Answer Key

Algebra I Part 2 Honors
Chapter 7

7.1 Solve Linear Systems by Graphing

Goal • Graph and solve systems of linear equations.

Your Notes

VOCABULARY

Systems of linear equations

A system of linear equations consists of two or more linear equations in the same variables.

Solution of a system of linear equations.

A solution of a system of linear equations in two variables is an ordered pair that satisfies each equation in the system.

Consistent independent system

A linear system that has exactly one solution

SOLVING A LINEAR SYSTEM USING THE GRAPH-AND-CHECK METHOD

Step 1 __Graph__ both equations in the same coordinate plane. For ease of graphing, you may want to write each equation in __slope-intercept form__.

Step 2 Estimate the coordinates of the __point of intersection__.

Step 3 __Check__ the coordinates algebraically by substituting into each equation of the original linear system.

7.1 Graphing
7.2 Substitution
7.3 Elimination (+ or - Only)
7.4 Elimination (x First)
7.5 Special Types (ℝ or ∅)
7.6 Systems of Linear Inequalities

pg. 16 #26

Your Notes

Example 1

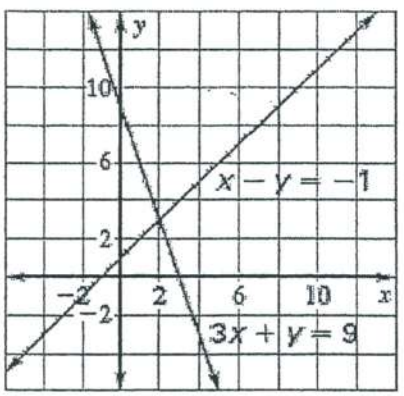
Use the graph-and-check method

Solve the linear system: $3x + y = 9$ **Equation 1**

$x - y = 1$ **Equation 2**

Solution

1. __Graph__ both equations.



To ease graphing, write each equation in slope intercept form.

2. **Estimate** the point of intersection. The two lines appear to intersect at (__2__, __3__).

3. **Check** whether (__2__, __3__) is a solution by substituting __2__ for x and __3__ for y in each of the original equations.

Equation 1	**Equation 2**
$3x + y = 9$	$x - y = -1$
$3(2) + 3 \stackrel{?}{=} 9$	$2 - 3 \stackrel{?}{=} -1$
$9 = 9$ ✓	$-1 = -1$ ✓

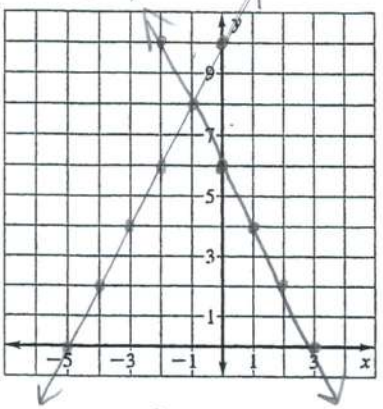
Because (__2__, __3__) is a solution of each equation in the linear system, it is a __solution of the linear system__.

HINT: On the side, rewrite equations in slope-intercept form! ☺

Your Notes

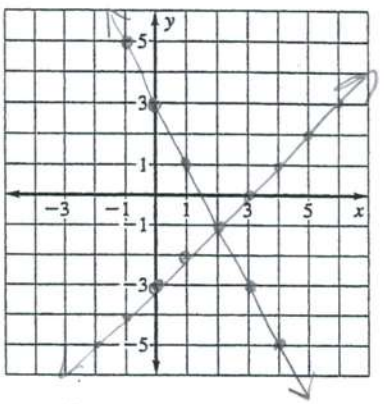
Checkpoint **Solve the linear system by graphing.**

1. $2y + 4x = 12$ $y = -2x + 6$
$2x - y = -10$ $y = 2x + 10$



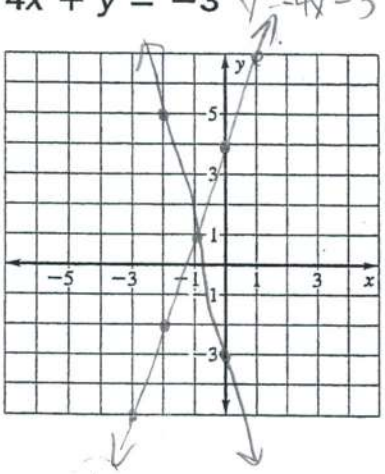
$(-1, 8)$

2. $4x + 2y = 6$ $y = -2x + 3$
$3x - 3y = 9$ $y = x - 3$



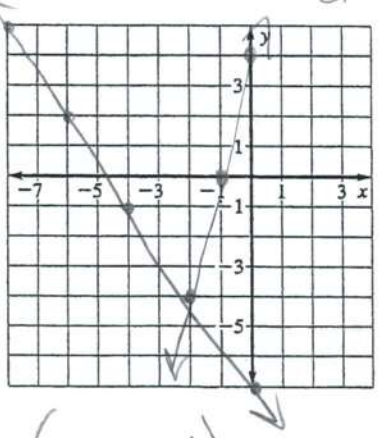
$(2, -1)$

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



$(-1, 1)$

4. $y = 4x + 4$
$2y = -3x - 14$ $y = \frac{-3}{2}x - 7$



$(-2, -4)$

Homework

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LESSON 7.1

Practice B

For use with pages 426–434

HINT: Plug the ordered pair into both equations.

Tell whether the ordered pair is a solution of the linear system.

1. (4, 1);
$x + 2y = 6$
$3x + y = 11$

$4+2(1)=6$ $3(4)+1=11$
$4+2=6$ $12+1=11$
$6=6$ ✓ $13=1$ ✗
NO

2. (−2, 1);
$5x - 2y = -12$
$x + 3y = 1$

$5(-2)-2(1)=-12$ $-2+3(1)=1$
$-10-2=-12$ $-2+3=1$
$-12=-12$ ✓ $1=1$ ✓
YES

3. (4, −3);
$-3x + 2y = -18$
$6x - y = 27$

$-3(4)+2(-3)=-18$ $6(4)-(-3)=27$
$-12-6=-18$ $24+3=27$
$-18=-18$ ✓ $27=27$ ✓
YES

4. (−4, −6);
$3x - y = 6$
$-x + 2y = 8$

$3(-4)-(-6)=6$
$12+6=6$
$18=6$ ✗
NO

5. (−4, 3);
$4x + 3y = -12$
$x + 2y = -6$

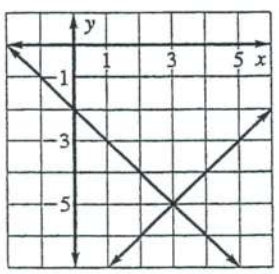
$4(-4)+3(3)=-12$
$16+9=-12$
$7=-12$ ✗
NO

6. (−2, −5);
$-x + y = -3$
$-x + 3y = -13$

$-(-2)+(-5)=-3$ $-(-2)+3(-5)=-13$
$2-5=-3$ $2-15=-13$
$-3=-3$ ✓ $-13=-13$ ✓
YES

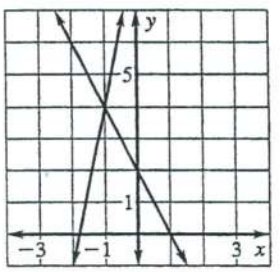
Use the graph to solve the linear system. Check your solution.

7. $x - y = 8$
$x + y = -2$
(3, −5)



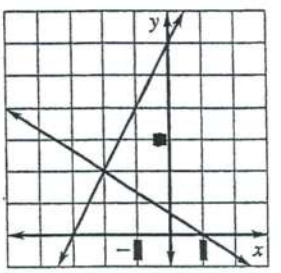
$3-(-5)=8$ $3+(-5)=-2$
$3+5=8$ $3-5=-2$
$8=8$ ✓ $-2=-2$ ✓

8. $5x - y = -9$
$y + 2x = 2$
(−1, 4)



$5(-1)-4=-9$ $4+2(-1)=2$
$-5-4=-9$ $4-2=2$
$-9=-9$ ✓ $2=2$ ✓

9. $2x + 3y = 2$
$-2x + y = 6$
(−2, 2)



$2(-2)+3(2)=2$ $-2(-2)+2=6$
$-4+6=2$ $4+2=6$
$2=2$ ✓ $6=6$ ✓

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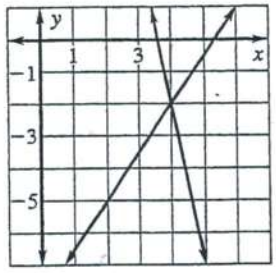
LESSON 7.1

Practice B *continued*

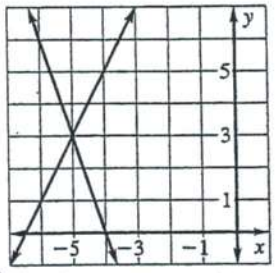
For use with pages 426–434

10. $3x - 2y = 16$
$5x + y = 18$ (4, −2)



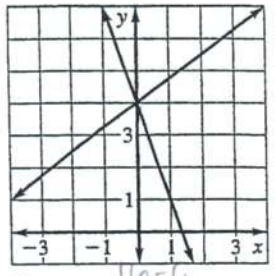
$12+4=16$ ✓ $20-2=18$ ✓

11. $2x - y = -13$
$y + 3x = -12$ (−5, 3)



$-10-3=-13$ ✓ $3-15=-12$ ✓

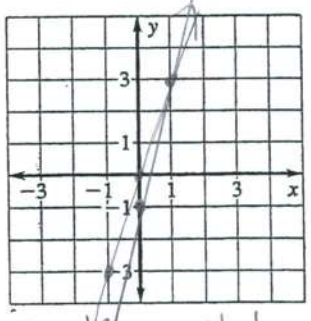
12. $6x + 2y = 8$
$-3x + 4y = 16$ (0, 4)



$8=8$ ✓ $16=16$ ✓

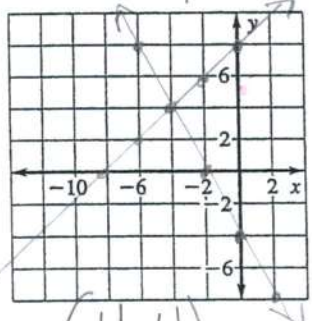
Solve the linear system by graphing. Check your solution.

13. $y = 3x$ (1, 3)
$y = 4x - 1$



$3=3$ $3=4-1$

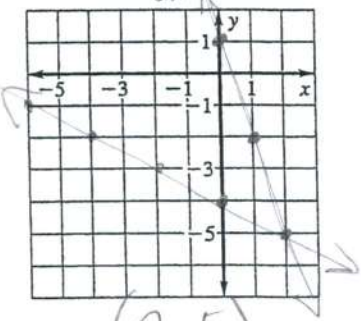
14. $2x + y = -4$ $y=-2x-4$
$x - y = -8$ $y=x+8$



(−4, 4)

$-8+4=-4$ $-4-4=-8$

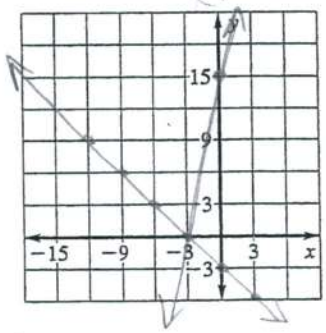
15. $-3x - y = -1$ $y=-3x+1$
$2x + 4y = -16$ $y=-\frac{1}{2}x-4$



(2, −5)

$-6+5=-1$ ✓ $4-20=-16$ ✓

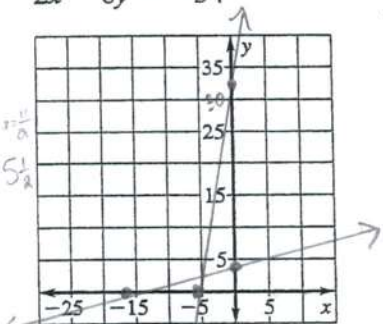
16. $2x + 2y = -6$ $y=-x-3$
$-5x + y = 15$ $y=5x+15$



(−3, 0)

$-6=-6$ $15=15$

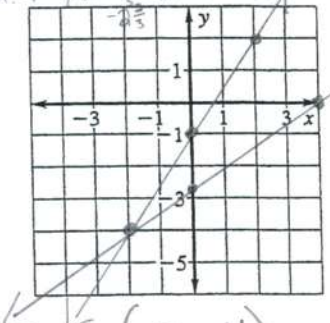
17. $-6x + y = 33$ $y=6x+33$
$2x - 8y = -34$



(−5, 3)

$30+3=33$ ✓ $-10-24=-34$ ✓

18. $-9x + 6y = -6$, $y=\frac{3}{2}x-1$
$2x - 3y = 8$ $y=\frac{2}{3}x-\frac{8}{3}$



(−2, −4)

$18-24=-6$ ✓ $-4+12=8$ ✓

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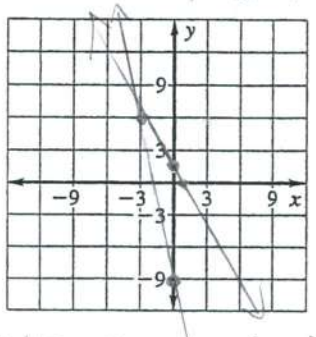
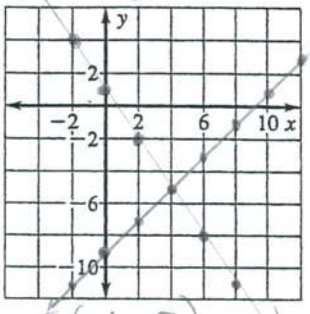
LESSON 7.1 **Practice B** *continued*
For use with pages 426–434

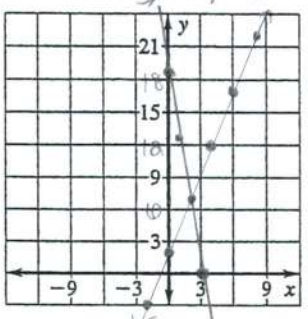
19. $3x + 2y = 3$
$5x + y = -9$



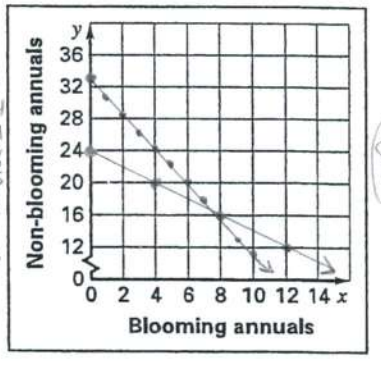
20. $x - y = 9$
$3x + 2y = 2$



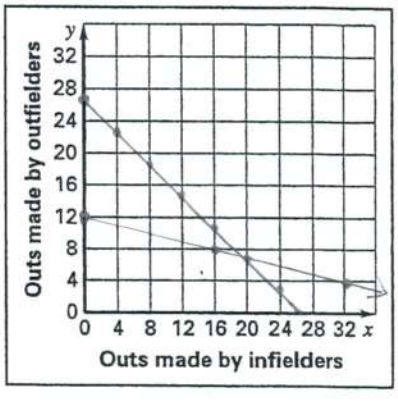
21. $6x + y = 19$
$5x - 2y = -4$



22. Hanging Flower Baskets You will be making hanging flower baskets. The plants you have picked out are blooming annuals and non-blooming annuals. The blooming annuals cost \$3.20 each and the non-blooming annuals cost \$1.50 each. You bought a total of 24 plants for \$49.60. Write a linear system of equations that you can use to find how many of each type of plant you bought. Then graph the linear system and use the graph to find how many of each type of plant you bought.



23. Baseball Outs In a game, 12 of a baseball team's 27 outs were fly balls. Twenty-five percent of the outs made by infielders and 100% of the outs made by outfielders were fly balls.



a. Write a linear system you can use to find the number of outs made by infielders and the number of outs made by outfielders. (*Hint:* Write one equation for the total number of outs and another equation for the number of fly ball outs.)

b. Graph your linear system.

c. How many outs were made by infielders? How many outs were made by outfielders?

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7.4 ELIMINATION USING MULTIPLICATION

_____

METHOD	THE BEST TIME TO USE THIS METHOD
GRAPHING	when you want to see the lines that the equations represent
SUBSTITUTION	when one equation is already (or almost) solved for x or y.
ELIMINATION BY ADDITION	when the coefficients of one variable are opposites.
ELIMINATION BY SUBTRACTION	(Multiply by -1) when the coefficients of one variable are the same
ELIMINATION WITH MULTIPLICATION	when no corresponding coefficients are the same or opposites

Ex 1: $2(2x + y = -9)$ → $-4x - 2y = 18$
$4x + 11y = 9$ → $4x + 11y = 9$

$9y = 27$
$y = 3$

$2x + y = -9$
$2x + 3 = -9$
$-3 \quad -3$
$2x = -12$
$x = -6$

$(-6, 3)$

Ex 2: $4x + 3y = 8$ → $4x + 3y = 8$
$-4(x - 2y = 13)$ → $-4x + 8y = -52$

$11y = -44$
$y = -4$

$x - 2y = 13$
$x - 2(-4) = 13$
$x + 8 = 13$
$x = 5$

$(5, -4)$

Ex 3: $-5(2x + 3y = 5)$ → $-10x - 15y = -25$
$2(5x + 4y = 16)$ → $10x + 8y = 32$

$-7y = 7$
$y = -1$

$2x + 3y = 5$
$2x + 3(-1) = 5$
$2x - 3 = 5$
$+3 \quad +3$
$2x = 8$
$x = 4$

$(4, -1)$

Ex 4: $2x - 3y = 6$ → $4(2x - 3y = 6)$ → $8x - 12y = 24$
$4y = -7x - 8$ → $7x + 4y = -8$ → $28x + 16y = -32$

$29x = 0$
$x = 0$

$4y = -7x - 8$
$4y = -7(0) - 8$
$\frac{4y}{4} = \frac{-8}{4}$
$y = -2$

$(0, -2)$

7.4 Solve Linear Systems by Multiplying First

Goal • Solve linear systems by multiplying first.

Your Notes

Example 1 ***Multiply one equation, then add***

Solve the linear system: $3x - 3y = 21$ **Equation 1**

$8x + 6y = -14$ **Equation 2**

Solution

1. **Multiply** Equation 1 by 2 so that the coefficients of y are opposites.

$3x - 3y = 21$ $\times 2 \Rightarrow$ $6x - 6y = 42$

$8x + 6y = -14$ $8x + 6y = -14$

2. **Add** the equations. $14x = 28$

3. **Solve** for x. $x = 2$

4. **Substitute** 2 for x in either of the original equations and solve for y.

$3x - 3y = 21$ **Write Equation 1.**

$3(2) - 3y = 21$ **Substitute 2 for x.**

$y = -5$ **Solve for y.**

The solution is $(2, -5)$.

CHECK Substitute 2 for x and -5 for y in the original equations.

Equation 1

$3x - 3y = 21$

$3(2) - 3(-5) \stackrel{?}{=} 21$

$21 = 21$ ✓

Equation 2

$8x + 6y = -14$

$8(2) + 6(-5) \stackrel{?}{=} -14$

$-14 = -14$ ✓

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Your Notes

Example 2 ***Multiply both equations, then subtract***

Solve the linear system: $3y = -2x + 17$ **Equation 1**

$3x + 5y = 27$ **Equation 2**

Solution

1. **Arrange** the equations so that like terms are in columns.

   $2x + 3y = 17$ **Rewrite Equation 1.**

   $3x + 5y = 27$ **Write Equation 2.**

2. **Multiply** Equation 1 by 3 and Equation 2 by 2 so that the coefficient of x in each equation is the least common multiple of 2 and 3, or 6.

   $2x + 3y = 17$ $\times 2 \rightarrow$ $6x + 9y = 51$

   $3x + 5y = 27$ $\times 3 \rightarrow$ $6x + 10y = 54$

3. Subtract the equations. $-1y = -3$

4. **Solve** for y. $y = 3$

5. **Substitute** 3 for y in either of the original equations and solve for x.

   $3x + 5y = 27$ **Write Equation 2.**

   $3x + 5(3) = 27$ **Substitute 3 for x.**

   $x = 4$ **Solve for x.**

The solution is (4, 3).

Checkpoint **Solve the linear system using elimination.**

1. $7x + 2y = 26$

$10x - 5y = -10$

(2, 6)

$35x + 10y = 130$

$20x - 10y = -20$

$55x = 110$

$x = 2$

$7x + 2y = 26$

$7(2) + 2y = 26$

$14 + 2y = 26$

$2y = 12$

$y = 6$

2. $5y = 9x - 8$

$-2(-9x + 5y = -8)$

$-20x + 10y = -10$

(−3, −7)

$18x - 10y = 16$

$-20x + 10y = -10$

$-2x = 6$

$x = -3$

$5y = 9(-3) - 8$

$5y = -27 - 8$

$5y = -35$

$y = -7$

(−3, −7)

Homework

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LESSON 7.4

Practice C

For use with pages 451–457

Solve the linear system by using elimination.

1. $-3x + 5y = 28$, $9x + 4y = 68$ (4, 8)
2. $2x + 7y = -13$, $-3x + 14y = -5$ (−3, −1)
3. $4x + 7y = -43$, $-3x + 6y = -69$ (5, −9)
4. $8x - 6y = -140$, $3x + 5y = 20$ (−10, 10)
5. $4x + 9y = -53$, $-6x - 4y = 32$ (−2, −5)
6. $-6x + 12y = 48$, $-7x + 18y = 84$ (6, 7)
7. $3x + 9y = 27$, $14x + 6y = 18$ (0, 3)
8. $-8x + 5y = 6$, $6x - 3y = 6$ (8, 14)
9. $10x - 8y = 28$, $12x + 5y = 92$ (6, 4)
10. $6x - 11y = -93$, $15x + 13y = 132$ (1, 9)
11. $-15x + 4y = -2$, $13x - 10y = -44$ (2, 7)
12. $9x - 8y = -3$, $14x - 12y = -6$ (−3, −3)

Solve the linear system by using any algebraic method.

13. $0.4x + 0.1y = 0.7$, $x - y = 3$ (2, −1)
14. $4x - 3y = 7$, $1.5x + y = 9$ (4, 3)
15. $1.5x + 2.6y = -12.7$, $-4.5x + 0.3y = 21.9$ (−5, −2)
16. $x + y = 7$, $\frac{1}{4}x - \frac{1}{4}y = \frac{5}{4}$ (6, 1)
17. $4x + y = -\frac{7}{4}$, $5x - 2y = -3$ $\left(-\frac{1}{2}, \frac{1}{4}\right)$
18. $\frac{2}{3}x - \frac{1}{4}y = -\frac{11}{3}$, $\frac{1}{3}x + \frac{3}{5}y = \frac{16}{15}$ (−4, 4)

19. Find the values of a and b so that the linear system has a solution of (2, 4).

$ax - by = 0$ Equation 1 $a = 2$

$bx - ay = -6$ Equation 2 $b = 1$

20. **Lift Tickets** Two families go skiing on a Saturday. One family purchases two adult lift tickets and four youth lift tickets for \$166. Another family purchases four adult lift tickets and five youth lift tickets for \$263. Let x represent the cost in dollars of one adult lift ticket and let y represent the cost in dollars of one youth lift ticket.

   a. Write a linear system that represents this situation. $2x + 4y = 166$, $4x + 5y = 263$

   b. Solve the linear system to find the cost of one adult and one youth lift ticket. Adult: \$37, Youth: \$23

   c. How much would it cost two adults and five youths to ski for a day? \$189

21. **Asian Cuisine** A group of your friends goes to a restaurant that features different Asian foods. There are eight people in your group. Some of the group order the Thai special for \$14.25 and the rest of the group order the Szechwan special for \$13.95. If the total bill was \$113.10, how many people ordered each dinner? 5 Thai, 3 Szechwan

22. **Getting to School** You walk 1.75 miles to school at an average speed r (in miles per hour). On the way back home, you are walking with a friend and your average speed is $\frac{3}{4}r$. The round trip took a total of 90 minutes. Find the average speed for each leg of your trip.

HINT: DISTANCE = RATE • TI

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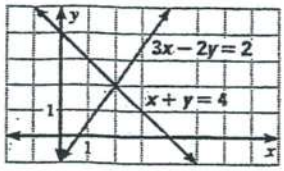
CONCEPT SUMMARY *For Your Notebook*

Methods for Solving Linear Systems

Method	Example	When to Use
Table (p. 426)	x | $y = 2x$ | $y = 3x - 1$ 0 | 0 | −1 1 | 2 | 2 2 | 4 | 5	When x-values are integers, so that equal values can be seen in the table
Graphing (p. 427)		When you want to see the lines that the equations represent
Substitution (p. 435)	$y = 4 - 2x$ $4x + 2y = 8$	When one equation is already solved for x or y
Addition (p. 444)	$4x + 7y = 15$ $6x - 7y = 5$	When the coefficients of one variable are opposites
Subtraction (p. 445)	$3x + 5y = -13$ $3x + y = -5$	When the coefficients of one variable are the same
Multiplication (p. 451)	$9x + 2y = 38$ $3x - 5y = 7$	When no corresponding coefficients are the same or opposites

Answer Key

Lesson 7.4

Practice Level C

1. (4, 8) **2.** (−3, −1) **3.** (5, −9)

4. (−10, 10) **5.** (−2, −5) **6.** (6, 7)

7. (0, 3) **8.** (8, 14) **9.** (6, 4) **10.** (1, 9)

11. (2, 7) **12.** (−3, −3) **13.** (2, −1) **14.** (4, 3)

15. (−5, −2) **16.** (6, 1) **17.** $\left(-\frac{1}{2}, \frac{1}{4}\right)$

18. (−4, 4) **19.** $a = 2, b = 1$

20. a. $2x + 4y = 166$ and $4x + 5y = 263$
b. Adult: \$37; Youth: \$23 **c.** \$189

21. Thai: 5 people; Schezwan: 3 people

22. To school: 2.72 mi/h; Home: 2.04 mi/h

1. $3(-3x+5y=28) \Rightarrow -9x+15y=84$
$9x+4y=68 \qquad 9x+4y=68$
$19y=152$
$y=8$

$-3x+5y=28$
$-3x+5(8)=28$
$-3x+40=28$
$-3x=-12$
$x=4$
$(4,8)$

2. $-2(2x+7y=-13) \Rightarrow -4x-14y=26$
$3x+14y=-5 \qquad -3x+14y=-5$
$-7x=21$
$x=-3$

$2x+7y=-13$
$2(-3)+7y=-13$
$-6+7y=-13$
$7y=-7$
$y=-1$
$(-3,-1)$

3. $3(4x+7y=-43) \Rightarrow 12x+21y=-129$
$4(3x+6y=-69) \qquad -12x+24y=-276$
$45y=-405$
$y=-9$

$-3x+6y=-69$
$-3x+6(-9)=-69$
$-3x-54=-69$
$-3x=-15$
$x=5$
$(5,-9)$

4. $5(8x-6y=-140) \Rightarrow 40x-30y=-700$
$6(3x+5y=20) \qquad 18x+30y=120$
$58x=-580$
$x=-10$

$3x+5y=20$
$3(-10)+5y=20$
$-30+5y=20$
$+30 \quad +30$
$5y=50$
$y=10$
$(-10,10)$

5. $3(4x+9y=-53) \Rightarrow 12x+27y=-159$
$2(-6x-4y=32) \qquad -12x-8y=64$
$19y=-95$
$y=-5$

$-6x-4y=32$
$-6x-4(-5)=32$
$-6x+20=32$
$-20 \quad -20$
$-6x=12$
$x=-2$
$(-2,-5)$

3.10

6. $3(-6x+12y=48) \Rightarrow -18x+36y=144$
$-2(-7x+18y=84) \quad 14x-36y=-168$

$-4x=-24$

$x=6$

$-6x+12y=48$
$-6(6)+12y=48$
$-36+12y=48$
$+36 \quad +36$

$12y=84$

$y=7$

$(6,7)$

7. $2(3x+9y=27) \Rightarrow 6x+18y=54$
$-3(14x+6y=18) \quad -42x-18y=-54$

$-36x=0$

$x=0$

$3x+9y=27$
$3(0)+9y=27$
$9y=27$
$y=3$

$(0,3)$

8. $3(-8x+5y=6) \Rightarrow -24x+15y=18$
$4(6x-3y=6) \quad 24x-12y=24$

$3y=42$

$y=14$

$6x-3y=6$
$6x-3(14)=6$
$6x-42=6$
$6x=48$
$x=8$

$(8,14)$

9. $6(10x-8y=28) \Rightarrow 60x-48y=168$
$-5(12x+5y=92) \quad -60x-25y=-460$

$-73y=-292$

$y=4$

$10x-8y=28$
$10x-8(4)=28$
$10x-32=28$
$+32 \quad +32$

$10x=60$

$x=6$

$(6,4)$

10. $5(6x-11y=-93) \Rightarrow 30x-55y=-465$
$-2(15x+13y=132) \quad -30x-26y=-264$

$-81y=-729$

$y=9$

$6x-11y=-93$
$6x-11(9)=-93$
$6x-99=-93$
$6x=6$
$x=1$

$(1,9)$

(11) $5(15x+4y=-2)$
$2(13x-10y=-44)$
$\Rightarrow$
$-75x+20y=-10$
$26x-20y=-88$
$-49x=-98$
$x=2$

$-15x+4y=-2$
$-15(2)+4y=-2$
$-30+4y=-2$
$+30 \quad +30$
$4y=28$
$y=7$
$(2,7)$

(12) $3(9x-8y=-3)$
$-2(14x-12y=-6)$
$\Rightarrow$
$27x-24y=-9$
$-28x+24y=12$
$-x=3$
$x=-3$

$9x-8y=-3$
$9(-3)-8y=-3$
$-27-8y=-3$
$+27 \quad +27$
$-8y=24$
$y=-3$
$(-3,-3)$

(13) $0.4x+0.1y=0.7$
$0.1(x-y=3)$
$\Rightarrow$
$0.4x+0.1y=0.7$
$0.1x-0.1y=0.3$
$0.5x=1.0$
$x=2$

$x-y=3$
$2-y=3$
$-y=1$
$y=-1$
$(2,-1)$

(14) $4x-3y=7$
$3(1.5x+y=9)$
$\Rightarrow$
$4x-3y=7$
$4.5x+3y=27$
$8.5x=34$
$x=4$

$4x-3y=7$
$4(4)-3y=7$
$16-3y=7$
$-3y=-9$
$y=3$
$(4,3)$

(15) $3(1.5x+2.6y=-12.7)$
$-4.5x+0.3y=21.9$
$\Rightarrow$
$4.5x+7.8y=-38.1$
$-4.5x+0.3y=21.9$
$8.1y=-16.2$
$y=-2$

$1.5x+2.6y=-12.7$
$1.5x+2.6(-2)=-12.7$
$1.5x-5.2=-12.7$
$1.5x=-7.5$
$x=-5$
$(-5,-2)$

6. $\frac{1}{4}(x+y=7)$ $\frac{1}{4}x-\frac{1}{4}y=\frac{5}{4}$ $\Rightarrow$ $\frac{1}{4}x+\frac{1}{4}y=\frac{7}{4}$ $\frac{1}{4}x-\frac{1}{4}y=\frac{5}{4}$

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

$x=6$

$x+y=7$

$6+y=7$

$y=1$

$(6,1)$

7. $4(4x+y=\frac{-7}{4})$ $2(5x-2y=-3)$ $\Rightarrow$ $16x+4y=-7$ $10x-4y=-6$

$26x=-13$

$x=\frac{-1}{2}$

$4x+y=\frac{-7}{4}$

$4(\frac{-1}{2})+y=\frac{-7}{4}$

$-2+y=\frac{-7}{4}+\frac{8}{4}$

$y=\frac{1}{4}$

$(\frac{-1}{2},\frac{1}{4})$

8. $2(\frac{4}{5}x-\frac{1}{4}y=\frac{-11}{3})$ $15(\frac{1}{3}x+\frac{3}{5}y=\frac{16}{15})$ $\Rightarrow$ $3(8x-3y=-44)$ $5x+9y=16$

$(-4,4)$

$\Rightarrow$ $24x-9y=-132$ $5x+9y=16$

$29x=-116$

$x=-4$

$5x+9y=16$

$5(-4)+9y=16$

$-20+9y=16$

$+20 \quad +20$

$9y=36$

$y=4$

9. $ax-by=0$ $bx-ay=-6$

Solution: $(2,4)$

$a(2)-b(4)=0$ $b(2)-a(4)=-6$ $\Rightarrow$ $2(2a-4b=0)$ $-4a+2b=-6$

$\Downarrow$

$4a-8b=0$ $-4a+2b=-6$

$-6b=-6$

$b=1$

$2a-4b=0$ $\Leftarrow$

$2a-4(1)=0$

$2a-4=0$

$2a=4$

$a=2$

$a=2$

$b=1$

(20) x = $ of adult tickets
y = $ of youth tickets

Adult: $37
Youth: $23

$-2(2x+4y=166) \Rightarrow -4x-8y=-332$
$4x+5y=263$

$-3y=-69$
$y=23$

$2x+4y=166$
$2x+4(23)=166$
$2x+92=166$
$2x=74$
$x=37$

2 Adult & 5 Youth
$2(37)+5(23)$
$74+115$
189

$189

(21) x = # of Thai specials
y = # of Szechwan specials

5 Thai
3 Szechwan

$-14.25(x+y=8) \Rightarrow -14.25x-14.25y=-114$
$14.25x+13.95y=113.10$

$-0.30y=-0.90$
$y=3$

$x+y=8$
$x+3=8$
$-3\ -3$
$x=5$

(22) to school:
$d=rt$
$1.75=rt$
$\frac{1.75}{r}=t$

from school:
$d=rt$
$1.75=\frac{3}{4}rt$
$\frac{1.75}{\frac{3}{4}r}=t$
$\frac{2.33}{r}=t$

Round Trip
time to school + time from school = total time
$\frac{1.75}{r}+\frac{2.33}{r}=1.5$ ← 90 min = 1.5 hours
* Need hours b/c rate is in mi/hr not min.

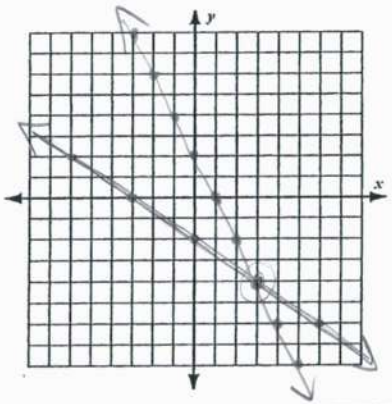
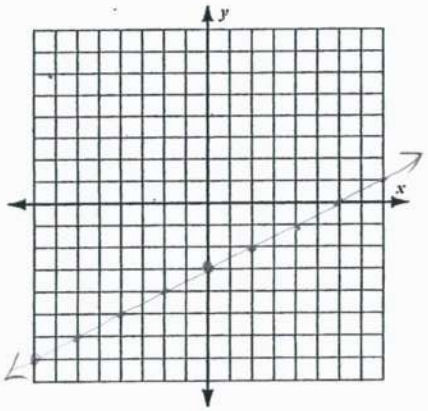
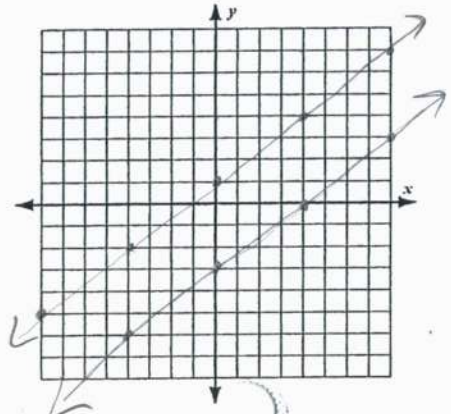
$\frac{1.75+2.33}{r}=1.5$
$\frac{4.08}{r}=1.5$
$\frac{4.08}{1.5}=\frac{1.5r}{1.5}$
$2.72=r$

$\frac{3}{4}r$
$\frac{3}{4}(2.72)$
2.04

To school: 2.75 mph
From school: 2.04 mph

7.5 Special Types of Linear Systems

_____

System of Equations	Solve by Graphing	Solution
$y=-\frac{2}{3}x-2$ $2x+y=2$ $y=-2x+2$		(3, -4)
$x-2y=6$ $y=\frac{1}{2}x-3$ $y=\frac{1}{2}x-3$		Infinitely Many Solutions
$3x-4y=12$ $y=\frac{3}{4}x-3$ $y=\frac{3}{4}x+1$		No Solution

System of Equations	Solve Algebraically	Solution
$2x-y=8$ $x-3y=4$	$-3(2x-y=8)$ $x-3y=4$ $x-3y=4$ $4-3y=4$ $-3y=0$ $y=0$ $-6x+3y=-24$ $x-3y=4$ $-5x=-20$ $x=4$	$(4,0)$
$5x+y=-2$ $-10x-2y=4$	$(5x+y=-2)2$ $-10x-2y=4$ $10x+2y=-4$ $-10x-2y=4$ $0=0$	Infinitely Many Solutions
$6x+2y=3$ $3x+y=-\frac{5}{2}$	$6x+2y=3$ $-2(3x+y=-\frac{5}{2})$ $6x+2y=3$ $-6x-2y=5$ $0=8$	No Solution

Summary:

Number of Solutions	Slopes and y-intercepts	Graph Solution	Algebraic Solution
One solution	different slope	intersecting lines	(x, y)
No solution	same slope different y-intercept	parallel lines	a false statement
Infinitely many solutions	same slope same y-intercept.	coinciding lines (same line)	a true statement

(H)

Word Problem: Matt invested $2,000 in stocks and bonds. This year the bonds paid 8% interest and the stocks paid 6% in dividends. Matt received a total of $144 in stocks and dividends. How much money did he invest in stocks? How much money did he invest in bonds?

Step 1: Define your variables. b = amount in bonds
s = amount in stocks

Step 2: Set up your system of equations. $\begin{cases} b + s = 2000 \\ 100(.08b + .06s = 144) \end{cases} \Rightarrow \begin{cases} -8b - 8s = -16000 \\ 8b + 6s = 14400 \end{cases}$

$-2s = -1600$
$s = 800$

$b + s = 2000$
$b + 800 = 2000$
$b = 1200$

Step 3: Solve and label your answers!

$800 stocks
$1200 bonds

Name _____ Date _____

LESSON 7.5

Practice C

For use with pages 459–465

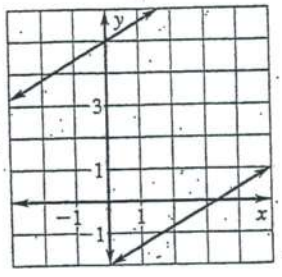
Match the linear system with its graph. Then use the graph to tell whether the linear system has *one solution*, *no solution*, or *infinitely many solutions*.

1. $6x + 4y = -5$ $y = \frac{-3}{2}x - \frac{5}{4}$
   $3x + 2y = -\frac{5}{2}$ $y = \frac{-3}{2}x - \frac{5}{4}$
   infinitely many solutions

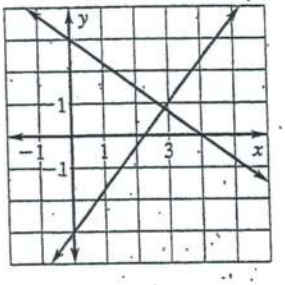
2. $3x + 4y = 12$ $y = \frac{-3}{4}x + 3$
   $-4x + 3y = -9$ $y = \frac{4}{3}x - 3$

3. $y = \frac{3}{5}x + 5$
   $-3x + 5y = -10$ $y = \frac{3}{5}x - 2$
   no solution

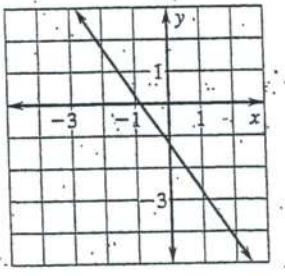
A.



B.

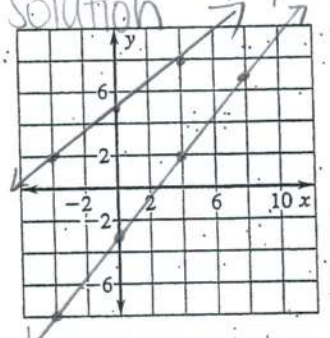


C.

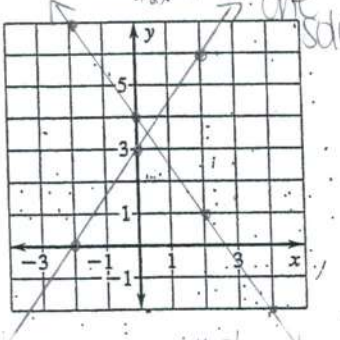


Graph the linear system. Then use the graph to tell whether the linear system has *one solution*, *no solution*, or *infinitely many solutions*.

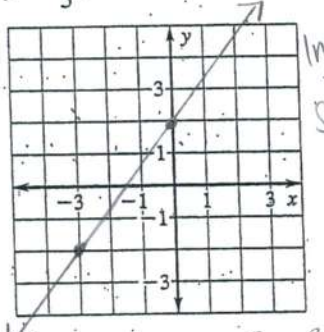
4. $4y = 3x + 20$ $y = \frac{3}{4}x + 5$
   $4y + 12 = 5x$ $y = \frac{5}{4}x - 3$
   one solution



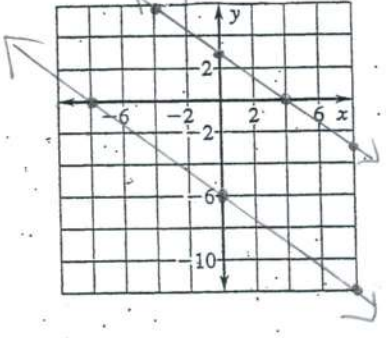
5. $3x + 2y = 8$ $y = \frac{-3}{2}x + 4$
   $-2x + 3y = 6$ $y = \frac{3}{2}x + 3$
   one solution



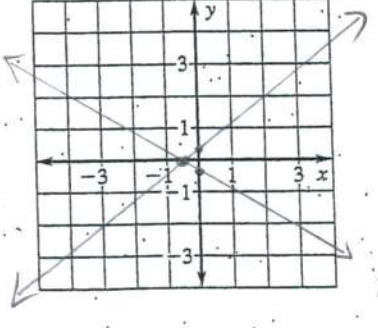
6. $3y - 4x = 6$ $y = \frac{4}{3}x + 2$
   $y = \frac{4}{3}x + 2$
   Infinitely Many Solutions.



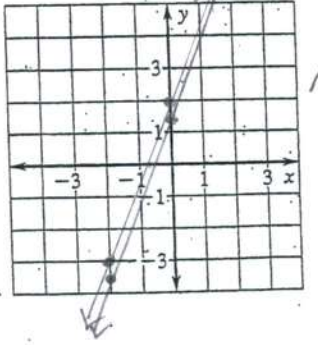
7. $3x + 4y = -24$ $y = -6$ $x = -8$ ∅
   $\frac{1}{3}y + \frac{1}{4}x = 1$ $y = \frac{-3}{4}x + 3$



8. $2x + 3y = -1$ $x = -\frac{1}{2}$ $y = -\frac{1}{3}$
   $-2x + 3y = 1$ $x = -\frac{1}{2}$ $y = \frac{1}{3}$
   one solution.



9. $-5x + 2y = 3$ $y = \frac{5}{2}x + \frac{3}{2}$
   $4y - 10x = 8$ $y = \frac{5}{2}x + 2$
   ∅



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Name _____ Date _____

LESSON 7.5 **Practice C** *continued*
For use with pages 459–465

Solve the linear system by using substitution or elimination.

10. $-x + 2y = -4$
$-3x + 4y = 4$
(-12, -8)

11. $4x + 3y = 2$
$2x + \frac{3}{2}y = 1$ IMS

12. $x + 8y = 16$
$-3x + 8y = -8$ $(6, \frac{5}{4})$

13. $-2x + 5y = -10$
$5y - 2x = 5$ $\emptyset$

14. $-2x + 3y = -\frac{1}{2}$
$3x + 2y = 4$ $(1, \frac{1}{2})$

15. $2y - 10x = -8$
$2y - x = 4$ $(\frac{4}{3}, \frac{8}{3})$

Without solving the linear system, tell whether the linear system has *one solution, no solution,* or *infinitely many solutions.*

16. $4y = 12x - 1$
$-12x + 3y = -1$ 1

17. $x + 4y = 3$
$\frac{1}{2}x + 2y = 4$ $\emptyset$

18. $-2x + 3y = 4$
$3x - 2y = 5$ 1

19. $5y - 4x = 3$
$10y = 8x + 6$ IMS

20. $y - \frac{1}{4}x = -2$
$x - 2y = 8$ 1

21. $3y + 5x = 1$
$-5x - 3y = 1$ $\emptyset$

22. $2y - x = 3$
$2x + y = 6$ 1

23. $-3x + 4y = -4$
$4x + 3y = 2$ 1

24. $4y = -5x + 3$
$2y + \frac{5}{2}x = \frac{3}{2}$ IMS

25. Restaurant Sales The table below shows the number of each of the specials that has been sold on a Friday night and a Saturday night.

Day	Number of vegetarian specials	Number of chicken specials	Total sales (dollars)
Friday	28	44	964.40
Saturday	21	33	723.30

a. Let x represent the cost (in dollars) of the vegetarian special and let y represent the cost (in dollars) of the chicken special. Write a linear system that models the situation. $28x+44y=964.40$ $21x+33y=723.30$

b. Solve the linear system. IMS

c. Can you determine how much each kind of special costs? Why or why not? No; many possible combinations

26. Retail Prices Two employees at a store are given the task of putting price tags on items. One person starts pricing items at a rate of 10 items per minute. The second person starts 10 minutes after the first person and prices items at a rate of 8 items per minute.

a. Let y be the number of items priced x minutes after the first person starts pricing. Write a linear system that models the situation.

b. Solve the linear system.

c. Does the solution of the linear system make sense in the context of the problem? *Explain.*

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pg.16

(10) $-2(-x+2y=-4)$
$-3x+4y=4$
$\Rightarrow$
$2x-4y=8$
$-3x+4y=4$
$-x=12$
$x=-12$

$-x+2y=-4$
$-(-12)+2y=-4$
$12+2y=-4$
$2y=-16$
$y=-8$
$(-12,-8)$

(11) $4x+3y=2$
$-2(2x+\frac{3}{2}y=1)$
$\Rightarrow$
$4x+3y=2$
$-4x-3y=-2$
$0=0$
IMS

(12) $-1(x+8y=16)$
$-3x+8y=-8$
$\Rightarrow$
$-x-8y=-16$
$-3x+8y=-8$
$-4x=-24$
$x=6$

$x+8y=16$
$6+8y=16$
$8y=10$
$y=\frac{5}{4}$
$(6,\frac{5}{4})$

(13) $-\frac{1}{2}(-2x+5y=-10)$
$-2x+5y=5$
$\Rightarrow$
$2x-5y=10$
$-2x+5y=5$
$0=15$
$\emptyset$

(14) $-2(-2x+3y=\frac{-1}{2})$
$3(3x+2y=4)$
$\Rightarrow$
$4x-6y=1$
$9x+6y=12$
$13x=13$
$x=1$

$3x+2y=4$
$3(1)+2y=4$
$3+2y=4$
$2y=1$
$y=\frac{1}{2}$
$(1,\frac{1}{2})$

(15) $2y-10x=-8$
$-1(2y-x=4)$
$\Rightarrow$
$2y-10x=-8$
$-2y+x=-4$
$-9x=-12$
$x=\frac{4}{3}$

$2y-x=4$
$2y-\frac{4}{3}=4$
$2y=\frac{16}{3}$
$y=\frac{16}{6}=\frac{8}{3}$
$(\frac{4}{3},\frac{8}{3})$

(16) $4y = 12x - 1 \Rightarrow -12x + 4y = -1$
$-12x + 3y = -1 \quad -1(-12x + 3y = -1)$
$\Rightarrow -12x + 4y = -1$
$12x - 3y = -1$
$y = -2$
One Solution

(17) $x + 4y = 3$
$-2\left(\frac{1}{2}x + 2y = 4\right) \Rightarrow x + 4y = 3$
$-x - 4y = -6$
$0 = -3$
NO Solution

(18) $3(-2x + 3y = 4) \Rightarrow -6x + 9y = 12$
$2(3x - 2y = 5) \quad 6x - 4y = 10$
$5y = 22$
One Solution

(19) $2(5y - 4x = 3) \Rightarrow -10y + 8x = -6$
$10y - 8x = 6 \quad 10y - 8x = 6$
$0 = 0$
IMS

(20) $2\left(y - \frac{1}{4}x = -2\right) \Rightarrow 2y - \frac{1}{2}x = -4$
$-2y + x = 8 \quad -2y + x = 8$
$\frac{1}{2}x = 4$
One Solution

(21) $5x + 3y = 1$
$-5x - 3y = 1$
$0 = 2$
NO Solution

(22) $2(-x + 2y = 3) = -2x + 4y = 6$
$2x + y = 6 \quad 2x + y = 6$
$5y = 12$
One Solution

(23) $4(-3x + 4y = -4) \Rightarrow -12x + 16y = -16$
$3(4x + 3y = 2) \quad 12x + 9y = 6$
One Solution

(24) $5x + 4y = 3$
$-2\left(\frac{5}{2}x + 2y = \frac{3}{2}\right) \Rightarrow 5x + 4y = 3$
$-5x - 4y = -3$
$0 = 0$
IMS

(25) a) $28x + 44y = 964.40$
$21x + 33y = 723.30$

b) $-\frac{1}{4}(28x + 44y = 964.40)$
$\frac{1}{3}(21x + 33y = 723.30)$
$\Rightarrow$
$-7x - 11y = -241.1$
$7x + 11y = 241.1$
$0 = 0$

Infinitely Many Solutions

c.) No we can not, from the situation they gave us, there are many possible combinations for how much each special costs.

(26)

7.6 Solve Linear Systems of Linear Inequalities

Goal • Solve systems of linear inequalities in two variables.

Your Notes

VOCABULARY

System of linear inequalities

two or more linear inequalities in the same variables

Solution of a system of linear inequalities

an ordered pair that is a solution of each inequality in the system.

Found in the "solution area"

Graph of a system of linear inequalities

graph of all solutions of the system

GRAPHING A SYSTEM OF LINEAR INEQUALITIES

Step 1 Graph each inequality.

Step 2 **Find** the intersection of the graphs. The graph of the system is this intersection.

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Your Notes

Example 1 *Graph a system of three linear inequalities*

Graph the system of inequalities.

$y > 1$ **Inequality 1**

$x \leq 4$ **Inequality 2**

$3y < 6x - 6$ **Inequality 3**

$y < 2x - 2$

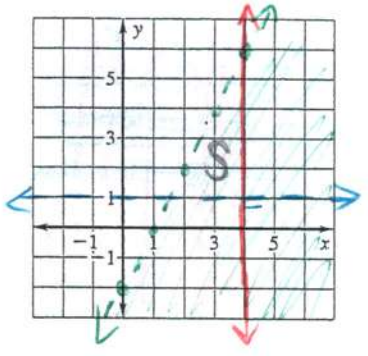
Solution

Graph all three inequalities in the same coordinate plane. The graph of the system is the intersection shown.

The region is above the line $y = 1$.

The region is on and to the left of the line $x = 4$.

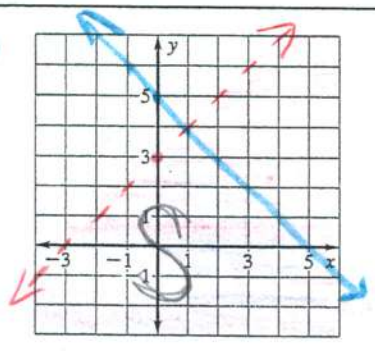
The region is below the line $3y = 6x - 6$.



Checkpoint **Graph the system of linear equations.**

1. $x + y \leq 5$ $y \leq -x + 5$

$y < x + 3$

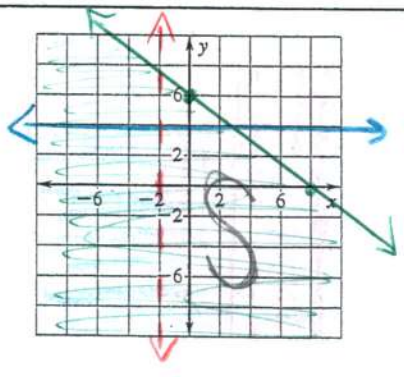


2. $x > -2$

$y \leq 4$

$3x + 4y \leq 24$

y-int: 6
x-int: 8
$y \leq \frac{-3}{4}x + 6$



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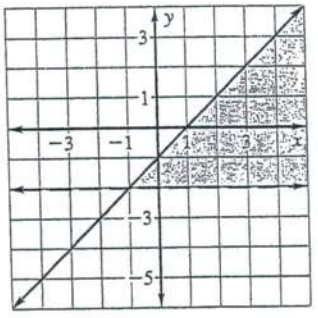
Your Notes

Example 2 *Write a system of linear inequalities*

Write a system of inequalities for the shaded region.

Solution



Inequality 1 One boundary line for the shaded region is $y = -2$. Because the shaded region is above the solid line, the inequality is $y \geq -2$.

Inequality 2 Another boundary line for the shaded region has a slope of 1 and a y-intercept of -1. So, its equation is $y = x - 1$. Because the shaded region is below the solid line, the inequality is $y \leq x - 1$.

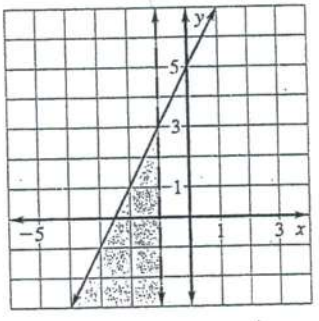
The system of inequalities for the shaded region is:

$y \geq -2$ **Inequality 1**

$y \leq x - 1$ **Inequality 2**

Checkpoint **Write a system of inequalities that defines the shaded region.**

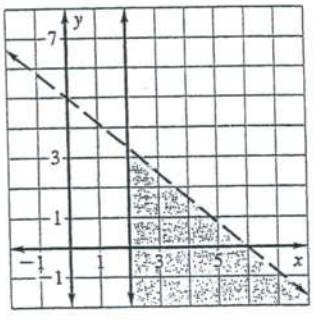
3.



$x < -1$

$y \leq 2x + 5$

4.



$x \geq 2$

$y \leq -\frac{5}{6}x + 5$

Homework

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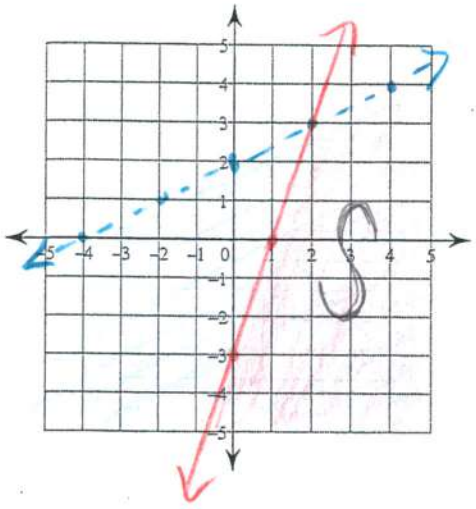
Sketch the solution to each system of inequalities.

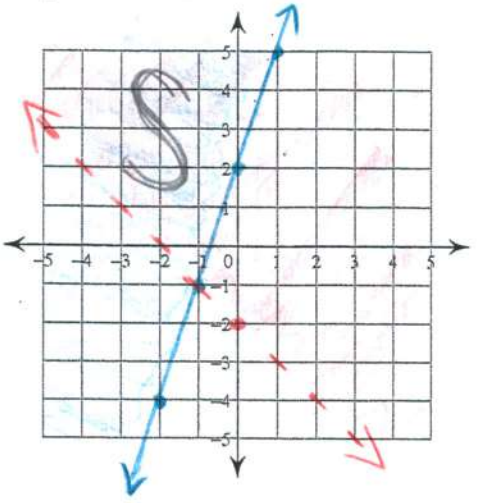
$y \leq 3x - 3$

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



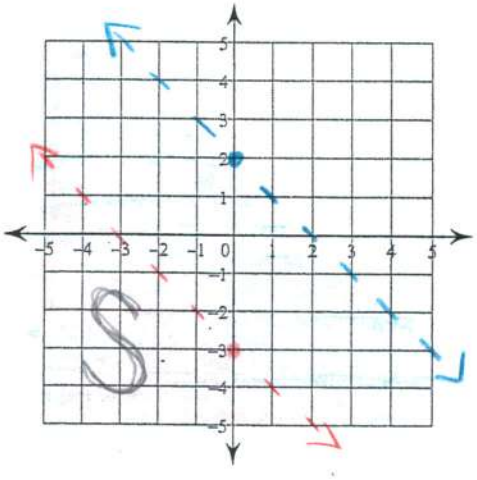
$y > -x - 2$

$y \geq 3x + 2$



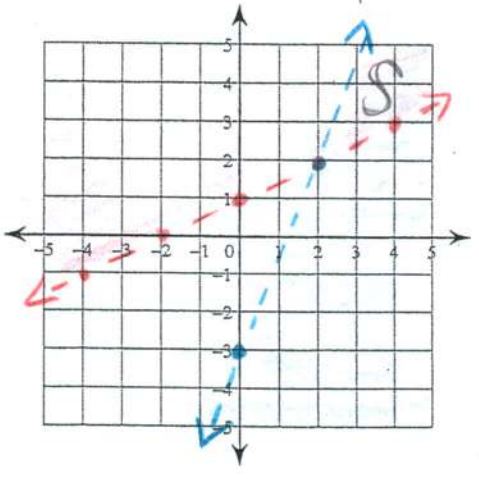
$y < -x - 3$

$y < -x + 2$



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

$y < \frac{5}{2}x - 3$



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Name _____ Date _____

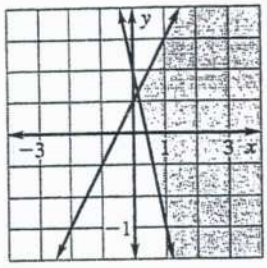
LESSON 7.6

Practice C

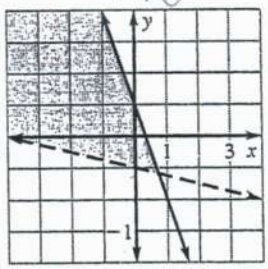
For use with pages 466–472

Tell whether the ordered pair is a solution of the system of inequalities.

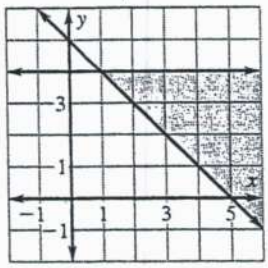
1. $(0, 1)$ NO



2. $(0, -1)$ NO



3. $(1, 4)$ Yes



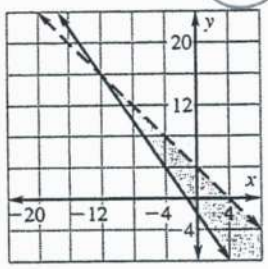
Match the system of inequalities with its graph.

4. $3x + 2y \geq 4$ $y \geq \frac{-3}{2}x + 2$
   $y > 4 - x$ $-3x$ (C)

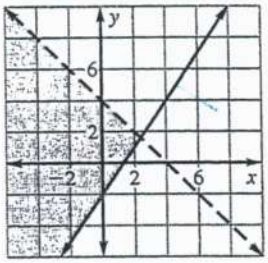
5. $3x + 2y \geq -4$ $y \geq \frac{-3}{2}x - 2$
   $x + y < 4$ $-x$ (B)

6. $3x - 2y \leq 4$ $y \geq \frac{-3}{2}x - 2$
   $x + y < 4$ $-x$ (A)

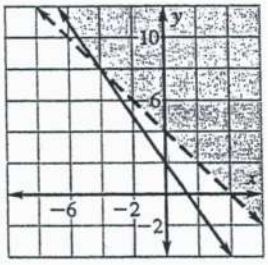
A.



B.

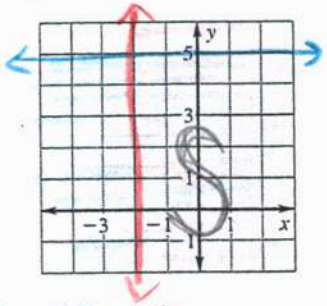


C.

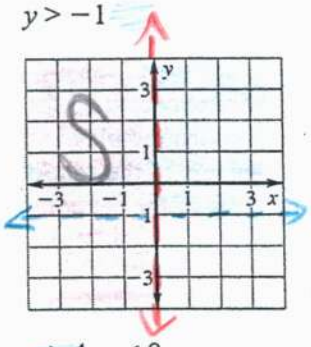


Graph the system of inequalities.

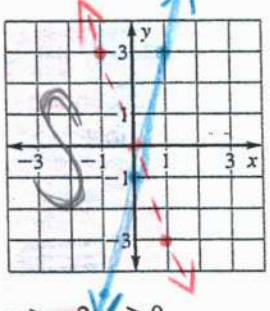
7. $x \geq -2$
   $y \leq 5$



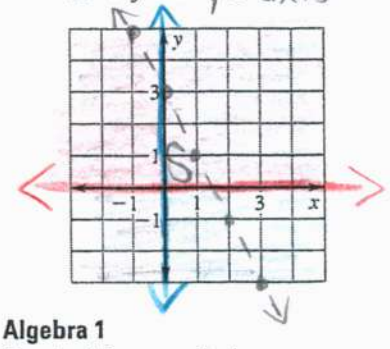
8. $x < 0$
   $y > -1$



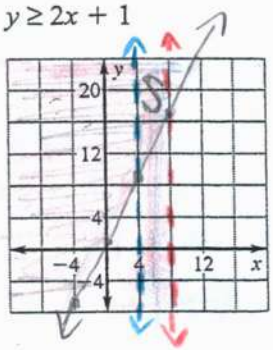
9. $3x + y < 0$ $y < -3x$
   $4x - y \leq 1$ $y \geq 4x - 1$



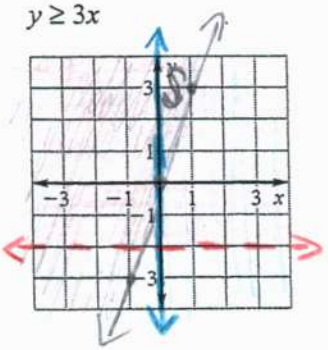
10. $x \geq 0, y \geq 0$
    $2x + y < 3$ $y < -2x + 3$



11. $x > 4, x < 8$
    $y \geq 2x + 1$



12. $y > -2, x \geq 0$
    $y \geq 3x$



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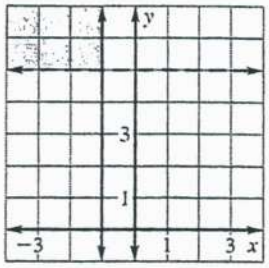
LESSON 7.6

Practice C *continued*

For use with pages 466–472

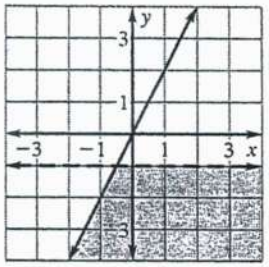
Write a system of inequalities for the shaded region.

13.



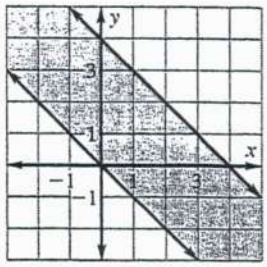
$x \leq -1$
$y > 5$

14.



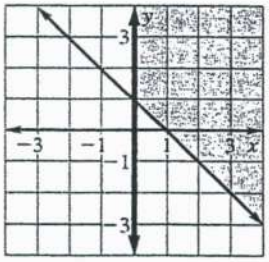
$y < -1$
$y < 2x$

15.



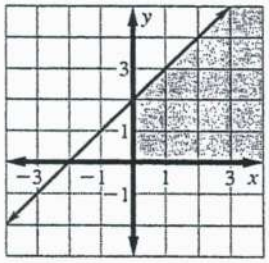
$y \geq -x$
$y \leq -x + 4$

16.



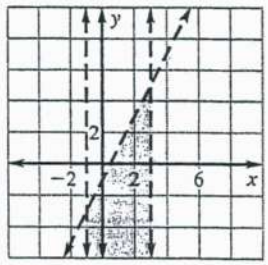
$x \geq 0$
$y \geq -x + 1$

17.



$y \geq 0$
$x \geq 0$
$y \leq x + 2$

18.



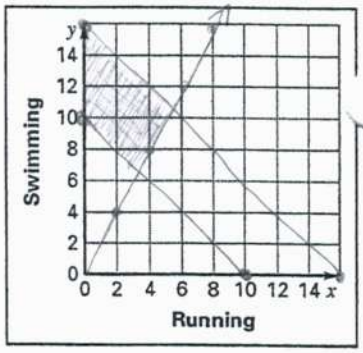
$x < 3$
$x > -1$
$y < 2x - 1$

19. Exercise You work out at least 10 hours a week, but no more than 15 hours a week. You divide your exercise time between swimming and running. This week, you want to spend at least twice the amount of time on swimming as on running. Write and graph a system of linear inequalities that gives the amounts of time you spend on each different kind of exercise. Then give two possible ways you can exercise.

x = amt of time running
y = amt of time swimming

$y \geq 2x$

$x + y \geq 10$
$x + y \leq 15$



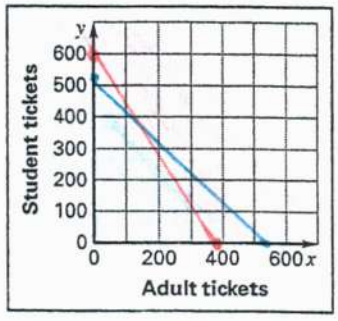
20. School Play The tickets for a school play cost \$8 for adults and \$5 for students. The auditorium in which the play is being held can hold at most 525 people. The organizers of the school play must make at least \$3000 to cover the costs of the set construction, costumes, and programs.

x = # of adult tickets
y = # of student tickets

a. Write a system of linear inequalities for the number of each type of ticket sold.

$8x + 5y \geq 3000$
$x + y \leq 525$

b. Graph the system of inequalities.



c. If the organizers sell out and sell twice as many student tickets as adult tickets, can they reach their goal? *Explain* how you got your answer.

c) $y = 2x$

$x + y = 525$
$x + 2x = 525$
$3x = 525$
$x = 175$
$y = 350$

$8(175) + 5(350) \geq 3000$
$1400 + 1750 \geq 3000$
$3150 \geq 3000$
YES

$8x + 5y \geq 3000$ x-int: 375, y-int: 600

$x + y \leq 525$ x-int: 525, y-int: 525

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Pg. 23

(1.) x = # of adult tickets
y = # of student tickets

50 adult tickets
350 student tickets

$x + y = 400 \rightarrow x + y = 400$
$4x + 2y = 900$ $\quad -y \quad -y$
$x = 400 - y$

$4x + 2y = 900$
$4(400 - y) + 2y = 900$
$1600 - 4y + 2y = 900$
$-2y = -700$
$y = 350$

$x + y = 400$
$x + 350 = 400$
$x = 50$

(2.) x = # of 7th grade tickets
y = # of 8th grade tickets

300 7th grade
250 8th grade

$x + y = 550 \rightarrow x + y = 550$
$5x + 3y = 2250$ $\quad -y \quad -y$
$x = 550 - y$

$5x + 3y = 2250$
$5(550 - y) + 3y = 2250$
$2750 - 5y + 3y = 2250$
$-2y = -500$
$y = 250$

$x + y = 550$
$x + 250 = 550$
$x = 300$

3-33

3. x = amount of 10% solution
y = amount of 20% solution

400ml of 10% solution
100 ml of 20% solution

$x + y = 500 \rightarrow x + y = 500$
$-y \quad -y$
$x = 500 - y$

$.10x + .20y = 500(.12)$
$.10x + .20y = 60$

$.10x + .20y = 60$
$.10(500 - y) + .20y = 60$
$50 - .10y + .20y = 60$
$.10y = 10$
$y = 100$

$x + y = 500$
$x + 100 = 500$
$x = 400$

4. x = amount of 25% copper
y = amount of 50% copper

200 grams of 25% copper
800 grams of 50% copper

$x + y = 1000 \rightarrow x + y = 1000$
$-y \quad -y$
$x = 1000 - y$

$.25x + .50y = 45(1000)$
$.25x + .50y = 450$

$.25x + .50y = 450$
$.25(1000 - y) + .50y = 450$
$250 - .25y + .50y = 450$
$250 + .25y = 450$
$.25y = 200$
$y = 800$

$x + y = 1000$
$x + 800 = 1000$
$x = 200$

(5) $y = 8 + .10x$
$y = 1 + x$

$8 + .10x = 1 + x$
$7 = .90x$
$7.78 = x$

x = # of rides
y = amt of money spent

If you're riding 7 rides or less, pay $1 to get in. If 8 or more, pay $8.

(6) x = # of times she goes to the gym
y = amount of money

$y = 200 + x$
$y = 30 + 5x$

$200 + x = 30 + 5x$
$170 = 4x$
$42.5 = x$

If you're going to the gym 42 times or less pay the $30. If 43 or more, pay $200.

pg. 28

(1) $3L = 4S$
$L + S = 21 \rightarrow L = 21 - S$

$3L = 4S$
$3(21 - S) = 4S$
$63 - 3S = 4S$
$63 = 7S$
$9 = S$

$L + S = 21$
$L + 9 = 21$
$L = 12$

9 & 12

(2) $L - S = 16 \rightarrow L = S + 16$
$5S = 2L - 8$

$5S = 2L - 8$
$5S = 2(S + 16) - 8$
$5S = 2S + 32 - 8$
$5S = 2S + 24$
$3S = 24$
$S = 8$

$L - S = 16$
$L - 8 = 16$
$L = 24$

8 & 24

(3.) $L = 2S + 1$
$L + S = 3L - 20 \rightarrow S + 20 = 2L$

$S + 20 = 2(2S + 1)$
$S + 20 = 4S + 2$
$18 = 3S$
$6 = S$

$L = 2S + 1$
$L = 2(6) + 1$
$L = 12 + 1$
$L = 13$

6 & 13

(4.) $3(2r + 3t = 31)$
$-2(3r + 2t = 29) \Rightarrow$

$6r + 9t = 93$
$-6r - 4t = -58$
$5t = 35$
$t = 7$

$2r + 3t = 31$
$2r + 3(7) = 31$
$2r + 21 = 31$
$2r = 10$
$r = 5$

tapes $7
records $5

(5.) $S + L = 4S \rightarrow L = 3S$
$2L - S = 30$

$2L - S = 30$
$2(3S) - S = 30$
$6S - S = 30$
$5S = 30$
$S = 6$

$L = 3S$
$L = 3(6)$
$L = 18$

6 & 18

Name _____ Date _____

Algebra I - Word Problems - Chapter 7

1.) In college, Ms. Nowalinski and her teammates were able to sell 400 tickets for their "Dancers for Cancer" benefit. Adult tickets cost $4 each and student tickets cost $2 each. How many of each type of ticket did she sell if her team raised $900 in ticket money?

50 adult
350 student

2.) Montgomery Middle School is holding a dance for the 7th and 8th graders this Friday and 550 students bought tickets to attend. In order to get more 8th graders to attend the dance, their tickets only cost $3, while 7th grader paid $5 per ticket. If ticket sales brought in $2250, how many 8th graders went to the dance?

300 7th grade
250 8th grade

3.) You are doing a lab for Mr. Chesbro and one of the materials you will need is 500 milliliters of a 12% saline solution. This is unfortunate because you only have 10% and 20% saline solutions. How much 10% solution could be mixed with the 20% solution in order to obtain the 500 milliliters of 12% solution you need?

400 ml of 10%
100 ml of 20%

4.) Ms. Parker's classes are working with copper. In her materials cabinet, she has a metal alloy that is 25% copper and another metal alloy that is 50% copper. Ms. Parker asks you to make 1000 grams of a metal alloy that is 45% copper. How much of each of the 25% and 50% alloys will you use?

200 grams of 25%
800 grams of 50%

5.) The 8th grade is going on a class trip to the amusement park and each student has two different options for purchasing tickets to ride the rides. One option is to pay $8 to get in and then 10 cents per ride. The other option is to pay $1 to get in and then $1 per ride. Decide when each option is appropriate so you can help everyone figure out which package to buy.

7 rides or more, pay $1. 8 rides or more, pay $8.

6.) Ms. Nowalinski is joining a gym and has two options for a 6 month membership. One option is to pay $200 up front and then $1 every time she used the gym. The second option is to pay $30 up front and then pay $5 each time. Which is the better option?

42 times or less, pay $30. If 43 or more, pay $200.

Chapter 7 Word Problems
(Numbers and Tickets)

Date: _____
Item # _____

Example 1: Find two numbers whose sum is 64 and whose difference is 42.

$x+y=64$

$x-y=42 \rightarrow x-y=42$

$+y \quad +y$

$x=42+y$

$x+y=64$

$(42+y)+y=64$

$2y=22$

$y=11$

$x=42+y$

$x=42+11$

$x=53$

53 & 11

Example 2: Twice one number added to another number is 18. Four times the first number minus the other number is 12. Find both numbers.

$2x+y=18 \rightarrow 2x+y=18$

$-2x \quad -2x$

$y=-2x+18$

$4x-y=12$

$4x-(-2x+18)=12$

$4x+2x-18=12$

$6x=30$

$x=5$

$y=-2x+18$

$y=-2(5)+18$

$y=-10+18$

$y=8$

5 & 8

Example 3: Three times one number equals twice a second number. Twice the first number is three more than the second number. Find both numbers.

$3x=2y$

$2x=y+3 \rightarrow 2x-3=y$

$3x=2(2x-3)$

$3x=4x-6$

$-x=-6$

$x=6$

$3x=2y$

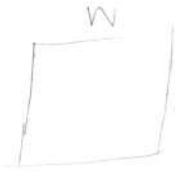
$3(6)=2y$

$18=2y$

$9=y$

6 & 9

Example 4: The length of Sally's garden is 4 meters greater than 3 times the width. The perimeter of her garden is 72 meters. What are the dimensions of Sally's garden?



$2w+2(3w+4)=72$
$2w+6w+8=72$
$8w=64$
$w=8$

$3w+4$
$3(8)+4$
$24+4$
28

Width: 8 meters
length: 28 meters

Example 5: In college, Ms. Cardozo and her teammates were able to sell 300 tickets for their "Serve to Save A Kidney" Volleyball Tournament. Tickets sold in advance were $3.00 and tickets at the door were $4.00. How many of each type of ticket did they sell if the team raised $1,040.00 in ticket money?

x = # of advance tickets
y = # of door tickets

$-3(x+y=300) \Rightarrow -3x-3y=-900$
$3x+4y=1040$
$y=140$

advance: 160
door: 140

$x+y=300$
$x+140=300$
$x=160$

Example 6: In college, Ms. Nowalinski and her teammates were able to sell 400 tickets for their "Dancers for Cancer" benefit. Adult tickets cost $4.00 each and student tickets cost $2.00 each. How many of each type of ticket did she sell if her team raised $900 in ticket money?

x = # of adult tickets
y = # of student tickets

$-2(x+y=400) \Rightarrow -2x-2y=-800$
$4x+2y=900$
$2x=100$
$x=50$

$x+y=400$
$50+y=400$
$y=350$

50 adult
350 student

Chapter 7 Word Problems
(Mixtures and Solutions)

Date: _____
Item # _____

Example 1: How many pounds of cashew nuts that sell for $2.00 per pound should be mixed with peanuts, which sell for $0.80 per pound, to make a 10-pound mixture which sells for $1.28 per pound?

x = lbs of cashews
y = lbs of peanuts

$-8(x + y = 10)$ → $-8x - 8y = -80$

$2x + .80y = 1.28$

$10(2x + .80y = 12.8)$ → $20x + 8y = 128$

$12x = 48$

$x = 4$

$x + y = 10$

$4 + y = 10$

$y = 6$

4 lbs of cashews
6 lbs of peanuts

Example 2: Susan wants to mix 10 pounds of Virginia peanuts that cost $3.50 a pound with Spanish peanuts that cost $3.00 a pound to obtain a mixture that costs $3.40 a pound. How many pounds of each type of peanut should she use?

x = lbs of Virginia
y = lbs of Spanish

$-10(x + y = 10)$

$3.5x + 3y = 3.4(10)$ → $10(3.5x + 3y = 34)$

$-10x - 10y = -100$

$35x + 30y = 340$

$25x = 240$

$x = 8$

$x + y = 10$

$8 + y = 10$

$y = 2$

8 lb of Virginia
2 lbs of Spanish

Example 3: Tanya has $235.00 in five-dollar bills and ten-dollar bills. If she has 33 bills in all, how many of each type of bill does she have?

x = # of $5
y = # of $10

$-5(x + y = 33)$ → $-5x - 5y = -165$

$5x + 10y = 235$

$5y = 70$

$y = 14$

$x + y = 33$

$x + 14 = 33$

$x = 19$

19 $5 bills
14 $10 bills

Example 4: A lab technician has a 15% alcohol solution and a 35% alcohol solution. She wants to make 100 gallons of a 29% alcohol solution. How much of each type of alcohol solution should she use?

X = amt of 15%
Y = amt of 35%

$-15(X+Y=100)$
$.15X+.35Y=.29(100)$
$100(.15X+.35Y=29)$

$-15X-15Y=-1500$
$15X+35Y=2900$
$20Y=1400$
$Y=70$

$X+Y=100$
$X+70=100$
$X=30$

30 gallons of 15%
70 gallons of 35%

Example 5: EJH Labs needs to make 1,000 gallons of a 34% acid solution. The only solutions available are 25% acid and 50% acid. How many gallons of each solution should be mixed to make the 34% solution?

X = amt of 25%
Y = amt of 50%

$-25(X+Y=1000)$
$.25X+.50Y=.34(1000)$
$100(.25X+.50Y=340)$

$-25X-25Y=-25000$
$25X+50Y=35000$
$25Y=9,000$
$Y=360$

640 gal of 25%
360 gal of 50%

$X+Y=1000$
$X+360=1000$
$X=640$

(6)

What Kind of Monkey Can Fly?

Solve each problem below using a system of two equations in two variables. Find the solution in the answer column and notice the letter next to it. Write this letter in each box that contains the number of that exercise.

(1) Three times the larger of two numbers is equal to four times the smaller. The sum of the numbers is 21. Find the numbers. 9:12 I

(2) The difference between two numbers is 16. Five times the smaller is the same as 8 less than twice the larger. Find the numbers. 8:24 A

(3) The larger of two numbers is 1 more than twice the smaller. The sum of the numbers is 20 less than three times the larger. Find the numbers. 6:13 N

(4) Two records and three tapes cost $31. Three records and two tapes cost $29. Find the cost of each record and each tape. tapes = $7 records = $5 L

(5) The sum of two numbers is the same as four times the smaller number. If twice the larger is decreased by the smaller, the result is 30. Find the numbers. 6:18 R

(6) A group of students go out for lunch. If two have hamburgers and five have hot dogs, the bill will be $8.00. If five have hamburgers and two have hot dogs, the bill will be $9.50. What is the price of a hamburger? hamburger: $1.50 hotdog: $1 T

(7) The price of a sweater is $5 less than twice the price of a shirt. If four sweaters and three shirts cost $200, find the price of each shirt and each sweater. Sweater: $35 Shirt: $20 B

(8) A shipment of TV sets, some weighing 30 kg each and the others weighing 50 kg each, has a total weight of 880 kg. If there are 20 TV sets all together, how many weigh 50 kg? 6 30kg TVs, 14 50kg TVs O

(S) 22, 6
(K) 16, 9
(R) 18, 6
(M) 11, 10
(B) $20, $35
(I) 12, 9
(P) $1.35
(N) 13, 6
(O) 14
(T) $1.50
(L) $8, $5
(A) 24, 8
(D) $23, $41
(H) $5, $7
(E) 17

2	4	8	6	2	1	5	7	2	7	8	8	3
A	H	O	T	A	I	R	B	A	B	O	O	N

(28)

pg. 28

(1) $3L=4S$
$L+S=21 \rightarrow L=21-S$

$3L=4S$
$3(21-S)=4S$
$63-3S=4S$
$63=7S$
$9=S$

$L+S=21$
$L+9=21$
$L=12$

9 & 12

(2) $L-S=16 \rightarrow L=S+16$
$5S=2L-8$

$5S=2L-8$
$5S=2(S+16)-8$
$5S=2S+32-8$
$5S=2S+24$
$3S=24$
$S=8$

$L-S=16$
$L-8=16$
$L=24$

8 & 24

(3) $L=2S+1$
$L+S=3L-20 \rightarrow S+20=2L$

$S+20=2(2S+1)$
$S+20=4S+2$
$18=3S$
$6=S$

$L=2S+1$
$L=2(6)+1$
$L=12+1$
$L=13$

6 & 13

893
58
35

(4) $3(2r+3t=31)$
$-2(3r+2t=29) \Rightarrow$

$6r+9t=93$
$-6r-4t=-58$
$5t=35$
$t=7$

$2r+3t=31$
$2r+3(7)=31$
$2r+21=31$
$2r=10$
$r=5$

tapes $7
records $5

(5) $S+L=4S \rightarrow L=3S$
$2L-S=30$

$2L-S=30$
$2(3S)-S=30$
$6S-S=30$
$5S=30$
$S=6$

$L=3S$
$L=3(6)$
$L=18$

6 & 18

⑥ x = $ of hamburger
y = $ of hot dog

hamburgers: $1.50
hotdogs: $1

$-5(2x+5y=8) \Rightarrow -10x-25y=-40$
$2(5x+2y=9.50) \Rightarrow 10x+4y=19$

$-21y=-21$
$y=1$

$2x+5y=8$
$2x+5(1)=8$
$2x+5=8$
$2x=3$
$x=1.5$

⑦ x = $ of sweater
y = $ of shirt

sweater: $35
shirt: $20

$x=2y-5$
$4x+3y=200$

$4x+3y=200$
$4(2y-5)+3y=200$
$8y-20+3y=200$
$11y=220$
$y=20$

$x=2y-5$
$x=2(20)-5$
$x=40-5$
$x=35$

⑧ x = # of 30 kg
y = # of 50 kg

6 30 kg TVs
14 50 kg TVs

$30x+50y=880$
$-30(x+y=20) \Rightarrow -30x-30y=-600$

$20y=280$
$y=14$

$x+y=20$
$x+14=20$
$x=6$

pg. 29

(60) x = # of \$3 beans
y = # of \$5 beans

25 lb of \$3
75 lb of \$5

$-3(x+y=100)$
$3x+5y=4.50(100)$ $\Rightarrow$

$-3x-3y=-300$
$3x+5y=450$
$2y=150$
$y=75$

$x+y=100$
$x+75=100$
$x=25$

(61) x = amt of peanuts
y = amt of cashews

1 5 lb of peanuts
5 lb of cashews

$2x+5y=2.75(20)$
$-2(x+y=20)$ $\Rightarrow$

$2x+5y=55$
$-2x-2y=-40$
$3y=15$
$y=5$

$x+y=20$
$x+5=20$
$x=15$

(62) x = amt of 25%
y = amt of 50%

120 mL of 25%
80 mL of 50%

$-.25(x+y=200)$
$.25x+.50y=.35(200)$ $\Rightarrow$

$-.25x-.25y=-50$
$.25x+.50y=70$
$.25y=20$
$y=80$

$x+y=200$
$x+80=200$
$x=120$

(63.) X = amt of 30% solution
Y = amt of 15% solution

50 ml of 30%
100 ml of 15%

$-15(X + Y = 150)$
$.30X + .15Y = 150(.20)$ ⇒
$100(.30X + .15Y = 30)$

$-15X - 15Y = -2250$
$30X + 15Y = 3000$
$15X = 750$
$X = 50$

$X + Y = 150$
$50 + Y = 150$
$Y = 100$

(64.) X = amt of 15%
Y = amt of 45%

200 mL of 15%
100 mL of 45%

$-15(X + Y = 300)$
$.15X + .45Y = 300(.25)$ ⇒
$100(.15X + .45Y = 75)$

$-15X - 15Y = -4500$
$15X + 45Y = 7500$
$30Y = 3000$
$Y = 100$

$X + Y = 300$
$X + 100 = 300$
$X = 200$

(65.) X = amt of $ @ 8%
Y = amt of $ @ 9%

$7,000 at 8%
$5,000 at 9%

$-8(X + Y = 12000)$
$100(.08X + .09Y = 1010)$ ⇒

$-8X - 8Y = -96000$
$8X + 9Y = 101000$
$Y = 5000$

$X + Y = 12000$
$X + 5000 = 12000$
$X = 7000$

pg 29

(66) X = amt in bonds at 12%
Y = amt in savings at 8%

5000 at 12%
3000 at 8%

$-8(X + Y = 8000)$
$100(.12X + .08Y = 840)$

$\Rightarrow$

$-8X - 8Y = -64000$
$12X + 8Y = 84000$

$4X = 20000$
$X = 5000$

$X + Y = 8000$
$5000 + Y = 8000$
$Y = 3000$

(67) with wind:
$d = rt$
$450 = r(3)$
$150 = r$

against wind:
$d = rt$
$450 = r(5)$
$90 = r$

X = rate of plane
Y = rate of wind

$X + Y = 150$
$X - Y = 90$
$2X = 240$
$X = 120$

$X + Y = 150$
$120 + Y = 150$
$Y = 30$

plane: 120 mi/hr
wind: 30 mi/hr

(68) with jetstream:
$d = rt$
$1800 = r(3)$
$600 = r$

against jetstream:
$d = rt$
$1800 = r(4)$
$450 = r$

X = rate of plane
Y = rate of jetstream

$X + Y = 600$
$X - Y = 450$
$2X = 1050$
$X = 525$

$X + Y = 600$
$525 + Y = 600$
$Y = 75$

plane: 525 mi/hr
jetstream: 75 mi/hr

ANSWERS

60. 25 lb at $3, 75 lb at $5

61. 15 lb peanuts, 5 lb cashews

62. 120 mL of 25%, 80 mL of 50%

63. 50 mL of 30%, 100 mL of 15%

64. 200 mL of 15%, 100 mL of 45%

65. $7000 at 8 percent, $5000 at 9 percent

66. $3000 at 8 percent, $5000 at 12 percent

67. 120 mi/h, 30 mi/h

68. 525 mi/h, 75 mi/h

60. **Coffee mixture.** A coffee merchant has coffee beans that sell for $3 per pound (lb) and $5 per pound. The two types are to be mixed to create 100 pounds of a mixture that will sell for $4.50 per pound. How much of each type of bean should be used in the mixture?

61. **Nut mixture.** Peanuts are selling for $2 per pound, and cashews are selling for $5 per pound. How much of each type of nut would be needed to create 20 lb of a mixture that would sell for $2.75 per pound?

62. **Acid solution.** A chemist has a 25% and a 50% acid solution. How much of each solution should be used to form 200 milliliters (mL) of a 35% acid solution?

63. **Alcohol solution.** A pharmacist wishes to prepare 150 mL of a 20% alcohol solution. She has a 30% solution and a 15% solution in her stock. How much of each should be used in forming the desired mixture?

64. **Alcohol solution.** You have two alcohol solutions, one a 15% solution and one a 45% solution. How much of each solution should be used to obtain 300 mL of a 25% solution?

65. **Investment.** Otis has a total of $12,000 invested in two accounts. One account pays 8 percent and the other 9 percent. If his interest for 1 year is $1010, how much does he have invested at each rate?

66. **Investment.** Amy invests a part of $8000 in bonds paying 12 percent interest. The remainder is in a savings account at 8 percent. If she receives $840 in interest for 1 year, how much does she have invested at each rate?

67. **Motion problem.** A plane flys 450 miles (mi) with the wind in 3 hours (h). Flying back against the wind, the plane takes 5 h to make the trip. What was the rate of the plane in still air? What was the rate of the wind?

68. **Motion problem.** An airliner made a trip of 1800 mi in 3 h, flying east across the country with the jetstream directly behind it. The return trip, against the jetstream, took 4 h. Find the speed of the plane in still air and the speed of the jetstream.

Chapter 7: Systems of Equations
Word Problems: Extra Practice

1. Ms. Cardozo sold 600 tickets for the high school play. If adult tickets cost $6 each and student tickets cost $4 each, how many of <u>each</u> type of ticket did she sell if $2,900 was collected in ticket money?

Define your variables: X = # of adult tickets y = # of student tickets

Set up your equation:

$x + y = 600$

$6x + 4y = 2900$

$-6(x+y=600) \Rightarrow -6x - 6y = -3600$

$6x + 4y = 2900$

$-2y = -700$

$y = 350$

$x + y = 600$

$x + 350 = 600$

$x = 250$

Solution: 250 adult tickets, 350 student tickets

2. The sum of two numbers is sixteen. Three times the larger number equals the sum of four times the smaller number and six. Find <u>both</u> numbers.

Define your variables: S = Smaller # L = larger #

Set up your equation:

$S + L = 16$

$3L = 4S + 6$

$S + L = 16 \Rightarrow L = 16 - S$

$3L = 4S + 6$

$3(16 - S) = 4S + 6$

$48 - 3S = 4S + 6$

$42 = 7S$

$6 = S$

$S + L = 16$

$6 + L = 16$

$L = 10$

Solution: 6 and 10

3. The length of a pool is three meters more than twice its width. If the perimeter of the pool is 36 meters, find the dimensions of the pool.

Define your variables: l = length w = width

Set up your equation:

$2w + 2l = 36$

$l = 2w + 3$

$2w + 2l = 36$

$2w + 2(2w + 3) = 36$

$2w + 4w + 6 = 36$

$6w = 30$

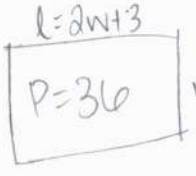
$w = 5$

$l = 2w + 3$

$l = 2(5) + 3$

$l = 10 + 3$

$l = 13$



Solution: width: 5 meters length: 13 meters

4. Mr. Chesbro has one solution that is 25% acid and a second that is 50% acid. How many liters of each solution should be mixed together to get 10 liters of a solution that is 40% acid?

Define your variables: X = amt of 25% Y = amt of 50%

Set up your equation: $X + Y = 10$

$.25X + .50Y = 10(.40)$

$= 4$

$(X + Y = 10)(-25) \Rightarrow -25X - 25Y = -250$

$(.25X + .50Y = 4)(100) \Rightarrow 25X + 50Y = 400$

$25Y = 150$

$Y = 6$

$X + Y = 10$

$X + 6 = 10$

$X = 4$

Solution: 4 L of 25% & 6 L of 50%

5. Mrs. Wescoe wants to buy a mixture of candy from a candy store. Jelly Belly jelly beans are worth $2.45 per pound and Starburst candies are worth $2.30 per pound. How much of each kind of candy should be mixed to create a 30-pound mixture worth $2.35 per pound?

Define your variables: X = lbs of jelly beans Y = lbs of Starbursts

Set up your equation: $X + Y = 30$

$2.45X + 2.30Y = 2.35(30)$

$= 70.5$

$-230(X + Y = 30)$

$100(2.45X + 2.30Y = 70.5)$

$-230X - 230Y = -6900$

$245X + 230Y = 7050$

$15X = 150$

$X = 10$

$X + Y = 30$

$10 + Y = 30$

$Y = 20$

Solution: 10 lbs of jelly beans 20 lbs of Starbursts

6. At a Lady Gaga concert, long-sleeve and short-sleeve t-shirts can be purchased. A long-sleeve t-shirt costs $25 and a short-sleeve t-shirt costs $15. During a concert, the t-shirt vendors collected $8,415 from the sale of 441 t-shirts. How many <u>short-sleeve</u> t-shirts were sold at that concert?

Define your variables: X = # of long sleeve Y = # of short sleeve

Set up your equation: $X + Y = 441$

$25X + 15Y = 8415$

$X + Y = 441$

$-15X - 15Y = -6615$

$25X + 15Y = 8415$

$10X = 1800$

$X = 180$

$180 + Y = 441$

$Y = 261$

Solution: 261 short-sleeve shirts

7. Montgomery UMS is selling tickets to a choral performance. On the first day of ticket sales, the school sold 3 senior citizen tickets and 1 child ticket for a total of $38. The school took in $52 on the second day by selling 3 senior citizen tickets and 2 child tickets. Find the price of a senior citizen ticket and the price of a child ticket.

Define your variables: x = $ of senior tix y = $ of child tix

Set up your equation:

$3x + y = 38$

$3x + 2y = 52$

$-1(3x + y = 38) \Rightarrow -3x - y = -38$

$3x + 2y = 52$

$y = 14$

$-3x + 2y = 52$

$-3x = -24$

$x = 8$

Solution: senior – $8 child – $14

8. Mr. Reed invested $500 into two different savings account. He put some money into Bank of America, earning a 7% interest rate, and he put the rest into Wachovia, earning a 10% interest rate. How much money did he put into each bank, if he made a total of $45.50 in interest?

Define your variables: x = amt in BOA y = amt in Wach.

Set up your equation:

$x + y = 500$

$.07x + .10y = 45.50$

$-7(x + y = 500) \Rightarrow -7x - 7y = -3500$

$10(.07x + .10y = 45.50) \Rightarrow 7x + 10y = 4550$

$3y = 1050$

$y = 350$

$x + y = 500$

$x + 350 = 500$

$x = 150$

Solution: $150 in Bank of America $350 in Wachovia

9. Amy invests a part of $8000 in bonds paying 12% interest. The remainder is in a savings account paying 8% interest. If she receives a total of $840 in interest for one year, how much does she have in each account?

Define your variables: x = amt in bonds 12% y = amt in savings 8%

Set up your equation:

$x + y = 8000$

$.12x + .08y = 840$

$-8(x + y = 8000) \Rightarrow -8x - 8y = -64000$

$100(.12x + .08y = 840) \Rightarrow 12x + 8y = 84000$

$4x = 20000$

$x = 5000$

$x + y = 8000$

$5000 + y = 8000$

$y = 3000$

Solution: $5000 in bonds $3000 in savings

Chapter 7: Putting It ALL Together

"what does this all really mean?

SYSTEMS OF EQUATIONS

- Two equations that we solve at once.
- There are 3 ways to solve:
  1. Graphing (7.1)
  2. Substitution (7.2)
  3. Elimination (7.3 and 7.4)
- There are 3 possible solutions: (7.5)
  1. one solution (an ordered pair)
     * Intersecting Lines!
     * This is the only ordered pair that makes both equations true.
  2. No Solution (a false algebraic statement)
     * Parallel Lines! (same m, different b)
     * No ordered pair will make both equations true.
  3. Infinite Solutions (a true algebraic statement
     * Coinciding Lines! (same m, same b)
     * Infinite points will satisfy both equations
     * The equations are equivalent, just written in different forms.

SYSTEMS of INEQUALITIES (7.6)

- Two or more inequalities that we solve at once.
- There is ONE way to solve - Graphing!
- This is a meticulous process - graph each inequality independently. Shade one at a time! (shade it! watch on youtube)
- There are 2 Possible Outcomes:
  1. Solution - the overlap of shading (the intersection of half planes)
  2. No Solution - there is no overlap.
- what do the ordered pairs mean?
  A point in the overlap satisfies ALL inequalities.

Name _____ Date _____

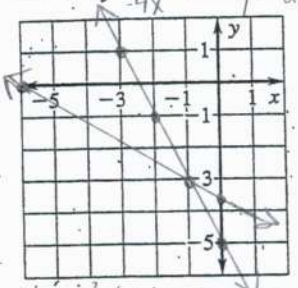
CHAPTER 7

Chapter Test C

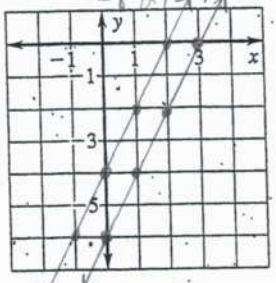
For use after Chapter 7

Solve the linear system by graphing.

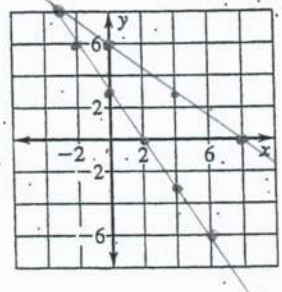
1. $3x + 5y = -18$
   $4x + 2y = -10$



2. $2x - y = 6$
   $4x - 2y = 8$



3. $3x + 4y = 24$
   $\frac{3}{2}x + y = 3$



Solve the linear system using substitution.

4. $3x - 2y = 6$
   $4y = -8$

5. $4x + 3y = 11$
   $3x - y = 5$

6. $4x + 5y = 18$
   $3x - 9y = -12$

7. $x + 6y = -17$
   $0.4x + 0.5y = -1.1$

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

9. $4x + \frac{1}{3}y = \frac{8}{3}$
   $\frac{1}{2}x + \frac{3}{4}y = -\frac{5}{2}$

10. A restaurant owner wants to add imitation maple syrup that costs \$4.00 per liter to 50 liters of pure maple syrup that costs \$9.50 per liter. How many liters of imitation maple syrup should be added to make a mixture that costs \$5.00 per liter?

Solve the linear system using elimination.

11. $3x - 6y = 6$
    $9x - 3y = 8$

12. $4x + 3y = 4$
    $8x + 6y = 8$

13. $3x - 4y = 8$
    $5x + 3y = -6$

14. $5y + 2x = 5x + 1$
    $3x - 2y = 3 + 3y$

15. $5x - 2y = 8x - 1$
    $2x + 7y = 4y + 9$

16. $\frac{2}{5}x - \frac{1}{3}y = 1$
    $\frac{3}{5}x + \frac{2}{3}y = 5$

17. Flying with the wind, a pilot travels 600 miles between two cities in four hours. The return trip into the wind takes five hours. The speed of the wind remains constant during the trip. Find the average speed of the plane with no wind and the speed of the wind.

Answers

1. One solution (-1, -3)
2. See left.
3. No solution
4. See left.
5. One solution (-3, 8)
6. See left.
7. $(\frac{8}{3}, -2)$
8. (2, 1)
9. (2, 2)
10. (1, -3)
11. No solution $\emptyset$
12. (1, -4)
13. 40.91 L imitation
14. 9.01 L pure
15. $(\frac{8}{3}, \frac{2}{3})$
16. IMS
17. (0, -2)
    $\emptyset$
    (-3, 5)
    (5, 3)
    plane: 135 mi/hr
    wind: 15 mi/hr

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Name _____ Date _____

CHAPTER 7 **Chapter Test C** *continued*
For use after Chapter 7

Without solving the linear system, tell whether the linear system has *one solution*, *no solution*, or *infinitely many solutions*.

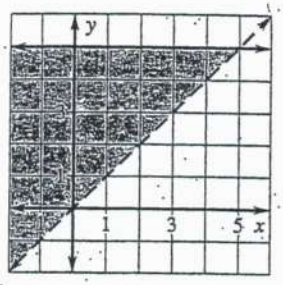
18. $12x - 16y = 8$
$3x - 4y = 2$

19. $0.4x + 0.5y = 0.2$
$0.3x - 0.1y = 1.1$

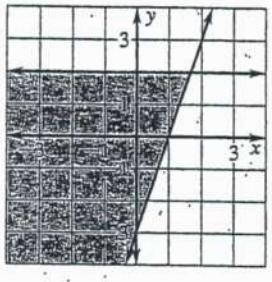
20. $0.2x - 0.6y = 0.6$
$0.4x - 1.2y = 2.4$

Write a system of linear inequalities for the shaded region.

21.



22.

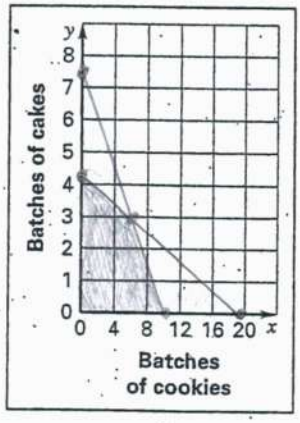


In Exercises 23–25, use the following information.

A bakery sells cookies and cakes. The table shows the time that it takes to bake and decorate each batch of cookies and each batch of cakes, and the time the bakery can devote to baking and decorating cookies and cakes.

	Cookies	Cakes	Available Time
Time to bake (hours)	1.5	2	15
Time to decorate (hours)	$\frac{2}{3}$	3	13

23. Write and graph a system of linear inequalities for the number x of batches of cookies and the number y of batches of cakes that the bakery can make under the given constraints.



24. Find the vertices (corner points) of the graph.

25. The bakery makes a profit of \$20 for each batch of cookies and \$30 for each batch of cakes. The profit P is given by the equation $P = 20x + 30y$. Find the profit for each ordered pair in Exercise 24. Which vertex results in the maximum profit?

Answers

18. I.MS

19. One Solution

20. $\emptyset$

21. $y > x$
$y \leq 5$

22. $y \leq 2$
$y \geq 3x - 3$

23. $\frac{3}{2}x + 2y \leq 15$
$\frac{2}{3}x + 3y \leq 13$

See left.

24. (0,0) (10,0) (10,4½) (6,3)

25. Max Profit: (6,3)

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pg. 36 - 37

(4) $3x-2y=6$

$4y=-8 \rightarrow \frac{4y}{4}=\frac{-8}{4}$

$y=-2$

$3x-2y=6$

$3x-2(-2)=6$

$3x+4=6$

$3x=2$

$x=\frac{2}{3}$

$3x-2y=6$

$3(\frac{2}{3})-2y=6$

$2-2y=6$

$-2 \quad -2$

$-2y=4$

$y=-2$

$(\frac{2}{3}, -2)$

(5) $4x+3y=11$

$3x-y=5 \rightarrow 3x-5=y$

$4x+3y=11$

$4x+3(3x-5)=11$

$4x+9x-15=11$

$13x-15=11$

$13x=26$

$x=2$

$3x-y=5$

$3(2)-y=5$

$6-y=5$

$1=y$

$(2,1)$

(6) $4x+5y=18$

$\frac{1}{3}(3x-9y=-12) \Rightarrow$

$4x+5y=18$

$x-3y=-4 \rightarrow x=3y-4$

$4x+5y=18$

$4(3y-4)+5y=18$

$12y-16+5y=18$

$17y=34$

$y=2$

$x=3y-4$

$x=3(2)-4$

$x=6-4$

$x=2$

$(2,2)$

(7) $x+6y=-17 \rightarrow x=-6y-17$

$10(0.4x+0.5y=-1.1)$

$4x+5y=-11$

$4x+5y=-11$

$4(-6y-17)+5y=-11$

$-24y-68+5y=-11$

$-19y=57$

$y=-3$

$x=-6y-17$

$x=-6(-3)-17$

$x=18-17$

$x=1$

$(1,-3)$

(8) $x-\frac{1}{2}y=1 \rightarrow x=\frac{1}{2}y+1$

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

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

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

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

$\frac{2}{3}=1$

No Solution

p.36

(9) $4x+\frac{1}{3}y=\frac{8}{3}$

$2\left(\frac{1}{2}x+\frac{3}{4}y=-\frac{5}{2}\right)$

$x+\frac{3}{2}y=-5 \rightarrow x=-\frac{3}{2}y-5$

$4x+\frac{1}{3}y=\frac{8}{3}$

$4\left(-\frac{3}{2}y-5\right)+\frac{1}{3}y=\frac{8}{3}$

$3(-6y-20+\frac{1}{3}y=\frac{8}{3})$

$-18y-60+y=8$

$-17y=68$

$y=-4$

$x=-\frac{3}{2}y-5$

$x=-\frac{3}{2}(-4)-5$

$x=6-5$

$x=1$ $(1,-4)$

(10) x = amt of imitation

y = amt of pure

40.91 L of imitation
9.01 L of pure

$x+y=50 \rightarrow x=50-y$

$4x+9.5y=50(5)$

$4x+9.5y=250$

$4x+9.5y=250$

$4(50-y)+9.5y=250$

$200-4y+9.5y=250$

$200+5.5y=250$

$5.5y=50$

$y=9.09$

$x+y=50$

$x+9.09=50$

$x=40.91$

$\frac{10}{15}$ 5 $\frac{2}{3}$

(11) $3x-6y=6$

$-2(9x-3y=8)$

$\Rightarrow$ $3x-6y=6$

$-18x+6y=-16$

$-15x=-10$

$x=\frac{2}{3}$

$3x-6y=6$

$3(\frac{2}{3})-6y=6$

$2-6y=6$

$-6y=4$

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

$\left(\frac{2}{3},-\frac{2}{3}\right)$

(12) $-2(4x+3y=4)$

$8x+6y=8$

$-8x-6y=-8$

$8x+6y=8$

$0=0$ IMS

(13) $3(3x-4y=8)$

$4(5x+3y=-6)$

$9x-12y=24$

$20x+12y=-24$

$29x=0$

$x=0$

$3x-4y=8$

$3(0)-4y=8$

$y=-2$

$(0,-2)$

(14) $5y+2x=5x+1$, $3x-2y=3+3y$ $\Rightarrow$ $-3x+5y=1$, $3x-5y=3$

$0=4$

NO Solution

(15) $5x-2y=8x-1$, $2x+7y=4y+9$ $\Rightarrow$ $2(-3x-2y=-1)$, $3(2x+3y=9)$ $\Rightarrow$ $-6x-4y=-2$, $6x+9y=27$

$5y=25$

$y=5$

$2x+3y=9$

$2x+3(5)=9$

$2x+15=9$

$2x=-6$

$x=-3$

$(-3,5)$

(16) $15\left(\frac{2}{5}x-\frac{1}{3}y=1\right)$ $2(6x-5y=15)$

$15\left(\frac{3}{5}x+\frac{2}{3}y=5\right)$ $9x+10y=75$

$12x-10y=30$

$9x+10y=75$

$21x=105$

$x=5$

$6x-5y=15$

$6(5)-5y=15$

$30-5y=15$

$-5y=-15$

$y=3$

$(5,3)$

(17)

with wind:	against wind
$d=rt$	$d=rt$
$600=r(4)$	$600=r(5)$
$150=r$	$120=r$

x = rate of plane

y = rate of wind

$x+y=150$

$x-y=120$

$2x=270$

$x=135$

$x+y=150$

$135+y=150$

$y=15$

plane: 135 mi/hr

wind: 15 mi/hr

29-37

18. $12x-16y=8$ $\quad 12x-16y=8$
$-4(3x-4y=2)$ $\quad -12x+16y=-8$
$0=0$

IMS

19. $\begin{pmatrix}0.4x+0.5y=0.2\\0.3x-0.1y=1.1\end{pmatrix}$ 10 $\quad 4x+5y=2$
$5(3x-y=11)$ $\Rightarrow$ $15x-5y=55$
$19x=57$
$x=3$

$3x-y=11$
$3(3)-y=11$
$-y=2$
$y=-2$
$(3,-2)$

One Solution

20. $\begin{pmatrix}0.2x-0.6y=0.6\\0.4x-1.2y=2.4\end{pmatrix}$ 10 $\quad -2(2x-6y=6)$
$4x-12y=24$
$-4x+12y=-12$
$4x-12y=24$
$0=12$

No Solution

21. $y>x$
$y\leq 5$

22. $y\leq 2$
$y\geq 3x-3$

23. $\frac{3}{2}x+2y\leq 15$ $\quad$ x-int: 10, y-int: $\frac{15}{2}=7\frac{1}{2}$
$\frac{2}{3}x+3y\leq 13$ $\quad$ x-int: $\frac{39}{2}=19\frac{1}{2}$, y-int: $\frac{13}{3}=4\frac{1}{3}$

24. $(0,0)$
$(10,0)$
$(0,4\frac{1}{3})$
$(6,3)$

25. $(0,0)$
$P=20(0)+30(0)$
$P=0$

$(10,0)$
$P=20(10)+3(0)$
$P=200$

$(0,4\frac{1}{3})$
$P=20(0)+30(\frac{13}{3})$
$P=130$

$(6,3)$
$P=20(6)+30(3)$
$P=120+90$
$P=210$

Max Profit: $(6,3)$

AIP2 Honors
Algebra Practice Problems

Name: _____
Date: _____

Ch.7 Test Review

Worksheet generated at **www.math.com**

1.) $-x + 4y = 4$
$x + y = 11$
$5y = 15$
$y = 3$
$x + y = 11$
$x + 3 = 11$
$x = 8$
(8,3)

2.) $+x + 5y = 23$
$-2x + 5y = 31$
$-x = 8$
$x = -8$
$-x + 5y = 23$
$-(-8) + 5y = 23$
$8 + 5y = 23$
$5y = 15$
$y = 3$
(-8,3)

3.) $-3x + 4y = 8$
$3x + 3y = 36$
$7y = 28$
$y = 4$
$3x - 4y = 8$
$3x - 4(4) = 8$
$3x - 16 = 8$
$3x = 24$
$x = 8$
(8,4)

4.) $4x + 2y = 24$
$2x - 2y = 6$
$6x = 30$
$x = 5$
$2x - 2y = 6$
$2(5) - 2y = 6$
$10 - 2y = 6$
$-2y = -4$
$y = 2$
(5,2)

5.) $-4x + 3y = 40$
$5x + 3y = 44$
$x = 4$
$4x + 3y = 40$
$4(4) + 3y = 40$
$16 + 3y = 40$
$3y = 24$
$y = 8$
(4,8)

6.) $-4(-3x + 3y = 27)$
$2x + 12y = 52$
$12x - 12y = -108$
$2x + 12y = 52$
$14x = -56$
$x = -4$
$-3x + 3y = 27$
$-3(-4) + 3y = 27$
$12 + 3y = 27$
$3y = 15$
$y = 5$
(-4,5)

7.) $3(2x - 5y = -38)$
$6x - 4y = -48$
$-6x + 15y = 144$
$6x - 4y = -48$
$11y = 66$
$y = 6$
$2x - 5y = -38$
$2x - 5(6) = -38$
$2x - 30 = -38$
$2x = -8$
$x = -4$
(-4,6)

8.) $-2(3x + 2y = -35)$
$12x + 4y = -100$
$-6x - 4y = 70$
$12x + 4y = -100$
$6x = -30$
$x = 5$
$3x + 2y = -35$
$3(5) + 2y = -35$
$15 + 2y = -35$
$2y = -50$
$y = -25$
(5,-25)

9.) $+2x + y = +21$
$-2x + 2y = -22$
$y = -1$
$-2x - 1 = -21$
$-2x = -20$
$x = 10$
(10,-1)

10.) $4(4x + 3y = 9)$
$-16x - 4y = 20$
$16x + 12y = 36$
$-16x - 4y = 20$
$8y = 56$
$y = 7$
$4x + 3y = 9$
$4x + 3(7) = 9$
$4x + 21 = 9$
$4x = -12$
$x = -3$
(-3,7)

11.) $5(-x + 5y = 43)$
$5x + y = 19$
$-5x + 25y = 215$
$5x + y = 19$
$26y = 234$
$y = 9$
$5x + y = 19$
$5x + 9 = 19$
$5x = 10$
$x = 2$
(2,9)

12.) $2(4x - 2y = -6)$
$3x + 4y = 12$
$8x - 4y = -12$
$3x + 4y = 12$
$11x = 0$
$x = 0$
$4x - 2y = -6$
$4(0) - 2y = -6$
$-2y = -6$
$y = 3$
(0,3)

13.) $-2x + 4y = +12$
$5x - 4y = 18$
$3x = 30$
$x = 10$
$2x - 4y = -12$
$2(10) - 4y = -12$
$20 - 4y = -12$
$-4y = -32$
$y = 8$
(10,8)

14.) $4x + y = 24$
$-4x + 2y = -12$
$3y = 12$
$y = 4$
$4x + y = 24$
$4x + 4 = 24$
$4x = 20$
$x = 5$
(5,4)

15.) $x - 2y = -11$
$-5x + 2y = -17$

$-4x = -28$
$x = 7$

$x - 2y = -11$
$7 - 2y = 11$
$-2y = 4$
$y = -2$

$(7, -2)$

16.) $y = 3x + 32$
$4x = -44 + 2y$

$4x = -44 + 2(3x + 32)$
$4x = -44 + 6x + 64$
$-2x = 20$
$x = -10$

$y = 3x + 32$
$y = 3(-10) + 32$
$y = -30 + 32$
$y = 2$

$(-10, 2)$

17.) $x = -5y - 45$
$x = 3y + 35$

$-5y - 45 = 3y + 35$
$80 = 8y$
$10 = y$

$x = 3y + 35$
$x = 3(10) + 35$
$x = 30 + 35$
$x = 65$

$(65, 10)$

18.) $x = y + 11$
$x - 5y = 43$

$y + 11 - 5y = 43$
$-4y = 32$
$y = -8$

$x = y + 11$
$x = -8 + 11$
$x = 3$

$(3, -8)$

19.) $x = -3y + 10$
$5x + 5y = 40$

$x = -3y + 10$
$x = -3(1) + 10$
$x = -3 + 10$
$x = 7$

$5(-3y + 10) + 5y = 40$
$-15y + 50 + 5y = 40$
$-10y + 50 = 40$
$-10y = -10$
$y = 1$

$(7, 1)$

20.) $5y + 2x = -16$
$y = -x - 8$

$y = -x - 8$
$y = -(-8) - 8$
$y = 8 - 8$
$y = 0$

$5y + 2x = -16$
$5(-x - 8) + 2x = -16$
$-5x - 40 + 2x = -16$
$-3x = 24$
$x = -8$

$(-8, 0)$