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Today's Agenda

- Warm-up   ** Please put homework on your desk

- Section 3.2 - Solving Linear Systems by Substitution

- Practice Problems

- Classwork / Homework

Page 2

Identifying Solutions Tell whether the ordered pair is a solution of the system.

8. (2, 0);
$$2x + y = 4$$
$$x - y = 1$$
NO.

9. (3, −1);
$$x + 2y = 1$$
$$-2x + y = -7$$
yes.

10. (−4, 3);
$$x + y = -1$$
$$-x - 3y = -5$$
yes

Graphing Systems Solve the system by graphing. Then check your solution.

14. $y = -\frac{1}{2}x - 1$
$y = \frac{1}{2}x - 3$
(2, -2)

15. $y = -x - 1$
$y = -3x + 5$
(3, -4)

only graph #14, 15, 29

Finding Solutions Graph the linear system and tell how many solutions it has. If it has exactly one solution, find and check the solution.

29. $y = 2x + 4$
$y = 2x - 1$
no solution
$-3y = 6 - x$ ... $\frac{-3}{3}$

30. $-4x + y = 3$
$8x - 2y = -6$
infinite
-2

33. $x - 3y = 6$
$2x - 6y = 8$
$-6y = 8 - 2x$ ... $\frac{8}{-6} - \frac{2x}{-6}$
Parallel

just tell if one, none, or infinite soln

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Tom needs a ride to the mall. The local cab service charges an initial fee of $5 plus $0.80 per mile. Uber charges an initial fee of $11 plus $0.40 per mile.

$.8 = \frac{8}{10} = \frac{4}{5}$

1) Write equations for each scenario.
$$y = .80x + 5$$
$$y = .40x + 11$$

2) Graph the equations on the same coordinate plane. $.4 = \frac{4}{10} = \frac{2}{5}$

3) Which service should Tom call if he needs to go to the mall that is...
   a) 5 miles away? Cab Co.
   b) 15 miles away? equal
   c) 20 miles away? Uber

Warm-Up -- Solve by Graphing

Cab Co. Uber 17 $ miles 15

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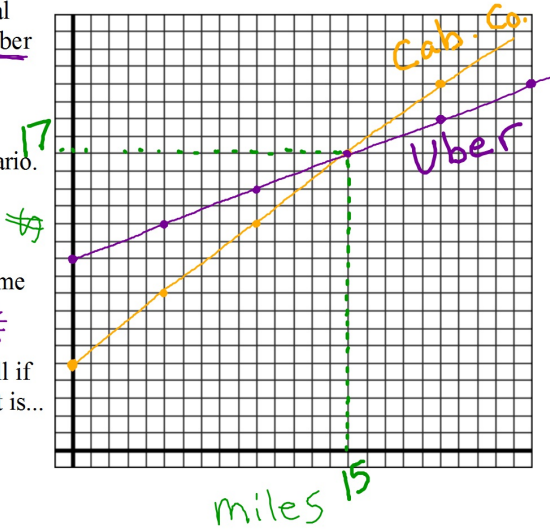
Section 3.2 - Solving Linear Systems by Substitution
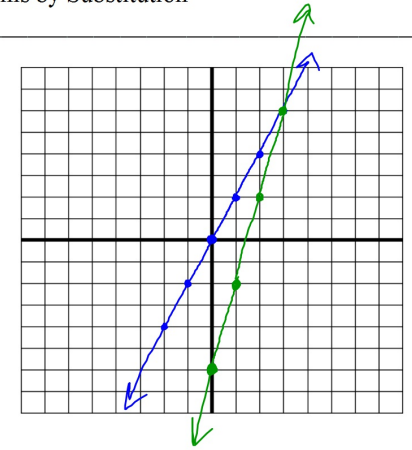
Ex 1:
$$\begin{cases} y = 2x + 0 \\ 4x - y = 6 \end{cases}$$

$6 = 2(3)$ T
$4(3) - 6 = 6$ T

Show that (3, 6) is a solution of this system.

Then, graph the system and find the point of intersection.

$$4x - y = 6$$
$$4x - 6 = y$$

Steps to Solving Using the Substitution Method
1. Solve one equaiton for either x or y
2. Substitute the expression into the other equation and solve for the other variable
3. Substitute the value from #2 into the revised equation from step #1 and solve
4. Check the solution in each of the original equation

2)
$$\begin{cases} y = 2x \\ 4x - y = 6 \end{cases}$$

$y = 2(3) = 6$

$4x - 2x = 6$
$2x = 6$
$x = 3$

$(3, 6)$

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

① $x = -3 + 2y$

② $3(-3 + 2y) + 2y = 7$
$-9 + 6y + 2y = 7$
$8y = 16$
$y = 2$

③ $x = -3 + 2(2)$
$x = 1$

$(1, 2)$

④ check

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4)
$$\begin{cases} 2x + y = 3 \\ 3x + y = 0 \end{cases}$$
① $y = 3 - 2x$

② $3x + 3 - 2x = 0$
$x + 3 = 0$
$x = -3$

③ $y = 3 - 2(-3)$
$= 3 + 6$
$= 9$

④ $(-3, 9)$

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5)
$$\begin{cases} 2x + 3y = 4 \\ x + 2y = 1 \end{cases}$$
① $x = 1 - 2y$

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

③ $x = 1 - 2(-2)$
$x = 1 + 4$
$x = 5$

$(5, -2)$

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6)

$$\begin{cases} 3x - y = 5 \\ 4x + 2y = 10 \end{cases}$$

① $-y = 5 - 3x \longrightarrow y = -5 + 3x$

② $4x + 2(-5 + 3x) = 10$

$4x - 10 + 6x = 10$

$10x = 20$

$x = 2$

③ $y = -5 + 3(2)$
$= 1$

④ $(2, 1)$

7)

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

③ $x = 3(-1) + 2 = -1$

② $3y + 2 + 2y = -3$

$5y + 2 = -3$

$5y = -5$

$y = -1$

④ $(-1, -1)$

8)

$$\begin{cases} x - y = 7 \\ 3x - 3y = 21 \end{cases}$$

$x = 7 + y$

$3(7 + y) - 3y = 21$

$21 + 3y - 3y = 21$

$21 = 21$ always true!

Infinite Solutions

9)

$$\begin{cases} 2x + y = -5 \\ -4x - 2y = 6 \end{cases}$$

$y = -5 - 2x$

$-4x - 2(-5 - 2x) = 6$

$-4x + 10 + 4x = 6$

$10 = 6$ never true!

No solutions $\longrightarrow$ Parallel

Application

Tickets for the school play are $3 for students and $5 for adults. On opening night, 937 tickets are sold and $3,943 is collected. How many of each ticket were sold? Define your variables and write a linear system.

x → students y → adults

$$x + y = 937 \longrightarrow x = 937 - y$$
$$3x + 5y = 3943$$

$$3(937 - y) + 5y = 3943$$
$$2811 - 3y + 5y = 3943$$
$$2y = 1132$$
$$y = 566 \text{ adult tix}$$

$$x = 937 - 566$$
$$x = 371 \text{ student tix}$$

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Application

Museum Admissions On one day, the Henry Ford Museum in Dearborn, Michigan, admitted 4400 adults and students and collected $57,200 in ticket sales. The price of admission is $14 for an adult and $10 for a student. How many adults and how many students were admitted to the museum that day?

y x

$$x + y = 4400 \longrightarrow x = 4400 - y$$
$$10x + 14y = 57200$$

$$x = 4400 - 3300$$
$$= 1100 \text{ student}$$

$$10(4400 - y) + 14y = 57200$$
$$44000 - 10y + 14y = 57200$$
$$4y = 13200$$
$$y = 3300 \text{ adult}$$

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Classwork / Homework :   p.135: # 17-22, 34

Solving Linear Systems Solve the system using substitution.

17. $y = 3x$
$-2x + y = 7$

18. $2m - 4n = 16$
$m = 6n$

19. $5x + 3y = 8$
$y = -5x + 16$

20. $-3x + 4y = 11$
$2x + y = 0$

21. $x - y = 2$
$5x - 2y = 7$

22. $2x + 3y = 5$
$2x + y = 4$

34. Food Your friend bought a total of 8 pounds of sliced turkey and sliced ham for a party. The total cost was $28.50. How much of each type of meat did your friend buy? Use the data from the sign to help you write the equations.

Deli Specials

Sliced turkey	$3/lb
Sliced Ham	$4/lb

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