GLENCOE MATHEMATICS

Algebra 1

Chapter 6 Resource Masters

Glencoe McGraw-Hill

New York, New York
Columbus, Ohio
Chicago, Illinois
Peoria, Illinois
Woodland Hills, California

CONSUMABLE WORKBOOKS Many of the worksheets contained in the Chapter Resource Masters booklets are available as consumable workbooks in both English and Spanish.

Study Guide and Intervention Workbook	0-07-827753-1
Study Guide and Intervention Workbook (Spanish)	0-07-827754-X
Skills Practice Workbook	0-07-827747-7
Skills Practice Workbook (Spanish)	0-07-827749-3
Practice Workbook	0-07-827748-5
Practice Workbook (Spanish)	0-07-827750-7
Reading to Learn Mathematics Workbook	0-07-861060-5

ANSWERS FOR WORKBOOKS The answers for Chapter 6 of these workbooks can be found in the back of this Chapter Resource Masters booklet.

StudentWorks™ This CD-ROM includes the entire Student Edition text along with the English workbooks listed above.

TeacherWorks™ All of the materials found in this booklet are included for viewing and printing in the *Glencoe Algebra 1 TeacherWorks* CD-ROM.

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Glencoe Algebra 1
Chapter 6 Resource Masters

3 4 5 6 7 8 9 10 024 11 10 09 08 07 06 05 04

Contents

Teacher's Guide to Using the Chapter 6 Resource Masters

The ***Fast File*** Chapter Resource system allows you to conveniently file the resources you use most often. The *Chapter 6 Resource Masters* includes the core materials needed for Chapter 6. These materials include worksheets, extensions, and assessment options. The answers for these pages appear at the back of this booklet.

All of the materials found in this booklet are included for viewing and printing in the *Algebra 1 TeacherWorks* CD-ROM.

Vocabulary Builder Pages vii–viii include a student study tool that presents up to twenty of the key vocabulary terms from the chapter. Students are to record definitions and/or examples for each term. You may suggest that students highlight or star the terms with which they are not familiar.

WHEN TO USE Give these pages to students before beginning Lesson 6-1. Encourage them to add these pages to their Algebra Study Notebook. Remind them to add definitions and examples as they complete each lesson.

Study Guide and Intervention

Each lesson in *Algebra 1* addresses two objectives. There is one Study Guide and Intervention master for each objective.

WHEN TO USE Use these masters as reteaching activities for students who need additional reinforcement. These pages can also be used in conjunction with the Student Edition as an instructional tool for students who have been absent.

Skills Practice There is one master for each lesson. These provide computational practice at a basic level.

WHEN TO USE These masters can be used with students who have weaker mathematics backgrounds or need additional reinforcement.

Practice There is one master for each lesson. These problems more closely follow the structure of the Practice and Apply section of the Student Edition exercises. These exercises are of average difficulty.

WHEN TO USE These provide additional practice options or may be used as homework for second day teaching of the lesson.

Reading to Learn Mathematics

One master is included for each lesson. The first section of each master asks questions about the opening paragraph of the lesson in the Student Edition. Additional questions ask students to interpret the context of and relationships among terms in the lesson. Finally, students are asked to summarize what they have learned using various representation techniques.

WHEN TO USE This master can be used as a study tool when presenting the lesson or as an informal reading assessment after presenting the lesson. It is also a helpful tool for ELL (English Language Learner) students.

Enrichment There is one extension master for each lesson. These activities may extend the concepts in the lesson, offer an historical or multicultural look at the concepts, or widen students' perspectives on the mathematics they are learning. These are not written exclusively for honors students, but are accessible for use with all levels of students.

WHEN TO USE These may be used as extra credit, short-term projects, or as activities for days when class periods are shortened.

Assessment Options

The assessment masters in the *Chapter 6 Resources Masters* offer a wide range of assessment tools for intermediate and final assessment. The following lists describe each assessment master and its intended use.

Chapter Assessment

CHAPTER TESTS

- *Form 1* contains multiple-choice questions and is intended for use with basic level students.
- *Forms 2A and 2B* contain multiple-choice questions aimed at the average level student. These tests are similar in format to offer comparable testing situations.
- *Forms 2C and 2D* are composed of free-response questions aimed at the average level student. These tests are similar in format to offer comparable testing situations. Grids with axes are provided for questions assessing graphing skills.
- *Form 3* is an advanced level test with free-response questions. Grids without axes are provided for questions assessing graphing skills.

  All of the above tests include a free-response Bonus question.
- The **Open-Ended Assessment** includes performance assessment tasks that are suitable for all students. A scoring rubric is included for evaluation guidelines. Sample answers are provided for assessment.
- A **Vocabulary Test**, suitable for all students, includes a list of the vocabulary words in the chapter and ten questions assessing students' knowledge of those terms. This can also be used in conjunction with one of the chapter tests or as a review worksheet.

Intermediate Assessment

- Four free-response **quizzes** are included to offer assessment at appropriate intervals in the chapter.
- A **Mid-Chapter Test** provides an option to assess the first half of the chapter. It is composed of both multiple-choice and free-response questions.

Continuing Assessment

- The **Cumulative Review** provides students an opportunity to reinforce and retain skills as they proceed through their study of Algebra 1. It can also be used as a test. This master includes free-response questions.
- The **Standardized Test Practice** offers continuing review of algebra concepts in various formats, which may appear on the standardized tests that they may encounter. This practice includes multiple-choice, grid-in, and quantitative-comparison questions. Bubble-in and grid-in answer sections are provided on the master.

Answers

- Page A1 is an answer sheet for the Standardized Test Practice questions that appear in the Student Edition on pages 364–365. This improves students' familiarity with the answer formats they may encounter in test taking.
- The answers for the lesson-by-lesson masters are provided as reduced pages with answers appearing in red.
- Full-size answer keys are provided for the assessment masters in this booklet.

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6

Reading to Learn Mathematics

Vocabulary Builder

This is an alphabetical list of the key vocabulary terms you will learn in Chapter 6. As you study the chapter, complete each term's definition or description. Remember to add the page number where you found the term. Add these pages to your Algebra Study Notebook to review vocabulary at the end of the chapter.

Vocabulary Term	Found on Page	Definition/Description/Example
Addition Property of Inequalities		
boundary		
compound inequality		
Division Property of Inequalities		
half-plane		
intersection		
Multiplication Property of Inequalities		

(continued on the next page)

Vocabulary Builder *(continued)*

Vocabulary Term	Found on Page	Definition/Description/Example
set-builder notation		
Subtraction Property of Inequalities		
union		

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6-1 Study Guide and Intervention

Solving Inequalities by Addition and Subtraction

Solve Inequalities by Addition Addition can be used to solve inequalities. If any number is added to each side of a true inequality, the resulting inequality is also true.

Addition Property of Inequalities	For all numbers a, b, and c, if $a > b$, then $a + c > b + c$, and if $a < b$, then $a + c < b + c$.

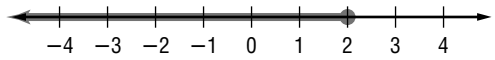
The property is also true when $>$ and $<$ are replaced with $\geq$ and $\leq$.

Example 1 **Solve $x - 8 \leq -6$. Then graph it on a number line.**

$x - 8 \leq -6$	Original inequality
$x - 8 + 8 \leq -6 + 8$	Add 8 to each side.
$x \leq 2$	Simplify.

The solution in set-builder notation is $\{x \mid x \leq 2\}$.

Number line graph:

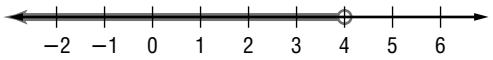


Example 2 **Solve $4 - 2a > -a$. Then graph it on a number line.**

$4 - 2a > -a$	Original inequality
$4 - 2a + 2a > -a + 2a$	Add $2a$ to each side.
$4 > a$	Simplify.
$a < 4$	$4 > a$ is the same as $a < 4$.

The solution in set-builder notation is $\{a \mid a < 4\}$.

Number line graph:

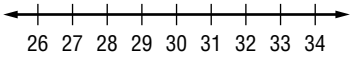


Lesson 6-1

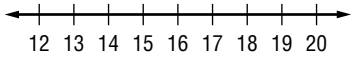
Exercises

Solve each inequality. Then check your solution, and graph it on a number line.

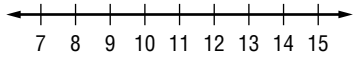
1. $t - 12 \geq 16$



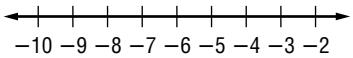
2. $n - 12 < 6$



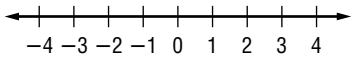
3. $6 \leq g - 3$



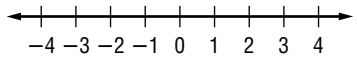
4. $n - 8 < -13$



5. $-12 > -12 + y$



6. $-6 > s - 8$



Solve each inequality. Then check your solution.

7. $-3x \leq 8 - 4x$

8. $0.6n \geq 12 - 0.4n$

9. $-8k - 12 < -9k$

10. $-y - 10 > 15 - 2y$

11. $z - \frac{1}{3} \leq \frac{4}{3}$

12. $-2b > -4 - 3b$

Define a variable, write an inequality, and solve each problem. Then check your solution.

13. A number decreased by 4 is less than 14.

14. The difference of two numbers is more than 12, and one of the numbers is 3.

15. Forty is no greater than the difference of a number and 2.

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6-1 Study Guide and Intervention *(continued)*

Solving Inequalities by Addition and Subtraction

Solve Inequalities by Subtraction Subtraction can be used to solve inequalities. If any number is subtracted from each side of a true inequality, the resulting inequality is also true.

Subtraction Property of Inequalities	For all numbers a, b, and c, if $a > b$, then $a - c > b - c$, and if $a < b$, then $a - c < b - c$.

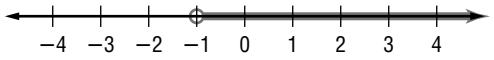
The property is also true when $>$ and $<$ are replaced with $\geq$ and $\leq$.

Example **Solve $3a + 5 > 4 + 2a$. Then graph it on a number line.**

$3a + 5 > 4 + 2a$	Original inequality
$3a + 5 - 2a > 4 + 2a - 2a$	Subtract $2a$ from each side.
$a + 5 > 4$	Simplify.
$a + 5 - 5 > 4 - 5$	Subtract 5 from each side.
$a > -1$	Simplify.

The solution is $\{a \mid a > -1\}$.

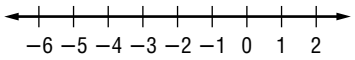
Number line graph:



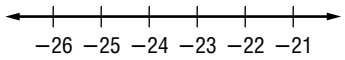
Exercises

Solve each inequality. Then check your solution, and graph it on a number line.

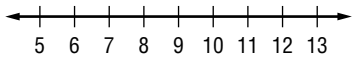
1. $t + 12 \geq 8$



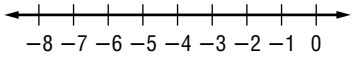
2. $n + 12 > -12$



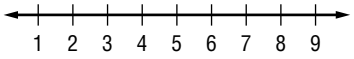
3. $16 \leq h + 9$



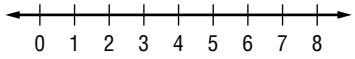
4. $y + 4 > -2$



5. $3r + 6 > 4r$



6. $\frac{3}{2}q - 5 \geq \frac{1}{2}q$



Solve each inequality. Then check your solution.

7. $4p \geq 3p + 0.7$

8. $r + \frac{1}{4} > \frac{3}{8}$

9. $9k + 12 > 8k$

10. $-1.2 > 2.4 + y$

11. $4y < 5y + 14$

12. $3n + 17 < 4n$

Define a variable, write an inequality, and solve each problem. Then check your solution.

13. The sum of a number and 8 is less than 12.

14. The sum of two numbers is at most 6, and one of the number is -2.

15. The sum of a number and 6 is greater than or equal to -4.

NAME _____ DATE _____ PERIOD _____

6-1 Skills Practice

Solving Inequalities by Addition and Subtraction

Match each inequality with its corresponding graph.

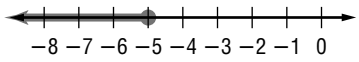
1. $x + 11 > 16$

2. $x - 6 < 1$

3. $x + 2 \leq -3$

4. $x + 3 \geq 1$

5. $x - 1 < -7$

a.


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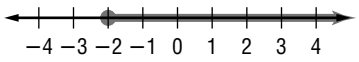

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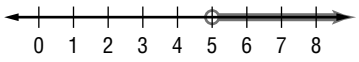

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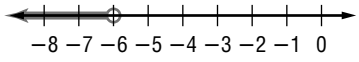
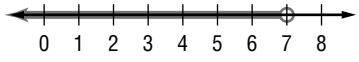
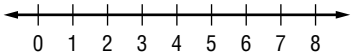


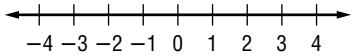
e.


Solve each inequality. Then check your solution, and graph it on a number line.

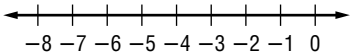
6. $d - 5 \leq 1$



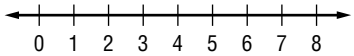
7. $s + 9 < 8$



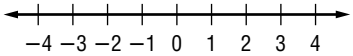
8. $a - 7 > -13$



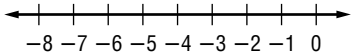
9. $w - 1 < 4$



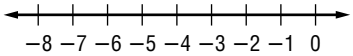
10. $4 \geq k + 3$



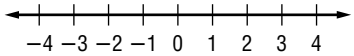
11. $-9 \leq b - 4$



12. $-2 \geq x + 4$



13. $2y < y + 2$



Define a variable, write an inequality, and solve each problem. Then check your solution.

14. A number decreased by 10 is greater than -5.

15. A number increased by 1 is less than 9.

16. Seven more than a number is less than or equal to -18.

17. Twenty less than a number is at least 15.

18. A number plus 2 is at most 1.

Lesson 6-1

NAME _____ DATE _____ PERIOD _____

6-1 Practice

Solving Inequalities by Addition and Subtraction

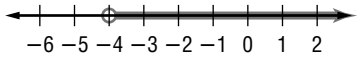
Match each inequality with its corresponding graph.

1. $-8 \geq x - 15$

2. $4x + 3 < 5x$

3. $8x > 7x - 4$

4. $12 + x \leq 9$

a.


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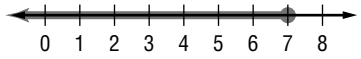

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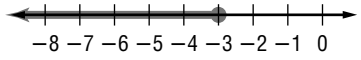

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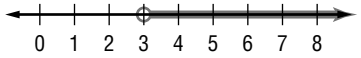
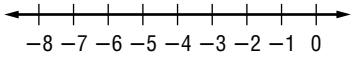
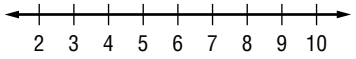


Solve each inequality. Then check your solution, and graph it on a number line.

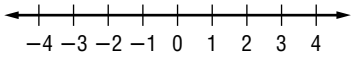
5. $r - (-5) > -2$



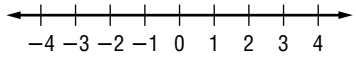
6. $3x + 8 \geq 4x$



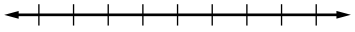
7. $n - 2.5 \geq -5$



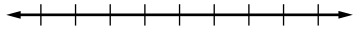
8. $1.5 < y + 1$



9. $z + 3 > \frac{2}{3}$



10. $\frac{1}{2} \leq c - \frac{3}{4}$



Define a variable, write an inequality, and solve each problem. Then check your solution.

11. The sum of a number and 17 is no less than 26.

12. Twice a number minus 4 is less than three times the number.

13. Twelve is at most a number decreased by 7.

14. Eight plus four times a number is greater than five times the number.

15. ATMOSPHERIC SCIENCE The troposphere extends from the earth's surface to a height of 6–12 miles, depending on the location and the season. If a plane is flying at an altitude of 5.8 miles, and the troposphere is 8.6 miles deep in that area, how much higher can the plane go without leaving the troposphere?

16. EARTH SCIENCE Mature soil is composed of three layers, the uppermost being topsoil. Jamal is planting a bush that needs a hole 18 centimeters deep for the roots. The instructions suggest an additional 8 centimeters depth for a cushion. If Jamal wants to add even more cushion, and the topsoil in his yard is 30 centimeters deep, how much more cushion can he add and still remain in the topsoil layer?

NAME _____ DATE _____ PERIOD _____

6-1 Reading to Learn Mathematics

Solving Inequalities by Addition and Subtraction

Pre-Activity **How are inequalities used to describe school sports?**

Read the introduction to Lesson 6-1 at the top of page 318 in your textbook.

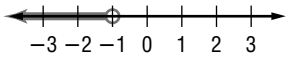
- Use the information in the graph to write an inequality statement about participation in two sports.

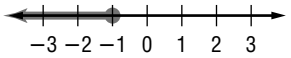
- Rewrite your inequality statement to show that 40 schools added both of the sports. Is the statement still true?

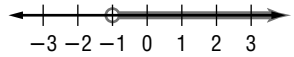
Lesson 6-1

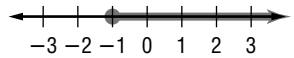
Reading the Lesson

Write the letter of the graph that matches each inequality.

1. $x \leq -1$ _____ **a.** 

2. $x \geq -1$ _____ **b.** 

3. $x < -1$ _____ **c.** 

4. $x > -1$ _____ **d.** 

5. Use the chart to write a sentence that could be described by the inequality $3n \geq 2n + 7$. Then solve the inequality.

Inequalities			
<	>	≤	≥
less than fewer than	greater than more than	at most no more than less than or equal to	at least no less than greater than or equal to

Helping You Remember

6. Teaching someone else can help you remember something. Explain how you would teach another student who missed class to solve the inequality $2x + 4 \leq 3x$.

NAME _____ DATE _____ PERIOD _____

6-1 Enrichment

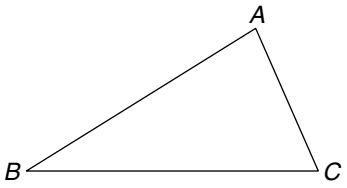
Triangle Inequalities

Recall that a line segment can be named by the letters of its endpoints. Line segment AB (written as $\overline{AB}$) has points A and B for endpoints. The *length* of AB is written without the bar as AB.

$$AB < BC \qquad m\angle A < m\angle B$$

The statement on the left above shows that $\overline{AB}$ is shorter than $\overline{BC}$. The statement on the right above shows that the measure of angle A is less than that of angle B.

These three inequalities are true for any triangle ABC, no matter how long the sides.



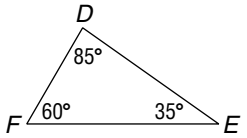
a. $AB + BC > AC$

b. If $AB > AC$, then $m\angle C > m\angle B$.

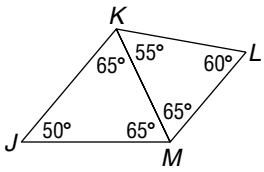
c. If $m\angle C > m\angle B$, then $AB > AC$.

Use the three triangle inequalities for these problems.

1. List the sides of triangle DEF in order of increasing length.



2. In the figure at the right, which line segment is the shortest?

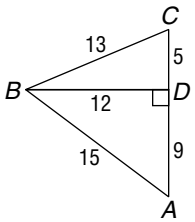


3. Explain why the lengths 5 cm, 10 cm, and 20 cm could not be used to make a triangle.

4. Two sides of a triangle measure 3 in. and 7 in. Between which two values must the third side be?

5. In triangle XYZ, $XY = 15$, $YZ = 12$, and $XZ = 9$. Which is the greatest angle? Which is the least?

6. List the angles $\angle A$, $\angle C$, $\angle ABC$, and $\angle ABD$, in order of increasing size.



NAME _____ DATE _____ PERIOD _____

6-2 Study Guide and Intervention

Solving Inequalities by Multiplication and Division

Solve Inequalities by Multiplication If each side of an inequality is multiplied by the same positive number, the resulting inequality is also true. However, if each side of an inequality is multiplied by the same negative number, the direction of the inequality must be reversed for the resulting inequality to be true.

Multiplication Property of Inequalities	For all numbers a, b, and c, with $c \neq 0$, **1.** if c is positive and $a > b$, then $ac > bc$; if c is positive and $a < b$, then $ac < bc$; **2.** if c is negative and $a > b$, then $ac < bc$; if c is negative and $a < b$, then $ac > bc$.

The property is also true when $>$ and $<$ are replaced with $\geq$ and $\leq$.

Example 1 **Solve $-\frac{y}{8} \geq 12$.**

$-\frac{y}{8} \geq 12$	Original equation
$(-8)\left(-\frac{y}{8}\right) \leq (-8)12$	Multiply each side by -8; change $\geq$ to $\leq$.
$y \leq -96$	Simplify.

The solution is $\{y \mid y \leq -96\}$.

Example 2 **Solve $\frac{3}{4}k < 15$.**

$\frac{3}{4}k < 15$	Original equation
$\left(\frac{4}{3}\right)\frac{3}{4}k < \left(\frac{4}{3}\right)15$	Multiply each side by $\frac{4}{3}$.
$k < 20$	Simplify.

The solution is $\{k \mid k < 20\}$.

Exercises

Solve each inequality. Then check your solution.

1. $\frac{y}{6} \leq 2$ **2.** $-\frac{n}{50} > 22$ **3.** $\frac{3}{5}h \geq -3$ **4.** $-\frac{p}{6} < -6$

5. $\frac{1}{4}n \geq 10$ **6.** $-\frac{2}{3}b < \frac{1}{3}$ **7.** $\frac{3m}{5} < -\frac{3}{20}$ **8.** $-2.51 \leq -\frac{2h}{4}$

9. $\frac{g}{5} \geq -2$ **10.** $-\frac{3}{4} > -\frac{9p}{5}$ **11.** $\frac{n}{10} \geq 5.4$ **12.** $\frac{2a}{7} \geq -6$

Define a variable, write an inequality, and solve each problem. Then check your solution.

13. Half of a number is at least 14.

14. The opposite of one-third a number is greater than 9.

15. One fifth of a number is at most 30.

Lesson 6-2

NAME _____ DATE _____ PERIOD _____

6-2 Study Guide and Intervention *(continued)*

Solving Inequalities by Multiplication and Division

Solve Inequalities by Division If each side of a true inequality is divided by the same positive number, the resulting inequality is also true. However, if each side of an inequality is divided by the same negative number, the direction of the inequality symbol must be reversed for the resulting inequality to be true.

Division Property of Inequalities	For all numbers a, b, and c with $c \neq 0$, **1.** if c is positive and $a > b$, then $\frac{a}{c} > \frac{b}{c}$; if c is positive and $a < b$, then $\frac{a}{c} < \frac{b}{c}$; **2.** if c is negative and $a > b$, then $\frac{a}{c} < \frac{b}{c}$; if c is negative and $a < b$, then $\frac{a}{c} > \frac{b}{c}$.

The property is also true when $>$ and $<$ are replaced with $\geq$ and $\leq$.

Example **Solve $-12y \geq 48$.**

$-12y \geq 48$ Original inequality

$\frac{-12y}{-12} \leq \frac{48}{-12}$ Divide each side by -12 and change $\geq$ to $\leq$.

$y \leq -4$ Simplify.

The solution is $\{y \mid y \leq -4\}$.

Exercises

Solve each inequality. Then check your solution.

1. $25g \geq -100$ **2.** $-2x \geq 9$ **3.** $-5c > 2$ **4.** $-8m < -64$

5. $-6k < \frac{1}{5}$ **6.** $18 < -3b$ **7.** $30 < -3n$ **8.** $-0.24 < 0.6w$

9. $25 \geq -2m$ **10.** $-30 > -5p$ **11.** $-2n \geq 6.2$ **12.** $-35 < 0.05h$

13. $-40 > 10h$ **14.** $-\frac{2}{3}n \geq 6$ **15.** $-3 < \frac{p}{4}$

Define a variable, write an inequality, and solve each problem. Then check your solution.

16. Four times a number is no more than 108.

17. The opposite of three times a number is greater than 12.

18. Negative five times a number is at most 100.

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6-2 Skills Practice

Solving Inequalities by Multiplication and Division

Match each inequality with its corresponding statement.

1. $3n < 9$ **a.** Three times a number is at most nine.

2. $\frac{1}{3}n \geq 9$ **b.** One third of a number is no more than nine.

3. $3n \leq 9$ **c.** Negative three times a number is more than nine.

4. $-3n > 9$ **d.** Three times a number is less than nine.

5. $\frac{1}{3}n \leq 9$ **e.** Negative three times a number is at least nine.

6. $-3n \geq 9$ **f.** One third of a number is greater than or equal to nine.

Solve each inequality. Then check your solution.

7. $14g > 56$ **8.** $11w \leq 77$ **9.** $20b \geq -120$ **10.** $-8r < 16$

11. $-15p \leq -90$ **12.** $\frac{s}{4} < 9$ **13.** $\frac{a}{9} \geq -15$ **14.** $-\frac{p}{7} > -9$

15. $-\frac{t}{12} \geq 6$ **16.** $5z < -90$ **17.** $-13m > -26$ **18.** $\frac{k}{5} \leq -17$

19. $-y < 36$ **20.** $-16c \geq -224$ **21.** $-\frac{h}{10} \leq 2$ **22.** $12 > \frac{d}{12}$

Define a variable, write an inequality, and solve each problem. Then check your solution.

23. Four times a number is greater than -48.

24. One eighth of a number is less than or equal to 3.

25. Negative twelve times a number is no more than 84.

26. Negative one sixth of a number is less than -9.

27. Eight times a number is at least 16.

Lesson 6-2

NAME _____ DATE _____ PERIOD _____

6-2 Practice

Solving Inequalities by Multiplication and Division

Match each inequality with its corresponding statement.

1. $-4n \geq 5$	**a.** Negative four times a number is less than five.
2. $\frac{4}{5}n > 5$	**b.** Four fifths of a number is no more than five.
3. $4n \leq 5$	**c.** Four times a number is fewer than five.
4. $\frac{4}{5}n \leq 5$	**d.** Negative four times a number is no less than five.
5. $4n < 5$	**e.** Four times a number is at most five.
6. $-4n < 5$	**f.** Four fifths of a number is more than five.

Solve each inequality. Then check your solution.

7. $-\frac{a}{5} < -14$	**8.** $-13h \leq 52$	**9.** $\frac{s}{16} \geq -6$	**10.** $39 > 13p$
11. $\frac{2}{3}n > -12$	**12.** $-\frac{5}{9}t < 25$	**13.** $-\frac{3}{5}m \leq -6$	**14.** $\frac{10}{3}k \geq -10$
15. $-3b \leq 0.75$	**16.** $-0.9c > -9$	**17.** $0.1x \geq -4$	**18.** $-2.3 < \frac{j}{4}$
19. $-15y < 3$	**20.** $2.6v \geq -20.8$	**21.** $0 > -0.5u$	**22.** $\frac{7}{8}f \leq -1$

Define a variable, write an inequality, and solve each problem. Then check your solution.

23. Negative three times a number is at least 57.

24. Two thirds of a number is no more than -10.

25. Negative three fifths of a number is less than -6.

26. FLOODING A river is rising at a rate of 3 inches per hour. If the river rises more than 2 feet, it will exceed flood stage. How long can the river rise at this rate without exceeding flood stage?

27. SALES Pet Supplies makes a profit of \$5.50 per bag on its line of natural dog food. If the store wants to make a profit of no less than \$5225, how many bags of dog food does it need to sell?

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6-2 Reading to Learn Mathematics

Solving Inequalities by Multiplication and Division

Pre-Activity **Why are inequalities important in landscaping?**

Read the introduction to Lesson 6-2 at the top of page 325 in your textbook.

- Would a wall 6 bricks high be lower than a wall 6 blocks high? Why?

- Would a wall n bricks high be lower than a wall n blocks high? Explain.

Reading the Lesson

1. Write an inequality that describes each situation.

a. A number n divided by 8 is greater than 5.

b. Twelve times a number k is at least 7.

c. A number x divided by -10 is less than or equal to 50.

d. Three fifths of a number n is at most 13.

e. Nine is greater than or equal to one half of a quantity m.

2. Use words to tell what each inequality says.

a. $12 < 6n$

b. $\frac{t}{-3} \geq 14$

c. $11x \leq 32$

Helping You Remember

3. In your own words, write a rule for multiplying and dividing inequalities by positive and negative numbers.

Lesson 6-2

NAME _____ DATE _____ PERIOD _____

6-2 Enrichment

The Maya

'I'he Maya were a Native American people who lived from about 1500 B.C. to about 1500 A.D. in the region that today encompasses much of Central America and southern Mexico. Their many accomplishments include exceptional architecture, pottery, painting, and sculpture, as well as significant advances in the fields of astronomy and mathematics.

The Maya developed a system of numeration that was based on the number twenty. The basic symbols of this system are shown in the table at the right. The places in a Mayan numeral are written vertically—the bottom place represents *ones*, the place above represents *twenties*, the place above that represents 20×20, or *four hundreds*, and so on. For instance, this is how to write the number 997 in Mayan numerals.

0	10
1	11
2	12
3	13
4	14
5	15
6	16
7	17
8	18
9	19

$\leftarrow 2 \times \boxed{400} = 800$

$\leftarrow 9 \times \boxed{20} = 180$

$\leftarrow 17 \times \boxed{1} = 17$

997

Evaluate each expression when $v =$ —•—, $w =$ ≡•••, $x =$ ••••, $y =$ ◎, and $z =$ ═••. Then write the answer in Mayan numerals. Exercise 5 is done for you.

1. $\frac{z}{w}$

2. $\frac{v + w + z}{x}$

3. xv

4. vxy

5. $wx - z$ •••◎

6. $vz + xy$

7. $w(v + x + z)$

8. vwz

9. $z(wx - x)$

Tell whether each statement is *true* or *false*.

10. ≡••• + —•— = —•— + ≡•••

11. $\frac{\equiv\bullet\bullet\bullet}{\bullet} = \frac{\bullet}{\bullet\bullet\bullet}$

12. $\frac{\bullet\bullet\bullet}{=} = \frac{\equiv\bullet\bullet\bullet}{\_\_\_}$

13. (••• + ——) + ═ = ••• + (—— + ═)

14. How are Exercises 10 and 11 alike? How are they different?

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6-3 Study Guide and Intervention

Solving Multi-Step Inequalities

Solve Multi-Step Inequalities To solve linear inequalities involving more than one operation, undo the operations in reverse of the order of operations, just as you would solve an equation with more than one operation.

Example 1 **Solve $6x - 4 \leq 2x + 12$.**

$6x - 4 \leq 2x + 12$	Original inequality
$6x - 4 - 2x \leq 2x + 12 - 2x$	Subtract $2x$ from each side.
$4x - 4 \leq 12$	Simplify.
$4x - 4 + 4 \leq 12 + 4$	Add 4 to each side.
$4x \leq 16$	Simplify.
$\frac{4x}{4} \leq \frac{16}{4}$	Divide each side by 4.
$x \leq 4$	Simplify.

The solution is $\{x \mid x \leq 4\}$.

Example 2 **Solve $3a - 15 > 4 + 5a$.**

$3a - 15 > 4 + 5a$	Original inequality
$3a - 15 - 5a > 4 + 5a - 5a$	Subtract $5a$ from each side.
$-2a - 15 > 4$	Simplify.
$-2a - 15 + 15 > 4 + 15$	Add 15 to each side.
$-2a > 19$	Simplify.
$\frac{-2a}{-2} < \frac{19}{-2}$	Divide each side by -2 and change $>$ to $<$.
$a < -9\frac{1}{2}$	Simplify.

The solution is $\left\{a \mid a < -9\frac{1}{2}\right\}$.

Exercises

Solve each inequality. Then check your solution.

1. $11y + 13 \geq -1$

2. $8n - 10 < 6 - 2n$

3. $\frac{q}{7} + 1 > -5$

4. $6n + 12 < 8 + 8n$

5. $-12 - d > -12 + 4d$

6. $5r - 6 > 8r - 18$

7. $\frac{-3x + 6}{2} \leq 12$

8. $7.3y - 14.4 > 4.9y$

9. $-8m - 3 < 18 - m$

10. $-4y - 10 > 19 - 2y$

11. $9n - 24n + 45 > 0$

12. $\frac{4x - 2}{5} \geq -4$

Define a variable, write an inequality, and solve each problem. Then check your solution.

13. Negative three times a number plus four is no more than the number minus eight.

14. One fourth of a number decreased by three is at least two.

15. The sum of twelve and a number is no greater than the sum of twice the number and -8.

Lesson 6-3

NAME _____ DATE _____ PERIOD _____

6-3 Study Guide and Intervention *(continued)*

Solving Multi-Step Inequalities

Solve Inequalities Involving the Distributive Property When solving inequalities that contain grouping symbols, first use the Distributive Property to remove the grouping symbols. Then undo the operations in reverse of the order of operations, just as you would solve an equation with more than one operation.

Example **Solve $3a - 2(6a - 4) > 4 - (4a + 6)$.**

$3a - 2(6a - 4) > 4 - (4a + 6)$	Original inequality
$3a - 12a + 8 > 4 - 4a - 6$	Distributive Property
$-9a + 8 > -2 - 4a$	Combine like terms.
$-9a + 8 + 4a > -2 - 4a + 4a$	Add $4a$ to each side.
$-5a + 8 > -2$	Combine like terms.
$-5a + 8 - 8 > -2 - 8$	Subtract 8 from each side.
$-5a > -10$	Simplify.
$a < 2$	Divide each side by -5 and change $>$ to $<$.

The solution in set-builder notation is $\{a \mid a < 2\}$.

Exercises

Solve each inequality. Then check your solution.

1. $2(t + 3) \geq 16$

2. $3(d - 2) - 2d > 16$

3. $4h - 8 < 2(h - 1)$

4. $6y + 10 > 8 - (y + 14)$

5. $4.6(x - 3.4) > 5.1x$

6. $-5x - (2x + 3) \geq 1$

7. $3(2y - 4) - 2(y + 1) > 10$

8. $8 - 2(b + 1) < 12 - 3b$

9. $-2(k - 1) > 8(1 + k)$

10. $0.3(y - 2) > 0.4(1 + y)$

11. $m + 17 \leq -(4m - 13)$

12. $3n + 8 \leq 2(n - 4) - 2(1 - n)$

13. $2(y - 2) > -4 + 2y$

14. $k - 17 \leq -(17 - k)$

15. $n - 4 \leq -3(2 + n)$

Define a variable, write an inequality, and solve each problem. Then check your solution.

16. Twice the sum of a number and 4 is less than 12.

17. Three times the sum of a number and six is greater than four times the number decreased by two.

18. Twice the difference of a number and four is less than the sum of the number and five.

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6-3 Skills Practice

Solving Multi-Step Inequalities

Justify each indicated step.

1.
$$\frac{3}{4}t - 3 \geq -15$$
$$\frac{3}{4}t - 3 + 3 \geq -15 + 3 \quad \textbf{a.}\ \_?\_$$
$$\frac{3}{4}t \geq -12$$
$$\frac{4}{3}\left(\frac{3}{4}\right)t \geq \frac{4}{3}(-12) \quad \textbf{b.}\ \_?\_$$
$$t \geq -16$$

2.
$$5(k + 8) - 7 \leq 23$$
$$5k + 40 - 7 \leq 23 \quad \textbf{a.}\ \_?\_$$
$$5k + 33 \leq 23$$
$$5k + 33 - 33 \leq 23 - 33 \quad \textbf{b.}\ \_?\_$$
$$5k \leq -10$$
$$\frac{5k}{5} \leq \frac{-10}{5} \quad \textbf{c.}\ \_?\_$$
$$k \leq -2$$

Solve each inequality. Then check your solution.

3. $-2b + 4 > -6$

4. $3x + 15 \leq 21$

5. $\frac{d}{2} - 1 \geq 3$

6. $\frac{2}{5}a - 4 < 2$

7. $-\frac{t}{5} + 7 > -4$

8. $\frac{3}{4}j - 10 \geq 5$

9. $-\frac{2}{3}f + 3 < -9$

10. $2p + 5 \geq 3p - 10$

11. $4k + 15 > -2k + 3$

12. $2(-3m - 5) \geq -28$

13. $-6(w + 1) < 2(w + 5)$

14. $2(q - 3) + 6 \leq -10$

Define a variable, write an inequality, and solve each problem. Then check your solution.

15. Four more than the quotient of a number and three is at least nine.

16. The sum of a number and fourteen is less than or equal to three times the number.

17. Negative three times a number increased by seven is less than negative eleven.

18. Five times a number decreased by eight is at most ten more than twice the number.

19. Seven more than five sixths of a number is more than negative three.

20. Four times the sum of a number and two increased by three is at least twenty-seven.

Lesson 6-3

NAME _____ DATE _____ PERIOD _____

6-3 Practice

Solving Multi-Step Inequalities

Justify each indicated step.

1.

$$x > \frac{5x - 12}{8}$$

$$8x > (8)\frac{5x - 12}{8}$$ **a.** ?

$$8x > 5x - 12$$

$$8x - 5x > 5x - 12 - 5x$$ **b.** ?

$$3x > -12$$

$$\frac{3x}{3} > \frac{-12}{3}$$ **c.** ?

$$x > -4$$

2.

$$2(2h + 2) < 2(3h + 5) - 12$$

$$4h + 4 < 6h + 10 - 12$$ **a.** ?

$$4h + 4 < 6h - 2$$

$$4h + 4 - 6h < 6h - 2 - 6h$$ **b.** ?

$$-2h + 4 < -2$$

$$-2h + 4 - 4 < -2 - 4$$ **c.** ?

$$-2h < -6$$

$$\frac{-2h}{-2} > \frac{-6}{-2}$$ **d.** ?

$$h > 3$$

Solve each inequality. Then check your solution.

3. $-5 - \frac{t}{6} \geq -9$

4. $4u - 6 \geq 6u - 20$

5. $13 > \frac{2}{3}a - 1$

6. $\frac{w + 3}{2} < -8$

7. $\frac{3f - 10}{5} > 7$

8. $h \leq \frac{6h + 3}{5}$

9. $3(z + 1) + 11 < -2(z + 13)$

10. $3e + 2(4e + 2) \leq 2(6e + 1)$

11. $5n - 3(n - 6) \geq 0$

Define a variable, write an inequality, and solve each problem. Then check your solution.

12. A number is less than one fourth the sum of three times the number and four.

13. Two times the sum of a number and four is no more than three times the sum of the number and seven decreased by four.

14. GEOMETRY The area of a triangular garden can be no more than 120 square feet. The base of the triangle is 16 feet. What is the height of the triangle?

15. MUSIC PRACTICE Nabuko practices the violin at least 12 hours per week. She practices for three fourths of an hour each session. If Nabuko has already practiced 3 hours in one week, how many sessions remain to meet or exceed her weekly practice goal?

NAME _____ DATE _____ PERIOD _____

6-3 Reading to Learn Mathematics

Solving Multi-Step Inequalities

Pre-Activity **How are linear inequalities used in science?**

Read the introduction to Lesson 6-3 at the top of page 332 in your textbook. Then write an inequality that could be used to find the temperatures in degrees Celsius for which each substance is a gas.

Argon: _____ Bromine: _____

Reading the Lesson

1. What does the phrase "undoing the operations in reverse of the order of operations" mean?

2. Describe how checking the solution of an inequality is different from checking the solution of an equation.

3. Describe how the Distributive Property can be used to remove the grouping symbols in the inequality $4x - 7(2x + 8) \leq 3x - 5$.

4. Is it possible to have no solution when you solve an inequality? Explain your answer and give an example.

Helping You Remember

5. Make a checklist of steps you can use when solving inequalities.

Lesson 6-3

NAME _____ DATE _____ PERIOD _____

6-3 Enrichment

Carlos Montezuma

During his lifetime, Carlos Montezuma (1865?–1923) was one of the most influential Native Americans in the United States. He was recognized as a prominent physician and was also a passionate advocate of the rights of Native American peoples. The exercises that follow will help you learn some interesting facts about Dr. Montezuma's life.

Solve each inequality. The word or phrase next to the equivalent inequality will complete the statement correctly.

1. $-2k > 10$

Montezuma was born in the state of __?__.

a. $k < -5$ Arizona

b. $k > -5$ Montana

c. $k > 12$ Utah

2. $5 \geq r - 9$

He was a Native American of the Yavapais, who are a __?__ people.

a. $r \leq -4$ Navajo

b. $r \geq -4$ Mohawk

c. $r \leq 14$ Mohave-Apache

3. $-y \leq -9$

Montezuma received a medical degree from __?__ in 1889.

a. $y \geq 9$ Chicago Medical College

b. $y \geq -9$ Harvard Medical School

c. $y \leq 9$ Johns Hopkins University

4. $-3 + q > 12$

As a physician, Montezuma's field of specialization was __?__.

a. $q > -4$ heart surgery

b. $q > 15$ internal medicine

c. $q < -15$ respiratory diseases

5. $5 + 4x - 14 \leq x$

For much of his career, he maintained a medical practice in __?__.

a. $x \leq 9$ New York City

b. $x \leq 3$ Chicago

c. $x \geq -9$ Boston

6. $7 - t < 7 + t$

In addition to maintaining his medical practice, he was also a(n) __?__.

a. $t > 7$ director of a blood bank

b. $t > 0$ instructor at a medical college

c. $t < -7$ legal counsel to physicians

7. $3a + 8 \geq 4a - 10$

Montezuma founded, wrote, and edited __?__, a monthly newsletter that addressed Native American concerns.

a. $a \leq -2$ Yavapai

b. $a \geq 18$ Apache

c. $a \leq 18$ Wassaja

8. $6n > 8n - 12$

Montezuma testified before a committee of the United States Congress concerning his work in treating __?__.

a. $n < 6$ appendicitis

b. $n > -6$ asthma

c. $n > -10$ heart attacks

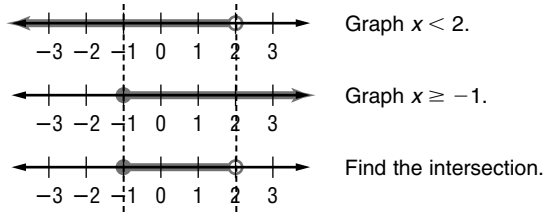
NAME _____ DATE _____ PERIOD _____

6-4 Study Guide and Intervention

Solving Compound Inequalities

Inequalities Containing *and* A compound inequality containing *and* is true only if both inequalities are true. The graph of a compound inequality containing *and* is the **intersection** of the graphs of the two inequalities. Every solution of the compound inequality must be a solution of both inequalities.

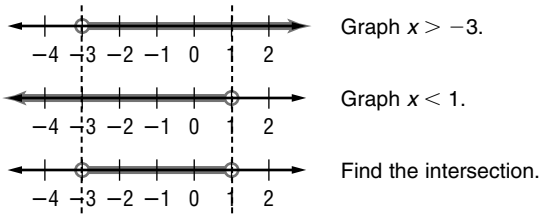
Example 1 **Graph the solution set of $x < 2$ and $x \geq -1$.**



The solution set is $\{x \mid -1 \leq x < 2\}$.

Example 2 **Solve $-1 < x + 2 < 3$ using *and*. Then graph the solution set.**

$$\begin{aligned} -1 &< x + 2 \\ -1 - 2 &< x + 2 - 2 \\ -3 &< x \end{aligned} \quad \text{and} \quad \begin{aligned} x + 2 &< 3 \\ x + 2 - 2 &< 3 - 2 \\ x &< 1 \end{aligned}$$

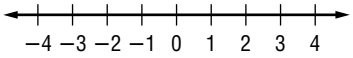


The solution set is $\{x \mid -3 < x < 1\}$.

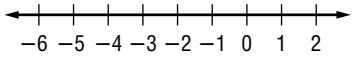
Exercises

Graph the solution set of each compound inequality.

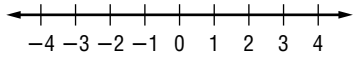
1. $b > -1$ and $b \leq 3$



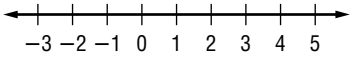
2. $2 \geq q \geq -5$



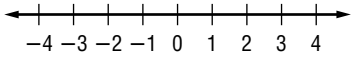
3. $x > -3$ and $x \leq 4$



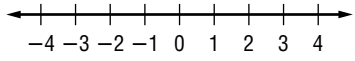
4. $-2 \leq p < 4$



5. $-3 < d$ and $d < 2$

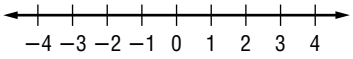


6. $-1 \leq p \leq 3$

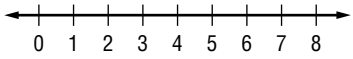


Solve each compound inequality. Then graph the solution set.

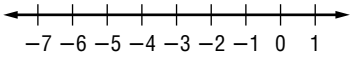
7. $4 < w + 3 \leq 5$



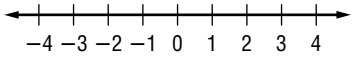
8. $-3 \leq p - 5 < 2$



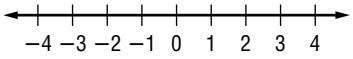
9. $-4 < x + 2 \leq -2$



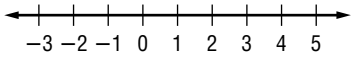
10. $y - 1 < 2$ and $y + 2 \geq 1$



11. $n - 2 > -3$ and $n + 4 < 6$



12. $d - 3 < 6d + 12 < 2d + 32$



Lesson 6-4

NAME _____ DATE _____ PERIOD _____

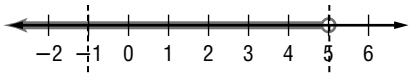
6-4 Study Guide and Intervention *(continued)*

Solving Compound Inequalities

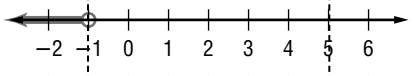
Inequalities Containing *or* A compound inequality containing *or* is true if one or both of the inequalities are true. The graph of a compound inequality containing *or* is the **union** of the graphs of the two inequalities. The union can be found by graphing both inequalities on the same number line. A solution of the compound inequality is a solution of either inequality, not necessarily both.

Example **Solve $2a + 1 < 11$ or $a > 3a + 2$.**

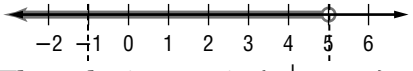
$$\begin{array}{rcl} 2a + 1 < 11 & \text{or} & a > 3a + 2 \\ 2a + 1 - 1 < 11 - 1 & & a - 3a > 3a - 3a + 2 \\ 2a < 10 & & -2a > 2 \\ \frac{2a}{2} < \frac{10}{2} & & \frac{-2a}{-2} < \frac{2}{-2} \\ a < 5 & & a < -1 \end{array}$$



Graph $a < 5$.



Graph $a < -1$.



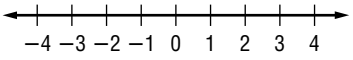
Find the union.

The solution set is $\{a \mid a < 5\}$.

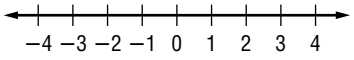
Exercises

Graph the solution set of each compound inequality.

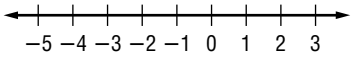
1. $b > 2$ or $b \leq -3$



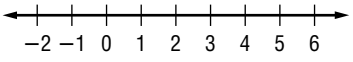
2. $3 \geq q$ or $q \leq 1$



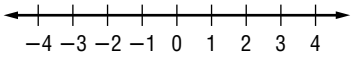
3. $y \leq -4$ or $y > 0$



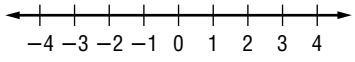
4. $4 \leq p$ or $p < 8$



5. $-3 < d$ or $d < 2$

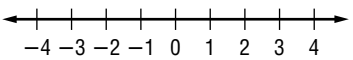


6. $-2 \leq x$ or $3 \leq x$

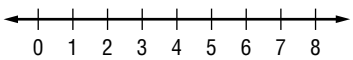


Solve each compound inequality. Then graph the solution set.

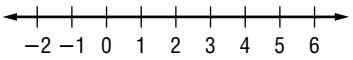
7. $3 < 3w$ or $3w \geq 9$



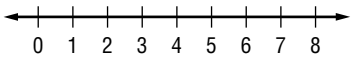
8. $-3p + 1 \leq -11$ or $p < 2$



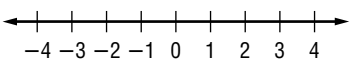
9. $2x + 4 \leq 6$ or $x \geq 2x - 4$



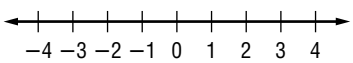
10. $2y + 2 < 12$ or $y - 3 \geq 2y$



11. $\frac{1}{2}n > -2$ or $2n - 2 < 6 + n$



12. $3a + 2 \geq 5$ or $7 + 3a < 2a + 6$



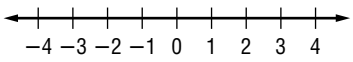
NAME _____ DATE _____ PERIOD _____

6-4 Skills Practice

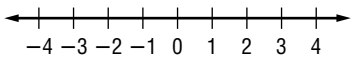
Solving Compound Inequalities

Graph the solution set of each compound inequality.

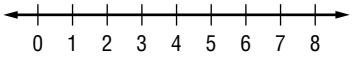
1. $b > 3$ or $b \leq 0$



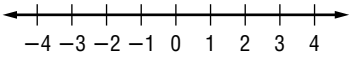
2. $z \leq 3$ and $z \geq -2$



3. $k > 1$ and $k > 5$

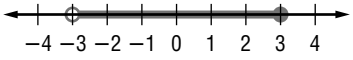


4. $y < -1$ or $y \geq 1$

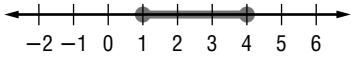


Write a compound inequality for each graph.

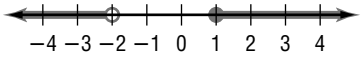
5.



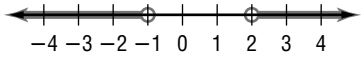
6.



7.

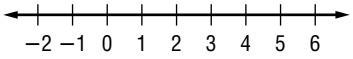


8.

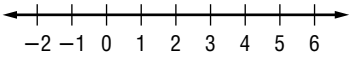


Solve each compound inequality. Then graph the solution set.

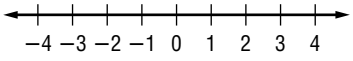
9. $m + 3 \geq 5$ and $m + 3 < 7$



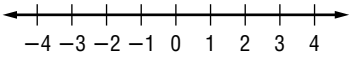
10. $y - 5 < -4$ or $y - 5 \geq 1$



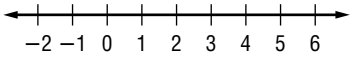
11. $4 < f + 6$ and $f + 6 < 5$



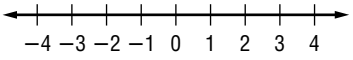
12. $w + 3 \leq 0$ or $w + 7 \geq 9$



13. $-6 < b - 4 < 2$



14. $p - 2 \leq -2$ or $p - 2 > 1$



Define a variable, write an inequality, and solve each problem. Then check your solution.

15. A number plus one is greater than negative five and less than three.

16. A number decreased by two is at most four or at least nine.

17. The sum of a number and three is no more than eight or is more than twelve.

Lesson 6-4

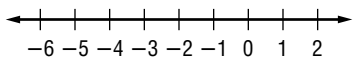
NAME _____ DATE _____ PERIOD _____

6-4 Practice

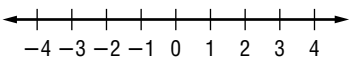
Solving Compound Inequalities

Graph the solution set of each compound inequality.

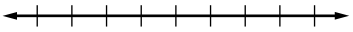
1. $-4 \leq e \leq 1$



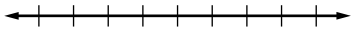
2. $x > 0$ or $x < 3$



3. $g < -3$ or $g \geq 4$

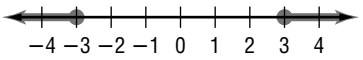


4. $-4 \leq p \leq 4$

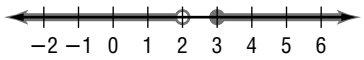


Write a compound inequality for each graph.

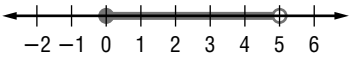
5.



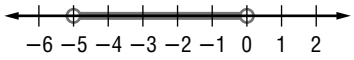
6.



7.

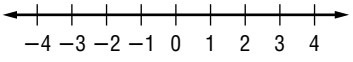


8.

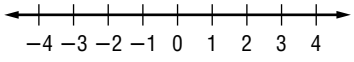


Solve each compound inequality. Then graph the solution set.

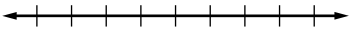
9. $k - 3 < -7$ or $k + 5 \geq 8$



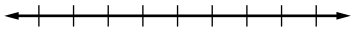
10. $-n < 2$ or $2n - 3 > 5$



11. $5 < 3h + 2 \leq 11$



12. $2c - 4 > -6$ and $3c + 1 < 13$



Define a variable, write an inequality, and solve each problem. Then check your solution.

13. Two times a number plus one is greater than five and less than seven.

14. A number minus one is at most nine, or two times the number is at least twenty-four.

METEOROLOGY For Exercises 15 and 16, use the following information.

Strong winds called the prevailing westerlies blow from west to east in a belt from 40° to 60° latitude in both the Northern and Southern Hemispheres.

15. Write an inequality to represent the latitude of the prevailing westerlies.

16. Write an inequality to represent the latitudes where the prevailing westerlies are *not* located.

17. NUTRITION A cookie contains 9 grams of fat. If you eat no fewer than 4 and no more than 7 cookies, how many grams of fat will you consume?

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6-4 Reading to Learn Mathematics

Solving Compound Inequalities

Pre-Activity **How are compound inequalities used in tax tables?**

Read the introduction to Lesson 6-4 at the top of page 339 in your textbook.

- Explain why it is possible that Mr. Kelly's income is $41,370.

- Explain why it is *not* possible that Mr. Kelly's income is $41,400.

Reading the Lesson

1. When is a compound inequality containing *and* true?

2. The graph of a compound inequality containing *and* is the _____ of the graphs of the two inequalities.

3. When is a compound inequality containing *or* true?

4. The graph of a compound inequality containing *or* is the _____ of the graphs of the two inequalities.

5. Suppose you use yellow to show the graph of Inequality #1 on the number line. You use blue to show the graph of Inequality #2. Write *and* or *or* in each blank to complete the sentence.

a. The part that is green is the graph of Inequality #1 _____ Inequality #2.

b. All colored parts form the graph of Inequality #1 _____ Inequality #2.

Helping You Remember

6. One way to remember something is to connect it to something that is familiar to you. Write two *true* compound statements about yourself, one using the word *and* and the other using the word *or*.

Lesson 6-4

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6-4 Enrichment

Some Properties of Inequalities

The two expressions on either side of an inequality symbol are sometimes called the *first* and *second* members of the inequality.

If the inequality symbols of two inequalities point in the same direction, the inequalities have the same sense. For example, $a < b$ and $c < d$ have the same sense; $a < b$ and $c > d$ have opposite senses.

In the problems on this page, you will explore some properties of inequalities.

Three of the four statements below are true for all numbers a and b (or a, b, c, and d). Write each statement in algebraic form. If the statement is true for all numbers, prove it. If it is not true, give an example to show that it is false.

1. Given an inequality, a new and equivalent inequality can be created by interchanging the members and reversing the sense.

2. Given an inequality, a new and equivalent inequality can be created by changing the signs of both terms and reversing the sense.

3. Given two inequalities with the same sense, the sum of the corresponding members are members of an equivalent inequality with the same sense.

4. Given two inequalities with the same sense, the difference of the corresponding members are members of an equivalent inequality with the same sense.

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6-5 Study Guide and Intervention

Solving Open Sentences Involving Absolute Value

Absolute Value Equations When solving equations that involve absolute value, there are two cases to consider.

Case 1: The value inside the absolute value symbols is positive.
Case 2: The value inside the absolute value symbols is negative.

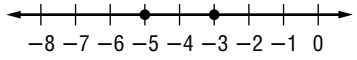
Example 1 **Solve $|x + 4| = 1$. Then graph the solution set.**

Write $|x + 4 = 1|$ as $x + 4 = 1$ or $x + 4 = -1$.

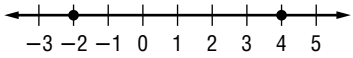
	or	
$x + 4 = 1$		$x + 4 = -1$
$x + 4 - 4 = 1 - 4$		$x + 4 = -1$
$x = -3$		$x + 4 - 4 = -1 - 4$
		$x = -5$

The solution set is $\{-5, -3\}$.

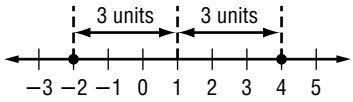
The graph is shown below.



Example 2 **Write an inequality involving absolute value for the graph.**



Find the point that is the same distance from -2 as it is from 4.



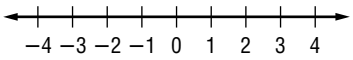
The distance from 1 to -2 is 3 units. The distance from 1 to 4 is 3 units.

So, $|x - 1| = 3$.

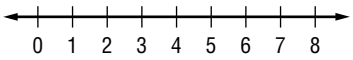
Exercises

Solve each open sentence. Then graph the solution set.

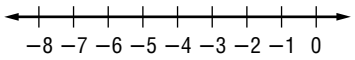
1. $|y| = 3$



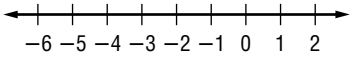
2. $|x - 4| = 4$



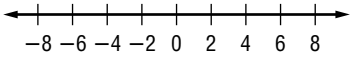
3. $|y + 3| = 2$



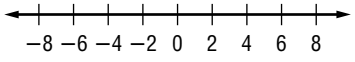
4. $|b + 2| = 3$



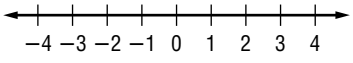
5. $|w - 2| = 5$



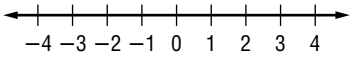
6. $|t + 2| = 4$



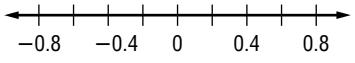
7. $|2x| = 8$



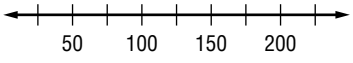
8. $|5y - 2| = 7$



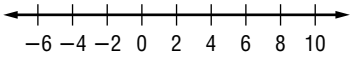
9. $|p - 0.2| = 0.5$



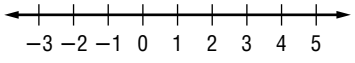
10. $|d - 100| = 50$



11. $|2x - 1| = 11$

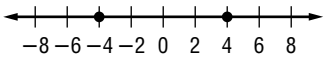


12. $\left|3x + \frac{1}{2}\right| = 6$

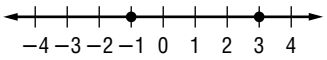


For each graph, write an open sentence involving absolute value.

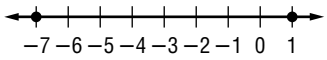
13.



14.



15.



Lesson 6-5

NAME _____ DATE _____ PERIOD _____

6-5 Study Guide and Intervention *(continued)*

Solving Open Sentences Involving Absolute Value

Absolute Value Inequalities When solving inequalities that involve absolute value, there are two cases to consider for inequalities involving $<$ (or $\leq$) and two cases to consider for inequalities involving $>$ (or $\geq$).

If $|x| < n$, then $x > -n$ and $x < n$.
If $|x| > n$, then $x > n$ or $x < -n$.

Remember that inequalities with *and* are related to intersections, while inequalities with *or* are related to unions.

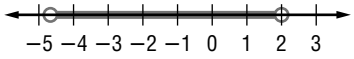
Example **Solve $|3a + 4| < 10$. Then graph the solution set.**

Write $|3a + 4| < 10$ as $3a + 4 < 10$ and $3a + 4 > -10$.

$3a + 4 < 10$	and	$3a + 4 > -10$
$3a + 4 - 4 < 10 - 4$		$3a + 4 - 4 > -10 - 4$
$3a < 6$		$3a > -14$
$\frac{3a}{3} < \frac{6}{3}$		$\frac{3a}{3} > \frac{-14}{3}$
$a < 2$		$a > -4\frac{2}{3}$

The solution set is $\left\{a \mid -4\frac{2}{3} < a < 2\right\}$.

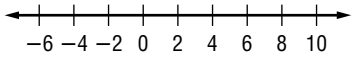
Now graph the solution set.



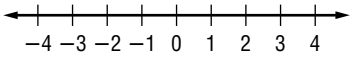
Exercises

Solve each open sentence. Then graph the solution set.

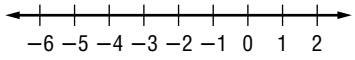
1. $|c - 2| > 6$



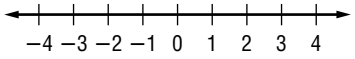
2. $|x - 9| < 0$



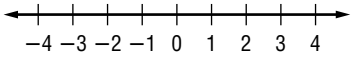
3. $|3f + 10| \leq 4$



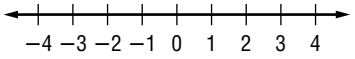
4. $|x| \leq 2$



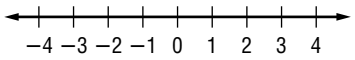
5. $|x| \geq 3$



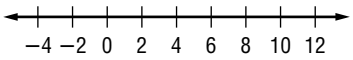
6. $|2x + 1| \geq -2$



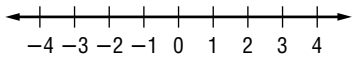
7. $|2d - 1| \leq 4$



8. $|3 - (x - 1)| \leq 8$

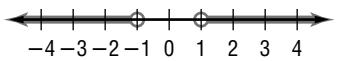


9. $|3r + 2| < -5$

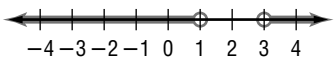


For each graph, write an open sentence involving absolute value.

10.



11.



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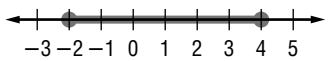


NAME _____ DATE _____ PERIOD _____

6-5 Skills Practice

Solving Open Sentences Involving Absolute Value

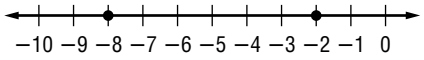
Match each open sentence with the graph of its solution set.

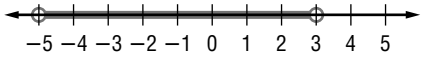
1. $|x| > 2$

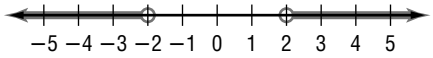
2. $|x + 5| = 3$

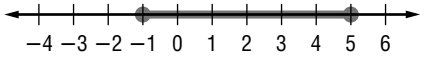
3. $|x - 2| \leq 3$

4. $|x + 1| < 4$

a.


b.


c.


d.


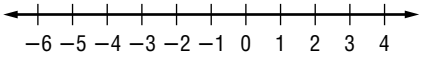
Express each statement using an inequality involving absolute value. Do *not* solve.

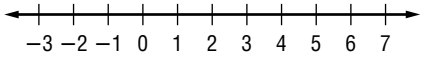
5. The weatherman predicted that the temperature would be within 3° of 52°F.

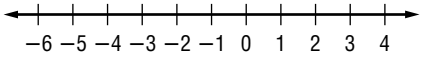
6. Serena will make the B team if she scores within 8 points of the team average of 92.

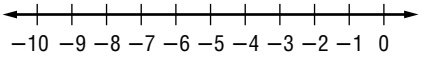
7. The dance committee expects attendance to number within 25 of last year's 87 students.

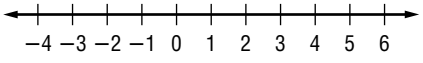
Solve each open sentence. Then graph the solution set.

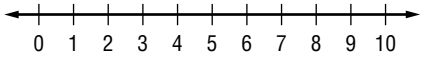
8. $|s + 1| = 5$


9. $|c - 3| < 1$


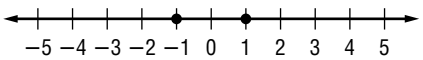
10. $|n + 2| \geq 1$


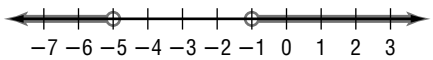
11. $|t + 6| > 4$


12. $|w - 2| = 2$


13. $|k - 5| \leq 4$


For each graph, write an open sentence involving absolute value.

14.


15.


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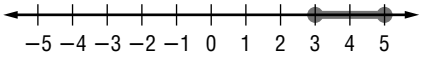

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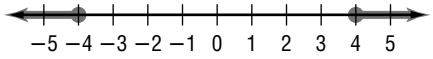


Lesson 6-5

NAME _____ DATE _____ PERIOD _____

6-5 Practice

Solving Open Sentences Involving Absolute Value

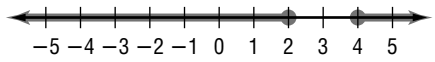
Match each open sentence with the graph of its solution set.

1. $|x + 7| = 3$

2. $|x - 3| \geq 1$

3. $|2x + 1| < 5$

4. $|5 - x| \geq 3$

a.


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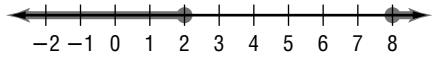
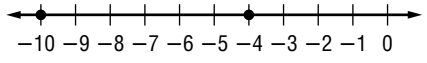
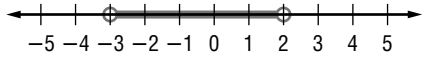


c.


d.


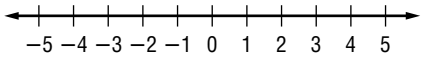
Express each statement using an inequality involving absolute value. Do *not* solve.

5. The height of the plant must be within 2 inches of the standard 13-inch show size.

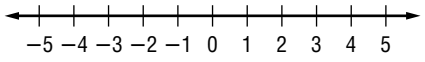
6. The majority of grades in Sean's English class are within 4 points of 85.

Solve each open sentence. Then graph the solution set.

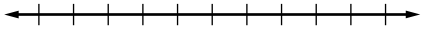
7. $|2z - 9| \leq 1$



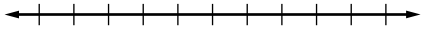
8. $|3 - 2r| > 7$



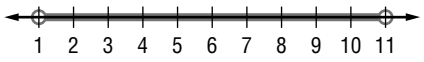
9. $|3t + 6| < 9$



10. $|2g - 5| \geq 9$



For each graph, write an open sentence involving absolute value.

11.


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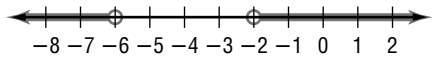

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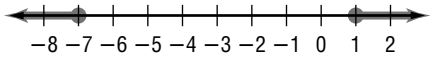
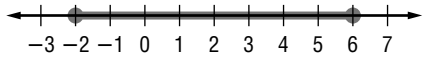


14.


15. FITNESS Taisha uses the elliptical cross-trainer at the gym. Her general goal is to burn 280 Calories per workout, but she varies by as much as 25 Calories from this amount on any given day. What is the range of the number of Calories burned for Taisha's cross-trainer workout?

16. TEMPERATURE A thermometer is guaranteed to give a temperature no more than 1.2°F from the actual temperature. If the thermometer reads 28°F, what is the range for the actual temperature?

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6-5 Reading to Learn Mathematics

Solving Open Sentences Involving Absolute Value

Pre-Activity **How is absolute value used in election polls?**

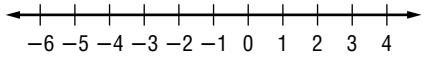
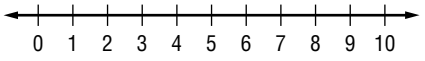
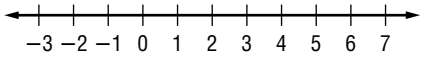
Read the introduction to Lesson 6-5 at the top of page 345 in your textbook.

- What does the phrase margin of error mean to you?

- In this poll, the number of people opposed to the tax levy may be as high as _____ or as low as _____. This can be written as the inequality $|x - $ _____ $| \leq 3$.

Reading the Lesson

Complete each compound sentence by writing *and* or *or* in the blank. Use the result to help you graph the absolute value sentence.

	Absolute Value Sentence	Compound Sentence	Graph
1.	$\|2x + 2\| = 8$	$2x + 2 = 8$ _____ $2x + 2 = -8$	
2.	$\|x - 5\| \leq 4$	$x - 5 \leq 4$ _____ $x - 5 \geq -4$	
3.	$\|2x - 3\| > 5$	$2x - 3 > 5$ _____ $2x - 3 < -5$	

4. How would you write the compound sentence $3x + 7 \geq 5$ or $3x + 7 \leq -5$ as an absolute value sentence?

Helping You Remember

5. Recall that $|x|$ tells you how many units the number x is from zero on the number line. Explain the meaning of $|x| = n$, $|x| < n$, and $|x| > n$ by using the idea of the distance from x to zero.

Lesson 6-5

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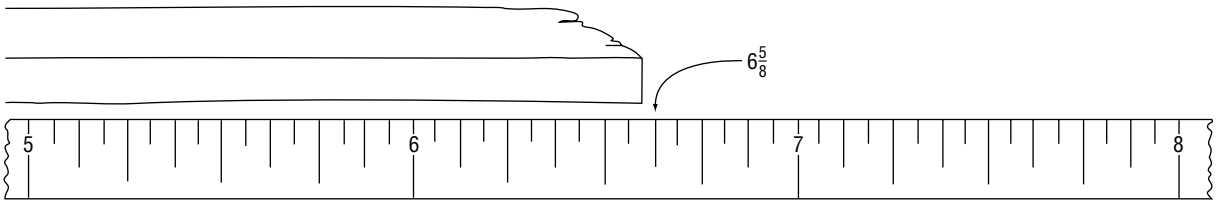
6-5 Enrichment

Precision of Measurement

The precision of a measurement depends both on your accuracy in measuring and the number of divisions on the ruler you use. Suppose you measured a length of wood to the nearest one-eighth of an inch and got a length of $6\frac{5}{8}$ in.



The drawing shows that the actual measurement lies somewhere between $6\frac{9}{11}$ in. and $6\frac{11}{16}$ in. This measurement can be written using the symbol $\pm$, which is read *plus or minus*. It can also be written as a compound inequality.

$$6\frac{5}{8} \pm \frac{1}{16} \text{ in.} \qquad 6\frac{9}{16} \text{ in.} \leq m \leq 6\frac{11}{16} \text{ in.}$$

In this example, $\frac{1}{16}$ in. is the absolute error. The absolute error is one-half the smallest unit used in a measurement.

Write each measurement as a compound inequality. Use the variable m.

1. $3\frac{1}{2} \pm \frac{1}{4}$ in.

2. 9.78 ± 0.005 cm

3. 2.4 ± 0.05 g

4. $28 \pm \frac{1}{2}$ ft

5. 15 ± 0.5 cm

6. $\frac{11}{16} \pm \frac{1}{64}$ in.

For each measurement, give the smallest unit used and the absolute error.

7. $12.5 \text{ cm} \leq m \leq 13.5 \text{ cm}$

8. $12\frac{1}{8} \text{ in.} \leq m \leq 12\frac{3}{8} \text{ in.}$

9. $56\frac{1}{2} \text{ in.} \leq m \leq 57\frac{1}{2} \text{ in.}$

10. $23.05 \text{ mm} \leq m \leq 23.15 \text{ mm}$

NAME _____ DATE _____ PERIOD _____

6-6 Study Guide and Intervention

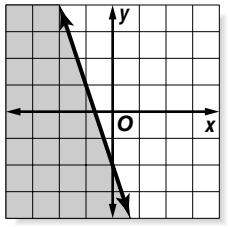
Graphing Inequalities in Two Variables

Graph Linear Inequalities The solution set of an inequality that involves two variables is graphed by graphing a related linear equation that forms a boundary of a **half-plane**. The graph of the ordered pairs that make up the solution set of the inequality fill a region of the coordinate plane on one side of the half-plane.

Example **Graph $y \leq -3x - 2$.**

Graph $y = -3x - 2$.

Since $y \leq -3x - 2$ is the same as $y < -3x - 2$ and $y = -3x - 2$, the boundary is included in the solution set and the graph should be drawn as a solid line.



Select a point in each half plane and test it. Choose (0, 0) and (−2, −2).

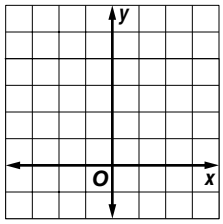
$y \leq -3x - 2$	$y \leq -3x - 2$
$0 \leq -3(0) - 2$	$-2 \leq -3(-2) - 2$
$0 \leq -2$ is false.	$-2 \leq 6 - 2$
	$-2 \leq 4$ is true.

The half-plane that contains (−2, −2) contains the solution. Shade that half-plane.

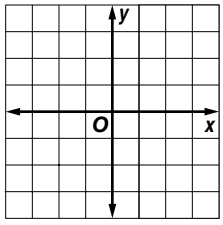
Exercises

Graph each inequality.

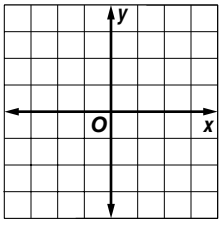
1. $y < 4$



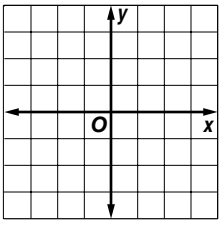
2. $x \geq 1$



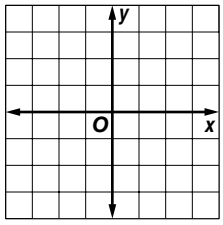
3. $3x \leq y$



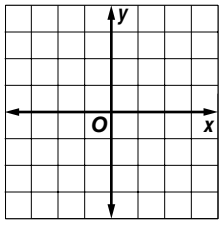
4. $-x > y$



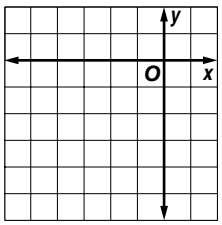
5. $x - y \geq 1$



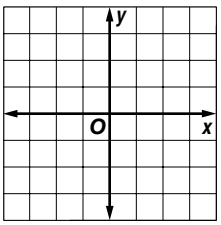
6. $2x - 3y \leq 6$



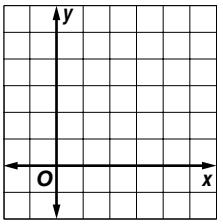
7. $y < -\frac{1}{2}x - 3$



8. $4x - 3y < 6$



9. $3x + 6y \geq 12$



NAME _____ DATE _____ PERIOD _____

6-6 Study Guide and Intervention *(continued)*

Graphing Inequalities in Two Variables

Solve Real-World Problems When solving real-life inequalities, the domain and range of the inequality are often restricted to nonnegative numbers or to whole numbers.

Example **BANKING A bank offers 4.5% annual interest on regular savings accounts and 6% annual interest on certificates of deposit (CD). If Marjean wants to earn at least $300 interest per year, how much money should she deposit in each type of account?**

Let x = the amount deposited in a regular savings account.

Let y = the amount deposited in a CD.

Then $0.045x + 0.06y \geq 300$ is an open sentence representing this situation.

Solve for y in terms of x.

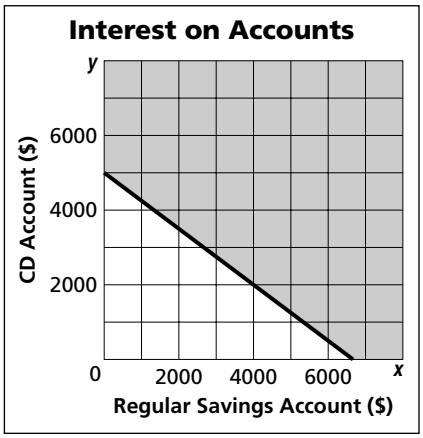
$0.045x + 0.06y \geq 300$ Original inequality

$0.06y \geq -0.045x + 300$ Subtract $0.045x$ from each side.

$y \geq -0.75x + 5000$ Divide each side by 0.06.

Graph $y \geq -0.75x + 5000$ and test the point (0, 0). Since $0 \geq -0.75(0) + 5000$ is false, shade the half-plane that does not contain (0, 0).

One solution is (4000, 2000). This represents $4000 deposited at 4.5% and $2,000 deposited at 6%.



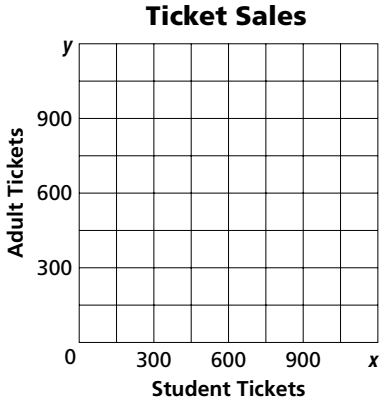
Exercises

1. **SOCIAL EVENTS** Tickets for the school play cost $5 per student and $7 per adult. The school wants to earn at least $5,400 on each performance.

   a. Write an inequality that represents this situation.

   b. Graph the solution set.

   c. If 500 adult tickets are sold, what is the minimum number of student tickets that must be sold?



2. **MANUFACTURING** An auto parts company can produce 525 four-cylinder engines or 270 V-6 engines per day. It wants to produce up to 300,000 engines per year.

   a. Write an inequality that represents this situation.

   b. Are there restrictions on the domain or range?

3. **GEOMETRY** The perimeter of a rectangular lot is less than 800 feet. Write an inequality that represents the amount of fencing that will enclose the lot.

NAME _____ DATE _____ PERIOD _____

6-6 Skills Practice

Graphing Inequalities in Two Variables

Determine which ordered pairs are part of the solution set for each inequality.

1. $y > 3x$, $\{(1, 5), (1, 0), (-1, 0), (5, 1)\}$

2. $y \geq x + 3$, $\{(2, -3), (-2, -1), (1, 6), (3, 4)\}$

3. $y < x - 1$, $\{(3, 1), (-2, -4), (4, -2), (-3, 3)\}$

Match each inequality with its graph.

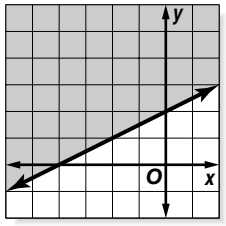
4. $y - 2x < 2$

5. $y \leq -3x$

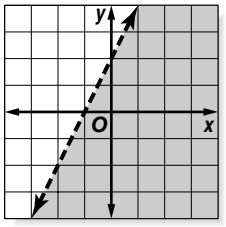
6. $2y - x \geq 4$

7. $x + y > 1$

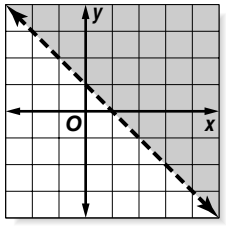
a.



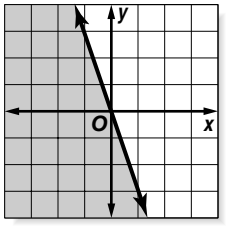
b.



c.

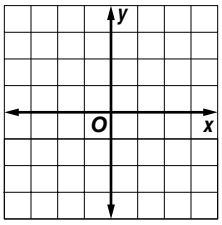


d.

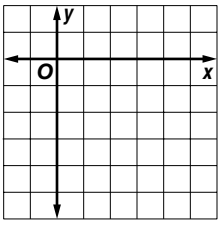


Graph each inequality.

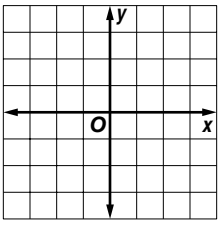
8. $y < -1$



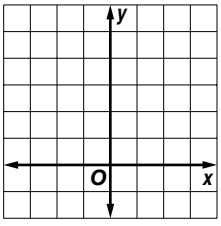
9. $y \geq x - 5$



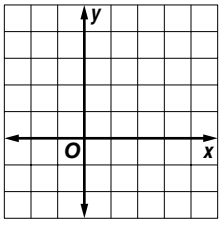
10. $y > 3x$



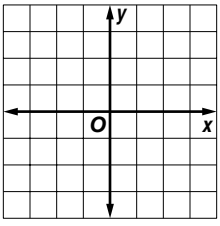
11. $y \leq 2x + 4$



12. $y + x > 3$



13. $y - x \geq 1$



NAME _____ DATE _____ PERIOD _____

6-6 Practice

Graphing Inequalities in Two Variables

Determine which ordered pairs are part of the solution set for each inequality.

1. $3x + y \geq 6$, $\{(4, 3), (-2, 4), (-5, -3), (3, -3)\}$

2. $y \geq x + 3$, $\{(6, 3), (-3, 2), (3, -2), (4, 3)\}$

3. $3x - 2y < 5$, $\{(4, -4), (3, 5), (5, 2), (-3, 4)\}$

Match each inequality with its graph.

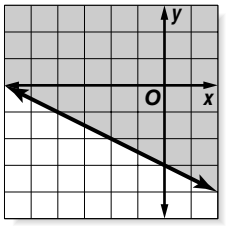
4. $5y - 2x \leq 10$

5. $3y > 3x + 9$

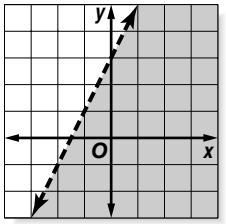
6. $y - 2x < 3$

7. $x + 2y \geq -6$

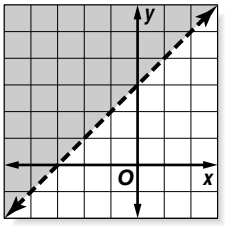
a.



b.



c.



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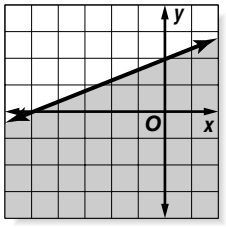
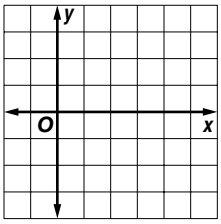
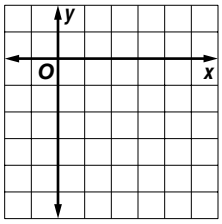


Graph each inequality.

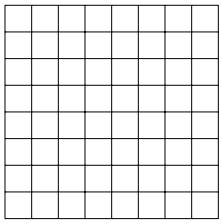
8. $2y - x < -4$



9. $2x - 2y \geq 8$



10. $3y > 2x - 3$



11. MOVING A moving van has an interior height of 7 feet (84 inches). You have boxes in 12 inch and 15 inch heights, and want to stack them as high as possible to fit. Write an inequality that represents this situation.

BUDGETING For Exercises 12 and 13, use the following information.

Satchi found a used bookstore that sells pre-owned videos and CDs. Videos cost \$9 each, and CDs cost \$7 each. Satchi can spend no more than \$35.

12. Write an inequality that represents this situation.

13. Does Satchi have enough money to buy 2 videos and 3 CDs?

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6-6 Reading to Learn Mathematics

Graphing Inequalities in Two Variables

Pre-Activity **How are inequalities used in budgets?**

Read the introduction to Lesson 6-6 at the top of page 352 in your textbook.

What do 3 and 4 represent in the terms $3x$ and $4y$?

Reading the Lesson

1. Complete the chart to show which type of line is needed for each symbol.

Symbol	Type of Line	Boundary Part of Solution?
$<$		
$>$		
$\leq$		
$\geq$		

2. If a test point results in a false statement, what do you know about the graph?

3. If a test point results in a true statement, what do you know about the graph?

4. When can the origin *not* be used as a test point?

Helping You Remember

5. The two-variable inequalities in this lesson can be solved for y in terms of x to get a sentence in slope-intercept form. It looks much like a slope-intercept equation, but it has an inequality symbol instead of an equals sign. For example, $4x + 2y \leq 5$ can be written as $y \leq -2x + \frac{5}{2}$. Explain how to graph an inequality once it is written in slope-intercept form. Use the idea that *greater* can mean *above* and *less* can mean *below*.

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6-6 Enrichment

Using Equations: Ideal Weight

You can find your ideal weight as follows.

A woman should weigh 100 pounds for the first 5 feet of height and 5 additional pounds for each inch over 5 feet (5 feet = 60 inches). A man should weigh 106 pounds for the first 5 feet of height and 6 additional pounds for each inch over 5 feet. These formulas apply to people with normal bone structures.

To determine your bone structure, wrap your thumb and index finger around the wrist of your other hand. If the thumb and finger just touch, you have normal bone structure. If they overlap, you are small-boned. If they don't overlap, you are large-boned. Small-boned people should decrease their calculated ideal weight by 10%. Large-boned people should increase the value by 10%.

Calculate the ideal weights of these people.

1. woman, 5 ft 4 in., normal-boned

2. man, 5 ft 11 in., large-boned

3. man, 6 ft 5 in., small-boned

4. you, if you are at least 5 ft tall

For Exercises 5–9, use the following information.

Suppose a normal-boned man is x inches tall. If he is at least 5 feet tall, then $x - 60$ represents the number of inches this man is over 5 feet tall. For each of these inches, his ideal weight is increased by 6 pounds. Thus, his proper weight (y) is given by the formula $y = 6(x - 60) + 106$ or $y = 6x - 254$. If the man is large-boned, the formula becomes $y = 6x - 254 + 0.10(6x - 254)$.

5. Write the formula for the weight of a large-boned man in slope-intercept form.

6. Derive the formula for the ideal weight (y) of a normal-boned female with height x inches. Write the formula in slope-intercept form.

7. Derive the formula in slope-intercept form for the ideal weight (y) of a large-boned female with height x inches.

8. Derive the formula in slope-intercept form for the ideal weight (y) of a small-boned male with height x inches.

9. Find the heights at which normal-boned males and large-boned females would weigh the same.

NAME _____ DATE _____ PERIOD _____

6

Chapter 6 Test, Form 1

SCORE _____

Write the letter for the correct answer in the blank at the right of each question.

For Questions 1–9, solve each inequality.

1. $x - 7 > 3$

A. $\{x \mid x > 10\}$ **B.** $\{x \mid x > -4\}$ **C.** $\{x \mid x < 10\}$ **D.** $\{x \mid x < -4\}$ **1.** _____

2. $3 \geq t + 1$

A. $\{t \mid t \leq 4\}$ **B.** $\{t \mid t \geq 2\}$ **C.** $\{t \mid t \leq 2\}$ **D.** $\{t \mid t \geq 4\}$ **2.** _____

3. $17 + a \leq 7$

A. $\{a \mid a \leq 10\}$ **B.** $\{a \mid a \leq -10\}$ **C.** $\{a \mid a \leq 24\}$ **D.** $\{a \mid a \leq -24\}$ **3.** _____

4. $3 < \frac{c}{5}$

A. $\left\{c \mid c > \frac{3}{5}\right\}$ **B.** $\left\{c \mid c < \frac{3}{5}\right\}$ **C.** $\{c \mid c < 15\}$ **D.** $\{c \mid c > 15\}$ **4.** _____

5. $1 \geq \frac{-y}{4}$

A. $\left\{y \mid y \geq -\frac{1}{4}\right\}$ **B.** $\{y \mid y \geq -4\}$ **C.** $\{y \mid y \leq 4\}$ **D.** $\{y \mid y \leq 3\}$ **5.** _____

6. $5s < -25$

A. $\{s \mid s < 125\}$ **B.** $\{s \mid s < -125\}$ **C.** $\{s \mid s > -5\}$ **D.** $\{s \mid s < -5\}$ **6.** _____

7. $-36 \leq 3t$

A. $\{t \mid t \geq -12\}$ **B.** $\{t \mid t \leq 12\}$ **C.** $\{t \mid t \geq 12\}$ **D.** $\{t \mid t \leq -12\}$ **7.** _____

8. $6y - 8 > 4y + 26$

A. $\{y \mid y > -9\}$ **B.** $\{y \mid y > -17\}$ **C.** $\{y \mid y > 9\}$ **D.** $\{y \mid y > 17\}$ **8.** _____

9. $3(2d - 1) \geq 4(2d - 3) - 3$

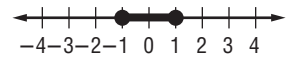
A. $\{d \mid d \geq -9\}$ **B.** $\{d \mid d \leq -6\}$ **C.** $\{d \mid d \geq 3\}$ **D.** $\{d \mid d \leq 6\}$ **9.** _____

10. Six is at least four more than a number. Which inequality represents this sentence?

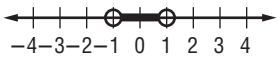
A. $6 \leq n + 4$ **B.** $6 \geq n + 4$ **C.** $4 \leq n + 6$ **D.** $4 \geq n + 6$ **10.** _____

11. Which of the following is the graph of the solution set of $m > -1$ and $m \leq 1$?

A.



B.



C.

D.

11. _____

12. Which compound inequality has the solution set shown in the graph?

A. $-3 \leq n < 1$ **B.** $-3 \leq n \leq 1$ **C.** $-3 < n \leq 1$ **D.** $-3 < n < 1$ **12.** _____

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Chapter 6 Test, Form 1 *(continued)*

13. Which compound inequality has the solution set shown in the graph?

A. $x < -1$ or $x > 3$ **B.** $x > -1$ or $x \geq 3$

C. $x > -1$ or $x < 3$ **D.** $x \leq -1$ or $x \geq 3$ **13.** _____

14. Which of the following is the solution set of $2s + 1 > 9$ or $s < -1$?

A. $\{s \mid s < -1 \text{ or } s > 4\}$ **B.** $\{s \mid s \leq -1 \text{ or } s \geq 4\}$

C. $\{s \mid -1 \leq s \leq 4\}$ **D.** $\{s \mid s < -1 \text{ or } s > 5\}$ **14.** _____

15. Which of the following is the solution set of $|s - 6| = 12$?

A. $\{6, -18\}$ **B.** $\{-6\}$ **C.** $\{18\}$ **D.** $\{-6, 18\}$ **15.** _____

16. Solve $|1 - 2b| = 1$.

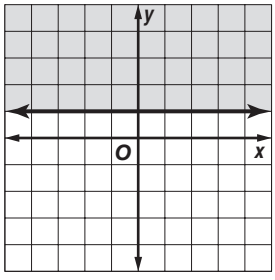
A. $\{1, -1\}$ **B.** $\{-1, 0\}$ **C.** $\{0, 1\}$ **D.** $\{0\}$ **16.** _____

17. Solve $|x - 3| < 2$.

A. $\{x \mid 1 < x < 5\}$ **B.** $\{x \mid -5 < x < -1\}$

C. $\{x \mid -1 < x < 1\}$ **D.** $\{x \mid -1 < x < 5\}$ **17.** _____

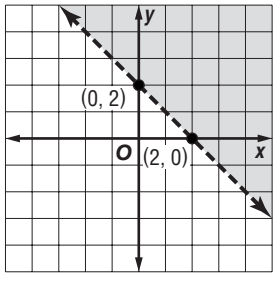
18. Which inequality has the solution set shown in the graph?



A. $y < 1$ **B.** $y > 1$

C. $y \leq 1$ **D.** $y \geq 1$ **18.** _____

19. Which inequality has the solution set shown in the graph?



A. $y < -x + 2$ **B.** $y > -x + 2$

C. $y < -x + 1$ **D.** $y > -x + 1$ **19.** _____

20. Juan's income y consists of at least \$37,500 salary plus 5% commission on all of his sales x. Which inequality represents Juan's income in one year?

A. $y \leq 37{,}500 + 5x$ **B.** $y \geq 37{,}500 + 0.05x$

C. $y \geq x + 0.05(37{,}500)$ **D.** $y \geq 37{,}500 + 5$ **20.** _____

Bonus If $x < 0$, which integer does not satisfy the inequality $x + 2 < 1$? **B:** _____

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6

Chapter 6 Test, Form 2A

SCORE _____

Write the letter for the correct answer in the blank at the right of each question.

For Questions 1–9, solve each inequality.

1. $-51 \le x + 38$

A. $\{x \mid x \le -13\}$ **B.** $\{x \mid x \le 89\}$ **C.** $\{x \mid x \ge -89\}$ **D.** $\{x \mid x \ge -13\}$ **1.** _____

2. $m - \frac{3}{8} > \frac{1}{2}$

A. $\left\{m \mid m > \frac{7}{8}\right\}$ **B.** $\left\{m \mid m < \frac{7}{8}\right\}$ **C.** $\left\{m \mid m < \frac{1}{8}\right\}$ **D.** $\left\{m \mid m > \frac{1}{8}\right\}$ **2.** _____

3. $6n \ge 19 + 5n$

A. $\{n \mid n \ge -19\}$ **B.** $\{n \mid n \ge 19\}$ **C.** $\{n \mid n \le 19\}$ **D.** $\left\{n \mid n \le \frac{11}{19}\right\}$ **3.** _____

4. $\frac{t}{-2} > 4$

A. $\{t \mid t < -8\}$ **B.** $\{t \mid t < -2\}$ **C.** $\{t \mid t > 2\}$ **D.** $\{t \mid t > -8\}$ **4.** _____

5. $\frac{5}{14} > -\frac{2}{7}d$

A. $\left\{d \mid d < \frac{5}{4}\right\}$ **B.** $\left\{d \mid d > \frac{5}{4}\right\}$ **C.** $\left\{d \mid d < -\frac{5}{4}\right\}$ **D.** $\left\{d \mid d > -\frac{5}{4}\right\}$ **5.** _____

6. $-3.5z < 42$

A. $\{z \mid z > 12\}$ **B.** $\{z \mid z < 12\}$ **C.** $\{z \mid z < -12\}$ **D.** $\{z \mid z > -12\}$ **6.** _____

7. $4w - 6 > 6w - 20$

A. $\{w \mid w < 7\}$ **B.** $\{w \mid w < 2\}$ **C.** $\{w \mid w < -7\}$ **D.** $\{w \mid w < -2\}$ **7.** _____

8. $2v + 3 \le \frac{5v + 8}{4}$

A. $\left\{v \mid v \le 1\frac{2}{3}\right\}$ **B.** $\left\{v \mid v \le -1\frac{1}{3}\right\}$ **C.** $\left\{v \mid v \ge 1\frac{2}{3}\right\}$ **D.** $\left\{v \mid v \ge -1\frac{1}{3}\right\}$ **8.** _____

9. $8r - (5r + 4) \ge -31$

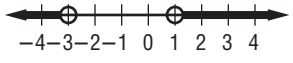
A. $\{r \mid r \le -9\}$ **B.** $\{r \mid r \ge -9\}$ **C.** $\{r \mid r \ge 9\}$ **D.** $\{r \mid r \le 9\}$ **9.** _____

10. The sum of two consecutive integers is at most 3. What is the greatest possible value for the greater integer?

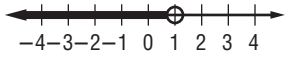
A. 5 **B.** 1 **C.** 3 **D.** 2 **10.** _____

11. Which of the following is the graph of the solution set of $y < -3$ or $y < 1$?

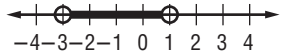
A.



B.



C.



D.

11. _____

6

Chapter 6 Test, Form 2A *(continued)*

12. Which compound inequality has the solution set shown in the graph?

A. $-1 < n < 2$ **B.** $-1 \le n < 2$

C. $n \ge -1$ or $n < 2$ **D.** $-1 < n \le 2$ **12.** _____

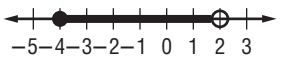
13. Which of the following is the solution set of $-4 < 3t + 5 \le 20$?

A. $\{t \mid -3 < t \le 5\}$ **B.** $\{t \mid t < -3\}$

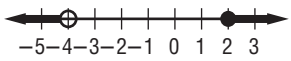
C. $\{t \mid t > -3 \text{ and } t \le 5\}$ **D.** $\{t \mid t < -3 \text{ or } t \ge 5\}$ **13.** _____

14. Which of the following is the graph of the solution set of $t - 4 \ge 4t + 8$ or $3t > 14 - 4t$?

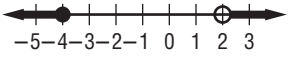
A.



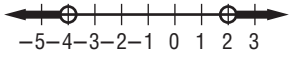
B.



C.



D.



14. _____

15. Which of the following is the solution set of $|3x + 18| = 12$?

A. $\{2\}$ **B.** $\{2, 10\}$ **C.** $\{-10, -2\}$ **D.** $\{10\}$ **15.** _____

16. The graph below represents the solution set of which inequality?

A. $|w + 5| \le 3$ **B.** $|w - 5| \ge 3$

C. $|w - 5| \le 3$ **D.** $|w + 5| \ge 3$ **16.** _____

17. Which of the following is the solution set of $|2x - 3| > 4$?

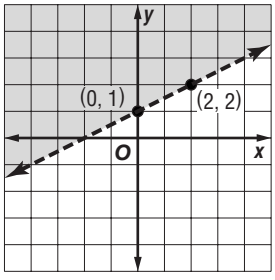
A. $\left\{x \mid x < -\frac{1}{2} \text{ or } x > \frac{7}{2}\right\}$ **B.** $\{x \mid x < -1 \text{ or } x > 7\}$

C. $\left\{x \mid -\frac{1}{2} < x < \frac{7}{2}\right\}$ **D.** $\left\{x \mid x < \frac{1}{2} \text{ or } x > \frac{7}{2}\right\}$ **17.** _____

18. Which ordered pair is part of the solution set of the inequality $12 + y \le -3x$?

A. $(-16, 3)$ **B.** $(1, 4)$ **C.** $(4, -1)$ **D.** $(3, -16)$ **18.** _____

19. Which inequality is graphed at the right?



A. $y < 2x + 1$ **B.** $y > 2x + 1$

C. $y < \frac{1}{2}x + 1$ **D.** $y > \frac{1}{2}x + 1$ **19.** _____

20. Taka is planning to buy a new coat and new shoes. He has saved \$122. Which inequality represents this situation if x represents the cost of a coat and y represents the cost of the shoes he buys?

A. $122 \le y + x$ **B.** $y \le 122 + x$

C. $y - x \ge 122$ **D.** $y \le 122 - x$ **20.** _____

Bonus Solve $6(|n| - 3) - 4|n| + 5 = 11$. **B:** _____

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6

Chapter 6 Test, Form 2B

SCORE _____

Write the letter for the correct answer in the blank at the right of each question.

For Questions 1–9, solve each inequality.

1. $-13 > w + 12$

A. $\{w \mid w < -25\}$ **B.** $\{w \mid w > -25\}$ **C.** $\{w \mid w > -1\}$ **D.** $\{w \mid w < -1\}$ **1.** _____

2. $x - \frac{1}{4} \leq -\frac{1}{2}$

A. $\left\{x \mid x \leq -\frac{1}{4}\right\}$ **B.** $\left\{x \mid x \leq -\frac{3}{4}\right\}$ **C.** $\left\{x \mid x \geq -\frac{1}{4}\right\}$ **D.** $\left\{x \mid x \geq -\frac{3}{4}\right\}$ **2.** _____

3. $2x - 7 \geq 3x$

A. $\left\{x \mid x \leq \frac{5}{7}\right\}$ **B.** $\{x \mid x \leq -7\}$ **C.** $\{x \mid x \geq 7\}$ **D.** $\{x \mid x \geq -7\}$ **3.** _____

4. $\frac{m}{-5} < -3$

A. $\{m \mid m > -15\}$ **B.** $\{m \mid m < -15\}$ **C.** $\{m \mid m < 15\}$ **D.** $\{m \mid m > 15\}$ **4.** _____

5. $-\frac{2}{3}s > 6$

A. $\{s \mid s > -9\}$ **B.** $\{s \mid s > 9\}$ **C.** $\{s \mid s < 9\}$ **D.** $\{s \mid s < -9\}$ **5.** _____

6. $-1.1t \leq 4.62$

A. $\{t \mid t \leq 5.72\}$ **B.** $\{t \mid t \geq 5.72\}$ **C.** $\{t \mid t \leq -4.2\}$ **D.** $\{t \mid t \geq -4.2\}$ **6.** _____

7. $5z - 4 > 2z + 8$

A. $\{z \mid z > 4\}$ **B.** $\{z \mid z < 1\}$ **C.** $\{z \mid z < 4\}$ **D.** $\{z \mid z > 1\}$ **7.** _____

8. $\frac{2 + 4b}{2} \geq 3b + 6$

A. $\{b \mid b \geq -5\}$ **B.** $\{b \mid b \leq -5\}$ **C.** $\{b \mid b \geq -2\}$ **D.** $\{b \mid b \leq -2\}$ **8.** _____

9. $7 - 9r - (r + 12) \leq 25$

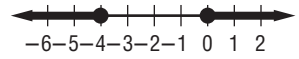
A. $\{r \mid r \leq -3\}$ **B.** $\left\{r \mid r \leq -\frac{3}{5}\right\}$ **C.** $\{r \mid r \geq -3\}$ **D.** $\left\{r \mid r \geq -\frac{3}{5}\right\}$ **9.** _____

10. The sum of two consecutive integers is at most 7. What is the largest possible value for the lesser integer?

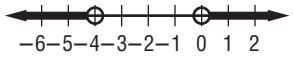
A. 1 **B.** 3 **C.** 2 **D.** 5 **10.** _____

11. Which of the following is the graph of the solution set of $x > 0$ or $x < -4$?

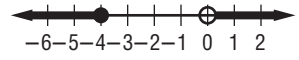
A.



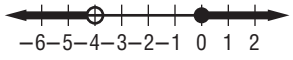
B.



C.



D.



11. _____

6

Chapter 6 Test, Form 2B *(continued)*

12. Which compound inequality has the solution set shown in the graph?

A. $-2 < y < 3$ **B.** $-2 < y \leq 3$

C. $y \geq -2$ or $y < 3$ **D.** $-2 \leq y < 3$ **12.** _____

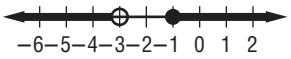
13. Which of the following is the solution set of $-3 < 2x + 7 \leq 13$?

A. $\{x \mid -5 < x \leq 3\}$ **B.** $\{x \mid x < -5\}$

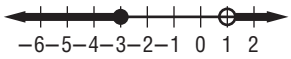
C. $\{x \mid x < 3$ or $x > -5\}$ **D.** $\{x \mid -5 \leq x < 3\}$ **13.** _____

14. Which of the following is the graph of the solution set of $7a + 3 \leq a - 15$ or $5a - 3 < 8a$?

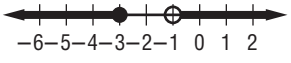
A.



B.



C.



D.

14. _____

15. Which of the following is the solution set of $|2x - 5| = 9$?

A. $\{-7, 2\}$ **B.** $\{-7\}$ **C.** $\{2\}$ **D.** $\{-2, 7\}$ **15.** _____

16. The graph below represents the solution set of which inequality?

A. $|5x + 10| > 10$ **B.** $|5x - 10| < 10$

C. $|5x - 10| > 10$ **D.** $|5x + 10| < 10$ **16.** _____

17. Which of the following is the solution set of $|4 - 7x| \geq 3$?

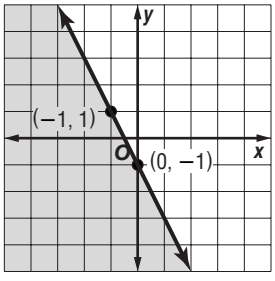
A. $\left\{x \mid x < \frac{1}{7} \text{ or } x > 1\right\}$ **B.** $\{x \mid x$ is a real number$\}$

C. $\left\{x \mid x \leq \frac{1}{7} \text{ or } x \geq 1\right\}$ **D.** $\{x \mid 1 \leq x \leq 7\}$ **17.** _____

18. Which ordered pair is part of the solution set of the inequality $5 - y \leq -3x$?

A. $(2, -1)$ **B.** $(-2, -1)$ **C.** $(-3, -5)$ **D.** $(3, -5)$ **18.** _____

19. Which inequality is graphed?



A. $y \leq 2x - 1$ **B.** $y \leq -2x - 1$

C. $y \geq 2x - 1$ **D.** $y \geq -2x - 1$ **19.** _____

20. Alicia is planning to buy a new baseball glove and a new baseball bat with at most \$196. Which inequality represents this situation if x represents the cost of a glove and y represents the cost of the bat she buys?

A. $y \leq 196 - x$ **B.** $y \leq 196 + x$

C. $196 \leq y + x$ **D.** $y - x \geq 196$ **20.** _____

Bonus Solve $2 - 3x < 5(2 - x) \leq 3(2 - x) + 10$. **B:** _____

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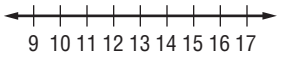
Chapter 6 Test, Form 2C

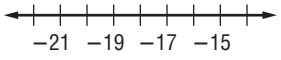
SCORE _____

Solve each inequality. Then graph your solution on a number line.

1. $x - 12 > 1$ **1.** _____



2. $-14 \leq n + 5$ **2.** _____



For Questions 3 and 4, solve each inequality.

3. $4 \geq -2 + t$ **3.** _____

4. $7 + z < 3$ **4.** _____

5. Define a variable, write an inequality, and solve: *The sum of* 2 *and a number is no greater than* 7. **5.** _____

Solve each inequality.

6. $\frac{b}{8} > -\frac{1}{5}$ **6.** _____

7. $\frac{t}{6} \geq 14$ **7.** _____

8. $-19.8 \geq 3.6y$ **8.** _____

9. $-4r < 22$ **9.** _____

10. $\frac{2a + 7}{5} \leq 5$ **10.** _____

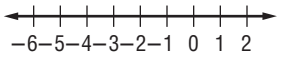
11. $4x - 5 < 2x + 11$ **11.** _____

12. $5(p + 2) - 2(p - 1) \geq 7p + 4$ **12.** _____

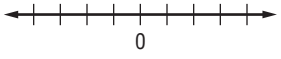
13. $1.3(c - 4) \leq 2.6 + 0.7c$ **13.** _____

For Questions 14–17, solve each compound inequality. Then graph the solution set.

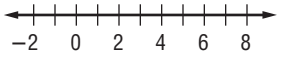
14. $3w < 6$ and $-5 < w$ **14.** _____



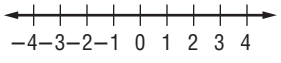
15. $-4 \leq n$ or $3n + 1 < -2$ **15.** _____



16. $-1 < \frac{3b + 4}{2} \leq \frac{25}{2}$ **16.** _____



17. $-4x - 8 \geq -4$ or $7x - 5 < 16$ **17.** _____



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Chapter 6 Test, Form 2C *(continued)*

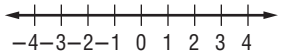
18. Define a variable, write an inequality and solve. Felicita's bank charges \$2.50 per month plus \$0.10 per check. How many checks does she write if her bank charges are always between \$3.50 and \$5.00?

18. _____

Solve each open sentence. Then graph the solution set.

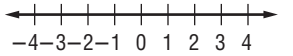
19. $|1 - y| = 2$

19. _____



20. $|3 - 2x| \geq 1$

20. _____



Solve each open sentence.

21. $|8x + 2| = 14$

21. _____

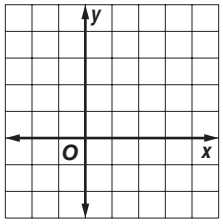
22. $|3w + 1| < 8$

22. _____

For Questions 22 and 23, graph each inequality.

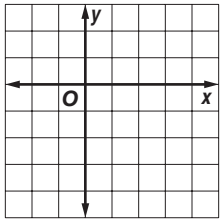
23. $y > -\frac{1}{3}x + 2$

23.



24. $2x - 3y \leq 12$

24.

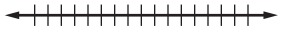


25. EXPENSES Camille has no more than \$20.00 to spend each week for lunch and bus fare. Lunch costs \$3.00 each day, and bus fare is \$0.75 each ride. Write an inequality for this situation. Can Camille buy lunch 5 times and ride the bus 8 times in one week?

25. _____

Bonus Graph the solution set of the compound inequality $3 < |x - 4| < 7$.

B:



NAME _____ DATE _____ PERIOD _____

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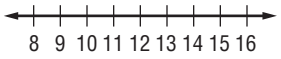
Chapter 6 Test, Form 2D

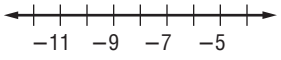
SCORE _____

Solve each inequality. Then graph your solution on a number line.

1. $y - 7 \leq 5$ **1.** _____



2. $m + 6 < -3$ **2.** _____



For Questions 3 and 4, solve each inequality.

3. $3 > s - 6$ **3.** _____

4. $8 + k \geq 13$ **4.** _____

5. Define a variable, write an inequality, and solve: *14 is greater than a number plus 5.* **5.** _____

Solve each inequality.

6. $\frac{h}{3} < 9$ **6.** _____

7. $-\frac{2}{3} > \frac{z}{5}$ **7.** _____

8. $9.8 \geq 2.8k$ **8.** _____

9. $-3m < -18$ **9.** _____

10. $\frac{3 - 4f}{2} > 1$ **10.** _____

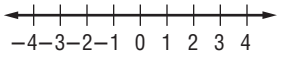
11. $5t + 8 \leq 3t - 3$ **11.** _____

12. $3(-w - 6) < 2(2w + 8) + 1$ **12.** _____

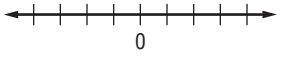
13. $1.9 + 1.7x < 2.1(3 + x)$ **13.** _____

For Questions 14–17, solve each compound inequality. Then graph the solution set.

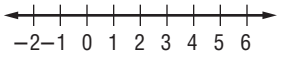
14. $7w > 14$ and $w < 3$ **14.** _____



15. $\frac{w}{3} < 1$ or $3w + 5 > 11$ **15.** _____



16. $1 \leq \frac{2y + 3}{4} < \frac{11}{4}$ **16.** _____



17. $2 + 3x > 8$ or $4 - 7x \leq -17$ **17.** _____

Assessment

Chapter 6 Test, Form 2D *(continued)*

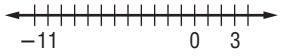
18. Define a variable, write an inequality and solve. Jose's bank charges \$3.75 per month plus \$0.10 per check. How many checks does he write if his bank charges are always between \$5.75 and \$7.25?

18. _____

Solve each open sentence. Then graph the solution set.

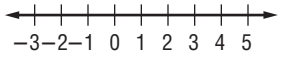
19. $|z + 4| = 7$

19. _____



20. $|w - 1| \leq 4$

20. _____



Solve each open sentence.

21. $|2x - 5| = 3$

21. _____

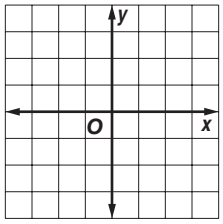
22. $|4 - 3c| > 5$

22. _____

For Questions 23 and 24, graph each inequality.

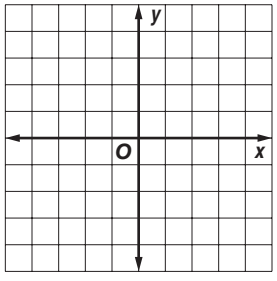
23. $y \leq 3x$

23.



24. $2y - 4x < 8$

24.

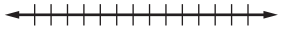


25. SHOPPING Matthew is shopping for shoes and socks. He has \$75.00 to spend. The shoes he likes cost \$28.00, and the socks cost \$4.00. Write an inequality for this situation. Can Matthew buy 2 pairs of shoes and 5 pairs of socks?

25. _____

Bonus Graph the solution set of the compound inequality $|x + 1| < 4$ or $|x + 1| \geq 6$.

B:



NAME _____ DATE _____ PERIOD _____

6 **Chapter 6 Test, Form 3**

SCORE _____

Solve each inequality. Then graph your solution on a number line.

1. $m - (-3.4) \geq 12.7$ **1.** _____

2. $t + (-4) < 32$ **2.** _____

Define a variable, write an inequality, and solve each problem.

3. Negative three sevenths plus a number is at least 2. **3.** _____

4. A number less 15 is greater than the sum of twice the number and 8. **4.** _____

Solve each inequality.

5. $-2.6 \geq \frac{w}{4}$ **5.** _____

6. $-11t < -9$ **6.** _____

7. $2 - 3b > \frac{11 - 15b}{7}$ **7.** _____

8. $5x - 3(x - 6) \leq 0$ **8.** _____

9. $-3x + 2(6x - 7) > 4(3 - 2x) + 17x - 8$ **9.** _____

Define a variable, write an inequality, and solve each problem.

10. Raul plans to spend \$78.00 on two shirts and a pair of jeans. He bought the two shirts for \$19.89 each. How much can he spend on the jeans? **10.** _____

11. The sum of two consecutive positive even integers is at most 15. What are the possible pairs of integers? **11.** _____

12. Susan makes 10% commission on her sales. She also receives a salary of \$25,600. How much must she sell to receive a total income between \$32,500 and \$41,900? **12.** _____

6

Chapter 6 Test, Form 3 *(continued)*

Solve each compound inequality, and graph the solution set.

13. $6 - 4m < 10$ and $4(m + 2) < 6 + 3m$ **13.** _____

14. $-\frac{n}{2} < 3$ or $2n - 3 > 12$ **14.** _____

15. $2(x - 14) - x < 7(x + 2) + x \leq x + 70$ **15.** _____

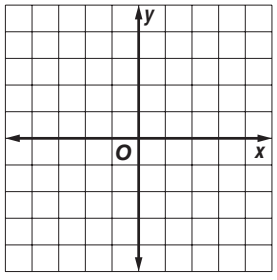
For Questions 16–18, solve each open sentence. Then graph the solution set.

16. $|5x - 3| = 17$ **16.** _____

17. $|-4x + 8| < 16$ **17.** _____

18. $\left|\frac{3 - 2x}{5}\right| \geq 1$ **18.** _____

19. Graph $-y \leq 3x$. **19.**



20. DOGS Each afternoon Maria walks the dogs at a local pet shelter for up to 2 hours. Maria spends 16 minutes walking a large dog and 12 minutes walking a small dog. Write an inequality for this situation. If Maria walked 9 dogs in one afternoon, what is the greatest number of large dogs that she could have walked that afternoon? **20.** _____

Bonus If $xy < 0$, determine if the compound inequality, $2x + 1 > 7$ and $4 - y < 3$, is *true* or *false*. Explain your reasoning. **B:** _____

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6 Chapter 6 Open-Ended Assessment

SCORE _____

Demonstrate your knowledge by giving a clear, concise solution to each problem. Be sure to include all relevant drawings and justify your answers. You may show your solution in more than one way or investigate beyond the requirements of the problem.

1. Solve $10n - 7(n + 2) > 5n - 12$. Explain each step in your solution.

2. Draw a line on a coordinate plane so that you can determine at least two points on the graph.

a. Write an inequality to represent one of the half planes created by the line.

b. Determine if the solution set of the inequality written for part **a** includes the line or not. Explain your response.

3. Let $b > 2$. Describe how you would determine if $ab > 2a$.

4. a. Explain why the solution set for $|x| = 3$ is $\{-3, 3\}$.

b. Determine if the open sentence $|x - 2| > 4$ and the compound inequality $-2x < 4$ or $x > 6$ have the same solution set.

5. ARCHITECTURE An architect is designing a house for the Frazier family. In the design, she must consider the desires of the family and the local building codes. The rectangular lot on which the house will be built is 158 feet long, and 90 feet wide.

a. The building codes state that one can build no closer than 20 feet to the lot line. Write an inequality to represent the possible widths of the house along the 90-foot dimension. Solve the inequality.

b. The Fraziers requested that the rectangular house contain no less than 2800 square feet and no more than 3200 square feet of floor space. If the house has only one floor, use the maximum value for the width of the house from part **a**, and explain how to use an inequality to find the possible lengths.

c. The Fraziers have asked that the cost of the house be about $175,000 and are willing to deviate from this price no more than $20,000. Write an open sentence involving an absolute value and solve. Explain the meaning of the answer.

Assessment

NAME _____ DATE _____ PERIOD _____

6

Chapter 6 Vocabulary Test/Review

SCORE _____

Addition Property of Inequalities	Division Property of Inequalities	Multiplication Property of Inequalities	Subtraction Property of Inequalities
boundary	half-plane	set-builder notation	union
compound inequality	intersection		

Write whether each sentence is *true* or *false*. If false, replace the underlined word or number to make a true sentence.

1. The Addition Property of Inequalities states that if the same number is added to each side of a true inequality, the resulting inequality is true. **1.** _____

2. An inequality defines the boundary or edge for each half-plane. **2.** _____

3. A compound inequality containing and is true if one or both of the inequalities is true. **3.** _____

4. According to the Division Property of Inequalities, if each side of a true inequality is divided by the same positive number, the direction of the inequality symbol must be reversed so that the resulting inequality is also true. **4.** _____

5. The solution set for an inequality that contains two variables consists of many ordered pairs which fill a region on the coordinate plane called a half-plane. **5.** _____

6. The graph of a compound inequality containing *and* is the intersection of the graphs of the two inequalities. **6.** _____

7. The Division Property of Inequalities states that if each side of a true inequality is divided by the same negative number, the resulting inequality is also true. **7.** _____

8. Set-builder notation is a way of writing a solution set. **8.** _____

9. If the same number is subtracted from each side of a true inequality, the resulting inequality is also true. **9.** _____

10. The graph of a compound inequality containing *and* is the union of the graphs of the two inequalities. **10.** _____

In your own words—

11. Explain how to use the Multiplication Property of Inequalities to solve the inequality $-\frac{2}{3}x \geq 7$.

NAME _____ DATE _____ PERIOD _____

6

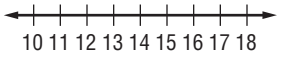
Chapter 6 Quiz

(Lessons 6–1 and 6–2)

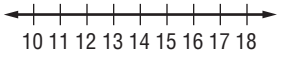
SCORE _____

Solve each inequality. Then graph your solution on a number line.

1. $n - 11 > 3$ **1.** _____



2. $w + 9 \leq -5$ **2.** _____



For Questions 3 and 4, solve each inequality.

3. $-4 < -4 + r$ **3.** _____

4. $\frac{1}{4} + m \geq \frac{3}{4}$ **4.** _____

5. Define a variable, write an inequality, and solve: *A number decreased by 7 is at least 15.* **5.** _____

Solve each inequality.

6. $\frac{m}{13} > -6$ **6.** _____

7. $-\frac{4}{9} < -\frac{5}{12}r$ **7.** _____

8. $-3n \leq 84$ **8.** _____

9. $-3.22 \geq 1.4w$ **9.** _____

10. STANDARDIZED TEST PRACTICE Which inequality does *not* have the solution $\{x \mid x < -2\}$?

A. $-3x > 6$ **B.** $-\frac{x}{2} < 1$

C. $7x < -14$ **D.** $\frac{4}{3}x < -\frac{8}{3}$ **10.** _____

Assessment

NAME _____ DATE _____ PERIOD _____

6

Chapter 6 Quiz

(Lesson 6–3)

SCORE _____

For Questions 1–8, solve each inequality.

1. $-\frac{d}{5} - 12 \geq 8$ **1.** _____

2. $9y - 6 > 2y + 15$ **2.** _____

3. $3(y - 2) + 4(3 - 2y) < 6(3y - 1) - 11y$ **3.** _____

4. $23 - t \leq 2(t - 9) - 3(t + 2)$ **4.** _____

5. Define a variable, write an inequality, and solve. *The sum of a number and three is less than nineteen less the number.* **5.** _____

NAME _____ DATE _____ PERIOD _____

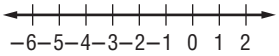
6

Chapter 6 Quiz

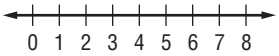
SCORE _____

(Lessons 6–4 and 6–5)

1. Solve $-14 \leq 3x + 1 < 1$. Then graph the solution set. **1.** _____



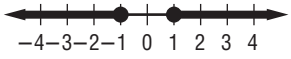
2. Solve the compound inequality $2y - 3 \leq 7$ or $-3y \leq -18$. Then graph the solution set. **2.** _____



3. Define a variable, write an inequality and solve. *Eight times a number is between 16 and 40.* **3.** _____

4. Solve $|2x + 5| = 3$. **4.** _____

5. Write an open sentence involving absolute value for this graph. **5.** _____



NAME _____ DATE _____ PERIOD _____

6

Chapter 6 Quiz

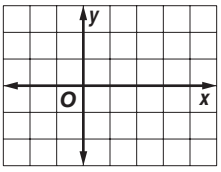
SCORE _____

(Lesson 6–6)

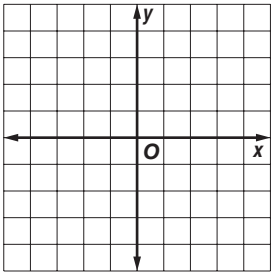
1. From the set $\{(0, 1), (3, -3), (4, 2), (-1, 2)\}$, which ordered pairs are part of the solution set for $x - y < 0$? **1.** _____

For Questions 2 and 3, graph each inequality.

2. $x < 3$ **2.**



3. $-2(x - y) \leq 4$ **3.**



4. CLOTHING Rita plans to spend at most \$230.00 on a new wardrobe. The skirts she wants to buy cost \$35 each, and the blouses cost \$25 each. Write an inequality that represents the number of skirts and blouses Rita can buy. Can Rita buy 4 skirts and 4 blouses? **4.** _____

NAME _____ DATE _____ PERIOD _____

6

Chapter 6 Mid-Chapter Test

SCORE _____

(Lessons 6–1 through 6–3)

Part I ***Write the letter for the correct answer in the blank at the right of each question.***

For Questions 1–3, solve each inequality.

1. $r - \frac{7}{8} > 1$

A. $\left\{r \mid r > \frac{1}{8}\right\}$ **B.** $\left\{r \mid r < \frac{1}{8}\right\}$ **C.** $\left\{r \mid r > 1\frac{7}{8}\right\}$ **D.** $\left\{r \mid r < 1\frac{7}{8}\right\}$ **1.** _____

2. $12x + 5 \geq 17x - 10$

A. $\{x \mid x \leq -3\}$ **B.** $\{x \mid x \geq 3\}$ **C.** $\{x \mid x \geq -3\}$ **D.** $\{x \mid x \leq 3\}$ **2.** _____

3. $6m - 2(7 + 3m) > 5(2m - 3) - m$

A. $\{m \mid m < 1\}$ **B.** $\left\{m \mid m < \frac{1}{9}\right\}$ **C.** $\{m \mid m > 1\}$ **D.** $\left\{m \mid m > \frac{1}{9}\right\}$ **3.** _____

4. Four less than three times a number is at most five. Which of the following describes the number?

A. any number less than 3

B. any number greater or equal to 3

C. any number less than or equal to 3

D. any number less than or equal to $\frac{1}{3}$ **4.** _____

Part II

Solve and check each inequality.

5. $4.2 > -11 + t$ **5.** _____

6. $-\frac{3}{5}v > -\frac{4}{15}$ **6.** _____

Define a variable, write an inequality, and solve each problem.

7. For a package to qualify for a certain postage rate, the sum of its length and girth cannot exceed 85 inches. If the girth is 63 inches, how long can the package be? **7.** _____

8. The minimum daily requirement of vitamin C for 14-year-olds is at least 50 mg per day. An average-sized apple contains 6 mg of vitamin C. How many apples would a person have to eat each day to satisfy this requirement? **8.** _____

Assessment

NAME _____ DATE _____ PERIOD _____

6

Chapter 6 Cumulative Review

(Chapters 1–6)

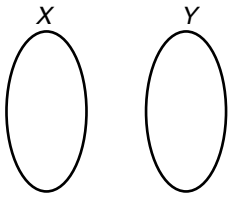
1. Simplify $4(2y + 5) + 6(4y + 3)$. (Lesson 1–6) **1.** _____

2. Name the set or sets of numbers to which the real number 0 belongs. (Lesson 2–7) **2.** _____

3. Solve $3x = \frac{2}{3}$. (Lesson 3–3) **3.** _____

4. State whether the percent of change is a percent of increase or a percent of decrease. Then find the percent of change. (Lesson 3–7)
original: 76
new: 57 **4.** _____

5. Express the relation $\{(-2, 1), (3, -1), (2, -2), (-2, 0)\}$ as a mapping. Then write the inverse of the relation. (Lesson 4–3) **5.**



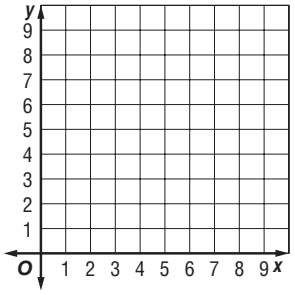
6. Determine whether the sequence $-6, -3, 0, 3 \ldots$ is an arithmetic sequence. If it is, state the common difference. (Lesson 4–7) **6.** _____

7. Find the slope of the line that passes through $(-2, 0)$ and $(5, -8)$. (Lesson 5–1) **7.** _____

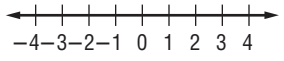
8. The Lopez family drove 165 miles in 3 hours. Write a direct variation equation for the distance driven in any time. How far can the Lopez family drive in 5 hours? (Lesson 5–2) **8.** _____

9. Write an equation of a line that passes through $(-2, -1)$ with slope 3. (Lesson 5–4) **9.** _____

10. Draw a scatter plot of the relation, and determine what relationship exists, if any, in the data. (Lesson 5–7)
$\{(1, 5), (1, 8), (2, 7), (3, 5), (3, 8), (4, 4), (5, 3), (5, 5), (6, 2), (7, 4), (8, 1), (9, 2)\}$ **10.**



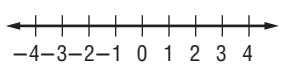
11. Solve $12 + r < 15$. Then graph the solution. (Lesson 6–1) **11.** _____



12. Solve $\frac{2u - 15}{7} \geq 3$. (Lesson 6–3) **12.** _____

13. Define a variable, write a compound inequality, and solve the problem. (Lesson 6–4)
Seven less than twice a number is greater than 13 or less than or equal to −5. **13.** _____

14. Solve $|3x + 4| \leq 5$. Then graph the solution set. (Lesson 6–5) **14.** _____



NAME _____ DATE _____ PERIOD _____

6 Standardized Test Practice

(Chapters 1–6)

Part I: Multiple Choice

Instructions: Fill in the appropriate oval for the best answer.

1. Evaluate $[1 + 4(5)] + [3(9) - 7]$. (Lesson 1–2)

A. 45 **B.** 27 **C.** 41 **D.** 31 **1.** Ⓐ Ⓑ Ⓒ Ⓓ

2. If a person's birthday is in January, what are the odds that it is between the 20th and the 29th, inclusively? (Lesson 2–6)

E. $\frac{10}{31}$ **F.** $\frac{8}{21}$ **G.** $\frac{21}{31}$ **H.** $\frac{10}{21}$ **2.** Ⓔ Ⓕ Ⓖ Ⓗ

3. How many liters of a 10% saline solution must be added to 4 liters of a 40% saline solution to obtain a 15% saline solution? (Lesson 3–9)

A. 20 L **B.** 4 L **C.** 2 L **D.** 48 L **3.** Ⓐ Ⓑ Ⓒ Ⓓ

4. The currency exchange rate between the U.S. and Canada in 1999 could be modeled by the equation $d = 1.49c$ where d represents the number of U.S. dollars and c represents the number of Canadian dollars. Solve the equation for Canadian dollar amounts of \$1, \$2, \$5, and \$20. (Lesson 4–4)

E. {(1, 1.49), (2, 2.98), (5, 7.45), (20, 29.8)

F. {(1, 1.5), (2, 3), (5, 7.5), (20, 30)}

G. {(1, 0.67), (2, 1.34), (5, 3.36), (20, 13.42)}

H. {(1, 2.49), (2, 3.49), (5, 6.49), (20, 21.49)} **4.** Ⓔ Ⓕ Ⓖ Ⓗ

5. If a line passes through $(0, -6)$ and has a slope of -3, what is the equation of the line? (Lesson 5–3)

A. $y = -6x - 3$ **B.** $x = -6y - 3$ **C.** $y = -3x - 6$ **D.** $x = -3y - 6$ **5.** Ⓐ Ⓑ Ⓒ Ⓓ

6. If r is the slope of a line, and s is the slope of a line perpendicular to that line, what is the relationship between r and s? (Lesson 5–6)

E. There is no relationship. **F.** $r = s$

G. $r = -s$ **H.** $r = -\frac{1}{s}$ **6.** Ⓔ Ⓕ Ⓖ Ⓗ

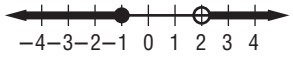
7. Which inequality does *not* have the solution $\{t \mid t > 4\}$? (Lesson 6–2)

A. $-t < -4$ **B.** $3t > 12$ **C.** $\frac{t}{2} > 2$ **D.** $-\frac{t}{8} > -\frac{1}{2}$ **7.** Ⓐ Ⓑ Ⓒ Ⓓ

8. Solve $4 - 2r \geq 3(5 - r) + 7(r + 1)$. (Lesson 6–3)

E. $\left\{r \mid r \leq -\frac{3}{2}\right\}$ **F.** $\{r \mid r \leq -3\}$ **G.** $\{r \mid r \leq -2\}$ **H.** $\left\{r \mid r \leq -\frac{9}{4}\right\}$ **8.** Ⓔ Ⓕ Ⓖ Ⓗ

9. Write a compound inequality for the graph. (Lesson 6–4)



A. $x < -1$ and $x \geq 2$ **B.** $x < -1$ or $x \geq 2$

C. $x \leq -1$ or $x > 2$ **D.** $x \leq -1$ and $x > 2$ **9.** Ⓐ Ⓑ Ⓒ Ⓓ

NAME _____ DATE _____ PERIOD _____

Standardized Test Practice *(continued)*

Part 2: Grid In

Instructions: Enter your answer by writing each digit of the answer in a column box and then shading in the appropriate oval that corresponds to that entry.

10. Find the 13th term of the arithmetic sequence $\frac{1}{2}, \frac{3}{4}, 1, 1\frac{1}{4}, 1\frac{1}{2}, \ldots$. (Lesson 4–7)

10.

	/	/	
.	.	.	.
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

11. If $y = 18$ when $x = 16$, find y when $x = 6$. (Lesson 5–2)

11.

	/	/	
.	.	.	.
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

For Questions 12 and 13, determine the value that is missing.

12. The solution set is $\{n \mid n \geq 15\}$ for the inequality $n - 7 \geq$ ___. (Lesson 6–1)

12.

	/	/	
.	.	.	.
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

13. If $|a - 8| = 17$, then $a =$ ___ or $a = -9$. (Lesson 6–5)

13.

	/	/	
.	.	.	.
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

Part 3: Quantitative Comparison

Instructions: Compare the quantities in columns A and B. Shade in
(A) if the quantity in column A is greater;
(B) if the quantity in column B is greater;
(C) if the quantities are equal; or
(D) if the relationship cannot be determined from the information given.

	Column A	Column B	
14.	the percent of change if original: 35 new: 49	the percent of change if original: 40 new: 50	**14.** (A) (B) (C) (D)

(Lesson 3–7)

	Column A	Column B	
15.	The slope of the line $y = 4x - 3$.	The slope of any line perpendicular to $y = 4x - 3$.	**15.** (A) (B) (C) (D)

(Lesson 5–6)

16. $-3 \leq 2x + 1 \leq 7$ **16.** (A) (B) (C) (D)

Column A	Column B
$4x$	$\frac{x}{2}$

(Lesson 6–4)

NAME _____ DATE _____ PERIOD _____

First Semester Test

(Chapters 1–6)

SCORE _____

For Questions 1–20, write the letter for the correct answer in the blank at the right of each question.

1. Evaluate $4v^2 - (n^2 - 3s)$ if $n = 8$, $s = 4$, and $v = 7$.

A. 120 **B.** 732 **C.** 32 **D.** 144 **1.** _____

2. Simplify $9a^2 + 7a + 4a^2 + 2a$.

A. $13a^2 + 9a$ **B.** $22a^3$ **C.** $36a^2 + 14a$ **D.** $16a^2 + 6a$ **2.** _____

3. Identify the conclusion of the statement.
If the oven works properly, then we will learn how to cook.

A. The oven works properly. **B.** The oven is new.

C. I already know how to cook. **D.** We will learn how to cook. **3.** _____

4. Evaluate $|x - 2| + \frac{3}{4}$ if $x = \frac{11}{5}$.

A. $\frac{99}{20}$ **B.** $\frac{51}{20}$ **C.** $\frac{19}{20}$ **D.** $-\frac{11}{20}$ **4.** _____

5. The land areas in square miles of the 19 zip codes in Guam are listed below. Use a stem-and-leaf plot to determine which measure of central tendency is equal to 7.
1 1 10 6 9 6 30 6 6 19 10 6 2 7 17 1 17 35 20

A. mean **B.** median **C.** mode **D.** frequency **5.** _____

6. Name the set of numbers to which the real number $\sqrt{196}$ does *not* belong.

A. rational number **B.** integer

C. irrational number **D.** natural number **6.** _____

7. Translate the sentence into an equation. Twelve times a number r is the same as two times the sum of r and p.

A. $12r = 2(r + p)$ **B.** $12r = 2r + p$

C. $12 + r = 2(r + p)$ **D.** $12 + r = 2r + p$ **7.** _____

8. Solve $\frac{5}{6}h = -30$.

A. -25 **B.** -180 **C.** -150 **D.** -36 **8.** _____

9. Solve $5(a - 12) = 8(3a + 2)$.

A. $-\frac{14}{19}$ **B.** -4 **C.** 3 **D.** $-\frac{44}{29}$ **9.** _____

10. The surface area A of a sphere is $A = 4\pi r^2$ where r is the radius of the sphere. What is the radius, rounded to the nearest tenth, of a ball with surface area equal to 85 square inches?

A. 2.6 in. **B.** 6.8 in. **C.** 2.7 in. **D.** 6.7 in. **10.** _____

NAME _____ DATE _____ PERIOD _____

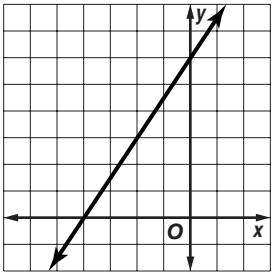
First Semester Test *(continued)*

(Chapters 1–6)

11. The coordinates of the vertices of rectangle $MNOP$ are $M(-2, 1)$, $N(4, 3)$, $O(5, 0)$, and $P(-1, -2)$. If the rectangle is reflected over the x-axis, which point below has the correct coordinates?

A. $M'(2, 1)$ **B.** $N'(4, -3)$ **C.** $O'(-5, 0)$ **D.** $P'(-2, -1)$ **11.** _____

12. The graph of the line is the graph of which equation?



A. $3x + 2y = 12$ **B.** $3x - 2y = 12$

C. $3x + 2y = -12$ **D.** $3x - 2y = -12$ **12.** _____

13. If $f(x) = 4x - 5$, find $f(3a + 1)$.

A. $12a - 4$ **B.** $7a - 4$

C. $12a - 1$ **D.** $12a + 4x - 5$ **13.** _____

14. The average rate of change for the combined population of San Diego, California and Tijuana, Mexico was 0.0825 million people per year from 1990 to 2000. If the 2000 population was about 4 million, what was the approximate 1990 population? **Source:** *Time* Magazine

A. 4.25 million **B.** 3.9 million **C.** 3.175 million **D.** 1.4 million **14.** _____

15. A line passes through $(-1, 3)$ and $(1, -3)$. Which equation does *not* represent the line?

A. $(y - 3) = -3(x + 1)$ **B.** $3x - y = 0$

C. $(y + 3) = -3(x - 1)$ **D.** $y = -3x$ **15.** _____

16. Write the slope-intercept form of an equation for the line that passes through $(4, 0)$ and is parallel to the graph of $3y - 6x = 4$.

A. $y = 2x - 8$ **B.** $2y = -x$ **C.** $y = 2x + 4$ **D.** $y = -2x + 8$ **16.** _____

17. Solve $8r - 14 < 12r - 6$.

A. $\{r \mid r < -2\}$ **B.** $\{r \mid r > 2\}$ **C.** $\{r \mid r < 2\}$ **D.** $\{r \mid r > -2\}$ **17.** _____

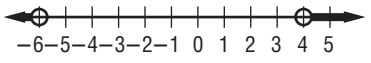
18. Solve $8 \leq 2h + 6 \leq 22$.

A. $\{h \mid 4 \leq h \leq 11\}$ **B.** $\{h \mid 7 \leq h \leq 14\}$

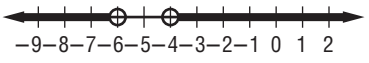
C. $\{h \mid 1 \leq h \leq 8\}$ **D.** $\{h \mid 0 \leq h \leq 14\}$ **18.** _____

19. Which graph represents the solution of $|n + 5| > 1$?

A.

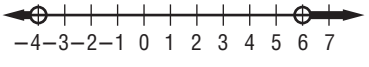


B.



C.

D.



19. _____

20. Which ordered pair is *not* a solution of $4x - 8y \geq 24$?

A. $(2, -2)$ **B.** $(-5, -4)$ **C.** $(7, -1)$ **D.** $(-8, -8)$ **20.** _____

NAME _____ DATE _____ PERIOD _____

First Semester Test *(continued)*

(Chapters 1–6)

21. Evaluate $\frac{3ab - c^2}{c}$ if $a = 14$, $b = 3$, and $c = 7$. **21.** _____

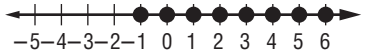
22. Find the solution set for $18 - 3x \geq 9$ if the replacement set is $\{1, 2, 3, 4, 5, 6\}$. **22.** _____

23. Name the property used in the equation $n + 5 = 0$. Then find the value of n. **23.** _____

24. Simplify $4.1(x + 2y) + 2.7(x + y) - 5x$. **24.** _____

25. Find a counterexample for the statement. *If you visit an art gallery, then you will see a painting by Monet.* **25.** _____

26. Name the coordinates of the points graphed on the number line.



26. _____

27. Simplify $4x(-7y) + (5u)(3v) - 11uv$. **27.** _____

28. Evaluate $\frac{uv + 12}{w}$ if $u = 3.6$, $v = 4$, and $w = 6$. **28.** _____

29. A card is selected at random from a standard deck of 52 cards. What are the odds against selecting a heart? **29.** _____

30. Solve the following problem by working backward. A father made a batch of cookies. His son ate four and gave six to a friend. Two of his daughters ate half of the remaining cookies. The father was left with thirteen cookies. How many cookies did the father make? **30.** _____

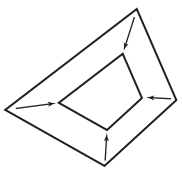
For Questions 31 and 32, solve each equation. **31.** _____

31. $\frac{6}{m} = \frac{18}{6}$ **32.** $2(3y - 2) = y$ **32.** _____

33. State whether the percent of change is a percent of increase or a percent of decrease. Then find the percent of change.
original: 180
new: 207 **33.** _____

34. Two airplanes leave Phoenix at the same time and fly in opposite directions. One plane travels 60 miles per hour faster than the other. After $2\frac{1}{2}$ hours they are 1700 miles apart. What is the rate of the slower plane? **34.** _____

35. Identify the transformation as a *reflection*, *translation*, *dilation*, or *rotation*. **35.** _____

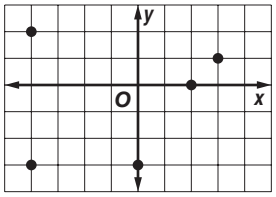


NAME _____ DATE _____ PERIOD _____

First Semester Test *(continued)*

(Chapters 1–6)

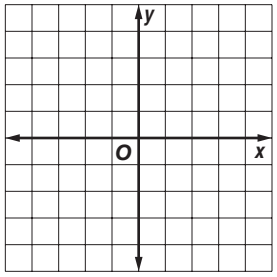
36. Express the relation shown in the graph as a set of ordered pairs. Then write the inverse of the relation.



36. _____

37. Graph $y = 2x - 3$.

37.



38. Write an equation for the nth term of the arithmetic sequence 7, 11, 15, 19, … .

38. _____

39. Ms. Ortiz paid $38 for 20 gallons of gasoline. Write a direct variation equation relating the cost of gasoline C to the number of gallons purchased n.

39. _____

40. Find the slope, y-intercept, and x-intercept of the line represented by the equation $3x - 4y = 8$.

40. _____

41. Find the value of r so that the line through $(2, 3)$ and $(r, -3)$ has a slope perpendicular to the graph of $y = -\frac{1}{6}x + 3$.

41. _____

For Questions 42 and 43, use the table that shows UV indices and humidities for 6 cities on a July day.

UV Index	4	4	6	7	8	10
Humidity Forecast (Percent)	74	80	63	52	55	29

42. Use a scatter plot to determine what relationship, if any, exists in the data.

42. _____

43. Write the slope-intercept form of an equation for a line of fit.

43. _____

For Questions 44 and 45, solve each inequality.

44.

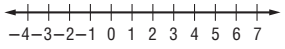
44. $\frac{5t + 9}{2} > 4t$

45. $2(5x - 4) \geq 7(x - 2)$

45. _____

46. Solve $4x + 9 < 1$ or $3x \geq 15$. Then graph the solution set.

46. _____



47. Solve $|2u + 7| = 13$.

47. _____

NAME _____ DATE _____ PERIOD _____

6

Standardized Test Practice

Student Record Sheet *(Use with pages 364–365 of the Student Edition.)*

Part 1 Multiple Choice

Select the best answer from the choices given and fill in the corresponding oval.

1	Ⓐ Ⓑ Ⓒ Ⓓ	**4**	Ⓐ Ⓑ Ⓒ Ⓓ	**7**	Ⓐ Ⓑ Ⓒ Ⓓ
2	Ⓐ Ⓑ Ⓒ Ⓓ	**5**	Ⓐ Ⓑ Ⓒ Ⓓ	**8**	Ⓐ Ⓑ Ⓒ Ⓓ
3	Ⓐ Ⓑ Ⓒ Ⓓ	**6**	Ⓐ Ⓑ Ⓒ Ⓓ	**9**	Ⓐ Ⓑ Ⓒ Ⓓ

Part 2 Short Response/Grid In

Solve the problem and write your answer in the blank.

For Questions 11 and 15, also enter your answer by writing each number or symbol in a box. Then fill in the corresponding oval for that number or symbol.

10 _____

11 _____ (grid in)

12 _____

13 _____

14 _____

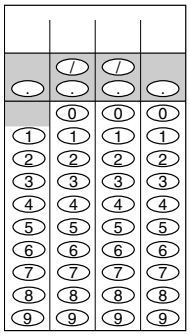
15 _____ (grid in)

16 _____

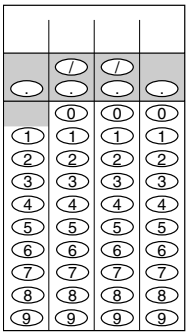
17 _____

18 _____

11



15



Part 3 Extended Response

Record your answers for Questions 19–21 on the back of this paper.

Answers

NAME _____ DATE _____ PERIOD ____

6-1 Study Guide and Intervention

Solving Inequalities by Addition and Subtraction

Solve Inequalities by Addition Addition can be used to solve inequalities. If any number is added to each side of a true inequality, the resulting inequality is also true.

Addition Property of Inequalities	For all numbers a, b, and c, if $a > b$, then $a + c > b + c$, and if $a < b$, then $a + c < b + c$.

The property is also true when $>$ and $<$ are replaced with $\geq$ and $\leq$.

Example 1 **Solve $x - 8 \leq -6$. Then graph it on a number line.**

$x - 8 \leq -6$	Original inequality
$x - 8 + 8 \leq -6 + 8$	Add 8 to each side.
$x \leq 2$	Simplify.

The solution in set-builder notation is $\{x \mid x \leq 2\}$.

Number line graph:

Example 2 **Solve $4 - 2a > -a$. Then graph it on a number line.**

$4 - 2a > -a$	Original inequality
$4 - 2a + 2a > -a + 2a$	Add $2a$ to each side.
$4 > a$	Simplify.
$a < 4$	$4 > a$ is the same as $a < 4$.

The solution in set-builder notation is $\{a \mid a < 4\}$.

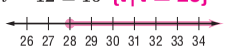
Number line graph:

Lesson 6-1

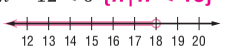
Exercises

Solve each inequality. Then check your solution, and graph it on a number line.

1. $t - 12 \geq 16$ $\{t \mid t \geq 28\}$

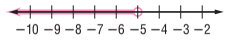


2. $n - 12 < 6$ $\{n \mid n < 18\}$

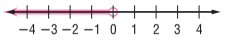


3. $6 \leq g - 3$ $\{g \mid g \geq 9\}$

4. $n - 8 < -13$ $\{n \mid n < -5\}$



5. $-12 > -12 + y$ $\{y \mid y < 0\}$



6. $-6 > s - 8$ $\{s \mid s < 2\}$

Solve each inequality. Then check your solution.

7. $-3x \leq 8 - 4x$ $\{x \mid x \leq 8\}$

8. $0.6n \geq 12 - 0.4n$ $\{n \mid n \geq 12\}$

9. $-8k - 12 < -9k$ $\{k \mid k < 12\}$

10. $-y - 10 > 15 - 2y$ $\{y \mid y > 25\}$

11. $z - \frac{1}{3} \leq \frac{4}{3}$ $\left\{z \mid z \leq 1\frac{2}{3}\right\}$

12. $-2b > -4 - 3b$ $\{b \mid b > -4\}$

Define a variable, write an inequality, and solve each problem. Then check your solution. 13–15. Sample answer: Let n = the number.

13. A number decreased by 4 is less than 14. $n - 4 < 14$; $\{n \mid n < 18\}$

14. The difference of two numbers is more than 12, and one of the numbers is 3. $n - 3 > 12$; $\{n \mid n > 15\}$

15. Forty is no greater than the difference of a number and 2. $40 \leq n - 2$; $\{n \mid n \geq 42\}$

NAME _____ DATE _____ PERIOD ____

6-1 Study Guide and Intervention (continued)

Solving Inequalities by Addition and Subtraction

Solve Inequalities by Subtraction Subtraction can be used to solve inequalities. If any number is subtracted from each side of a true inequality, the resulting inequality is also true.

Subtraction Property of Inequalities	For all numbers a, b, and c, if $a > b$, then $a - c > b - c$, and if $a < b$, then $a - c < b - c$.

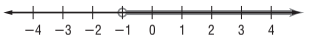
The property is also true when $>$ and $<$ are replaced with $\geq$ and $\leq$.

Example **Solve $3a + 5 > 4 + 2a$. Then graph it on a number line.**

$3a + 5 > 4 + 2a$	Original inequality
$3a + 5 - 2a > 4 + 2a - 2a$	Subtract $2a$ from each side.
$a + 5 > 4$	Simplify.
$a + 5 - 5 > 4 - 5$	Subtract 5 from each side.
$a > -1$	Simplify.

The solution is $\{a \mid a > -1\}$.

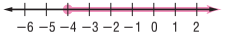
Number line graph:



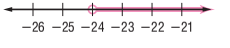
Exercises

Solve each inequality. Then check your solution, and graph it on a number line.

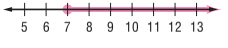
1. $t + 12 \geq 8$ $\{t \mid t \geq -4\}$



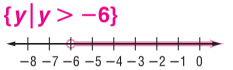
2. $n + 12 > -12$ $\{n \mid n > -24\}$



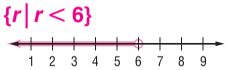
3. $16 \leq h + 9$ $\{h \mid h \geq 7\}$



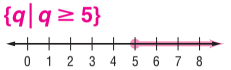
4. $y + 4 > -2$ $\{y \mid y > -6\}$



5. $3r + 6 > 4r$ $\{r \mid r < 6\}$



6. $\frac{3}{2}q - 5 \geq \frac{1}{2}q$ $\{q \mid q \geq 5\}$



Solve each inequality. Then check your solution.

7. $4p \geq 3p + 0.7$ $\{p \mid p \geq 0.7\}$

8. $r + \frac{1}{4} > \frac{3}{8}$ $\left\{r \mid r > \frac{1}{8}\right\}$

9. $9k + 12 > 8k$ $\{k \mid k > -12\}$

10. $-1.2 > 2.4 + y$ $\{y \mid y < -3.6\}$

11. $4y < 5y + 14$ $\{y \mid y > -14\}$

12. $3n + 17 < 4n$ $\{n \mid n > 17\}$

Define a variable, write an inequality, and solve each problem. Then check your solution. 13–15. Sample answer: Let n = the number.

13. The sum of a number and 8 is less than 12. $n + 8 < 12$; $\{n \mid n < 4\}$

14. The sum of two numbers is at most 6, and one of the number is -2. $n + (-2) \leq 6$; $\{n \mid n \leq 8\}$

15. The sum of a number and 6 is greater than or equal to -4. $n + 6 \geq -4$; $\{n \mid n \geq -10\}$

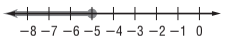
NAME _____ DATE _____ PERIOD ____

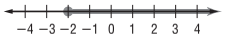
6-1 Skills Practice

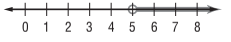
Solving Inequalities by Addition and Subtraction

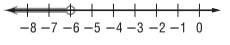
Match each inequality with its corresponding graph.

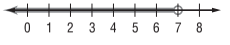
1. $x + 11 > 16$ **c**
2. $x - 6 < 1$ **e**
3. $x + 2 \leq -3$ **a**
4. $x + 3 \geq 1$ **b**
5. $x - 1 < -7$ **d**

a. 

b. 

c. 

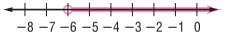
d. 

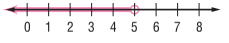
e. 

Solve each inequality. Then check your solution, and graph it on a number line.

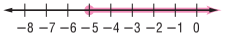
6. $d - 5 \leq 1$ **{d | d ≤ 6}**

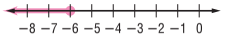

7. $s + 9 < 8$ **{s | s < −1}**


8. $a - 7 > -13$ **{a | a > −6}**


9. $w - 1 < 4$ **{w | w < 5}**


10. $4 \geq k + 3$ **{k | k ≤ 1}**


11. $-9 \leq b - 4$ **{b | b ≥ −5}**


12. $-2 \geq x + 4$ **{x | x ≤ −6}**


13. $2y < y + 2$ **{y | y < 2}**


Define a variable, write an inequality, and solve each problem. Then check your solution. **14–18. Sample answer: Let *n* = the number.**

14. A number decreased by 10 is greater than −5. ***n* − 10 > −5; {*n* | *n* > 5}**
15. A number increased by 1 is less than 9. ***n* + 1 < 9; {*n* | *n* < 8}**
16. Seven more than a number is less than or equal to −18. ***n* + 7 ≤ −18; {*n* | *n* ≤ −25}**
17. Twenty less than a number is at least 15. ***n* − 20 ≥ 15; {*n* | *n* ≥ 35}**
18. A number plus 2 is at most 1. ***n* + 2 ≤ 1; {*n* | *n* ≤ −1}**

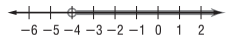
NAME _____ DATE _____ PERIOD ____

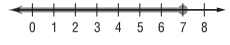
6-1 Practice (Average)

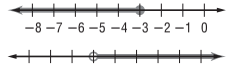
Solving Inequalities by Addition and Subtraction

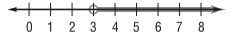
Match each inequality with its corresponding graph.

1. $-8 \geq x - 15$ **b**
2. $4x + 3 < 5x$ **d**
3. $8x > 7x - 4$ **a**
4. $12 + x \leq 9$ **c**

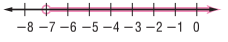
a. 

b. 

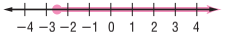
c. 

d. 

Solve each inequality. Then check your solution, and graph it on a number line.

5. $r - (-5) > -2$ **{r | r > −7}**


6. $3x + 8 \geq 4x$ **{x | x ≤ 8}**


7. $n - 2.5 \geq -5$ **{n | n ≥ −2.5}**


8. $1.5 < y + 1$ **{y | y > 0.5}**


9. $z + 3 > \frac{2}{3}$ **$\{z \mid z > -2\frac{1}{3}\}$**


10. $\frac{1}{2} \leq c - \frac{3}{4}$ **$\{c \mid c \geq 1\frac{1}{4}\}$**


Define a variable, write an inequality, and solve each problem. Then check your solution. **11–14. Sample answer: Let *n* = the number.**

11. The sum of a number and 17 is no less than 26.
***n* + 17 ≥ 26; {*n* | *n* ≥ 9}**

12. Twice a number minus 4 is less than three times the number.
***2n* − 4 < 3*n*; {*n* | *n* > −4}**

13. Twelve is at most a number decreased by 7.
***12 ≤ n* − 7; {*n* | *n* ≥ 19}**

14. Eight plus four times a number is greater than five times the number.
***8 + 4n > 5n*; {*n* | *n* < 8}**

15. **ATMOSPHERIC SCIENCE** The troposphere extends from the earth's surface to a height of 6–12 miles, depending on the location and the season. If a plane is flying at an altitude of 5.8 miles, and the troposphere is 8.6 miles deep in that area, how much higher can the plane go without leaving the troposphere? **no more than 2.8 mi**

16. **EARTH SCIENCE** Mature soil is composed of three layers, the uppermost being topsoil. Jamal is planting a bush that needs a hole 18 centimeters deep for the roots. The instructions suggest an additional 8 centimeters depth for a cushion. If Jamal wants to add even more cushion, and the topsoil in his yard is 30 centimeters deep, how much more cushion can he add and still remain in the topsoil layer? **no more than 4 cm**

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6-1

Reading to Learn Mathematics

Solving Inequalities by Addition and Subtraction

Pre-Activity **How are inequalities used to describe school sports?**

Read the introduction to Lesson 6-1 at the top of page 318 in your textbook.

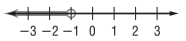
- Use the information in the graph to write an inequality statement about participation in two sports. **Sample answer: For softball and track and field, 13,009 < 14,587**

- Rewrite your inequality statement to show that 40 schools added both of the sports. Is the statement still true?
Sample answer: 13,049 < 14,627; yes

Reading the Lesson

Write the letter of the graph that matches each inequality.

1. $x \leq -1$ **b**
2. $x \geq -1$ **d**
3. $x < -1$ **a**
4. $x > -1$ **c**

a.


b.


c.


d.


5. Use the chart to write a sentence that could be described by the inequality $3n \geq 2n + 7$. Then solve the inequality.

Inequalities			
<	>	≤	≥
less than fewer than	greater than more than	at most no more than less than or equal to	at least no less than greater than or equal to

Sample answer: Three times a number is at least two times the number plus 7; $n \geq 7$

Helping You Remember

6. Teaching someone else can help you remember something. Explain how you would teach another student who missed class to solve the inequality $2x + 4 \leq 3x$.
Subtract $2x$ from each side. Simplify.

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6-1

Enrichment

Triangle Inequalities

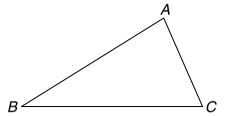
Recall that a line segment can be named by the letters of its endpoints. Line segment AB (written as $\overline{AB}$) has points A and B for endpoints. The *length* of AB is written without the bar as AB.

$$AB < BC \qquad m\angle A < m\angle B$$

The statement on the left above shows that $\overline{AB}$ is shorter than $\overline{BC}$. The statement on the right above shows that the measure of angle A is less than that of angle B.

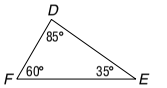
These three inequalities are true for any triangle ABC, no matter how long the sides.

a. $AB + BC > AC$
b. If $AB > AC$, then $m\angle C > m\angle B$.
c. If $m\angle C > m\angle B$, then $AB > AC$.

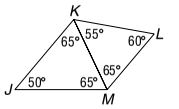


Use the three triangle inequalities for these problems.

1. List the sides of triangle DEF in order of increasing length.
$\overline{DF}$, $\overline{DE}$, $\overline{EF}$



2. In the figure at the right, which line segment is the shortest?
$\overline{LM}$

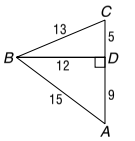


3. Explain why the lengths 5 cm, 10 cm, and 20 cm could not be used to make a triangle. **5 + 10 is not greater than 20.**

4. Two sides of a triangle measure 3 in. and 7 in. Between which two values must the third side be? **4 in. and 10 in.**

5. In triangle XYZ, $XY = 15$, $YZ = 12$, and $XZ = 9$. Which is the greatest angle? Which is the least? **$\angle Z$; $\angle Y$**

6. List the angles $\angle A$, $\angle C$, $\angle ABC$, and $\angle ABD$, in order of increasing size.
$\angle ABD$, $\angle A$, $\angle ABC$, $\angle C$



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6-2 Study Guide and Intervention

Solving Inequalities by Multiplication and Division

Solve Inequalities by Multiplication If each side of an inequality is multiplied by the same positive number, the resulting inequality is also true. However, if each side of an inequality is multiplied by the same negative number, the direction of the inequality must be reversed for the resulting inequality to be true.

Multiplication Property of Inequalities	For all numbers a, b, and c, with $c \neq 0$, **1.** if c is positive and $a > b$, then $ac > bc$; if c is positive and $a < b$, then $ac < bc$; **2.** if c is negative and $a > b$, then $ac < bc$; if c is negative and $a < b$, then $ac > bc$.

The property is also true when $>$ and $<$ are replaced with $\geq$ and $\leq$.

Example 1 **Solve $-\frac{y}{8} \geq 12$.**

$-\frac{y}{8} \geq 12$ Original equation

$(-8)\left(-\frac{y}{8}\right) \leq (-8)12$ Multiply each side by -8; change $\geq$ to $\leq$.

$y \leq -96$ Simplify.

The solution is $\{y \mid y \leq -96\}$.

Example 2 **Solve $\frac{3}{4}k < 15$.**

$\frac{3}{4}k < 15$ Original equation

$\left(\frac{4}{3}\right)\frac{3}{4}k < \left(\frac{4}{3}\right)15$ Multiply each side by $\frac{4}{3}$.

$k < 20$ Simplify.

The solution is $\{k \mid k < 20\}$.

Exercises

Solve each inequality. Then check your solution.

1. $\frac{y}{6} \leq 2$ $\{y \mid y \leq 12\}$

2. $-\frac{n}{50} > 22$ $\{n \mid n < -1100\}$

3. $\frac{3}{5}h \geq -3$ $\{h \mid h \geq -5\}$

4. $-\frac{p}{6} < -6$ $\{p \mid p > 36\}$

5. $\frac{1}{4}n \geq 10$ $\{n \mid n \geq 40\}$

6. $-\frac{2}{3}b < \frac{1}{3}$ $\left\{b \mid b > -\frac{1}{2}\right\}$

7. $\frac{3m}{5} < -\frac{3}{20}$ $\left\{m \mid m < -\frac{1}{4}\right\}$

8. $-2.51 \leq -\frac{2h}{4}$ $\{h \mid h \leq 5.02\}$

9. $\frac{g}{5} \geq -2$ $\{g \mid g \geq -10\}$

10. $-\frac{3}{4} > -\frac{9p}{5}$ $\left\{p \mid p > \frac{5}{12}\right\}$

11. $\frac{n}{10} \geq 5.4$ $\{n \mid n \geq 54\}$

12. $\frac{2a}{7} \geq -6$ $\{a \mid a \geq -21\}$

Define a variable, write an inequality, and solve each problem. Then check your solution. 13–15. Sample answer: Let n = the number.

13. Half of a number is at least 14. $\frac{1}{2}n \geq 14$; $\{n \mid n \geq 28\}$

14. The opposite of one-third a number is greater than 9. $-\frac{1}{3}n > 9$; $\{n \mid n < -27\}$

15. One fifth of a number is at most 30. $\frac{1}{5}n \leq 30$; $\{n \mid n \leq 150\}$

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6-2 Study Guide and Intervention (continued)

Solving Inequalities by Multiplication and Division

Solve Inequalities by Division If each side of a true inequality is divided by the same positive number, the resulting inequality is also true. However, if each side of an inequality is divided by the same negative number, the direction of the inequality symbol must be reversed for the resulting inequality to be true.

Division Property of Inequalities	For all numbers a, b, and c with $c \neq 0$, **1.** if c is positive and $a > b$, then $\frac{a}{c} > \frac{b}{c}$; if c is positive and $a < b$, then $\frac{a}{c} < \frac{b}{c}$; **2.** if c is negative and $a > b$, then $\frac{a}{c} < \frac{b}{c}$; if c is negative and $a < b$, then $\frac{a}{c} > \frac{b}{c}$.

The property is also true when $>$ and $<$ are replaced with $\geq$ and $\leq$.

Example **Solve $-12y \geq 48$.**

$-12y \geq 48$ Original inequality

$\frac{-12y}{-12} \leq \frac{48}{-12}$ Divide each side by -12 and change $\geq$ to $\leq$.

$y \leq -4$ Simplify.

The solution is $\{y \mid y \leq -4\}$.

Exercises

Solve each inequality. Then check your solution.

1. $25g \geq -100$ $\{g \mid g \geq -4\}$

2. $-2x \geq 9$ $\left\{x \mid x \leq -4\frac{1}{2}\right\}$

3. $-5c > 2$ $\left\{c \mid c < -\frac{2}{5}\right\}$

4. $-8m < -64$ $\{m \mid m > 8\}$

5. $-6k < \frac{1}{5}$ $\left\{k \mid k > -\frac{1}{30}\right\}$

6. $18 < -3b$ $\{b \mid b < -6\}$

7. $30 < -3n$ $\{n \mid n < -10\}$

8. $-0.24 < 0.6w$ $\{w \mid w > -0.4\}$

9. $25 \geq -2m$ $\left\{m \mid m \geq -12\frac{1}{2}\right\}$

10. $-30 > -5p$ $\{p \mid p > 6\}$

11. $-2n \geq 6.2$ $\{n \mid n \leq -3.1\}$

12. $-35 < 0.05h$ $\{h \mid h > -700\}$

13. $-40 > 10h$ $\{h \mid h < -4\}$

14. $-\frac{2}{3}n \geq 6$ $\{n \mid n \leq -9\}$

15. $-3 < \frac{p}{4}$ $\{p \mid p > -12\}$

Define a variable, write an inequality, and solve each problem. Then check your solution. 16–18. Sample answer: Let n = the number.

16. Four times a number is no more than 108. $4n \leq 108$; $\{n \mid n \leq 27\}$

17. The opposite of three times a number is greater than 12. $-3n > 12$; $\{n \mid n < -4\}$

18. Negative five times a number is at most 100. $-5n \leq 100$; $\{n \mid n \geq -20\}$

Answers

NAME _____ DATE _____ PERIOD ____

6-2 Skills Practice

Solving Inequalities by Multiplication and Division

Match each inequality with its corresponding statement.

1. $3n < 9$ **d**	**a.** Three times a number is at most nine.
2. $\frac{1}{3}n \geq 9$ **f**	**b.** One third of a number is no more than nine.
3. $3n \leq 9$ **a**	**c.** Negative three times a number is more than nine.
4. $-3n > 9$ **c**	**d.** Three times a number is less than nine.
5. $\frac{1}{3}n \leq 9$ **b**	**e.** Negative three times a number is at least nine.
6. $-3n \geq 9$ **e**	**f.** One third of a number is greater than or equal to nine.

Solve each inequality. Then check your solution.

7. $14g > 56$ $\{g \mid g > 4\}$	**8.** $11w \leq 77$ $\{w \mid w \leq 7\}$	**9.** $20b \geq -120$ $\{b \mid b \geq -6\}$	**10.** $-8r < 16$ $\{r \mid r > -2\}$
11. $-15p \leq -90$ $\{p \mid p \geq 6\}$	**12.** $\frac{s}{4} < 9$ $\{s \mid s < 36\}$	**13.** $\frac{a}{9} \geq -15$ $\{a \mid a \geq -135\}$	**14.** $-\frac{p}{7} > -9$ $\{p \mid p < 63\}$
15. $-\frac{t}{12} \geq 6$ $\{t \mid t \leq -72\}$	**16.** $5z < -90$ $\{z \mid z < -18\}$	**17.** $-13m > -26$ $\{m \mid m < 2\}$	**18.** $\frac{k}{5} \leq -17$ $\{k \mid k \leq -85\}$
19. $-y < 36$ $\{y \mid y > -36\}$	**20.** $-16c \geq -224$ $\{c \mid c \leq 14\}$	**21.** $-\frac{h}{10} \leq 2$ $\{h \mid h \geq -20\}$	**22.** $12 > \frac{d}{12}$ $\{d \mid d < 144\}$

Define a variable, write an inequality, and solve each problem. Then check your solution. **23–27. Sample answer: Let n = the number.**

23. Four times a number is greater than -48. $4n > -48$; $\{n \mid n > -12\}$

24. One eighth of a number is less than or equal to 3. $\frac{1}{8}n \leq 3$; $\{n \mid n \leq 24\}$

25. Negative twelve times a number is no more than 84. $-12n \leq 84$; $\{n \mid n \geq -7\}$

26. Negative one sixth of a number is less than -9. $-\frac{1}{6}n < -9$; $\{n \mid n > 54\}$

27. Eight times a number is at least 16. $8n \geq 16$; $\{n \mid n \geq 2\}$

Lesson 6-2

NAME _____ DATE _____ PERIOD ____

6-2 Practice (Average)

Solving Inequalities by Multiplication and Division

Match each inequality with its corresponding statement.

1. $-4n \geq 5$ **d**	**a.** Negative four times a number is less than five.
2. $\frac{4}{5}n > 5$ **f**	**b.** Four fifths of a number is no more than five.
3. $4n \leq 5$ **e**	**c.** Four times a number is fewer than five.
4. $\frac{4}{5}n \leq 5$ **b**	**d.** Negative four times a number is no less than five.
5. $4n < 5$ **c**	**e.** Four times a number is at most five.
6. $-4n < 5$ **a**	**f.** Four fifths of a number is more than five.

Solve each inequality. Then check your solution.

7. $-\frac{a}{5} < -14$ $\{a \mid a > 70\}$	**8.** $-13h \leq 52$ $\{h \mid h \geq -4\}$	**9.** $\frac{s}{16} \geq -6$ $\{s \mid s \geq -96\}$	**10.** $39 > 13p$ $\{p \mid p < 3\}$
11. $\frac{2}{3}n > -12$ $\{n \mid n > -18\}$	**12.** $-\frac{5}{9}t < 25$ $\{t \mid t > -45\}$	**13.** $-\frac{3}{5}m \leq -6$ $\{m \mid m \geq 10\}$	**14.** $\frac{10}{3}k \geq -10$ $\{k \mid k \geq -3\}$
15. $-3b \leq 0.75$ $\{b \mid b \geq -0.25\}$	**16.** $-0.9c > -9$ $\{c \mid c < 10\}$	**17.** $0.1x \geq -4$ $\{x \mid x \geq -40\}$	**18.** $-2.3 < \frac{j}{4}$ $\{j \mid j > -9.2\}$
19. $-15y < 3$ $\left\{y \mid y > -\frac{1}{5}\right\}$	**20.** $2.6v \geq -20.8$ $\{v \mid v \geq -8\}$	**21.** $0 > -0.5u$ $\{u \mid u > 0\}$	**22.** $\frac{7}{8}f \leq -1$ $\left\{f \mid f \leq -\frac{8}{7}\right\}$

Define a variable, write an inequality, and solve each problem. Then check your solution. **23–25. Sample answer: Let n = the number.**

23. Negative three times a number is at least 57. $-3n \geq 57$; $\{n \mid n \leq -19\}$

24. Two thirds of a number is no more than -10. $\frac{2}{3}n \leq -10$; $\{n \mid n \leq -15\}$

25. Negative three fifths of a number is less than -6. $-\frac{3}{5}n < -6$; $\{n \mid n > 10\}$

26. FLOODING A river is rising at a rate of 3 inches per hour. If the river rises more than 2 feet, it will exceed flood stage. How long can the river rise at this rate without exceeding flood stage? **no more than 8 h**

27. SALES Pet Supplies makes a profit of $5.50 per bag on its line of natural dog food. If the store wants to make a profit of no less than $5225, how many bags of dog food does it need to sell? **at least 950 bags**

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6-2

Reading to Learn Mathematics

Solving Inequalities by Multiplication and Division

Pre-Activity **Why are inequalities important in landscaping?**

Read the introduction to Lesson 6-2 at the top of page 325 in your textbook.

- Would a wall 6 bricks high be lower than a wall 6 blocks high? Why?
  yes; 6(3) < 6(12)
- Would a wall n bricks high be lower than a wall n blocks high? Explain.
  yes; When one quantity is less than another quantity, multiplying both quantities by the same positive number does not change the truth of the inequality.

Reading the Lesson

1. Write an inequality that describes each situation.

a. A number n divided by 8 is greater than 5. $n \div 8 > 5$

b. Twelve times a number k is at least 7. $12k \geq 7$

c. A number x divided by -10 is less than or equal to 50. $x \div (-10) \leq 50$

d. Three fifths of a number n is at most 13. $\frac{3}{5}n \leq 13$

e. Nine is greater than or equal to one half of a quantity m. $9 \geq \frac{1}{2}m$

2. Use words to tell what each inequality says.

a. $12 < 6n$ **12 is less than 6 times a number *n*.**

b. $\frac{t}{-3} \geq 14$ **A number *t* divided by −3 is greater than or equal to 14.**

c. $11x \leq 32$ **11 times a number *x* is at most 32.**

Helping You Remember

3. In your own words, write a rule for multiplying and dividing inequalities by positive and negative numbers.

Sample answer: When you multiply or divide each side of a true inequality by a positive number, the result is true. When you multiply or divide a true inequality by a negative number, you must reverse the direction of the inequality sign.

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6-2

Enrichment

The Maya

'The Maya were a Native American people who lived from about 1500 B.C. to about 1500 A.D. in the region that today encompasses much of Central America and southern Mexico. Their many accomplishments include exceptional architecture, pottery, painting, and sculpture, as well as significant advances in the fields of astronomy and mathematics.

The Maya developed a system of numeration that was based on the number twenty. The basic symbols of this system are shown in the table at the right. The places in a Mayan numeral are written vertically—the bottom place represents *ones*, the place above represents *twenties*, the place above that represents 20×20, or *four hundreds*, and so on. For instance, this is how to write the number 997 in Mayan numerals.

0	◎	10	═
1	•	11	═ •
2	••	12	═ ••
3	•••	13	═ •••
4	••••	14	═ ••••
5	—	15	═ ═
6	— •	16	═ ═ •
7	— ••	17	═ ═ ••
8	— •••	18	═ ═ •••
9	— ••••	19	═ ═ ••••

•• ← $2 \times$ [400] $= 800$
•••• ← $9 \times$ [20] $= 180$
═ •• ← $17 \times$ [1] $= 17$
997

Evaluate each expression when $v =$ —•, $w =$ ═ •••, $x =$ ••••, $y =$ ◎, and $z =$ ═ ••. Then write the answer in Mayan numerals. Exercise 5 is done for you.

1. $\frac{z}{w}$ •••

2. $\frac{v + w + z}{x}$ ••••

3. xv • ••••

4. vxy ◎

5. $wx - z$ ••• ◎

6. $vz + xy$ ••• ═ ••

7. $w(v + x + z)$ •••• ═ •

8. vwz ••• •••• •

9. $z(wx - x)$ •• ◎ ═ •

Tell whether each statement is *true* or *false*.

10. ═ ••• + — • = — • + ═ ••• **true**

11. ═ ••• / • = • / — ••• **false**

12. ═ ••• / ═ ═ = ═ ••• / ═ ═ **false**

13. (••• + ——) + ═ ═ = ••• + (—— + ═ ═) **true**

14. How are Exercises 10 and 11 alike? How are they different?

Both involve changing the order of the symbols. Exercise 10 involves changing the order of the addends in an addition problem. Exercise 11 involves changing the order of the digits in a numeral.

Answers

NAME _____ DATE _____ PERIOD ____

6-3 Study Guide and Intervention

Solving Multi-Step Inequalities

Solve Multi-Step Inequalities To solve linear inequalities involving more than one operation, undo the operations in reverse of the order of operations, just as you would solve an equation with more than one operation.

Example 1 **Solve $6x - 4 \le 2x + 12$.**

$6x - 4 \le 2x + 12$	Original inequality
$6x - 4 - 2x \le 2x + 12 - 2x$	Subtract $2x$ from each side.
$4x - 4 \le 12$	Simplify.
$4x - 4 + 4 \le 12 + 4$	Add 4 to each side.
$4x \le 16$	Simplify.
$\frac{4x}{4} \le \frac{16}{4}$	Divide each side by 4.
$x \le 4$	Simplify.

The solution is $\{x \mid x \le 4\}$.

Example 2 **Solve $3a - 15 > 4 + 5a$.**

$3a - 15 > 4 + 5a$	Original inequality
$3a - 15 - 5a > 4 + 5a - 5a$	Subtract $5a$ from each side.
$-2a - 15 > 4$	Simplify.
$-2a - 15 + 15 > 4 + 15$	Add 15 to each side.
$-2a > 19$	Simplify.
$\frac{-2a}{-2} < \frac{19}{-2}$	Divide each side by -2 and change $>$ to $<$.
$a < -9\frac{1}{2}$	Simplify.

The solution is $\left\{a \mid a < -9\frac{1}{2}\right\}$.

Exercises

Solve each inequality. Then check your solution.

1. $11y + 13 \ge -1$ — $\left\{y \mid y \ge -1\frac{3}{11}\right\}$
2. $8n - 10 < 6 - 2n$ — $\left\{n \mid n < 1\frac{3}{5}\right\}$
3. $\frac{q}{7} + 1 > -5$ — $\{q \mid q > -42\}$
4. $6n + 12 < 8 + 8n$ — $\{n \mid n > 2\}$
5. $-12 - d > -12 + 4d$ — $\{d \mid d < 0\}$
6. $5r - 6 > 8r - 18$ — $\{r \mid r < 4\}$
7. $\frac{-3x + 6}{2} \le 12$ — $\{x \mid x \ge -6\}$
8. $7.3y - 14.4 > 4.9y$ — $\{y \mid y > 6\}$
9. $-8m - 3 < 18 - m$ — $\{m \mid m > -3\}$
10. $-4y - 10 > 19 - 2y$ — $\left\{y \mid y < -14\frac{1}{2}\right\}$
11. $9n - 24n + 45 > 0$ — $\{n \mid n < 3\}$
12. $\frac{4x - 2}{5} \ge -4$ — $\left\{x \mid x \ge -4\frac{1}{2}\right\}$

Define a variable, write an inequality, and solve each problem. Then check your solution. 13–15. Sample answer: Let n = the number.

13. Negative three times a number plus four is no more than the number minus eight. $-3n + 4 \le n - 8$; $\{n \mid n \ge 3\}$
14. One fourth of a number decreased by three is at least two. $\frac{1}{4}n - 3 \ge 2$; $\{n \mid n \ge 20\}$
15. The sum of twelve and a number is no greater than the sum of twice the number and -8. $12 + n \le 2n + (-8)$; $\{n \mid n \ge 20\}$

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6-3 Study Guide and Intervention (continued)

Solving Multi-Step Inequalities

Solve Inequalities Involving the Distributive Property When solving inequalities that contain grouping symbols, first use the Distributive Property to remove the grouping symbols. Then undo the operations in reverse of the order of operations, just as you would solve an equation with more than one operation.

Example **Solve $3a - 2(6a - 4) > 4 - (4a + 6)$.**

$3a - 2(6a - 4) > 4 - (4a + 6)$	Original inequality
$3a - 12a + 8 > 4 - 4a - 6$	Distributive Property
$-9a + 8 > -2 - 4a$	Combine like terms.
$-9a + 8 + 4a > -2 - 4a + 4a$	Add $4a$ to each side.
$-5a + 8 > -2$	Combine like terms.
$-5a + 8 - 8 > -2 - 8$	Subtract 8 from each side.
$-5a > -10$	Simplify.
$a < 2$	Divide each side by -5 and change $>$ to $<$.

The solution in set-builder notation is $\{a \mid a < 2\}$.

Exercises

Solve each inequality. Then check your solution.

1. $2(t + 3) \ge 16$ — $\{t \mid t \ge 5\}$
2. $3(d - 2) - 2d > 16$ — $\{d \mid d > 22\}$
3. $4h - 8 < 2(h - 1)$ — $\{h \mid h < 3\}$
4. $6y + 10 > 8 - (y + 14)$ — $\left\{y \mid y > -2\frac{2}{7}\right\}$
5. $4.6(x - 3.4) > 5.1x$ — $\{x \mid x < -31.28\}$
6. $-5x - (2x + 3) \ge 1$ — $\left\{x \mid x \le -\frac{4}{7}\right\}$
7. $3(2y - 4) - 2(y + 1) > 10$ — $\{y \mid y > 6\}$
8. $8 - 2(b + 1) < 12 - 3b$ — $\{b \mid b < 6\}$
9. $-2(k - 1) > 8(1 + k)$ — $\left\{k \mid k < -\frac{3}{5}\right\}$
10. $0.3(y - 2) > 0.4(1 + y)$ — $\{y \mid y < -10\}$
11. $m + 17 \le -(4m - 13)$ — $\left\{m \mid m \le -\frac{4}{5}\right\}$
12. $3n + 8 \le 2(n - 4) - 2(1 - n)$ — $\{n \mid n \ge 18\}$
13. $2(y - 2) > -4 + 2y$ — $\varnothing$
14. $k - 17 \le -(17 - k)$ — $\{k \mid k \text{ is a real number}\}$
15. $n - 4 \le -3(2 + n)$ — $\left\{n \mid n \le -\frac{1}{2}\right\}$

Define a variable, write an inequality, and solve each problem. Then check your solution. 16–18. Sample answer: Let n = the number.

16. Twice the sum of a number and 4 is less than 12. $2(n + 4) < 12$; $\{n \mid n < 2\}$
17. Three times the sum of a number and six is greater than four times the number decreased by two. $3(n + 6) > 4n - 2$; $\{n \mid n < 20\}$
18. Twice the difference of a number and four is less than the sum of the number and five. $2(n - 4) < n + 5$; $\{n \mid n < 13\}$

NAME _____ DATE _____ PERIOD ____

6-3 Skills Practice

Solving Multi-Step Inequalities

Justify each indicated step.

1. $\frac{3}{4}t - 3 \geq -15$

$\frac{3}{4}t - 3 + 3 \geq -15 + 3$ **a.** ?

$\frac{3}{4}t \geq -12$

$\frac{4}{3}\left(\frac{3}{4}\right)t \geq \frac{4}{3}(-12)$ **b.** ?

$t \geq -16$

a. Add 3 to each side.
b. Multiply each side by $\frac{4}{3}$.

2. $5(k + 8) - 7 \leq 23$

$5k + 40 - 7 \leq 23$ **a.** ?

$5k + 33 \leq 23$

$5k + 33 - 33 \leq 23 - 33$ **b.** ?

$5k \leq -10$

$\frac{5k}{5} \leq \frac{-10}{5}$ **c.** ?

$k \leq -2$

a. Distributive Property
b. Subtract 33 from each side.
c. Divide each side by 5.

Solve each inequality. Then check your solution.

3. $-2b + 4 > -6$ $\{b \mid b < 5\}$

4. $3x + 15 \leq 21$ $\{x \mid x \leq 2\}$

5. $\frac{d}{2} - 1 \geq 3$ $\{d \mid d \geq 8\}$

6. $\frac{2}{5}a - 4 < 2$ $\{a \mid a < 15\}$

7. $-\frac{t}{5} + 7 > -4$ $\{t \mid t < 55\}$

8. $\frac{3}{4}j - 10 \geq 5$ $\{j \mid j \geq 20\}$

9. $-\frac{2}{3}f + 3 < -9$ $\{f \mid f > 18\}$

10. $2p + 5 \geq 3p - 10$ $\{p \mid p \leq 15\}$

11. $4k + 15 > -2k + 3$ $\{k \mid k > -2\}$

12. $2(-3m - 5) \geq -28$ $\{m \mid m \leq 3\}$

13. $-6(w + 1) < 2(w + 5)$ $\{w \mid w > -2\}$

14. $2(q - 3) + 6 \leq -10$ $\{q \mid q \leq -5\}$

Define a variable, write an inequality, and solve each problem. Then check your solution. 15–20. Sample answer: Let n = the number.

15. Four more than the quotient of a number and three is at least nine. $\frac{n}{3} + 4 \geq 9$; $\{n \mid n \geq 15\}$

16. The sum of a number and fourteen is less than or equal to three times the number. $n + 14 \leq 3n$; $\{n \mid n \geq 7\}$

17. Negative three times a number increased by seven is less than negative eleven. $-3n + 7 < -11$; $\{n \mid n > 6\}$

18. Five times a number decreased by eight is at most ten more than twice the number. $5n - 8 \leq 2n + 10$; $\{n \mid n \leq 6\}$

19. Seven more than five sixths of a number is more than negative three. $\frac{5}{6}n + 7 > -3$; $\{n \mid n > -12\}$

20. Four times the sum of a number and two increased by three is at least twenty-seven. $4(n + 2) + 3 \geq 27$; $\{n \mid n \geq 4\}$

NAME _____ DATE _____ PERIOD ____

6-3 Practice (Average)

Solving Multi-Step Inequalities

Justify each indicated step.

1. $x > \frac{5x - 12}{8}$

$8x > (8)\frac{5x - 12}{8}$ **a.** ?

$8x > 5x - 12$

$8x - 5x > 5x - 12 - 5x$ **b.** ?

$3x > -12$

$\frac{3x}{3} > \frac{-12}{3}$ **c.** ?

$x > -4$

a. Multiply each side by 8.
b. Subtract $5x$ from each side.
c. Divide each side by 3.

2. $2(2h + 2) < 2(3h + 5) - 12$

$4h + 4 < 6h + 10 - 12$ **a.** ?

$4h + 4 < 6h - 2$

$4h + 4 - 6h < 6h - 2 - 6h$ **b.** ?

$-2h + 4 < -2$

$-2h + 4 - 4 < -2 - 4$ **c.** ?

$-2h < -6$

$\frac{-2h}{-2} > \frac{-6}{-2}$ **d.** ?

$h > 3$

a. Distributive Property
b. Subtract $6h$ from each side.
c. Subtract 4 from each side.
d. Divide each side by -2 and change $<$ to $>$.

Solve each inequality. Then check your solution.

3. $-5 - \frac{t}{6} \geq -9$ $\{t \mid t \leq 24\}$

4. $4u - 6 \geq 6u - 20$ $\{u \mid u \leq 7\}$

5. $13 > \frac{2}{3}a - 1$ $\{a \mid a < 21\}$

6. $\frac{w + 3}{2} < -8$ $\{w \mid w < -19\}$

7. $\frac{3f - 10}{5} > 7$ $\{f \mid f > 15\}$

8. $h \leq \frac{6h + 3}{5}$ $\{h \mid h \geq -3\}$

9. $3(z + 1) + 11 < -2(z + 13)$ $\{z \mid z < -8\}$

10. $3e + 2(4e + 2) \leq 2(6e + 1)$ $\{e \mid e \geq 2\}$

11. $5n - 3(n - 6) \geq 0$ $\{n \mid n \geq -9\}$

Define a variable, write an inequality, and solve each problem. Then check your solution. 12–13. Sample answer: Let n = the number.

12. A number is less than one fourth the sum of three times the number and four. $n < \frac{3n + 4}{4}$; $\{n \mid n < 4\}$

13. Two times the sum of a number and four is no more than three times the sum of the number and seven decreased by four. $2(n + 4) \leq 3(n + 7) - 4$; $\{n \mid n \geq -9\}$

14. GEOMETRY The area of a triangular garden can be no more than 120 square feet. The base of the triangle is 16 feet. What is the height of the triangle? no more than 15 ft

15. MUSIC PRACTICE Nabuko practices the violin at least 12 hours per week. She practices for three fourths of an hour each session. If Nabuko has already practiced 3 hours in one week, how many sessions remain to meet or exceed her weekly practice goal? at least 12 sessions

Answers

NAME _____ DATE _____ PERIOD ____

6-3

Reading to Learn Mathematics

Solving Multi-Step Inequalities

Pre-Activity **How are linear inequalities used in science?**

Read the introduction to Lesson 6-3 at the top of page 332 in your textbook. Then write an inequality that could be used to find the temperatures in degrees Celsius for which each substance is a gas.

Argon: $\frac{9}{5}C + 32 > -303$ Bromine: $\frac{9}{5}C + 32 > 138$

Reading the Lesson

1. What does the phrase "undoing the operations in reverse of the order of operations" mean?

   Sample answer: First add or subtract to undo subtraction or addition, then multiply or divide to undo division or multiplication.

2. Describe how checking the solution of an inequality is different from checking the solution of an equation.

   Sample answer: Instead of substituting one value for the variable, there are infinitely many values that can be used to check. It is a good idea to use a value that is less than, the value equal to, and a value greater than the number in the solution to check an inequality.

3. Describe how the Distributive Property can be used to remove the grouping symbols in the inequality $4x - 7(2x + 8) \leq 3x - 5$.

   Multiply -7 by both $2x$ and 8.

4. Is it possible to have no solution when you solve an inequality? Explain your answer and give an example.

   Sample answer: Yes; if solving results in an inequality that is never true (and the signs have been reversed if necessary), then there is no solution. Example: $3(t - 4) - 8 > 3(t + 4) - 8$

Helping You Remember

5. Make a checklist of steps you can use when solving inequalities.

   (1) Use the Distributive Property to remove any grouping symbols.
   (2) Combine any like terms.
   (3) Add or subtract the same variable terms or constants on both sides.
   (4) Multiply or divide to undo operations.
   (5) Reverse the direction of the inequality symbol if both sides were multiplied or divided by a negative number.
   (6) Be sure the variable is by itself on one side of the final inequality.

Lesson 6-3

NAME _____ DATE _____ PERIOD ____

6-3

Enrichment

Carlos Montezuma

During his lifetime, Carlos Montezuma (1865?–1923) was one of the most influential Native Americans in the United States. He was recognized as a prominent physician and was also a passionate advocate of the rights of Native American peoples. The exercises that follow will help you learn some interesting facts about Dr. Montezuma's life.

Solve each inequality. The word or phrase next to the equivalent inequality will complete the statement correctly.

1. $-2k > 10$
Montezuma was born in the state of ___?___.

(a)	$k < -5$	Arizona
b.	$k > -5$	Montana
c.	$k > 12$	Utah

2. $5 \geq r - 9$
He was a Native American of the Yavapais, who are a ___?___ people.

a.	$r \leq -4$	Navajo
b.	$r \geq -4$	Mohawk
(c)	$r \leq 14$	Mohave-Apache

3. $-y \leq -9$
Montezuma received a medical degree from ___?___ in 1889.

(a)	$y \geq 9$	Chicago Medical College
b.	$y \geq -9$	Harvard Medical School
c.	$y \leq 9$	Johns Hopkins University

4. $-3 + q > 12$
As a physician, Montezuma's field of specialization was ___?___.

a.	$q > -4$	heart surgery
(b)	$q > 15$	internal medicine
c.	$q < -15$	respiratory diseases

5. $5 + 4x - 14 \leq x$
For much of his career, he maintained a medical practice in ___?___.

a.	$x \leq 9$	New York City
(b)	$x \leq 3$	Chicago
c.	$x \geq -9$	Boston

6. $7 - t < 7 + t$
In addition to maintaining his medical practice, he was also a(n) ___?___.

a.	$t > 7$	director of a blood bank
(b)	$t > 0$	instructor at a medical college
c.	$t < -7$	legal counsel to physicians

7. $3a + 8 \geq 4a - 10$
Montezuma founded, wrote, and edited ___?___, a monthly newsletter that addressed Native American concerns.

a.	$a \leq -2$	Yavapai
b.	$a \geq 18$	Apache
(c)	$a \leq 18$	Wassaja

8. $6n > 8n - 12$
Montezuma testified before a committee of the United States Congress concerning his work in treating ___?___.

(a)	$n < 6$	appendicitis
b.	$n > -6$	asthma
c.	$n > -10$	heart attacks

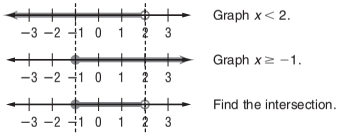
NAME _____ DATE _____ PERIOD ____

6-4 Study Guide and Intervention

Solving Compound Inequalities

Inequalities Containing *and* A compound inequality containing *and* is true only if both inequalities are true. The graph of a compound inequality containing *and* is the **intersection** of the graphs of the two inequalities. Every solution of the compound inequality must be a solution of both inequalities.

Example 1 **Graph the solution set of $x < 2$ and $x \geq -1$.**



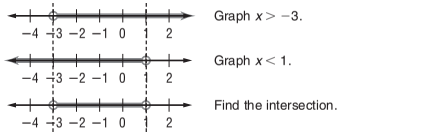
The solution set is $\{x \mid -1 \leq x < 2\}$.

Example 2 **Solve $-1 < x + 2 < 3$ using *and*. Then graph the solution set.**

$-1 < x + 2$ and $x + 2 < 3$

$-1 - 2 < x + 2 - 2$ $x + 2 - 2 < 3 - 2$

$-3 < x$ $x < 1$



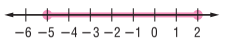
The solution set is $\{x \mid -3 < x < 1\}$.

Exercises

Graph the solution set of each compound inequality.

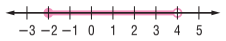
1. $b > -1$ and $b \leq 3$

2. $2 \geq q \geq -5$



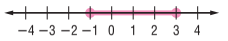
3. $x > -3$ and $x \leq 4$

4. $-2 \leq p < 4$



5. $-3 < d$ and $d < 2$

6. $-1 \leq p \leq 3$



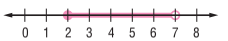
Solve each compound inequality. Then graph the solution set.

7. $4 < w + 3 \leq 5$

$\{w \mid 1 < w \leq 2\}$

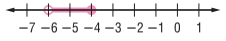
8. $-3 \leq p - 5 < 2$

$\{p \mid 2 \leq p < 7\}$



9. $-4 < x + 2 \leq -2$

$\{x \mid -6 < x \leq -4\}$

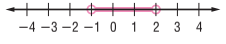


10. $y - 1 < 2$ and $y + 2 \geq 1$

$\{y \mid -1 \leq y < 3\}$

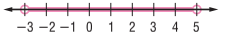
11. $n - 2 > -3$ and $n + 4 < 6$

$\{n \mid -1 < n < 2\}$



12. $d - 3 < 6d + 12 < 2d + 32$

$\{d \mid -3 < d < 5\}$



NAME _____ DATE _____ PERIOD ____

6-4 Study Guide and Intervention *(continued)*

Solving Compound Inequalities

Inequalities Containing *or* A compound inequality containing *or* is true if one or both of the inequalities are true. The graph of a compound inequality containing *or* is the **union** of the graphs of the two inequalities. The union can be found by graphing both inequalities on the same number line. A solution of the compound inequality is a solution of either inequality, not necessarily both.

Example **Solve $2a + 1 < 11$ or $a > 3a + 2$.**

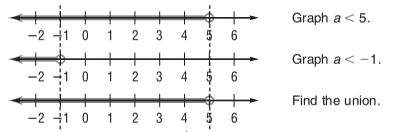
$2a + 1 < 11$ or $a > 3a + 2$

$2a + 1 - 1 < 11 - 1$ $a - 3a > 3a - 3a + 2$

$2a < 10$ $-2a > 2$

$\frac{2a}{2} < \frac{10}{2}$ $\frac{-2a}{-2} < \frac{2}{-2}$

$a < 5$ $a < -1$

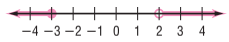


The solution set is $\{a \mid a < 5\}$.

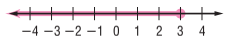
Exercises

Graph the solution set of each compound inequality.

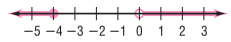
1. $b > 2$ or $b \leq -3$



2. $3 \geq q$ or $q \leq 1$

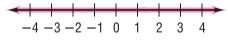


3. $y \leq -4$ or $y > 0$

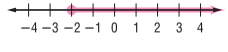


4. $4 \leq p$ or $p < 8$

5. $-3 < d$ or $d < 2$



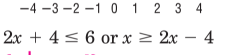
6. $-2 \leq x$ or $3 \leq x$



Solve each compound inequality. Then graph the solution set.

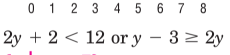
7. $3 < 3w$ or $3w \geq 9$

$\{w \mid 1 < w\}$



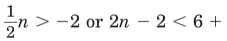
8. $-3p + 1 \leq -11$ or $p < 2$

$\{p \mid p \geq 4 \text{ or } p < 2\}$



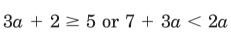
9. $2x + 4 \leq 6$ or $x \geq 2x - 4$

$\{x \mid x \leq 4\}$



10. $2y + 2 < 12$ or $y - 3 \geq 2y$

$\{y \mid y < 5\}$



11. $\frac{1}{2}n > -2$ or $2n - 2 < 6 + n$

$\{n \mid n \text{ is a real number}\}$

12. $3a + 2 \geq 5$ or $7 + 3a < 2a + 6$

$\{a \mid a < -1 \text{ or } a \geq 1\}$

Answers

NAME _____ DATE _____ PERIOD ____

6-4 Skills Practice

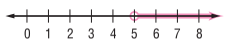
Solving Compound Inequalities

Graph the solution set of each compound inequality.

1. $b > 3$ or $b \leq 0$

2. $z \leq 3$ and $z \geq -2$

3. $k > 1$ and $k > 5$



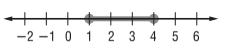
4. $y < -1$ or $y \geq 1$

Write a compound inequality for each graph.

5.

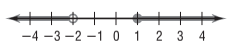
$-3 < x \leq 3$

6.



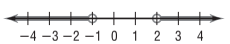
$1 \leq x \leq 4$

7.



$x < -2$ or $x \geq 1$

8.



$x < -1$ or $x > 2$

Solve each compound inequality. Then graph the solution set.

9. $m + 3 \geq 5$ and $m + 3 < 7$

$\{m \mid 2 \leq m < 4\}$

10. $y - 5 < -4$ or $y - 5 \geq 1$

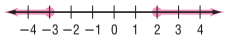
$\{y \mid y < 1$ or $y \geq 6\}$

11. $4 < f + 6$ and $f + 6 < 5$

$\{f \mid -2 < f < -1\}$

12. $w + 3 \leq 0$ or $w + 7 \geq 9$

$\{w \mid w \leq -3$ or $w \geq 2\}$

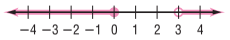


13. $-6 < b - 4 < 2$

$\{b \mid -2 < b < 6\}$

14. $p - 2 \leq -2$ or $p - 2 > 1$

$\{p \mid p \leq 0$ or $p > 3\}$



Define a variable, write an inequality, and solve each problem. Then check your solution. 15–17. Sample answer: Let n = the number.

15. A number plus one is greater than negative five and less than three.

$-5 < n + 1 < 3$; $\{n \mid -6 < n < 2\}$

16. A number decreased by two is at most four or at least nine.

$n - 2 \leq 4$ or $n - 2 \geq 9$; $\{n \mid n \leq 6$ or $n \geq 11\}$

17. The sum of a number and three is no more than eight or is more than twelve.

$n + 3 \leq 8$ or $n + 3 > 12$; $\{n \mid n \leq 5$ or $n > 9\}$

Lesson 6-4

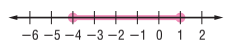
NAME _____ DATE _____ PERIOD ____

6-4 Practice (Average)

Solving Compound Inequalities

Graph the solution set of each compound inequality.

1. $-4 \leq e \leq 1$



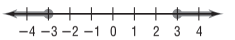
2. $x > 0$ or $x < 3$

3. $g < -3$ or $g \geq 4$

4. $-4 \leq p \leq 4$

Write a compound inequality for each graph.

5.



$x \leq -3$ or $x \geq 3$

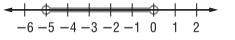
6.

$x < 2$ or $x \geq 3$

7.

$0 \leq x < 5$

8.

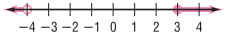


$-5 < x < 0$

Solve each compound inequality. Then graph the solution set.

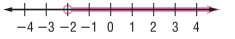
9. $k - 3 < -7$ or $k + 5 \geq 8$

$\{k \mid k < -4$ or $k \geq 3\}$



10. $-n < 2$ or $2n - 3 > 5$

$\{n \mid n > -2\}$



11. $5 < 3h + 2 \leq 11$

$\{h \mid 1 < h \leq 3\}$

12. $2c - 4 > -6$ and $3c + 1 < 13$

$\{c \mid -1 < c < 4\}$

Define a variable, write an inequality, and solve each problem. Then check your solution. 13–14. Sample answer: Let n = the number.

13. Two times a number plus one is greater than five and less than seven.

$5 < 2n + 1 < 7$; $\{n \mid 2 < n < 3\}$

14. A number minus one is at most nine, or two times the number is at least twenty-four.

$n - 1 \leq 9$ or $2n \geq 24$; $\{n \mid n \leq 10$ or $n \geq 12\}$

METEOROLOGY For Exercises 15 and 16, use the following information.

Strong winds called the prevailing westerlies blow from west to east in a belt from 40° to 60° latitude in both the Northern and Southern Hemispheres.

15. Write an inequality to represent the latitude of the prevailing westerlies.

$\{w \mid 40 \leq w \leq 60\}$

16. Write an inequality to represent the latitudes where the prevailing westerlies are *not* located. $\{w \mid w < 40$ or $w > 60\}$

17. NUTRITION A cookie contains 9 grams of fat. If you eat no fewer than 4 and no more than 7 cookies, how many grams of fat will you consume? between 36 g and 63 g inclusive

NAME _____ DATE _____ PERIOD ____

6-4

Reading to Learn Mathematics

Solving Compound Inequalities

Pre-Activity **How are compound inequalities used in tax tables?**

Read the introduction to Lesson 6-4 at the top of page 339 in your textbook.

- Explain why it is possible that Mr. Kelly's income is $41,370.
  $41,370 is greater than or equal to $41,350 and less than $41,400.

- Explain why it is *not* possible that Mr. Kelly's income is $41,400.
  $41,400 is not less than $41,400.

Reading the Lesson

1. When is a compound inequality containing *and* true?
   It is true when both inequalities are true.

2. The graph of a compound inequality containing *and* is the ___intersection___ of the graphs of the two inequalities.

3. When is a compound inequality containing *or* true?
   It is true when one or both of the inequalities is true.

4. The graph of a compound inequality containing *or* is the ___union___ of the graphs of the two inequalities.

5. Suppose you use yellow to show the graph of Inequality #1 on the number line. You use blue to show the graph of Inequality #2. Write *and* or *or* in each blank to complete the sentence.

   a. The part that is green is the graph of Inequality #1 ___and___ Inequality #2.

   b. All colored parts form the graph of Inequality #1 ___or___ Inequality #2.

Helping You Remember

6. One way to remember something is to connect it to something that is familiar to you. Write two *true* compound statements about yourself, one using the word *and* and the other using the word *or*.
   Sample answer: I am 14 and I am a freshman in high school. After school, I will go to football practice or I will go home.

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6-4

Enrichment

Some Properties of Inequalities

The two expressions on either side of an inequality symbol are sometimes called the *first* and *second* members of the inequality.

If the inequality symbols of two inequalities point in the same direction, the inequalities have the same sense. For example, $a < b$ and $c < d$ have the same sense; $a < b$ and $c > d$ have opposite senses.

In the problems on this page, you will explore some properties of inequalities.

Three of the four statements below are true for all numbers a and b (or a, b, c, and d). Write each statement in algebraic form. If the statement is true for all numbers, prove it. If it is not true, give an example to show that it is false.

1. Given an inequality, a new and equivalent inequality can be created by interchanging the members and reversing the sense.
   If $a > b$, then $b < a$.
   $a > b$, $a - b > 0$, $-b > -a$, $(-1)(-b) < (-1)(-a)$, $b < a$

2. Given an inequality, a new and equivalent inequality can be created by changing the signs of both terms and reversing the sense.
   If $a > b$, then $2a < 2b$.
   $a > b$, $a - b > 0$, $-b > -a$, $-a < -b$

3. Given two inequalities with the same sense, the sum of the corresponding members are members of an equivalent inequality with the same sense.
   If $a > b$ and $c > d$, then $a + c > b + d$.
   $a > b$ and $c > d$, so $(a - b)$ and $(c - d)$ are positive numbers, so the sum $(a - b) + (c - d)$ is also positive.
   $a - b + c - d > 0$, so $a + c > b + d$.

4. Given two inequalities with the same sense, the difference of the corresponding members are members of an equivalent inequality with the same sense.
   If $a > b$ and $c > d$, then $a - c > b - d$. The statement is false. $5 > 4$ and $3 > 2$, but $5 - 3 \not> 4 - 2$.

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6-5 Study Guide and Intervention

Solving Open Sentences Involving Absolute Value

Absolute Value Equations When solving equations that involve absolute value, there are two cases to consider.

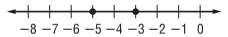
Case 1: The value inside the absolute value symbols is positive.
Case 2: The value inside the absolute value symbols is negative.

Example 1 **Solve $|x + 4| = 1$. Then graph the solution set.**

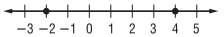
Write $|x + 4 = 1|$ as $x + 4 = 1$ or $x + 4 = -1$.

$x + 4 = 1$	or	$x + 4 = -1$
$x + 4 - 4 = 1 - 4$		$x + 4 = -1$
$x = -3$		$x + 4 - 4 = -1 - 4$
		$x = -5$

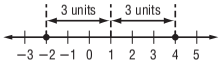
The solution set is $\{-5, -3\}$.
The graph is shown below.



Example 2 **Write an inequality involving absolute value for the graph.**



Find the point that is the same distance from -2 as it is from 4.

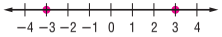


The distance from 1 to -2 is 3 units. The distance from 1 to 4 is 3 units.
So, $|x - 1| = 3$.

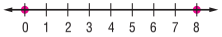
Exercises

Solve each open sentence. Then graph the solution set.

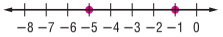
1. $|y| = 3$ {−3, 3}



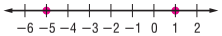
2. $|x - 4| = 4$ {0, 8}



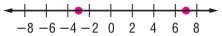
3. $|y + 3| = 2$ {−5, −1}



4. $|b + 2| = 3$ {−5, 1}

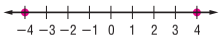


5. $|w - 2| = 5$ {−3, 7}



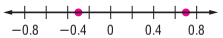
6. $|t + 2| = 4$ {−6, 2}

7. $|2x| = 8$ {−4, 4}

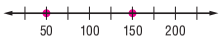


8. $|5y - 2| = 7$ $\left\{-1, 1\frac{4}{5}\right\}$

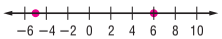
9. $|p - 0.2| = 0.5$ {−0.3, 0.7}



10. $|d - 100| = 50$ {50, 150}



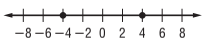
11. $|2x - 1| = 11$ {−5, 6}



12. $\left|3x + \frac{1}{2}\right| = 6$ $\left\{-2\frac{1}{6}, 1\frac{5}{6}\right\}$

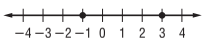
For each graph, write an open sentence involving absolute value.

13.



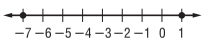
$|x| = 4$

14.



$|x - 1| = 2$

15.



$|x + 3| = 4$

Lesson 6-5

NAME _____ DATE _____ PERIOD ____

6-5 Study Guide and Intervention (continued)

Solving Open Sentences Involving Absolute Value

Absolute Value Inequalities When solving inequalities that involve absolute value, there are two cases to consider for inequalities involving $<$ (or $\leq$) and two cases to consider for inequalities involving $>$ (or $\geq$).

If $|x| < n$, then $x > -n$ and $x < n$.
If $|x| > n$, then $x > n$ or $x < -n$.

Remember that inequalities with *and* are related to intersections, while inequalities with *or* are related to unions.

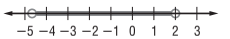
Example **Solve $|3a + 4| < 10$. Then graph the solution set.**

Write $|3a + 4| < 10$ as $3a + 4 < 10$ and $3a + 4 > -10$.

$3a + 4 < 10$	and	$3a + 4 > -10$
$3a + 4 - 4 < 10 - 4$		$3a + 4 - 4 > -10 - 4$
$3a < 6$		$3a > -14$
$\frac{3a}{3} < \frac{6}{3}$		$\frac{3a}{3} > \frac{-14}{3}$
$a < 2$		$a > -4\frac{2}{3}$

The solution set is $\left\{a \mid -4\frac{2}{3} < a < 2\right\}$.

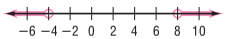
Now graph the solution set.



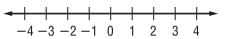
Exercises

Solve each open sentence. Then graph the solution set.

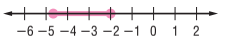
1. $|c - 2| > 6$
{c | c < −4 or c > 8}



2. $|x - 9| < 0$
∅



3. $|3f + 10| \leq 4$
$\left\{f \mid -4\frac{2}{3} \leq f \leq -2\right\}$

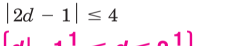


4. $|x| \leq 2$
{x | −2 ≤ x ≤ 2}

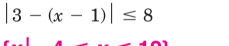
5. $|x| \geq 3$
{x | x ≤ −3 or x ≥ 3}

6. $|2x + 1| \geq -2$
{x | x is a real number}

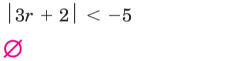
7. $|2d - 1| \leq 4$
$\left\{d \mid -1\frac{1}{2} \leq d \leq 2\frac{1}{2}\right\}$



8. $|3 - (x - 1)| \leq 8$
{x | −4 ≤ x ≤ 12}

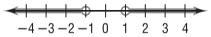


9. $|3r + 2| < -5$
∅



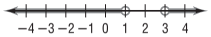
For each graph, write an open sentence involving absolute value.

10.



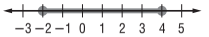
$|x| > 1$

11.



$|x - 2| > 1$

12.



$|x - 1| \leq 3$

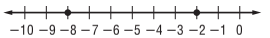
NAME _____ DATE _____ PERIOD ____

6-5 Skills Practice

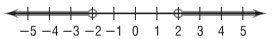
Solving Open Sentences Involving Absolute Value

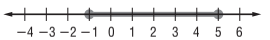
Match each open sentence with the graph of its solution set.

1. $|x| > 2$ **c**
2. $|x + 5| = 3$ **a**
3. $|x - 2| \leq 3$ **d**
4. $|x + 1| < 4$ **b**

a. 

b. 

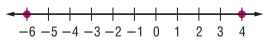
c. 

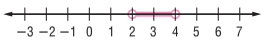
d. 

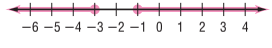
Express each statement using an inequality involving absolute value. Do *not* solve.

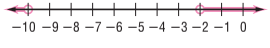
5. The weatherman predicted that the temperature would be within 3° of 52°F.
   $|t - 52| \leq 3$
6. Serena will make the B team if she scores within 8 points of the team average of 92.
   $|p - 92| \leq 8$
7. The dance committee expects attendance to number within 25 of last year's 87 students.
   $|a - 87| \leq 25$

Solve each open sentence. Then graph the solution set.

8. $|s + 1| = 5$ $\{-6, 4\}$


9. $|c - 3| < 1$ $\{c \mid 2 < c < 4\}$


10. $|n + 2| \geq 1$ $\{n \mid n \leq -3 \text{ or } n \geq -1\}$


11. $|t + 6| > 4$ $\{t \mid t < -10 \text{ or } t > -2\}$


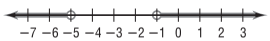
12. $|w - 2| = 2$ $\{0, 4\}$


13. $|k - 5| \leq 4$ $\{k \mid 1 \leq k \leq 9\}$


For each graph, write an open sentence involving absolute value.

14. 

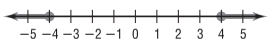
$|x| = 1$

15. 

$|x + 3| > 2$

16. 

$|x - 4| \leq 1$

17. 

$|x| \geq 4$

Lesson 6-5

NAME _____ DATE _____ PERIOD ____

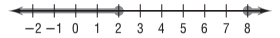
6-5 Practice (Average)

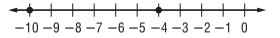
Solving Open Sentences Involving Absolute Value

Match each open sentence with the graph of its solution set.

1. $|x + 7| = 3$ **c**
2. $|x - 3| \geq 1$ **a**
3. $|2x + 1| < 5$ **d**
4. $|5 - x| \geq 3$ **b**

a. 

b. 

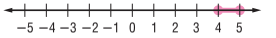
c. 

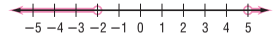
d. 

Express each statement using an inequality involving absolute value. Do *not* solve.

5. The height of the plant must be within 2 inches of the standard 13-inch show size.
   $|h - 13| \leq 2$
6. The majority of grades in Sean's English class are within 4 points of 85.
   $|g - 85| \leq 4$

Solve each open sentence. Then graph the solution set.

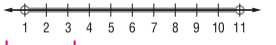
7. $|2z - 9| \leq 1$ $\{z \mid 4 \leq z \leq 5\}$


8. $|3 - 2r| > 7$ $\{r \mid r < -2 \text{ or } r > 5\}$


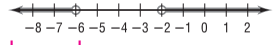
9. $|3t + 6| < 9$ $\{t \mid -5 < t < 1\}$


10. $|2g - 5| \geq 9$ $\{g \mid g \leq -2 \text{ or } g \geq 7\}$

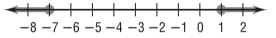

For each graph, write an open sentence involving absolute value.

11. 

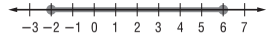
$|x - 6| < 5$

12. 

$|x + 4| > 2$

13. 

$|x + 3| \geq 4$

14. 

$|x - 2| \leq 4$

15. **FITNESS** Taisha uses the elliptical cross-trainer at the gym. Her general goal is to burn 280 Calories per workout, but she varies by as much as 25 Calories from this amount on any given day. What is the range of the number of Calories burned for Taisha's cross-trainer workout? $\{c \mid 255 \leq c \leq 305\}$

16. **TEMPERATURE** A thermometer is guaranteed to give a temperature no more than 1.2°F from the actual temperature. If the thermometer reads 28°F, what is the range for the actual temperature? $\{t \mid 26.8 \leq t \leq 29.2\}$

Answers

NAME _____ DATE _____ PERIOD ____

6-5

Reading to Learn Mathematics

Solving Open Sentences Involving Absolute Value

Pre-Activity **How is absolute value used in election polls?**

Read the introduction to Lesson 6-5 at the top of page 345 in your textbook.

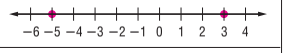
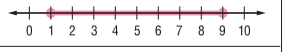
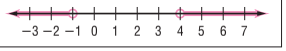
- What does the phrase margin of error mean to you?

  Sample answer: The number of points a reported result may be off from the exact result.

- In this poll, the number of people opposed to the tax levy may be as high as **48%** or as low as **42%**. This can be written as the inequality $|x - $ **45** $| \leq 3$.

Reading the Lesson

Complete each compound sentence by writing *and* or *or* in the blank. Use the result to help you graph the absolute value sentence.

	Absolute Value Sentence	Compound Sentence	Graph
1.	$\|2x + 2\| = 8$	$2x + 2 = 8$ **or** $2x + 2 = -8$	
2.	$\|x - 5\| \leq 4$	$x - 5 \leq 4$ **and** $x - 5 \geq -4$	
3.	$\|2x - 3\| > 5$	$2x - 3 > 5$ **or** $2x - 3 < -5$	

4. How would you write the compound sentence $3x + 7 \geq 5$ or $3x + 7 \leq -5$ as an absolute value sentence? **$|3x + 7| \geq 5$**

Helping You Remember

5. Recall that $|x|$ tells you how many units the number x is from zero on the number line. Explain the meaning of $|x| = n$, $|x| < n$, and $|x| > n$ by using the idea of the distance from x to zero.

$|x| = n$ means x is exactly n units from zero. $|x| < n$ means x is less than n units from zero. $|x| > n$ means x is more than n units from zero.

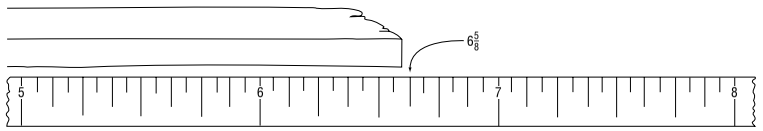
NAME _____ DATE _____ PERIOD ____

6-5

Enrichment

Precision of Measurement

The precision of a measurement depends both on your accuracy in measuring and the number of divisions on the ruler you use. Suppose you measured a length of wood to the nearest one-eighth of an inch and got a length of $6\frac{5}{8}$ in.



The drawing shows that the actual measurement lies somewhere between $6\frac{9}{11}$ in. and $6\frac{11}{16}$ in. This measurement can be written using the symbol $\pm$, which is read *plus or minus*. It can also be written as a compound inequality.

$$6\tfrac{5}{8} \pm \tfrac{1}{16} \text{ in.} \qquad 6\tfrac{9}{16} \text{ in.} \leq m \leq 6\tfrac{11}{16} \text{ in.}$$

In this example, $\frac{1}{16}$ in. is the absolute error. The absolute error is one-half the smallest unit used in a measurement.

Write each measurement as a compound inequality. Use the variable m.

1. $3\frac{1}{2} \pm \frac{1}{4}$ in.

   $3\frac{1}{4}$ in. $\leq m \leq 3\frac{3}{4}$ in.

2. 9.78 ± 0.005 cm

   9.775 cm $\leq m \leq$ 9.785 cm

3. 2.4 ± 0.05 g

   2.35 g $\leq m \leq$ 2.45 g

4. $28 \pm \frac{1}{2}$ ft

   $27\frac{1}{2}$ ft $\leq m \leq 28\frac{1}{2}$ ft

5. 15 ± 0.5 cm

   14.5 cm $\leq m \leq$ 15.5 cm

6. $\frac{11}{16} \pm \frac{1}{64}$ in.

   $\frac{43}{64}$ in. $\leq m \leq \frac{45}{64}$ in.

For each measurement, give the smallest unit used and the absolute error.

7. 12.5 cm $\leq m \leq$ 13.5 cm

   1 cm, 0.5 cm

8. $12\frac{1}{8}$ in. $\leq m \leq 12\frac{3}{8}$ in.

   $\frac{1}{4}$ in., $\frac{1}{8}$ in.

9. $56\frac{1}{2}$ in. $\leq m \leq 57\frac{1}{2}$ in.

   1 in., $\frac{1}{2}$ in.

10. 23.05 mm $\leq m \leq$ 23.15 mm

    0.1 mm, 0.05 mm

Glencoe Algebra 1

NAME _____ DATE _____ PERIOD ____

6-6 Study Guide and Intervention

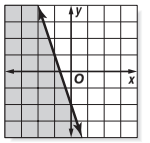
Graphing Inequalities in Two Variables

Graph Linear Inequalities The solution set of an inequality that involves two variables is graphed by graphing a related linear equation that forms a boundary of a **half-plane**. The graph of the ordered pairs that make up the solution set of the inequality fill a region of the coordinate plane on one side of the half-plane.

Example **Graph $y \leq -3x - 2$.**

Graph $y = -3x - 2$.

Since $y \leq -3x - 2$ is the same as $y < -3x - 2$ and $y = -3x - 2$, the boundary is included in the solution set and the graph should be drawn as a solid line.



Select a point in each half plane and test it. Choose (0, 0) and (−2, −2).

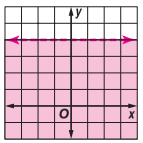
$y \leq -3x - 2$	$y \leq -3x - 2$
$0 \leq -3(0) - 2$	$-2 \leq -3(-2) - 2$
$0 \leq -2$ is false.	$-2 \leq 6 - 2$
	$-2 \leq 4$ is true.

The half-plane that contains (−2, −2) contains the solution. Shade that half-plane.

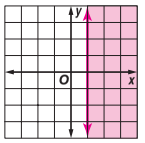
Exercises

Graph each inequality.

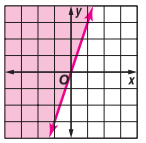
1. $y < 4$



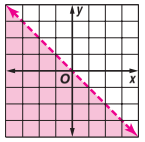
2. $x \geq 1$



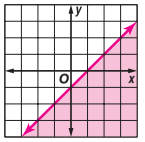
3. $3x \leq y$



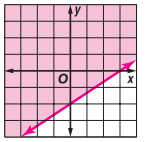
4. $-x > y$



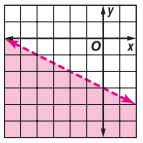
5. $x - y \geq 1$



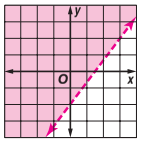
6. $2x - 3y \leq 6$



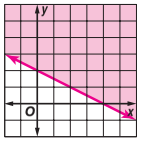
7. $y < -\frac{1}{2}x - 3$



8. $4x - 3y < 6$



9. $3x + 6y \geq 12$



NAME _____ DATE _____ PERIOD ____

6-6 Study Guide and Intervention *(continued)*

Graphing Inequalities in Two Variables

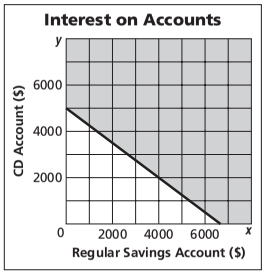
Solve Real-World Problems When solving real-life inequalities, the domain and range of the inequality are often restricted to nonnegative numbers or to whole numbers.

Example **BANKING A bank offers 4.5% annual interest on regular savings accounts and 6% annual interest on certificates of deposit (CD). If Marjean wants to earn at least $300 interest per year, how much money should she deposit in each type of account?**

Let x = the amount deposited in a regular savings account.

Let y = the amount deposited in a CD.

Then $0.045x + 0.06y \geq 300$ is an open sentence representing this situation.



Solve for y in terms of x.

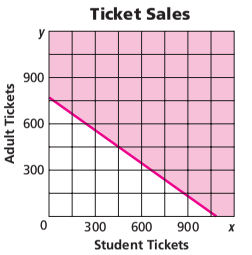
$0.045x + 0.06y \geq 300$	Original inequality
$0.06y \geq -0.045x + 300$	Subtract $0.045x$ from each side.
$y \geq -0.75x + 5000$	Divide each side by 0.06.

Graph $y \geq -0.75x + 5000$ and test the point (0, 0).
Since $0 \geq -0.75(0) + 5000$ is false, shade the half-plane that does not contain (0, 0).

One solution is (4000, 2000). This represents $4000 deposited at 4.5% and $2,000 deposited at 6%.

Exercises

1. SOCIAL EVENTS Tickets for the school play cost $5 per student and $7 per adult. The school wants to earn at least $5,400 on each performance.



a. Write an inequality that represents this situation. $5x + 7y \geq 5400$

b. Graph the solution set.

c. If 500 adult tickets are sold, what is the minimum number of student tickets that must be sold? 380

2. MANUFACTURING An auto parts company can produce 525 four-cylinder engines or 270 V-6 engines per day. It wants to produce up to 300,000 engines per year.

a. Write an inequality that represents this situation. $525f + 270s \leq 300000$

b. Are there restrictions on the domain or range? Neither f nor s is negative.

3. GEOMETRY The perimeter of a rectangular lot is less than 800 feet. Write an inequality that represents the amount of fencing that will enclose the lot. $2\ell + 2w \leq 800$

Answers

NAME _____ DATE _____ PERIOD ____

6-6 Skills Practice

Graphing Inequalities in Two Variables

Determine which ordered pairs are part of the solution set for each inequality.

1. $y > 3x$, $\{(1, 5), (1, 0), (-1, 0), (5, 1)\}$ **{(1, 5), (−1, 0)}**

2. $y \geq x + 3$, $\{(2, -3), (-2, -1), (1, 6), (3, 4)\}$ **{(1, 6)}**

3. $y < x - 1$, $\{(3, 1), (-2, -4), (4, -2), (-3, 3)\}$ **{(3, 1), (−2, −4), (4, −2)}**

Match each inequality with its graph.

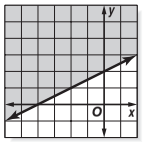
4. $y - 2x < 2$ **b**

5. $y \leq -3x$ **d**

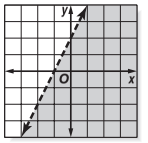
6. $2y - x \geq 4$ **a**

7. $x + y > 1$ **c**

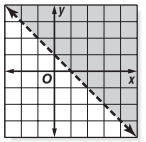
a.



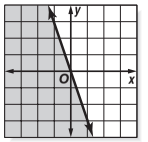
b.



c.

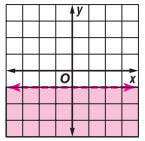


d.

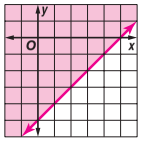


Graph each inequality.

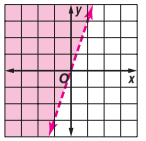
8. $y < -1$



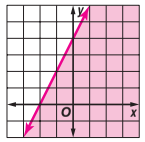
9. $y \geq x - 5$



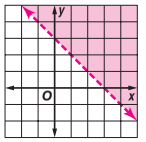
10. $y > 3x$



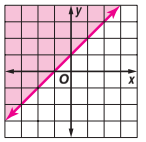
11. $y \leq 2x + 4$



12. $y + x > 3$



13. $y - x \geq 1$



NAME _____ DATE _____ PERIOD ____

6-6 Practice (Average)

Graphing Inequalities in Two Variables

Determine which ordered pairs are part of the solution set for each inequality.

1. $3x + y \geq 6$, $\{(4, 3), (-2, 4), (-5, -3), (3, -3)\}$ **{(4, 3), (3, −3)}**

2. $y \geq x + 3$, $\{(6, 3), (-3, 2), (3, -2), (4, 3)\}$ **{(−3, 2)}**

3. $3x - 2y < 5$, $\{(4, -4), (3, 5), (5, 2), (-3, 4)\}$ **{(3, 5), (−3, 4)}**

Match each inequality with its graph.

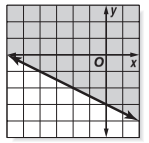
4. $5y - 2x \leq 10$ **d**

5. $3y > 3x + 9$ **c**

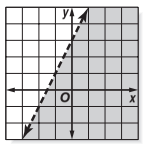
6. $y - 2x < 3$ **b**

7. $x + 2y \geq -6$ **a**

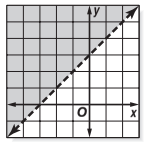
a.



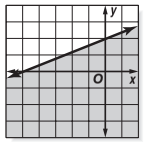
b.



c.

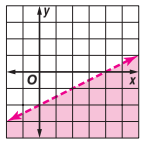


d.

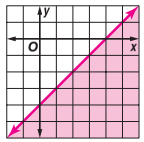


Graph each inequality.

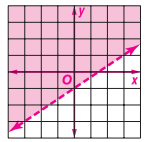
8. $2y - x < -4$



9. $2x - 2y \geq 8$



10. $3y > 2x - 3$



11. **MOVING** A moving van has an interior height of 7 feet (84 inches). You have boxes in 12 inch and 15 inch heights, and want to stack them as high as possible to fit. Write an inequality that represents this situation. **$12x + 15y \leq 84$**

BUDGETING For Exercises 12 and 13, use the following information.

Satchi found a used bookstore that sells pre-owned videos and CDs. Videos cost \$9 each, and CDs cost \$7 each. Satchi can spend no more than \$35.

12. Write an inequality that represents this situation. **$9x + 7y \leq 35$**

13. Does Satchi have enough money to buy 2 videos and 3 CDs?
No, the purchases will be \$39, which is greater than \$35.

NAME _____ DATE _____ PERIOD ____

6-6

Reading to Learn Mathematics

Graphing Inequalities in Two Variables

Pre-Activity **How are inequalities used in budgets?**

Read the introduction to Lesson 6-6 at the top of page 352 in your textbook.

What do 3 and 4 represent in the terms $3x$ and $4y$?

the average amount spent on a cafeteria lunch and a fast-food lunch

Reading the Lesson

1. Complete the chart to show which type of line is needed for each symbol.

Symbol	Type of Line	Boundary Part of Solution?
$<$	dashed	no
$>$	dashed	no
$\leq$	solid	yes
$\geq$	solid	yes

2. If a test point results in a false statement, what do you know about the graph?

The half-plane containing the test point is not part of the solution and is not shaded.

3. If a test point results in a true statement, what do you know about the graph?

The half-plane containing the test point is part of the solution and is shaded.

4. When can the origin *not* be used as a test point?

The origin cannot be used as a test point when it is on the boundary.

Helping You Remember

5. The two-variable inequalities in this lesson can be solved for y in terms of x to get a sentence in slope-intercept form. It looks much like a slope-intercept equation, but it has an inequality symbol instead of an equals sign. For example, $4x + 2y \leq 5$ can be written as $y \leq -2x + \frac{5}{2}$. Explain how to graph an inequality once it is written in slope-intercept form. Use the idea that *greater* can mean *above* and *less* can mean *below*.

Draw the boundary line. If the inequality symbol is $>$ or $<$, make the boundary dashed. If the symbol is $\geq$ or $\leq$, make the boundary line solid. If the symbol in the slope-intercept inequality is $<$ or $\leq$, shade below the boundary to indicate smaller values of y. If the symbol is $>$ or $\geq$, shade above the boundary to indicate greater values of y.

NAME _____ DATE _____ PERIOD ____

6-6

Enrichment

Using Equations: Ideal Weight

You can find your ideal weight as follows.

A woman should weigh 100 pounds for the first 5 feet of height and 5 additional pounds for each inch over 5 feet (5 feet = 60 inches). A man should weigh 106 pounds for the first 5 feet of height and 6 additional pounds for each inch over 5 feet. These formulas apply to people with normal bone structures.

To determine your bone structure, wrap your thumb and index finger around the wrist of your other hand. If the thumb and finger just touch, you have normal bone structure. If they overlap, you are small-boned. If they don't overlap, you are large-boned. Small-boned people should decrease their calculated ideal weight by 10%. Large-boned people should increase the value by 10%.

Calculate the ideal weights of these people.

1. woman, 5 ft 4 in., normal-boned
120 lb

2. man, 5 ft 11 in., large-boned
189.2 lb

3. man, 6 ft 5 in., small-boned
187.2 lb

4. you, if you are at least 5 ft tall
Answers will vary.

For Exercises 5–9, use the following information.

Suppose a normal-boned man is x inches tall. If he is at least 5 feet tall, then $x - 60$ represents the number of inches this man is over 5 feet tall. For each of these inches, his ideal weight is increased by 6 pounds. Thus, his proper weight (y) is given by the formula $y = 6(x - 60) + 106$ or $y = 6x - 254$. If the man is large-boned, the formula becomes $y = 6x - 254 + 0.10(6x - 254)$.

5. Write the formula for the weight of a large-boned man in slope-intercept form. $y = 6.6x - 279.4$

6. Derive the formula for the ideal weight (y) of a normal-boned female with height x inches. Write the formula in slope-intercept form. $y = 5x - 200$

7. Derive the formula in slope-intercept form for the ideal weight (y) of a large-boned female with height x inches. $y = 5.5x - 220$

8. Derive the formula in slope-intercept form for the ideal weight (y) of a small-boned male with height x inches. $y = 5.4x - 228.6$

9. Find the heights at which normal-boned males and large-boned females would weigh the same. **68 in., or 5 ft 8 in.**

Answers

Chapter 6 Assessment Answer Key

Form 1

Page 379

1. A
2. C
3. B
4. D
5. B
6. D
7. A
8. D
9. D
10. B
11. C
12. B

Page 380

13. D
14. A
15. D
16. C
17. A
18. D
19. B
20. B

B: -1

Form 2A

Page 381

1. C
2. A
3. B
4. A
5. D
6. D
7. A
8. B
9. B
10. D
11. B

(continued on the next page)

Chapter 6 Assessment Answer Key

Form 2A *(continued)*
Page 382

12. D

13. A

14. C

15. C

16. C

17. A

18. A

19. D

20. D

B: $\{-12, 12\}$

Form 2B
Page 383

1. A

2. A

3. B

4. D

5. D

6. D

7. A

8. B

9. C

10. B

11. B

Page 384

12. D

13. A

14. C

15. D

16. B

17. C

18. B

19. B

20. A

B: $\{x \mid -3 \leq x < 4\}$

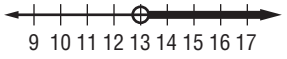
Answers

Chapter 6 Assessment Answer Key

Form 2C

Page 385

1. $\{x \mid x > 13\}$



2. $\{n \mid n \geq -19\}$

3. $\{t \mid t \leq 6\}$

4. $\{z \mid z < -4\}$

5. Sample answer:
n = the number;
$2 + n \leq 7$; $\{n \mid n \leq 5\}$

6. $\left\{b \middle| b > -1\frac{3}{5}\right\}$

7. $\{t \mid t \geq 84\}$

8. $\{y \mid y \leq -5.5\}$

9. $\{r \mid r > -5.5\}$

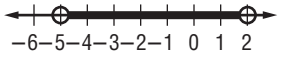
10. $\{a \mid a \leq 9\}$

11. $\{x \mid x < 8\}$

12. $\{p \mid p \leq 2\}$

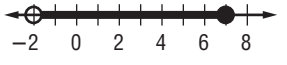
13. $\{c \mid c \leq 13\}$

14. $\{w \mid -5 < w < 2\}$



15. $\{x \mid x$ is a real number$\}$

16. $\{b \mid -2 < b \leq 7\}$



17.

Page 386

18. Sample answer:
n = the number of checks;
$3.5 < 2.5 + 0.1n < 5$;
Between 10 and 25 checks.

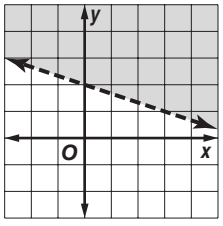
19. $\{-1, 3\}$

20. $\{x \mid x \leq 1$ or $x \geq 2\}$

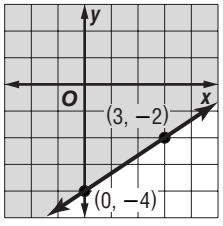
21. $\{-2, 1.5\}$

22. $\left\{w \middle| -3 < w < 2\frac{1}{3}\right\}$

23.

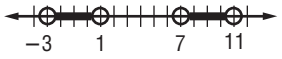


24.



25. $3x + 0.75y \leq 20$;
No, the cost would be more than $20.00.

B:

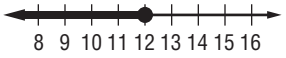


Chapter 6 Assessment Answer Key

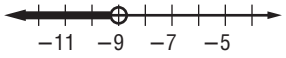
Form 2D

Page 387

1. $\{y \mid y \leq 12\}$



2. $\{m \mid m < -9\}$



3. $\{s \mid s < 9\}$

4. $\{k \mid k \geq 5\}$

5. Sample answer:
n = the number;
$14 > n + 5$; $\{n \mid n < 9\}$

6. $\{h \mid h < 27\}$

7. $\left\{z \mid z < -3\frac{1}{3}\right\}$

8. $\{k \mid k \leq 3.5\}$

9. $\{m \mid m > 6\}$

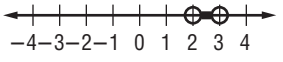
10. $\{f \mid f < 0.25\}$

11. $\{t \mid t \leq -5.5\}$

12. $\{w \mid w > -5\}$

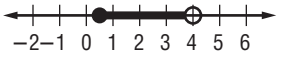
13. $\{x \mid x > -11\}$

14. $\{w \mid 2 < w < 3\}$

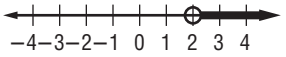


15. $\{w \mid w$ is a real number.$\}$

16. $\{y \mid 0.5 \leq y < 4\}$



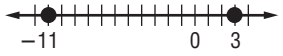
17. $\{x \mid x > 2\}$



Page 388

18. Sample answer:
n = the number of checks;
$5.75 < 3.75 + 0.1n < 7.25$;
Between 20 and 35 checks.

19. $\{-11, 3\}$

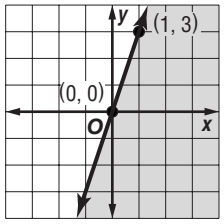


20. $\{w \mid -3 \leq w \leq 5\}$

21. $\{1, 4\}$

22. $\left\{c \mid c < -\frac{1}{3} \text{ or } c > 3\right\}$

23.



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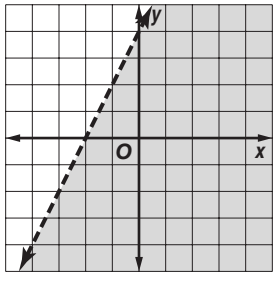


25. $28x + 4y \leq 75$;
No, the cost would be more than $75.00.

B:

Answers

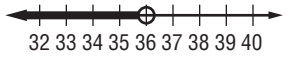
Chapter 6 Assessment Answer Key

Form 3

Page 389

1. $\{m \mid m \geq 9.3\}$

2. $\{t \mid t < 36\}$



3. Sample answer: n = the number; $-\frac{3}{7} + n \geq 2$; $\left\{n \mid n \geq 2\frac{3}{7}\right\}$

4. Sample answer: n = the number; $n - 15 > 2n + 8$; $\{n \mid n < -23\}$

5. $\{w \mid w \leq -10.4\}$

6. $\left\{t \mid t > \frac{9}{11}\right\}$

7. $\{b \mid b < 0.5\}$

8. $\{x \mid x \leq -9\}$

9. $\varnothing$

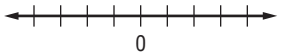
10. Sample answer: j = cost of jeans; $2(19.89) + j \leq 78$; no more than \$38.22

11. Sample answer: n = small positive even integer; $n + n + 2 \leq 15$; 6, 8; 4, 6; 2, 4

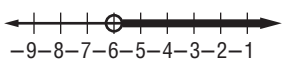
12. Sample answer: s = amount of sales; $32{,}500 \leq 0.1s + 25{,}600 \leq 41{,}900$ between \$69,000 and \$163,000

Page 390

13. $\varnothing$

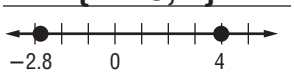


14. $\{n \mid n > -6\}$

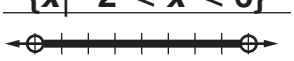


15. $\{x \mid -6 < x \leq 8\}$

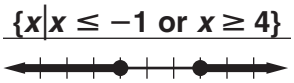
16. $\{-2.8, 4\}$



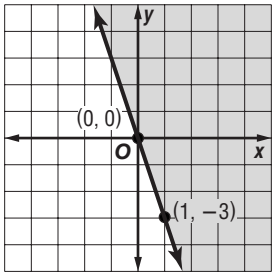
17. $\{x \mid -2 < x < 6\}$



18. $\{x \mid x \leq -1 \text{ or } x \geq 4\}$



19.



20. $16x + 12y \leq 120$; 3

B: false; Sample answer: $x > 3$ and $y > 1$. If $xy < 0$, x and y cannot both be positive so $x > 3$ and $y > 1$ is false.

Chapter 6 Assessment Answer Key

Page 391, Open-Ended Assessment
Scoring Rubric

Score	General Description	Specific Criteria
4	**Superior** A correct solution that is supported by well-developed, accurate explanations	• Shows thorough understanding of the concepts of *using the properties of inequalities, solving inequalities, solving compound inequalities, solving open sentences involving absolute value,* and *graphing inequalities in two variables.* • Uses appropriate strategies to solve problems. • Computations are correct. • Written explanations are exemplary. • Graphs are accurate and appropriate. • Goes beyond requirements of some or all problems.
3	**Satisfactory** A generally correct solution, but may contain minor flaws in reasoning or computation	• Shows an understanding of the concepts of *using the properties of inequalities, solving inequalities, solving compound inequalities, solving open sentences involving absolute value,* and *graphing inequalities in two variables.* • Uses appropriate strategies to solve problems. • Computations are mostly correct. • Written explanations are effective. • Graphs are mostly accurate and appropriate. • Satisfies all requirements of problems.
2	**Nearly Satisfactory** A partially correct interpretation and/or solution to the problem	• Shows an understanding of most of the concepts of *using the properties of inequalities, solving inequalities, solving compound inequalities, solving open sentences involving absolute value,* and *graphing inequalities in two variables.* • May not use appropriate strategies to solve problems. • Computations are mostly correct. • Written explanations are satisfactory. • Graphs are mostly accurate. • Satisfies the requirements of most of the problems.
1	**Nearly Unsatisfactory** A correct solution with no supporting evidence or explanation	• Final computation is correct. • No written explanations or work is shown to substantiate the final computation. • Graphs may be accurate but lack detail or explanation. • Satisfies minimal requirements of some of the problems.
0	**Unsatisfactory** An incorrect solution indicating no mathematical understanding of the concept or task, or no solution is given	• Shows little or no understanding of most of the concepts of *using the properties of inequalities, solving inequalities, solving compound inequalities, solving open sentences involving absolute value,* and *graphing inequalities in two variables.* • Does not use appropriate strategies to solve problems. • Computations are incorrect. • Written explanations are unsatisfactory. • Graphs are inaccurate or inappropriate. • Does not satisfy requirements of problems. • No answer may be given.

Chapter 6 Assessment Answer Key

Page 391, Open-Ended Assessment
Sample Answers

In addition to the scoring rubric found on page A25, the following sample answers may be used as guidance in evaluating open-ended assessment items.

1.

$10n - 7(n + 2) > 5n - 12$	Original inequality
$10n - 7n - 14 > 5n - 12$	Distributive Property
$3n - 14 > 5n - 12$	Combine like terms.
$3n - 14 - 5n > 5n - 12 - 5n$	Subtract $5n$ from each side.
$-2n - 14 > -12$	Simplify.
$-2n - 14 + 14 > -12 + 14$	Add 14 to each side.
$-2n > 2$	Simplify.
$\frac{-2n}{-2} < 2 \div (-2)$	Divide each side by -2.
$n < -1$	Simplify.

The solution set is $\{n \mid n < -1\}$.

2a. After drawing a graph, students should write an inequality that corresponds with the line they have drawn. The inequality may or may not include equality.

2b. The solution set includes the boundary (line) if the inequality written for part **a** includes equality. If the inequality written for part **a** does not include equality, then the student should state that the solution set of the inequality does not include the line.

3. The inequality $ab > 2a$ can be determined to be true or false by considering the value of a. Since $b > 2$, by the Multiplication Property of Inequality $ab > 2a$ is true if a is a positive number.

4a. $|x| = 3$ means the distance from 0 to x is 3 units. The only values for x that satisfy this statement are $x = -3$ and $x = 3$. Thus, the solution set is $\{-3, 3\}$.

4b. The solution set for $|x - 2| > 4$ is $\{x \mid x < -2 \text{ or } x > 6\}$. The solution set for $-2x < 4$ or $x > 6$ is $\{x \mid x > -2\}$. One includes numbers greater than -2, and the other includes numbers less than -2 or greater than 6. These solution sets are not the same.

5a. $w \leq 90 - 2(20)$; $\{w \mid w \leq 50\}$

5b. The formula for the area of a rectangle with 50 substituted for the width can be used to write the compound inequality $2800 \leq 50\ell \leq 3200$. The possible lengths are found by solving this compound inequality for ℓ. The solution set is $\{\ell \mid 56 \leq \ell \leq 64\}$.

5c. $|175{,}000 - x| \leq 20{,}000$;
$155{,}000 \leq x \leq 195{,}000$;
The Fraziers are willing to pay from \$155,000 to \$195,000 for the house.

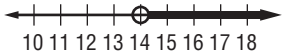
Chapter 6 Assessment Answer Key

Vocabulary Test/Review
Page 392

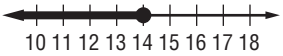
1. true
2. false; equation
3. false; or
4. false; negative
5. true
6. true
7. false; positive
8. true
9. true
10. false; intersection
11. Multiply both sides of the inequality by $-\frac{3}{2}$ and change $\geq$ to $\leq$.

Quiz (Lessons 6–1 and 6–2)
Page 393

1. $\{n \mid n > 14\}$



2. $\{w \mid w \leq -14\}$



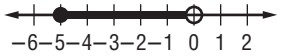
3. $\{r \mid r > 0\}$
4. $\left\{m \middle| m \geq \frac{1}{2}\right\}$
5. Sample answer:
   n = the number;
   $n - 7 \geq 15$; $\{n \mid n \geq 22\}$
6. $\{m \mid m > -78\}$
7. $\left\{r \middle| r < 1\frac{1}{15}\right\}$
8. $\{n \mid n \geq -28\}$
9. $\{w \mid w \leq -2.3\}$
10. B

Quiz (Lesson 6–3)
Page 393

1. $\{d \mid d \leq -100\}$
2. $\{y \mid y > 3\}$
3. $\{y \mid y > 1\}$
4. $\varnothing$
5. Sample answer:
   n = the number;
   $n + 3 < 19 - n$; $\{n \mid n < 8\}$

Quiz (Lessons 6–4 and 6–5)
Page 394

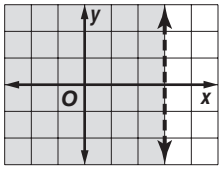
1. $\{x \mid -5 \leq x < 0\}$

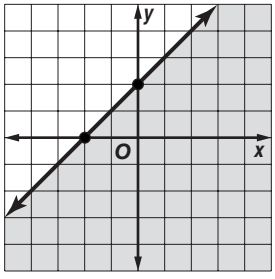


2. $\{y \mid y \leq 5 \text{ or } y \geq 6\}$

3. Sample answer:
   x = the number;
   $16 < 8x < 40$; $\{x \mid 2 < x < 5\}$
4. $\{-4, -1\}$
5. $|x| \geq 1$

Quiz (Lesson 6–6)
Page 394

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

3. 

4. $35x + 25y \leq 230$;
   No, the cost is greater than $230.

Answers

Chapter 6 Assessment Answer Key

Mid-Chapter Test
Page 395

1. C

2. D

3. B

4. C

5. $\{t \mid t < 15.2\}$

6. $\left\{v \mid v < \frac{4}{9}\right\}$

7. Sample answer: ℓ = length; $\ell + 63 \leq 85$; 22 in. or less

8. Sample answer: a = no. of apples; $6a \geq 50$; at least $8\frac{1}{3}$ apples

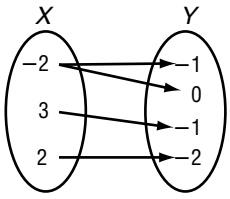
Cumulative Review
Page 396

1. $32y + 38$

2. whole number, integer, rational number

3. $\frac{2}{9}$

4. decrease; 25%

5. 

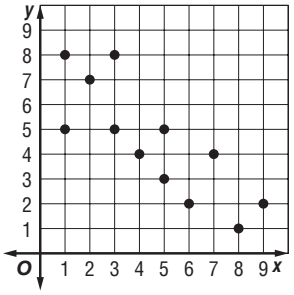
{(1, −2), (−1, 3), (−2, 2), (0, −2)}

6. yes; common difference is 3

7. $-\frac{8}{7}$

8. $d = 55t$; 275 miles

9. $y = 3x + 5$

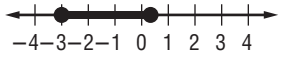
10. 

negative correlation

11. $\{r \mid r < 3\}$;


12. $\{u \mid u \geq 18\}$

13. let n = the number; $2n - 7 \leq -5$ or $2n - 7 > 13$; $\{n \mid n \leq 1 \text{ or } n > 10\}$

14. $\left\{x \mid -3 \leq x \leq \frac{1}{3}\right\}$;


Chapter 6 Assessment Answer Key

Standardized Test Practice

Page 397

1. A B **C** D

2. E F G **H**

3. **A** B C D

4. **E** F G H

5. A B **C** D

6. E F G **H**

7. A B C **D**

8. E **F** G H

9. A B **C** D

Page 398

10.

7	/	2	
.	/	/	
.	.	.	.
	0	0	0
1	1	1	1
2	2	**2**	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

11.

6	.	7	5
.	/	/	
.	**.**	.	.
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	**5**
6	6	6	6
7	7	**7**	7
8	8	8	8
9	9	9	9

12.

8			
.	/	/	
.	.	.	.
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

13.

2	5		
.	/	/	
.	.	.	.
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	**5**	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

14. **A** B C D

15. **A** B C D

16. A B C **D**

Answers

Chapter 6 Assessment Answer Key

First Semester Test

Page 399

1. D
2. A
3. D
4. C
5. B
6. C
7. A
8. D
9. B
10. A

Page 400

11. B
12. D
13. C
14. C
15. B
16. A
17. D
18. C
19. B
20. B

(continued on the next page)

Chapter 6 Assessment Answer Key

First Semester Test *(continued)*

Page 401

21. 11

22. {1, 2, 3}

23. Additive Inverse Property; −5

24. $1.8x + 10.9y$

25. You could visit an art gallery that has no paintings by Monet.

26. {−1, 0, 1, 2, 3, 4, 5, 6, ...}

27. $-28xy + 4uv$

28. 4.4

29. 3:1

30. 36

31. 2

32. $\frac{4}{5}$

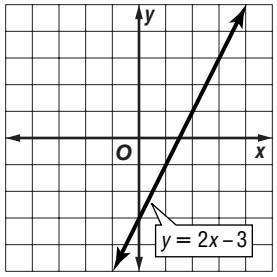
33. increase; 15%

34. 310 mph

35. dilation

Page 402

36. {(−4, 2), (−4, −3), (0, −3), (2, 0), (3, 1)}; {(2, −4), (−3, −4), (−3, 0), (0, 2), (1, 3)}

37. 

38. $a_n = 4n + 3$

39. $C = 1.9n$

40. $\frac{3}{4}$; −2; $\frac{8}{3}$

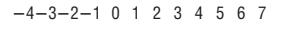
41. 1

42. negative correlation

43. Sample answer using (4, 80) and (10, 29): $y = -\frac{17}{2}x + 114$

44. $\{t \mid t < 3\}$

45. $\{x \mid x \geq -2\}$

46. $\{x \mid x < -2 \text{ or } x \geq 5\}$;


47. {−10, 3}

Answers