LESSON 2.3

TEACHER'S NAME ____________ CLASS ______ ROOM ______ DATE ______

Lesson Plan for Block Scheduling

1-day lesson (See *Pacing the Chapter,* TE pages 64C–64D) For use with pages 82–90

GOALS

1. Use the slope-intercept form of a linear equation to graph linear equations.
2. Use the standard form of a linear equation to graph linear equations.

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 79; Answer Transparencies
____ Warm-Up or Daily Homework Quiz: TE pages 82 and 81, CRB page 38, or Transparencies

TEACHING OPTIONS

____ Motivating the Lesson: TE page 83
____ Lesson Opener (Application): CRB page 39 or Transparencies
____ Graphing Calculator Activity with Keystrokes: CRB page 40
____ Examples 1–5: SE pages 83–85
____ Extra Examples: TE pages 83–85 or Transparencies
____ Technology Activity: SE page 90
____ Closure Question: TE page 85
____ Guided Practice Exercises: SE page 86

APPLY/HOMEWORK

Homework Assignment

____ Block Schedule: 16–18, 20–36 even, 37–40, 44, 46, 52–60 even, 61, 63–67, 69–85 odd, 86; Quiz 1: 1–11

Reteaching the Lesson

____ Practice Masters: CRB pages 41–43 (Level A, Level B, Level C)
____ Reteaching with Practice: CRB pages 44–45 or Practice Workbook with Examples
____ Personal Student Tutor

Extending the Lesson

____ Applications (Interdisciplinary): CRB page 47
____ Math & History: SE page 89; CRB page 48; Internet
____ Challenge: SE page 88; CRB page 49 or Internet

ASSESSMENT OPTIONS

____ Checkpoint Exercises: TE pages 83–85 or Transparencies
____ Daily Homework Quiz (2.3): TE page 88, CRB page 53, or Transparencies
____ Standardized Test Practice: SE page 88; TE page 88; STP Workbook; Transparencies
____ Quiz (2.1–2.3): SE page 89; CRB page 50

Notes ____________

Lesson 2.3

LESSON 2.3

NAME ______________________ DATE ________

Available as a transparency

Warm-Up Exercises

For use before Lesson 2.3, pages 82–90

Solve for y when $x = 0$.

1. $2x + 2y = 12$
2. $y - 4x = 8$
3. $200y + 400x = 1200$

Solve for y.

4. $2x + y = 150$
5. $8x - 3y = 6$

Daily Homework Quiz

For use after Lesson 2.2, pages 75–81

Find the slope of the line through the given points. Tell whether the line *rises, falls, is horizontal,* or *is vertical.*

1. $(2, -4), (1, 5)$
2. $(3, 4), (-5, 4)$

Tell which line is steeper.

3. Line 1: through $(-3, 5)$ and $(2, -5)$
   Line 2: through $(4, -1)$ and $(0, 3)$
4. Line 1: through $(2, 4)$ and $(-1, 7)$
   Line 2: through $(3, -1)$ and $(4, 1)$
5. Tell whether the lines are *parallel, perpendicular,* or *neither.*
   Line 1: through $(-2, 6)$ and $(2, -4)$
   Line 2: through $(-2, -1)$ and $(3, 1)$
6. Find the average rate of change in y where x is in seconds and y is in feet for the points $(5, 6)$ and $(3, 2)$.

Lesson 2.3

LESSON **2.3**

NAME ______________________ DATE __________

Available as a transparency

Application Lesson Opener

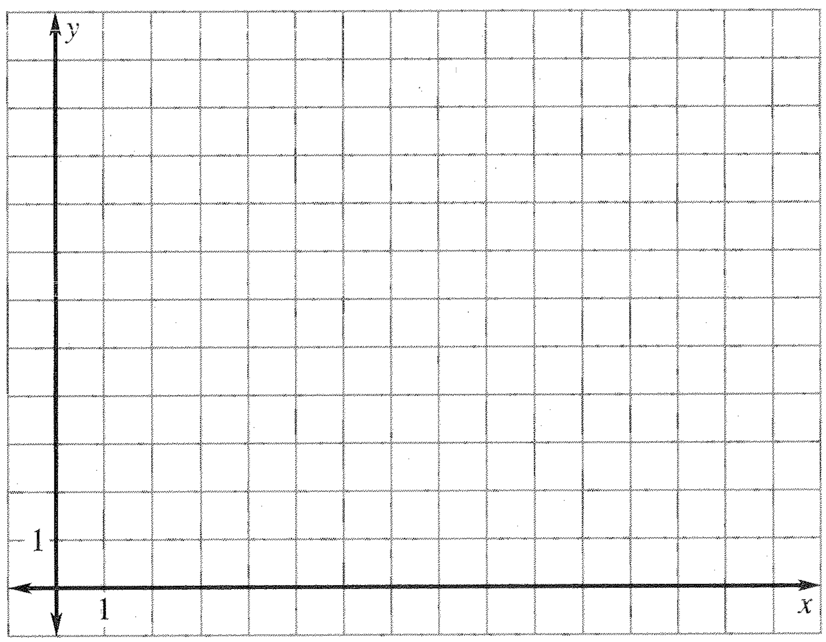
For use with pages 82–89

During last night's basketball game, Lisa Schmidt made 30 points in field goals. A field goal is worth 2 or 3 points.

1. If Lisa made 9 field goals worth 2 points each, how many did she make worth 3 points each?

2. Let x represent the number of 2-point field goals Lisa made and y represent the number of 3-point field goals she made. Write an equation to model the situation.

3. Plot several points to graph the equation.



4. Where does the line cross the x-axis? What does this point represent in terms of Lisa's points?

5. Where does the line cross the y-axis? What does this point represent in terms of Lisa's points?

Lesson 2.3

LESSON 2.3

NAME ______________________ DATE ____________

Graphing Calculator Activity Keystrokes

For use with page 90

TI-82

[Y=] [(-)] [(] 1 [÷] 6 [)] [X,T,θ] [+] 5
[WINDOW] [ENTER] [(-)] 5 [ENTER] 40 [ENTER]
5 [ENTER] [(-)] 10 [ENTER] 20 [ENTER] 5 [ENTER]
[GRAPH]

TI-83

[Y=] [(-)] [(] 1 [÷] 6 [)] [X,T,θ,n] [+] 5
[WINDOW] [(-)] 5 [ENTER] 40 [ENTER] 5 [ENTER]
[(-)] 10 [ENTER] 20 [ENTER] 5 [ENTER] 1 [ENTER]
[GRAPH]

SHARP EL-9600c

[Y=] [(-)] [(] 1 [÷] 6 [)] [X/θ/T/n] [+] 5
[WINDOW] [(-)] 5 [ENTER] 40 [ENTER] 5 [ENTER]
[(-)] 10 [ENTER] 20 [ENTER] 5 [ENTER]
[GRAPH]

CASIO CFX-9850GA PLUS

From the main menu, select GRAPH.

[(-)] [(] 1 [÷] 6 [)] [X,θ,T] [+] 5 [EXE]
[SHIFT] [F3] [(-)] 5 [EXE] 40 [EXE] 5 [EXE]
[(-)] 10 [EXE] 20 [EXE] 5 [EXE] [EXIT] [F6]

Lesson 2.3

LESSON 2.3

NAME ____________________ DATE ________

Practice C

For use with pages 82–89

Find the slope and the y-intercept of the line.

1. $y = 4x + 2$
2. $y = -3x + \frac{1}{2}$
3. $y = -\frac{2}{3}x + 4$
4. $y = -3 + 2x$
5. $y = 6$
6. $4x - 3y + 1 = 0$
7. $7x + 5y - 8 = 0$
8. $-3x + 2y + 4 = 0$
9. $-8x + 3y = 0$
10. $-2x + 5y - 7 = 0$
11. $3x - 7y + 1 = 0$
12. $x + 2y - 5 = 0$

Find the intercepts of the line.

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

Graph the equation.

22. $y = -3x + 5$
23. $y = -2x - \frac{1}{2}$
24. $y = \frac{3}{4}x + 1$
25. $x = \frac{4}{3}$
26. $2x + 3y + 6 = 0$
27. $3x - 4y = 10$
28. $-x + 2y - 8 = 0$
29. $\frac{1}{2}x + 2y - 3 = 0$
30. $4x - \frac{3}{2}y - 1 = 0$

31. ***Fund Raiser*** The marching band holds a fund raiser each year in which they sell t-shirts and sweatshirts with the school's name and mascot on it. The t-shirts sell for \$7 and the sweatshirts sell for \$15. The band needs to raise \$3000. Write a model that shows the number of t-shirts and sweatshirts that must be sold. Then graph the model and determine three combinations of t-shirts and sweatshirts that satisfy the model.

32. ***Linear Depreciation*** A business purchases a piece of equipment for \$300,000. The value, V, of the machine after t years is represented by the model $2V + 100{,}001t = 600{,}000$.

    a. Find the V-intercept of the model. What does the V-intercept represent?

    b. Find the slope of the model. What does the slope represent?

LESSON 2.3

NAME ______________________ DATE __________

Reteaching with Practice

For use with pages 82–89

GOAL **Use the slope-intercept and standard forms of linear equations to graph linear equations**

VOCABULARY

The **slope-intercept form** of a linear equation is $y = mx + b$, where m is the slope and b is the y-intercept.

The **standard form** of a linear equation is $Ax + By = C$, where A and B are not both zero.

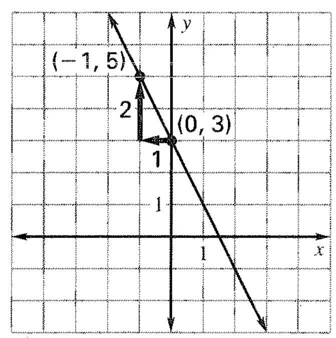
The ***y*-intercept** is the y-coordinate of the point where the graph crosses the y-axis and is found by letting $x = 0$ and solving for y.

The ***x*-intercept** is the x-coordinate of the point where the graph crosses the x-axis and is found by letting $y = 0$ and solving for x.

EXAMPLE 1 Graphing with the Slope-Intercept Form

Graph $2x + y = 3$.

SOLUTION



1. Write the equation in slope-intercept form by subtracting $2x$ from each side.

   $y = -2x + 3$

2. The y-intercept is 3, so plot the point (0, 3).
3. The slope is $-\frac{2}{1}$, so plot a second point by moving 1 unit to the left and 2 units up. This point is $(-1, 5)$.
4. Draw a line through the two points.

Exercises for Example 1

Graph the equation.

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

EXAMPLE 2 Graphing with the Standard Form

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

SOLUTION

1. The equation is already in standard form.
2. $-2x + 3(0) = -6$ Let $y = 0$.

   $x = 3$ Solve for x.

   The x-intercept is 3, so plot (3, 0) .

continued

NAME ______________________ DATE ___________

Reteaching with Practice

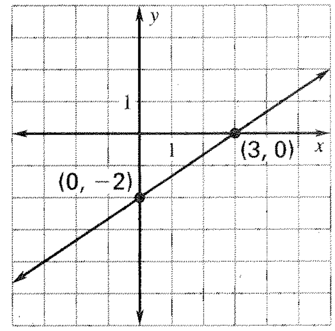
For use with pages 82–89

3. $-2(0) + 3y = -6$ Let $x = 0$.

   $y = -2$ Solve for y.

   The y-intercept is -2, so plot $(0, -2)$.

4. Draw a line through the two points.



Exercises for Example 2

Graph the equation.

4. $-x + 4y = 8$ **5.** $2x + 5y = -10$ **6.** $2x - y = 4$

7. $x = -3$ **8.** $y = -6$ **9.** $x = 4$

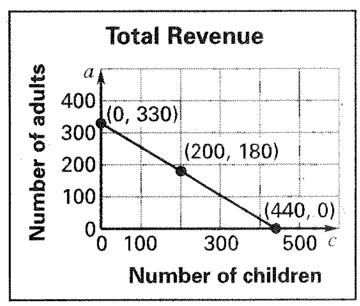
EXAMPLE 3 Using the Standard Form

Sales for the firefighter's benefit dinner were \$1980. The cost for a child's dinner was \$4.50 and an adult's dinner was \$6.00. Describe the number of children and adults who attended to reach this amount.

SOLUTION

Verbal Model [Cost per child] · [Number of children] + [Cost per adult] · [Number of adults] = [Total revenue]

Algebraic Model $4.50c + 6.00a = 1980$



The graph of $4.5c + 6a = 1980$ is a line that intersects the c-axis at (440, 0) and the a-axis at (0, 330). Points with integer coefficients on the line segment joining (440, 0) and (0, 330) represent the numbers of children and adults that could have attended. One way to earn \$1980 would be to sell 200 children's tickets and 180 adult's tickets.

Exercises for Example 3

10. Members of the chorus need to raise \$650 selling hoagies and pizzas. The profit they receive on each hoagie is \$1.25 and \$2.50 for each pizza. Find three different combinations for the numbers of each sold to raise the needed amount.

11. Daniel is employed at two different restaurants. At one restaurant he makes \$5.35 per hour and at the other he makes \$6.25. Daniel needs to earn \$105.30 a week to pay his bills. Describe the number of hours he could work at each restaurant to earn this amount.

LESSON 2.3

NAME ______________________________ DATE __________

Quick Catch-Up for Absent Students

For use with pages 82–90

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

Lesson 2.3: Quick Graphs of Linear Equations

____ **Goal 1:** Use the slope-intercept form of a linear equation to graph linear equations. (pp. 82–83)

Material Covered:

____ Activity: Investigating Slope and y-intercept

____ Example 1: Graphing with the Slope-Intercept Form

____ Example 2: Using the Slope-Intercept Form

Vocabulary:

y-intercept, p. 84 slope-intercept form of a linear equation, p. 84

____ **Goal 2:** Use the standard form of a linear equation to graph linear equations. (pp. 84–85)

Material Covered:

____ Student Help: Look back

____ Example 3: Drawing Quick Graphs

____ Example 4: Graphing Horizontal and Vertical Lines

____ Student Help: Study Tip

____ Example 5: Using the Standard Form

Vocabulary:

standard form of a linear equation, p. 84

x-intercept, p. 84

Activity 2.3: Graphing Equations (p. 90)

____ **Goal:** Graph equations of the form $y = f(x)$ using a graphing calculator.

____ Student Help: Keystroke Help

____ Other (specify) ______________________________

____

Homework and Additional Learning Support

____ Textbook (specify) pp. 86–89

____

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

____ *Personal Student Tutor* for Lesson 2.3

Lesson 2.3

LESSON
2.3

NAME ______________________ DATE ________

Interdisciplinary Application

For use with pages 82–89

The Internet

COMPUTER SCIENCE The Internet has become a major tool for any institution that uses computers. Indeed, some businesses do nothing but work in designing material to be exchanged over the Internet through the World Wide Web (WWW). To transmit information on the WWW, designers and programmers must translate the information into a special computer language known as HTML (Hypertext Markup Language), thus making it available for others to view.

One of the major concerns of these WWW designers is the concept of load time—the time it takes for a computer to transfer an entire document from one computer to another. There are many factors that influence this speed-of-transfer, but the most obvious is the length of the document. Longer documents take longer to transfer.

In Exercises 1–6, use the following information.

Suppose you were starting a company that wanted to provide complete works of literature over the Internet for English classes to use. The following questions have to do with some decisions you will have to make in setting up your business.

The HTML programmers gathered some sample novels and calculated that, if x is the number of words in a novel and y is load time of the novel (in seconds), then the relationship between the two is

$$y = 0.003x + 2.2.$$

1. What is the slope of the line given by this equation?

2. Using your own words, say what the slope represents.

3. What is the y-intercept of this equation?

4. Using your own words, say what the y-intercept represents.

5. Write the equation in standard form.

6. Graph the equation.

In Exercises 7–11, calculate the load times of the following works of literature using the given word counts.

7. *Gulliver's Travels* by Jonathan Swift: 106,014 words

8. *Flatland* by Edwin Abbot: 14,784 words

9. *Titus Andronicus* by William Shakespeare: 22,962 words

10. Research has determined that users will not want to wait more than 60 seconds for a document to load. Which of the works in Exercises 7, 8, and 9 will load in this time?

11. What would you suggest as a remedy for pages that take too long to load?

LESSON 2.3

NAME ______________________ DATE ________

Math and History Application

For use with page 89

HISTORY The race to set transatlantic speed records has a long history. In July of 1845 the clipper ship *James Baines* set a record for sailing ships by sailing from Boston to Liverpool in 12 days and 6 hours. Just a few years ago, a swimmer named Ben Lecomte set a much slower but equally amazing record. It took Lecomte 80 days to swim from Hyannis, MA, to Quiberon on the French coast with the aid of a monofin attached to both feet. Ben was accompanied by a ship, and swam inside a "protective ocean device" that used electric fields to repel sharks.

Migrating (and lost) birds have also set some impressive records. The current distance record holder appears to be a Common Tern. Banded as a chick in Finland on June 30, 1996, it was caught on January 24, 1997 on a beach in southeastern Australia! Scientists estimate that it flew about 26,000 kilometers in at most 208 days, for a minimum average speed of 3.2 miles per hour.

In the Math and History feature on page 89 you may have noticed that the QE2's speed was given in knots or nautical miles per hour. The nautical mile is about 1.151 statute or land miles, which seems like a strange number. This "sea mile," which has been used by mariners since the seventeenth century, is based on the practice of measuring latitude and longitude in degrees. If you traveled all the way around the earth at the equator, you'd cover 360 degrees, and each degree is divided into 60 minutes. The nautical mile is defined so that one nautical mile equals one minute along any great circle. Aviators also navigate with degrees and minutes, so airplane speeds are also usually measured in knots.

MATH Here are some problems about transatlantic travel by ships, people, and birds.

1. If the Titanic had missed the iceberg and kept on going at the average speed that you computed in the Math and History feature, when would it have reached New York?
2. The distance from Boston to Liverpool is about 3150 miles. How many times faster was the Titanic's average speed traveling from Cobh to the iceberg than the average speed of the *James Baines* on its record-setting trip?
3. Find Ben Lecomte's approximate speed in knots for his transatlantic swim, which covered 3736 nautical miles.
4. When not swimming, Ben rested on the ship, which was allowed to drift with currents and winds, so that his progress would be due solely to his swimming. What do you think a graph of his distance from Hyannis plotted against time would look like? Would it be linear? Would its slope always be positive?

Lesson 2.3

LESSON **2.4**

TEACHER'S NAME ____________________ CLASS ______ ROOM ______ DATE ______

Lesson Plan

2-day lesson (See *Pacing the Chapter,* TE pages 64C–64D) For use with pages 91–98

GOALS
1. **Write linear equations.**
2. **Write direct variation equations.**

State/Local Objectives ____

____

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

STARTING OPTIONS

____ Homework Check: TE page 86; Answer Transparencies
____ Warm-Up or Daily Homework Quiz: TE pages 91 and 88, CRB page 53, or Transparencies

TEACHING OPTIONS

____ Motivating the Lesson: TE page 92
____ Lesson Opener (Application): CRB page 54 or Transparencies
____ Examples: Day 1: 1–4, SE pages 91–93; Day 2: 5–7, SE pages 93–94
____ Extra Examples: Day 1: TE pages 92–93 or Transp.; Day 2: TE pages 93–94 or Transp.; Internet
____ Closure Question: TE page 94
____ Guided Practice: SE page 95 Day 1: Exs. 2, 4–11; Day 2: Exs. 1, 3, 12

APPLY/HOMEWORK

Homework Assignment

____ Basic Day 1: 14–22 even, 29–41 odd, 42; Day 2: 25, 26–40 even, 43–59 odd, 69, 71–93 odd
____ Average Day 1: 14–28 even, 25–51 odd; Day 2: 44–58 even, 59–65 odd, 69, 71–93 odd
____ Advanced Day 1: 14–28 even, 25–57 odd, 60, 62; Day 2: 56, 58, 59–69 odd, 70, 71–93 odd

Reteaching the Lesson

____ Practice Masters: CRB pages 55–57 (Level A, Level B, Level C)
____ Reteaching with Practice: CRB pages 58–59 or Practice Workbook with Examples
____ Personal Student Tutor

Extending the Lesson

____ Applications (Real-Life): CRB page 61
____ Challenge: SE page 98; CRB page 62 or Internet

ASSESSMENT OPTIONS

____ Checkpoint Exercises: Day 1: TE pages 92–93 or Transp.; Day 2: TE pages 93–94 or Transp.
____ Daily Homework Quiz (2.4): TE page 98, CRB page 65, or Transparencies
____ Standardized Test Practice: SE page 98; TE page 98; STP Workbook; Transparencies

Notes ____

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LESSON 2.4

TEACHER'S NAME ______________________ CLASS ______ ROOM ______ DATE ______

Lesson Plan for Block Scheduling

1-day lesson (See *Pacing the Chapter,* TE pages 64C–64D) **For use with pages 91–98**

GOALS
1. **Write linear equations.**
2. **Write direct variation equations.**

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 86; Answer Transparencies
____ Warm-Up or Daily Homework Quiz: TE pages 91 and 88, CRB page 53, or Transparencies

TEACHING OPTIONS
____ Motivating the Lesson: TE page 92
____ Lesson Opener (Application): CRB page 54 or Transparencies
____ Examples: 1–7, SE pages 91–94;
____ Extra Examples: TE pages 92–94 or Transparancies.; Internet
____ Closure Question: TE page 94
____ Guided Practice Exercises: SE page 95

APPLY/HOMEWORK
Homework Assignment
____ Block Schedule: 14–24 even, 25–61 odd, 67, 69, 71–93 odd

Reteaching the Lesson
____ Practice Masters: CRB pages 55–57 (Level A, Level B, Level C)
____ Reteaching with Practice: CRB pages 58–59 or Practice Workbook with Examples
____ Personal Student Tutor

Extending the Lesson
____ Applications (Real Life): CRB page 61
____ Challenge: SE page 98; CRB page 62 or Internet

ASSESSMENT OPTIONS
____ Checkpoint Exercises: TE pages 92–94 or Transparancies
____ Daily Homework Quiz (2.4): TE page 98, CRB page 65, or Transparencies
____ Standardized Test Practice: SE page 98; TE page 98; STP Workbook; Transparencies

Notes ______________________________

LESSON 2.4

NAME ____________________ DATE ________

Available as a transparency

Warm-Up Exercises

For use before Lesson 2.4, pages 91–98

1. Find the slope and the y-intercept of $y = 2x - 4$.

2. Find the slope and the y-intercept of $y = \frac{3}{2}x + 1$.

3. Find the slope of a line parallel to the line in Exercise 1.

4. Find the slope of a line perpendicular to the line in Exercise 2.

Daily Homework Quiz

For use after Lesson 2.3, pages 82–90

1. Draw the line with slope $m = -2$ and y-intercept $b = -1$.

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

3. Find the slope and the y-intercept of the line $-3x + y = -8$.

4. Graph $3x - 2y = 6$. Label any intercepts.

Lesson 2.4

LESSON 2.4

NAME ______________________ DATE __________

Available as a transparency

Application Lesson Opener

For use with pages 91–98

The volume of blood your heart pumps is related to your pulse rate. The table shows the volume of blood pumped for several pulse rates.

Pulse rate (p) (in beats per minute)	60	72	85	94
Volume of blood pumped (V) (in liters)	3.6	4.32	5.1	5.64
$\frac{V}{p}$				

1. Divide the volume by the related pulse rate to complete the table.
2. Write an equation of the form $V = kp$ that represents the relationship in the table.

The table shows the number of minutes of exercise it takes to burn 150 calories for several activities.

Activity	Bicycling	Walking	Swimming laps	Washing windows
Minutes	15	30	20	50
$\frac{\text{Cal}}{\text{min}}$				

3. Divide to find the number of calories burned per minute.
4. Let c represent the number of calories burned and let t represent the number of minutes spent exercising. Is there a single value you can use for k to write an equation of the form $c = kt$ that will work for all activities? Explain.

Lesson 2.4

LESSON **2.4**

NAME ______________________________ DATE __________

Practice A

For use with pages 91–98

Write an equation of the line that has the given slope and *y*-intercept.

1. $m = 3, b = 2$
2. $m = 4, b = -5$
3. $m = -6, b = 1$
4. $m = -1, b = -9$
5. $m = 2, b = 0$
6. $m = 0, b = 7$

Write an equation of the line that passes through the given point and has the given slope.

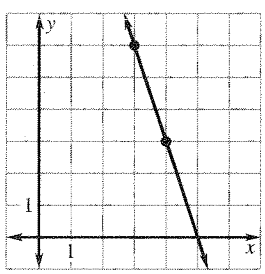
7. $(0, 3), m = 5$
8. $(0, -2), m = 3$
9. $(1, 2), m = -2$
10. $(3, 1), m = 4$
11. $(-2, 6), m = 0$
12. $(4, -1), m = 1$
13. $(5, -2), m = -1$
14. $(-3, -7), m = 2$
15. $(8, 2), m = -1$

Write an equation of the line that passes through the given points.

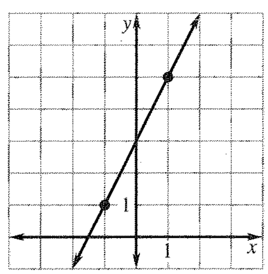
16. $(1, 1), (5, 9)$
17. $(2, 1), (3, -7)$
18. $(-1, 4), (2, 16)$
19. $(-3, -2), (-1, 0)$
20. $(5, 5), (8, -4)$
21. $(0, 3), (4, 0)$
22. $(2, -1), (1, -6)$
23. $(7, 8), (2, 18)$
24. $(9, 4), (1, 8)$

Write an equation of the line.

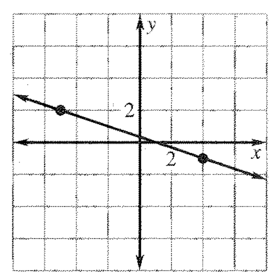
25.



26.



27.



Tell whether the data show direct variation. If so, write an equation relating *x* and *y*.

28.

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

29.

x	−2	−1	0	1	2
y	2	1	0	−1	−2

30. *Sales Tax* The amount of sales tax in Pennsylvania varies directly with the price of merchandise. Use the given tax table to write an equation relating the price x and the amount of sales tax y.

Price, x (dollars)	10	20	30	40	50
Tax, y (dollars)	0.60	1.20	1.80	2.40	3

Lesson 2.4

LESSON 2.4

NAME ______________________ DATE ________

Practice B

For use with pages 91–98

Write an equation of the line that has the given slope and *y*-intercept.

1. $m = 4, b = -4$
2. $m = -6, b = 3$
3. $m = \frac{4}{3}, b = 6$
4. $m = -\frac{1}{2}, b = -4$
5. $m = 8, b = 0$
6. $m = 0, b = 5$

Write an equation of the line that passes through the given point and has the given slope.

7. $(2, 1), m = -2$
8. $(-4, 3), m = 5$
9. $(7, -5), m = 1$
10. $(-1, -10), m = 3$
11. $\left(\frac{1}{2}, 4\right), m = -8$
12. $\left(\frac{2}{3}, 0\right), m = -4$

Write an equation of the line that passes through the given points.

13. $(-2, 1), (2, 4)$
14. $(-1, 3), (1, -1)$
15. $(-3, -1), (3, 2)$
16. $(4, -2), (6, -3)$
17. $(1, 5), (-4, 0)$
18. $(3, -7), (-2, 3)$
19. $(-6, 1), (-5, 4)$
20. $(-3, -2), (4, 1)$
21. $(10, -4), (6, -10)$

The variables *x* and *y* vary directly. Write an equation that relates the variables. Then find *y* when *x* = 10.

22. $x = 2, y = 6$
23. $x = -1, y = 5$
24. $x = 4, y = -10$
25. $x = 1, y = 0.25$
26. $x = -8, y = 2$
27. $x = \frac{1}{3}, y = \frac{9}{10}$

Measuring Speed **In Exercises 28 and 29, use the following information.**
The speed of an automobile in miles per hour varies directly with its speed in kilometers per hour. A speed of 64 miles per hour is equivalent to a speed of 103 kilometers per hour.

28. Write a linear model that relates speed in miles per hour to speed in kilometers per hour.
29. You are driving through Canada and see a speed limit sign that says the speed limit is 80 kilometers per hour. You are traveling 55 miles per hour. Are you speeding?

Fish and Shellfish Consumption **In Exercises 30 and 31, use the following information.**
For 1992 through 1994, the per capita consumption of fish and shellfish in the U.S. increased at a rate that was approximately linear. In 1992, the per capita consumption was 14.7 pounds, and in 1994 it was 15.1 pounds.

30. Write a linear model for the per capita consumption of fish and shellfish in the U.S. Let *t* represent the number of years since 1992.
31. What would you expect the per capita consumption of fish and shellfish to be in 2002?

LESSON 2.4

NAME ______________________ DATE ____________

Practice C

For use with pages 91–98

Write an equation of the line that passes through the given points.

1. $(2, -1), (3, 8)$
2. $(-5, 3), (2, 2)$
3. $(1, -6), (1, -2)$
4. $(7, 2), (-4, -6)$
5. $(3, 8), (-1, 8)$
6. $(6, 6), (-2, -2)$

Write an equation of the line that passes through the given point and is perpendicular to the given line.

7. $(1, 3),\ y = 2x - 1$
8. $(-3, 2),\ y = -4x + 3$
9. $(1, 1),\ y = \frac{1}{2}x - 7$
10. $(-3, 1),\ y = -\frac{2}{3}x + 4$
11. $(7, -3),\ y = 8$
12. $(5, 2),\ x = 2$

Write an equation of the line that passes through the given point and is parallel to the given line.

13. $(-2, 1),\ y = 2x + 5$
14. $(1, -1),\ y = -x + 3$
15. $(-3, -5),\ y = 12 + x$
16. $(3, -4),\ y = \frac{1}{2}x - 8$
17. $(10, -12),\ y = -\frac{3}{4}x + 1$
18. $(4, -9),\ y = 14$

Labor Force **In Exercises 19–21, use the following information.**

From 1840 to 1850, the rate at which the percent of the labor force in nonfarming occupations increased was approximately linear. In 1840, 31.4% of the labor force held nonfarming jobs. In 1850, 36.3% of the labor force held nonfarming jobs.

19. Write a linear model for the percentage of the labor force in nonfarming occupations. Let $t = 0$ represent 1840.
20. In 1860, the percent of the labor force in nonfarming occupations was 41.1%. Is the model for the percentage of nonfarming occupations from 1840 to 1850 still an appropriate model?
21. In 1870, the percent of the labor force in nonfarming occupations was 47.0%. Is the model for the percentage of nonfarming occupations from 1840 to 1850 still an appropriate model?

College Tuition **In Exercises 22–24, use the following information.**

The rate of increase in tuition at a college from 1990 to 1995 was approximately linear. In 1990, the tuition was $15,500 and in 1995 it was $22,600.

22. Write a linear model for the tuition from 1990 to 1995. Let $t = 0$ represent 1990.
23. Write a linear model for the tuition from 1990 to 1995. Use the actual years as the coordinates for time.
24. Although the models in Exercises 22 and 23 are different, use both models to approximate the tuition in 2000. Do both models yield the same result?

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Reteaching with Practice

For use with pages 91–98

GOAL **Write linear equations and direct variation equations**

VOCABULARY

Two variables x and y show **direct variation** provided $y = kx$ and $k \neq 0$.

The nonzero constant k is called the **constant of variation.**

EXAMPLE 1 *Writing an Equation Given the Slope and y-intercept*

Write an equation of the line that has $m = -\frac{2}{3}$ and $b = -2$.

SOLUTION

$y = mx + b$	Use slope-intercept form.
$y = -\frac{2}{3}x - 2$	Substitute $-\frac{2}{3}$ for m and -2 for b.

An equation of the line is $y = -\frac{2}{3}x - 2$.

Exercises for Example 1

Write an equation of the line that has the given slope and y-intercept.

1. $m = 3,\ b = 0$ **2.** $m = \frac{3}{4},\ b = 2$ **3.** $m = -2,\ b = -3$

EXAMPLE 2 *Writing an Equation Given the Slope and a Point*

Write an equation of the line that passes through $(-1, -3)$ and has a slope of 4.

SOLUTION

$y - y_1 = m(x - x_1)$	Use point-slope form.
$y + 3 = 4(x + 1)$	Substitute for m, x_1, and y_1.
$y + 3 = 4x + 4$	Distributive property
$y = 4x + 1$	Write in slope-intercept form.

Exercises for Example 2

Write an equation of the line that passes through the given point and has the given slope.

4. $(2, -1),\ m = -5$ **5.** $(0, 5),\ m = \frac{1}{3}$ **6.** $(-3, -2),\ m = 0$

EXAMPLE 3 *Writing an Equation Given Two Points*

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

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Reteaching with Practice

For use with pages 91–98

SOLUTION

First, find the slope by letting $(x_1, y_1) = (-1, -3)$ and $(x_2, y_2) = (2, 4)$.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - (-3)}{2 - (-1)} = \frac{7}{3}$$

Because you know the slope and a point on the line, use the point-slope form to find an equation of the line.

$y - y_1 = m(x - x_1)$	Use point-slope form.
$y + 1 = \frac{7}{3}(x + 3)$	Substitute for m, x_1, and y_1.
$y + 1 = \frac{7}{3}x + 7$	Distributive property
$y = \frac{7}{3}x + 6$	Write in slope-intercept form.

Exercises for Example 3

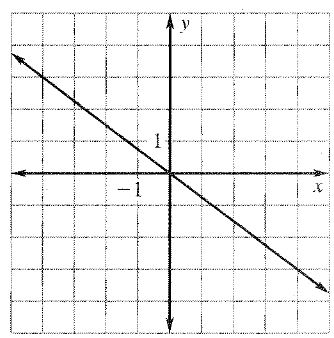
Write an equation of the line that passes through the given points.

7. (2, 5) and (4, −1) **8.** (−2, 1) and (4, 7) **9.** (−5, 0) and (0, −1)

EXAMPLE 4 Writing and Using a Direct Variation Equation

The variables x and y vary directly, and $y = 3$ when $x = -4$. Write an equation that relates the variables. Then find y when $x = 4$.

SOLUTION



$y = kx$

$3 = k(-4)$

$-\frac{3}{4} = k$

The direct variation equation is $y = -\frac{3}{4}x$.

When $x = 4$, the value of y is $y = -\frac{3}{4}(4) = -3$.

Exercises for Example 4

The variables x and y vary directly. Write an equation that relates the variables. Then find y when $x = -2$.

10. $x = 10,\ y = 100$ **11.** $x = -3,\ y = 12$ **12.** $x = 18,\ y = -2$

Lesson 2.4

LESSON 2.4

NAME ______________________________ DATE __________

Quick Catch-Up for Absent Students

For use with pages 91–98

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

Lesson 2.4: Writing Equations of Lines

____ **Goal 1:** Write linear equations. (pp. 91–93)

Material Covered:

____ Example 1: Writing an Equation Given the Slope and y-intercept

____ Example 2: Writing an Equation Given the Slope and a Point

____ Example 3: Writing Equations of Perpendicular and Parallel Lines

____ Example 4: Writing an Equation Given Two Points

____ Example 5: Writing and Using a Linear Model

____ **Goal 2:** Write direct variation equations. (p. 94)

Material Covered:

____ Example 6: Writing and using a Direct Variation Equation

____ Example 7: Identifying Direct Variation

Vocabulary:

direct variation, p. 94 constant of variation, p. 94

____ Other (specify) ______________________________

____

Homework and Additional Learning Support

____ Textbook (specify) pp. 95–98

____

____ Internet: Extra Examples at www.mcdougallitell.com

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

____ *Personal Student Tutor* for Lesson 2.4

NAME ______________________ DATE __________

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

For use with pages 91–98

Psychology

Psychometricians are people who specialize in tests and measurements of mental processes, such as achievement tests and personality tests. They frequently use psychological tests to help with career counselling or to select people to receive special training.

Many times, the actual scores from a group of people have to be scaled for interpretation or standardization. This aids the psychometricians in reporting scores to people that have not received the special training needed to interpret the raw scores.

In Exercises 1–8, use the following information.

A psychometrician develops a test to determine the speed at which individuals read. Scores on this test range from 0 (very slow readers) to 22 (very fast readers). However, the psychologist wants the scores to be converted to a scale ranging from 0 to 100.

To convert the scores, the psychometrician wants people who scored 22 to have a "converted" score of 100, while people who scored 0 to maintain their score of 0. All scores in-between will be scaled appropriately.

1. Write two ordered pairs to represent the lowest and highest possible scores on the test. The ordered pairs should be of the form (old score, new score).
2. Find the equation of the line passing through the points in Exercise 1.
3. Use the equation found in Exercise 2 to find the scaled scores of the following people.

Name	*Original Score*	*Scaled Score*
Wade	15	
Felecia	18	
Lee	10	
Brandy	8	
Tonya	21	

4. Do you think a scores from 0 to 100 is easier to interpret than a range of scores from 0 to 22?
5. Suppose the psychometrician wanted to re-scale the scores on a scale of 1 to 10, where 1 represented the fastest readers and 10 represented the slowest. What two ordered pairs, of the form (old score, new score), would represent this new situation?
6. Find the equation of the line passing through the points in Exercise 5.
7. Use the equation found in Exercise 6 to re-scale the scores of the following people.

Name	*Original Score*	*Scaled Score*
Wade	15	
Felecia	18	
Lee	10	
Brandy	8	
Tonya	21	

NAME ______________________________ DATE __________

Challenge: Skills and Applications

For use with pages 91–98

1. Find the value of k that makes the line through $(2, -3)$ and $(5, k)$ have y-intercept 4.

2. Find the value of k that makes the line through $(-4, k)$ and $(-1, 2k)$ have y-intercept -7.

3. Suppose a line goes through the points (x_1, y_1) and (x_2, y_2). Express the y-intercept of the line in terms of these four coordinates.

4. A line can be defined by a set of parametric equations that specify the coordinate of a point (x, y) on the line as functions of a third variable t, often thought of as representing time. Suppose a certain line is defined by the following parametric equations.

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

   a. Find the coordinates of the 2 points on the line that are associated with $t = 0$ and $t = 1$, and use these to give an equation for the line in point-slope form.

   b. Find the point on the line associated with $t = \frac{1}{2}$. How is this point related *geometrically* to the two points you found in part (a). Make a conjecture about any point associated with a value of t between 0 and 1.

5. Show that if the points (x_1, y_1) and (x_2, y_2) are on the graph of $y = mx + b$, then

$$\frac{y_1 - b}{y_2 - b} = \frac{x_1}{x_2}.$$

(*Hint:* This equation will be true if and only if $x_2(y_1 - b) = x_1(y_2 - b)$. Show that the two sides of this equation reduce to the same expression.)

6. In the slope-intercept form $y = mx + b$, suppose b is fixed but m is allowed to vary. Describe in words the family of lines that results from using all possible values of m.

7. In the point-slope form $y - y_1 = m(x - x_1)$, describe in words the family of lines that results when m is allowed to vary through all real numbers. Does the special case $m = 0$ fit your description?