

## 6) Linear Systems

46. What is the solution to the system of  $2x = y + 3$  and  $x + y = 3$ ?

(1) (2,1)

(3) (3,0)

(2) (1,2)

(4) (3,3)

**(1) (2, 1)**

substitution

$$x + y = 3 \rightarrow y = 3 - x$$

$$2x = y + 3$$

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

$$2x = -x + 6$$

$$+x \quad +x$$

$$\underline{3x = 6}$$

$$3 \quad 3$$

$$x = 2$$

$$x + y = 3$$

$$2 + y = 3$$

$$y = 1$$

**Check**

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

$$4 = 4$$

$$2 + 1 = 3$$

$$3 = 3$$

47. Which system of equations has the same solution set as the system below?

$$2x + 2y = 16$$

$$3x - y = 4$$

(1)  $2x + 2y = 16$

$$6x - 2y = 8$$

(2)  $2x + 2y = 16$

$$6x - 2y = 4$$

(3)  $x + y = 16$

$$3x - y = 4$$

(4)  $6x + 6y = 48$

$$6x + 2y = 8$$

$$2x + 2y = 16$$

(1)  $2x + 2y = 16 \rightarrow$  same as 1<sup>st</sup> equation

$$3x - y = 4$$

$6x - 2y = 8 \rightarrow$  equivalent to 2<sup>nd</sup> equation

(1) Same equation as  $2x + 2y = 16$

$2(3x - y = 4)$  is  $6x - 2y = 8$  **multiplication property of equality**

(2) Same as  $2x + 2y = 16$

$2(3x - y = 4)$  **is not**  $6x - 2y = 4$

(3)  $2(x + y = 16)$  **is not**  $2x + 2y = 16$

Same as  $3x - y = 4$

(4)  $3(2x + 2y = 16)$  **is**  $6x + 6y = 48$

$2(3x - y = 4)$  **is not**  $6x + 2y = 8$

This problem can also be solved by solving the given system and substituting the solution into each system pictured below.

**Solution to the system: (3, 5)**

$$2(3) + 2(5) = 16$$

$$6(3) - 2(5) = 8$$

$$6 + 10 = 16$$

$$18 - 10 = 8$$

$$16 = 16$$

$$8 = 8$$

48. A student store sold a total of 55 shirts for \$620. The shirts sold were either red or white. If the red shirts sold for \$12 each and the white shirts sold for \$10 each, how many of each color were sold?

(1) 20 red and 35 white

(2) 27 red and 28 white

(3) 28 red and 27 white

(4) 35 red and 20 white

w: # of white shirts sold

$$10w + 12r = 620$$

r: # of red shirts sold

$$10w + 12(55 - w) = 620$$

$$10w + 660 - 12w = 620$$

$$w + r = 55 \rightarrow r = 55 - w$$

$$-2w + 660 = 620$$

$$10w + 12r = 620$$

$$-2w = -40$$

$$w = 20$$

$$w + r = 55$$

$$20 + r = 55$$

$$r = 35$$

**(4) 35 red and 20 white**

49. Diane delivers newspapers for \$5 a day plus \$0.04 per newspaper delivered. Jeremy delivers newspapers for \$2 a day plus \$0.10 per newspaper delivered. How many newspapers would Diane and Jeremy need to deliver in order to earn the same amount of money in one day?

<p><b>n:</b> the number of newspapers delivered in one day  <b>T:</b> total amount of money earned</p> <p><b>Diane: <math>T = .04n + 5</math>                      Jeremy: <math>T = .10n + 2</math></b></p> <p>\$ Diane earns in one day = \$ Jeremy earns in one day</p> <p style="text-align: center;"><math>T = T</math></p> <p><math>.04n + 5 = .10n + 2</math>  <math>5 = .06n + 2</math>  <math>3 = .06n</math>  <math>50 = n</math>      <b>Each person needs to deliver 50 newspapers.</b></p>	<p><b>Check</b></p> <table style="width: 100%;"> <tr> <td style="width: 50%;">Diane</td> <td style="width: 50%;">Jeremy</td> </tr> <tr> <td><math>T = .04(50) + 5</math></td> <td><math>T = .10(50) + 2</math></td> </tr> <tr> <td><math>T = 2 + 5</math></td> <td><math>T = 5 + 2</math></td> </tr> <tr> <td><math>T = 7</math></td> <td><math>T = 7</math></td> </tr> <tr> <td><b>\$7</b></td> <td><b>\$7</b></td> </tr> </table>	Diane	Jeremy	$T = .04(50) + 5$	$T = .10(50) + 2$	$T = 2 + 5$	$T = 5 + 2$	$T = 7$	$T = 7$	<b>\$7</b>	<b>\$7</b>
Diane	Jeremy										
$T = .04(50) + 5$	$T = .10(50) + 2$										
$T = 2 + 5$	$T = 5 + 2$										
$T = 7$	$T = 7$										
<b>\$7</b>	<b>\$7</b>										

50. Jim and Larry work at a furniture store. Larry earns \$200 per week plus 3.5% of his total sales in dollars,  $x$ . Jim is paid \$350 per week plus 3% of his total sales,  $x$ .

- a) Write a system of equations that represents the weekly pay,  $y$ , of Larry and Jim based on total sales,  $x$ .

<p><b>x:</b> the amount of money generated in sales in one week  <b>y:</b> the total amount of money earned in one week</p> <p><b>Larry: <math>y = .035x + 200</math>                      Jim: <math>y = .03x + 350</math></b></p>
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- b) Determine the value of  $x$ , in dollars, that will make their weekly pay the same.

<p><b>Larry: <math>y = .035x + 200</math>                      Jim: <math>y = .03x + 350</math></b></p> <p>\$ Larry earns in one week = \$ Jim earns in one week</p> <p style="text-align: center;"><math>y = y</math></p> <p><math>.035x + 200 = .03x + 350</math>  <math>.005x + 200 = 350</math>  <math>.005x = 150</math>  <math>x = 30,000</math></p> <p><b>Larry and Jim will earn the same amount of money if each one of them generates \$30,000 in sales.</b></p>	<p><b>Check</b></p> <p>Larry  <math>y = .035(30,000) + 200</math>  <math>y = 1250</math>  <b>\$1250</b></p> <p>Jim  <math>y = .03(30,000) + 350</math>  <math>y = 1250</math>  <b>\$1250</b></p>
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*A check can also be done using the table of values on the calculator.*