LESSON 2.5

TEACHER'S NAME _____ CLASS _____ ROOM _____ DATE _____

Lesson Plan

1-day lesson (See *Pacing the Chapter*, TE pages 64C–64D) **For use with pages 99–107**

GOALS

1. **Use a scatter plot to identify the correlation shown by a set of data.**
2. **Approximate the best-fitting line for a set of data.**

State/Local Objectives _____

_____

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

STARTING OPTIONS

____ Homework Check: TE page 95; Answer Transparencies
____ Warm-Up or Daily Homework Quiz: TE pages 100 and 98, CRB page 65, or Transparencies

TEACHING OPTIONS

____ Motivating the Lesson: TE page 101
____ Concept Activity: SE page 99; CRB page 66 (Activity Support Master)
____ Lesson Opener (Application): CRB page 67 or Transparencies
____ Graphing Calculator Activity with Keystrokes: CRB page 68
____ Examples 1–3: SE pages 100–102
____ Extra Examples: TE pages 101–102 or Transparencies
____ Technology Activity: SE page 107
____ Closure Question: TE page 102
____ Guided Practice Exercises: SE page 103

APPLY/HOMEWORK

Homework Assignment

____ Basic 8–24 even, 25, 28, 31–43 odd; Quiz 2: 1–9
____ Average 8–24 even, 25–28, 31–43 odd; Quiz 2: 1–9
____ Advanced 8–24 even, 25–29, 31–43 odd; Quiz 2: 1–9

Reteaching the Lesson

____ Practice Masters: CRB pages 69–71 (Level A, Level B, Level C)
____ Reteaching with Practice: CRB pages 72–73 or Practice Workbook with Examples
____ Personal Student Tutor

Extending the Lesson

____ Applications (Interdisciplinary): CRB page 75
____ Challenge: SE page 105; CRB page 76 or Internet

ASSESSMENT OPTIONS

____ Checkpoint Exercises: TE pages 101–102 or Transparencies
____ Daily Homework Quiz (2.5): TE page 106, CRB page 80, or Transparencies
____ Standardized Test Practice: SE page 105; TE page 106; STP Workbook; Transparencies
____ Quiz (2.4–2.5): SE page 106; CRB page 77

Notes _____

_____

_____

LESSON 2.5

TEACHER'S NAME _____ CLASS _____ ROOM _____ DATE _____

Lesson Plan for Block Scheduling

Half-day lesson (See *Pacing the Chapter*, TE pages 64C–64D) **For use with pages 99–107**

GOALS

1. **Use a scatter plot to identify the correlation shown by a set of data.**
2. **Approximate the best-fitting line for a set of data.**

State/Local Objectives _____

_____

_____

CHAPTER PACING GUIDE	
Day	**Lesson**
1	2.1 (all); 2.2 (all)
2	2.3 (all)
3	2.4 (all)
4	**2.5 (all)**; 2.6 (all)
5	2.7 (all); 2.8 (all)
6	Review/Assess Ch. 2

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

STARTING OPTIONS

____ Homework Check: TE page 95; Answer Transparencies
____ Warm-Up or Daily Homework Quiz: TE pages 100 and 98, CRB page 65, or Transparencies

TEACHING OPTIONS

____ Motivating the Lesson: TE page 101
____ Concept Activity: SE page 99; CRB page 66 (Activity Support Master)
____ Lesson Opener (Application): CRB page 67 or Transparencies
____ Graphing Calculator Activity with Keystrokes: CRB page 68
____ Examples 1–3: SE pages 100–102
____ Extra Examples: TE pages 101–102 or Transparencies
____ Technology Activity: SE page 107
____ Closure Question: TE page 102
____ Guided Practice Exercises: SE page 103

APPLY/HOMEWORK

Homework Assignment (See also the assignment for Lesson 2.6.)

____ Block Schedule: 8–24 even, 25–28, 31–43 odd; Quiz 2: 1–9

Reteaching the Lesson

____ Practice Masters: CRB pages 69–71 (Level A, Level B, Level C)
____ Reteaching with Practice: CRB pages 72–73 or Practice Workbook with Examples
____ Personal Student Tutor

Extending the Lesson

____ Applications (Interdisciplinary): CRB page 75
____ Challenge: SE page 105; CRB page 76 or Internet

ASSESSMENT OPTIONS

____ Checkpoint Exercises: TE pages 101–102 or Transparencies
____ Daily Homework Quiz (2.5): TE page 106, CRB page 80, or Transparencies
____ Standardized Test Practice: SE page 105; TE page 106; STP Workbook; Transparencies
____ Quiz (2.4–2.5): SE page 106; CRB page 77

Notes _____

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_____

LESSON 2.5

NAME _____ DATE _____

Available as a transparency

WARM-UP EXERCISES

For use before Lesson 2.5, pages 99–107

1. Find the slope of the line through $(1, 4)$ and $(-5, -2)$.

Find an equation of the line through each pair of points.

2. $(-2, 5)$ and $(1, -1)$

3. $(100, 500)$ and $(150, 1000)$

4. $(0.26, 8.5)$ and $(0.36, 9.8)$

DAILY HOMEWORK QUIZ

For use after Lesson 2.4, pages 91–98

1. Write an equation of the line with slope 4 and y-intercept -2.3.

2. Write an equation of the line with slope -1 that passes through $(2, -3)$.

3. Write an equation of the line that passes through $(3, -5)$ and is perpendicular to the line through $(1, 4)$ and $(3, -2)$.

4. Write an equation of the line that passes through $(-2, 5)$ and $(2, -3)$.

The variables x and y vary directly. Write an equation that relates the variables. Then find y when $x = 3$.

5. $x = 4, y = 10$

6. $x = 6, y = \frac{1}{2}$

NAME _____ DATE _____

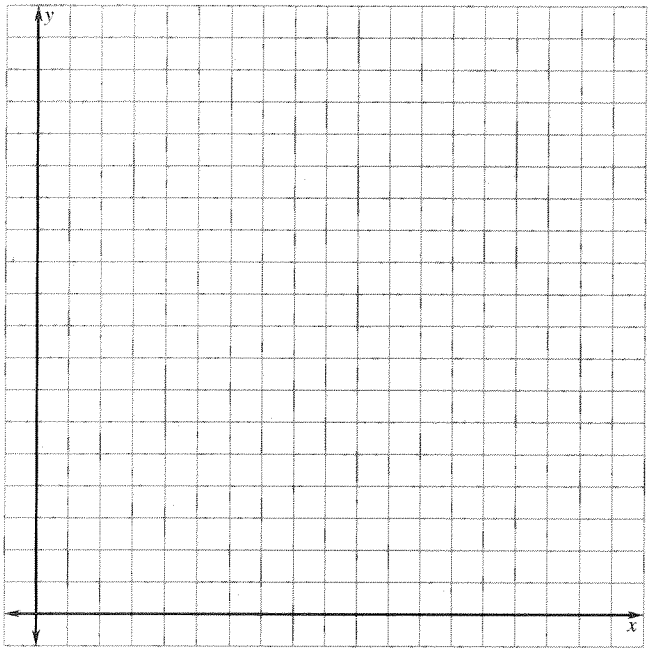
Activity Support Master

For use with page 99

Steps 1 and 2

Distance from projector to screen (cm), x	*Length of line segment on screen (cm), y*
200	
210	
220	
230	
240	
250	
260	
270	
280	
290	

Steps 3 and 4



LESSON 2.5

NAME _____ DATE _____

Available as a transparency

Application Lesson Opener

For use with pages 100–106

1. Are scores on a test and hours studied for the test related? If so, as the number of hours studied increases, would you expect scores to increase or decrease?

Given paired data (x, y), if y tends to increase as x increases then the paired data have a *positive correlation*. If y tends to decrease as x increases then the paired data have a *negative correlation*.

2. Do scores on a test and hours studied have a positive correlation or a negative correlation?

In Questions 3–7, tell whether you expect the paired data to have a *positive correlation* or a *negative correlation*.

3. Hours after a rain shower stops and relative humidity at the location of the shower.

4. Distance traveled in a fixed amount of time and the speed at which a person was traveling.

5. The number of people who attend a movie and the amount of money taken in at the box office.

6. The time it takes to walk a mile and the number of calories burned.

7. The time it takes to walk a mile and the length of the legs of the person who is walking.

LESSON 2.5

NAME _____ DATE _____

Graphing Calculator Activity Keystrokes

For use with page 107

TI-82

STAT 1

Enter *x*-values in L1.

1 ENTER 4 ENTER 5 ENTER 8 ENTER
11 ENTER 11 ENTER 15 ENTER 18 ENTER
21 ENTER 25 ENTER 29 ENTER

Enter *y*-values in L2.

8 ENTER 10 ENTER 13 ENTER 15 ENTER
18 ENTER 20 ENTER 22 ENTER 25 ENTER
29 ENTER 32 ENTER 33 ENTER

2nd [STAT PLOT] 1

Choose the following.

On; Type ⌐·⌐ ; Xlist L1; Ylist L2; Mark: ▫

WINDOW ENTER 0 ENTER 30 ENTER 5 ENTER
0 ENTER 35 ENTER 5 ENTER

GRAPH STAT ▶ 5 2nd L1 , 2nd L2
ENTER Y= VARS 5 ▶ ▶ 7 GRAPH

TI-83

STAT 1

Enter *x*-values in L1.

1 ENTER 4 ENTER 5 ENTER 8 ENTER
11 ENTER 11 ENTER 15 ENTER 18 ENTER
21 ENTER 25 ENTER 29 ENTER

Enter *y*-values in L2.

8 ENTER 10 ENTER 13 ENTER 15 ENTER
18 ENTER 20 ENTER 22 ENTER 25 ENTER
29 ENTER 32 ENTER 33 ENTER

2nd [STAT PLOT] 1

Choose the following.

On; Type ⌐·⌐ ; Xlist L1; Ylist L2; Mark: ▫

WINDOW 0 ENTER 30 ENTER 5 ENTER
0 ENTER 35 ENTER 5 ENTER

GRAPH STAT ▶ 4 2nd L1 , 2nd L2
ENTER Y= VARS 5 ▶ ▶ 1 GRAPH

SHARP EL-9600c

STAT [A] ENTER

Enter *x*-values in L1.

1 ENTER 4 ENTER 5 ENTER 8 ENTER
11 ENTER 11 ENTER 15 ENTER 18 ENTER
21 ENTER 25 ENTER 29 ENTER

Enter *y*-values in L2.

8 ENTER 10 ENTER 13 ENTER 15 ENTER
18 ENTER 20 ENTER 22 ENTER 25 ENTER
29 ENTER 32 ENTER 33 ENTER

2ndF [STAT PLOT] [A] ENTER

Choose the following.

on; DATA XY; ListX: L1; ListY: L2.

2ndF [STAT PLOT] [G] 3

ZOOM [A] 9 +− ×÷ CL STAT [D] 0 2 (
2ndF [L1] , 2ndF [L2] , VARS +− ×÷ [A]
ENTER 1) ENTER GRAPH

CASIO CFX-9850GA PLUS

From the main menu, select STAT.

Enter *x*-values in List 1.

1 EXE 4 EXE 5 EXE 8 EXE 11 EXE 11 EXE 15 EXE
18 EXE 21 EXE 25 EXE 29 EXE

Enter *y*-values in List 2.

8 EXE 10 EXE 13 EXE 15 EXE 18 EXE 20 EXE
22 EXE 25 EXE 29 EXE 32 EXE 33 EXE

SHIFT F3 0 EXE 30 EXE 5 EXE 0 EXE 35 EXE
5 EXE EXIT

SHIFT [SetUp] F2 EXIT F1 F6

Choose the following. Graph Type: Scatter; Xlist: List1; Ylist: List2; Frequency: 1; MarkType: ▫

EXIT F1 F1 F6

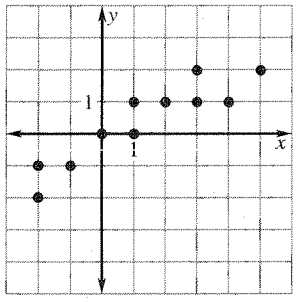
LESSON 2.5

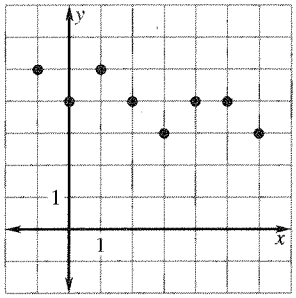
NAME _____ DATE _____

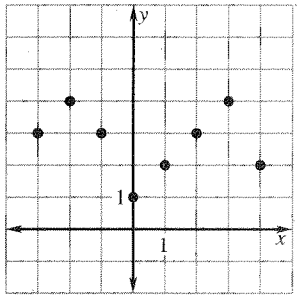
Practice A

For use with pages 100–106

Tell whether *x* and *y* have a *positive correlation*, a *negative correlation*, or *relatively no correlation*.

1. 

2. 

3. 

Draw a scatter plot of the data. Then tell whether the data have a *positive correlation*, a *negative correlation*, or *relatively no correlation*.

4.

x	1	2	3	4	5	6	7	8
y	6	6	5	5	6	5	4	3

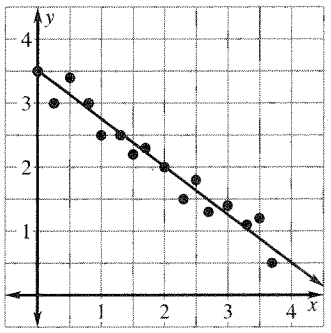
5.

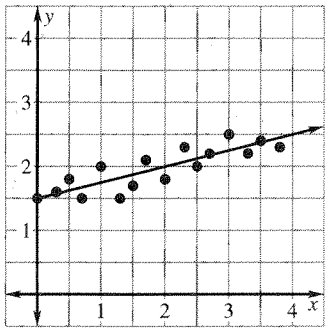
x	1	2	3	4	5	6	7	8
y	4	5	1	6	6	3	1	6

6.

x	1	2	3	4	5	6	7	8
y	2	2	4	6	8	8	10	10

Approximate the best fitting line for the data.

7. 

8. 

9. ***Computers Per Capita*** The table shows the number of computers per 1000 people in the U.S. from 1991 through 1995. Draw a scatter plot of the data and describe the correlation shown.

Year	1991	1992	1993	1994	1995
Computers per 1000 people	245.4	266.9	296.6	329.2	364.7

LESSON 2.5

NAME _____ DATE _____

Practice B

For use with pages 100–106

Lesson 2.5

Draw a scatter plot of the data. Then tell whether the data have a *positive correlation*, a *negative correlation*, or *relatively no correlation*.

1.

x	−3	−2.5	−2	−1.75	−1.5	−1	−0.5	0	0.5	0.75	1	1.5
y	0.25	0.5	1	1.5	1.25	2	2.5	2.5	3	3.25	3.5	3.75

2.

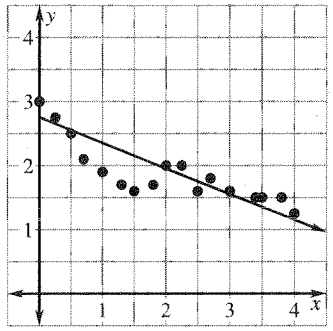
x	0	0.5	1	1.25	1.5	2	2.5	3	3.25	3.5	4	4.25
y	2.75	3	2.5	2	1.75	1	1.25	1.5	2.5	3	3.25	3

3.

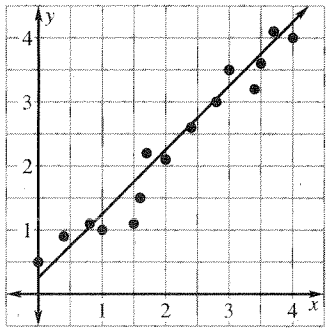
x	−2	−1	−0.5	0	0.25	1	1.5	2.5	2.75	3.5	4	4.5
y	1	1.25	0.5	0	−1	−1.25	−2	−2.25	−2	−3	−3.25	−3.5

Approximate the best-fitting line for the data.

4.



5.



Draw a scatter plot of the data. Then approximate the best-fitting line for the data.

6.

x	−2	−1.5	−1	−0.5	0	0.5	1	1.5	2
y	3	2.5	3	2.4	2.2	2	2.1	1.8	1.5

7.

x	−5	−4	−3	−2	−1	0	1	2	3
y	3	2.5	2.8	3.2	3	4	4.2	4.3	4.5

Broccoli Consumption **In Exercises 8–10, use the following information.**

The table shows the per capita consumption of broccoli, b (in pounds), for the years 1980 through 1989.

Year, t	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Pounds, b	1.6	1.8	2.2	2.3	2.7	2.9	3.5	3.6	4.2	4.5

8. Draw a scatter plot for the data. Let t represent the number of years since 1980.

9. Approximate the best-fitting line for the data.

10. If this pattern were to continue, what would the per capita consumption of broccoli be in 2002?

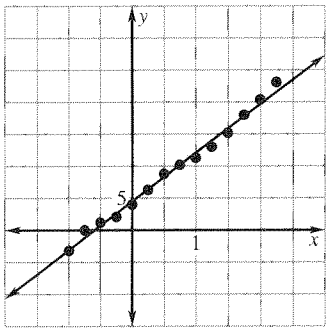
LESSON 2.5

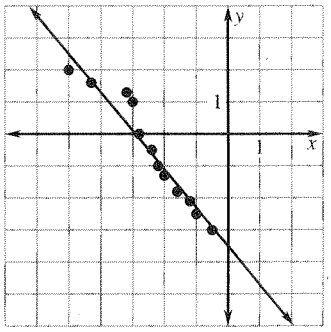
NAME _____ DATE _____

Practice C

For use with pages 100–106

Approximate the best-fitting line for the data.

1. 

2. 

Draw a scatter plot of the data. Then approximate the best-fitting line for the data.

3.

x	−3	−2	−1	0	1	2	3
y	8	7.2	6.4	6	5.5	5	4.8

4.

x	0	1	2	3	4	5	6
y	4	3.5	3.8	4.6	6	7.8	10

5.

x	0	0.5	1	1.5	2	2.5	3
y	0.6	3.2	4.4	5.8	7	8.2	12

African-American Elected Officials **In Exercises 6–8, use the following information.**
The table shows the number of African-American elected officials in U.S. and state legislatures for the years 1984 to 1993.

Year	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Officials	396	407	420	440	436	448	447	484	510	571

6. Draw a scatter plot for the data. Let $t = 4$ represent 1984.
7. Approximate the best-fitting line for the data.
8. If this pattern continues, how many African-American officials will be in the U.S. and state legislatures in 2000?

Home Run Champions **In Exercises 9 and 10, use the following information.**
The table shows the number of home runs hit by the American League Home Run Champion from 1990 to 1996.

Year	1990	1991	1992	1993	1994	1995	1996
Home Runs	51	44	43	46	40	50	52

9. Draw a scatter plot for the data. Let $t = 0$ represent 1990.
10. Approximate the best-fitting line for the data.

LESSON 2.5

NAME _____ DATE _____

Reteaching with Practice

For use with pages 100–106

GOAL **Use a scatter plot to identify the correlation shown by a set of data and approximate the best-fitting line for a set of data**

VOCABULARY

A **scatter plot** is a graph used to determine whether there is a relationship between paired data.

If y tends to increase as x increases, then there is a **positive correlation.**

If y tends to decrease as x increases, then there is a **negative correlation.**

If the points show no linear pattern, then there is **relatively no correlation.**

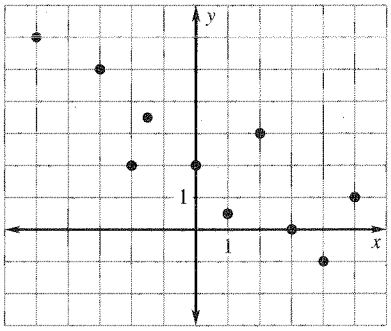
EXAMPLE 1 Determining Correlation

Draw a scatter plot of the data and describe the correlation shown by the scatter plot.

x	−5	−3	−2	−1.5	0	1	2	3	4	5
y	6	5	2	3.5	2	0.5	3	0	−1	1

SOLUTION

The scatter plot shows a negative correlation, which means that as the values of x increase, the values of y tend to decrease.



Exercises for Example 1

Draw a scatter plot of the data. Then tell whether the data have a *positive correlation, negative correlation,* or *relatively no correlation.*

1.

x	−2.5	−2	−2	−1	0	0	0	1	2	2
y	−6	−2.5	−4	0	0	−1	−3	3	1	5

2.

x	−3	−3	−2	−1	0	0	2	2	3	5
y	4	0	−1	2	3	−3	−2	4	2	0

NAME _____ DATE _____

Reteaching with Practice

For use with pages 100–106

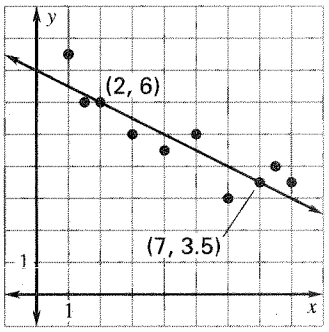
EXAMPLE 2 Fitting a Line to Data

Approximate the best-fitting line for the data in the table.

x	1	1.5	2	3	4	5	6	7	7.5	8
y	7.5	6	6	5	4.5	5	3	3.5	4	3.5

SOLUTION

To begin, draw a scatter plot of the data. Then sketch the line that best fits the points, with as many points above the line as below it.



Now, estimate the coordinates of two points on the line, not necessarily data points. Use these points to find an equation of the line.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3.5 - 6}{7 - 2} = \frac{-2.5}{5} = -\frac{1}{2}$$ Find the slope of the line.

$y - y_1 = m(x - x_1)$ Use point-slope form.

$y - 6 = -\frac{1}{2}(x - 2)$ Substitute for m, x, and y_1.

$y - 6 = -\frac{1}{2}x + 1$ Distributive property

$y = -\frac{1}{2}x + 7$ Solve for y.

Exercises for Example 2

Approximate the best-fitting line for the data.

3.

x	−1	−0.5	0.5	1	1.5	2	3	3.5	4	4.2
y	8	8	7	5.5	10	3	3	0.5	0	−2

4. The data in the table shows the age, t (in years), and the corresponding height, h (in inches), for a male from the age of 2 to the age of 19.

Age (t)	2	3	6	8	10	12	14	15	17	18	19
Height (h)	28	33	40	46	52	55	61	64	70	72	72

NAME _____ DATE _____

Quick Catch-Up for Absent Students

For use with pages 99–107

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

Activity 2.5: Fitting a Line to a Set of Data (p. 99)

____ **Goal:** Approximate the best-fitting line for a set of data.

Lesson 2.5: Correlation and Best-Fitting Lines

____ **Goal 1:** Use a scatter plot to identify the correlation shown by a set of data. (p. 100)

Material Covered:

____ Example 1: Determining Correlation

Vocabulary:

scatter plot, p. 100
negative correlation, p. 100
positive correlation, p. 100
relatively no correlation, p. 100

____ **Goal 2:** Approximate the best-fitting line for a set of data. (pp. 101–102)

Material Covered:

____ Example 2: Fitting a Line to Data

____ Example 3: Using a Fitted Line

Activity 2.5: Using Linear Regression (p. 107)

____ **Goal:** Find the best-fitting line for a set of data using the *linear regression* feature of a graphing calculator.

____ Student Help: Keystroke Help

____ Other (specify) _____

_____

Homework and Additional Learning Support

____ Textbook (specify) pp. 103–106 _____

_____

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

____ *Personal Student Tutor* for Lesson 2.5

LESSON 2.5

NAME _____ DATE _____

Interdisciplinary Application

For use with pages 100–106

The Universe

SCIENCE Some scientists believe that the universe is expanding. Edwin Hubble, an astronomer of the early 20th century, collected data on 24 celestial objects that support this theory. When Hubble observed theses 24 celestial objects, he measured how far they were away from Earth, in *megaparsecs*, and how quickly they were receding from Earth, in kilometers per second.

A *parsec* is a unit that astronomers use to measure distance. One parsec is equal to about 19.2 trillion miles, and a *megaparsec* is equal to a thousand parsecs.

In Exercises 1–4, use the following data that was collected by Hubble.

Distance from Earth, x	2.0	2.0	2.0	2.0	1.7	1.4	1.1	1.1	1.0	0.9	0.9
Velocity, y	500	850	800	1090	960	500	450	500	920	−30	650

Distance from Earth, x	0.9	0.9	0.8	0.63	0.5	0.5	0.45	0.275	0.275	0.263
Velocity, y	150	500	300	200	290	270	200	−185	−220	−70

Distance from Earth, x	0.214	0.034	0.032
Velocity, y	−130	290	170

1. Use a graphing calculator to make a scatter plot of the data. Does the scatter plot show a *positive correlation,* a *negative correlation,* or *relatively no correlation?*
2. Use the linear regression feature of a graphing calculator to find an equation of the best-fitting line for the data.
3. Predict the recession velocity of a new object discovered 1.3 megaparsecs from Earth.
4. Suppose you observed an object receding from Earth at the rate of 250 kilometers per second. Predict its distance from Earth.

NAME _____ DATE _____

Challenge: Skills and Applications

For use with pages 100–106

In Exercises 1–3, use the following data on sweater sales at a small store.

Air temperature (°F)	22	28	34	44
Sweaters sold	57	51	38	26

1. The *mean data point* $(\bar{x}, \bar{y})$ for a set of data is the point whose coordinates are the average of all the x-coordinates and the average of all the y-coordinates, respectively.

   a. Calculate the mean data point $(\bar{x}, \bar{y})$ for the data above.

   b. Subtract the coordinates of the mean data point that you found in Part (a) from the coordinates of each data point; that is, subtract the $\bar{x}$ from each x-coordinate and the $\bar{y}$ from each y-coordinate, to get a new table of data points. What is the new mean data point? Make a conjecture based on your answer.

2. **a.** Calculate the slope m of the best-fitting line for the data above, using the following formula

$$m = \frac{(x_1 - \bar{x})(y_1 - \bar{y}) + (x_2 - \bar{x})(y_2 - \bar{y}) + \cdots + (x_n - \bar{x})(y_n - \bar{y})}{(x_1 - \bar{x})^2 + (x_2 - \bar{x})^2 + \cdots + (x_n - \bar{x})^2}$$

   Note: You have already calculated the numbers in parentheses in Exercise 1.

   b. The best-fitting line always passes through the point $(\bar{x}, \bar{y})$. Use this fact to write the equation of the best-fitting line for the data above.

3. The *standard deviation* of a set of data is a measure of how much variation there is in the values of a single variable. (Thus, for the data above, there will be a standard deviation for the x-coordinates, denoted σ_x, ("sigma sub x"), and a standard deviation for the y-coordinates, σ_y.)

   a. Use the following formula to find σ_x, for the data above, and the corresponding formula to find σ_y.

$$\sigma_x = \sqrt{\frac{(x_1 - \bar{x})^2 + (x_2 - \bar{x})^2 + \cdots + (x_n - \bar{x})^2}{n}}$$

   b. Find the standard deviation for the new data you found in part (b) of Exercise 1. Make a conjecture about the standard deviation of such translated data.

LESSON 2.6

TEACHER'S NAME _____ CLASS _____ ROOM _____ DATE _____

Lesson Plan for Block Scheduling

Half-day lesson (See *Pacing the Chapter*, TE pages 64C–64D) **For use with pages 108–113**

GOALS

1. **Graph linear inequalities in two variables.**
2. **Use linear inequalities to solve real-life problems.**

State/Local Objectives _____

_____

_____

CHAPTER PACING GUIDE	
Day	**Lesson**
1	2.1 (all); 2.2 (all)
2	2.3 (all)
3	2.4 (all)
4	2.5 (all); **2.6 (all)**
5	2.7 (all); 2.8 (all)
6	Review/Assess Ch. 2

Lesson 2.6

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

STARTING OPTIONS

____ Homework Check: TE page 103; Answer Transparencies
____ Warm-Up or Daily Homework Quiz: TE pages 108 and 106, CRB page 80, or Transparencies

TEACHING OPTIONS

____ Motivating the Lesson: TE page 109
____ Lesson Opener (Activity): CRB page 81 or Transparencies
____ Examples 1–4: SE pages 108–110
____ Extra Examples: TE pages 109–110 or Transparencies; Internet
____ Closure Question: TE page 110
____ Guided Practice Exercises: SE page 111

APPLY/HOMEWORK

Homework Assignment (See also the assignment for Lesson 2.5.)

____ Block Schedule: 14–44 even, 45–49, 52, 57–73 odd

Reteaching the Lesson

____ Practice Masters: CRB pages 82–84 (Level A, Level B, Level C)
____ Reteaching with Practice: CRB pages 85–86 or Practice Workbook with Examples
____ Personal Student Tutor

Extending the Lesson

____ Applications (Real Life): CRB page 88
____ Challenge: SE page 113; CRB page 89 or Internet

ASSESSMENT OPTIONS

____ Checkpoint Exercises: TE pages 109–110 or Transparencies
____ Daily Homework Quiz (2.6): TE page 113, CRB page 92, or Transparencies
____ Standardized Test Practice: SE page 113; TE page 113; STP Workbook; Transparencies

Notes _____

_____

_____

LESSON 2.6

NAME _____ DATE _____

Available as a transparency

WARM-UP EXERCISES

For use before Lesson 2.6, pages 108–113

Graph each line on the same coordinate grid.

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

DAILY HOMEWORK QUIZ

For use after Lesson 2.5, pages 99–107

1. Draw a scatter plot of the data. Tell whether x and y have a *positive correlation,* a *negative correlation,* or *relatively no correlation.*

   $(-3, 1), (-3, 2), (-2, 0), (-1, 2), (0, 0),$

   $(1, -2), (2, -1), (2, -2), (3, -1), (3, -3)$

2. Draw a scatter plot of the data. Approximate the best-fitting line.

   $(2, 10), (2, 12), (4, 11), (6, 7), (6, 9),$

   $(8, 6), (8, 8), (10, 6), (12, 3), (12, 6)$

3. Use the results from Exercise 2 to predict the value of y when $x = 14$.

LESSON 2.6

NAME _____ DATE _____

Available as a transparency

Activity Lesson Opener

For use with pages 108–113

SET UP: Work in a group.
YOU WILL NEED: • colored pencils • ruler

Use the inequality that is assigned to you.

Group 1: $y \geq 2x - 3$

Group 2: $y \leq 2x - 3$

Group 3: $y \leq -2x + 3$

Group 4: $y \geq -2x - 3$

Group 5: $y < \frac{1}{2}x + 2$

Group 6: $y > \frac{1}{2}x - 2$

Group 7: $y > -\frac{1}{2}x + 2$

Group 8: $y > -\frac{1}{2}x - 2$

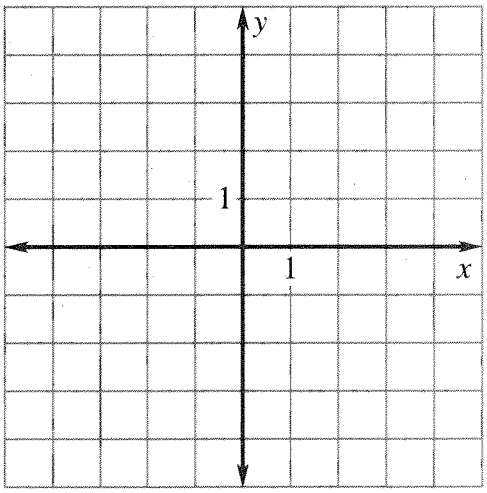
Group 9: $y > 2x - 4$

Group 10: $y < -2x + 4$

Your teacher will call out ordered pairs randomly generated by flipping a coin and rolling a number cube twice. Heads indicate the number on the number cube is positive and tails indicate it is negative. A 6 on a number cube will be a zero.

1. Decide if the ordered pair is a solution to the inequality. If it is, plot it on the grid with a red pencil. If it is not, plot it with a blue pencil.

After ten points are called out, the group with the most red points wins.



2. The boundary of the solution region is a line. Is the boundary line included in the region? If it is, graph it with a red pencil. If not, graph it with a blue pencil. Finish graphing the inequality by shading the entire solution with a red pencil.

LESSON 2.6

NAME _____ DATE _____

Practice A

For use with pages 108–113

Check whether the given ordered pairs are solutions of the inequality.

1. $x + y < 5$; $(1, 2), (7, -2)$
2. $x > 3$; $(0, 4), (5, 1)$
3. $y \leq -1$; $(-1, 3), (2, -1)$
4. $y - x \geq -1$; $(5, 6), (-3, -1)$
5. $x < 2y + 5$; $(4, 0), (-4, -5)$
6. $y \geq x - 7$; $(2, 4), (8, -3)$

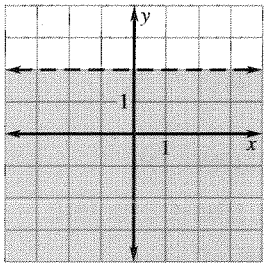
Graph the inequality in a coordinate plane.

7. $x > -3$
8. $x < 1$
9. $x \geq 5$
10. $x \leq -7$
11. $y > 1$
12. $y < -6$
13. $y \leq -2$
14. $y \geq 4$

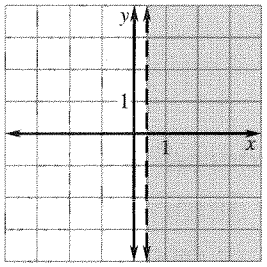
Match the inequality with its graph.

15. $3x + y > 1$
16. $2x - y \leq -3$
17. $-4x + y < -1$
18. $-2x + y \leq 0$
19. $5x > 2$
20. $3y < 6$

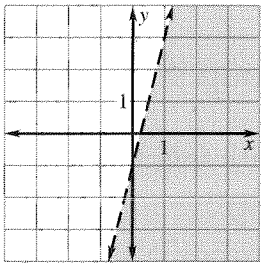
A.



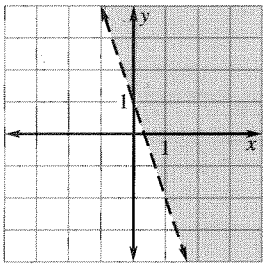
B.



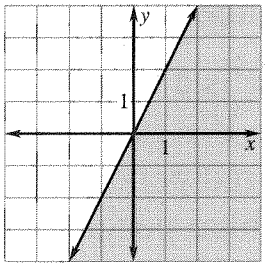
C.



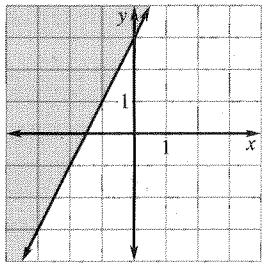
D.



E.



F.



Basketball Stats **In Exercises 21–23, use the following information.**

In order for this year's star basketball player to break the school record for most points (excluding free throws), he must score at least 34 points. The points may be scored by two-point shots and three-point shots.

21. Write an inequality that represents the number of two- and three-point shots he needs to break the record.
22. In the first game he scored 13 two-point shots and 2 three-point shots. Did he break the record?
23. Give two possible combinations of two- and three-point shots that will give him the record.

LESSON 2.6

NAME _____ DATE _____

Practice B

For use with pages 108–113

Check whether the given ordered pairs are solutions of the inequality.

1. $2x - 3y \leq 2$; $(0, -1), (3, 2)$
2. $x + 2y > 4$; $(2, 1), (-3, 6)$
3. $5x + y \geq -3$; $(-3, 6), (2, -5)$
4. $3x - 10y < -8$; $(6, 3), (-4, -2)$
5. $4y - 2x < 5$; $(2, 0), (-3, 1)$
6. $2y + x \geq 3$; $(-1, -2), (1, 1)$

Graph the inequality in a coordinate plane.

7. $x \geq 1$
8. $x < -\frac{1}{2}$
9. $2x > 6$
10. $y < 4$
11. $y \geq -5$
12. $\frac{1}{3}y \geq -2$
13. $y < 2x - 1$
14. $y \geq \frac{1}{2}x + 5$
15. $4x + y \leq -2$
16. $x + 2y > 4$
17. $-5x + 5y > 1$
18. $3x - y \leq 7$
19. $2x - 4y > 8$
20. $6x - 3y \geq -1$
21. $12x + 4y < 8$

Defrosting Meat **In Exercises 22–24, use the following information.**
According to one cookbook, you should always defrost meat in the original wrappings on a refrigerator shelf. You should allow 5 hours for each pound, less for thinner cuts.

22. Write and graph an inequality that represents the time t (in hours) and the number of pounds p of meat being defrosted. Use t on the vertical axis and p on the horizontal axis.
23. What are the coordinates of a 2-pound roast that has been defrosting for 12 hours?
24. Is it possible that the roast in Exercise 23 is completely defrosted? Explain your answer.

Fundraiser **In Exercises 25–27, use the following information.**
An environmentalist group is planning a fundraiser. The group wants to purchase caps and T-shirts with their logo on them and sell them at a profit. They can buy caps for \$3 each and T-shirts for \$5 each. They have \$800 to spend.

25. Write and graph an inequality that represents the numbers of caps x and T-shirts y that the group can buy.
26. Suppose the group purchased 50 caps and 150 T-shirts. What point on the coordinate plane represents this purchase?
27. Is the point in Exercise 26 a solution of the inequality?

LESSON 2.6

NAME _____ DATE _____

Practice C

For use with pages 108–113

Graph the inequality in a coordinate plane.

1. $x - 3 < 5$
2. $y + 2 > -3$
3. $-3x + 2y \geq 0$
4. $-4x + 7y > 0$
5. $2x + 3y \leq 6$
6. $4x - 3y > 12$
7. $3x - 2y \geq 9$
8. $-5x + 3y < 10$
9. $7x + 4y \leq 8$
10. $6x - 5y > 10$
11. $4x + 3y \geq 2$
12. $8x - 9y \leq 3$
13. $2x + 3y < 5$
14. $4x - 3y > 1$
15. $3x + 5y \leq 8$

Test Scores **In Exercises 16–18, use the following information.**

A history exam included multiple choice questions that were worth 4 points each and true/false questions that were worth 2 points each. The highest score earned by a person in your class was 92.

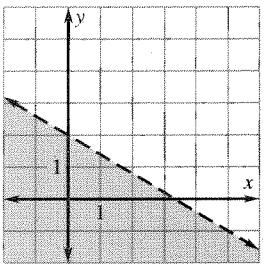
16. Write an inequality that represents the number of multiple choice questions and true/false questions that could have been answered correctly by any member of your class.
17. Graph the inequality.
18. Is it possible that someone answered 20 multiple choice questions and 7 true/false questions correctly?

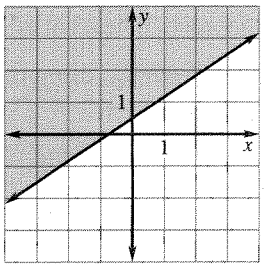
Babysitting Wages **In Exercises 19 and 20, use the following information.**

You earn \$3 per hour when you babysit the Thompson children. You earn \$3.50 per hour when you babysit the Stewart children. You would like to buy a \$47.50 ticket for a concert that is coming to town in 5 weeks.

19. Write and graph an inequality that represents the number of hours you need to babysit for the Thompson's and Stewart's to earn enough money to buy your concert ticket.
20. Give three possible combinations of babysitting hours that satisfy the inequality.

Visual Thinking Write the inequality represented by the graph.

21. 

22. 

LESSON 2.6

NAME _____ DATE _____

Reteaching with Practice

For use with pages 108–113

GOAL **Graph linear inequalities in two variables and use linear inequalities to solve real-life problems**

VOCABULARY

A **linear inequality** in two variables can be written in one of the following forms: $Ax + By < C$, $Ax + By \leq C$, $Ax + By > C$, $Ax + By \geq C$.

An ordered pair (x, y) is a **solution** of a linear inequality if the inequality is true when the values for x and y are substituted into the inequality.

A **graph** of a linear inequality in two variables is the graph of all solutions of the inequality.

The boundary line of the inequality divides the coordinate plane into two **half-planes;** a shaded region containing the points that are solutions of the inequality, and an unshaded region which contains the points that are not.

EXAMPLE 1 Checking Solutions of Inequalities

Check whether the given ordered pair is a solution of $-x + 2y < 6$.

a. $(0, -6)$ **b.** $(2, 4)$ **c.** $(-3, 2)$

SOLUTION

Ordered Pair	Substitute	Conclusion
a. $(0, -6)$	$-(0) + 2(-6) = -12 < 6$	$(0, -6)$ is a solution.
b. $(2, 4)$	$-(2) + 2(4) = 6 \not< 6$	$(2, 4)$ is not a solution.
c. $(-3, 2)$	$-(-3) + 2(2) = 7 \not< 6$	$(-3, 2)$ is not a solution.

Exercises for Example 1

Check whether the given ordered pairs are solutions of the inequality.

1. $x \geq -1$; $(-1, -2), (5, 2)$

2. $y \leq x + 1$; $(4, 5), (-2, 1)$

3. $y > 5$; $(2, 6), (0, 2)$

4. $4x < -9$; $(3, -2), (-2, -5)$

EXAMPLE 2 Graphing Linear Inequalities in One Variable

Graph (a) $2y > 6$ and (b) $x \geq -5$ in the coordinate plane.

SOLUTION

a. Graph the boundary line $y = 3$. Use a dashed line because $y > 3$.

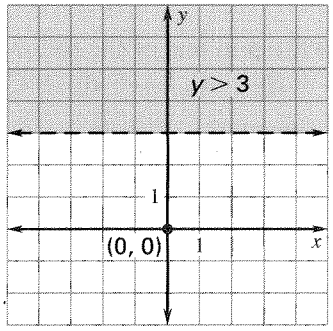
b. Graph the boundary line $x = -5$. Use a solid line because $x \geq -5$.

NAME _____ DATE _____

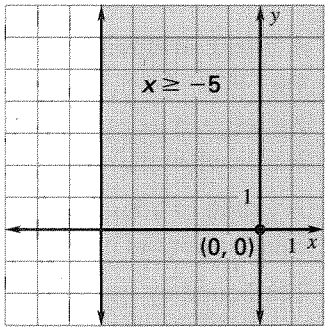
Reteaching with Practice

For use with pages 108–113

Test the point (0, 0). Because (0, 0) is *not* a solution of the inequality, shade the half-plane above the line.



Test the point (0, 0). Because (0, 0) *is* a solution of the inequality, shade the half-plane to the right of the line.



Exercises for Example 2

Graph the inequality in the coordinate plane.

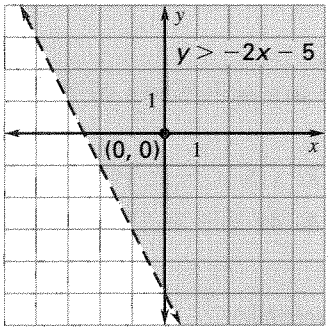
5. $2x \geq -4$ **6.** $-y < -2$ **7.** $3x \leq 9$

EXAMPLE 3 Graphing Linear Inequalities in Two Variables

Graph $y > -2x - 5$.

SOLUTION

Graph the boundary line $y = -2x - 5$. Use a dashed line because $y > -2x - 5$. Test the point (0, 0). Because (0, 0) *is* a solution of the inequality, shade the half-plane above the line.



Exercises for Example 3

Graph the inequality.

8. $y \geq -x + 2$ **9.** $y < -\frac{1}{2}x + 4$ **10.** $-y \leq x + 3$

LESSON 2.6

NAME _____ DATE _____

Quick Catch-Up for Absent Students

For use with pages 108–113

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

Lesson 2.6: Linear Inequalities in Two Variables

____ **Goal 1:** Graph linear inequalities in two variables. (pp. 108–109)

Material Covered:

____ Example 1: Checking Solutions of Inequalities

____ Activity: Investigating the Graph of an Inequality

____ Student Help: Look Back

____ Example 2: Graphing Linear Inequalities in One Variable

____ Student Help: Study Tip

____ Example 3: Graphing Linear Inequalities in Two Variables

Vocabulary:

linear inequality in two variables, p. 108
solution of a linear inequality in two variables, p. 108
graph of a linear inequality in two variables, p. 108
half-plane, p. 108

____ **Goal 2:** Use linear inequalities to solve real-life problems. (p. 110)

Material Covered:

____ Example 4: Writing and Using a Linear Inequality

____ Other (specify) _____

_____

Homework and Additional Learning Support

____ Textbook (specify) pp. 111–113

_____

____ Internet: Extra Examples at www.mcdougallittell.com

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

____ *Personal Student Tutor* for Lesson 2.6

Lesson 2.6

LESSON 2.6

NAME _____ DATE _____

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

For use with pages 108–113

Playing Computer Games

Some of the more popular computer games are called simulations. They generally take a real-life situation and reproduce it in an exciting and entertaining way.

Suppose you are playing a game that simulates the workings of an ancient tribe of people. These people have to support their village by obtaining food from the wild. Since they are rather primitive, they only know of two ways of getting food: hunting and gathering. You are going to use your knowledge of linear inequalities to direct your people in the most efficient way to gather food.

Suppose your tribe of people has ten people designated to gather food, with the following conditions.

- Each one of them can gather food for up to twelve hours a day.
- Each hour hunting will yield six units of food, while each hour gathering will yield four.
- Tribal customs require that for each hour hunting, at least two hours must be spent gathering.

Answer the following questions to optimize the amount of food that your people can gather.

1. How many hours total can the tribe devote to obtaining food each day?
2. Let x represent hours spent hunting and y represent hours spent gathering. Write an inequality to represent how these quantities relate to the total number of hours spent obtaining food.
3. Write an inequality using x and y to represent the restriction due to tribal customs.
4. Knowing that each hour hunting will yield six units of food, while each hour gathering will yield four, write an expression using x and y to represent how much food is collected.
5. Graph the inequalities from Exercises 2 and 3. Also, graph the inequalities $x \geq 0$ and $y \geq 0$ (because these variables can't be less than zero—you cannot work negative hours!). Shade in the areas that *all* the inequalities share. Your shaded area should look like a polygon.
6. Pick four ordered pairs inside the region you have just shaded, and evaluate them in the expression you found in Exercise 4. Which pair yields the most food?
7. Compare your answers with others in the class, and see who has the best scheme for gathering food.

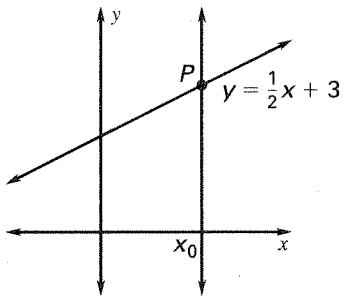
LESSON 2.6

NAME _____ DATE _____

Challenge: Skills and Applications

For use with pages 108–113

1. In the graph at the right, the solid line is the graph of $y = \frac{1}{2}x + 3$.



   a. What is the equation of the vertical line shown? In terms of x_0, what is the y-coordinate of the point where it intersects the graph?

   b. Write an inequality in one variable whose solutions are precisely the y-coordinates of the points on the vertical line and *above* the graph.

   c. Based on your answers to parts (a) and (b), describe a method of graphing an inequality in two variables that does not require testing any points.

In Exercises 2 and 3, graph each inequality.

2. $2(x - y) < 3x + y + 2$

3. $\frac{2x + 4}{y} \leq 5$ (*Hint*: Graph the equality, then consider the inequality cases $y > 0$ and $y < 0$ separately.)

4. a. Describe in words the family of lines whose questions are of the form $y - 2 = m(x - 5)$, for all possible values of m.

   b. For what values of m will the lines have a y-intercept that is greater than or equal to 0?

   c. For what values of m will the lines have an x-intercept that is greater than or equal to 0? For what values of m will both intercepts be positive?

5. Suppose a line is defined by the parametric equations

   $x = a + 2t$

   $y = b + 3t$.

   a. By solving for t in the first equation and substituting the expression you get into the second equation, write the equation of the line in point-slope form, in terms of the constants a and b.

   b. Suppose you know that $a \leq 4$ and $b \geq 5$. Write a single inequality in x and y that describes the half-plane consisting of the point lines satisfying the parametric equations in part (a).

LESSON 2.7

TEACHER'S NAME _____ CLASS _____ ROOM _____ DATE _____

Lesson Plan

1-day lesson (See *Pacing the Chapter*, TE pages 64C–64D) **For use with pages 114–121**

GOALS

1. **Represent piecewise functions.**
2. **Use piecewise functions to model real-life quantities.**

State/Local Objectives _____

_____

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

STARTING OPTIONS

____ Homework Check: TE page 111; Answer Transparencies
____ Warm-Up or Daily Homework Quiz: TE pages 114 and 113, CRB page 92, or Transparencies

TEACHING OPTIONS

____ Lesson Opener (Application): CRB page 93 or Transparencies
____ Graphing Calculator Activity with Keystrokes: CRB pages 94–95
____ Examples 1–6: SE pages 114–116
____ Extra Examples: TE pages 115–116 or Transparencies
____ Technology Activity: SE page 121
____ Closure Question: TE page 116
____ Guided Practice Exercises: SE page 117

APPLY/HOMEWORK

Homework Assignment

____ Basic 14–26 even, 27–41 odd, 60, 61, 63–71 odd
____ Average 14–26 even, 27–43 odd, 50–52, 60, 61, 63–71 odd
____ Advanced 14–26 even, 27–47 odd, 50–55, 60–62, 63–71 odd

Reteaching the Lesson

____ Practice Masters: CRB pages 96–98 (Level A, Level B, Level C)
____ Reteaching with Practice: CRB pages 99–100 or Practice Workbook with Examples
____ Personal Student Tutor

Extending the Lesson

____ Applications (Interdisciplinary): CRB page 102
____ Challenge: SE page 120; CRB page 103 or Internet

ASSESSMENT OPTIONS

____ Checkpoint Exercises: TE pages 115–116 or Transparencies
____ Daily Homework Quiz (2.7): TE page 120, CRB page 106, or Transparencies
____ Standardized Test Practice: SE page 120; TE page 120; STP Workbook; Transparencies

Notes _____

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