Contents

Contents

Contents

Descriptions of Resources

This Chapter Resource Book is organized by lessons within the chapter in order to make your planning easier. The following materials are provided:

Tips for New Teachers These teaching notes provide both new and experienced teachers with useful teaching tips for each lesson, including tips about common errors and inclusion.

Parent Guide for Student Success This guide helps parents contribute to student success by providing an overview of the chapter along with questions and activities for parents and students to work on together.

Prerequisite Skills Review Worked-out examples are provided to review the prerequisite skills highlighted on the Study Guide page at the beginning of the chapter. Additional practice is included with each worked-out example.

Strategies for Reading Mathematics The first page teaches reading strategies to be applied to the current chapter and to later chapters. The second page is a visual glossary of key vocabulary.

Lesson Plans and Lesson Plans for Block Scheduling This planning template helps teachers select the materials they will use to teach each lesson from among the variety of materials available for the lesson. The block-scheduling version provides additional information about pacing.

Warm-Up Exercises and Daily Homework Quiz The warm-ups cover prerequisite skills that help prepare students for a given lesson. The quiz assesses students on the content of the previous lesson. (Transparencies also available)

Activity Support Masters These blackline masters make it easier for students to record their work on selected activities in the Student Edition.

Alternative Lesson Openers An engaging alternative for starting each lesson is provided from among these four types: ***Application, Activity, Graphing Calculator,*** or ***Visual Approach.*** (Color transparencies also available)

Graphing Calculator Activities with Keystrokes Keystrokes for four models of calculators are provided for each Technology Activity in the Student Edition, along with alternative Graphing Calculator Activities to begin selected lessons.

Practice A, B, and C These exercises offer additional practice for the material in each lesson, including application problems. There are three levels of practice for each lesson: A (basic), B (average), and C (advanced).

Contents

CHAPTER 2

Tips for New Teachers

For use with Chapter 2

Lesson 2.1

TEACHING TIP Students should be able to find the domain and range of a function from either its mapping, graph, or equation. You might need to teach students how to do so for each of these representations of a function. Make sure to have some examples of functions that have a restricted domain and/or range, such as a quadratic or a square-root function.

TEACHING TIP Show your students the difference between the *mathematical* domain/range of a function and the *real-life* domain/range of that same function in a given word problem. For instance, in Example 6 on page 70, the *mathematical* domain and range of the function $d = 97.8 \cdot t$ are all real numbers. However, its *real-life* domain and range are restricted as shown in the problem. Students need to use common sense to determine the domain and range in word problems.

TEACHING TIP Some students learn how to use the *vertical line test* without understanding how it derives from the definition of *function*. Remind your students that if two points on a graph lie on a vertical line they must have the same x-coordinate, or input, and different y-coordinates, or outputs. Therefore, if a vertical line intersects a graph twice, this means that for a given input there are two different outputs and the relation is not a function.

Lesson 2.2

COMMON ERROR When discussing page 77, students might think that lines are either parallel or perpendicular. Remind them that lines could also be oblique or overlapping by showing them examples and drawings.

Lesson 2.3

COMMON ERROR Some students "plot" the slope, as if it were a point. This way, a slope such as $\frac{4}{3}$ is plotted as the point (3, 4). Remind students that the slope represents *change* in coordinates. This means that when students use the slope to graph a line they must start from a point *on* the line, not the origin.

COMMON ERROR Students might incorrectly interpret the negative sign of a slope to mean "move down *and* left." If they do so, the line will rise from left to right instead of falling. To avoid this mistake, ask your students to decide whether the line will rise or fall *before* they graph it. Then, after they graph it, they should check whether their graph agrees with what they thought.

Lesson 2.4

TEACHING TIP Teach your students how to find the equation of a line given a point on the line and its slope by plugging these values into the equation $y = mx + b$. They will get an equation that they can solve to find the value of the y-intercept, b.

INCLUSION The typical problems asking for the equation of a line parallel or perpendicular to a given line can be too abstract for some students. A visual representation might help them to organize and understand the information from the problem. Students should sketch a graph of the problem showing what they know and what they must find—they can use different colors to differentiate the data from the unknown.

Lesson 2.5

COMMON ERROR Many students believe they must take two data points to draw the best-fitting line and, therefore, to find its equation. Some of these students always take the left-most and the right-most data points on the scatter plot. Remind your students that the best-fitting line might not go through any of the data points. Rather than choosing two points to graph the line, students must graph the line first and then take two points on it to find its equation.

TEACHING TIP Best-fitting lines allow us to make predictions, but their validity is often limited to a small domain. Use Example 3 on page 102 to show students that they must be careful to consider whether the model is valid for the case considered. Ask them to estimate the number of hours slept per day by a 5 year old, and they will get $h \approx 4.9$. Discuss with your students what would be a valid domain for the best-fitting line for this problem as well as other examples you might use.

Tips for New Teachers

For use with Chapter 2

LESSON 2.6

TEACHING TIP Some students learn how to graph a linear inequality in two variables but are not able to list possible solutions of the inequality. Make sure that your students understand why one of the half-planes is shaded and how to use that graph to find some solutions of the inequality. Ask students whether all points on the shaded region are possible solutions of the inequality and create an example where the solutions must be limited to lattice points (you can link this kind of problem to the ideas of domain and range).

LESSON 2.7

TEACHING TIP If your students do not understand the need to show open or solid dots on a graph at the points of discontinuity, try the following approach. Sketch the graph of a discontinuous piecewise function without writing its corresponding rule. Then ask your students what is the value of the function at the point of discontinuity. Looking at this graph, students will know there are two possible values for the function, but they will not know which one to take. Remind students that a function cannot yield two different outputs for the same input so the graph must clearly show which one is the value of the function. Using a solid and an open dot help us to do so.

COMMON ERROR Some students always connect the different segments and/or rays of a piecewise function, without allowing any points of discontinuity. These graphs are not even functions, because they include vertical segments. Remind students that the different parts of a piecewise function do not have to be connected.

LESSON 2.8

COMMON ERROR Some students always use a table of values to graph functions. This is not wrong but can lead the students to get incorrect answers. For example, if students make a table of values for $-3 \leq x \leq 3$ for the function $y = |x - 5|$, their graph is most likely to be a line. Ask your students to identify what type of graph they will get beforehand just by looking at the equation.

Outside Resources

BOOKS/PERIODICALS

Weist, Lynda R., and Robert J. Quinn. "Exploring Probability Through an Even-Odds Dice Game." *Mathematics Teaching in the Middle School* (March 1999), pp. 358–362.

ACTIVITIES/MANIPULATIVES

Hadley, William S. "Experiments from Psychology and Neurology." *Activities: Mathematics Teacher* (October 1996), pp. 562–569.

SOFTWARE

Dugdale, Sharon, and David Kibbey. *Green Globs.* Writing equations through given points; challenging game format. Pleasantville, NY: Sunburst Communications.

VIDEOS

Algebra for All and Its Impact. Video of panel discussion on content and teaching of algebra. Reston, VA: NCTM, 1998.

CHAPTER 2

NAME _____ DATE _____

Parent Guide for Student Success

For use with Chapter 2

Chapter Overview One way that you can help your student succeed in Chapter 2 is by discussing the lesson goals in the chart below. When a lesson is completed, ask your student to interpret the lesson goals for you and to explain how the mathematics of the lesson relates to one of the key applications listed in the chart.

Lesson Title	*Lesson Goals*	*Key Applications*
2.1: Functions and Their Graphs	Identify and represent relations and functions. Graph linear functions and evaluate functions.	• Ballooning • Boston Marathon • Water Pressure
2.2: Slope and Rate of Change	Find the slope of a line, classify parallel and perpendicular lines, and use slope to solve real-life problems.	• Ladder Safety • Deserts • Oceanography
2.3: Quick Graphs of Linear Equations	Use the slope-intercept form or the standard form of a linear equation to graph the equation.	• Buying a Computer • Rainforests • Car Wash
2.4: Writing Equations of Lines	Write linear equations. Write and use direct variation equations.	• Politics • Jewelry • Breaking Waves
2.5: Correlation and Best-Fitting Lines	Use a scatter plot to identify the correlation shown by a set of data. Approximate the best-fitting line for a set of data.	• Sleep Requirements • Old Faithful • City Year
2.6: Linear Inequalities in Two Variables	Graph linear inequalities in two variables and use linear inequalities to solve real-life problems.	• Communication • Nutrition • Movies
2.7: Piecewise Functions	Represent piecewise functions and use piecewise functions to model real-life quantities.	• Urban Parking • Social Security • Snowstorm
2.8: Absolute Value Functions	Represent absolute value functions and use them to model real-life situations.	• Billiards • Music Singles • Sound Levels

Study Strategy

Making a Skills File is the study strategy featured in Chapter 2 (see page 66). Encourage your student to record the key skills covered in each lesson along with an example that illustrates the skill. Have your student look over the goals and example titles to be sure no skill is missed.

NAME _____ DATE _____

Parent Guide for Student Success

For use with Chapter 2

Key Ideas **Your student can demonstrate understanding of key concepts by working through the following exercises with you.**

Lesson	Exercise
2.1	Is the relation (0, 1), (0, −1), (2, 3) a function? Explain.
2.2	Ty was 50 in. tall when he was 8 years old and 60 in. tall when he was 12. What was the rate of change in Ty's height?
2.3	Marcia is trying to earn \$240 to buy a bicycle. She can earn \$8 an hour babysitting or \$10 an hour mowing lawns. Write a model for the problem. Find the intercepts of the graph of the model.
2.4	Write an equation of the line that passes through $(3, -1)$ and is perpendicular to the line $y = -3x + 5$.
2.5	Is there usually a positive correlation, a negative correlation, or no correlation between the age of a car and its market value?
2.6	Is $(-5, 6)$ part of the graph of $3x + 2y \leq -1$?
2.7	The cost of x T-shirts at a sale is given by the function below. Find the cost of three T-shirts and of six T-shirts. $C(x) = \begin{cases} 10x, & \text{if } 0 \leq x \leq 2 \\ 8x, & \text{if } 2 < x \leq 4 \\ 5x, & \text{if } x > 4 \end{cases}$
2.8	For $y = -2\lvert x - 5\rvert + 2$, identify the vertex and tell whether the graph opens up or down.

Home Involvement Activity

Directions: Think of a real-life situation that can be represented by a piecewise function, such as the postal rates on page 119. Write equations to model the function and sketch its graph. Check your work by testing a few different values.

Answers

2.1: No; for the input 0 there are two outputs, 1 and −1. **2.2:** 2.5 inches per year **2.3:** $8x + 10y = 240$; x-intercept: 30, y-intercept: 24 **2.4:** $y = \frac{1}{3}x - 2$ **2.5:** negative correlation **2.6:** yes **2.7:** three T-shirts: \$24, six T-shirts: \$30 **2.8:** (5, 2); down

CHAPTER 2

NAME _____ DATE _____

Prerequisite Skills Review

For use before Chapter 2

EXAMPLE 1 Evaluating an Algebraic Expression

Evaluate the expression for the given values of x and y.

a. $\frac{6-y}{7-x}$; $x = -1$, $y = -4$ **b.** $\frac{x-10}{y-4}$; $x = 12$, $y = 2$

SOLUTION

a. $\frac{6-y}{7-x} = \frac{6-(-4)}{7-(-1)}$ Substitute -1 for x and -4 for y.

$= \frac{6+4}{7+1}$ Perform operation.

$= \frac{10}{8}$

$= \frac{5}{4}$ Simplify.

b. $\frac{x-10}{y-4} = \frac{(12)-10}{(2)-4}$ Substitute 12 for x and 2 for y.

$= \frac{2}{-2}$ Perform operation.

$= -1$ Simplify.

Exercises for Example 1

Evaluate the expression for the given values of *x* and *y*.

1. $\frac{4-y}{8-x}$; $x = 4$, $y = -8$ **2.** $\frac{x-9}{y-3}$; $x = -3$, $y = 7$

3. $\frac{(-4)-y}{2-x}$; $x = -6$, $y = 8$ **4.** $\frac{x-(-3)}{y-4}$; $x = -9$, $y = 5$

EXAMPLE 2 Rewriting an Equation with More Than One Variable

Solve the equation for y.

a. $5x + y = 12$ **b.** $3x - 4y = -8$

SOLUTION

a. $5x + y = 12$ Write original equation.

$y = -5x + 12$ Subtract $5x$ from each side.

b. $3x - 4y = -8$ Write original equation.

$-4y = -3x - 8$ Subtract $3x$ from each side.

$y = \frac{3}{4}x + 2$ Divide each side by -4.

NAME _____ DATE _____

Prerequisite Skills Review

For use before Chapter 2

Exercises for Example 2

Solve the equation for y.

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

6. $6x - 3y = 15$

7. $-2x - 7y = -49$

8. $10x + 5y = -75$

EXAMPLE 3 Solving an Inequality

Solve the inequality.

a. $-3x + 10 \geq -8$

b. $5y + 12 < -3y - 4$

SOLUTION

a. $-3x + 10 \geq -8$ Write original inequality.

$-3x \geq -18$ Subtract 10 from each side.

$x \leq 6$ Divide each side by -3 and reverse the inequality.

b. $5y + 12 < -3y - 4$ Write original inequality.

$8y + 12 < -4$ Add $3y$ to each side.

$8y < -16$ Subtract 12 from each side.

$y < -2$ Divide each side by 8.

Exercises for Example 3

Solve the inequality.

9. $x + 4 > -8x - 23$

10. $-2y - 6 \geq -4$

11. $4x - 17 \leq -5$

12. $4y + 11 < 6y - 9$

CHAPTER 2

NAME _____ DATE _____

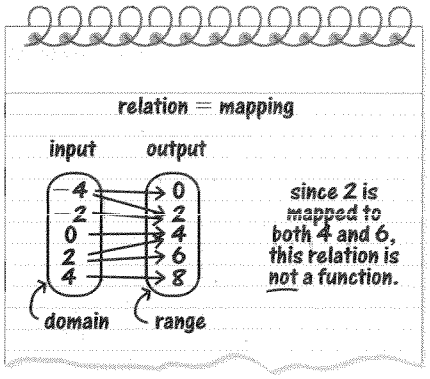
Strategies for Reading Mathematics

For use with Chapter 2

Strategy: Reading Vocabulary and Taking Notes in Algebra

You have probably already noted how important it is to understand mathematical terms when studying algebra. You can make your studying easier by looking for highlighted vocabulary terms in **heavy type** like this. Then write definitions and examples in your notebook to help you remember the terms. The notebook page below shows a sample of the notes you might take about the vocabulary in the next paragraph.

A **relation** is a mapping, or pairing, of input values with output values. The set of input values is the **domain**, and the set of output values is the **range**. A relation is a **function** provided there is exactly one output for each input. It is not a function if at least one input has more than one output.



Study Tip

Reading Vocabulary

When you see highlighted words in heavy type, that means the terms are important. Read the sentence that the term is in for its definition. Check sentences just before and after the term to make sure that you have a complete definition.

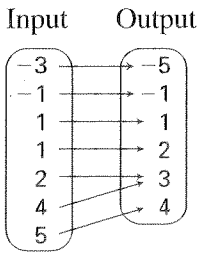
Study Tip

Taking Notes

Make your notes brief. Write important words that will help you remember the meaning of each term. You might also include pictures, diagrams, or examples.

Questions

1. What are the domain and range of the relation shown on the notebook above? Which other input value could you use to show the relation is not a function?
2. Use a table to represent the relation above. Circle or highlight the parts of your table that show the relation is not a function.
3. What are the domain and range of the relation shown at the right? Is the relation a function? Explain how you know.
4. The domain of a relation is $-3, -2, -1, 0, 1, 2, 3$, and the relation maps each value to its square. What is the range of the relation? Make a table or diagram to represent the relation. Is this relation a function?



NAME _____ DATE _____

Strategies for Reading Mathematics

For use with Chapter 2

Visual Glossary

The Study Guide on page 66 lists the key vocabulary for Chapter 2 as well as review vocabulary from the previous chapter. Use the page references on page 66 or the Glossary in the textbook to review key terms from the prior chapter. Use the visual glossary below to help you understand some of the key vocabulary in Chapter 2. You may want to copy these diagrams into your notebook and refer to them as you complete the chapter.

GLOSSARY

Linear function (p. 69)
A function of the form $y = mx + b$ where m and b are constants. The graph of a linear function is a line.

Solution of a linear inequality in two variables (p. 108)
An ordered pair (x, y) that, when x and y are substituted in the inequality, gives a true statement.

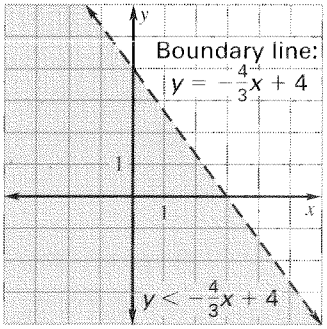
Graph of a linear inequality in two variables (p. 108) The graph of all solutions of the inequality.

Piecewise function (p. 114)
A function represented by a combination of equations, each corresponding to a part of the domain.

Step function (p. 115) A piecewise function whose graph resembles a set of stair steps.

Graphing the Solution of a Linear Inequality

First, graph the line that forms the boundary of the solution region. Then shade the appropriate half-plane.



Use a dashed boundary line for $<$.

Check if $(0, 0)$ is a solution.

$y < -\frac{4}{3}x + 4$

$0 \stackrel{?}{<} -\frac{4}{3} \cdot 0 + 4$

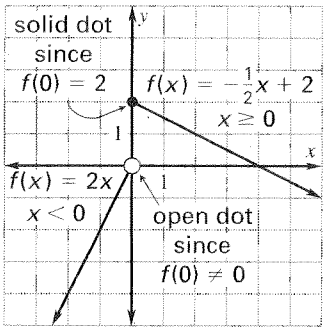
$0 < 4$ ✓

Shade the half-plane containing the origin.

Graphing a Piecewise Function

Graph each piece separately. Be careful to graph the correct point wherever there is a jump from one piece to another.

$$f(x) = \begin{cases} 2x, & \text{if } x < 0 \\ -\frac{1}{2}x + 2, & \text{if } x \geq 0 \end{cases}$$



LESSON 2.1

TEACHER'S NAME _____ CLASS _____ ROOM _____ DATE _____

Lesson Plan

1-day lesson (See *Pacing the Chapter*, TE pages 64C–64D) **For use with pages 67–74**

GOALS

1. **Represent relations and functions.**
2. **Graph and evaluate linear functions.**

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 67 and 56, CRB page 11, or Transparencies

TEACHING OPTIONS

____ Motivating the Lesson: TE page 68
____ Lesson Opener (Visual Approach): CRB page 12 or Transparencies
____ Examples 1–6: SE pages 67–70
____ Extra Examples: TE pages 68–70 or Transparencies; Internet
____ Closure Question: TE page 70
____ Guided Practice Exercises: SE page 71

APPLY/HOMEWORK

Homework Assignment

____ Basic 20–48 even, 49, 51, 59–62, 65–81 odd
____ Average 20–48 even, 49, 51–62, 65–81 odd
____ Advanced 20–48 even, 49–63, 64–81

Reteaching the Lesson

____ Practice Masters: CRB pages 13–15 (Level A, Level B, Level C)
____ Reteaching with Practice: CRB pages 16–17 or Practice Workbook with Examples
____ Personal Student Tutor

Extending the Lesson

____ Applications (Interdisciplinary): CRB page 19
____ Challenge: SE page 74; CRB page 20 or Internet

ASSESSMENT OPTIONS

____ Checkpoint Exercises: TE pages 68–70 or Transparencies
____ Daily Homework Quiz (2.1): TE page 74, CRB page 23, or Transparencies
____ Standardized Test Practice: SE page 74; TE page 74; STP Workbook; Transparencies

Notes _____

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LESSON 2.1

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 67–74**

GOALS

1. **Represent relations and functions.**
2. **Graph and evaluate linear functions.**

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 2.1

✓ 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 67 and 56, CRB page 11, or Transparencies

TEACHING OPTIONS

____ Motivating the Lesson: TE page 68
____ Lesson Opener (Visual Approach): CRB page 12 or Transparencies
____ Examples 1–6: SE pages 67–70
____ Extra Examples: TE pages 68–70 or Transparencies; Internet
____ Closure Question: TE page 70
____ Guided Practice Exercises: SE page 71

APPLY/HOMEWORK

Homework Assignment (See also the assignment for Lesson 2.2.)

____ Block Schedule: 20–48 even, 49, 51–62, 65–81 odd

Reteaching the Lesson

____ Practice Masters: CRB pages 13–15 (Level A, Level B, Level C)
____ Reteaching with Practice: CRB pages 16–17 or Practice Workbook with Examples
____ Personal Student Tutor

Extending the Lesson

____ Applications (Interdisciplinary): CRB page 19
____ Challenge: SE page 74; CRB page 20 or Internet

ASSESSMENT OPTIONS

____ Checkpoint Exercises: TE pages 68–70 or Transparencies
____ Daily Homework Quiz (2.1): TE page 74, CRB page 23, or Transparencies
____ Standardized Test Practice: SE page 74; TE page 74; STP Workbook; Transparencies

Notes _____

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LESSON 2.1

NAME _____ DATE _____

Available as a transparency

WARM-UP EXERCISES

For use before Lesson 2.1, pages 67–74

Evaluate the expression when $x = -2$.

1. $4x - 2$
2. $\frac{1}{3}x + \frac{5}{3}$
3. $2x^2 - x + 4$
4. $-4x^2 - 6x + 12$
5. $\frac{1}{2}|x - 3| - \frac{3}{2}$

DAILY HOMEWORK QUIZ

For use after Lesson 1.7, pages 49–56

1. Rewrite $|2 - 5x| = 6$ as two linear equations.
2. Is -15 a solution of $\left|20 - \frac{5}{3}x\right| = 5$?
3. Solve $|4 - 6x| = 2$.
4. Rewrite $|5 + 4x| < 7$ as a compound inequality.

Solve the inequality. Then graph your solution.

5. $|9 - 4x| < 5$
6. $|2x + 10| \geq 4$

LESSON 2.1

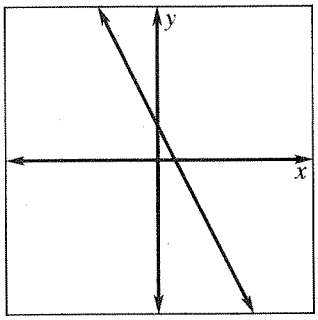
NAME _____ DATE _____

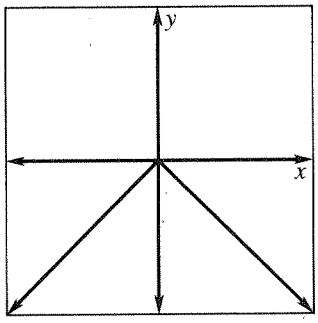
Available as a transparency

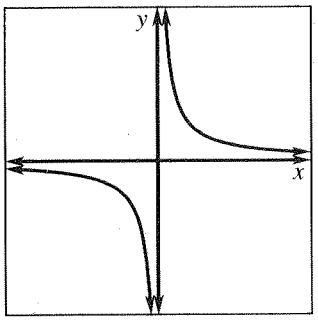
Visual Approach Lesson Opener

For use with pages 67–74

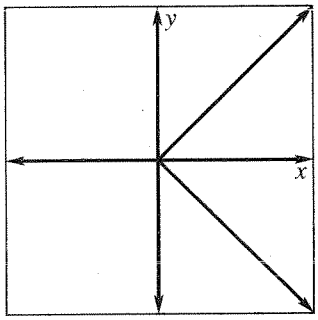
These are functions.

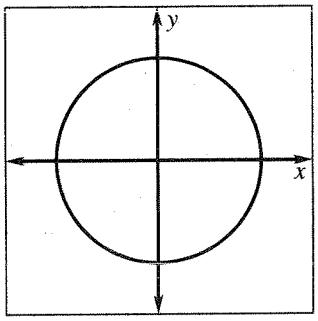


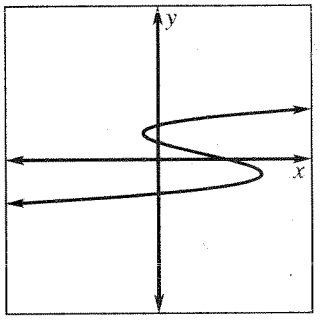




These are not functions.

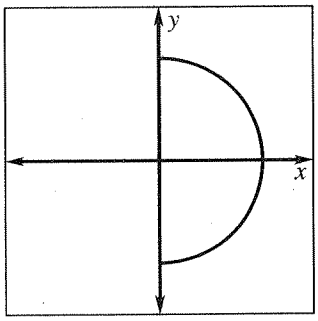




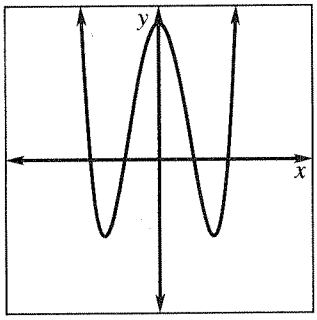


Four of the following are functions. Which are they?

A.



B.



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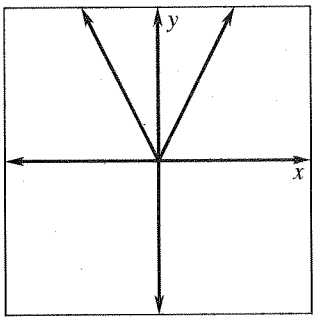
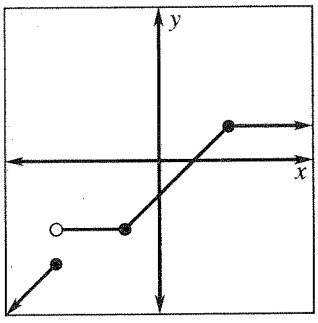
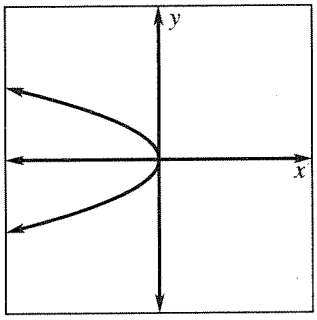


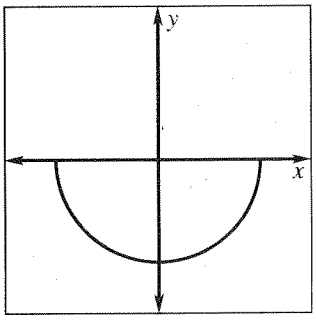
D.



E.



F.



LESSON 2.1

NAME _____ DATE _____

Practice C

For use with pages 67–74

Tell whether the relation is a function.

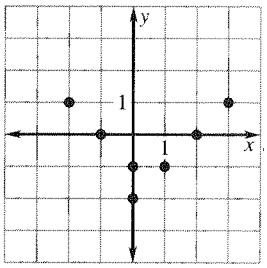
1. Input Output

3	−1
2	−5
5	5
4	6

2.

x	1	2	4	7	0
y	0	0	0	0	0

3.



State the quadrant in which each point lies. Assume that *a* and *b* are positive numbers.

4. (a, b) **5.** $(-a, b)$ **6.** $(-a, -b)$ **7.** $(a, -b)$

Graph the function.

8. $y = 3x + 5$ **9.** $y = -3$ **10.** $y = 4 - 7x$

11. $y = \frac{1}{2}x + 2$ **12.** $y = 4 - \frac{3}{4}x$ **13.** $y = \frac{3}{5}x$

Decide whether the function is linear. Then find the indicated value of $f(x)$.

14. $f(x) = 7x + 2,\ f(2)$ **15.** $f(x) = x^2 + 3x - 1,\ f(-3)$ **16.** $f(x) = |x| + x,\ f(-5)$

17. $f(x) = (x + 3)^2,\ f(4)$ **18.** $f(x) = \frac{x - 7}{3x},\ f(2)$ **19.** $f(x) = 2x^3 - 4,\ f(1)$

Earthquakes **In Exercises 20–22, use the table below which shows 10 of the worst earthquakes of the 20th century.**

Location (Year)	*Magnitude, x*	*Deaths, y*
Chile (1960)	8.3	5000
India (1950)	8.7	1530
Japan (1946)	8.4	2000
Chile (1939)	8.3	28,000
India (1934)	8.4	10,700
Japan (1933)	8.9	2990
China (1927)	8.3	200,000
Japan (1923)	8.3	200,000
China (1920)	8.6	100,000
Chile (1906)	8.6	20,000

20. Identify the domain and range of the relation.

21. Graph the relation.

22. Is the number of deaths a function of the magnitude of an earthquake? Explain.

LESSON 2.1

NAME _____ DATE _____

Reteaching with Practice

For use with pages 67–74

GOAL **Represent relations and functions and graph and evaluate linear functions**

VOCABULARY

A **relation** is a mapping, or pairing, of input values with output values.

The set of input values is the **domain,** and the set of output values is the **range.**

A relation is a **function** provided there is exactly one output for each input. It is not a function if at least one input has more than one output.

The first number in an ordered pair is the ***x*-coordinate,** and the second number is the ***y*-coordinate.**

A **coordinate plane** is formed by two real number lines that intersect at a right angle.

A **quadrant** is one of the four parts into which the axes divide a coordinate plane.

The horizontal axis in a coordinate plane is the ***x*-axis,** and the vertical axis is the ***y*-axis.**

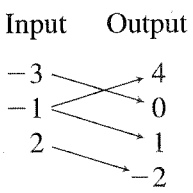
The **origin** (0, 0) is the point in a coordinate plane where the axes intersect.

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

The input variable is called the **independent variable,** and the output variable is called the **dependent variable.**

EXAMPLE 1 ***Identifying Functions***

Identify the domain and range. Then tell whether the relation is a function.



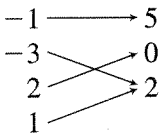
SOLUTION

The domain consists of -3, -1, and 2, and the range consists of -2, 0, 1, and 4. The relation is not a function because the input -1 is mapped onto both 1 and 4.

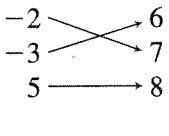
Exercises for Example 1

Identify the domain and range. Then tell whether the relation is a function.

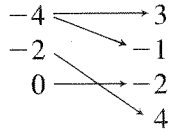
1. Input Output



2. Input Output



3. Input Output



LESSON 2.1 CONTINUED

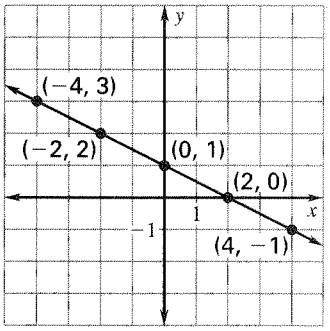
NAME _____ DATE _____

Reteaching with Practice

For use with pages 67–74

EXAMPLE 2 Graphing a Function

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



SOLUTION

1. Construct a table of values.

x	-4	-2	0	2	4
y	3	2	1	0	-1

2. Plot the points.
3. Draw a line through the points.

Exercises for Example 2

Graph the function.

4. $y = x - 4$ **5.** $y = -x$ **6.** $y = -3$

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

EXAMPLE 3 Evaluating Functions

Evaluate the function when $x = -4$. The symbol $f(x)$ is an example of **function notation** and is read as "the value of f at x" or "f of x."

a. $f(x) = 5 - 2x$ **b.** $f(x) = x^3 - 9$

SOLUTION

a. $f(x) = 5 - 2x$ Write function.

$f(-4) = 5 - 2(-4)$ Substitute -4 for x.

$= 13$ Simplify.

b. $f(x) = x^3 - 9$

$f(-4) = (-4)^3 - 9$

$= -73$

Exercises for Example 3

Evaluate the function for the given value of x.

10. $f(x) = 3x - 11$; $f(0)$ **11.** $f(x) = x^2 - 4$; $f(1)$ **12.** $f(x) = 6 - x$; $f(-5)$

Lesson 2.1

LESSON 2.1

NAME _____ DATE _____

Quick Catch-Up for Absent Students

For use with pages 67–74

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

Lesson 2.1: Functions and Their Graphs

____ **Goal 1**: Represent relations and functions. (pp. 67–68)

Material Covered:

____ Example 1: Identifying Functions

____ Student Help: Study Tip

____ Student Help: Skills Review

____ Example 2: Graphing Relations

____ Example 3: Using the Vertical Line Test in Real Life

Vocabulary:

relation, p. 67 — domain, p. 67

range, p. 67 — function, p. 67

ordered pair, p. 67 — coordinate plane, p. 67

____ **Goal 2**: Graph and evaluate linear functions. (pp. 69–70)

Material Covered:

____ Example 4: Graphing a Function

____ Student Help: Study Tip

____ Example 5: Evaluating Functions

____ Example 6: Using a Function in Real Life

Vocabulary:

equation in two variables, p. 69 — solution of an equation in two variables, p. 69

independent variable, p. 69 — dependent variable, p. 69

graph of an equation in two variables, p. 69

linear functions, p. 69 — function notation, p. 69

____ Other (specify) _____

_____

Homework and Additional Learning Support

____ Textbook (specify) pp. 71–74

_____

____ Internet: Extra Examples at www.mcdougallitell.com

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

____ *Personal Student Tutor* for Lesson 2.1

LESSON 2.1

NAME _____ DATE _____

Interdisciplinary Application

For use with pages 67–74

Nutrition

HEALTH Nutritionists examine many common foods to determine the content of several important substances. For people on restricted diets, this information is vital to healthy living, and food producers are required by law to label their foods with these numbers.

For example, many people monitor their intake of fats and sodium. Sources of these ingredients in everyday meals include cooking oils, salad dressings, and other condiments. The amounts of calories, fat, saturated fat, and sodium for one tablespoon of several of these items is given in the following table:

Type	*Calories*	*Fat (g)*	*Saturated Fat (g)*	*Sodium (mg)*
Butter (salted)	100	11	7.1	116
Margarine (salted)	100	11	2.2	132
Olive Oil	125	14	1.9	0
Bleu Cheese Dressing	75	8	1.5	164
French Dressing (Regular)	85	9	1.4	188
French Dressing (Low Calorie)	25	2	0.2	306
Italian Dressing	80	9	1.3	162
Mayonnnaise	100	11	1.7	80

1. First, consider the columns labeled *Fat* and *Saturated Fat*.
   - **a.** Graph the data in the two columns with *Fat* on the x-axis and *Saturated Fat* on the y-axis.
   - **b.** Is this graph the graph of a function? Explain why or why not.
   - **c.** Do you notice any points that seem to "stick out" from the rest of the data? Which types of food do these points represent?
   - **d.** Suppose you were cooking a chicken dish for someone who wants their saturated fat intake to be less than two grams. Which of these items would be okay to include in the recipe?
2. Consider the relationship between *Sodium* and *Calories*.
   - **a.** Graph the data with *Calories* on the x-axis and *Sodium* on the y-axis.
   - **b.** Is this graph the graph of a function? Explain why or why not.
   - **c.** Do you notice any points that seem to "stick out" from the rest of the data? Which types of food do these points represent?
   - **d.** Suppose you were supervising the diet of clients who needed to reduce their sodium intake. If you were to recommend two items from the list, which two would they be?

LESSON 2.1

NAME _____ DATE _____

Challenge: Skills and Applications

For use with pages 67–74

In Exercises 1–5, use the following information.

A function f may have the property that, for *all* numbers a and b in the domain of f,

$$f(a) + f(b) = f(a + b).$$

Check whether each of the following functions has the property described above. If it does not, give an example to show that it does not.

1. $f(x) = x^2$
2. $f(x) = 2x$
3. $f(x) = |x|$
4. $f(x) = 5x + 1$
5. What must be true about the numbers m and/or b in order for a function of the form $f(x) = mx + b$ to have the property above?

In Exercises 6–10, use the following information.

A function with the property that $f(-x) = f(x)$, for all numbers x in its domain, is called an *even* function. A function with the property that $f(-x) = -f(x)$, for all x, is called an *odd* function. Tell whether each of the following is odd or even or neither.

6. $f(x) = x^2 + 2$
7. $x + 1$
8. $f(x) = f(x) = x^3 + x$
9. $f(x) = |x|$
10. If $f(x)$ is a function of the form $f(x) = ax^n + bx^{n-1} + \ldots + nx + p$, what do you think must be true about the coefficients, $a, b, \ldots, p$ in order for f to be an even function? an odd function?

In Exercises 11–14, use the following information.

A *one-to-one* function f with the property that is a and b are any two distinct numbers in the domain of f, $f(a) \neq f(b)$. (In other words, f never maps two distinct inputs to the same output.) Tell whether each of the following functions is one-to-one. If it is not, give an example of a violation of the foregoing definition.

11. $f(x) = x^3$
12. $f(x) = x^2 + 1$
13. $f(x) = |x|$
14. $f(x) = -2x + 5$

LESSON 2.2

TEACHER'S NAME _____ CLASS _____ ROOM _____ DATE _____

Lesson Plan

1-day lesson (See *Pacing the Chapter*, TE pages 64C–64D) **For use with pages 75–81**

GOALS

1. **Find slopes of lines and classify parallel and perpendicular lines.**
2. **Use slope to solve real-life problems.**

State/Local Objectives _____

_____

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

STARTING OPTIONS

____ Homework Check: TE page 71; Answer Transparencies
____ Warm-Up or Daily Homework Quiz: TE pages 75 and 74, CRB page 23, or Transparencies

TEACHING OPTIONS

____ Motivating the Lesson: TE page 76
____ Lesson Opener (Activity): CRB page 24 or Transparencies
____ Graphing Calculator Activity with Keystrokes: CRB pages 25–26
____ Examples 1–6: SE pages 75–78
____ Extra Examples: TE pages 76–78 or Transparencies; Internet
____ Closure Question: TE page 78
____ Guided Practice Exercises: SE page 79

APPLY/HOMEWORK

Homework Assignment

____ Basic 17–36, 38–48 even, 49, 51, 54, 59–71 odd
____ Average 17–47, 48–56 even, 59–71 odd
____ Advanced 17–50, 52–58, 59–71 odd

Reteaching the Lesson

____ Practice Masters: CRB pages 27–29 (Level A, Level B, Level C)
____ Reteaching with Practice: CRB pages 30–31 or Practice Workbook with Examples
____ Personal Student Tutor

Extending the Lesson

____ Cooperative Learning Activity: CRB page 33
____ Applications (Real-Life): CRB page 34
____ Challenge: SE page 81; CRB page 35 or Internet

ASSESSMENT OPTIONS

____ Checkpoint Exercises: TE pages 76–78 or Transparencies
____ Daily Homework Quiz (2.2): TE page 81, CRB page 38, or Transparencies
____ Standardized Test Practice: SE page 81; TE page 81; STP Workbook; Transparencies

Notes _____

_____

_____

LESSON 2.2

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 75–81**

GOALS

1. **Find slopes of lines and classify parallel and perpendicular lines.**
2. **Use slope 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

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

STARTING OPTIONS

____ Homework Check: TE page 71; Answer Transparencies
____ Warm-Up or Daily Homework Quiz: TE pages 75 and 74, CRB page 23, or Transparencies

TEACHING OPTIONS

____ Motivating the Lesson: TE page 76
____ Lesson Opener (Activity): CRB page 24 or Transparencies
____ Graphing Calculator Activity with Keystrokes: CRB pages 25–26
____ Examples 1–6: SE pages 75–78
____ Extra Examples: TE pages 76–78 or Transparencies; Internet
____ Closure Question: TE page 78
____ Guided Practice Exercises: SE page 79

APPLY/HOMEWORK

Homework Assignment (See also the assignment for Lesson 2.1.)

____ Block Schedule: 17–47, 48–56 even, 59–71 odd

Reteaching the Lesson

____ Practice Masters: CRB pages 27–29 (Level A, Level B, Level C)
____ Reteaching with Practice: CRB pages 30–31 or Practice Workbook with Examples
____ Personal Student Tutor

Extending the Lesson

____ Cooperative Learning Activity: CRB page 33
____ Applications (Real Life): CRB page 34
____ Challenge: SE page 81; CRB page 35 or Internet

ASSESSMENT OPTIONS

____ Checkpoint Exercises: TE pages 76–78 or Transparencies
____ Daily Homework Quiz (2.2): TE page 81, CRB page 38, or Transparencies
____ Standardized Test Practice: SE page 81; TE page 81; STP Workbook; Transparencies

Notes _____

_____

_____

LESSON 2.2

NAME _____ DATE _____

Available as a transparency

WARM-UP EXERCISES

For use before Lesson 2.2, pages 75–81

Evaluate the expression.

1. $\dfrac{-1-4}{4-(-3)}$

2. $\dfrac{0-(-2)}{-1-(-2)}$

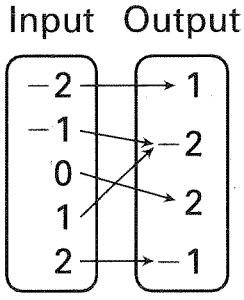
3. $\dfrac{3-4}{2+1}$

4. $\dfrac{2-(-2)}{3-6}$

DAILY HOMEWORK QUIZ

For use after Lesson 2.1, pages 67–74

1. Identify the domain and range.



2. Graph the relation in Exercise 1. Then use the vertical line test to tell whether the relation is a function.

3. Graph the function $y = 2x - 1$.

4. Decide whether the function $f(x) = 4x^2 - x + 1$ is linear. Find the value of $f(3)$.

Lesson 2.2

LESSON
2.2

NAME _____ DATE _____

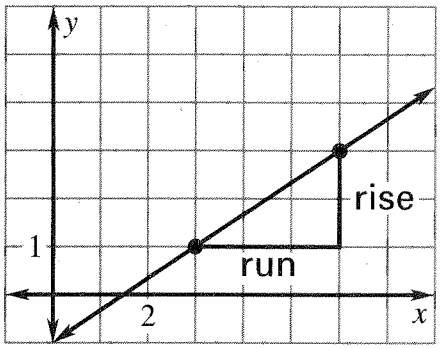
Available as a transparency

Activity Lesson Opener

For use with pages 75–81

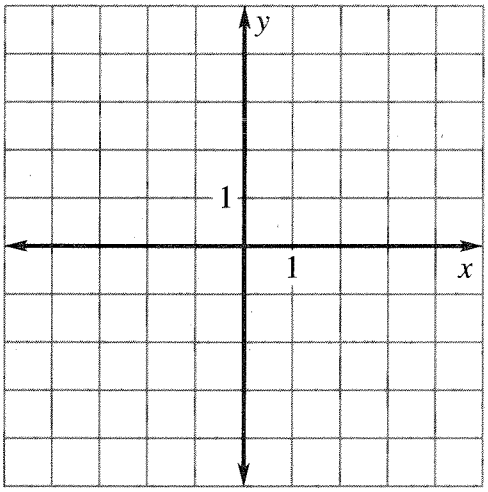
SET UP: Work in a group.
YOU WILL NEED: • colored pencils • ruler

The slope of a line that is not vertical is the ratio of the rise (vertical change) to the run (horizontal change).



1. What is the slope of the line in the diagram?

2. Plot the points $(2, -2)$ and $(4, -1)$ in the grid below and draw a line through the points.



3. Use a colored pencil to mark the rise. Use a different colored pencil to mark the run. Find the slope of the line.

4. Plot the points $(-2, 1)$ and $(2, 3)$ on the same grid. Draw a line through the points. Use colored pencils to find the slope. Write the slope in simplest form.

5. What do you notice about the lines? What do you notice about their slopes?

Lesson 2.2

LESSON 2.2

NAME _____ DATE _____

Graphing Calculator Activity

For use with pages 75-81

GOAL **To classify lines using slopes**

Recall that $y = mx + b$ is a linear function, where m and b are constants. The **slope** of a nonvertical line is the ratio of vertical change (the *rise*) to horizontal change (the *run*). The slope of a line is represented by the letter m.

Activity

1. Use a graphing calculator to graph the following.

   $y = 0.5x$
   $y = x$
   $y = 3x$
   $y = -3x$
   $y = -x$
   $y = -0.5x$

2. Would you describe the lines with slopes of $m = 0.5$, $m = 1$, and $m = 3$ as *rising from left to right* or falling *from left to right?*

3. Would you describe the lines with slopes of $m = -0.5$, $m = -1$, and $m = -3$ as *rising from left to right* or *falling from left to right?*

4. Choose two lines from Step 1. Compare the absolute values of the slopes. Which line is steeper?

Exercises

1. Determine which of the following are lines that rise from left to right.

   a. $y = 2x$ **b.** $y = -5x$ **c.** $y = -0.3$ **d.** $y = 7x$

2. Determine which lines in Exercise 1 fall from left to right.

3. Use a graphing calculator to check your answers to Exercises 1 and 2.

4. Order the following lines in terms of steepness, listing the steepest line first.

   $y = 0.3$
   $y = 3x$
   $y = 7x$
   $y = 0.7x$
   $y = 5x$

5. Use a graphing calculator to check your answer to Exercise 4.

Lesson 2.2

NAME _____ DATE _____

Graphing Calculator Activity

For use with pages 75–81

TI-82

Y= 0.5 X,T,θ ENTER

X,T,θ ENTER

3 X,T,θ ENTER

(-) 3 X,T,θ ENTER

(-) X,T,θ ENTER

(-) 0.5 X,T,θ ENTER

ZOOM 6

TI-83

Y= 0.5 X,T,θ,*n* ENTER

X,T,θ,*n* ENTER

3 X,T,θ,*n* ENTER

(-) 3 X,T,θ,*n* ENTER

(-) X,T,θ,*n* ENTER

(-) 0.5 X,T,θ,*n* ENTER

ZOOM 6

SHARP EL-9600c

Y= 0.5 X/θ/T/*n* ENTER

X/θ/T/*n* ENTER

3 X/θ/T/*n* ENTER

(-) 3 X/θ/T/*n* ENTER

(-) X/θ/T/*n* ENTER

(-) 0.5 X/θ/T/*n* ENTER

ZOOM [A] 5

CASIO CFX-9850GA PLUS

From the main menu, select GRAPH.

0.5 X,*θ*,T EXE

X,*θ*,T EXE

3 X,*θ*,T EXE

(-) 3 X,*θ*,T EXE

(-) X,*θ*,T EXE

(-) 0.5 X,*θ*,T EXE

SHIFT F3 F3 EXIT F6

LESSON 2.2

NAME _____ DATE _____

Practice C

For use with pages 75–81

Find the slope of the line passing through the given points.

1. $(6, 3), (-4, -1)$
2. $(-5, -3), (-7, -6)$
3. $\left(\frac{1}{5}, \frac{3}{5}\right), \left(\frac{3}{4}, -\frac{1}{4}\right)$
4. $\left(-1, \frac{1}{3}\right), \left(3, -\frac{2}{3}\right)$
5. $\left(-\frac{3}{5}, -3\right), \left(-\frac{6}{5}, 0\right)$
6. $(-5, 2), (12, -14)$

Decide whether the line passing through the given points *rises, falls, is horizontal,* or *is vertical.*

7. $(-9, -11), (-5, 5)$
8. $(-1, 6), (-1, 7)$
9. $(7, 0), (1, 12)$

Determine which line is steeper.

10. Line 1: through $(3, 7)$ and $(6, 2)$
    Line 2: through $(2, 4)$ and $(3, 8)$
11. Line 1: through $(1, 1)$ and $(0, 2)$
    Line 2: through $(-1, -4)$ and $(2, -2)$
12. Line 1: through $(5, 2)$ and $(-1, 3)$
    Line 2: through $(-3, 4)$ and $(2, 5)$
13. Line 1: through $(-6, 2)$ and $(1, -1)$
    Line 2: through $(4, 3)$ and $(-1, 3)$

14. ***Parallel Lines*** If two nonvertical lines are parallel, what do you know about their slopes?
15. ***Perpendicular Lines*** If two nonvertical lines are perpendicular, what do you know about their slopes?
16. ***Vertical Lines*** All vertical lines are parallel to what type of line?
17. ***Vertical Lines*** All vertical lines are perpendicular to what type of line?
18. ***Washington Monument*** The Washington Monument is 555 feet tall. The monument is composed of a 500-foot pillar topped by a 55-foot pyramid. The base of the pillar is 55 feet wide. The base of the pyramid is 34 feet wide. Approximate the slope of the sides of the pillar and the slope of the pyramid.
19. ***Pyramids of Egypt*** The sides of the base of the largest pyramid, Khufu, has length 755 feet. The height of Khufu was originally 482 feet, but now is approximately 450 Feet. Find the slope of a side of the pyramid at its original size and at its present size.
20. ***Equilateral Triangles*** An equilateral triangle has the same side lengths and angle measures. Draw an equilateral triangle on a coordinate plane such that one of the vertices is the origin. Approximate the slopes of the sides of your triangle. What are the slopes of the sides of any equilateral triangle in this position?

LESSON 2.2

NAME _____ DATE _____

Reteaching with Practice

For use with pages 75–81

GOAL **Find slopes of lines, classify parallel and perpendicular lines, and use slope to solve real-life problems**

VOCABULARY

The **slope** of a nonvertical line is the ratio of the vertical change (the *rise*) to the horizontal change (the *run*).

Two lines in a plane are **parallel** if they do not intersect and they have the same slope.

Two lines in a plane are **perpendicular** if they intersect to form a right angle. The slopes of two perpendicular lines are negative reciprocals.

EXAMPLE 1 Finding the Slope of a Line

Find the slope of the line passing through $(-1, 4)$ and $(-3, 4)$.

SOLUTION

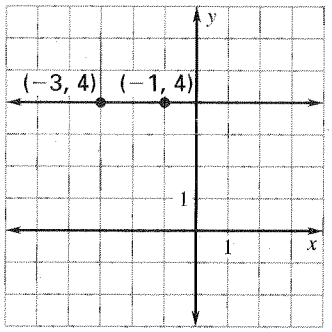
Let $(x_1, y_1) = (-1, 4)$ and $(x_2, y_2) = (-3, 4)$.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$ Write formula for slope.

$$= \frac{4 - 4}{-3 - (-1)}$$ Substitute values.

$$= \frac{0}{-2}$$ Simplify.

Because the slope is zero, the line is horizontal.



Exercises for Example 1

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

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

4. $(5, -1), (5, 6)$ **5.** $(4, -1), (4, 4)$ **6.** $(2, 5), (-2, -1)$

EXAMPLE 2 Classifying Parallel and Perpendicular Lines

Tell whether the lines are *parallel, perpendicular,* or *neither.*

a. Line 1: through $(-1, 3)$ and $(1, -3)$
Line 2: through $(3, 0)$ and $(0, -1)$

b. Line 1: through $(-2, 6)$ and $(0, -2)$
Line 2: through $(-1, 6)$ and $(1, -2)$

NAME _____ DATE _____

Reteaching with Practice

For use with pages 75–81

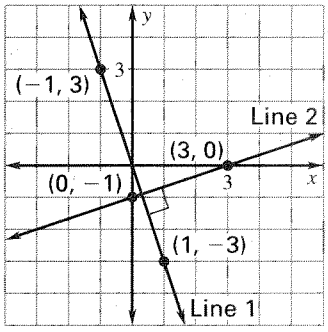
SOLUTION

a. The slopes of the two lines are:

$$m_1 = \frac{3 - (-3)}{-1 - 1} = \frac{6}{-2} = -3$$

$$m_2 = \frac{0 - (-1)}{3 - 0} = \frac{1}{3}$$

Because $m_1 m_2 = -3 \cdot \frac{1}{3} = -1$, the lines are perpendicular.

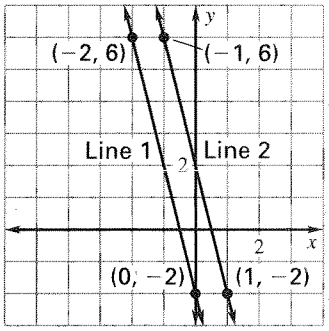


b. The slopes of the two lines are:

$$m_1 = \frac{6 - (-2)}{-2 - 0} = \frac{8}{-2} = -4$$

$$m_2 = \frac{6 - (-2)}{-1 - 1} = \frac{8}{-2} = -4$$

Because $m_1 = m_2 = -4$, the lines are parallel.



Exercises for Example 2

Tell whether the lines are *parallel*, *perpendicular*, or *neither*.

7. Line 1: through (2, 4) and (−1, −5)
Line 2: through (0, −2) and (−3, 7)

8. Line 1: through (−3, 5) and (−6, −1)
Line 2: through (−2, −5) and (4, −8)

EXAMPLE 3 Slope as a Rate of Change

Six years ago a house was purchased for $89,000. This year it was appraised at $125,000. Find the average rate of change and use it to determine the value after 9 years.

SOLUTION

$$\text{Average rate of change} = \frac{\text{Change in value}}{\text{Change in time}}$$

$$= \frac{\$125{,}000 - \$89{,}000}{6 \text{ yrs}} = \frac{\$36{,}000}{6 \text{ yrs}} = \$6000 \text{ per year}$$

Over a 9-year period, the value changed 9($6000) = $54,000. The value after 9 years was $89,000 + $54,000 = $143,000.

Exercises for Example 3

9. On a typical summer evening the temperature was 90°F at 7:00 P.M. At 8:00 A.M. the next morning the temperature was 70.5°F. What is the average rate of change in temperature? Estimate what the temperature was at midnight.

LESSON 2.2

NAME _____ DATE _____

Quick Catch-Up for Absent Students

For use with pages 75–81

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

Lesson 2.2: Slope and Rate of Change

____ **Goal 1:** Find slopes of lines and classify parallel and perpendicular lines. (pp. 75–77)

Material Covered:

____ Student Help: Look Back

____ Example 1: Finding the Slope of a Line

____ Example 2: Classifying Lines Using Slope

____ Student Help: Study Tip

____ Example 3: Comparing Steepness of Lines

____ Example 4: Classifying Parallel and Perpendicular Lines

Vocabulary:

slope, p. 75

parallel lines, p. 77

perpendicular lines, p. 77

____ **Goal 2:** Use slope to solve real-life problems. (p. 78)

Material Covered:

____ Student Help: Skills Review

____ Example 5: Geometrical Use of Slope

____ Example 6: Slope as Rate of Change

____ Other (specify) _____

_____

Homework and Additional Learning Support

____ Textbook (specify) pp. 79–81

_____

____ Internet: Extra Examples at www.mcdougallitell.com

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

____ *Personal Student Tutor* for Lesson 2.2

LESSON 2.2

NAME _____ DATE _____

Cooperative Learning Activity

For use with pages 75–81

GOAL **To compare temperatures in the Fahrenheit and Celsius scales**

Materials: Graph paper

Background

By constructing a linear graph, the relationship between two variables can be developed.

Instructions

1. Draw a graph where the x-axis represents degrees Celsius and the y-axis represents degrees Fahrenheit.
2. The freezing point of water on each temperature scale is 0°C and 32°F. The boiling point of water on each temperature scale is 32°C and 212°F. Plot these points, (0, 32) and (100, 212), on your graph.
3. Find the slope of the line using the points.
4. Find the y-intercept.
5. Using the slope-intercept form of an equation, write an equation that converts a temperature C in degrees Celsius to the temperature F in degrees Fahrenheit.

Analyzing the Results

1. Does your graph enable you to find any temperature in degrees Fahrenheit, given a temperature in degrees Celsius?
2. Can you find any temperature in degrees Celsius given a temperature in degrees Fahrenheit?

LESSON 2.2

NAME _____ DATE _____

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

For use with pages 75–81

Economics

The U.S. Department of Commerce (DOC) is the governmental agency in charge of monitoring and making predictions about the U.S. economy. Using the data that they gather from businesses all over the country, the DOC makes predictions about how strong the economy will be in the future.

In many cases, the DOC groups data according to sectors of the economy — small segments of the economy that deal with similar industries. For example, Building Materials, Automotive Sales, Furniture Sales, and General Merchandise are sectors.

One of the variables that the DOC wants to predict is called *national income wage and salary disbursements*—basically, how much money is paid to the employees of the country.

In Exercises 1–8, use the following information.

DOC analysts collected data from four sectors of the economy: Building Materials, Automotive Sales, Furniture Sales, and General Merchandise. The analysts used these data to develop a linear equation to predict national wages based on each one of the sectors. The equations are given in the following table.

Wages vs. Building materials
$W = 551.50 + 0.07635B$
Wages vs. Auto Sales
$W = 603.752 + 0.01895A$
Wages vs. Furniture Sales
$W = 560.92 + 0.08F$
Wages vs. General Merchandise
$W = 923.73 + 0.0246G$

1. Find the slope of each equation.
2. Which line is the steepest?
3. Which of these lines is the least steep?
4. Suppose each of the sectors had an increase of \$1 million in sales. Based on the slopes of the equations, (a) which sector would have the most effect on national wages and (b) which would have the least effect?
5. Do you think it is significant that the slopes found in Exercise 4 are positive? Explain.
6. What would it mean if one of these sectors was related to national wages by a negative slope?
7. What would it mean if one of these sectors was related to national wages by a zero slope?

LESSON 2.2

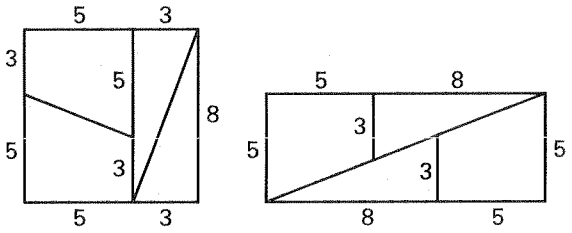
NAME _____ DATE _____

Challenge: Skills and Applications

For use with pages 75–81

In Exercises 1 and 2, use slopes to check whether each set of 3 points lies on one line.

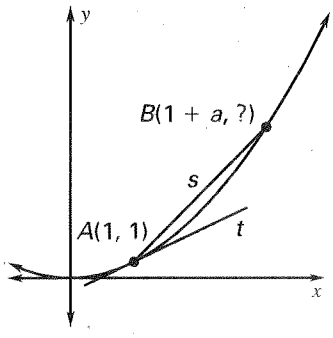
1. $(-1, -3), (2, 1), (8, 9)$
2. $(-4, 7), (0, 2), (5, -2)$
3. Find k so that the line through $(7, 2k)$ and $(4, -3)$ is parallel to the line through $(1, k + 1)$ and $(3, 5)$.
4. Find k so that the line through $(k - 1, k + 2)$ and $(4, -1)$ is perpendicular to the line through $(-3, 2)$ and $(2, 5)$.
5. **a.** Find the areas of the square and the rectangle shown below.



   b. Explain why the two areas you found in part (a) should be the same.

   c. Resolve the apparent contradiction between your results in parts (a) and (b) by using slopes. Draw a diagram to illustrate the actual situation.

6. The curve shown at the right is the graph of $y = x^2$. Line t is a *tangent line* to the graph at A (that is, a line that intersects the graph only at this point and remains on the "same side" of the graph), while line s intersects the graph at points A and B.



   a. Explain in words what would happen to the relationship between the slopes of lines s and t as the number a approached 0, but point B remained on the graph.

   b. Express the second coordinate of point B in terms of a.

   c. Using your answer to part (b), express the slope of line s in terms of a.

   d. By simplifying your answer to part (c) under the assumption that $a \neq 0$, but imagining a approaching 0, estimate the slope of the line t.

Lesson 2.2

LESSON 2.3

TEACHER'S NAME _____ CLASS _____ ROOM _____ DATE _____

Lesson Plan

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 _____

_____

✓ 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

____ Basic 16–18, 20–36 even, 37–40, 44, 46, 52–60 even, 63, 65, 66, 69–85 odd; Quiz 1: 1–11
____ Average 16–18, 20–36 even, 37–40, 44, 46, 52–60 even, 61, 63, 65, 66, 69–85 odd, 86; Quiz 1: 1–11
____ Advanced 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 _____

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