LESSON 1.5

TEACHER'S NAME _____ CLASS _____ ROOM _____ DATE _____

Lesson Plan for Block Scheduling

Half-day lesson (See *Pacing the Chapter*, TE pages 1C–1D) **For use with pages 33–40**

GOAL

1. **Use a general problem-solving plan to solve real-life problems.**
2. **Use other problem-solving strategies to help solve real-life problems.**

State/Local Objectives _____

_____

_____

CHAPTER PACING GUIDE	
Day	**Lesson**
1	1.1 (all); 1.2 (all)
2	1.3 (all); 1.4 (begin)
3	1.4 (end); **1.5 (all)**
4	1.6 (all); 1.7 (all)
5	Review/Assess Ch. 1

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

STARTING OPTIONS

____ Homework Check: TE page 29; Answer Transparencies
____ Warm-Up or Daily Homework Quiz: TE pages 33 and 32, CRB page 66, or Transparencies

TEACHING OPTIONS

____ Motivating the Lesson: TE page 34
____ Lesson Opener (Application): CRB page 67 or Transparencies
____ Examples1–6: SE pages 33–36
____ Extra Examples: TE pages 34–36 or Transparencies
____ Closure Question: TE page 36
____ Guided Practice Exercises: SE page 37

APPLY/HOMEWORK

Homework Assignment (See also the assignment for Lesson 1.4.)

____ Block Schedule: 8–21, 28, 29, 31–41 odd; Quiz 2: 1–8

Reteaching the Lesson

____ Practice Masters: CRB pages 68–70 (Level A, Level B, Level C)
____ Reteaching with Practice: CRB pages 71–72 or Practice Workbook with Examples
____ Personal Student Tutor

Extending the Lesson

____ Applications (Real Life): CRB page 74
____ Math & History: SE page 40; CRB page 75; Internet
____ Challenge: SE page 39; CRB page 76 or Internet

ASSESSMENT OPTIONS

____ Checkpoint Exercises: TE pages 34–36 or Transparencies
____ Daily Homework Quiz (1.5): TE page 39, CRB page 80, or Transparencies
____ Standardized Test Practice: SE page 39; TE page 39; STP Workbook; Transparencies
____ Quiz (1.3–1.5): SE page 40; CRB page 77

Notes _____

_____

_____

LESSON 1.5

NAME _____ DATE _____

Available as a transparency

WARM-UP EXERCISES

For use before Lesson 1.5, pages 33–40

Solve each equation for *t*.

1. $I = prt$

2. $d = rt$

Complete the unit analysis.

3. 25 feet per second to miles per hour

4. \$4.50 for 2.5 pounds to dollars per ounce

DAILY HOMEWORK QUIZ

For use after Lesson 1.4, pages 26–32

Find *y* by substituting the value of *x* into the equation and solving for *y*.

1. $4x - 2xy = 8; x = 4$

2. $3x - 5y - 11 = 0; x = -3$

Solve for *y*. Then find the value of *y* for the given value of *x*.

3. $-2x + 5y + 4 = 0; x = -3$

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

5. The surface area of a rectangular prism is given by the formula $S = 2(hw + lh + lw)$. Solve the formula for w. Then evaluate the formula for $l = 4$ cm, $h = 7$ cm, and $S = 188$ cm^2.

LESSON 1.5

NAME _____ DATE _____

Available as a transparency

Application Lesson Opener

For use with pages 33–40

The table shows Ayla's height several years in a row.

Age (years)	5	6	7	8
Height (inches)	46	48	50	52

1. How much has Ayla been growing each year?

2. If Ayla continues to grow at the same rate, how tall will she be when she is 11 years old?

3. Describe Ayla's height when she is n years old.

Rahmi is Ayla's brother. The table shows Rahmi's height several years in a row.

Age (years)	8	9	10	11
Height (inches)	52	54.5	57	59.5

4. How much has Rahmi been growing each year?

5. If Rahmi continues to grow at the same rate, how tall will he be when he is 13 years old?

6. Describe Rahmi's height when he is n years old.

NAME _____ DATE _____

Practice A

For use with pages 33–40

Party Supplies **In Exercises 1–4, use the following information.** You have \$120 to purchase juice for a party. Each case of 24 bottles costs \$5.99. Assuming there is no sales tax, how many cases can you purchase? Use the following verbal model.

Total cost	=	Price per case	·	Number of cases

1. Assign labels to the parts of the verbal model.
2. Use the labels to translate the verbal model into an algebraic model.
3. Solve the algebraic model.
4. Answer the question.

Vacation Trip **In Exercises 5–8, use the following information.** On a trip to the Grand Canyon, you drove 168 miles in $3\frac{1}{2}$ hours. What was your average speed? Use the following verbal model.

Distance	=	Rate	·	Time

5. Assign labels to the parts of the verbal model.
6. Use the labels to translate the verbal model into an algebraic model.
7. Solve the algebraic model.
8. Answer the question.

Book Club **In Exercises 9–12, use the following information.** A book club promises to send 8 books for \$1, if you join the club. After you receive the 8 books, you may select more books at a rate of \$19.99 per book. If you spend a total of \$80.96, how many extra books did you purchase? Use the following verbal model.

Total cost	=	Cost for first 8 books	+	Cost of a book	·	Number of books

9. Assign labels to the parts of the verbal model.
10. Use the labels to translate the verbal model into an algebraic model.
11. Solve the algebraic model.
12. Answer the question.

Lawn Fertilizer **In Exercises 13–16, use the following information.** A bag of lawn fertilizer claims that it will cover 5000 square feet of grass. If your yard is 27,500 square feet, how many bags of fertilizer will you need? Use the following verbal model.

Yard size	=	Coverage for one bag	·	Number of bags

13. Assign labels to the parts of the verbal model.
14. Use the labels to translate the verbal model into an algebraic model.
15. Solve the algebraic model.
16. Answer the question.

LESSON 1.5

NAME _____ DATE _____

Practice B

For use with pages 33–40

Land Speed Record **In Exercises 1–4, use the following information.** The land speed record was broken in 1997 by a British car called the Thrust SSC. The Thrust SSC traveled at a rate of 763 miles per hour. This was accomplished by using a jet engine. How long would it take the Thrust SSC to travel 100 miles? Use the following verbal model.

$$\boxed{\text{Distance}} = \boxed{\text{Rate}} \cdot \boxed{\text{Time}}$$

1. Assign labels to the parts of the verbal model.
2. Use the labels to translate the verbal model into an algebraic model.
3. Solve the algebraic model.
4. Answer the question.

New Carpeting **In Exercises 5–9, use the following information.** You just added a family room to your home. You have budgeted $450 for carpeting. If you need 30 square yards of carpeting, how much can you spend per square yard?

5. Write a verbal model.
6. Assign labels to the parts of the verbal model.
7. Use the labels to translate the verbal model into an algebraic model.
8. Solve the algebraic model.
9. Answer the question.

Sharing the Driving **In Exercises 10–14, use the following information.** You and a friend share the driving on a 300 mile trip. Your friend drives for 3 hours at an average speed of 52 miles per hour. How fast must you drive for the remainder of the trip if you want to reach your hotel in 3 more hours?

10. Write a verbal model.
11. Assign labels to the parts of the verbal model.
12. Use the labels to translate the verbal model into an algebraic model.
13. Solve the algebraic model.
14. Answer the question.

Time Management **In Exercises 15–19, use the following information.** You need to do an experiment at home for your science class and write a lab report on your findings. The experiment involves trials that take 5 minutes each to perform. You want to watch a basketball game that starts in $1\frac{1}{2}$ hours. If it takes about 30 minutes to write the lab report, how many trials can you perform before the game starts?

15. Write a verbal model.
16. Assign labels to the parts of the verbal model.
17. Use the labels to translate the verbal model into an algebraic model.
18. Solve the algebraic model.
19. Answer the question.

NAME _____ DATE _____

Practice C

For use with pages 33–40

Wagon Trains **In Exercises 1–5, use the following information.** In the 1800s settlers traveled across the country in wagon trains. A wagon train consisted of a group of families who traveled together. Each family had its own wagon and oxen or mules to pull the wagons. The wagons followed each other in a long line called a wagon train. Wagon trains traveled at a rate of approximately 2 miles per hour. The distance between Buffalo, New York and Los Angeles, California is 2198 miles. How long would it have taken for the wagon trains to travel from Buffalo to Los Angeles?

1. Write a verbal model.
2. Assign labels to the parts of the verbal model.
3. Use labels to translate the verbal model into an algebraic model.
4. Solve the algebraic model.
5. Answer the question

6. ***100-Meter Dash*** In 1996 Gail Devers won the 100-meter dash in the Olympic Games. Her time was 10.94 seconds. What was her speed in meters per second? Round your answer to 4 significant digits.
7. ***Commission*** A salesman's salary is $18,500 per year. In addition, the salesman earns 5% commission on the year's sales. Last year the salesman earned $25,400. How much was sold that year?
8. ***Visiting Friends*** Your friend's family moved to a town 300 miles from where you live. You and your friend decide to meet halfway between the two towns to visit. Your friend averages 50 miles per hour on his trip. You average 60 miles per hour on your trip. If you and your friend leave at the same time, how much earlier do you arrive at the same meeting place?
9. ***Wallpaper Project*** You want to wallpaper a room that will require 320 square feet of wallpaper. The wallpaper you selected costs $21.99 per roll. Each roll will cover 40 square feet. How much will your project cost?
10. ***Soccer Trophies*** After winning the league title, a soccer team receives a team trophy as well as individual trophies. The table gives the cost of trophies at a local store.

Trophy	Team	1	2	3	4	5
Total cost	$40	$50	$60	$70	$80	$90

Determine the total cost of giving trophies to a team with 21 members.

11. ***Area Rug*** A circular rug covers about 30 square feet. Use the guess, check, and revise method to approximate the radius of the rug to the nearest tenth of a foot.

LESSON 1.5

NAME _____ DATE _____

Reteaching with Practice

For use with pages 33–40

GOAL **Use a general problem-solving plan and other strategies to solve real-life problems**

VOCABULARY

A **verbal model** is an expression that uses words to represent a real-life situation.

The verbal model is then used to write a mathematical statement, called an **algebraic model.**

EXAMPLE 1 Drawing a Diagram

Two airports, one in California and one in New York, are 3000 miles apart. A plane leaving California is traveling to New York at 200 miles per hour. Another plane leaving New York is traveling to California at 250 miles per hour. When will the two planes pass each other?

SOLUTION

			From California			From New York	
Verbal Model	Total distance	=	Miles per hour	· Number of hours	+	Miles per hour	· Number of hours

Labels	Total distance = 3000	(miles)
	California rate = 200	(miles per hour)
	California time = t	(hours)
	New York rate = 250	(miles per hour)
	New York time = t	(hours)
Algebraic Model	$\mathbf{3000 = 200t + 250t}$	Write algebraic model.
	$3000 = 450t$	Combine like terms.
	$6\frac{2}{3} = t$	Divide each side by 450.

After $6\frac{2}{3}$ hours, the two planes will pass each other.

NAME _____ DATE _____

Reteaching with Practice

For use with pages 33–40

Exercises for Example 1

1. In a football game, the quarterback is 15 yards away from making a first down and is running at 264 yards per minute. After 0.03 of a minute, a linebacker who is 15 yards on the opposite side of the first down marker begins running directly towards the quarterback at 440 yards per minute. Will the linebacker be able to tackle the quarterback before he gets the first down?
2. Two sisters who live 500 miles apart decide to meet at the halfway point for a visit. Joanne leaves at 11:00 and travels at 50 miles per hour. At noon, Sue leaves traveling 60 miles per hour. Who will reach the halfway point first, and how long will she have to wait for her sister?

EXAMPLE 2 Guess, Check, and Revise

Compact discs cost \$16.99 each and cassette tapes cost \$8.99 each. If the total bill equaled \$78.93, how many of each were bought?

SOLUTION

Verbal Model

Total bill	=	Price per CD	·	Number of CDs	+	Price per tape	·	Number of tapes

Algebraic Model $78.93 = 16.99c + 8.99t$

Guess different values for c and t. Substitute these values into the equation until you get both sides equal.

The number of CDs was 2, $16.99 \times 2 = 33.98$, and the number of tapes was 5, $8.99 \times 5 = 44.95$, for a total bill of $\$33.98 + \$44.95 = \$78.93$.

Exercises for Example 2

3. A farmer has 64 yards of fencing and wants to create a rectangular enclosure for his animals. What is the enclosure with the greatest area?
4. A cylindrical swimming pool 5 feet in depth needs approximately 2292 gallons of water to be full. To the nearest tenth, what is the radius of the pool?

LESSON 1.5

NAME _____ DATE _____

Quick Catch-Up for Absent Students

For use with pages 33–40

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

Lesson 1.5: Problem Solving Using Algebraic Models

____ **Goal 1:** Use a general problem-solving plan to solve real-life problems. (pp. 33–34)

Material Covered:

____ Example 1: Writing and Using a Formula

____ Student Help: Study Tip

____ Example 2: Writing and Using a Simple Model

____ Example 3: Writing and Using a Model

Vocabulary:

verbal model, p. 33 algebraic model, p. 33

____ **Goal 2:** Use other problem-solving strategies to help solve real-life problems. (pp. 35–36)

Material Covered:

____ Student Help: Skills Review

____ Example 4: Drawing a Diagram

____ Example 5: Looking for a Pattern

____ Example 6: Guess, Check, and Revise

____ Other (specify) _____

_____

Homework and Additional Learning Support

____ Textbook (specify) pp. 37–40 _____

_____

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

____ *Personal Student Tutor* for Lesson 1.5

NAME _____ DATE _____

Real Life Application: When Will I Ever Use This?

For use with pages 33–40

Amusement Parks

Cedar Point Amusement Park in Sandusky, Ohio, is one of the largest and most popular amusement parks in the world. Over three million people visit the park each year. Open in 1870, it is the second oldest amusement park in North America. In 1990, Cedar Point was listed in the *Guinness Book of World Records* for having more roller coasters than any other amusement park in the world. Currently, it has a total of fourteen roller coasters.

In Exercises 1–5, use the following information.

Suppose you, your uncle, and your little brother are purchasing passes to Cedar Point. You pay x dollars for your adult pass and \$28 less for your little brother's pass. Your uncle pays the senior citizen rate, which is \$16 less than the adult pass. Two hours after the park opens, 4668 adult passes, 118 senior citizen passes, and 634 child passes are sold. The park's income for these two hours is \$186,320.

1. If the number of people entering the park is consistent, how many people could you expect to be in the park after six hours?
2. Write a verbal model for the income of the amusement park after the first two hours.
3. Assign labels to the parts of the verbal model.
4. Translate the verbal model into an algebraic model.
5. Determine the individual prices of an adult pass, a child pass, and a senior citizen pass. What was the total cost for you, your brother, and your uncle to enter the park?
6. Suppose there is a 20% discount on both senior citizen and children's passes. Determine the income for the park in the first two hours.

LESSON 1.5

NAME _____ DATE _____

Math and History Application

For use with page 40

HISTORY Puzzles about dividing some amount of food or some quantity of money among several people have been part of recreational mathematics and mathematics instruction since the time of the Ahmes Papyrus (about 1650 BC). Here's a problem very similar to the Ahmes problem on page 40 of your textbook, but it's from a Greek collection made some time around 520 AD.

> Determine a number of apples such that if six people receive one third, one eighth, one fourth and one fifth of the total number of apples, while the fifth person receives 10 apples, there remains one apple as the share of the sixth person.

About 1000 years later, the Italian mathematician Girolamo Cardano wrote one of the first algebra textbooks. First published in 1545, it was written in Latin and bore the title *Ars Magnae Sive de Regulis Algebraicis*—The Great Art, or The Rules of Algebra. His main theme was the solution of quadratic equations, which you will see in Chapter 5, and cubic equations, but he includes some classic puzzle problems like the following:

> One man said to another, give me one third of what you have and three gold pieces more, and I will have three times what you still have. And the second said to the first, give me half of yours and two gold pieces more and what you then have will be one ninth of all that I have. How much does each man have?

This is a tricky problem, and it takes Cardano over a page to work through the solution. He uses a method similar to one that you'll learn in Chapter 3, but after you've studied Chapter 3 you'll probably find that you can solve his problem in a few lines using modern notation.

MATH The Math & History feature on page 40 illustrates the rule of false position, which is still a good way to solve problems about sharing fractions of some total amount. Usually the first step is to find a number divisible by all the denominators.

1. You want to make integers out of the fractions $\frac{1}{4}$, $\frac{2}{5}$, $\frac{4}{7}$, and $\frac{5}{8}$ by multiplying each fraction by the same integer n. What is the smallest n that will work?
2. Now try another problem from the Ahmes Papyrus. "A quantity, its $\frac{2}{3}$, its $\frac{1}{2}$, and its $\frac{1}{7}$ added together, become 33. What is the quantity?" A hint, not given in the papyrus, is that the answer is not a whole number.
3. Solve the Greek problem about apples. The first step in using the rule of false position is to turn the fractions into whole numbers by multiplying each fraction by some integer n. Figure out the smallest n that works, just as you did in Problem 1. Then check the whole numbers you get to see if you have a solution.
4. For a real challenge, try to solve Cardano's problem. The answers here are whole numbers less than 20, so guess and check might work. What should the first man's amount be divisible by? How about the second man's amount?

NAME _____ DATE _____

Challenge: Skills and Applications

For use with pages 33–40

1. Lisa Chung wants to cover a 6-mile course in 1 hour by running part of the course and walking the rest. She also wants to make a 5-minute stop for water. Lisa runs at 8 mi/h and walks at 3 mi/h. How many miles will she have to run?

2. Two computer printers are put to work printing 200 copies of a document. One of the printers takes 2.5 minutes to print a copy of the document; the other will print a copy in 1.5 minutes.

   a. Let x = the time (in minutes) that both copiers work to complete the job. Write expressions for how many copies each printer will print in 1 minute.

   b. Write an equation involving x that models the given conditions.

   c. How long will it take both printers working together to complete the job?

3. A sump pump in Mark Morgenstern's basement kicks on automatically when the water level reaches a certain depth and turns off automatically when the depth is down to 0. One rainy night, water began to accumulate in the basement at 12:00 midnight, rising at a constant rate. The sump pump turned on at 7:30 A.M. and began pumping at a constant rate. At 8:00 A.M. the water depth was 2 in., and water stopped coming into the basement. By 10:30 A.M. all the water had been pumped out.

   a. Using r in./h for the rate of water accumulation and s in./h for the rate at which water is pumped out, write an equation modeling the situation at 8:00 A.M.

   b. Using the rest of the given information, find s.

   c. Find the rate r at which water had been accumulating.

4. A tank contains 300 liters of a 10% solution of sodium thiosulfate (a chemical used in photography). This means (roughly speaking) that 10% of the volume of the solution is pure sodium thiosulfate, and the rest is water.

   a. Suppose x liters of a 15% solution of the same chemical is added to the tank. Write an equation, involving x, that expresses the fact that the result of this addition is a 12% solution.

   b. How much, by volume, of a 15% solution must be added to the tank to produce a 12% solution?

LESSON 1.6

TEACHER'S NAME _____ CLASS _____ ROOM _____ DATE _____

Lesson Plan for Block Scheduling

Half-day lesson (See *Pacing the Chapter*, TE pages 1C–1D) **For use with pages 41–48**

GOALS
1. **Solve simple inequalities.**
2. **Solve compound inequalities.**

State/Local Objectives _____

_____

_____

CHAPTER PACING GUIDE	
Day	**Lesson**
1	1.1 (all); 1.2 (all)
2	1.3 (all); 1.4 (begin)
3	1.4 (end); 1.5 (all)
4	**1.6 (all)**; 1.7 (all)
5	Review/Assess Ch. 1

Lesson 1.6

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

STARTING OPTIONS

____ Homework Check: TE page 37; Answer Transparencies
____ Warm-Up or Daily Homework Quiz: TE pages 41 and 39, CRB page 80, or Transparencies

TEACHING OPTIONS

____ Motivating the Lesson: TE page 42
____ Lesson Opener (Activity): CRB page 81 or Transparencies
____ Graphing Calculator Activity with Keystrokes: CRB page 82
____ Examples1–7: SE pages 41–44
____ Extra Examples: TE pages 42–44 or Transparencies; Internet
____ Technology Activity: SE page 48
____ Closure Question: TE page 44
____ Guided Practice Exercises: SE page 45

APPLY/HOMEWORK

Homework Assignment (See also the assignment for Lesson 1.7.)

____ Block Schedule: 13–24, 26–48 even, 49, 51, 58–60, 61–69 odd

Reteaching the Lesson

____ Practice Masters: CRB pages 83–85 (Level A, Level B, Level C)
____ Reteaching with Practice: CRB pages 86–87 or Practice Workbook with Examples
____ Personal Student Tutor

Extending the Lesson

____ Applications (Interdisciplinary): CRB page 89
____ Challenge: SE page 47; CRB page 90 or Internet

ASSESSMENT OPTIONS

____ Checkpoint Exercises: TE pages 42–44 or Transparencies
____ Daily Homework Quiz (1.6): TE page 47, CRB page 93, or Transparencies
____ Standardized Test Practice: SE page 47; TE page 47; STP Workbook; Transparencies

Notes _____

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LESSON 1.6

NAME _____ DATE _____

Available as a transparency

WARM-UP EXERCISES

For use before Lesson 1.6, pages 41–48

Solve the equation.

1. $7x - 4 = 5x + 2$
2. $10 - 3y = 16y - 9$
3. $\frac{3}{5}m - \frac{3}{4} = \frac{1}{2} + \frac{2}{5}m$

Fill in the blank with $<$, $>$, or $=$.

4. -16 ____ -19
5. $-4 - 8$ ____ $16 + (-4)$

DAILY HOMEWORK QUIZ

For use after Lesson 1.5, pages 33–40

Cyclists A and B each average 30 km/h for the first hour of a 100 km race. At the end of the hour, B has a mishap and loses 12 min. Cyclist A finishes the remainder of the race at an average rate of 25 km/h. If cyclist B averages 27.5 km/h after resuming, will B catch A before the finish line?

1. Write a verbal model for the distance at which A and B will again be even.
2. Assign labels to the verbal model.
3. Use the labels to translate the verbal model into an algebraic model.
4. Solve the algebraic model.
5. Answer the question. Explain.

LESSON 1.6

NAME _____ DATE _____

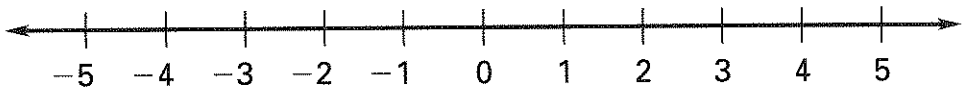
Available as a transparency

Activity Lesson Opener

For use with pages 41–47

YOU WILL NEED: • colored pencils

1. Shade the number line with a colored pencil to show $x < 2$. Leave the dot for the endpoint open (not shaded) since $x = 2$ is not included in the solution.



2. Use a different color pencil to show $x \geq -1$ on the same number line. Is -1 included in the solution? Should the dot for the endpoint be open or closed?

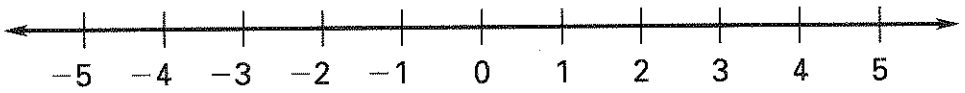
3. The solution to $x < 2$ **and** $x \geq -1$ is the part that is shaded both colors. Describe the solution.

4. Is 0 a solution to $x < 2$ **and** $x \geq -1$? Is -2 a solution?

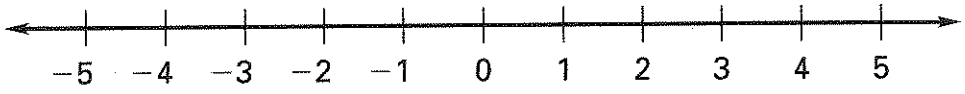
5. The solution to $x < 2$ **or** $x \geq -1$ is the part that is shaded either color. Describe the solution.

Shade the number line and describe the solution to each compound inequality.

6. $x \leq -3$ and $x < 1$



7. $x < -3$ or $x < 1$



Lesson 1.6

LESSON 1.6

NAME _____ DATE _____

Graphing Calculator Activity Keystrokes

For use with page 48

TI-82

Y= (3 X,T,θ + 2 2nd [TEST] 3 (-) 4) ENTER

ZOOM 6

TI-83

Y= (3 X,T,θ,n + 2 2nd [TEST] 3 (-) 4) ENTER

ZOOM 6

SHARP EL-9600c

Y= (3 X/θ/T/n + 2 MATH [F] 3 (-) 4) ENTER

ZOOM [A] 5

CASIO CFX-9850GA PLUS

Note: The *Test* feature is not available for the graph mode. Therefore, solve the inequality first and then enter the endpoints in two lists. If the solution goes past -10 or 10, use these values instead because we are only looking at a portion of the solution. From the main menu, choose STAT.

Enter the following in List 1.

(-) 2 EXE 10 EXE

Enter the following in List 2.

1 EXE 1 EXE SHIFT F3 F3 EXIT F1 F6

Choose the following.

Graph Type: xyLine; LList: List 1; YList: List 2; Frequency: 1; Mark Type: EXIT F1

LESSON 1.6

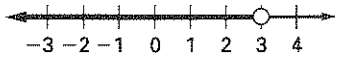
NAME _____ DATE _____

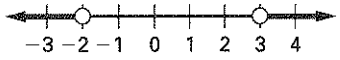
Practice A

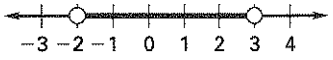
For use with pages 41–47

Match the inequality with its graph.

1. $x \leq 0$
2. $-2 < x < 3$
3. $x < -2$ or $x > 3$
4. $x > -2$
5. $x < 3$
6. $x \geq 0$

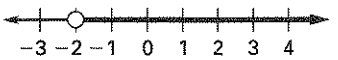
A. 

B. 

C. 

D. 

E. 

F. 

Decide whether the given number is a solution of the inequality.

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

Solve the inequality.

13. $x + 3 < 1$
14. $x - 5 \geq 2$
15. $4 \leq 7 + x$
16. $2x > 6$
17. $\frac{1}{2}x \leq 5$
18. $3x > -9$
19. $-3x < -12$
20. $-2x > 18$
21. $-\frac{1}{3}x \leq -7$
22. $-3 < x + 5 < 2$
23. $4 < -2x < 6$
24. $0 \leq x - 4 \leq 7$
25. $x + 1 < -5$ or $x + 1 > 3$
26. $x - 2 < 1$ or $x - 2 > 8$
27. $7x \leq -28$ or $7x \geq 7$

Solve the inequality. Then graph the solution.

28. $2x + 3 > 11$
29. $3 - 2x \leq 5$
30. $3 - x \geq -2$
31. $\frac{1}{3}x + 3 < 5$
32. $7 - \frac{3}{2}x \geq 6$
33. $1 - 2x > x + 10$

34. ***Moon's Orbit*** As the moon orbits Earth, the closest it ever gets to Earth is 221,463 miles. The farthest away it ever gets is 252,710 miles. Write an inequality that represents the various distances of the moon from Earth.

35. ***January Temperatures*** The highest January temperature in the United States was 98° F in Laredo, Texas in 1954. The lowest January temperature in the United States was −80° F in Prospect Creek, Alaska in 1971. Write an inequality that represents the various temperatures in the United States during January.

36. ***Bird Eggs*** The largest egg laid by any bird is that of the ostrich. An ostrich egg can reach 8 inches in length. The smallest egg is that of the vervain hummingbird. Its eggs are approximately 0.4 inch in length. Write an inequality that represents the various lengths of bird eggs.

LESSON 1.6

NAME _____ DATE _____

Practice B

For use with pages 41–47

Graph the solution of the inequality.

1. $x < 4$
2. $x > -3$
3. $x \leq -1$
4. $x \geq 7$
5. $3 < x < 5$
6. $x \leq -4$ or $x \geq -1$

Solve the inequality.

7. $x + 8 < 14$
8. $-11x > 77$
9. $2x - 1 > -5$
10. $3x + 2 < 8$
11. $5x - 8 \geq -3$
12. $\frac{1}{2}x + 4 \leq 7$
13. $-x + 5 \geq 6$
14. $4 - 2x \leq 0$
15. $-3x + 5 > -1$
16. $7 - 9x < 12$
17. $-5x + 1 \geq 1$
18. $3x - 1 \leq 2x + 2$
19. $-2 < 2x - 5 < 3$
20. $-4 < 2 - x < 6$
21. $x - 4 \leq 2$ or $x - 4 \geq 12$
22. $x - 1 < -3$ or $x - 1 > 3$
23. $3 \leq \frac{1}{2}x - 1 \leq 5$
24. $2(x - 3) < 8$

Solve the inequality. Then graph the solution.

25. $\frac{2}{3}x - 5 > 1$
26. $6 + 3x \leq 5$
27. $3 - x > 2$
28. $7 - \frac{3}{2}x \geq 6$
29. $1 - 2x > x + 10$
30. $2(4 - x) \geq 6$

31. ***Extreme Points*** The northernmost point of the United States is Point Barrow, Alaska. It lies on the 71°23′ latitude line. The southernmost point of the United States is Ka Lae, Hawaii. It lies on the 18°55′ latitude line. Write an inequality that represents the various latitudes of locations in the United States.

32. ***Exam Grades*** The grades for a course are based on 5 exams and 1 final. All six of the tests are worth 100 points. In order to receive an A in the course, you must earn at least 540 points. Your grades on the 5 exams are as follows: 87, 95, 92, 81, and 89. Write an inequality that represents the various grades you can earn on the final and still get an A. Solve the inequality.

33. ***Speed Limit*** The speed limit on a certain stretch of highway is 65 miles per hour. Write an inequality that represents the distances you can travel if you obey the speed limit for 2 hours. Solve the inequality.

34. ***January Temperatures*** The highest January temperature in the United States was 98° F in Laredo, Texas in 1954. The lowest January temperature in the United States was −80° F in Prospect Creek, Alaska in 1971. Write an inequality that represents the various temperatures in the United States during January.

35. ***Bird Eggs*** The largest egg laid by any bird is that of the ostrich. An ostrich egg can reach 8 inches in length. The smallest egg is that of the vervain hummingbird. Its eggs are approximately 0.4 inch in length. Write an inequality that represents the various lengths of bird eggs.

LESSON 1.6

NAME _____ DATE _____

Practice C

For use with pages 41–47

Solve the inequality.

1. $4 - 2x > x + 1$
2. $5x - 7 \leq 7x - 6$
3. $5 \leq \frac{1}{2}x - 1 \leq 8$
4. $1 - 2x < -3$ or $3 - x > 5$
5. $3(x - 5) > x + 2$
6. $4 - 3x < 5(x + 1)$
7. $2(x + 1) \leq 6(2 - x) + 3$
8. $7 - 3x \geq 2(x - 4)$
9. $-4 < 3(x + 2) - 1 < 2$
10. $2.2 < 5x - 2 < 6.8$
11. $3.2 \leq 2.5x - 1.8 \leq 5.2$
12. $2.5 < 0.2x + 0.5 < 3.8$
13. $\frac{3}{2}x + 1 < 0$ or $\frac{3}{2}x + 1 > 5$
14. $\frac{2}{3}x - 8 \leq 3(x + 2)$
15. $\frac{5}{4} - \frac{1}{6}x \geq \frac{3}{2}$

Decide which inequalities have no solution and which inequalities are true for all real numbers.

16. $2x + 7 < 2(x - 3)$
17. $3(x + 2) - 4x > x - (2x - 8)$
18. $5(4 - x) \leq -4x + 20 - x$

19. ***Distance from the Sun*** Mercury is the closest planet to the sun. Mercury is 57.9 million kilometers from the sun. Pluto is the farthest planet from the sun. Pluto is 5900 million kilometers from the sun. Write an inequality that represents the various distances from a planet to the sun.

20. ***Beaufort Scale*** The Beaufort Scale is a system for describing the speed of wind. The table below shows the 13 descriptions of the Beaufort Scale. Write an inequality for each of the descriptions.

Description	*Speed, S*	*Description*	*Speed, S*
Calm	under 1 mph	Strong Breeze	25–31 mph
Light Air	1–3 mph	Near Gale	32–38 mph
Light Breeze	4–7 mph	Gale	39–46 mph
Gentle Breeze	8–12 mph	Strong Gale	47–54 mph
Moderate Breeze	13–18 mph	Storm	55–63 mph
Fresh Breeze	19–24 mph	Violent Storm	64–72 mph
		Hurricane	over 72 mph

21. ***Video Arcade*** You have \$4.25 to spend at a video arcade. Some games cost \$0.75 to play and other games cost \$0.50 to play. You decide to play 2 games that cost \$0.75. Write and solve an inequality to find the possible number of \$0.50 video games you can play.

LESSON 1.6

NAME _____ DATE _____

Reteaching with Practice

For use with pages 41–47

GOAL **Solve simple inequalities and compound inequalities**

VOCABULARY

Inequalities such as $x \leq 1$ and $2n - 3 > 9$ are examples of **linear inequalities** in one variable.

A **solution** of an inequality in one variable is a value of the variable that makes the inequality true.

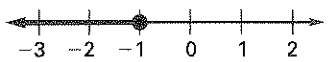
A **compound inequality** is two simple inequalities joined by "and" or "or."

The **graph** of an inequality in one variable consists of all points on a real number line that corresponds to solutions of the inequality.

EXAMPLE 1 Solving an Inequality with a Variable on One Side

Solve $3 - 2x \geq 5$. Then graph the solution.

SOLUTION

$3 - 2x \geq 5$	Write original inequality.
$-2x \geq 2$	To isolate $-2x$, subtract 3 from each side.
$x \leq -1$	Divide each side by -2 and reverse the inequality.
	Graph the solution.

Exercises for Example 1

Solve the inequality. Then graph your solution.

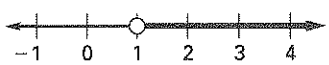
1. $-4x \leq -4$ **2.** $3x \geq -6$ **3.** $-2x > 6$

4. $-x - 1 < -1$ **5.** $6 \leq 3x - 3$ **6.** $-5 > 2x + 13$

EXAMPLE 2 Solving an Inequality with a Variable on Both Sides

Solve $-n + 4 > -5n + 8$. Then graph the solution.

SOLUTION

$-n + 4 > -5n + 8$	Write original inequality.
$4n + 4 > 8$	To collect the variable terms, add $5n$ to each side.
$4n > 4$	Subtract 4 from each side.
$n > 1$	Divide each side by 4.
	Graph the solution.

NAME _____ DATE _____

Reteaching with Practice

For use with pages 41–47

Exercises for Example 2

Solve the inequality. Then graph your solution.

7. $3x + 5 > x + 7$ **8.** $-5x + 9 \leq 2(x - 6)$ **9.** $-x \leq -4x + 3$

EXAMPLE 3 Solving an "And" Compound Inequality

Solve $-2 < 1 - 3x < 10$. Then graph the solution.

SOLUTION

$-2 < 1 - 3x < 10$	Write the original inequality.
$-3 < -3x < 9$	To isolate $-3x$, subtract 1 from each expression.
$1 > x > -3$	Divide each expression by -3 and reverse the inequality.
	Graph the solution.

Exercises for Example 3

Solve the inequality. Then graph your solution.

10. $4 < 2x < 8$ **11.** $2 \leq 3 - x \leq 8$ **12.** $-4 < x + 1 < 6$

EXAMPLE 4 Solving an "Or" Compound Inequality

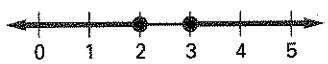
Solve $2x - 5 \geq 1$ or $2x - 5 \leq -1$. Then graph the solution.

SOLUTION OF FIRST INEQUALITY

$2x - 5 \geq 1$	Write first inequality.
$2x \geq 6$	Add 5 to each side.
$x \geq 3$	Divide each side by 2.

SOLUTION OF SECOND INEQUALITY

$2x - 5 \leq -1$	Write second inequality.
$2x \leq 4$	Add 5 to each side.
$x \leq 2$	Divide each side by 2.



Graph the solutions.

Exercises for Example 4

Solve the inequality. Then graph your solution.

13. $3x \leq -3$ or $x - 1 \geq 0$ **14.** $5x + 6 \leq 11$ or $-3x \leq -12$

15. $4x - 3 > 9$ or $-2x > 2$ **16.** $x > 0$ or $5x - 4 < -14$

LESSON 1.6

NAME _____ DATE _____

Quick Catch-Up for Absent Students

For use with pages 41–48

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

Lesson 1.6: Solving Linear Inequalities

____ **Goal 1:** Solve simple inequalities. (pp. 41–42)

Material Covered:

____ Activity: Investigating Properties of Inequalities

____ Example 1: Solving an Inequality with a Variable on One Side

____ Student Help: Study Tip

____ Example 2: Solving an Inequality with a Variable on Both Sides

____ Example 3: Using a Simple Inequality

Vocabulary:

linear inequality in one variable, p. 41
solution of a linear inequality in one variable, p. 41
graph of a linear inequality in one variable, p. 41

____ **Goal 2:** Solve compound inequalities. (pp. 43–44)

Material Covered:

____ Student Help: Study Tip

____ Example 4: Solving an "And" Compound Inequality

____ Example 5: Solving an "Or" Compound Inequality

____ Example 6: Using an "And" Compound Inequality

____ Example 7: Using an "Or" Compound Inequality

Vocabulary:

compound inequality, p. 43

Activity 1.6: Solving an Inequality (p. 48)

____ **Goal:** Solve a linear inequality using the *Test* feature of a graphing calculator.

____ Student Help: Keystroke Help

____ Other (specify) _____

_____

Homework and Additional Learning Support

____ Textbook (specify) pp. 45–47

_____

____ Internet: Extra Examples at www.mcdougallittell.com

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

____ *Personal Student Tutor* for Lesson 1.6

LESSON 1.6

NAME _____ DATE _____

Interdisciplinary Application

For use with pages 41–47

Organ Transplants

BIOLOGY An organ transplant is the transfer of an organ from one person to another. Some of the most commonly transplanted organs are the heart, kidney, and liver. Organ transplants can greatly increase the quality of a patient's life who otherwise may have died or been severely disabled. Once a patient qualifies for a transplant, he or she must be put on a waiting list until a suitable donor is found. This waiting period can be a very frustrating time for the patients and their families. The United Network for Organ Sharing (UNOS), located in Richmond, Virginia, oversees the lists of patients who are waiting for organ transplants.

It is possible that a transplanted organ can be rejected by a patient's body. Rejection occurs when the body's immune system recognizes the transplanted organ as foreign and attacks the new organ. Health care professionals attempt to prevent organ rejection by choosing the best donor and using special medication to help protect the transplant. The survival rates of patients who receive organ transplants can vary from organ to organ.

The first successful kidney transplant was performed by Dr. Joseph Murray at the Brigham and Women's Hospital in Boston, Massachusetts, in 1954. Kidney transplants are the most successful types of organ transplant, with over ninety percent of transplants still functioning after one year.

In Exercises 1–6, use the following information.

In 1990, the number of kidney transplant procedures K was approximately 9733. From 1990 through 1996, the number of kidney transplant procedures increased by an average of 404 procedures per year.

1. Write a verbal model that gives the number of kidney transplant procedures t years after 1990.
2. Assign labels to the verbal model and write an algebraic model that gives the number of kidney transplant procedures t years after 1990.
3. Complete the table shown below for the given values of t.

t	0	1	2	3	4	5	6
K							

4. According to the model, what will the number of kidney transplant procedures be in 2004?
5. Use the model to write and solve an inequality that shows the values of t for which the number of kidney transplant procedures performed will be at least 17,005.
6. Write an inequality that shows the values of t for which the number of kidney transplant procedures performed will be at most 14,177.

LESSON 1.6

NAME _____ DATE _____

Challenge: Skills and Applications

For use with pages 41–47

In Exercises 1–4, solve the compound inequality.

1. $x - 1 < 3$ and $1 - 2x < -9$
2. $3n + 1 > 10$ and $\frac{1}{2}n - 1 > 3$
3. $-2x + 1 > 5$ or $x + 6 < 1$
4. $2(x + 3) < 14$ or $-5 - x < 1$

5. **a.** Suppose a and b are both positive numbers and $a < b$. Is one of the following always true: $\frac{1}{a} < \frac{1}{b}$ or $\frac{1}{a} > \frac{1}{b}$? Explain how you know, basing your explanation on the transformations that produce equivalent inequalities.

   b. Suppose b is a positive number and a is a negative number. Answer the same question as in part (a), and give a similar explanation.

   c. Suppose both a and b are negative. Again, answer the same question and explain.

6. **a.** Suppose a and b are positive and $a < b$. Explain how you know that $a^2 < b^2$.

   b. Suppose you know that for two numbers a and b, $a^2 < b^2$. Does it follow that $a < b$? Discuss the different cases depending on which of the two numbers a and b is positive.

In Exercises 7–9, solve the inequality.

Example: $\frac{5}{x} + \frac{1}{2} < 3$

Solution: Since you don't know whether x is positive or negative, you have to consider two cases: (1) $x > 0$ or (2) $x < 0$.

(1) $x > 0$:

Multiply both sides of the given inequality by $2x$, which is positive.

$10 + x < 6x \implies 10 < 5x \implies 2 < x$

In this case, the solution is $x > 0$ and $x > 2$, or $x > 2$.

(2) $x < 0$:

Proceeding as before, except that now $2x$ is negative, you have

$10 + x > 6x \implies 10 > 5x \implies 2 > x$

The solution is $x < 0$ and $x < 2$, or $x < 0$.

Combining the results of these two cases, you have $x > 2$ or $x < 0$.

7. $\frac{11}{3} - \frac{2}{x} > 5$
8. $\frac{8}{x} + 7 < 9$
9. $\frac{3}{4} + \frac{12}{x - 1} > 1$

LESSON 1.7

TEACHER'S NAME _____ CLASS _____ ROOM _____ DATE _____

Lesson Plan

1-day lesson (See *Pacing the Chapter*, TE pages 1C–1D)

For use with pages 49–56

GOALS

1. **Solve absolute value equations and inequalities.**
2. **Use absolute value equations and inequalities to solve real-life problems.**

State/Local Objectives _____

_____

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

STARTING OPTIONS

____ Homework Check: TE page 45; Answer Transparencies
____ Warm-Up or Daily Homework Quiz: TE pages 50 and 47, CRB page 93, or Transparencies

TEACHING OPTIONS

____ Motivating the Lesson: TE page 51
____ Concept Activity: SE page 49; CRB page 94 (Activity Support Master)
____ Lesson Opener (Graphing Calculator): CRB page 95 or Transparencies
____ Graphing Calculator Activity with Keystrokes: CRB pages 96–97
____ Examples 1–5: SE pages 50–52
____ Extra Examples: TE pages 51–52 or Transparencies; Internet
____ Closure Question: TE page 52
____ Guided Practice Exercises: SE page 53

APPLY/HOMEWORK

Homework Assignment

____ Basic 18–58 even, 59, 61, 65, 66, 77–79, 90–106 even; Quiz 3: 1–18
____ Average 18–58 even, 59–65, 66, 67, 77–85, 90–106 even; Quiz 3: 1–18
____ Advanced 18–58 even, 59–65, 66, 67–75 odd, 76–89, 90–106 even; Quiz 3: 1–18

Reteaching the Lesson

____ Practice Masters: CRB pages 98–100 (Level A, Level B, Level C)
____ Reteaching with Practice: CRB pages 101–102 or Practice Workbook with Examples
____ Personal Student Tutor

Extending the Lesson

____ Applications (Real-Life): CRB page 104
____ Challenge: SE page 55; CRB page 105 or Internet

ASSESSMENT OPTIONS

____ Checkpoint Exercises: TE pages 51–52 or Transparencies
____ Daily Homework Quiz (1.7): TE page 56 or Transparencies
____ Standardized Test Practice: SE page 55; TE page 56; STP Workbook; Transparencies
____ Quiz (1.6–1.7): SE page 56

Notes _____

_____

_____

LESSON 1.7

TEACHER'S NAME _____ CLASS _____ ROOM _____ DATE _____

Lesson Plan for Block Scheduling

Half-day lesson (See *Pacing the Chapter,* TE pages 1C–1D) **For use with pages 49–56**

GOALS

1. **Solve absolute value equations and inequalities.**
2. **Use absolute value equations and inequalities to solve real-life problems.**

State/Local Objectives _____

_____

_____

CHAPTER PACING GUIDE	
Day	**Lesson**
1	1.1 (all); 1.2 (all)
2	1.3 (all); 1.4 (begin)
3	1.4 (end); 1.5 (all)
4	1.6 (all); **1.7 (all)**
5	Review/Assess Ch. 1

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

STARTING OPTIONS

____ Homework Check: TE page 45; Answer Transparencies
____ Warm-Up or Daily Homework Quiz: TE pages 50 and 47, CRB page 93, or Transparencies

TEACHING OPTIONS

____ Motivating the Lesson: TE page 51
____ Concept Activity: SE page 49; CRB page 94 (Activity Support Master)
____ Lesson Opener (Graphing Calculator): CRB page 95 or Transparencies
____ Graphing Calculator Activity with Keystrokes: CRB pages 96–97
____ Examples 1–5: SE pages 50–52
____ Extra Examples: TE pages 51–52 or Transparencies; Internet
____ Closure Question: TE page 52
____ Guided Practice Exercises: SE page 53

APPLY/HOMEWORK

Homework Assignment (See also the assignment for Lesson 1.6.)

____ Block Schedule: 18–58 even, 59–65 odd, 66, 67, 77–85, 90–106 even; Quiz 3: 1–18

Reteaching the Lesson

____ Practice Masters: CRB pages 98–100 (Level A, Level B, Level C)
____ Reteaching with Practice: CRB pages 101–102 or Practice Workbook with Examples
____ Personal Student Tutor

Extending the Lesson

____ Applications (Real Life): CRB page 104
____ Challenge: SE page 55; CRB page 105 or Internet

ASSESSMENT OPTIONS

____ Checkpoint Exercises: TE pages 51–52 or Transparencies
____ Daily Homework Quiz (1.7): TE page 56 or Transparencies
____ Standardized Test Practice: SE page 55; TE page 56; STP Workbook; Transparencies
____ Quiz (1.6–1.7): SE page 56

Notes _____

_____

_____

LESSON 1.7

NAME _____ DATE _____

Available as a transparency

WARM-UP EXERCISES

For use before Lesson 1.7, pages 49–56

Solve the inequality.

1. $18x + 7 > -14 + 6x$

2. $\frac{3}{4}x - 3 \leq 9$

3. $5(6 - x) \geq -15$

4. $x + 5 > 12$ or $x - 7 < -9$

5. $-4 \leq 2x - 4 \leq 10$

DAILY HOMEWORK QUIZ

For use after Lesson 1.6, pages 41–48

Decide whether the given number is a solution of the inequality.

1. $14 > -3x - 4; -6$

2. $-4 \leq -5 - 2x \leq 3; -3$

Solve the inequality. Then graph your solution.

3. $\frac{2}{3}p - 4 < -2$

4. $-3 \leq 2x - 5 \leq 3$

5. $-3t - 5 < -8$ or $-4t + 3 > 7$

Lesson 1.7

LESSON 1.7

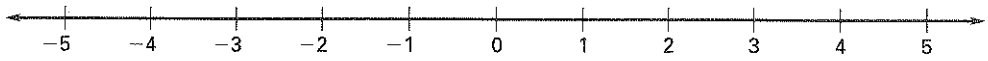
NAME _____ DATE _____

Activity Support Master

For use with page 49

Step 2

a.



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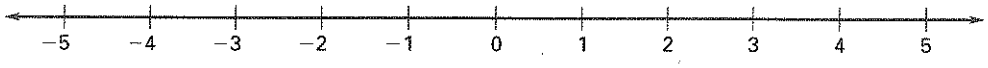

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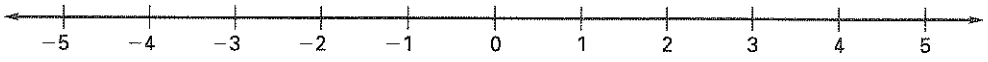

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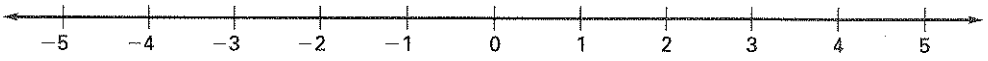

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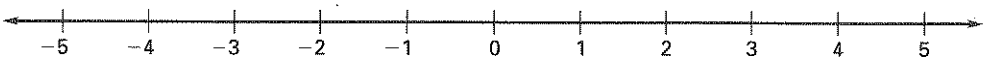

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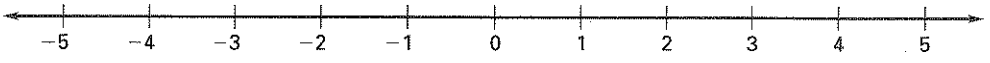
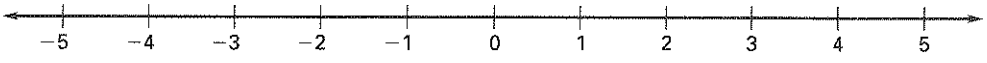


h.

i.



LESSON 1.7

NAME _____ DATE _____

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Graphing Calculator Lesson Opener

For use with pages 50–56

1. Use the *Table* feature of a graphing calculator to solve the equation $|2x - 3| = 5$.

Let y_1 equal the left side of the equation. Some calculators have an absolute value key while others list absolute value in a menu. Let y_2 equal the right side, which is a constant.

Scroll through x-values in the table that increase from 0 to find the positive solution(s) and then scroll through x-values in the table that decrease from 0 to find the negative solution(s). You may need to reset the step value to scroll through the negative values.

What are the solutions?

2. Use the *Table* feature of a graphing calculator to solve the inequality $|5x - 4| > 14$.

Enter the left side as y_1 and the right side as y_2. Look for positive and negative values so that $y_1 > y_2$.

What are the integer solutions?

Use the *Table* feature of a graphing calculator to solve the equation or inequality.

3. $|4x - 2| = 10$

4. $|3x + 9| = 15$

5. $|2x - 9| \leq 7$

6. $|x + 2| - 3 \geq 4$

Lesson 1.7

LESSON 1.7

NAME _____ DATE _____

Graphing Calculator Activity

For use with pages 50–56

GOAL **To use a graphing calculator to find absolute values and solve absolute value inequalities.**

The *absolute value* of a number x, written $|x|$, is the distance on a number line that the number is from 0.

Activity

1. Find the following absolute values.
   (a) $|3|$ (b) $|-3|$ (c) $|0|$ (d) $|-5|$

2. Use a graphing calculator to solve the following inequalities. (See Activity 1.6 on page 48.)
   (a) $|x| < 3$ (b) $|x| > 3$

3. Explain in general how the graph of $|x| < k$ differs from the graph of $|x| > k$ where k is a positive number.

Exercises

1. Find the following absolute values.
   (a) $|-8|$ (b) $|4|$ (c) $|-7|$ (d) $|-2|$

2. Predict the solutions of the following absolute values.
   (a) $|x| < 2$ (b) $|x| > 2$

3. Use a graphing calculator to verify your predictions in Exercise 2.

4. Use a graphing calculator to solve the following inequalities.
   (a) $|x - 2| < 5$ (b) $|x - 2| > 5$

LESSON 1.7 CONTINUED

NAME _____ DATE _____

Graphing Calculator Activity

For use with pages 50–56

TI-82

Step 1:

2nd [ABS] 3 ENTER

2nd [ABS] (-) 3 ENTER

2nd [ABS] 0 ENTER

2nd [ABS] (-) 5 ENTER

Step 2:

Y= (2nd [ABS] X,T,θ 2nd [TEST] 5 3) ZOOM 6

Y= CLEAR (2nd [ABS] X,T,θ 2nd [TEST] 3 3) GRAPH

SHARP EL-9600c

Step 1:

MATH [B] 1 3 ENTER

MATH [B] 1 (-) 3 ENTER

MATH [B] 1 0 ENTER

MATH [B] 1 (-) 5 ENTER

Step 2:

Y= (MATH [B] 1 X/θ/T/n ► MATH [F] 5 3) ZOOM [A] 5

Y= CL (MATH [B] 1 X/θ/T/n ► MATH [F] 3 3) GRAPH

TI-83

Step 1:

MATH ► 1 3) ENTER

MATH ► 1 (-) 3) ENTER

MATH ► 1 0) ENTER

MATH ► 1 (-) 5) ENTER

Step 2:

Y= (MATH ► 1 X,T,θ,n) 2nd [TEST] 5 3) ZOOM 6

Y= CLEAR (MATH ► 1 X,T,θ,n) 2nd [TEST] 3 3) GRAPH

CASIO CFX-9850GA PLUS

From the main menu choose RUN.

Step 1: OPTN F3 F2 3 ENTER

OPTN F3 F2 (-) 3 ENTER

OPTN F3 F2 0 ENTER

OPTN F3 F2 (-) 5 ENTER

Step 2: Note: The *Test* feature is not available for the graph mode. Therefore, solve the inequality first and then enter the endpoints in two lists. If the solution goes past −10 or 10, use these values instead because we are only looking at a portion of the solution. From the main menu, choose STAT.

Enter the following in List 1. (-) 3 EXE 3 EXE

Enter the following in List 2.

1 EXE 1 EXE SHIFT F3 F3 EXIT F1 F6

Choose the following. Graph Type: xyLine; LList: List 1; YList: List 2; Frequency: 1; Mark Type: ▫

EXIT F1 EXIT (-) 10 EXE (-) 3 EXE

Enter the following in List 3.

3 EXE 10 EXE F6 F2

Choose the following.

Graph Type: xyLine; XList: List 3; YList: List 2; Frequency: 1; Mark Type: ▫

EXIT F4 F1 ▼ F1 F6

LESSON 1.7

NAME _____ DATE _____

Practice A

For use with pages 50–56

Rewrite the absolute value equation as two linear equations.

1. $|x + 2| = 7$
2. $|2x - 1| = 5$
3. $|5x + 11| = 6$
4. $\left|\frac{1}{2}t - 3\right| = 1$
5. $|5 - t| = 3$
6. $|1 - 4t| = 9$
7. $|5x - 4| = 6$
8. $|3x + 4| = 8$
9. $|2x - 3| = 7$
10. $|3x + 7| = 5$
11. $\left|x - \frac{1}{2}\right| = 9$
12. $|2.3 - 5.7x| = 11.4$

Solve the equation.

13. $|x| = 9$
14. $|x| = 25$
15. $|t| = 4$
16. $|x + 3| = 5$
17. $|3x - 2| = 8$
18. $|2x + 6| = 14$
19. $\left|\frac{1}{2}t - 4\right| = 1$
20. $|11 - 3t| = 2$
21. $|7t + 3| = 4$

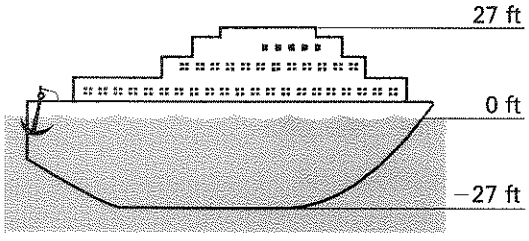
Rewrite the absolute value inequality as a compound inequality.

22. $|x + 7| < 3$
23. $|2x - 4| \leq 10$
24. $|5 - 3x| < 7$
25. $|x - 4| > 5$
26. $|5x + 1| \geq 4$
27. $|2 - x| > 9$
28. $\left|\frac{1}{3}x - 5\right| \leq 3$
29. $|2 + 8x| < 9$
30. $|3.5 - 2.1x| \geq 1.5$
31. $\left|\frac{3}{4}x + 1\right| \geq 2$
32. $|2.3x - 1.7| < 3.3$
33. $\left|\frac{2}{3} - \frac{1}{4}x\right| \leq \frac{5}{4}$

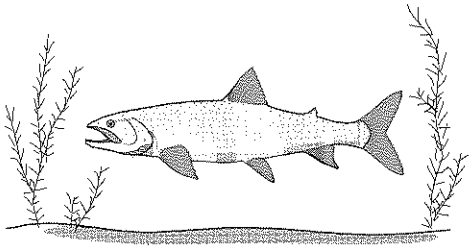
Solve the inequality.

34. $|x| < 8$
35. $|x| > 6$
36. $|x| \leq 3$
37. $|x - 5| < 1$
38. $|3x + 2| \leq 7$
39. $|4 - x| < 5$
40. $|x + 8| \geq 3$
41. $|2x - 1| > 5$
42. $|11 - 3x| > 4$

43. ***Touring a Ship*** The diagram below shows the water line of a large ship. The ship extends 27 feet above the water and 27 feet below the water. Suppose you toured the entire ship. Write an absolute value inequality that represents all the distances you could have been from the water line.



44. ***Water Temperature*** Most fish can adjust to a change in the water temperature of up to 15° F if the change is not sudden. Suppose a lake trout is living comfortably in water that is 58° F. Write an absolute value inequality that represents the range of temperatures at which the lake trout can survive.



LESSON 1.7

NAME _____ DATE _____

Practice B

For use with pages 50–56

Decide whether the number is a solution of the equation.

1. $|5x - 4| = 6;\ 2$
2. $|3x + 4| = 8;\ -4$
3. $|2x - 3| = 7;\ 2$
4. $|5 - 3x| = 8;\ 1$
5. $\left|\frac{1}{2}x - 2\right| = 4;\ -1$
6. $\left|3 - \frac{1}{4}x\right| = 4;\ 28$

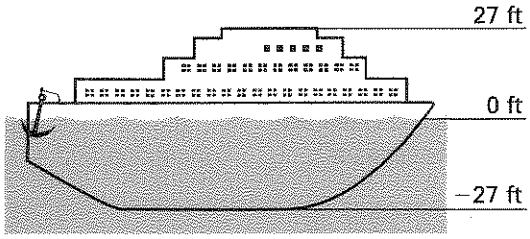
Solve the equation.

7. $|x + 3| = 5$
8. $|3x - 2| = 8$
9. $|2x + 6| = 14$
10. $\left|\frac{1}{2}t - 4\right| = 1$
11. $|11 - 3t| = 2$
12. $|7t + 3| = 4$
13. $|2x - 7| = 7$
14. $\left|1 - \frac{2}{3}x\right| = 9$
15. $|4 - 5x| = 6$

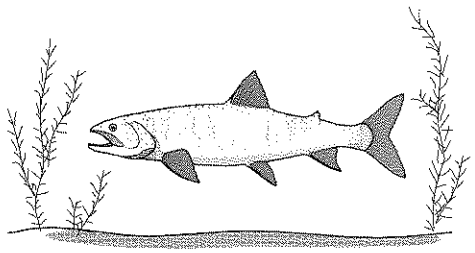
Solve the inequality.

16. $|x - 5| < 1$
17. $|3x + 2| \leq 7$
18. $|4 - x| < 5$
19. $|x + 8| \geq 3$
20. $|2x - 1| > 5$
21. $|11 - 3x| > 4$
22. $\left|\frac{1}{2}x - 3\right| \leq 5$
23. $\left|2 - \frac{1}{3}x\right| \geq 10$
24. $|4x - 1| < 3$

25. ***Touring a Ship*** The diagram below shows the water line of a large ship. The ship extends 27 feet above the water and 27 feet below the water. Suppose you toured the entire ship. Write an absolute value inequality that represents all the distances you could have been from the water line.



26. ***Water Temperature*** Most fish can adjust to a change in the water temperature of up to 15° F if the change is not sudden. Suppose a lake trout is living comfortably in water that is 58° F. Write an absolute value inequality that represents the range of temperatures at which the lake trout can survive.



27. ***Hours of Daylight*** According to the *Old Farmer's Almanac,* the hours of daylight in Fairbanks, Alaska, range from approximately $3\frac{1}{2}$ hours in mid-December to approximately 21 hours in mid-June. Write an absolute value inequality that represents the hours of daylight in Fairbanks.

28. ***Elephant Longevity*** On average an elephant will live from 30 to 40 years. Write an absolute value inequality that represents the typical ages of an elephant.

LESSON 1.7

NAME _____ DATE _____

Practice C

For use with pages 50–56

Solve the equation.

1. $|6x - 3| = 9$
2. $|4 - 5x| = 14$
3. $\left|\frac{3}{4} + 2x\right| = 2$
4. $|3(x - 4)| = 1$
5. $|2(4 - x)| = 12$
6. $\left|\frac{4}{5} - \frac{1}{4}x\right| = \frac{3}{5}$

Solve for x. Assume that a and b are positive numbers.

7. $|x| = a$
8. $|x + a| = b$
9. $|x - a| = b$
10. $|ax| = b$
11. $\left|\frac{x}{a}\right| = b$
12. $|x - a| = a$

Solve the inequality. If there is no solution, write *no solution*.

13. $|4 - x| > 3$
14. $|8x - 12| \leq 4$
15. $\left|\frac{2}{3}x + 3\right| > 2$
16. $|5x + 2| < -4$
17. $\left|6 - \frac{5}{6}x\right| \geq \frac{1}{3}$
18. $\left|1 + \frac{3}{4}x\right| > -1$
19. $|2 - 5x| \leq 0$
20. $|x + 7| < 0$
21. $|2x + 3| \geq 0$

22. ***Machine Shop*** Three circles have to be cut into a piece of metal. The specifications state that each of the diameters must be within 0.001 centimeter of the given measurements. Let D represent the given measurement and let x represent the actual diameter of the circle. Write an absolute value inequality that describes the acceptable diameters of the circle. If the circles are to be 13 centimeters, 9 centimeters, and 6 centimeters, describe the acceptable diameters of each circle.

23. ***Distance to the Sun*** The distance to the sun from the nine planets ranges from 57.9 million kilometers to 5900 million kilometers. Write an absolute value inequality that describes the possible distances from a planet to the sun.

24. ***Distance*** Your house is 10 miles away from your school. Your friend's house is 3 miles from your school. Write an absolute value inequality that describes the possible distances from your house to your friend's house.

LESSON 1.7

NAME _____ DATE _____

Reteaching with Practice

For use with pages 50–56

GOAL **Solve absolute value equations and inequalities and use absolute value equations and inequalities to solve real-life problems**

VOCABULARY

The **absolute value** of a number x, written $|x|$, is the distance the number is from 0 on a number line. The absolute value of a number is always nonnegative.

EXAMPLE 1 Solving an Absolute Value Equation

Solve $\left|\frac{1}{2}x + 5\right| = 7$.

SOLUTION

$\left|\frac{1}{2}x + 5\right| = 7$ — Write original equation.

$\frac{1}{2}x + 5 = 7$ or $\frac{1}{2}x + 5 = -7$ — Expression can be 7 or -7.

$\frac{1}{2}x = 2$ or $\frac{1}{2}x = -12$ — Subtract 5 from each side.

$x = 4$ or $x = -24$ — Multiply each side by $\frac{2}{1}$.

The solutions are 4 and -24.

When $x = 4$: $\left|\frac{1}{2}(4) + 5\right| = |7| = 7$

When $x = -24$: $\left|\frac{1}{2}(-24) + 5\right| = |-7| = 7$

Exercises for Example 1

Solve the equation.

1. $|r - 8| = 2$ **2.** $|2m + 5| = 9$ **3.** $|8 - 3n| = 16$

EXAMPLE 2 Solving an Inequality of the Form $|ax + b| < c$

Solve $|2x + 3| < 7$.

SOLUTION

$|2x + 3| < 7$. — Write original inequality.

$-7 < 2x + 3 < 7$ — Write equivalent compound inequality.

$-10 < 2x < 4$ — Subtract 3 from each expression.

$-5 < x < 2$ — Divide each expression by 2.

The solutions are all real numbers greater than -5 and less than 2.

Exercises for Example 2

Solve the inequality.

4. $|x - 5| < 3$ **5.** $|2x + 1| \leq 3$ **6.** $|10 - 4x| < 2$

NAME _____ DATE _____

Reteaching with Practice

For use with pages 50–56

EXAMPLE 3 Solving an Inequality of the Form $|ax + b| \geq c$

Solve $|\frac{2}{3}t + 2| \geq 10$.

SOLUTION OF FIRST INEQUALITY		SOLUTION OF SECOND INEQUALITY
$\frac{2}{3}t + 2 \leq -10$	Write inequality.	$\frac{2}{3}t + 2 \geq 10$
$\frac{2}{3}t \leq -12$	Subtract 2 from each side.	$\frac{2}{3}t \geq 8$
$t \leq -18$	Multiply each side by $\frac{3}{2}$.	$t \geq 12$

The solutions are all real numbers less than or equal to -18 or greater than or equal to 12.

Exercises for Example 3

Solve the inequality.

7. $|y + 3| > 5$ **8.** $|x - 4| \geq 14$ **9.** $|4n + 7| > 1$

EXAMPLE 4 Writing an Absolute Value Model

The tolerance when machining a certain piece of steel is 0.0005 inch. One piece of steel is supposed to be 5.25 inches. Write an absolute value inequality that describes the acceptable lengths for the piece of steel.

SOLUTION

Verbal Model $\left|\boxed{\text{Actual length}} - \boxed{\text{Ideal length}}\right| \leq \boxed{\text{Tolerance}}$

Labels

	Actual length $= l$	(inches)
	Ideal length $= 5.25$	(inches)
	Tolerance $= 0.0005$	(inch)

Algebraic Model $|l - 5.25| \leq 0.0005$

Exercises for Example 4

10. The average height range of a golden retriever is 20–24 inches. Write the average height range as an absolute value inequality.

11. The average life span for a horse is 20 to 40 years. Write the average life span as an absolute value inequality.

LESSON 1.7

NAME _____ DATE _____

Quick Catch-Up for Absent Students

For use with pages 49–56

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

Activity 1.7: Absolute Value Equations and Inequalities (p. 49)

____ **Goal:** Determine what the solution of an absolute value equation or inequality looks like on a number line.

Lessson 1.7: Solving Absolute Value Equations and Inequalities

____ **Goal 1:** Solve absolute value equations and inequalities. (pp. 50-51)

Material Covered:

____ Example 1: Solving an Absolute Value Equation

____ Example 2: Solving an Inequality of the Form $|ax + b| < c$

____ Example 3: Solving an Inequality of the Form $|ax + b| \geq c$

Vocabulary:

absolute value, p. 50

____ **Goal 2:** Use absolute value equations and inequalities to solve real-life problems. (p. 52)

Material Covered:

____ Example 4: Writing a Model for Tolerance

____ Example 5: Writing an Absolute Value Model

____ Other (specify) _____

_____

Homework and Additional Learning Support

____ Textbook (specify) pp. 53–56 _____

_____

____ Internet: Extra Examples at www.mcdougallittell.com

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

____ *Personal Student Tutor* for Lesson 1.7

LESSON 1.7

NAME _____ DATE _____

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

For use with pages 50–56

Food and Beverage Spices

Spice is the term given to various food seasonings made from plants. Spices have a distinctive taste and smell, and are used by people throughout the world on different foods and beverages. Some common spices include pepper, cinnamon, ginger, and paprika. Spice plants grow in many tropical countries around the world but some spices such as oregano, thyme, and sage can be grown in one's own garden.

A company sells a particular spice according to its "mesh size," which is a measurement regarding the particle size of the spice. After a spice is ground, it is then sifted through various screens to obtain varying degrees of fineness and coarseness. A ten-mesh screen, for example, will have ten large openings per linear inch, while a forty-mesh screen will have forty small openings per linear inch. Therefore, a spice that is listed as 18/20 would sift through an eighteen-mesh screen but stay on top of a twenty-mesh screen.

In Exercises 1–3, use the following information.

Suppose you have just opened a new restaurant and you are placing an order for various spices for your head chef. You order the following spices (assume that a spice ordered as 20 mesh would stay on top of a 20-mesh screen).

Spice	*Mesh size*
Indian black tellicherry	30 mesh
Hungarian hot paprika	50 mesh
Spanish rosemary	16 mesh

1. Suppose you tell the spice company that you are not very fussy about the mesh size of each spice, and you will be satisfied as long as it is within five mesh sizes of the specified size. Write and solve an absolute value inequality to describe the range of the mesh size m for each spice.
2. Suppose you are unaware that the mesh sizes are only available in even number sizes. How many different mesh sizes could the spice company send you for each spice?
3. The spice company shows that a one-pound bag of forty-mesh Spanish rosemary leaves is much more expensive than a one-pound bag of ten mesh. Why might this be?

LESSON 1.7

NAME _____ DATE _____

Challenge: Skills and Applications

For use with pages 50–56

In Exercises 1–3, solve the inequality.

1. $|2x - 5| \leq 3$ **2.** $\left|\frac{x}{3} + 4\right| > 7$ **3.** $|-4x + 9| \geq 7$

4. a. Prove that the inequality $|a + b| \leq |a| + |b|$ holds for all real numbers.

b. Give an example to show that it can happen that $|a + b| < |a| + |b|$.

In Exercises 5–7, write as an absolute value inequality, without any squares.

5. $x^2 < 25$ **6.** $(x - 3)^2 > 16$ **7.** $-3(x + 4)^2 > 12$

In Exercises 8–10, solve the inequality. (*Hint:* Locate the points that satisfy the inequality on a number line.)

8. $|x - 2| + |x - 3| \leq 1$ **9.** $|x - 4| + |x - 1| > 5$ **10.** $|x - 7| + |x - 2| > 4$

In Exercises 11–13, rewrite as a single inequality involving absolute value.

11. $x < -2$ or $x > 10$ **12.** $-13 \leq x \leq 5$ **13.** $x + 3 < -1$ or $x - 5 > 11$

In Exercises 14–15, solve the inequality.

Example: $|x - 3| < |x - 1|$

Solution: Since $|x - 3|$ represents the distance from x to 3 on the number line, and $|x - 1|$ represents the distance from x to 1, this inequality says that the distance from x to 3 must be less than the distance from x to 1. Therefore, the solution is $x > 2$.

14. $|x - 5| > |x + 7|$ **15.** $|2x - 3| \leq |2x - 7|$

CHAPTER 1

NAME _____ DATE _____

Chapter Review Games and Activities

For use after Chapter 1

Solve the following problems and find the answer in the boxes at the bottom of the page. Cross out the box that contains each answer. Place the remaining letters on the lines below the boxes to find the answer to the following riddle: *What do Smokey the Bear and Alexander the Great have in common?*

Unless stated otherwise, solve for x. Show your work.

1. If you place the following in order, which value is the largest?

   $-3.02, -3.2, -\pi, -\sqrt{10}$

2. Simplify and then evaluate where $x = -3$.

   $5x^2 - 3(x^2 - 3x) + 5x + 7$

3. Simplify and then evaluate where $x = -1$.

   $5(x - 3x) - 4(x^2 - x)$

4. $55 = 18 + 0.004x$

5. $-\frac{3}{4}\left(\frac{8}{5}x - \frac{7}{9}\right) = \frac{17}{60}$

6. For $y = 6$, find x.

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

7. $16x + 12 = x$

8. $1670 = 2.5x + 15(x - 20)$
   Round the answer to the nearest unit

9. $3(5 - x) + \frac{2}{3}x > 3$

10. $5x - 7 \leq 21$

11. $|3x - 4| = 1$

12. $\left|\frac{2}{5}x + 2\right| > 17$

13. $|1 - 3x| < 5$

14. $|x - 50| \geq 0.055$

S $x = 0$	M $x = -\frac{2}{3}$	A $x = -3.02$	I $x < \frac{28}{3}$	L $x = 9250$	S $x = \frac{5}{3}$ or 1
A $x < \frac{36}{7}$	N $x > \frac{75}{2}$ or $x < -\frac{95}{2}$	D $x < 2$ $x < -4/3$	R $x = -0.80$	D $x > 7/36$	T $x = 2$
Y $x = -17$	L $x = -2$	K $-\frac{4}{3} < x < 2$	E $x = -0.25$	T $x \leq \frac{28}{5}$	N $x > \frac{36}{7}$
S $x = 113$	A $x > 0$	D $x \geq 50.055$ or $x \leq 49.945$	M $x < 2$	N $x = 0.25$	E $x < \frac{72}{2}$ or $x > \frac{92}{2}$

They both have the same ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___!!

Review and Assess