LESSON 3.1

TEACHER'S NAME _____ CLASS _____ ROOM _____ DATE _____

Lesson Plan

2-day lesson (See *Pacing the Chapter*, TE pages 136C–136D) **For use with pages 139–146**

GOALS

1. **Graph and solve systems of linear equations in two variables.**
2. **Use linear systems to solve real-life problems.**

State/Local Objectives _____

_____

✓ Check the items you wish to use for this lesson.

STARTING OPTIONS

____ Prerequisite Skills Review: CRB pages 5–6
____ Strategies for Reading Mathematics: CRB pages 7–8
____ Warm-Up or Daily Homework Quiz: TE pages 139 and 128, CRB page 11, or Transparencies

TEACHING OPTIONS

____ Motivating the Lesson: TE page 140
____ Lesson Opener (Application): CRB page 12 or Transparencies
____ Graphing Calculator Activity with Keystrokes: CRB page 13
____ Examples: 1–3: SE pages 139–140; Day 2: 4, SE page 141
____ Extra Examples: Day 1: TE page 140 or Transp.; Day 2: TE page 141 or Transp.; Internet
____ Technology Activity: SE page 146
____ Closure Question: TE page 141
____ Guided Practice: SE page 142 Day 1: Exs. 1–9; Day 2: Ex. 10

APPLY/HOMEWORK

Homework Assignment

____ Basic Day 1: 12–28 even, 32–40 even, 41–45 odd; Day 2: 33–39 odd, 42–50 even, 53, 54, 64, 67–79 odd
____ Average Day 1: 12–46 even, 53–55; Day 2: 33–39 odd, 49–52, 57–63 odd, 64, 67–79 odd
____ Advanced Day 1: 12–48 even, 49–53; Day 2: 54–65, 67–79 odd

Reteaching the Lesson

____ Practice Masters: CRB pages 14–16 (Level A, Level B, Level C)
____ Reteaching with Practice: CRB pages 17–18 or Practice Workbook with Examples
____ Personal Student Tutor

Extending the Lesson

____ Applications (Interdisciplinary): CRB page 20
____ Challenge: SE page 145; CRB page 21 or Internet

ASSESSMENT OPTIONS

____ Checkpoint Exercises: Day 1: TE page 140 or Transp.; Day 2: TE page 141 or Transp.
____ Daily Homework Quiz (3.1): TE page 145, CRB page 24, or Transparencies
____ Standardized Test Practice: SE page 145; TE page 145; STP Workbook; Transparencies

Notes _____

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LESSON 3.1

TEACHER'S NAME _____ CLASS _____ ROOM _____ DATE _____

Lesson Plan for Block Scheduling

1-day lesson (See *Pacing the Chapter,* TE pages 136C–136D) **For use with pages 139–146**

GOALS

1. **Graph and solve systems of linear equations in two variables.**
2. **Use linear systems to solve real-life problems.**

State/Local Objectives _____

_____

_____

CHAPTER PACING GUIDE	
Day	**Lesson**
1	**3.1 (all)**
2	3.2 (all)
3	3.3 (all); 3.4(all)
4	3.5 (all); 3.6 (all)
5	Review/Assess Ch. 3

✓ Check the items you wish to use for this lesson.

STARTING OPTIONS

____ Prerequisite Skills Review: CRB pages 5–6
____ Strategies for Reading Mathematics: CRB pages 7–8
____ Warm-Up or Daily Homework Quiz: TE pages 139 and 128, CRB page 11, or Transparencies

TEACHING OPTIONS

____ Motivating the Lesson: TE page 140
____ Lesson Opener (Application): CRB page 12 or Transparencies
____ Graphing Calculator Activity with Keystrokes: CRB page 13
____ Examples: 1–4: SE pages 139–141
____ Extra Examples: TE pages 140–141 or Transparancies; Internet
____ Technology Activity: SE page 146
____ Closure Question: TE page 141
____ Guided Practice Exercises: SE page 142

APPLY/HOMEWORK

Homework Assignment

____ Block Schedule: 12–50 even, 52–56, 60–64, 67–79 odd

Reteaching the Lesson

____ Practice Masters: CRB pages 14–16 (Level A, Level B, Level C)
____ Reteaching with Practice: CRB pages 17–18 or Practice Workbook with Examples
____ Personal Student Tutor

Extending the Lesson

____ Applications (Interdisciplinary): CRB page 20
____ Challenge: SE page 145; CRB page 21 or Internet

ASSESSMENT OPTIONS

____ Checkpoint Exercises: TE pages 140–141 or Transparancies
____ Daily Homework Quiz (3.1): TE page 145, CRB page 24, or Transparencies
____ Standardized Test Practice: SE page 145; TE page 145; STP Workbook; Transparencies

Notes _____

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LESSON 3.1

NAME _____ DATE _____

Available as a transparency

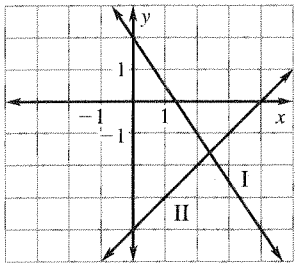
WARM-UP EXERCISES

For use before Lesson 3.1, pages 139–146

Decide whether the point is a solution of the equation.

1. $2x - 3y = 6, (1, -3)$ **2.** $-4x + y = -5, (2, 3)$

Match each line with its equation.



3. $3x + 2y = 4$ **4.** $x - y = 4$

Lesson 3.1

DAILY HOMEWORK QUIZ

For use after Lesson 2.8, pages 122–128

Graph the function. Identify the vertex, and tell whether the graph is wider, narrower, or the same width as the graph of $y = |x|$.

1. Graph $y = -2|x + 1|$ **2.** Graph $y = \frac{1}{3}|x - 2| + 1$

3. Use a graph to write an equation of the absolute value function that has vertex $(1, 3)$, and branches that pass through $(-2, 1)$ and $(7, -1)$.

LESSON 3.1

NAME _____ DATE _____

Available as a transparency

Application Lesson Opener

For use with pages 139–145

Ayla Stewart just graduated from college with a degree in computer science. She has two job offers. If she takes the first job, she will get a $10,000 bonus and her salary will be $40,000 a year. If she takes the second job, she will get a $20,000 bonus and her salary will be $35,000 a year.

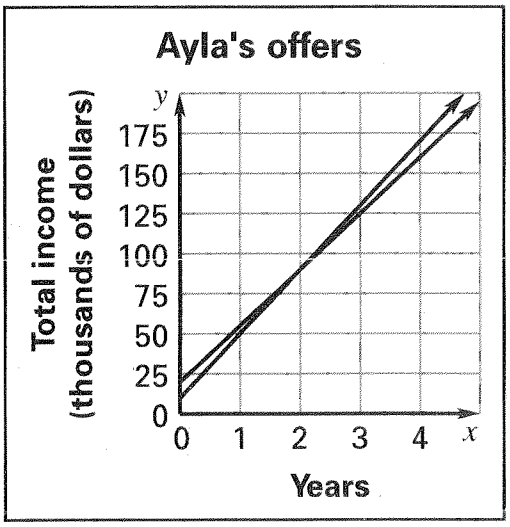
Lesson 3.1

The following system of equations represents Ayla's choices.

$y = 40x + 10$

$y = 35x + 20$

A graph of the equations is shown at the right.



1. How can you determine from the graph the number of years Ayla must work before her total income from the two offers would be the same?

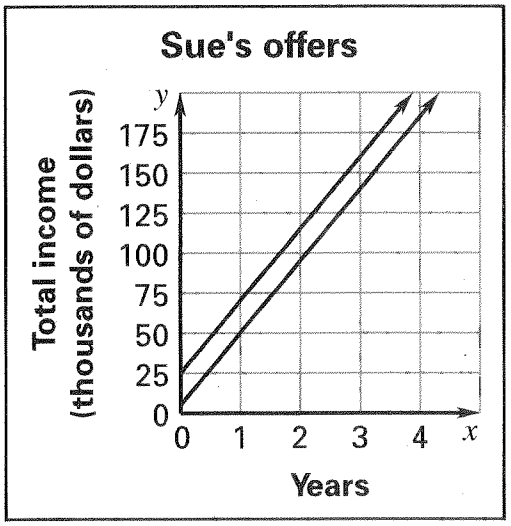
2. How many years must Ayla work before her total income from the two offers would be the same?

3. Ayla's friend Sue Evans has offers represented by these equations.

   $y = 45x + 5$

   $y = 45x + 25$

   Does the graph show you a number of years at which Sue's total income from both offers is the same? Explain.



LESSON 3.1

NAME _____ DATE _____

Graphing Calculator Activity Keystrokes

For use with page 146

TI-82

Y= ((-) 5 ÷ 3) X,T,θ − 5
ENTER
2 X,T,θ − (45 ÷ 2) ENTER
ZOOM 6
WINDOW ENTER 0 ENTER 25
ENTER 1 ENTER (-) 20 ENTER 0
ENTER 1 ENTER GRAPH

Find point of intersection near $x \approx 4.77$.

2nd [CALC] 5 ENTER ENTER

Use the cursor keys, ◀ and ▶, to move the trace cursor to select the guess at $x \approx 4.77$.
ENTER .

TI-83

Y= ((-) 5 ÷ 3) X,T,θ,n − 5
ENTER
2 X,T,θ,n − (45 ÷ 2) ENTER
ZOOM 6
WINDOW 0 ENTER 25 ENTER 1
ENTER (-) 20 ENTER 0 ENTER 1
ENTER 1 ENTER GRAPH

Find point of intersection near $x \approx 4.77$.

2nd [CALC] 5 ENTER ENTER 4.77 ENTER

SHARP EL-9600c

Y= ((-) 5 ÷ 3) X/θ/T/n − 5
ENTER
2 X/θ/T/n − (45 ÷ 2) ENTER

Adjust window and graph

ZOOM [A] 5
WINDOW 0 ENTER 25 ENTER 1
ENTER (-) 20 ENTER 0 ENTER 1
ENTER GRAPH

Find point of intersection near $x \approx 4.77$.

2ndF [A] 2

CASIO CFX-9850GA PLUS

From the main menu, select GRAPH.

((-) 5 ÷ 3) X,θ,T − 5 EXE
2 X,θ,T − (45 ÷ 2) EXE

Adjust window and graph

SHIFT F3 F3 EXIT F6
F3 0 EXE 25 EXE 1 EXE (-) 20
EXE 0 EXE 1 EXE EXIT F6

Find point of intersection near $x \approx 4.77$.

F5 F5

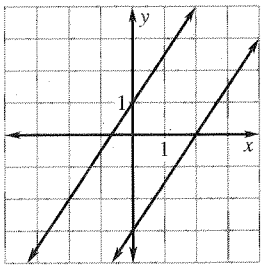
LESSON 3.1

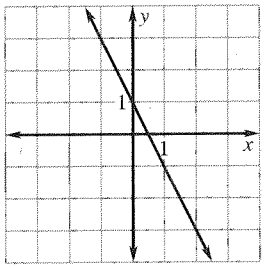
NAME _____ DATE _____

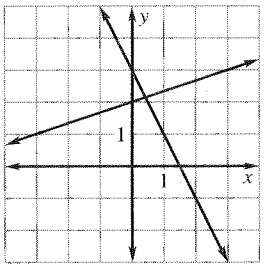
Practice A

For use with pages 139–145

The graph of a system of two linear equations is shown. Tell whether the linear system has *infinitely many solutions, one solution,* or *no solution.*

1. 

2. 

3. 

Check whether the ordered pair is a solution of the system.

4. $(1, 5)$
   $3x - y = -2$
   $-4x + 2y = 5$

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

6. $(-3, -4)$
   $4x - 7y = 16$
   $-6x + y = 14$

7. $(1, -3)$
   $x + 2y = -5$
   $2x + y = -1$

8. $(-2, 1)$
   $2x + 5y = 1$
   $3x - 2y = 4$

9. $(0, 4)$
   $3x - 4y = -16$
   $-2x + y = 4$

Graph the linear system and tell how many solutions it has.

10. $-2x + y = 1$
    $-4x + 2y = -8$

11. $4x - y = -3$
    $2x - y = 1$

12. $5x - y = 2$
    $-10x + 2y = -4$

13. $x - 2y = 6$
    $-3x + 6y = 2$

14. $2x - 3y = 3$
    $6x - 9y = 9$

15. $3x - y = 2$
    $5x - 2y = -2$

Graph the linear system and estimate the solution. Then check the solution algebraically.

16. $x + y = 3$
    $2x + y = 4$

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

18. $y = 3x$
    $x + 2y = -14$

19. $x = 3$
    $x + y = 7$

20. $y = -4$
    $2x + y = -2$

21. $x - y = -4$
    $x - y = 5$

22. $x + y = 1$
    $2x + 2y = 2$

23. $2x + y = 4$
    $3x = 6$

24. $3x + 2y = -1$
    $-x + y = -3$

25. ***Amusement Park*** A group of 42 people go to an amusement park. The admission fee for adults is \$16. The admission fee for children is \$12. The group spent \$568 to get into the park. How many adults and how many children were in the group? Use the verbal model to write and solve a system of linear equatoins.

Number of adults	+	Number of children	=	Total in the group

Price for adults	·	Number of adults	+	Price for children	·	Number of children	=	Total cost of admission

LESSON 3.1

NAME _____ DATE _____

Practice B

For use with pages 139–145

Check whether the ordered pair is a solution of the system.

1. $(2, 1)$
$x + 2y = 4$
$3x - y = 5$

2. $(-3, 5)$
$3x - 7y = -34$
$-5x - 2y = 5$

3. $(-1, 2)$
$4x + 5y = 6$
$7x + y = 5$

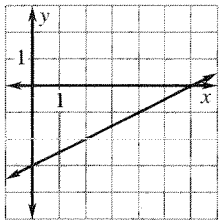
Match the linear system with its graph. Tell how many solutions the system has.

4. $2x + y = 9$
$-3x + y = -1$

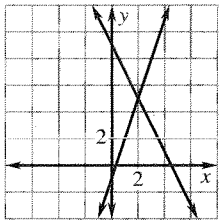
5. $3x + 2y = 4$
$6x + 4y = 10$

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

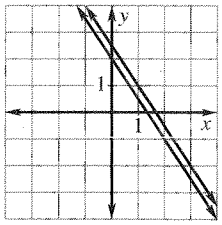
A.



B.



C.



Graph the linear system and estimate the solution. Then check the solution algebraically.

7. $x + 2y = 3$
$-7x + 3y = -21$

8. $2x - 3y = 2$
$-5x + 2y = -16$

9. $3x - y = -8$
$-2x + 5y = 1$

10. $3x + 5y = -19$
$5x - 2y = 20$

11. $4x - 3y = -14$
$-2x + 5y = 14$

12. $x - 7y = -28$
$9x + 2y = 8$

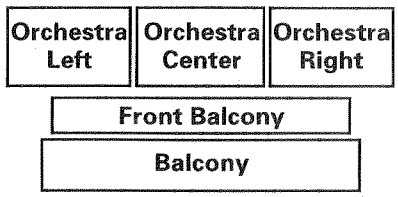
Graph the linear system and tell how many solutions it has. If there is exactly one solution, estimate the solution and check it algebraically.

13. $3x + 5y = 2$
$4x + 2y = -2$

14. $\frac{1}{2}x + 2y = 5$
$x + 4y = 10$

15. $7x + 2y = -1$
$14x + 4y = 8$

16. ***Ballet Performance*** A ballet company says that 540 tickets have been sold for its upcoming performance of *Swan Lake*. Tickets for the Orchestra Center and Front Balcony seats are \$56. Tickets for the Left and Right Orchestra and Balcony seats are \$38. The company has sold \$24,120 in tickets. How many \$56 and \$38 seats were sold?



Break-Even Analysis **In Exercises 17–20, use the following information.**
You purchase a skateboard shop for \$110,000. You estimate that monthly costs will be \$3800. The monthly revenue is expected to be \$5600.

17. Let R represent the revenue you bring in during the first t months. Write a linear model for R.

18. Let C represent your costs, including the purchase price, during the first t months. Write a linear model for C.

19. Graph the revenue and cost equations on the same coordinate plane.

20. How many months will it take until revenue and costs are equal (the "break-even point")?

LESSON 3.1

NAME _____ DATE _____

Practice C

For use with pages 139–145

Check whether the ordered pair is a solution of the system.

1. $\left(1, \frac{1}{2}\right)$
   $3x + 4y = 5$
   $-4x + 6y = -1$

2. $\left(-\frac{1}{3}, \frac{3}{8}\right)$
   $3x + 8y = 2$
   $9x - 16y = -9$

3. $\left(-\frac{1}{2}, \frac{3}{2}\right)$
   $2x + 6y = 8$
   $5x + y = 4$

Graph the linear system and estimate the solution. Then check the solution algebraically.

4. $x + 2y = 7$
   $3x + y = 6$

5. $2x + 3y = 11$
   $3x - 2y = -16$

6. $4x + 5y = 9$
   $2x - 3y = -1$

7. $3x - 5y = -4$
   $-x + 2y = 1$

8. $4x - 5y = 2$
   $8x + y = 4$

9. $3x + 4y = -3$
   $-x + 8y = -6$

10. $4x - 4y = -3$
    $2x + 8y = 1$

11. $3x + 2y = -3$
    $6x - 2y = -3$

12. $4x - 2y = -1$
    $3x - 3y = -3$

Graph the linear system and tell how many solutions it has. If there is exactly one solution, estimate the solution and check it algebraically.

13. $4x + 3y = -1$
    $3x + 6y = 6$

14. $2x + y = 4$
    $x - 2y = 3$

15. $-x + y = 6$
    $2x - 2y = -12$

16. $3x + 4y = 15$
    $2x + 3y = 10$

17. $2x - y = 4$
    $-4x + 2y = -8$

18. $8x + 2y = -10$
    $4x + y = 5$

Determine whether the following systems are *consistent* and *independent, consistent* and *dependent,* or *inconsistent.*

19. $-3x + 7y = 5$
    $6x - 14y = -10$

20. $3x - y = 3$
    $-12x + 4y = -1$

21. $4x + 3y = 6$
    $6x + 8y = 8$

22. Write a system of equations that has no solution.

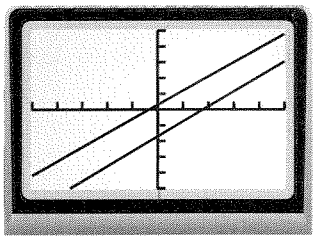
23. Write a system of equations that has infinitely many solutions.

24. Write a system of equations that has exactly one solution.

25. The graph of the system

    $9x - 10y = -3$
    $19x - 20y = 34$

    is shown to the right. Explain why there is a solution to this system.



26. ***Bargain Hunting*** A local department store is having a coupon sale in which you receive \$30 off any purchase over \$50. A competing store is offering 30% off all purchases over \$50. Write and graph two equations that describe the prices at both stores. When does the store offering the coupon sale have a better deal than their competitor?

27. ***Test Questions*** A history test is to have 20 questions. The teacher uses multiple choice and essay questions. The multiple choice questions are worth 4 points each. The essay questions are worth 8 points each. The test has a total of 100 points. Write a system of equations to determine how many of each type of question appears on the exam.

LESSON 3.1

NAME _____ DATE _____

Reteaching with Practice

For use with pages 139–145

GOAL **Graph and solve systems of linear equations in two variables**

VOCABULARY

A **system of two linear equations** in two variables x and y consists of two equations, $Ax + By = C$ and $Dx + Ey = F$.

A **solution** of a system of linear equations in two variables is an ordered pair (x, y) that satisfies *both* equations.

EXAMPLE 1 Solving a System Graphically

Solve the system.

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

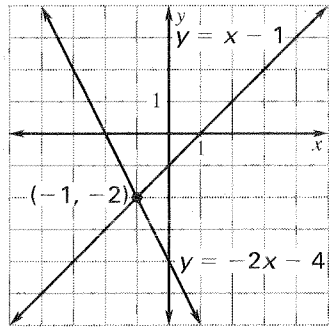
$2x + y = -4$ **Equation 2**

SOLUTION

Begin by writing each equation in slope-intercept form.

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

$y = -2x - 4$ **Equation 2**



Then sketch the graph of each equation. From the graph, the lines appear to intersect at $(-1, -2)$. To algebraically check this, substitute -1 for x and -2 for y into each of the original equations.

$-1 - (-2) = 1$ ✓ Equation 1 checks.

$2(-1) + (-2) = -4$ ✓ Equation 2 checks.

The solution is $(-1, -2)$.

Exercises for Example 2

Graph the linear system and estimate the solution. Then check the solution algebraically.

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

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

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

EXAMPLE 2 Systems with Many Solutions

Tell how many solutions the linear system has.

$6x - 8y = 2$

$\frac{9}{2}x - 6y = \frac{3}{2}$

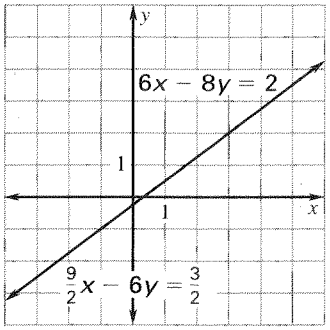
NAME _____ DATE _____

Reteaching with Practice

For use with pages 139–145

SOLUTION

Begin by writing each equation in slope-intercept form. Notice that both equations have the same slope-intercept form, $y = \frac{3}{4}x - \frac{1}{4}$. The graph of the equations is the same line. So, each point on the line is a solution, and the system has infinitely many solutions.



Exercises for Example 2

Graph the linear system and tell how many solutions it has.

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

5. $6x + 8y = 8$
$y = -\frac{3}{4}x + 1$

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

EXAMPLE 3 Systems with No Solutions

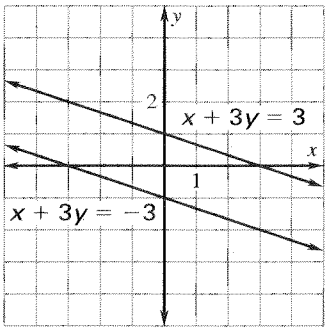
Tell how many solutions the linear system has.

$x + 3y = 3$

$x + 3y = -3$

SOLUTION

Begin by writing each equation in slope-intercept form. Notice that both equations have the same slope, $-\frac{1}{3}$. The graphs of the equations are two parallel lines, so the two lines have no point of intersection and the system has no solution.



Exercises for Example 3

Graph the linear system and tell how many solutions it has.

7. $2x + y = 5$
$-2x - y = 1$

8. $3x + y = 4$
$-6x - 2y = -12$

9. $-8x + 2y = -4$
$-12x + 3y = 9$

LESSON 3.1

NAME _____ DATE _____

Quick Catch-Up for Absent Students

For use with pages 139–146

The items checked below were covered in class on (date missed) _____

Lesson 3.1: Solving Linear Systems by Graphing

____ **Goal 1:** Graph and solve systems of linear equations in two variables. (pp. 139–140)

Material Covered:

____ Example 1: Checking Solutions of a Linear System

____ Example 2: Solving a System Graphically

____ Example 3: Systems with Many or No Solutions

Vocabulary:

system of two linear equations in two variables, p. 139

solution of a system of linear equations, p. 139

____ **Goal 2:** Use linear systems to solve real-life problems. (p. 141)

Material Covered:

____ Example 4: Writing and Using a Linear System

Activity 3.1: Graphing Systems of Equations (p. 146)

____ **Goal:** Estimate the solution to a system of linear equations using a graphing calculator.

____ Student Help: Keystroke Help

____ Other (specify) _____

_____

Homework and Additional Learning Support

____ Textbook (specify) pp. 142–145 _____

_____

____ Internet: Extra Examples at www.mcdougallittel.com

____ *Reteaching with Practice* worksheet (specify exercises) _____

____ *Personal Student Tutor* for Lesson 3.1

LESSON 3.1

NAME _____ DATE _____

Interdisciplinary Applications

For use with pages 139–145

Maps, and the Military

GEOGRAPHY The Army trains its soldiers to always know their location by finding their coordinates on a map. One of the methods that the Army teaches is for the soldiers to look for two geographic features they can see and locate the features on a map. The soldiers then determine the coordinates of the two features by using a map. After making some calculations (some with a compass), the soldiers draw a line from each geographic location and can find their exact location at the intersection of the two lines.

In Exercises 1–3, use the following information.

Soldier Brown is on a field expedition. She needs to determine her location. In the distance, she can see two mountains. From her map, she determines the coordinates of Mountain Azure as (3, 5) and Mount Blue as (12, 7). A compass reading gives the slope of the line from Mountain Azure to her position as 2, and the slope from Mount Blue to her location as $-\frac{3}{2}$. Her location is (x, y) where the two lines intersect.

1. Write an equation of the line that passes through Soldier Brown's location and Mountain Azure's location.
2. Write an equation of the line that passes through Soldier Brown's location and Mount Blue's location.
3. Use the equations from Exercises 1 and 2 to form a system of equations. Graph the system and find the location of Soldier Brown.

In Exercises 4–6, use the following information.

Soldier Brown's partner, Soldier Heizingberger, needs to determine his location. She radios him the coordinates of Mount Blue, but he cannot see it. He can see Mountain Azure and knows its coordinates and the slope of the line from Mountain Azure to his location is -2. He can also see a water tower and knows from his map that the coordinates of the water tower are (9, 3) and the slope of the line from the water tower to his location is $\frac{1}{2}$.

4. Write an equation of the line that passes through Soldier Heizingberger's location and the water tower's location.
5. Write an equation of the line that passes through Mountain Azure's location and Soldier Heizingberger's location.
6. Use the equations from Exercises 4 and 5 to determine the location of Soldier Heizingberger.

LESSON 3.1

NAME _____ DATE _____

Challenge: Skills and Applications

For use with pages 139–145

Check, by graphing, whether each system of 3 equations has a common solution. If it does, give the solution. If it does not, state that it does not.

1. $x - 3y = 9$
$2x + y = 4$
$3x - y = 11$

2. $-x + 2y = 4$
$2x - y = 10$
$3x + 4y = -7$

3. a. Without graphing, tell whether or not the following system, in which $a \neq b$, has a solution, and if so what it is. If it does not have a solution, explain why not.

$$y - 4 = a(x + 1)$$
$$y - 4 = b(x + 1)$$

b. Explain why your answer to part (a) does not depend on the values of a and b, as long as $a \neq b$.

4. a. Put each of the equations in the following system into slope intercept form.

$$2x - 6y = 5$$
$$-3x + 9y = 10$$

b. From your answer to part (a), and without graphing, tell whether the graphs of the two equations intersect once, do not intersect, or define the same line.

c. Based on your answer to part (b), describe a general method for determining the nature of the solution(s) of a linear system without graphing.

5. Each of the following pairs of parametric equations defines a linear function.

$x = 3 + 2t$ $\qquad$ $x = 8 - t$

$y = -4 + t$ $\qquad$ $y = 1 - 3t$

a. Solve the first equation in each pair for t, and substitute the expression you get into the second equation to get two equations in x and y.

b. Solve the system of two equations in the variables x and y that you found in part (a).

c. Find the value(s) of t associated with the solution you found in part (b)—one value of t for each pair. Are the two values of t the same? How would you interpret this fact, thinking of the variable t as the time when a particle moving along each line reaches the point with the corresponding coordinates?

LESSON 3.2

TEACHER'S NAME _____ CLASS _____ ROOM _____ DATE _____

Lesson Plan

2-day lesson (See *Pacing the Chapter*, TE pages 136C–136D) **For use with pages 147–155**

GOALS

1. **Use algebraic methods to solve linear systems.**
2. **Use linear systems to model real-life situations.**

State/Local Objectives _____

_____

✓ Check the items you wish to use for this lesson.

STARTING OPTIONS

____ Homework Check: TE page 142; Answer Transparencies
____ Warm-Up or Daily Homework Quiz: TE pages 148 and 145, CRB page 24, or Transparencies

TEACHING OPTIONS

____ Motivating the Lesson: TE page 149
____ Concept Activity: SE page 147
____ Lesson Opener (Application): CRB page 25 or Transparencies
____ Graphing Calculator Activity with Keystrokes: CRB pages 26–27
____ Examples: Day 1: 1–3, SE pages 148–150; Day 2: 4–5, SE pages 150–151
____ Extra Examples: Day 1: TE pages 149–150 or Transp.; Day 2: TE page 150 or Transp.
____ Closure Question: TE page 151
____ Guided Practice: SE page 152 Day 1: Exs. 1–2, 4–9; Day 2: Exs. 3, 10

APPLY/HOMEWORK

Homework Assignment

____ Basic Day 1: 12–20 even, 24–32 even, 36–44 even; 50; Day 2: 33–41 odd, 51–55 odd, 63, 64, 67–81 odd; Quiz 1: 1–19
____ Average Day 1: 12–20 even, 24–34 even, 38–52 even; Day 2: 33–51 odd, 54–58 even, 63, 64, 67–81 odd; Quiz 1: 1–19
____ Advanced Day 1: 12–54 even; Day 2: 47–57 odd, 59–65, 67–81 odd; Quiz 1: 1–19

Reteaching the Lesson

____ Practice Masters: CRB pages 28–30 (Level A, Level B, Level C)
____ Reteaching with Practice: CRB pages 31–32 or Practice Workbook with Examples
____ Personal Student Tutor

Extending the Lesson

____ Applications (Real-Life): CRB page 34
____ Challenge: SE page 154; CRB page 35 or Internet

ASSESSMENT OPTIONS

____ Checkpoint Exercises: Day 1: TE pages 149–150 or Transp.; Day 2: TE page 150 or Transp.
____ Daily Homework Quiz (3.2): TE page 154, CRB page 39, or Transparencies
____ Standardized Test Practice: SE page 154; TE page 154; STP Workbook; Transparencies
____ Quiz (3.1–3.2): SE page 155; CRB page 36

Notes _____

_____

_____

LESSON 3.2

TEACHER'S NAME _____ CLASS _____ ROOM _____ DATE _____

Lesson Plan for Block Scheduling

1-day lesson (See *Pacing the Chapter,* TE pages 136C–136D) **For use with pages 147–155**

GOALS

1. **Use algebraic methods to solve linear systems.**
2. **Use linear systems to model real-life situations.**

State/Local Objectives _____

_____

_____

CHAPTER PACING GUIDE	
Day	**Lesson**
1	3.1 (all)
2	**3.2 (all)**
3	3.3 (all); 3.4(all)
4	3.5 (all); 3.6 (all)
5	Review/Assess Ch. 3

✓ Check the items you wish to use for this lesson.

STARTING OPTIONS

____ Homework Check: TE page 142; Answer Transparencies
____ Warm-Up or Daily Homework Quiz: TE pages 148 and 145, CRB page 24, or Transparencies

TEACHING OPTIONS

____ Motivating the Lesson: TE page 149
____ Concept Activity: SE page 147
____ Lesson Opener (Application): CRB page 25 or Transparencies
____ Graphing Calculator Activity with Keystrokes: CRB pages 26–27
____ Examples: 1–5: SE pages 148–151
____ Extra Examples: TE pages 149–150 or Transparancies
____ Closure Question: TE page 151
____ Guided Practice Exercises: SE page 152

APPLY/HOMEWORK

Homework Assignment

____ Block Schedule: 12–54 even, 63, 64, 67–81 odd; Quiz 1: 1–19

Reteaching the Lesson

____ Practice Masters: CRB pages 28–30 (Level A, Level B, Level C)
____ Reteaching with Practice: CRB pages 31–32 or Practice Workbook with Examples
____ Personal Student Tutor

Extending the Lesson

____ Applications (Real Life): CRB page 34
____ Challenge: SE page 154; CRB page 35 or Internet

ASSESSMENT OPTIONS

____ Checkpoint Exercises: TE pages 149–150 or Transparancies
____ Daily Homework Quiz (3.2): TE page 154, CRB page 39, or Transparencies
____ Standardized Test Practice: SE page 154; TE page 154; STP Workbook; Transparencies
____ Quiz (3.1–3.2): SE page 155; CRB page 36

Notes _____

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LESSON 3.2

NAME _____ DATE _____

Available as a transparency

WARM-UP EXERCISES

For use before Lesson 3.2, pages 147–155

Solve each equation for the indicated variable.

1. $2x - y = 5, y$

2. $-x + 2y = 3, x$

3. $3x - 4y = 12, y$

4. $3x - 4y = 12, x$

DAILY HOMEWORK QUIZ

For use after Lesson 3.1, pages 139–146

1. Check whether $(2, -5)$ is a solution of the system of equations.

$7x + 4y = -6$

$6x + 5y = -11$

2. Graph the system and estimate the solution.

$x + y = 1$

$x - 3y = 5$

3. Tell how many solutions the system has.

$7x + 5y = 10$

$y = -\frac{7}{5}x + 2$

4. A store sells packs of AA batteries for \$1.89 and packs of AAA batteries for \$1.53, tax included. Jeff bought 8 packs and spent a total of \$14.04. How many packs of each kind of battery did he buy?

Lesson 3.2

LESSON 3.2

NAME _____ DATE _____

Available as a transparency

Application Lesson Opener

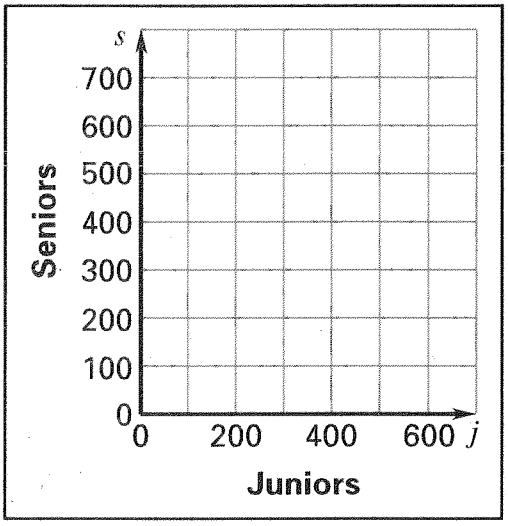
For use with pages 148–155

The junior class at Brady High School sponsors the prom. This year's junior class did not earn enough on fundraising activities to offset the cost, so the junior class members have agreed to pay a higher ticket price than the seniors.

Thus, junior tickets cost \$10.50 and senior tickets cost \$7.50. Planners expect 560 juniors and seniors to buy tickets. They need to collect \$5000 on ticket sales to cover the remaining expenses.

1. Let j represent the number of juniors and let s represent the number of seniors. Write a system of linear equations to model the situation.

2. Graph the system.



3. Is it easy or difficult to determine from the graph how many juniors and seniors need to attend the prom for the class to break even?

Lesson 3.2

LESSON 3.2

NAME _____ DATE _____

Graphing Calculator Activity

For use with pages 148–155

GOAL **To solve a system of two equations using algebra**

Activity

1. Consider the following two equations:
   $2x + y = 4$
   $2x - y = 8$
   Notice that the sum of the two equations is $(2x + y) + (2x - y) = 4 + 8$. This simplifies to $4x = 12$, and then to $x = 3$.
2. Notice that the difference of the two equations is $(2x + y) - (2x - y) = 4 - 8$. This simplifies to $2y = -4$, and then to $y = -2$.
3. In Steps 1 and 2, we have shown that the point $(x, y) = (3, -2)$ is the only point to satisfy both of equations $2x + y = 4$ and $2x - y = 8$. Use a graphing calculator to verify that $(x, y) = (3, -2)$ is the intersection of $2x + y = 4$ and $2x - y = 8$.

Exercises

1. Find the sum of the following equations.

   $3x + y = 9$
   $3x - y = 3$

2. Find the difference of the equations in Exercise 1.
3. Use the information from Exercises 1 and 2 to find the intersection of the two equations in Exercise 1. Use a graphing calculator to verify your answer.
4. Follow the steps from the activity to find the intersection of the following equations.

   $x - 4y = 8$
   $x + 4y = 16$

5. Use a graphing calculator to verify your answer in Exercise 4.
6. Solve each of the following equations for y.

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

7. Since the two equations in Exercise 6 are equivalent, use this idea to find the intersection of the following equations using the algebraic method from the activity.

   $2x - y = 4$
   $4x + 2y = 24$

8. Verify your answer in Exercise 7 with a graphing calculator.

Lesson 3.2

NAME _____ DATE _____

Graphing Calculator Activity

For use with pages 148–155

TI-82

Rewrite $2x + y = 4$ as $y = -2x + 4$.

Rewrite $2x - y = 8$ as $y = 2x - 8$.

Y= (−) 2 X,T,θ + 4 ENTER

Y= 2 X,T,θ − 8 ENTER

ZOOM 6

Find point of intersection at $x = 3$.

2nd [CALC] 5 ENTER ENTER

Use the cursor keys, ◀ and ▶, to move the trace cursor to select the guess at $x = 3$. ENTER

TI-83

Rewrite $2x + y = 4$ as $y = -2x + 4$.

Rewrite $2x - y = 8$ as $y = 2x - 8$.

Y= (−) 2 X,T,θ,n + 4 ENTER

2 X,T,θ,n − 8 ENTER

ZOOM 6

Find point of intersection at $x = 3$.

2nd [CALC] 5 ENTER ENTER 3 ENTER

SHARP EL-9600c

Rewrite $2x + y = 4$ as $y = -2x + 4$.

Rewrite $2x - y = 8$ as $y = 2x - 8$.

Y= (−) 2 X/θ/T/n + 4 ENTER

Y= 2 X/θ/T/n − 8 ENTER

ZOOM [A] 5

Find point of intersection at $x = 3$.

2ndF [A] 2

CASIO CFX-9850GA PLUS

Rewrite $2x + y = 4$ as $y = -2x + 4$.

Rewrite $2x - y = 8$ as $y = 2x - 8$.

From the main menu, choose GRAPH

− 2 X,θ,T + 4 EXE

2 X,θ,T − 8 EXE

SHIFT F3 F3 EXIT F6

Find point of intersection at $x = 3$.

F5 F5

LESSON 3.2

NAME _____ DATE _____

Practice A

For use with pages 148–155

Solve the system using the substitution method.

1. $x + 3y = 5$
   $2x - 3y = 1$
2. $2x + y = 6$
   $3x + 5y = 9$
3. $3x - 7y = 10$
   $x - 4y = 5$
4. $5x - 2y = -20$
   $6x + y = -7$
5. $x - y = 12$
   $2x + 3y = -1$
6. $-4x + y = 8$
   $x - 3y = 9$
7. $3x + y = 6$
   $2x - 4y = 10$
8. $4x + 6y = 8$
   $3x + y = 9$
9. $x - 7y = 12$
   $2x + 8y = 14$

Solve the system using the linear combination method.

10. $4x + 2y = 2$
    $5x - 2y = -11$
11. $7x + 3y = -12$
    $-7x + 2y = -8$
12. $6x - 7y = 4$
    $x + 7y = 17$
13. $6x + 3y = -15$
    $-6x + 5y = 7$
14. $x + 2y = 7$
    $x - 2y = 5$
15. $2x + y = -2$
    $-2x + 5y = -16$

Solve the system using any algebraic method.

16. $x + 2y = 7$
    $3x + 5y = 17$
17. $x + 3y = 8$
    $4x - 3y = 2$
18. $x + y = 9$
    $x - y = 1$
19. $x + y = 4$
    $-x + 2y = 17$
20. $3x + 4y = 0$
    $9x - 4y = 0$
21. $2x + y = 0$
    $-2x + y = -4$
22. $2x - 5y = 4$
    $3x + 4y = 9$
23. $5x + 7y = 12$
    $3x - 2y = 8$
24. $3x - 4y = 6$
    $4x + 7y = 1$
25. $4x + 7y = -10$
    $3x - 7y = -4$
26. $-2x + 3y = 8$
    $x - 5y = -4$
27. $6x + y = 0$
    $15x + 2y = 9$

28. ***Band Competition*** The band boosters are organizing a trip to a national competition for the 226-member marching band. A bus will hold 70 students and their instruments. A van will hold 8 students and their instruments. A bus costs $280 to rent for the trip. A van costs $70 to rent for the trip. The boosters have $980 to use for transportation. Use the verbal model below to write a system of equations whose solution is how many buses and vans should be rented. Solve the system.

Students per bus	·	Number of buses	+	Students per van	·	Number of vans	=	Students on trip

Price per bus	·	Number of buses	+	Price per van	·	Number of vans	=	Cost of transportation

LESSON 3.2

NAME _____ DATE _____

Practice B

For use with pages 148–155

Solve the system using the substitution method.

1. $2x - 5y = 9$
   $-3x + y = -7$
2. $-3x + 4y = 1$
   $x - 2y = 1$
3. $6x + 2y = 11$
   $4x + y = 6$
4. $x - 2y = -1$
   $5x - 7y = 4$
5. $4x + 3y = 3$
   $2x + y = -3$
6. $10x - 16y = 17$
   $x + y = 3$

Solve the system using the linear combination method.

7. $5x + y = 6$
   $-5x + 3y = -22$
8. $2x - 3y = 4$
   $8x + 3y = 1$
9. $4x + y = -5$
   $4x + 3y = 9$
10. $2x - 7y = -10$
    $3x + 2y = 10$
11. $3x - 4y = 12$
    $6x + 2y = -11$
12. $5x - 2y = -15$
    $7x + 5y = 18$

Solve the system using any algebraic method.

13. $4x + 7y = -10$
    $3x - 7y = -4$
14. $-2x + 3y = 8$
    $x - 5y = -4$
15. $6x + y = 0$
    $15x + 2y = 9$
16. $6x - 3y = 1$
    $4x - 2y = 7$
17. $3x - 8y = 1$
    $6x + 2y = 11$
18. $4x - 16y = 4$
    $-3x + 12y = -3$
19. $2x + 8y = 8$
    $3x - 2y = -16$
20. $-5x + y = 17$
    $3x + 2y = 8$
21. $3x - 9y = 3$
    $x + 8y = 9$

22. ***CDs and Cassettes*** For 1990 through 1998, the manufacturer's shipments for audio cassettes, A (in millions), and compact discs, C (in millions), can be modeled by the equations

    $A = -31.8t + 322$ **Audio cassette shipments**

    $C = 42.8t + 110$ **Compact disc shipments**

    where t is the number of years since 1990. In what year did the number of compact discs shipped surpass the number of audio cassettes shipped?

23. ***Golf Bags*** A sporting goods store receives a shipment of 124 golf bags. The shipment includes two types of bags, full-size and collapsible. The full-size bags cost \$38.50 each. The collapsible bags cost \$22.50 each. The bill for the shipment is \$3430. How many of each type of golf bag are in the shipment?

24. ***Vacation Trip*** You and a friend share the driving on a 280 mile trip. Your average speed is 58 miles per hour. You friend's average speed is 53 miles per hour. You drive one hour longer than your friend. How many hours did each of you drive? Use the following verbal model.

    [Your speed] · [Your time] + [Friend's speed] · [Friend's time] = [Total distance]

    [Your time] = [Friend's time] + [1 hour]

LESSON 3.2

NAME _____ DATE _____

Practice C

For use with pages 148–155

Solve the system using the substitution method.

1. $2x + y = 5$
   $4x + 3y = 7$

2. $4x + 2y = 2$
   $x + 3y = 13$

3. $x - 3y = 8$
   $-2x + 3y = -7$

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

5. $x - 3y = 18$
   $-x + 3y = 12$

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

Solve the system using the linear combination method.

7. $2x + 3y = 12$
   $3x - 4y = 1$

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

9. $3x + 4y = -6$
   $2x - 5y = 19$

10. $2x + 5y = 1$
    $x + \frac{5}{2}y = \frac{1}{2}$

11. $\frac{1}{2}x + 3y = 9$
    $\frac{1}{3}x + y = 4$

12. $4x - 6y = 4$
    $6x + 3y = 2$

Solve the system using any algebraic method.

13. $0.25x + 0.5y = 12.5$
    $0.3x + 0.5y = 13$

14. $0.75x + 0.3y = 4.5$
    $0.125x + 0.4y = -1$

15. $0.2x + 1.4y = 9.4$
    $0.5x - 0.7y = -1.7$

16. $0.8x - 2.1y = 10.8$
    $1.6x - 0.7y = 7.6$

17. $5x - 4y = -4$
    $2x + 2y = -\frac{7}{10}$

18. $5x + y = \frac{5}{6}$
    $3x + 4y = -8$

19. $6x - 9y = 1$
    $2x + 4y = 5$

20. $0.3x - 0.2y = 1.4$
    $0.12x - 0.8y = 0.56$

21. $4.2x + 2.1y = 10.5$
    $1.4x - 1.3y = 2.7$

22. ***Labor Force*** From 1840 to 1990 the percent of the labor force in farming and non-farming occupations can be modeled by the following equations where t is the number of years since 1840.

    $y = -0.48t + 67.2$ **farming occupations**

    $y = 0.48t + 32.9$ **nonfarming occupations**

    In what year was the labor force split equally into farming and non-farming occupations? Round your answer to the nearest year.

Computers Per Capita Use the table below of the number of computers per 1000 people in the United Kingdom and Netherlands from 1991 through 1995.

Years since 1990, t	*1*	*2*	*3*	*4*	*5*
United Kingdom, U	125.7	144.8	164.8	187.4	216.5
Netherlands, N	109.7	131.1	156.9	184.3	214.8

23. Use a graphing calculator to make scatter plots for the data.

24. For each scatter plot, find an equation of the line of best fit.

25. Find the coordinates of the point of intersection. Describe what this point represents.

LESSON 3.2

NAME _____ DATE _____

Reteaching with Practice

For use with pages 148–155

GOAL **Use algebraic methods to solve linear systems**

VOCABULARY

Two methods for solving linear systems are given below.

The Substitution Method

Step 1: Solve one of the equations for one of its variables.

Step 2: Substitute the expression from Step 1 into the other equation and solve for the other variable.

Step 3: Substitute the value from Step 2 into the revised equation from Step 1 and solve.

The Linear Combination Method

Step 1: Multiply one or both of the equations by a constant to obtain coefficients that differ only in sign for one of the variables.

Step 2: Add the revised equations from Step 1. Combining like terms will eliminate one of the variables. Solve for the remaining variable.

Step 3: Substitute the value obtained in Step 2 into either of the original equations and solve for the other variable.

The Substitution Method

EXAMPLE 1

Use the substitution method to solve the linear system.

$6x + y = -2$ **Equation 1**

$4x - 3y = 17$ **Equation 2**

SOLUTION

Solve Equation 1 for y.

$6x + y = -2$	Write Equation 1.
$y = -6x - 2$	Revised Equation 1

Substitute $-6x - 2$ for y in Equation 2 and solve for x.

$4x - 3y = 17$	Write Equation 2.
$4x - 3(-6x - 2) = 17$	Substitute $-6x - 2$ for y.
$4x + 18x + 6 = 17$	Distributive property
$x = \frac{1}{2}$	Solve for x.

Substitute the value of x into the revised Equation 1 and solve for y.

$y = -6x - 2$	Revised Equation 1
$y = -6\left(\frac{1}{2}\right) - 2$	Substitute $\frac{1}{2}$ for x.
$y = -5$	Solve for y.

The solution is $\left(\frac{1}{2}, -5\right)$.

Lesson 3.2

NAME _____ DATE _____

Reteaching with Practice

For use with pages 148–155

Exercises for Example 1

Solve the linear system using the substitution method.

1. $2x - y = 6$
$2x + 2y = -9$

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

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

4. $2x - 5y = 9$
$y = 3x - 7$

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

6. $6x + 2y = 11$
$y = -4x + 6$

EXAMPLE 2 The Linear Combination Method

Use the linear combination method to solve the linear system.

$6x + 3y = 3$ **Equation 1**

$8x + 4y = 4$ **Equation 2**

SOLUTION

$24x + 12y = 12$ Multiply Equation 1 by 4.

$-24x - 12y = -12$ Multiply Equation 2 by -3, so the x-coefficients differ only in sign.

$0 = 0$ Add the equations.

Because the statement $0 = 0$ is always true, there are infinitely many solutions.

Exercises for Example 2

Solve the linear system using the linear combination method.

7. $9x + 2y = 0$
$3x - 5y = 17$

8. $2x - 3y = 5$
$-6x + 9y = 12$

9. $4x + 5y = 13$
$3x + y = -4$

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

11. $11x + 6y = 1$
$3x + 2y = -3$

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

LESSON 3.2

NAME _____ DATE _____

Quick Catch-Up for Absent Students

For use with pages 147–155

The items checked below were covered in class on (date missed) _____

Activity 3.2: Combining Equations in a Linear System (p. 147)

____ **Goal:** Determine how the graph of the sum of the equations of a system is related to the graph of the system.

Lesson 3.2: Solving Linear Systems Algebraically

____ **Goal 1:** Use algebraic methods to solve linear systems. (pp. 148–150)

Material Covered:

____ Example 1: The Substitution Method

____ Student Help: Study Tip

____ Example 2: The Linear Combination Method: Multiplying One Equation

____ Example 3: The Linear Combination Method: Multiplying Both Equations

____ Example 4: Linear Systems with Many or No Solutions

Vocabulary:

substitution method, p. 148 linear combination method, p. 149

____ **Goal 2:** Use linear systems to model real-life situations. (p. 151)

Material Covered:

____ Example 5: Use a Linear System as a Model

____ Other (specify) _____

_____

Homework and Additional Learning Support

____ Textbook (specify) pp. 152–155

_____

____ *Reteaching with Practice* worksheet (specify exercises) _____

____ *Personal Student Tutor* for Lesson 3.2

LESSON 3.2

NAME _____ DATE _____

Real-Life Application: When Will I Ever Use This?

For use with pages 148–155

A Recreational Budget

You and nine friends have decided to take a few days to go camping in Pennsylvania's Allegheny National Forest. You are planning a recreational budget of $50 per day for activities. On one of the days you will rent canoes and tubes to explore the Clarion River. Tube rentals cost $6.95, and the cost to rent a canoe is $10.95 for three hours. Each person would need a tube, but canoes hold up to three individuals. In order to budget for your day on the river, consider the following questions.

1. Write an equation that shows how many tubes t and canoes c you would need to accommodate your group.
2. Round the cost of the tubes and canoes to the nearest dollar, then write an equation that expresses how much the tubes and canoes will cost and remain within the confines of your recreational budget.
3. According to the equations from Exercises 1 and 2, how many tubes and canoes can you rent?

Another activity that your group is considering is the amusement park on the outskirts of the forest. The bumper cars cost $3.00 per hour and two people can ride in each car. Another choice is the water slide. The cost is $8.00 per person.

4. Write an equation that shows how many bumper car tickets b and water slide passes w you would need to purchase.
5. Write an equation that expresses how much the bumper car tickets and water slide passes would cost and remain within the confines of your recreational budget.
6. According to the equations from Exercises 3 and 4, how many bumper cars and water slide passes can you purchase?