{3}{2}$ rise ↑ run →

$b = -7$

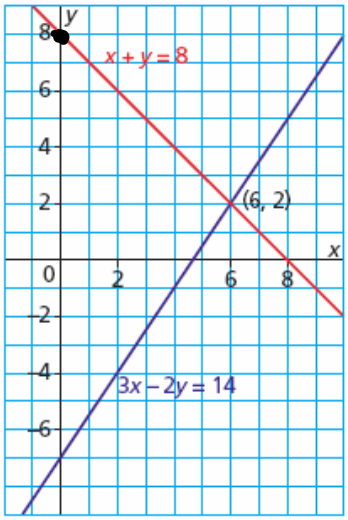
Point of intersection is $(6, 2)$

x, y

Example 1 Solving a Linear System by Graphing

Graph each line.

The point of intersection appears to be (6, 2).



Check it

LHS = RHS for both

on next page

(Solution continues.)

7.2 Solving a System of Linear Equations Graphically

Example 1 Solving a Linear System by Graphing

Verify the solution. In each equation, substitute: $x = 6$ and $y = 2$

$x + y = 8$

L. S. $= x + y$
$= 6 + 2$
$= 8$
$=$ R.S.

$3x - 2y = 14$

L.S. $= 3x - 2y$
$= 3(6) - 2(2)$
$= 18 - 4$
$= 14$
$=$ R.S.

For each equation, the left side is equal to the right side.
So, $x = 6$ and $y = 2$ is the solution of the linear system.

1. Solve this linear system.

① $2x + 3y = 3$

② $x - y = 4$

Using graphing method

① $2x + 3y = 3$ (-2x -2x)

$3y = -2x + 3$

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

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

$m = \frac{-2}{3}$ ↓ → or $\frac{2}{-3}$

$b = +1$

Plot y intercept 1st

then use slope to get other

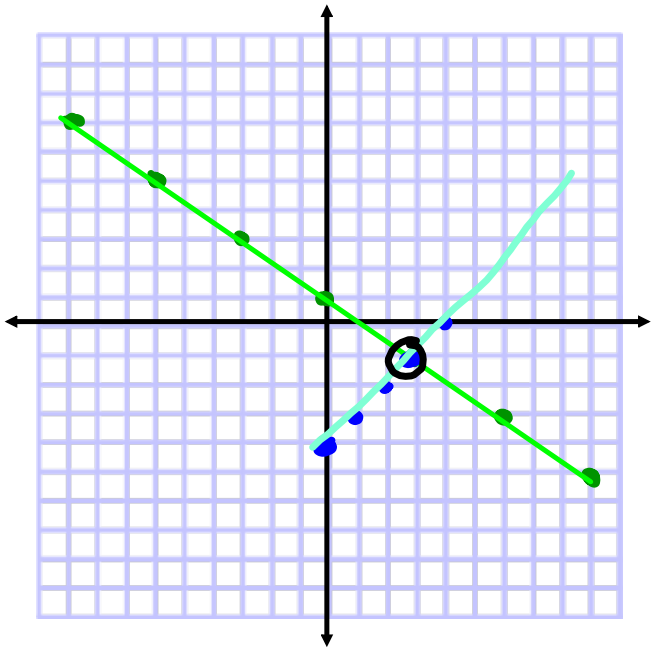
② $x - y = 4$ (-x -x)

$\frac{-1y}{-1} = \frac{-x}{-1} + \frac{4}{-1}$

$y = 1x - 4$

$m = \frac{1}{1}$ ↑ →

$b = -4$



point of intersect

(3, -1)

Method 2: Substitution

I like this one better

7.4 Using a Substitution Strategy to Solve a System of Linear Equations

Solving Systems of Equations

There are a number of different ways in which to solve systems of equations. The second method we are going to look at is called *substitution.*

When we refer to solving a system of equations, we want to **solve for a numerical value** **for one variable**.

Rules for Substitution as a method for solving a system of equations.

- **There must be the same number of equations as variables.**

  - If there are two variables, there must be two equations; three variables, three equations, etc.

- **One of the equations can easily be substituted into the other equation to solve for one variable.**

→ look for the "letter" that is alone
→ coefficient is 1

Steps when solving systems of equations using substitution

alone

① $-8x + y = 0$

② $x + 2y + 17 = 0$

alone

STOP AFTER THIS

Doesn't matter which you start with

Step 1: Isolate one of the variables with the coefficient 1.

① $-8x + y = 0$

alone

$y = +8x + 0$

$y = 8x$

Step 2: Substitute into the other equation.

Sub this value into ② wher "y" appears

$x + 2y + 17 = 0$

$x + 2(8x) + 17 = 0$

$x + 16x + 17 = 0$

add

$17x + 17 = 0$

Solve For "x" want x alone

$17x + 17 - 17 = 0 - 17$

$\frac{17x}{17} = \frac{-17}{17}$

$x = -1$

Step 3: Solve for the variable Using step 1's equation

Sub into $y = 8x$ ① Rearrange Step 1

$y = 8(-1)$

$y = -8$

x, y

(-1, -8)


Homework:
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Questions: 3ab,
5ai
Page 425-427
Questions:
Math

You try with Substitution

Solve the follwoing systems of equations using substitution

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