

Chapter 3

Resource Masters



Mathematics

Applications and Concepts

Course 2



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.

<i>Study Guide and Intervention Workbook</i>	0-07-860128-2
<i>Study Guide and Intervention Workbook (Spanish)</i>	0-07-860134-7
<i>Practice: Skills Workbook</i>	0-07-860129-0
<i>Practice: Skills Workbook (Spanish)</i>	0-07-860135-5
<i>Practice: Word Problems Workbook</i>	0-07-860130-4
<i>Practice: Word Problems Workbook (Spanish)</i>	0-07-860136-3
<i>Reading to Learn Mathematics Workbook</i>	0-07-861058-3

Answers for Workbooks The answers for Chapter 3 of these workbooks can be found in the back of this Chapter Resource Masters booklet.

Spanish Assessment Masters Spanish versions of forms 2A and 2C of the Chapter 3 Test are available in the *Glencoe Mathematics: Applications and Concepts Spanish Assessment Masters, Course 2* (0-07-860138-X).

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Mathematics: Applications and Concepts, Course 2
Chapter 3 Resource Masters

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Teacher's Guide to Using the *Chapter 3 Resource Masters*

The **Fast File** Chapter Resource system allows you to conveniently file the resources you use most often. The *Chapter 3 Resource Masters* includes the core materials needed for Chapter 3. 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 *Glencoe Mathematics: Applications and Concepts, Course 2, 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 3-1. Encourage them to add these pages to their mathematics study notebook. Remind them to add definitions and examples as they complete each lesson.

Family Letter and Family Activity Page ix is a letter to inform your students' families of the requirements of the chapter. The family activity on page x helps them understand how the mathematics students are learning is applicable to real life.

When to Use Give these pages to students to take home before beginning the chapter.

Study Guide and Intervention There is one Study Guide and Intervention master for each lesson in Chapter 3.

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.

Practice: Skills There is one master for each lesson. These provide practice that more closely follows the structure of the Practice and Applications section of the Student Edition exercises.

When to Use These provide additional practice options or may be used as homework for second day teaching of the lesson.

Practice: Word Problems There is one master for each lesson. These provide practice in solving word problems that apply the concepts of the lesson.

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 3 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 **Extended-Response 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 *Glencoe Mathematics: Applications and Concepts, Course 2*. It can also be used as a test. This master includes free-response questions.
- The **Standardized Test Practice** offers continuing review of pre-algebra concepts in various formats, which may appear on the standardized tests that they may encounter. This practice includes multiple-choice, short response, grid-in, and extended response 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 146–147. This improves students' familiarity with the answer formats they may encounter in test taking.
- Detailed rubrics for assessing the extended response questions on page 147 are provided on page A2.
- 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.

Reading to Learn Mathematics

Vocabulary Builder

This is an alphabetical list of new vocabulary terms you will learn in Chapter 3. As you study the chapter, complete each term's definition or description. Remember to add the page number where you found the term. Add this page to your math study notebook to review vocabulary at the end of the chapter.

Vocabulary Term	Found on Page	Definition/Description/Example
absolute value		
additive inverse		
coordinate grid		
coordinate plane		
graph		
integer [IHN-tih-juhr]		
negative integer		
opposite		

Reading to Learn Mathematics**Vocabulary Builder** (continued)

Vocabulary Term	Found on Page	Definition/Description/Example
ordered pair		
origin		
positive integer		
quadrant		
x -axis		
x -coordinate		
y -axis		
y -coordinate		

Family Letter

Dear Parent or Guardian:

"When am I ever going to use this stuff?" Students in math classes often ask this question. Integers are everywhere. We use them for golf scores. We use them when finding elevation, balancing a checkbook, or talking about temperature. There are many practical uses of integers.

In **Chapter 3, Algebra: Integers**, your child will learn how to order, add, subtract, multiply, divide, and find the absolute value of integers. Your child will also learn about the coordinate system and how to graph points. In the study of this chapter, your child will complete a variety of daily classroom assignments and activities and possibly produce a chapter project.

By signing this letter and returning it with your child, you agree to encourage your child by getting involved. Enclosed is an activity you can do with your child that also relates the math we will be learning in Chapter 3 to the real world. You may also wish to log on to the **Online Study Tools** for self-check quizzes, Parent and Student Study Guide pages, and other study help at www.msmath2.net. If you have any questions or comments, feel free to contact me at school.

Sincerely,

Signature of Parent or Guardian _____ Date _____

Family Activity

Ordering Integers

Consult a newspaper, watch the news, surf the Internet, or watch the weather channel with a family member. Find the high and low temperatures on the same day for eight cities: Buenos Aires, Moscow, Zurich, Tokyo, New York, Denver, Los Angeles, and your community. Record the date and the temperatures in the table.

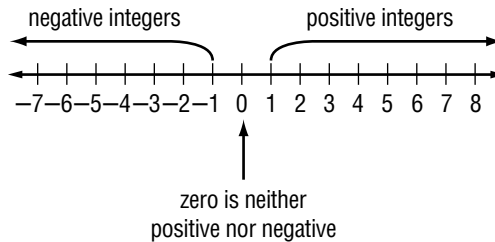
High and Low Temperatures on _____

City	High Temperature (°F)	Low Temperature (°F)
Buenos Aires		
Moscow		
Zurich		
Tokyo		
New York		
Denver		
Los Angeles		

- Which city has the highest high temperature?
- Which city has the lowest low temperature?
- List the cities in order from lowest high temperature to highest high temperature.
- List the cities in order from lowest low temperature to highest low temperature.
- Were the cities in the same order in the answers for Questions 3 and 4? Why or why not?

3-1**Study Guide and Intervention****Integers and Absolute Value**

Integers less than zero are **negative integers**. Integers greater than zero are **positive integers**.



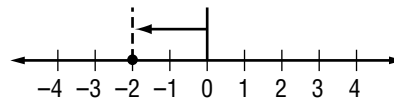
The absolute value of an integer is the distance the number is from zero on a number line. Two vertical bars are used to represent absolute value. The symbol for absolute value of 3 is $|3|$.

EXAMPLE 1 Write an integer that represents 160 feet below sea level.

Because it represents *below* sea level, the integer is -160 .

EXAMPLE 2 Evaluate $|-2|$.

On the number line, the graph of -2 is 2 units away from 0. So, $|-2| = 2$.

**EXERCISES**

Write an integer for each situation.

- | | |
|---------------------------------|-------------------|
| 1. 12°C above 0 | 2. a loss of \$24 |
| 3. a gain of 20 pounds | 4. falling 6 feet |

Evaluate each expression.

- | | |
|------------|-------------|
| 5. $ 12 $ | 6. $ -150 $ |
| 7. $ -8 $ | 8. $ 75 $ |
| 9. $ -19 $ | 10. $ 84 $ |

3-1**Practice: Skills*****Integers and Absolute Value*****Write an integer for each situation.**

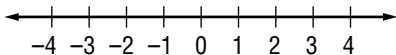
1. 15°C below 0
2. a profit of \$27
3. 2010 A.D.
4. average attendance is down 38 people
5. 376 feet above sea level
6. a withdrawal of \$200
7. 3 points lost
8. a bonus of \$150
9. a deposit of \$41
10. 240 B.C.
11. a wage increase of \$120
12. 60 feet below sea level

Evaluate each expression.

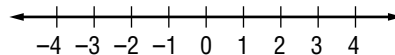
13. $|-1|$
14. $|9|$
15. $|23|$
16. $|-107|$
17. $|-45|$
18. $|19|$
19. $|0|$
20. $|6| - |-2|$
21. $|-8| + |4|$
22. $|-12| - |12|$

Graph each set of integers on a number line.

23. $\{0, 2, -3\}$



24. $\{-4, -1, 3\}$



3-1**Practice: Word Problems*****Integers and Absolute Value***

<p>1. DEATH VALLEY The lowest point in the United States is Death Valley in California. Its altitude is 282 feet below sea level. Write an integer to represent the altitude of Death Valley.</p>	<p>2. RAIN A meteorologist reported that in the month of April there were 3 inches more rainfall than normal. Write an integer to represent the amount of rainfall above normal in April.</p>
<p>3. ARCHIMEDES A famous mathematician and physicist named Archimedes was born in 287 B.C. Write an integer to express the year of his birth.</p>	<p>4. TEMPERATURE In our world's tropical rain forests, the average temperature of every month is 64 degrees above zero or higher. Write an integer to express this temperature.</p>
<p>5. STOCK MARKET A certain stock gained 5 points in one day and lost 4 points the next day. Write integers to represent the stock's gains and losses for the two days.</p>	<p>6. ALTITUDE An airplane pilot changed his altitude by 100 meters. Describe what this could mean.</p>

3-1**Reading to Learn Mathematics*****Integers and Absolute Value***

Pre-Activity *Read the introduction at the top of page 106 in your textbook. Write your answers below.*

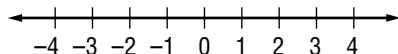
1. What does a value of -2 represent?
2. On which down did they lose the most yards?
3. How can you represent a gain of 9 yards?

Reading the Lesson

4. Express each of the following in words.

Symbols	Words
+7	
-7	
7	

5. On the following number line, draw a circle around the negative integers and label them *negative*. Draw a rectangle around the positive integers and label them *positive*.

**Helping You Remember**

6. Show a classmate how a number line can be used to show negative and positive integers. Explain the difference between some integers and the absolute values of those integers. Draw a number line to show what you mean.

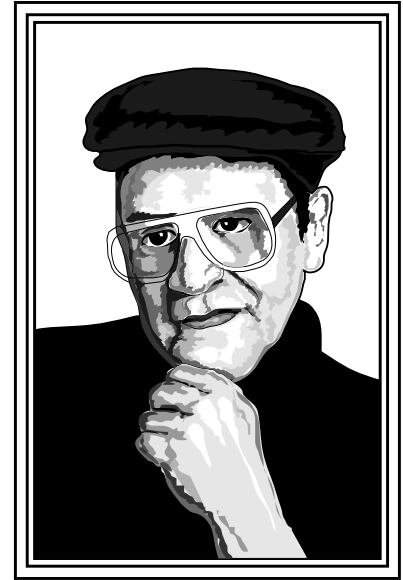
3-1**Enrichment****Jaime Escalante**

Jaime Escalante (1930–) was born in La Paz, Bolivia, and came to the United States in 1963. For ten years, he worked at odd jobs to support himself and his family while pursuing his dream—becoming certified to teach high school mathematics in California. As a mathematics teacher, he has become well known for his ability to inspire students to succeed in mathematics at levels they never thought possible. In 1988, the story of Mr. Escalante and a group of his students was the subject of the popular motion picture *Stand and Deliver*.

Mr. Escalante teaches concepts students must master if they are to succeed in high school and college mathematics. One of these is the concept of absolute value. For instance, a student should be able to solve an equation like $|y| = 6$ quickly using mental math. Here's how.

You know that $|6| = 6$ and $|-6| = 6$.

So, the equation $|y| = 6$ has *two* solutions: 6 and -6 .



Solve each equation. (Hint: One equation has no solution.)

1. $|a| = 8$

2. $|r| = 0$

3. $|j| = -3$

4. $|t| + 1 = 15$

5. $10 - |m| = 3$

6. $|c| - 4 = 16$

7. $5|z| = 60$

8. $12 \div |g| = 4$

9. $48 = 8|x|$

10. $2|d| + 3 = 5$

11. $4|p| - 9 = 59$

12. $7|z| + 12 = 12$

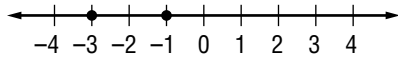
13. Suppose that the value of x can be selected from the set $\{-2, -1, 0, 1, 2\}$. Find all of the solutions of the equation $|x| = x$.

14. One of these statements is false. Which one is it? Explain.

- The absolute value of every integer is positive.
- There is at least one integer whose absolute value is zero.
- The absolute value of an integer is never negative.

3-2**Study Guide and Intervention****Comparing and Ordering Integers**

When two numbers are graphed on a number line, the number to the left is always less than ($<$) the number to the right. The number to the right is always greater than ($>$) the number to the left.

Model**Words**

-3 is less than -1 . -1 is greater than -3 .

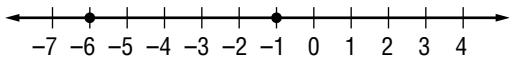
Symbols

$-3 < -1$ $-1 > -3$

The symbol points to the lesser number.

EXAMPLE 1 Replace the \bullet with $<$ or $>$ to make $-1 \bullet -6$ a true sentence.

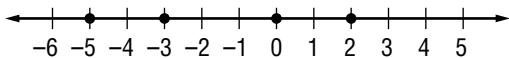
Graph each integer on a number line.



Since -1 is to the right of -6 , $-1 > -6$.

EXAMPLE 2 Order the integers $2, -3, 0, -5$ from least to greatest.

To order the integers, graph them on a number line.



Order the integers by reading from left to right: $-5, -3, 0, 2$.

EXERCISES

1. Replace the \bullet with $<$ or $>$ to make $-5 \bullet -10$ a true sentence.
2. Order $-1, 5, -3,$ and 2 from least to greatest.
3. Order $0, -4, -2,$ and 7 from greatest to least.
4. Order $-3, |-2|, 4, 0,$ and -5 from greatest to least.

3-2**Practice: Skills****Comparing and Ordering Integers**

Replace each ● with $<$ or $>$ to make a true sentence.

1. $-15 \bullet -16$

2. $-8 \bullet -7$

3. $0 \bullet -2$

4. $-2 \bullet -5$

5. $-25 \bullet 3$

6. $-14 \bullet |-20|$

7. $|-4| \bullet 3$

8. $|-6| \bullet |-7|$

9. $|-7| \bullet |2|$

10. $-8 \bullet |-9|$

Determine whether each sentence is *true* or *false*. If *false*, change one number to make the sentence true.

11. $-7 < 3$

12. $2 > 0$

13. $-20 < -22$

14. $12 < 15$

15. $3 > |-5|$

16. $|-2| < -3$

17. $|8| < |-10|$

18. $|-11| = 11$

19. $-4 < 4$

20. $|-9| < |-10|$

Order the integers from least to greatest.

21. 12, -6, 20, -47, -11

22. 9, -6, 0, -4, 17, -11

Order the integers from greatest to least.

23. -40, 65, -7, 24, -6, 15

24. $|-13|$, 0, 7, -8, -5, $|2|$

3-2**Practice: Word Problems****Comparing and Ordering Integers**

HISTORY OF WRITING For Exercises 1 and 2, use the table below. It shows important events in the history of writing.

Event	Aprox. Year
The <i>Iliad</i> and the <i>Odyssey</i> are composed by Homer.	700 BC
T'sai Lun invents paper.	105 AD
Date of oldest existing papyrus	2200 BC
Ovid wrote <i>Metamorphosis</i> .	5 AD
Torah is compiled.	450 BC
Metal type developed in Korea	1241 AD

EXTREME TEMPERATURES For Exercises 3–5, use the table below. It shows the extreme temperatures for four states. Temperatures are in degrees Fahrenheit.

Extreme Temperatures (°F)

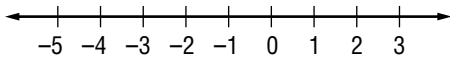
State	Highest	Lowest
Alabama	104	3
Nebraska	118	-47
Maine	101	-30
Florida	109	-2

1. Write each year as an integer.	2. Order the integers from Exercise 1 from least to greatest. Write a sentence describing the earliest and most recent events in the table.
3. Arrange the highest temperatures from greatest to least.	4. What is the median low temperature for these four states?
5. Nebraska's lowest temperature was -47°F , and Maine's lowest temperature was -30°F . Write a true statement using the two temperatures with the symbol $>$ or $<$.	6. MONEY Mr. Firewalks pays close attention to how much money is in his checking account. One week he deposited \$230, spent \$15 on a lunch, and loaned \$25 to a friend. Write each transaction as an integer, and list them from least to greatest.

3-2**Reading to Learn Mathematics****Comparing and Ordering Integers**

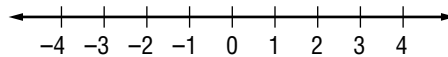
Pre-Activity *Read the introduction at the top of page 109 in your textbook. Write your answers below.*

1. What is the wind chill if there is a wind at 20 miles per hour and the temperature is 5° ?
2. Which is colder, a temperature of 15° with a 20 mile-per-hour wind or a temperature of 10° with a 10 mile-per-hour wind?
3. Graph both wind chills found in Exercise 2 on a number line.

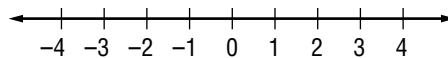
**Reading the Lesson**

For Exercises 4 and 5, express each of the following in words. Then graph the numbers on a number line.

4. $-1 < 0$



5. $3 > -2$



6. When two numbers are graphed on a number line, what can you tell about the number to the left? the number to the right?

Helping You Remember

7. Write a set of six numbers, some positive and some negative. Explain how you can use a number line to order the numbers from least to greatest.

3-2**Enrichment****Quantitative Comparisons**

An unusual type of problem is found on some standardized multiple-choice tests. This problem type is called the *quantitative comparison*.

In each quantitative comparison question, you are given two quantities, one in Column A and one in Column B. You are to compare the two quantities and shade one of four circles on an answer sheet.

- Shade circle A if the quantity in Column A is greater;
 Shade circle B if the quantity in Column B is greater;
 Shade circle C if the two quantities are equal;
 Shade circle D if the relationship cannot be determined from the information given.

Shade the correct oval to the left of each problem number.

	Column A	Column B
(A) (B) (C) (D) 1.	$0.006 + 2$	$0.002 + 6$
(A) (B) (C) (D) 2.	ten billion dollars	1,000 million dollars
(A) (B) (C) (D) 3.	20 inches	the perimeter of a square with an area of 25 square inches
(A) (B) (C) (D) 4.	half of one third	one fifth
(A) (B) (C) (D) 5.	the greatest possible product of two odd positive numbers less than 20	the greatest possible product of two even positive numbers less than 20
(A) (B) (C) (D) 6.	0.000000001	$-x$ is x if greater than 0
(A) (B) (C) (D) 7.	$ x $	$ x + 1 $
(A) (B) (C) (D) 8.	$ y $	$ -y $
(A) (B) (C) (D) 9.	$2 x $ if $x \neq 0$	$ x $ if $x \neq 0$
(A) (B) (C) (D) 10.	$-x$ if x is less than 0	$ x $ if x is less than 0

3-3

Study Guide and Intervention

The Coordinate Plane

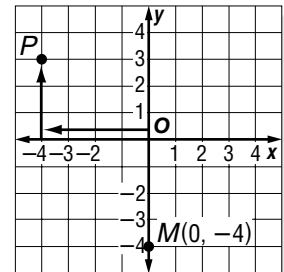
The **coordinate plane** is used to locate points. The horizontal number line is the **x-axis**. The vertical number line is the **y-axis**. Their intersection is the **origin**.

Points are located using **ordered pairs**. The first number in an ordered pair is the **x-coordinate**; the second number is the **y-coordinate**.

The coordinate plane is separated into four sections called **quadrants**.

EXAMPLE 1 Name the ordered pair for point P. Then identify the quadrant in which P lies.

- Start at the origin.
 - Move 4 units left along the x-axis.
 - Move 3 units up on the y-axis.
- The ordered pair for point P is $(-4, 3)$.
P is in the upper left quadrant or quadrant II.



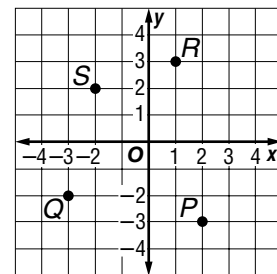
EXAMPLE 2 Graph and label the point $M(0, -4)$.

- Start at the origin.
- Move 0 units along the x-axis.
- Move 4 units down on the y-axis.
- Draw a dot and label it $M(0, -4)$.

EXERCISES

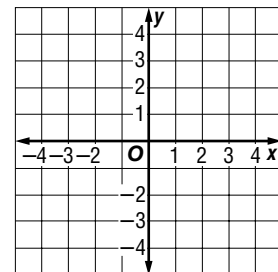
Name the ordered pair for each point graphed at the right. Then identify the quadrant in which each point lies.

- | | |
|------|------|
| 1. P | 2. Q |
| 3. R | 4. S |



Graph and label each point on the coordinate plane.

- | | |
|---------------|----------------|
| 5. $A(-1, 1)$ | 6. $B(0, -3)$ |
| 7. $C(3, 2)$ | 8. $D(-3, -1)$ |
| 9. $E(1, -2)$ | 10. $F(1, 3)$ |

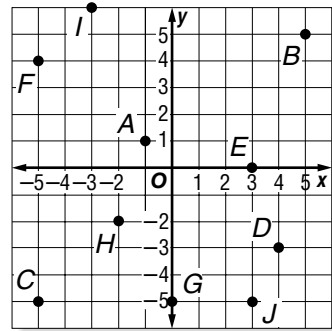


3-3

Practice: Skills

The Coordinate Plane

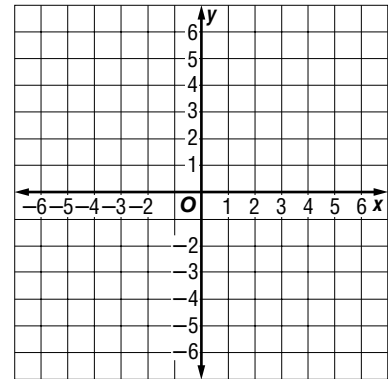
Name the ordered pair for each point graphed at the right. Then identify the quadrant in which each point lies.



- | | |
|-------------|--------------|
| 1. <i>A</i> | 2. <i>B</i> |
| 3. <i>C</i> | 4. <i>D</i> |
| 5. <i>E</i> | 6. <i>F</i> |
| 7. <i>G</i> | 8. <i>H</i> |
| 9. <i>I</i> | 10. <i>J</i> |

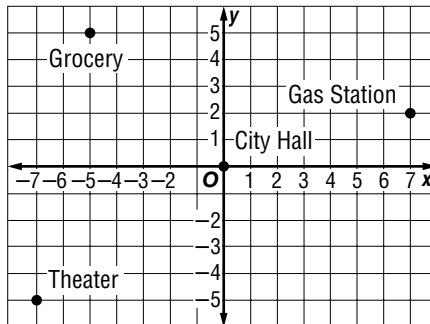
Graph and label each point on the coordinate plane.

- | | |
|-----------------|----------------|
| 11. $N(-1, 3)$ | 12. $V(2, -4)$ |
| 13. $C(4, 0)$ | 14. $P(-6, 2)$ |
| 15. $M(-5, 0)$ | 16. $K(-1, 5)$ |
| 17. $I(-3, -3)$ | 18. $A(5, -3)$ |
| 19. $D(0, -5)$ | |



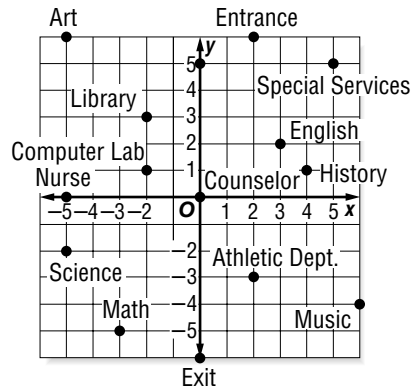
Name the ordered pair for each point on the city map at the right.

20. City Hall
21. Theater
22. Gas Station
23. Grocery



3-3**Practice: Word Problems****The Coordinate Plane**

SCHOOL For Exercises 1–4, use the coordinate plane at the right. It shows a map of the rooms in a junior high school.



<p>1. Thalia is in the room located at $(-2, 1)$. What room is she in? Describe in words how to get from the origin to this point.</p>	<p>2. Thalia's next class is 8 units to the right and 5 units down on the map from where she is now. In what room is Thalia's next class? Find the ordered pair that represents the location of that room.</p>
<p>3. Tyrone is in the Art room, but his next class is in the History room. Give Tyrone directions on how to get to the History room.</p>	<p>4. On the map, which classrooms are located in the third quadrant? Describe the coordinates of all points in the third quadrant.</p>
<p>5. NEIGHBORHOOD Delsin made a map of his neighborhood in such a way that each intersection is a point on a coordinate plane. Right now, Delsin stands at point $(-4, -3)$. Give the ordered pair of where he will be if moves 5 units to the right and 7 units up on the map.</p>	<p>6. NEIGHBORHOOD Refer to Exercise 5. In which quadrant is Delsin when he is done walking? Describe this quadrant.</p>

3-3**Reading to Learn Mathematics****The Coordinate Plane**

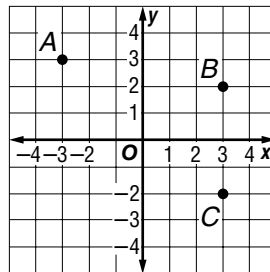
Pre-Activity *Read the introduction at the top of page 112 in your textbook. Write your answers below.*

- Suppose Terrell starts at the corner of Russel and Main and walks 1 block north and 2 blocks east. Name the intersection of his location.
- Using the words *north*, *south*, *west*, and *east*, write directions to go from the corner of School and Highland to the corner of Main and Oak.

Reading the Lesson

- The word *coordinate* comes from two Latin words that mean “to arrange together.” How are coordinates used together to locate a point in a coordinate plane?

- Look at the coordinate plane at the right. Name the ordered pair for each point graphed.



- In the coordinate plane in Exercise 4, tell which quadrant each of the points is in.

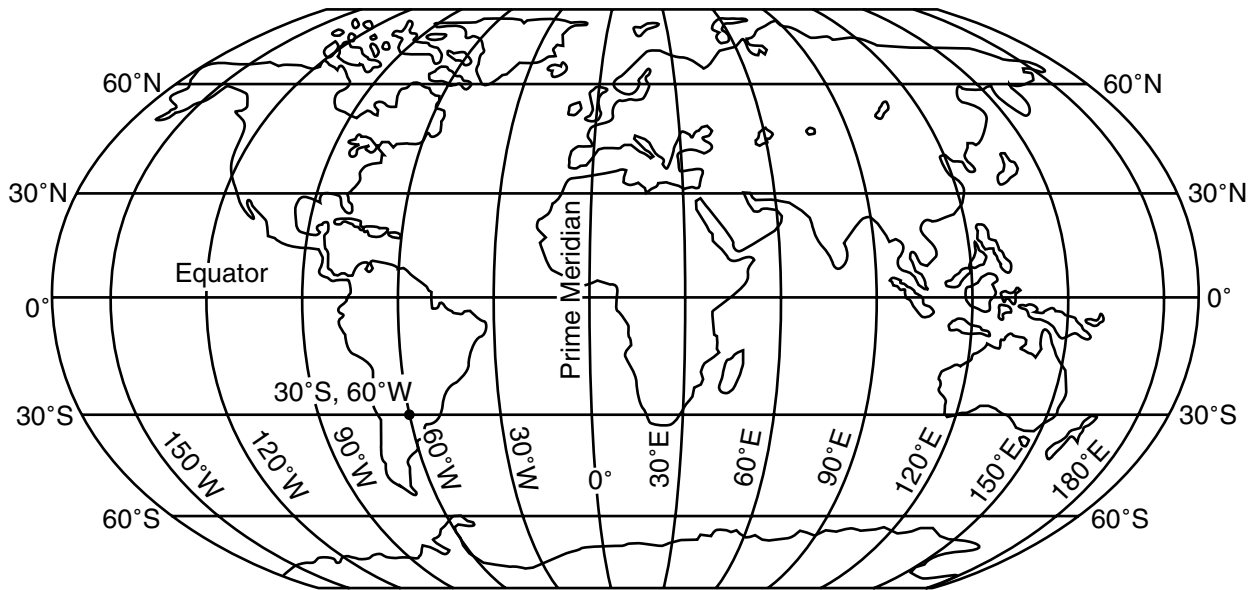
Helping You Remember

- Write a way to remember the names of the four quadrants of the coordinate plane.

3-3**Enrichment****Latitude and Longitude**

This world map shows some of the latitude and longitude lines. Latitude is measured in degrees north and south of the equator. Longitude is measured in degrees east and west of the prime meridian, a line passing through Greenwich, England. (Greenwich is a suburb of London.)

The latitude is usually given first. For example, the location of 30°S , 60°W is lower South America.



Name a place near each location. Use an atlas or other reference source to check your answers.

- | | | |
|---|--|---|
| 1. 30°N , 30°W | 2. 30°S , 30°E | 3. 60°N , 120°W |
| 4. 15°N , 150°W | 5. 30°S , 140°E | 6. 25°N , 100°W |
| 7. 40°N , 120°W | 8. 45°N , 90°W | 9. 40°N , 5°W |
| 10. 60°N , 45°W | 11. 35°N , 140°E | 12. 0° , 60°E |

3-4**Study Guide and Intervention****Adding Integers**

For integers with the same sign:

- the sum of two positive integers is positive.
- the sum of two negative integers is negative.

For integers with different signs, subtract their absolute values. The sum is:

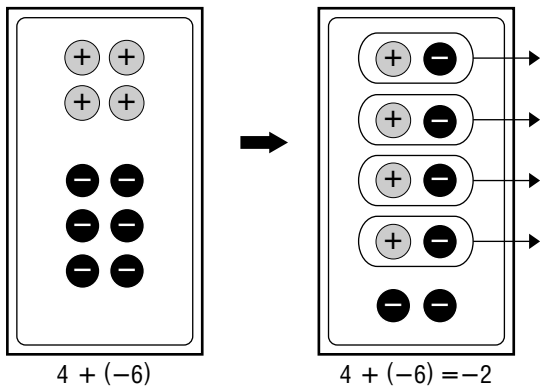
- positive if the positive integer has the greater absolute value.
- negative if the negative integer has the greater absolute value.

To add integers, it is helpful to use counters or a number line.

EXAMPLE 1 Find $4 + (-6)$.

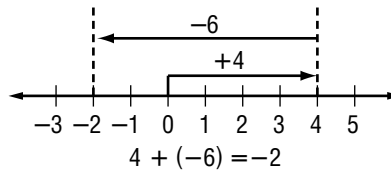
Method 1 Use counters.

Combine a set of 4 positive counters and a set of 6 negative counters on a mat.



Method 2 Use a number line.

- Start at 0.
- Move 4 units right.
- Then move 6 units left.

**EXERCISES**

Add.

1. $-5 + (-2)$

2. $8 + 1$

3. $-7 + 10$

4. $16 + (-11)$

5. $-22 + (-7)$

6. $-50 + 50$

7. $-10 + (-10)$

8. $100 + (-25)$

9. $-35 + -20$

Evaluate each expression if $a = 8$, $b = -8$, and $c = 4$.

10. $a + 15$

11. $b + (-9)$

12. $a + b$

13. $b + c$

14. $-10 + c$

15. $12 + b$

3-4**Practice: Skills*****Adding Integers***

Tell whether each sum is positive, negative, or zero without adding.

Add.

1. $5 + (-8)$

2. $-3 + 3$

3. $-3 + (-8)$

4. $-7 + (-7)$

5. $-8 + 10$

6. $-7 + 13$

7. $15 + (-10)$

8. $-11 + (-12)$

9. $25 + (-12)$

10. $-14 + (-13)$

11. $14 + (-27)$

12. $-28 + 16$

Evaluate each expression if $a = -8$, $b = 12$, and $c = -4$.

13. $5 + a$

14. $b + (-9)$

15. $c + (-5)$

16. $a + b$

17. $a + 0$

18. $b + c$

19. $-12 + b$

20. $a + (-7)$

21. $21 + c$

22. $a + c$

3-4**Practice: Word Problems*****Adding Integers***

Write an addition expression to describe each situation. Then find each sum.

<p>1. FOOTBALL A team gains 20 yards. Then they lose 7 yards.</p>	<p>2. MONEY Roger owes his mom \$5. He borrows another \$6 from her.</p>
<p>3. GOLF Juanita's score was 5 over par on the first 9 holes. Her score was 4 under par on the second 9 holes.</p>	<p>4. HOT AIR BALLOON A balloon rises 340 feet into the air. Then it descends 130 feet.</p>
<p>5. CYCLING A cyclist travels downhill for 125 feet. Then she travels up a hill 50 feet.</p>	<p>6. AIRPLANE A plane descends 1,200 feet. Then it descends another 500 feet.</p>

3-4**Reading to Learn Mathematics*****Adding Integers***

Pre-Activity *Read the introduction at the top of page 120 in your textbook. Write your answers below.*

1. What is the charge at the top of a cloud where there are more protons than electrons?
2. What is the charge at the bottom of a cloud where there are more electrons than protons?

Reading the Lesson

For Exercises 3 and 4, tell how you would solve each of the following on a number line. Then solve.

3. $-7 + (-9)$
4. $-7 + 9$
5. When you use counters to add integers, what property are you applying when you remove zero pairs?
6. How many units away from 0 is the number 17? How many units away from 0 is the number -17 ? What are 17 and -17 called?

Helping You Remember

7. Work with a partner. Tell your partner how to use absolute values to add integers with different signs when the positive integer has the greater absolute value. Then have your partner explain to you how to use absolute values to add integers with different signs when the negative integer has the greater absolute value.

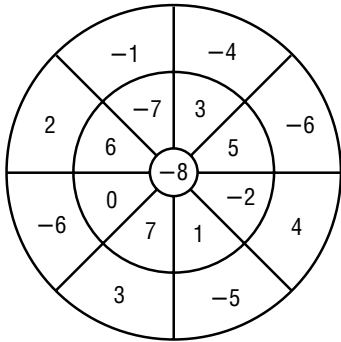
3-4

Enrichment

Dartboard Puzzles

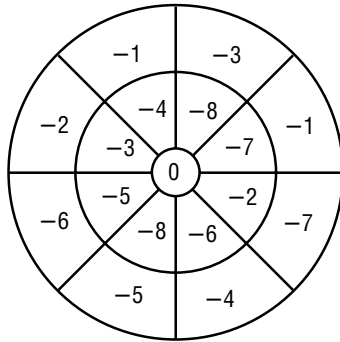
Three darts are thrown. Each dart must land on a different space in order to count. Find the highest and the lowest possible scores.

1.



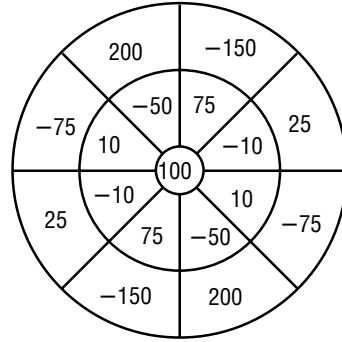
highest score:
lowest score:

2.



highest score:
lowest score:

3.

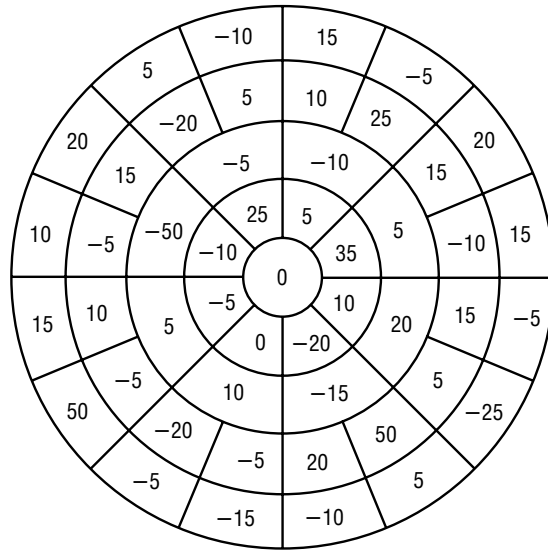
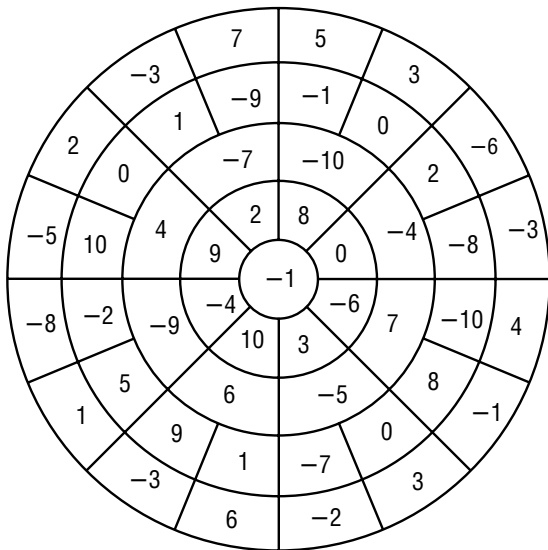


highest score:
lowest score:

In these problems, five darts are thrown. Each dart must land on a different space in order to count. Solve each puzzle.

4. Find three ways to make the score -5 .

5. Find three ways to make the score 0.



3-5**Study Guide and Intervention*****Subtracting Integers***

To subtract an integer, add its opposite.

EXAMPLE 1 Find $6 - 9$.

$$\begin{aligned} 6 - 9 &= 6 + (-9) \\ &= -3 \end{aligned}$$

To subtract 9, add -9 .
Simplify.

EXAMPLE 2 Find $-10 - (-12)$.

$$\begin{aligned} -10 - (-12) &= -10 + 12 \\ &= 2 \end{aligned}$$

To subtract -12 , add 12.
Simplify.

EXAMPLE 3 Evaluate $a - b$ if $a = -3$ and $b = 7$.

$$\begin{aligned} a - b &= -3 - 7 \\ &= -3 + (-7) \\ &= -10 \end{aligned}$$

Replace a with -3 and b with 7.
To subtract 7, add -7 .
Simplify.

EXERCISES**Subtract.**

1. $7 - 9$

2. $20 - (-6)$

3. $-10 - 4$

4. $0 - 12$

5. $-7 - 8$

6. $13 - 18$

7. $-20 - (-5)$

8. $-8 - (-6)$

9. $25 - (-14)$

10. $-75 - 50$

11. $15 - 65$

12. $19 - (-10)$

Evaluate each expression if $m = -2$, $n = 10$, and $p = 5$.

13. $m - 6$

14. $9 - n$

15. $p - (-8)$

16. $p - m$

17. $m - n$

18. $-25 - p$

3-5**Practice: Skills*****Subtracting Integers*****Subtract.**

1. $5 - 2$

2. $6 - (-7)$

3. $-3 - 2$

4. $8 - 13$

5. $-7 - (-7)$

6. $6 - 12$

7. $15 - (-7)$

8. $-15 - 6$

9. $-3 - 8$

10. $-10 - 12$

11. $13 - (-12)$

12. $14 - (-22)$

13. $10 - (-20)$

14. $-16 - 14$

15. $-25 - 25$

16. $6 - (-31)$

17. $-18 - (-40)$

18. $15 - (-61)$

Evaluate each expression if $r = -4$, $s = 10$, and $t = -7$.

19. $r - 7$

20. $t - s$

21. $s - (-8)$

22. $t - r$

23. $s - t$

24. $r - s$

3-5**Practice: Word Problems*****Subtracting Integers*****Subtract.**

<p>1. FOOTBALL A team gained 5 yards on their first play of the game. Then they lost 6 yards. Find the total change in yardage.</p>	<p>2. CHECKING Your checking account is overdrawn by \$50. You write a check for \$20. What is the balance in your account?</p>
<p>3. TEMPERATURE The average temperature in Calgary, Canada, is 22°C in July and -11°C in January. Find the range of the highest and lowest temperatures in Calgary.</p>	<p>4. ROLLER COASTER A roller coaster begins at 90 feet above ground level. Then it descends 105 feet. Find the height of the coaster after the first descent.</p>
<p>5. SAVINGS Sonia has \$235 in her savings account. She withdraws \$45. What is left in her savings account?</p>	<p>6. BEACH Wai and Kuri were digging in the sand at the beach. Wai dug a hole that was 15 inches below the surface, and Kuri dug a hole that was 9 inches below the surface. Find the difference in the depths of their holes.</p>

3-5**Reading to Learn Mathematics*****Subtracting Integers***

Pre-Activity *Complete the Mini Lab at the top of page 128 in your textbook.
Write your answers below.*

1. Write a related addition sentence for each subtraction sentence.

Use a number line to find each difference. Write an equivalent addition sentence for each.

2. $1 - 5$

3. $-2 - 1$

4. $-3 - 4$

5. $0 - 5$

6. **Compare and contrast** subtraction sentences with their related addition sentences.

Reading the Lesson

**Tell how you would solve each of the following on a number line.
Then solve.**

7. $-8 - (-6)$

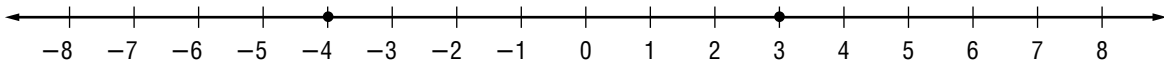
8. $6 - 8$

Helping You Remember

9. Write the rule that tells how to subtract integers. Then give an example.

3-5**Enrichment****Distance on the Number Line**

To find the distance between two points on a number line, subtract their coordinates. Then, take the absolute value of the difference.



$$-4 - 3 = -7$$

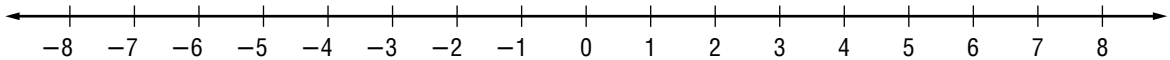
$$|-7| = 7$$

You can also find the distance by finding the absolute value of the difference of the coordinates.

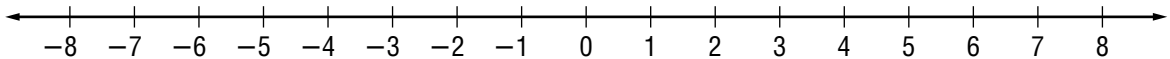
$$|-4 - 3| = 7$$

Graph each pair of points. Then write an expression using absolute value to find the distance between the points.

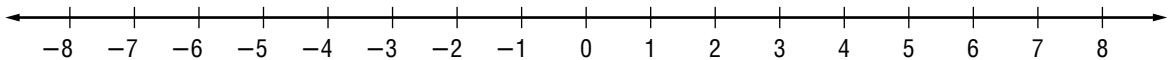
1. A at -5 and B at 2



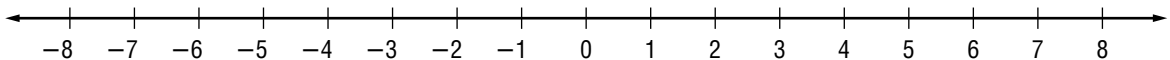
2. C at -7 and D at -1



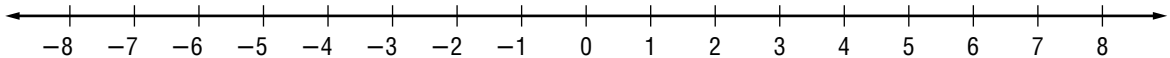
3. E at -5 and F at 5



4. W at 0 and X at 6



5. Y at -4 and Z at 0



3-6**Study Guide and Intervention*****Multiplying Integers***

The product of two integers with **different** signs is **negative**.

The product of two integers with the **same** sign is **positive**.

EXAMPLE 1 Multiply $5(-2)$.

$$5(-2) = -10 \quad \text{The integers have different signs. The product is negative.}$$

EXAMPLE 2 Multiply $-3(7)$.

$$-3(7) = -21 \quad \text{The integers have different signs. The product is negative.}$$

EXAMPLE 3 Multiply $-6(-9)$.

$$-6(-9) = 54 \quad \text{The integers have the same sign. The product is positive.}$$

EXAMPLE 4 Multiply $(-7)^2$.

$$\begin{aligned} (-7)^2 &= (-7)(-7) && \text{There are 2 factors of } -7. \\ &= 49 && \text{The product is positive.} \end{aligned}$$

EXAMPLE 5 Simplify $-2(6c)$.

$$\begin{aligned} -2(6c) &= (-2 \cdot 6)c && \text{Associative Property of Multiplication.} \\ &= -12c && \text{Simplify.} \end{aligned}$$

EXAMPLE 6 Simplify $2(5x)$.

$$\begin{aligned} 2(5x) &= (2 \cdot 5)x && \text{Associative Property of Multiplication.} \\ &= 10x && \text{Simplify.} \end{aligned}$$

EXERCISES**Multiply.**

- | | | |
|------------|---------------|-------------|
| 1. $-5(8)$ | 2. $-3(-7)$ | 3. $10(-8)$ |
| 4. $-8(3)$ | 5. $-12(-12)$ | 6. $(-8)^2$ |

ALGEBRA Simplify each expression.

- | | | |
|-------------|---------------|--------------|
| 7. $-5(7a)$ | 8. $3(-2x)$ | 9. $4(6f)$ |
| 10. $7(6b)$ | 11. $-6(-3y)$ | 12. $7(-8g)$ |

ALGEBRA Evaluate each expression if $a = -3$, $b = -4$, and $c = 5$.

- | | | |
|------------|-------------|-----------|
| 13. $-2a$ | 14. $9b$ | 15. ab |
| 16. $-3ac$ | 17. $-2c^2$ | 18. abc |

3-6**Practice: Skills*****Multiplying Integers*****Multiply.**

1. $-4(6)$

2. $-2(-8)$

3. $12(-4)$

4. $-6(5)$

5. $-10(-9)$

6. $-(5)^2$

7. $(-5)^2$

8. $-30(5)$

9. $20(-6)$

10. $-14(-6)$

11. $(-13)^2$

12. $-7(15)$

ALGEBRA Simplify each expression.

13. $-3(4y)$

14. $7(-3x)$

15. $7(5g)$

16. $7(7w)$

17. $3(-3y)$

18. $-2(-10h)$

ALGEBRA Evaluate each expression if $g = -5$, $h = -3$, and $k = 4$.

19. $-3g$

20. $5h$

21. $7gk$

22. $-2gh$

23. $-10h$

24. $-2h^2$

3-6**Practice: Word Problems*****Multiplying Integers*****Multiply.**

<p>1. TEMPERATURE Suppose the temperature outside is dropping 3 degrees each hour. How much will the temperature drop in 8 hours?</p>	<p>2. DIVING A deep-sea diver descends below the surface of the water at a rate of 60 feet each minute. What is the depth of the diver after 10 minutes?</p>
<p>3. STOCK A computer stock lost 2 points each hour for 6 hours. Find the total points the stock fell.</p>	<p>4. DROUGHT A drought can cause the level of the local water supply to drop by a few inches each week. Suppose the level of the water supply drops 2 inches each week. How far will it have dropped in 4 weeks?</p>
<p>5. MONEY Mrs. Rockwell lost money on an investment at a rate of \$4 per day. How much did she lose after two weeks?</p>	<p>6. TENNIS BALLS Josh purchased 8 cans of tennis balls. The cans came with 3 balls in each can. How many balls did Josh purchase?</p>

3-6**Reading to Learn Mathematics*****Multiplying Integers***

Pre-Activity Complete the Mini Lab at the top of page 134 in your textbook. Write your answers below.

1. Write a multiplication sentence that describes the model.

Find each product using counters.

2. $3(-2)$

3. $4(-3)$

4. $1(-7)$

5. $5(-2)$

6. Write a rule for finding the sign of the product of a positive and negative integer.

Reading the Lesson

7. Give an example that shows how multiplication is the same as repeated addition. In your example, tell what the addend is.
8. How does the sentence $4(-2) = -2(4)$ illustrate the Commutative Property of Multiplication?
9. Complete each of the following sentences with the word *positive* or *negative*.
 - a. The product of two integers with different signs is _____.
 - b. The product of two integers with the same sign is _____.

Helping You Remember

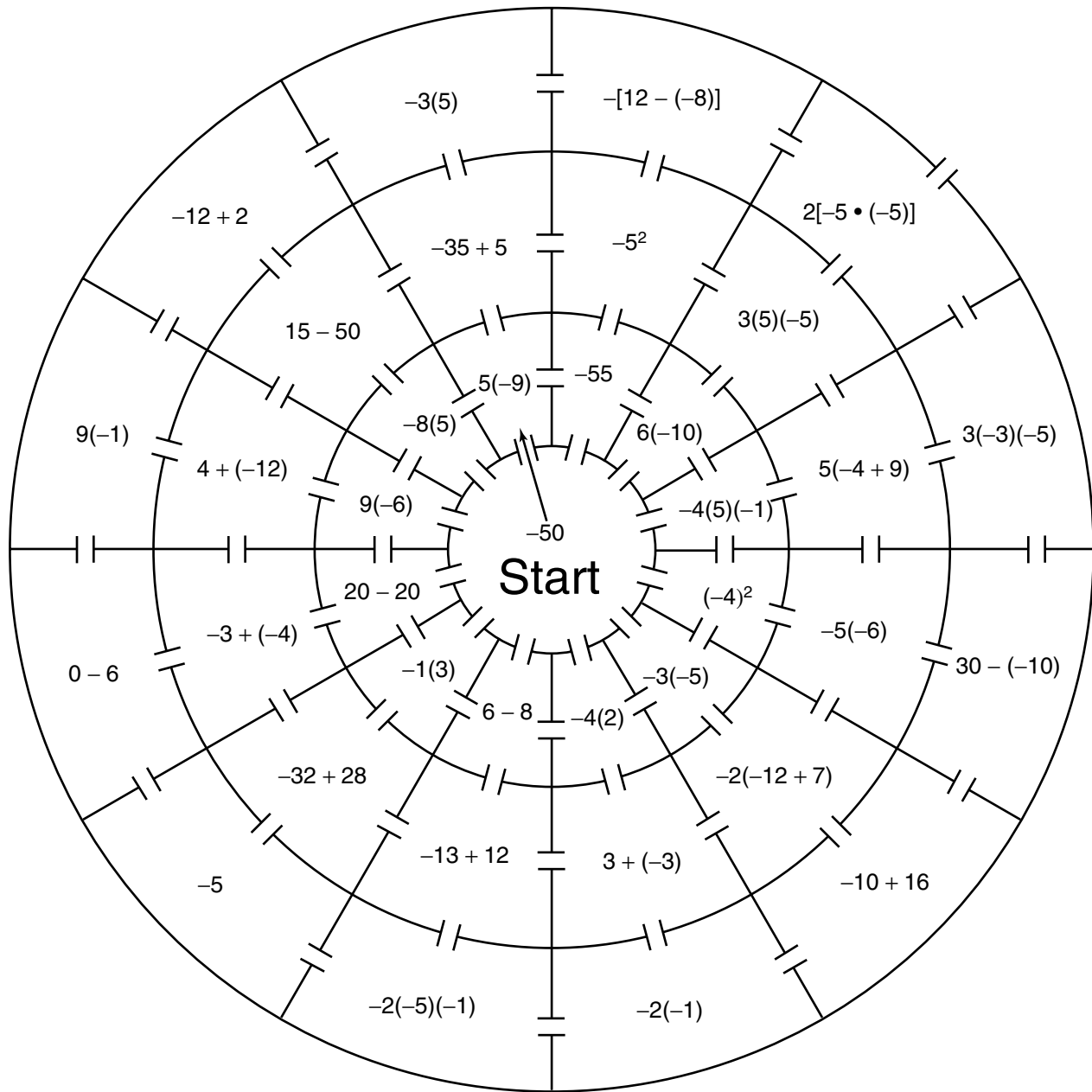
10. You know the rule for determining the sign of the product of two integers when the signs are alike or different. Consider the product of three integers. With a partner summarize the signs of the products of 3 integers when three, two, one or none of the integers are positive.

3-6

Enrichment

Integer Maze

Find your way through the maze by moving to the expression in an adjacent section with the next highest value.



3-7**Study Guide and Intervention*****Dividing Integers***

The quotient of two integers with different signs is negative.

The quotient of two integers with the same sign is positive.

EXAMPLE 1 Divide $30 \div (-5)$.

$30 \div (-5)$ The integers have different signs.

$30 \div (-5) = -6$ The quotient is negative.

EXAMPLE 2 Divide $-100 \div (-5)$.

$-100 \div (-5)$ The integers have the same sign.

$-100 \div (-5) = 20$ The quotient is positive.

EXERCISES**Divide.**

1. $-12 \div 4$

2. $-14 \div (-7)$

3. $\frac{18}{-2}$

4. $-6 \div (-3)$

5. $-10 \div 10$

6. $\frac{-80}{-20}$

7. $350 \div (-25)$

8. $-420 \div (-3)$

9. $\frac{540}{45}$

10. $\frac{-256}{16}$

ALGEBRA Evaluate each expression if $d = -24$, $e = -4$, and $f = 8$.

11. $12 \div e$

12. $40 \div f$

13. $d \div 6$

14. $d \div e$

15. $f \div e$

16. $e^2 \div f$

17. $\frac{-d}{e}$

18. $ef \div 2$

19. $\frac{f^2}{e^2}$

20. $\frac{de}{f}$

3-7**Practice: Skills*****Dividing Integers*****Divide.**

1. $-15 \div 3$

2. $-24 \div (-8)$

3. $22 \div (-2)$

4. $-49 \div (-7)$

5. $-8 \div (-8)$

6. $\frac{36}{-4}$

7. $225 \div (-15)$

8. $\frac{0}{-9}$

9. $-38 \div 2$

10. $\frac{64}{4}$

11. $-500 \div (-50)$

12. $-189 \div (-21)$

ALGEBRA Evaluate each expression if $m = -32$, $n = 2$, and $p = -8$.

13. $m \div n$

14. $p \div 4$

15. $p^2 \div m$

16. $m \div p$

17. $\frac{-p}{n}$

18. $p \div n^2$

19. $\frac{p^2}{n^2}$

20. $\frac{18 - n}{p}$

21. $m \div (np)$

22. $\frac{m}{p} + n$

3-7**Practice: Word Problems*****Dividing Integers*****Divide.**

<p>1. STOCK MARKET During a 5-day workweek, the stock market decreased by 65 points. Find the average daily change in the market for the week.</p>	<p>2. MOTION Mr. Diaz decreased the speed of his car by 30 miles per hour over a period of 10 seconds. Find the average change in speed each second.</p>
<p>3. WEATHER Over the past seven days, Mrs. Cho found that the temperature outside had dropped a total of 35 degrees. Find the average drop in temperature each day.</p>	<p>4. BASKETBALL The basketball team lost their last 6 games. They lost by a total of 48 points. Find the average number of points by which each game was lost.</p>
<p>5. POPULATION The enrollment at Davis Middle School dropped by 60 students over a 5-year period. What is the average yearly drop in enrollment?</p>	<p>6. SUBMARINE A submarine descends at a rate of 60 feet each minute. How long will it take it to descend to a depth of 660 feet below the surface?</p>

3-7**Reading to Learn Mathematics*****Dividing Integers***

Pre-Activity Complete the Mini Lab at the top of page 138 in your textbook.
Write your answers below.

Find each quotient using counters.

1. $-6 \div 2$

2. $-12 \div 3$

Reading the Lesson

Write two division sentences related to each of the following multiplication sentences.

3. $-6(-3) = 18$

4. $-21(-2) = 42$

5. $-6(3) = -18$

6. $2(-21) = -42$

7. Complete each of the following sentences with the word *positive* or *negative*.

a. The quotient of two integers with different signs is _____.

b. The quotient of two integers with the same sign is _____.

8. In the division sentence $-72 \div 8 = -9$, identify the dividend, the divisor, and the quotient.

Helping You Remember

9. Describe how the operations of multiplication and division are opposite of each other. Are these operations opposite in all cases? What is the one integer that cannot be a divisor?

3-7**Enrichment****Division by Zero?**

Some interesting things happen when you try to divide by zero. For example, look at these two equations.

$$\frac{5}{0} = x \qquad \frac{0}{0} = y$$

If you can write the equations above, you can also write the two equations below.

$$0 \cdot x = 5 \qquad 0 \cdot y = 0$$

However, there is no number that will make the left equation true. This equation has no solution. For the right equation, *every* number will make it true. The solutions for this equation are “all numbers.”

Because division by zero leads to impossible situations, it is not a “legal” step in solving a problem. People say that division by zero is undefined, or not possible, or simply not allowed.

Describe the solution set for each equation.

1. $4x = 0$

2. $x \cdot 0 = 0$

3. $x \cdot 0 = x$

4. $\frac{0}{x} = 0$

5. $\frac{0}{x} = x$

6. $\frac{0}{x} = 5$

What values for x must be excluded to prevent division by 0?

7. $\frac{1}{x^2}$

8. $\frac{1}{x-1}$

9. $\frac{1}{x+1}$

10. $\frac{0}{2x}$

11. $\frac{1}{2x-2}$

12. $\frac{1}{3x+6}$

Explain what is wrong with this “proof.”

13. Step 1 $0 \cdot 1 = 0$ and $0 \cdot (-1) = 0$

Step 2 Therefore, $\frac{0}{0} = 1$ and $\frac{0}{0} = -1$.

Step 3 Therefore, $1 = -1$.

Chapter 3 Test, Form 1

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

1. Write an integer that represents 8°C below 0.

- A. -8 B. 8 C. $|-8|$ D. $|8|$ 1. _____

2. Evaluate $|3|$.

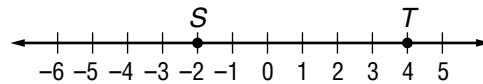
- F. 6 G. -3 H. 3 I. 0 2. _____

3. Evaluate $|-9|$.

- A. 0 B. 9 C. 18 D. -9 3. _____

4. Write the integers represented by S and T on the number line.

- F. $S, 4; T, -2$ G. $S, -4; T, 2$
H. $S, 2; T, -4$ I. $S, -2; T, 4$



4. _____

5. Order 4, -5 , 3, and 0 from least to greatest.

- A. $0, 3, 4, -5$ B. $-5, 0, 3, 4$ C. $4, 3, 0, -5$ D. $0, -5, 3, 4$ 5. _____

6. Simplify $4(9a)$.

- F. $13a$ G. $5a$ H. $36a$ I. $49a$ 6. _____

7. What value of z makes $14 - 3 = z$ a true sentence?

- A. 11 B. 17 C. -11 D. -17 7. _____

Replace each \bullet to make a true sentence.

8. $-4 \bullet 0$

- F. $>$ G. $<$ H. $=$ I. $+$ 8. _____

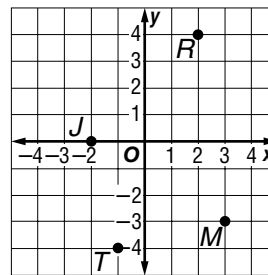
9. $3 \bullet -6$

- A. $>$ B. $<$ C. $=$ D. $+$ 9. _____

Use the graph to name the ordered pair for each point.

10. J

- F. $(0, -2)$ G. $(0, 2)$
H. $(-2, 0)$ I. $(2, 0)$



10. _____

11. M

- A. $(-3, 3)$ B. $(3, 3)$
C. $(-3, -3)$ D. $(3, -3)$

11. _____

12. R

- F. $(2, 4)$ G. $(4, 2)$ H. $(-2, 4)$ I. $(2, -4)$ 12. _____

13. T

- A. $(1, -4)$ B. $(-1, -4)$ C. $(-1, 4)$ D. $(-4, -1)$ 13. _____

Chapter 3 Test, Form 1 (continued)**Add, subtract, multiply, or divide.**

14. $8 + (-7)$

F. 1

G. -1

H. 15

I. -15

14. _____

15. $-7(-6)$

A. -1

B. -42

C. 42

D. -13

15. _____

16. $18 \div (-9)$

F. 9

G. 2

H. -9

I. -2

16. _____

17. $35 - 12$

A. -23

B. 23

C. 47

D. -47

17. _____

18. $(-3)^2$

F. -9

G. -1

H. -6

I. 9

18. _____

19. $0 + 20$

A. 20

B. -20

C. 2

D. 0

19. _____

Evaluate each expression if $a = -4$, $b = 6$, and $c = -1$.

20. $10 - a$

F. -6

G. 6

H. 14

I. -14

20. _____

21. bc

A. 6

B. -6

C. 5

D. -5

21. _____

22. $\frac{-12}{b}$

F. -18

G. -6

H. -2

I. 2

22. _____

23. $9 + b$

A. 54

B. -3

C. 3

D. 15

23. _____

24. $b - 2$

F. 4

G. -4

H. 62

I. -3

24. _____

25. $c + 5$

A. -4

B. 4

C. 6

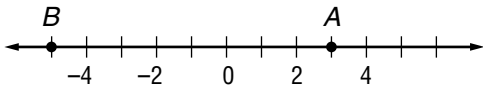
D. -6

25. _____

Bonus Find $|t - v|$ when $t = 9$ and $v = 5$.**B:** _____

Chapter 3 Test, Form 2A

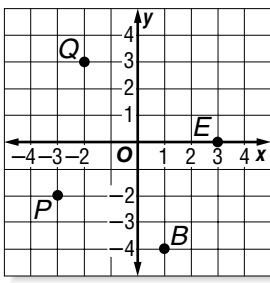
Write the letter for the correct answer in the blank at the right of each question.

- Write an integer that represents a 5-yard loss.
 A. $|5|$ B. $|-5|$ C. -5 D. 5 1. _____
- Evaluate $|-7|$.
 F. 7 G. $-|-7|$ H. 14 I. -7 2. _____
- Evaluate $|5| + |-2|$.
 A. -7 B. -3 C. 3 D. 7 3. _____
- Write the integers represented by A and B on the number line.
 F. $A, -3; B, -5$ G. $A, 3; B, -5$
 H. $A, -3; B, 5$ I. $A, -5; B, 3$  4. _____
- Order $6, -2, 3, 0,$ and -1 from least to greatest.
 A. $-2, -1, 0, 3, 6$ B. $-2, 0, -1, 3, 6$
 C. $-1, -2, 0, 3, 6$ D. $0, -1, -2, 3, 6$ 5. _____
- Simplify $-8(3z)$.
 F. $24z$ G. $-5z$ H. $-24z$ I. $-11z$ 6. _____
- What value of q makes $-15 - (-9) = q$ a true sentence?
 A. -24 B. -6 C. 24 D. 6 7. _____

Replace each \bullet to make a true sentence.

- $-5 \bullet 2$
 F. $>$ G. $<$ H. $=$ I. $+$ 8. _____
- $-1 \bullet -7$
 A. $>$ B. $<$ C. $=$ D. $+$ 9. _____

Use the graph to name the ordered pair for each point.

- Q
 F. $(0, 3)$ G. $(2, -3)$
 H. $(-2, -3)$ I. $(-2, 3)$  10. _____
- E
 A. $(0, 3)$ B. $(2, -3)$
 C. $(3, 0)$ D. $(-3, 0)$ 11. _____
- P
 F. $(-2, -3)$ G. $(-3, -2)$ H. $(3, -2)$ I. $(-3, 2)$ 12. _____
- B
 A. $(-1, -4)$ B. $(-1, 4)$ C. $(-4, 1)$ D. $(1, -4)$ 13. _____

Chapter 3 Test, Form 2A (continued)**Add, subtract, multiply, or divide.**

14. $12 + (-5)$

F. 7

G. -7

H. 17

I. -17

14. _____

15. $-8(-10)$

A. -80

B. 80

C. -18

D. 18

15. _____

16. $\frac{-48}{-24}$

F. 2

G. -2

H. -24

I. 0.5

16. _____

17. $-37 - 8$

A. 45

B. -29

C. -45

D. 296

17. _____

18. $7(-3)$

F. $-2\frac{1}{3}$

G. 4

H. 21

I. -21

18. _____

19. $0 - 5$

A. 10

B. -5

C. 0

D. 5

19. _____

Evaluate each expression if $x = -3$, $y = 8$, and $z = -4$.

20. $y - (-5)$

F. 3

G. -13

H. 13

I. -3

20. _____

21. xz

A. -12

B. 12

C. -7

D. -1

21. _____

22. $-8 \div y$

F. 0

G. -16

H. -1

I. 1

22. _____

23. $x + 11$

A. 8

B. 14

C. -8

D. -14

23. _____

24. $\frac{z^2}{2}$

F. 4

G. -8

H. -4

I. 8

24. _____

25. $x + y + z$

A. -1

B. 1

C. 15

D. -15

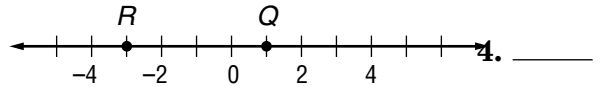
25. _____

Bonus Find $|q - r|$ when $q = -3$ and $r = 3$.**B:** _____

Chapter 3 Test, Form 2B

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

- Write an integer that represents a loss of \$20.
 A. $|-20|$ B. -20 C. $|20|$ D. 20 1. _____
- Evaluate $|-4|$.
 F. -4 G. $-|-4|$ H. 4 I. 8 2. _____
- Evaluate $|7| + |-3|$.
 A. 10 B. 4 C. -4 D. -10 3. _____
- Write the integers represented by Q and R on the number line.
 F. $Q, -3; R, 1$ G. $Q, 3; R, -1$
 H. $Q, -1; R, 3$ I. $Q, 1; R, -3$ 4. _____



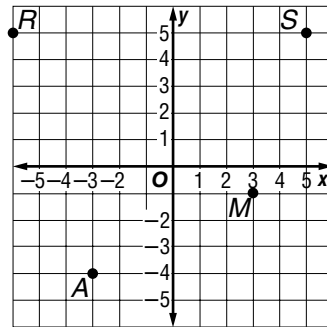
- Order 3, -4 , 0, 1, and -2 from least to greatest.
 A. $-4, -2, 0, 1, 3$ B. $3, 1, 0, -2, -4$ 5. _____
 C. $3, 1, 0, -4, -2$ D. $-2, -4, 0, 1, 3$
- Simplify $-5(7r)$.
 F. $35r$ G. $-35r$ H. $2r$ I. $-12r$ 6. _____
- What value of s makes $-18 - (-5) = s$ a true sentence?
 A. 13 B. -23 C. 23 D. -13 7. _____

Replace each \bullet to make a true sentence.

- $10 \bullet -10$
 F. $>$ G. $<$ H. $=$ I. $+$ 8. _____
- $-3 \bullet 5$
 A. $>$ B. $<$ C. $=$ D. $+$ 9. _____

Use the graph to name the ordered pair for each point.

- S
 F. $(5, -5)$ G. $(-1, 3)$
 H. $(5, 5)$ I. $(-5, 5)$ 10. _____
- R
 A. $(-6, 5)$ B. $(5, -6)$
 C. $(5, 5)$ D. $(6, 5)$ 11. _____
- A
 F. $(-3, 4)$ G. $(-3, -4)$ H. $(3, -4)$ I. $(-4, -3)$ 12. _____
- M
 A. $(3, 1)$ B. $(-1, 3)$ C. $(1, 3)$ D. $(3, -1)$ 13. _____



Chapter 3 Test, Form 2B (continued)

Add, subtract, multiply, or divide.

14. $11 + (-7)$

F. 4 G. -4 H. -18 I. 18 14. _____

15. $-5(-11)$

A. 16 B. -16 C. 55 D. -55 15. _____

16. $-15 \div (-3)$

F. -5 G. 5 H. -18 I. 18 16. _____

17. $-39 - 7$

A. -46 B. 46 C. 273 D. -32 17. _____

18. $8(-4)$

F. -2 G. 32 H. 4 I. -32 18. _____

19. $0 - 7$

A. 0 B. -7 C. -14 D. 7 19. _____

Evaluate each expression if $a = 4$, $b = 7$, and $c = -5$.

20. $b - (-4)$

F. -3 G. -11 H. 3 I. 11 20. _____

21. ac

A. 20 B. -20 C. -1 D. 9 21. _____

22. $\frac{-7}{b}$

F. 14 G. 0 H. 1 I. -1 22. _____

23. $a + 13$

A. -17 B. 9 C. 17 D. -9 23. _____

24. $c^2 \div 5$

F. 5 G. -5 H. 2 I. 30 24. _____

25. $a + b + c$

A. 16 B. -6 C. -16 D. 6 25. _____

Bonus Find $|s - t|$ when $s = -5$ and $t = 5$.**B:** _____

Chapter 3 Test, Form 2C

Write an integer for each situation.

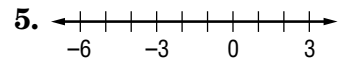
1. a deposit of \$45
2. 5°C below 0

1. _____
2. _____

For Questions 3 and 4, evaluate each expression.

3. $|-11|$
4. $|4| + |-6|$
5. Graph the set of numbers $\{-3, 2, -5\}$ on a number line.

3. _____
4. _____



For Questions 6–8, replace each ● with < or > to make a true sentence.

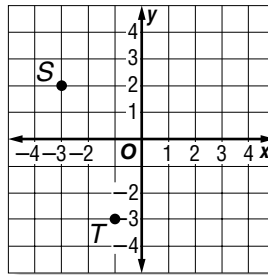
6. $-16 \bullet -22$
7. $-5 \bullet 1$
8. $12 \bullet -1$
9. Order $-2, 5, 0, 7, -1,$ and 3 from least to greatest.

6. _____
7. _____
8. _____
9. _____

10. **TEMPERATURE** On the same day, a thermometer registered -4°F in Athens and -9°F in Seattle. Which Washington city was warmer?

10. _____

Name the ordered pair for each point graphed at the right. Then identify in which quadrant each point lies.

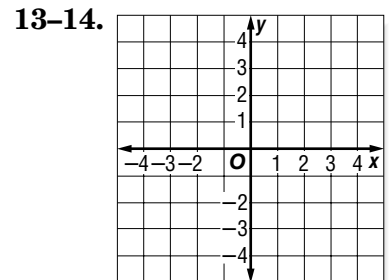


11. S
12. T

11. _____
12. _____

Graph and label each point.

13. $Q(1, -2)$
14. $W(0, 4)$



13–14.

Chapter 3 Test, Form 2C (continued)**Add, subtract, multiply, or divide.**

15. $-25 + (-12)$ 15. _____

16. $8(-11)$ 16. _____

17. $40 \div (-8)$ 17. _____

18. $4 - (-2)$ 18. _____

19. $(-3)^2$ 19. _____

20. $6 + (-9)$ 20. _____

21. $-9 - 8$ 21. _____

22. $\frac{-6}{-3}$ 22. _____

Evaluate each expression if $x = -4$, $y = 6$, and $z = -3$.

23. $15 - (-y)$ 23. _____

24. $20 \div x$ 24. _____

25. $7 + z$ 25. _____

26. $-2(3z)$ 26. _____

27. $\frac{xy}{12}$ 27. _____

28. $x + y$ 28. _____

29. xy 29. _____

30. $x - z$ 30. _____

For Questions 31 and 32, simplify each expression.

31. $-5(3a)$ 31. _____

32. $3(-4c)$ 32. _____

33. What value of w makes $-24 - (-13) = w$ a true sentence? 33. _____

Bonus Find $|a - b|$ when $a = -6$ and $b = 6$. **B:** _____

Chapter 3 Test, Form 2D

Write an integer for each situation.

- 300 feet above sea level
- a loss of \$13

1. _____

2. _____

For Questions 3 and 4, evaluate each expression.

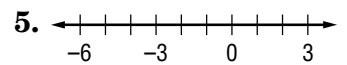
3. $|-13|$

3. _____

4. $|3| + |-5|$

4. _____

5. Graph the set of numbers on a number line:
- $\{-6, 2, -3\}$
- .



For Questions 6–8, replace each \bullet with $<$ or $>$ to make a true sentence.

6. $-7 \bullet -5$

6. _____

7. $0 \bullet -35$

7. _____

8. $-1 \bullet 1$

8. _____

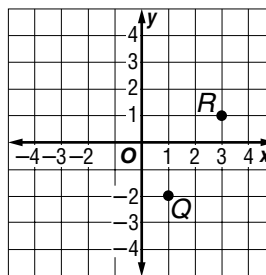
9. Order 3,
- -8
- , 4, 2,
- -5
- , and
- -1
- from least to greatest.

9. _____

10. **TEMPERATURE** On the same day, a thermometer registered -10°F in Duluth and -7°F in St. Paul. Which Minnesota city was warmer?

10. _____

Name the ordered pair for each point graphed at the right. Then identify in which quadrant each point lies.

11. R 12. Q 

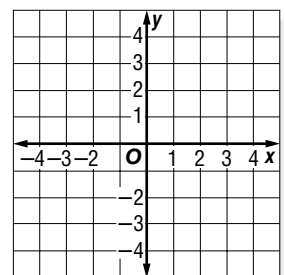
11. _____

12. _____

Graph and label each point.

13. $A(-3, -2)$ 14. $S(0, 2)$

13–14.



Chapter 3 Test, Form 2D (continued)**Add, subtract, multiply, or divide.**

15. $-2 + 4$

15. _____

16. $7(-10)$

16. _____

17. $\frac{60}{-3}$

17. _____

18. $6 - (-3)$

18. _____

19. $(-5)^2$

19. _____

20. $-1 + (-11)$

20. _____

21. $-10 - 7$

21. _____

22. $-8 \div (-4)$

22. _____

Evaluate each expression if $a = -8$, $b = 5$, and $c = -2$.

23. $8 - (-b)$

23. _____

24. $16 \div c$

24. _____

25. $9 + c$

25. _____

26. $-5(3c)$

26. _____

27. $ab \div 10$

27. _____

28. $a + b$

28. _____

29. ab

29. _____

30. $a - c$

30. _____

For Questions 31 and 32, simplify each expression.

31. $-6(5z)$

31. _____

32. $-4(-2y)$

32. _____

33. What value of d makes $-25 - (-16) = d$ a true sentence?

33. _____

Bonus Find $|x-y|$ when $x = -7$ and $y = 7$.

B: _____

Chapter 3 Test, Form 3

Write an integer for each situation.

- 380 meters above sea level
- a loss of 11 yards

1. _____

2. _____

For Questions 3 and 4, evaluate each expression.

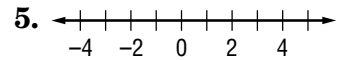
3. $|-16|$

3. _____

4. $|-3| - |1|$

4. _____

5. Graph the set of numbers $\{5, -3, 2, -4\}$ on a number line.



For Questions 6–8, replace each ● with $<$ or $>$ to make a true sentence.

6. $-28 \bullet -30$

6. _____

7. $-8 \bullet 5$

7. _____

8. $11 \bullet -10$

8. _____

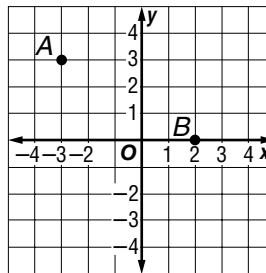
9. Order $-5, -7, 4, 0, -3,$ and 10 from least to greatest.

9. _____

10. **TEMPERATURE** On the same day, a thermometer registered -8°C in Chicago, Illinois and -5°C in Detroit, Michigan. Which city was colder?

10. _____

Name the ordered pair for each point graphed at the right. Then identify in which quadrant each point lies.



11. A

11. _____

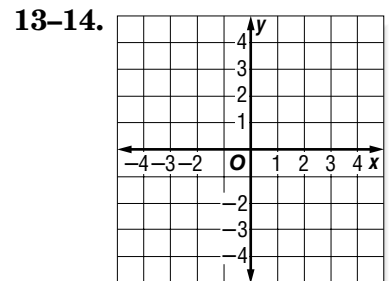
12. B

12. _____

Graph and label each point.

13. $L(-2, -4)$

14. $M(0, -3)$



Chapter 3 Test, Form 3 *(continued)*

Add, subtract, multiply, or divide.

15. $-40 + 12$ 15. _____

16. $6(-4)$ 16. _____

17. $\frac{0}{-3}$ 17. _____

18. $-5 - 3 + 2$ 18. _____

19. $-(11^2)$ 19. _____

20. $-13 + 18 + (-2)$ 20. _____

21. $-18 - (-21)$ 21. _____

22. $-56 \div (-7)$ 22. _____

Evaluate each expression if $q = -8$, $r = 5$, and $s = -3$.

23. $q - r$ 23. _____

24. $-2qr$ 24. _____

25. $-9 + s$ 25. _____

26. $qs \div 8$ 26. _____

27. $-rs^2$ 27. _____

28. $\frac{-10 + q}{s^2}$ 28. _____

29. $-s - 2$ 29. _____

30. $q + r + s$ 30. _____

For Questions 31 and 32, simplify each expression.

31. $-5(7e)$ 31. _____

32. $(-2b)(3c)$ 32. _____

33. What value of a makes $-18 \div (-3) = a$ a true statement? 33. _____

Bonus PATTERNS Find the next two numbers in the following B: _____

pattern: 96, -48, 24, -12, ...

Then describe the pattern.

Chapter 3

Extended Response Assessment

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 solutions in more than one way or investigate beyond the requirements of the problem. If necessary, record your answer on another piece of paper.

1. Horatio, Glen, Carlos, and Meredith played in the company golf tournament. Their scores after the first round are listed below.
 - Horatio: two over par (+2)
 - Glen: three under par (−3)
 - Carlos: four over par (+4)
 - Meredith: one under par (−1)
 - a. Explain how to compare integers.
 - b. Order the golf scores from least to greatest.
 - c. Explain what is meant by the *absolute value* of a number.
 - d. Find the absolute value of Glen's score.
 - e. Glen's second round score is +2. Use counters to find Glen's total score after two rounds.
 - f. Meredith's second round score is −3. Find her total score after two rounds.
 - g. Horatio's second round score is −3. Use counters to find the difference between Horatio's first and second round scores.
2. On graph paper, draw a coordinate plane.
 - a. Graph and label the point $A(4, 6)$. Describe how you locate this point. Identify the quadrant in which the point lies.
 - b. Multiply the x -coordinate of point A by -2 and multiply the y -coordinate of point A by -1 . Name the new point B and give its coordinates. Graph point B and identify the quadrant in which it lies.
 - c. Divide the x -coordinate of point B by 4 and divide the y -coordinate of point B by -3 . Name the new point C and give its coordinates. Graph point C and identify the quadrant in which it lies.

Chapter 3 Vocabulary Test/Review

absolute value (p. 107)
 additive inverse (p. 121)
 coordinate grid (p. 112)
 coordinate plane (p. 112)
 graph (p. 106)
 integer (p. 106)

negative integer (p. 106)
 opposite (p. 121)
 ordered pair (p. 112)
 origin (p. 112)
 positive integer (p. 106)
 quadrant (p. 113)

x -axis (p. 112)
 x -coordinate (p. 112)
 y -axis (p. 112)
 y -coordinate (p. 112)

Choose from the terms above to complete each sentence.

1. Vertical bars before and after a number indicate _____, the distance a number is from zero on a number line. 1. _____
2. A(n) _____ is a number that can be graphed on a number line. 2. _____
3. When you _____ a point, you locate its position on a coordinate plane by drawing a dot at the location of its ordered pair. 3. _____
4. The _____ is the opposite of any number. When added to the number, the sum equals 0. 4. _____
5. The _____ is the first number of an ordered pair. It corresponds to a number on the x -axis. 5. _____
6. The _____ is the vertical number line of a coordinate plane. 6. _____
7. A(n) _____ is an integer less than zero. 7. _____
8. The point at which the number lines of a coordinate plane intersect is called the _____. 8. _____
9. Two integers that are the same distance from 0 on a number line, but on opposite sides of 0, are called _____. 9. _____
10. A(n) _____ is one of four sections of a coordinate plane. 10. _____

In your own words, define each term.

11. coordinate plane
12. ordered pair

Chapter 3 Quiz*(Lessons 3-1 and 3-2)*

1. **MULTIPLE-CHOICE TEST ITEM** Order the integers $-2, 4, 7, -5,$ and 1 from least to greatest

- A. $-2, -5, 1, 4, 7$ B. $1, -2, 4, -5, 7$
 C. $-5, -2, 1, 4, 7$ D. $7, 4, 1, -2, -5$

1. _____

Write an integer for each situation.

2. 15°F below 0 3. a deposit of $\$24$

2. _____

3. _____

Evaluate each expression.

4. $|-3|$
 5. $|9|$
 6. $|13| + |-2|$

4. _____

5. _____

6. _____

Replace each \bullet with $<$ or $>$ to make a true sentence.

7. $-34 \bullet -134$
 8. $-27 \bullet -8$
 9. $12 \bullet -12$
 10. $-111 \bullet -888$

7. _____

8. _____

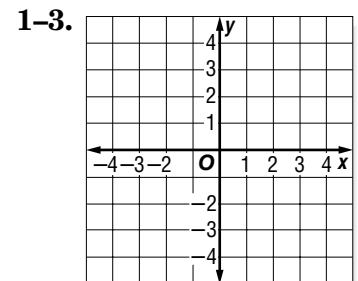
9. _____

10. _____

Chapter 3 Quiz*(Lessons 3-3 and 3-4)*

On the coordinate plane, graph and label each point.

1. $S(1, 0)$
 2. $R(-3, -1)$
 3. $T(3, -2)$



4. Find $12 + (-7)$.

4. _____

5. Evaluate $x + y$ if $x = -8$ and $y = 4$.

5. _____

Chapter 3 Quiz*(Lessons 3-5 and 3-6)*

SCORE _____

Subtract or multiply.

1. $-8 - 5$

1. _____

2. $-10(-3)$

2. _____

3. $-(9^2)$

3. _____

4. $15 - (-20)$

4. _____

Evaluate each expression if $f = -4$, $g = 2$, and $h = 7$.

5. $-9g$

5. _____

6. $-h - 3$

6. _____

7. $h - f$

7. _____

8. fgh

8. _____

Simplify each expression.

9. $-2(9e)$

9. _____

10. $5(-4s)$

10. _____

Chapter 3 Quiz*(Lesson 3-7)*

SCORE _____

1. Find the quotient of -56 and 14 .

1. _____

Divide.

2. $-63 \div (-9)$

2. _____

3. $-21 \div 7$

3. _____

Evaluate each expression if $r = 18$, $s = -4$, and $t = -3$.

4. $r \div t$

4. _____

5. $st \div 6$

5. _____

Chapter 3 Mid-Chapter Test

(Lessons 3-1 through 3-4)

PART I

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

- Evaluate $|-5|$.
 A. -4 B. 5 C. $-|5|$ D. -5 1. _____
- Evaluate $|-6| - |2|$.
 F. 4 G. -8 H. 8 I. -4 2. _____
- Order the integers 6, 4, 18, -4, 3, and -7 from least to greatest.
 A. 3, 4, 6, 18, -4, -7 B. 18, 6, 4, 3, -4, -7
 C. -4, -7, 3, 4, 6, 18 D. -7, -4, 3, 4, 6, 18 3. _____
- Find $-8 + 12$.
 F. -20 G. -4 H. 20 I. 4 4. _____
- Evaluate $a + b$ if $a = -3$ and $b = -14$.
 A. -17 B. -11 C. 17 D. 11 5. _____
- Identify the quadrant in which $(-1, 4)$ lies.
 F. I G. II H. III I. IV 6. _____

PART II

Write an integer for each situation.

7. a deposit of \$50 7. _____

8. 3 inches below normal 8. _____

Replace each \bullet with $>$ or $<$ to make a true sentence.

9. $14 \bullet -2$ 9. _____

10. $-111 \bullet -11$ 10. _____

Name the ordered pair for each letter and identify its quadrant.

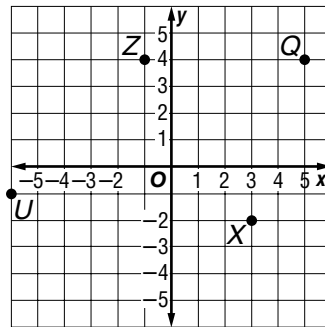
11. Q 11. _____

12. U 12. _____

13. X 13. _____

14. Z 14. _____

15. Find $(-12) + 8 + (-7)$. 15. _____



Chapter 3 Cumulative Review*(Chapters 1–3)*

1. Evaluate the expression $2d + 5f$ if $d = 4$ and $f = 2$.
(Lesson 1-4)

1. _____

TENNIS For Questions 2–4, use the stem-and-leaf plot below. It shows the number of matches won by each member of the East High School Tennis Team.

2. How many members are on the tennis team? (Lesson 2-5)

2. _____

3. Find the mean, median, mode, and range for these data.
(Lessons 2-3, 2-4)

3. _____

Stem	Leaf
0	3 4
1	5 7 8
2	0 2 2 4 7
3	1 3 5 5
4	0
5	4

$$3 | 1 = 31$$

4. Write a sentence or two to describe the distribution of the number of matches won. (Lesson 2-5)

4. _____

5. Evaluate $|3| - |-2|$. (Lesson 3-1)

5. _____

6. Order 61, -72 , 50, -31 , -12 , and 12 from least to greatest.
(Lesson 3-2)

6. _____

7. Which is greater, -9 or 8? (Lesson 3-2)

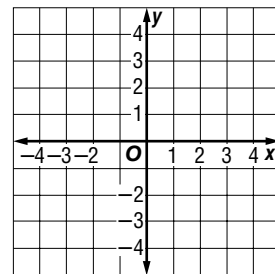
7. _____

Graph and label each point. (Lesson 3-3)

8. $A(2, -2)$

9. $M(-3, -1)$

8–9.



Add, subtract, multiply, or divide.

10. $4 + (-4)$ (Lesson 3-4)

10. _____

11. $-18 - 12$ (Lesson 3-5)

11. _____

12. $-5(-6)$ (Lesson 3-6)

12. _____

13. $12 \div (-3)$ (Lesson 3-7)

13. _____

Standardized Test Practice

(Chapters 1–4)

Part 1: Multiple Choice

Instructions: Fill in the appropriate oval for the best answer.

1. Evaluate $7b - a$ if $a = 5$ and $b = 2$. (Lesson 1-4)

- A. 9 B. 33 C. 12 D. 21

1. (A) (B) (C) (D)

2. If there are 28 basketball games during a season, how many games ended in a winning score of 70–79 points? (Lesson 2-1)

- F. 28 G. 8
H. 3 I. 5

Score	Frequency
50–59	2
60–69	5
70–79	?
80–89	12
90–99	6

2. (F) (G) (H) (I)

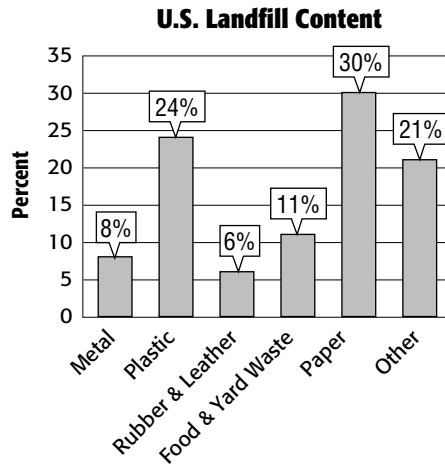
3. Find the median of the following data. 5, 9, 13, 4, 7, 5, 10 (Lesson 2-4)

- A. 5 B. 7 C. 8 D. 9

3. (A) (B) (C) (D)

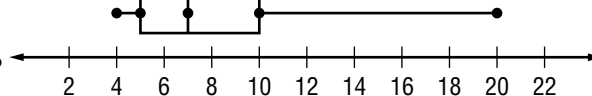
4. **ENVIRONMENT** The bar graph represents the content (in percents) of U.S. landfills. Which is *not* a true statement? (Lesson 2-7)

- F. The mode is paper.
G. Metal makes up 8% of landfills.
H. Plastic and paper make up most of landfills.
I. The median is 24%.



4. (F) (G) (H) (I)

5. What is the range of data in the following box-and-whisker plot? (Lessons 2-3, 2-6)



- A. 5 B. 16 C. 7 D. 15

5. (A) (B) (C) (D)

6. Evaluate $|9| - |-4|$. (Lesson 3-1)

- F. 13 G. -13 H. -5 I. 5

6. (F) (G) (H) (I)

7. In which quadrant is the point $(-5, 7)$ located? (Lesson 3-2)

- A. I B. II C. III D. IV

7. (A) (B) (C) (D)

8. Evaluate $-x - 11$ if $x = -10$. (Lesson 3-5)

- F. -21 G. 21 H. -1 I. 1

8. (F) (G) (H) (I)

9. Evaluate $ac \div b$ if $a = -8$, $b = -6$, and $c = 3$. (Lessons 3-6, 3-7)

- A. -144 B. 4 C. 16 D. -4

9. (A) (B) (C) (D)

Standardized Test Practice *(continued)*

(Chapters 1–4)

Part 2: Short Response\Grid In

Instructions: Enter your grid in answers by writing each digit of the answer in a column box and then shading in the appropriate circle that corresponds to that entry. Write answers to short answer questions in the space provided.

10. Solve $20 = \frac{n}{4}$ (Lesson 1-5)

11. Evaluate $\frac{-a}{b}$ if $a = 16$ and $b = -2$. (Lesson 3-7)

10.

○	○	○	○	○
●	●	●	●	●
0	0	0	0	0
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

11.

○	○	○	○	○
●	●	●	●	●
0	0	0	0	0
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

12. The frequency table summarizes the number of DVDs owned by students in a classroom. Describe the interval and scale. (Lesson 2-1)

Number of DVDs	Tally	Frequency
0–4		5
5–9		7
10–14		10
15–19		3
20–24		2

12. _____

13. Find $6 + (-12)$. (Lesson 3-4)

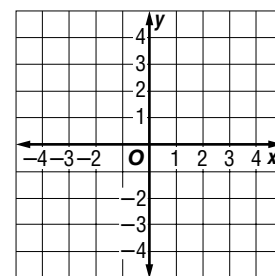
13. _____

Part 3: Extended Response

Instructions: Write your answers below or to the right of the questions.

14. **GEOMETRY** Consider the points $A(-2, 4)$, $B(3, 4)$, $C(3, 0)$, and $D(-2, 0)$. (Lesson 3-3)

a. Graph the points in the same coordinate plane. Describe how you locate point A .



b. Multiply the x -coordinate of point B by -1 and multiply the y -coordinate of point B by $\frac{1}{2}$. Name the new point B' and give its coordinates. Graph point B' and identify the quadrant in which it lies.

Standardized Test Practice

Student Recording Sheet (Use with pages 146–147 of the Student Edition.)

Part 1: Multiple Choice

Select the best answer from the choices given and fill in the corresponding oval.

1. (A) (B) (C) (D)

4. (F) (G) (H) (I)

7. (A) (B) (C) (D)

10. (F) (G) (H) (I)

2. (F) (G) (H) (I)

5. (A) (B) (C) (D)

8. (F) (G) (H) (I)

3. (A) (B) (C) (D)

6. (F) (G) (H) (I)

9. (A) (B) (C) (D)

Part 2: Short Response/Grid in

Solve the problem and write your answer in the blank.

For grid in questions, also enter your answer by writing each number or symbol in a box. Then fill in the corresponding circle for that number or symbol.

11. _____

12. _____ (grid in)

13. _____

14. _____ (grid in)

15. _____

16. _____

17. _____

18. _____

19. _____ (grid in)

12.

0	0	0	0	0
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

14.

0	0	0	0	0
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

19.

0	0	0	0	0
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

Part 3: Extended Response

Record your answer for Question 20 on the back of this paper.

Standardized Test Practice

Rubric (Use to score the Extended Response question on page 147 of the Student Edition.)

General Scoring Guidelines

- If a student gives only a correct numerical answer to a problem but does not show how he or she arrived at the answer, the student will be awarded only 1 credit. All extended response questions require the student to show work.
- A fully correct answer for a multiple-part question requires correct responses for all parts of the question. For example, if a question has three parts, the correct response to one or two parts of the question that required work to be shown is *not* considered a fully correct response.
- Students who use trial and error to solve a problem must show their method. Merely showing that the answer checks or is correct is not considered a complete response for full credit.

Exercise 20 Rubric

Score	Specific Criteria
4	The 3 points are correctly graphed on a coordinate plane with all labels in place. The quadrant where no point on the graph is represented is recognized as quadrant IV. The figure formed by connecting the points is recognized as a triangle. An understanding that the way to double the size of the triangle is to multiply each ordered pair by 2 is demonstrated. The table is expanded and all values are correctly computed.
3	All of the parts of the question are correctly answered, but the graph is not correctly labeled. OR One of the points is not correctly graphed, but all other parts of the question are correct. OR The quadrant where no point on the graph is represented is not recognized as quadrant IV, but all other parts of the question are correct. OR The figure formed by connecting the points is not recognized as a triangle, but all other parts of the question are correct. OR There is no understanding that the way to double the size of the triangle is to multiply the ordered pair by 2, but all other parts of the question are correct. OR There are computational errors in the expanded table, but all other parts of the question are correct.
2	Two parts of the question (the graph, the recognition of the quadrant, the recognition of the triangle, the understanding of how to double the size of the figure, or the completion of the table) are incorrect.
1	Only one or two parts of the question (the graph, the recognition of the quadrant, the recognition of the triangle, the understanding of how to double the size of the figure, or the completion of the table) are correct.
0	Response is completely incorrect.

NAME _____ DATE _____ PERIOD _____

3-1 Study Guide and Intervention

Integers and Absolute Value

Integers less than zero are **negative integers**. Integers greater than zero are **positive integers**.

The **absolute value** of an integer is the distance the number is from zero on a number line. Two vertical bars are used to represent absolute value. The symbol for absolute value of 3 is $|3|$.

EXAMPLE 1 Write an integer that represents **160 feet below sea level**.
Because it represents *below* sea level, the integer is -160 .

EXAMPLE 2 Evaluate $|-2|$.
On the number line, the graph of -2 is 2 units away from 0. So, $|-2| = 2$.

EXERCISES

Write an integer for each situation.

- 12°C above 0 **12**
- a loss of \$24 **-24**
- a gain of 20 pounds **20**
- falling 6 feet **-6**

Evaluate each expression.

- $|12|$ **12**
- $|-150|$ **150**
- $|-8|$ **8**
- $|75|$ **75**
- $|-19|$ **19**
- $|84|$ **84**

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3-1 Practice: Skills

Integers and Absolute Value

Write an integer for each situation.

- 15°C below 0 **-15**
- a profit of \$27 **27**
- 2010 A.D. **2010**
- average attendance is down 38 people **-38**
- 376 feet above sea level **376**
- a withdrawal of \$200 **-200**
- 3 points lost **-3**
- a bonus of \$150 **150**
- a deposit of \$41 **41**
- 240 B.C. **-240**
- a wage increase of \$120 **120**
- 60 feet below sea level **-60**

Evaluate each expression.

- $|-1|$ **1**
- $|9|$ **9**
- $|23|$ **23**
- $|-107|$ **107**
- $|-45|$ **45**
- $|19|$ **19**
- $|0|$ **0**
- $|6| - |-2|$ **4**
- $|-8| + |4|$ **12**
- $|-12| - |12|$ **0**

Graph each set of integers on a number line.

- $\{0, 2, -3\}$
- $\{-4, -1, 3\}$

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NAME _____ DATE _____ PERIOD _____

3-1

Reading to Learn Mathematics Integers and Absolute Value

Pre-Activity Read the introduction at the top of page 106 in your textbook. Write your answers below.

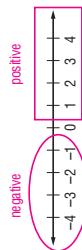
1. What does a value of -2 represent? **a 2-yard loss**
2. On which down did they lose the most yards? **3rd down**
3. How can you represent a gain of 9 yards? **+9 or 9**

Reading the Lesson

4. Express each of the following in words.

Symbols	Words
+7	positive seven
-7	negative seven
7	absolute value of seven

5. On the following number line, draw a circle around the negative integers and label them *negative*. Draw a rectangle around the positive integers and label them *positive*.



Helping You Remember

6. Show a classmate how a number line can be used to show negative and positive integers. Explain the difference between some integers and the absolute values of those integers. Draw a number line to show what you mean. **See students' work.**

NAME _____ DATE _____ PERIOD _____

3-1

Practice: Word Problems Integers and Absolute Value

<p>1. DEATH VALLEY The lowest point in the United States is Death Valley in California. Its altitude is 282 feet below sea level. Write an integer to represent the altitude of Death Valley. -282</p>	<p>2. RAIN A meteorologist reported that in the month of April there were 3 inches more rainfall than normal. Write an integer to represent the amount of rainfall above normal in April. 3</p>
<p>3. ARCHIMEDES A famous mathematician and physicist named Archimedes was born in 287 B.C. Write an integer to express the year of his birth. -287</p>	<p>4. TEMPERATURE In our world's tropical rain forests, the average temperature of every month is 64 degrees above zero or higher. Write an integer to express this temperature. 64</p>
<p>5. STOCK MARKET A certain stock gained 5 points in one day and lost 4 points the next day. Write integers to represent the stock's gains and losses for the two days. 5; -4</p>	<p>6. ALTITUDE An airplane pilot changed his altitude by 100 meters. Describe what this could mean. Sample answer: The airplane could be flying 100 meters higher or 100 meters lower, 100 or -100.</p>

Lesson 3-1

NAME _____ DATE _____ PERIOD _____

3-1 Enrichment

Jaime Escalante

Jaime Escalante (1930–) was born in La Paz, Bolivia, and came to the United States in 1963. For ten years, he worked at odd jobs to support himself and his family while pursuing his dream—becoming certified to teach high school mathematics in California. As a mathematics teacher, he has become well known for his ability to inspire students to succeed in mathematics at levels they never thought possible. In 1988, the story of Mr. Escalante and a group of his students was the subject of the popular motion picture *Stand and Deliver*.

Mr. Escalante teaches concepts students must master if they are to succeed in high school and college mathematics. One of these is the concept of absolute value. For instance, a student should be able to solve an equation like $|y| = 6$ quickly using mental math. Here's how.

You know that $|6| = 6$ and $|-6| = 6$.

So, the equation $|y| = 6$ has *two* solutions: 6 and -6.


Solve each equation. (Hint: One equation has no solution.)

- $|a| = 8$
8, -8
- $|r| = 0$
0
- $|t| = -3$
no solution
- $|c| - 4 = 16$
20, -20
- $10 - |m| = 3$
7, -7
- $5|z| = 60$
12, -12
- $12 \div |g| = 4$
3, -3
- $2|d| + 3 = 5$
1, -1
- $4|p| - 9 = 59$
17, -17
- Suppose that the value of x can be selected from the set $\{-2, -1, 0, 1, 2\}$. Find all of the solutions of the equation $|x| = x$. **0, 1, 2**
- One of these statements is false. Which one is it? Explain.
 - The absolute value of every integer is positive.
 - There is at least one integer whose absolute value is zero.
 - The absolute value of an integer is never negative. **Statement a is false; the absolute value of 0 is 0, which is not positive.**

NAME _____ DATE _____ PERIOD _____


3-2 Study Guide and Intervention

Comparing and Ordering Integers



When two numbers are graphed on a number line, the number to the left is always less than (<) the number to the right. The number to the right is always greater than (>) the number to the left.

Model



Words
-3 is less than -1. -1 is greater than -1.

Symbols
-3 < -1 -1 > -3

The symbol points to the lesser number.


NAME _____ DATE _____ PERIOD _____

3-2 Study Guide and Intervention

Comparing and Ordering Integers

When two numbers are graphed on a number line, the number to the left is always less than (<) the number to the right. The number to the right is always greater than (>) the number to the left.

Model




Words
-3 is less than -1. -1 is greater than -1.

Symbols
-3 < -1 -1 > -3

The symbol points to the lesser number.

EXAMPLE 1 Replace the ● with < or > to make -1 ● -6 a true sentence.


Graph each integer on a number line.



Since -1 is to the right of -6, -1 > -6.

EXAMPLE 2 Order the integers 2, -3, 0, -5 from least to greatest.

To order the integers, graph them on a number line.



Order the integers by reading from left to right: -5, -3, 0, 2.

EXERCISES

- Replace the ● with < or > to make -5 ● -10 a true sentence. **>**
- Order -1, 5, -3, and 2 from least to greatest. **-3, -1, 2, 5**
- Order 0, -4, -2, and 7 from greatest to least. **7, 0, -2, -4**
- Order -3, |-2|, 4, 0, and -5 from greatest to least. **4, |-2|, 0, -3, -5**

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Answers

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3-2

Practice: Skills

Comparing and Ordering Integers

Replace each \bullet with $<$ or $>$ to make a true sentence.

1. $-15 \bullet -16$ $>$
2. $-8 \bullet -7$ $<$
3. $0 \bullet -2$ $>$
4. $-2 \bullet -5$ $>$
5. $-25 \bullet 3$ $<$
6. $-14 \bullet |-20|$ $<$
7. $|-4| \bullet 3$ $>$
8. $|-6| \bullet |-7|$ $<$
9. $|-7| \bullet |2|$ $>$
10. $-8 \bullet |-9|$ $<$

Determine whether each sentence is *true* or *false*. If *false*, change one number to make the sentence true.

11. $-7 < 3$ **true**
12. $2 > 0$ **true**
13. $-20 < -22$ **false; Sample answer: $-20 < 22$**
14. $12 < 15$ **true**
15. $3 > |-5|$ **false; Sample answer: $3 > |-1|$**
16. $|-2| < -3$ **false; Sample answer: $|-2| < 3$**
17. $|8| < |-10|$ **true**
18. $|-11| = 11$ **true**
19. $-4 < 4$ **true**
20. $|-9| < |-10|$ **true**

Order the integers from least to greatest.

21. $12, -6, 20, -47, -11$
 $-47, -11, -6, 12, 20$
22. $9, -6, 0, -4, 17, -11$
 $-11, -6, -4, 0, 9, 17$

Order the integers from greatest to least.

23. $-40, 65, -7, 24, -6, 15$
 $65, 24, 15, -6, -7, -40$
24. $|-13|, 0, 7, -8, -5, |2|$
 $|-13|, 7, |2|, 0, -5, -8$

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NAME _____

DATE _____

PERIOD _____

3-2

Practice: Word Problems

Comparing and Ordering Integers

HISTORY OF WRITING For Exercises 1 and 2, use the table below. It shows important events in the history of writing.

Event	Aprox. Year
The <i>Iliad</i> and the <i>Odyssey</i> are composed by Homer.	700 BC
T'sai Lun invents paper.	105 AD
Date of oldest existing papyrus	2200 BC
Ovid wrote <i>Metamorphosis</i> .	5 AD
Torah is compiled.	450 BC
Metal type developed in Korea	1241 AD

EXTREME TEMPERATURES For Exercises 3-5, use the table below. It shows the extreme temperatures for four states. Temperatures are in degrees Fahrenheit.

State	Highest	Lowest
Alabama	104	3
Nebraska	118	-47
Maine	101	-30
Florida	109	-2

Extreme Temperatures (°F)

1. Write each year as an integer. **-700, 105, -2200, 5, -450, 1241**

2. Order the integers from Exercise 1 from least to greatest. Write a sentence describing the earliest and most recent events in the table. **-2200, -700, -450, 5, 105, 1241; See students' work.**

3. Arrange the highest temperatures from greatest to least. **118, 109, 104, 101**

4. What is the median low temperature for these four states? **-16**

5. Nebraska's lowest temperature was -47°F , and Maine's lowest temperature was -30°F . Write a true statement using the two temperatures with the symbol $>$ or $<$.
Sample answer: $-47 < -30$

6. **MONEY** Mr. Firewalks pays close attention to how much money is in his checking account. One week he deposited \$230, spent \$15 on a lunch, and loaned \$25 to a friend. Write each transaction as an integer, and list them from least to greatest. **-25, -15, 230**

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Mathematics: Applications and Concepts, Course 2

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3-2 Reading to Learn Mathematics

Comparing and Ordering Integers

Pre-Activity Read the introduction at the top of page 109 in your textbook. Write your answers below.

- What is the wind chill if there is a wind at 20 miles per hour and the temperature is 5°? **-15**
- Which is colder, a temperature of 15° with a 20 mile-per-hour wind or a temperature of 10° with a 10 mile-per-hour wind? **10° with 10 mph wind**
- Graph both wind chills found in Exercise 2 on a number line.

LESSON 3-2

Reading the Lesson

For Exercises 4 and 5, express each of the following in words. Then graph the numbers on a number line.

- $-1 < 0$ **negative 1 is less than 0**
- $3 > -2$ **3 is greater than negative 2**

- When two numbers are graphed on a number line, what can you tell about the number to the left? the number to the right?
Sample answer: The number to the left is always less than the number to the right. The number to the right is always greater than the number to the left.

Helping You Remember

7. Write a set of six numbers, some positive and some negative. Explain how you can use a number line to order the numbers from least to greatest.
See students' work.

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3-2 Enrichment

Quantitative Comparisons

An unusual type of problem is found on some standardized multiple-choice tests. This problem type is called the *quantitative comparison*.

In each quantitative comparison question, you are given two quantities, one in Column A and one in Column B. You are to compare the two quantities and shade one of four circles on an answer sheet.

Shade circle A if the quantity in Column A is greater;
 Shade circle B if the quantity in Column B is greater;
 Shade circle C if the two quantities are equal;
 Shade circle D if the relationship cannot be determined from the information given.

LESSON 3-2

Shade the correct oval to the left of each problem number.

	Column A	Column B
1. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D	0.006 + 2	0.002 + 6
2. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D	ten billion dollars	1,000 million dollars
3. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D	20 inches	the perimeter of a square with an area of 25 square inches
4. <input type="radio"/> B <input type="radio"/> A <input type="radio"/> C <input type="radio"/> D	half of one third	one fifth
5. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D	the greatest possible product of two odd positive numbers less than 20	the greatest possible product of two even positive numbers less than 20
6. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D	0.000000001	$-x$ is x if greater than 0
7. <input type="radio"/> D <input type="radio"/> B <input type="radio"/> C <input type="radio"/> A	$ x $	$ x + 1 $
8. <input type="radio"/> C <input type="radio"/> B <input type="radio"/> A <input type="radio"/> D	$ y $	$ -y $
9. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D	$2 x $ if $x \neq 0$	$ x $ if $x \neq 0$
10. <input type="radio"/> C <input type="radio"/> A <input type="radio"/> B <input type="radio"/> D	$-x$ if x is less than 0	$ x $ if x is less than 0

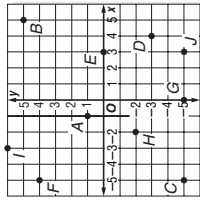
NAME _____ DATE _____ PERIOD _____

3-3

Practice: Skills

The Coordinate Plane

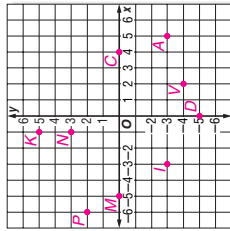
Name the ordered pair for each point graphed at the right. Then identify the quadrant in which each point lies.



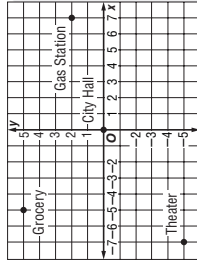
1. A **(-1, 1), II**
2. B **(5, 5), I**
3. C **(-5, -5), III**
4. D **(4, -3), IV**
5. E **(3, 0), x-axis**
6. F **(-5, 4), II**
7. G **(0, -5), y-axis**
8. H **(-2, -2), III**
9. I **(-3, 6), II**
10. J **(3, -5), IV**

Graph and label each point on the coordinate plane.

11. N(-1, 3)
12. V(2, -4)
13. C(4, 0)
14. P(-6, 2)
15. M(-5, 0)
16. K(-1, 5)
17. I(-3, -3)
18. A(5, -3)
19. D(0, -5)



Name the ordered pair for each point on the city map at the right.



20. City Hall **(0, 0)**
21. Theater **(-7, -5)**
22. Gas Station **(7, 2)**
23. Grocery **(-5, 5)**

NAME _____ DATE _____ PERIOD _____

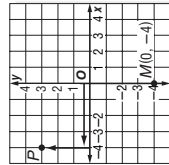
3-3

Study Guide and Intervention

The Coordinate Plane

The coordinate plane is used to locate points. The horizontal number line is the **x-axis**. The vertical number line is the **y-axis**. Their intersection is the **origin**. Points are located using **ordered pairs**. The first number in an ordered pair is the **x-coordinate**; the second number is the **y-coordinate**. The coordinate plane is separated into four sections called **quadrants**.

EXAMPLE 1 Name the ordered pair for point P. Then identify the quadrant in which P lies.



- Start at the origin.
 - Move 4 units left along the x-axis.
 - Move 3 units up on the y-axis.
- The ordered pair for point P is (-4, 3). P is in the upper left quadrant or quadrant II.

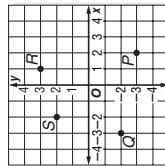
EXAMPLE 2 Graph and label the point M(0, -4).

- Start at the origin.
- Move 0 units left along the x-axis.
- Move 4 units down on the y-axis.
- Draw a dot and label it M(0, -4).

EXERCISES

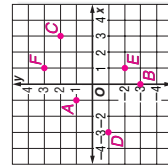
Name the ordered pair for each point graphed at the right. Then identify the quadrant in which each point lies.

1. P **(2, -3), IV**
2. Q **(-3, -2), III**
3. R **(1, 3), I**
4. S **(-2, 2), II**



Graph and label each point on the coordinate plane.

5. A(-1, 1)
6. B(0, -3)
7. C(3, 2)
8. D(-3, -1)
9. E(1, -2)
10. F(1, 3)

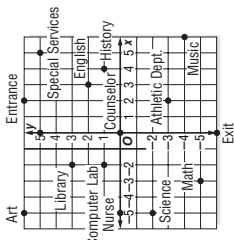


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3-3 Practice: Word Problems

The Coordinate Plane

SCHOOL For Exercises 1–4, use the coordinate plane at the right. It shows a map of the rooms in a junior high school.



Lesson 3-3

<p>1. Thalia is in the room located at $(-2, 1)$. What room is she in? Describe in words how to get from the origin to this point. Computer Lab; move 2 units to the left and one unit up.</p>	<p>2. Thalia's next class is 8 units to the right and 5 units down on the map from where she is now. In what room is Thalia's next class? Find the ordered pair that represents the location of that room. Music room; $(6, -4)$</p>
<p>3. Tyrone is in the Art room, but his next class is in the History room. Give Tyrone directions on how to get to the History room. Sample answer: Walk 9 units to the right, and then 5 units down.</p>	<p>4. On the map, which classrooms are located in the third quadrant? Describe the coordinates of all points in the third quadrant. Science and Math rooms; the x- and y-coordinates are all negative.</p>
<p>5. NEIGHBORHOOD Delsin made a map of his neighborhood in such a way that each intersection is a point on a coordinate plane. Right now, Delsin stands at point $(-4, -3)$. Give the ordered pair of where he will be if moves 5 units to the right and 7 units up on the map. $(1, 4)$</p>	<p>6. NEIGHBORHOOD Refer to Exercise 5. In which quadrant is Delsin when he is done walking? Describe this quadrant. Quadrant I; Sample answer: Quadrant I is the upper-right quadrant.</p>

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3-3 Reading to Learn Mathematics

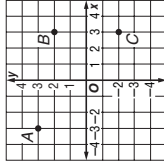
The Coordinate Plane

Pre-Activity Read the introduction at the top of page 112 in your textbook. Write your answers below.

- Suppose Terrell starts at the corner of Russel and Main and walks 1 block north and 2 blocks east. Name the intersection of his location.
Highland and Mobile
- Using the words *north*, *south*, *west*, and *east*, write directions to go from the corner of School and Highland to the corner of Main and Oak.
Sample answer: Walk 6 blocks west, 1 block south, and 1 block west.

Reading the Lesson

- The word *coordinate* comes from two Latin words that mean “to arrange together.” How are coordinates used together to locate a point in a coordinate plane? **Sample answer: The location of a point in a coordinate plane depends on position along an x -axis and position along a y -axis. Both positions, called the x -coordinate and the y -coordinate, are needed in order to locate a point in a coordinate plane. The pair of coordinates is called an ordered pair. The pair of coordinates is ordered such that the x -coordinate is always the first number of the pair and the y -coordinate is always the second number of the pair.**



- Look at the coordinate plane at the right. Name the ordered pair for each point graphed.
 $A(-3, 3)$; $B(3, 2)$; $C(3, -2)$
- In the coordinate plane in Exercise 4, tell which quadrant each of the points is in.
Point A is in quadrant II, point B is in quadrant I, and point C is in quadrant IV.

Helping You Remember

- Write a way to remember the names of the four quadrants of the coordinate plane.
Sample answer: Begin in the quadrant where both coordinates are positive (the upper-right quadrant). This is quadrant I. Name the rest of the quadrants by going counterclockwise around the quadrants: II (upper-left quadrant), III (lower-left quadrant), IV (lower-right quadrant).

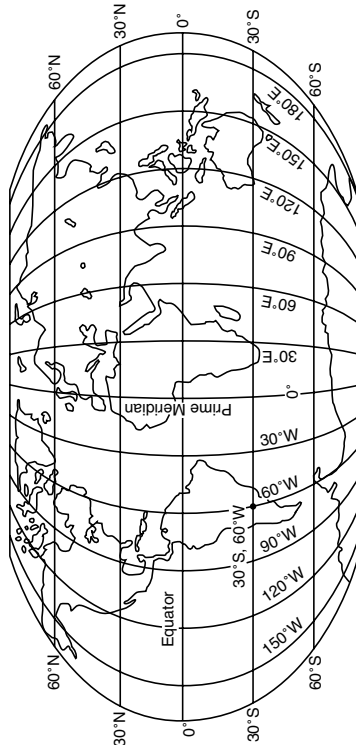
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3-3 Enrichment

Latitude and Longitude

This world map shows some of the latitude and longitude lines. Latitude is measured in degrees north and south of the equator. Longitude is measured in degrees east and west of the prime meridian, a line passing through Greenwich, England. (Greenwich is a suburb of London.)

The latitude is usually given first. For example, the location of 30°S, 60°W is lower South America.



(Sample answers are given. Students may provide more specific places.)

Name a place near each location. Use an atlas or other reference source to check your answers.

- 30°N, 30°W **Atlantic Ocean**
- 30°S, 30°E **South Africa**
- 60°N, 120°W **Canada**
- 15°N, 150°W **Hawaii**
- 30°S, 140°E **Australia**
- 25°N, 100°W **Mexico**
- 40°N, 120°W **California**
- 45°N, 90°W **Wisconsin**
- 40°N, 5°W **Spain**
- 60°N, 45°W **Greenland**
- 35°N, 140°E **Japan**
- 0°, 60°E **Indian Ocean**

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Mathematics: Applications and Concepts, Course 2

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3-4 Study Guide and Intervention Adding Integers

For integers with the same sign:

- the sum of two positive integers is positive.
- the sum of two negative integers is negative.

For integers with different signs, subtract their absolute values. The sum is:

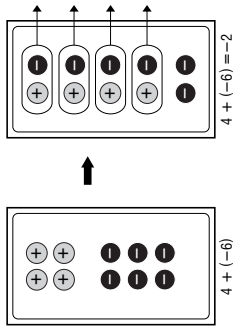
- positive if the positive integer has the greater absolute value.
- negative if the negative integer has the greater absolute value.

To add integers, it is helpful to use counters or a number line.

EXAMPLE 1 Find $4 + (-6)$.

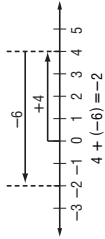
Method 1 Use counters.

- Combine a set of 4 positive counters and a set of 6 negative counters on a mat.



Method 2 Use a number line.

- Start at 0.
- Move 4 units right.
- Then move 6 units left.



EXERCISES

Add.

- $-5 + (-2)$ **-7**
- $8 + 1$ **9**
- $-7 + 10$ **3**
- $16 + (-11)$ **5**
- $-22 + (-7)$ **-29**
- $-50 + 50$ **0**
- $-10 + (-10)$ **-20**
- $100 + (-25)$ **75**
- $-35 + -20$ **-15**

Evaluate each expression if $a = 8$, $b = -8$, and $c = 4$.

- $a + 15$ **23**
- $b + (-9)$ **-17**
- $a + b$ **0**
- $b + c$ **-4**
- $-10 + c$ **-6**
- $12 + b$ **4**

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3-4 Practice: Skills Adding Integers

Tell whether each sum is positive, negative, or zero without adding.

1. $5 + (-8)$ **-3** 2. $-3 + 3$ **0**

3. $-3 + (-8)$ **-11** 4. $-7 + (-7)$ **-14**

5. $-8 + 10$ **2** 6. $-7 + 13$ **6**

7. $15 + (-10)$ **5** 8. $-11 + (-12)$ **-23**

9. $25 + (-12)$ **13** 10. $-14 + (-13)$ **-27**

11. $14 + (-27)$ **-13** 12. $-28 + 16$ **-12**

Evaluate each expression if $a = -8$, $b = 12$, and $c = -4$.

13. $5 + a$ **-3** 14. $b + (-9)$ **3**

15. $c + (-5)$ **-9** 16. $a + b$ **4**

17. $a + 0$ **-8** 18. $b + c$ **8**

19. $-12 + b$ **0** 20. $a + (-7)$ **-15**

21. $21 + c$ **17** 22. $a + c$ **-12**

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Lesson 3-4

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3-4 Practice: Word Problems Adding Integers

Write an addition expression to describe each situation. Then find each sum.

<p>1. FOOTBALL A team gains 20 yards. Then they lose 7 yards. $20 + (-7)$; 13</p>	<p>2. MONEY Roger owes his mom \$5. He borrows another \$6 from her. $(-5) + (-6)$; -11</p>
<p>3. GOLF Juanita's score was 5 over par on the first 9 holes. Her score was 4 under par on the second 9 holes. $5 + (-4)$; 1</p>	<p>4. HOT AIR BALLOON A balloon rises 340 feet into the air. Then it descends 130 feet. $340 + (-130)$; 210</p>
<p>5. CYCLING A cyclist travels downhill for 125 feet. Then she travels up a hill 50 feet. $-125 + 50$; -75</p>	<p>6. AIRPLANE A plane descends 1,200 feet. Then it descends another 500 feet. $-1,200 + (-500)$; -1,700</p>

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3-4**Reading to Learn Mathematics**
Adding Integers

Pre-Activity Read the introduction at the top of page 120 in your textbook. Write your answers below.

1. What is the charge at the top of a cloud where there are more protons than electrons? **positive**
2. What is the charge at the bottom of a cloud where there are more electrons than protons? **negative**

Reading the Lesson

For Exercises 3 and 4, tell how you would solve each of the following on a number line. Then solve.

3. $-7 + (-9)$ **Starting at 0, move left 7 units, then move left another 9 units; -16.**
4. $-7 + 9$ **Starting at 0, move left 7 units, then move right 9 units; 2.**
5. When you use counters to add integers, what property are you applying when you remove zero pairs? **Additive Inverse Property**
6. How many units away from 0 is the number 17? How many units away from 0 is the number -17? What are 17 and -17 called? **17; 17; opposites or additive inverses**

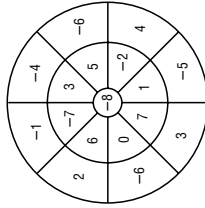
Helping You Remember

7. Work with a partner. Tell your partner how to use absolute values to add integers with different signs when the positive integer has the greater absolute value. Then have your partner explain to you how to use absolute values to add integers with different signs when the negative integer has the greater absolute value. **See students' work.**

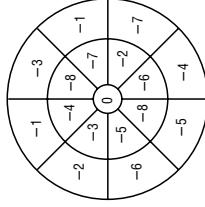
3-4**Enrichment****Dartboard Puzzles**

Three darts are thrown. Each dart must land on a different space in order to count. Find the highest and the lowest possible scores.

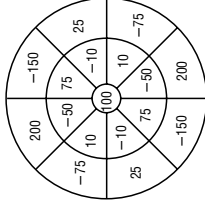
1.



2.



3.



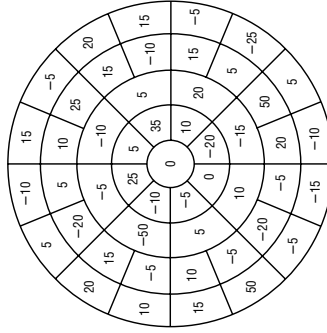
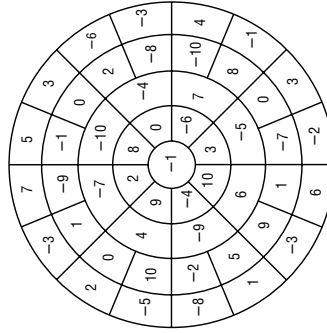
highest score: **18**
lowest score: **-21**

highest score: **-2**
lowest score: **-23**

highest score: **500**
lowest score: **-375**

In these problems, five darts are thrown. Each dart must land on a different space in order to count. Solve each puzzle.

4. Find three ways to make the score -5.
5. Find three ways to make the score 0.



Answers will vary.

3-5 Study Guide and Intervention
Subtracting Integers

NAME _____ DATE _____ PERIOD _____

To subtract an integer, add its opposite.

EXAMPLE 1 Find $6 - 9$.

$6 - 9 = 6 + (-9)$ To subtract 9, add -9 .
 $= -3$ Simplify.

EXAMPLE 2 Find $-10 - (-12)$.

$-10 - (-12) = -10 + 12$ To subtract -12 , add 12.
 $= 2$ Simplify.

EXAMPLE 3 Evaluate $a - b$ if $a = -3$ and $b = 7$.

$a - b = -3 - 7$ Replace a with -3 and b with 7.
 $= -3 + (-7)$ To subtract 7, add -7 .
 $= -10$ Simplify.

EXERCISES

Subtract.

1. $7 - 9$ **-2** 2. $20 - (-6)$ **26**

3. $-10 - 4$ **-14** 4. $0 - 12$ **-12**

5. $-7 - 8$ **-15** 6. $13 - 18$ **-5**

7. $-20 - (-5)$ **-15** 8. $-8 - (-6)$ **-2**

9. $25 - (-14)$ **39** 10. $-75 - 50$ **-125**

11. $15 - 65$ **-50** 12. $19 - (-10)$ **29**

Evaluate each expression if $m = -2$, $n = 10$, and $p = 5$.

13. $m - 6$ **-8** 14. $9 - n$ **-1**

15. $p - (-8)$ **13** 16. $p - m$ **7**

17. $m - n$ **-12** 18. $-25 - p$ **-30**

3-5 Practice: Skills
Subtracting Integers

NAME _____ DATE _____ PERIOD _____

Subtract.

1. $5 - 2$ **3** 2. $6 - (-7)$ **13**

3. $-3 - 2$ **-5** 4. $8 - 13$ **-5**

5. $-7 - (-7)$ **0** 6. $6 - 12$ **-6**

7. $15 - (-7)$ **22** 8. $-15 - 6$ **-21**

9. $-3 - 8$ **-11** 10. $-10 - 12$ **-22**

11. $13 - (-12)$ **25** 12. $14 - (-22)$ **36**

13. $10 - (-20)$ **30** 14. $-16 - 14$ **-30**

15. $-25 - 25$ **-50** 16. $6 - (-31)$ **37**

17. $-18 - (-40)$ **22** 18. $15 - (-61)$ **76**

Evaluate each expression if $r = -4$, $s = 10$, and $t = -7$.

19. $r - 7$ **-11** 20. $t - s$ **-17**

21. $s - (-8)$ **18** 22. $t - r$ **-3**

23. $s - t$ **17** 24. $r - s$ **-14**

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3-5

Reading to Learn Mathematics

Subtracting Integers

Pre-Activity Complete the Mini Lab at the top of page 128 in your textbook. Write your answers below.

1. Write a related addition sentence for each subtraction sentence.

Sample answers: $3 + (-5) = -2$; $-1 + (-4) = -5$

Use a number line to find each difference. Write an equivalent addition sentence for each.

2. $1 - 5$ $1 - 5 = -4$; $1 + (-5) = -4$

3. $-2 - 1$ $-2 - 1 = -3$; $-2 + (-1) = -3$

4. $-3 - 4$ $-3 - 4 = -7$; $-3 + (-4) = -7$

5. $0 - 5$ $0 - 5 = -5$; $0 + (-5) = -5$

6. Compare and contrast subtraction sentences with their related addition sentences. **Sample answer:** The subtraction problems give the same answer as their related addition problems. Subtracting a positive integer is the same as adding a negative integer.

Reading the Lesson

Tell how you would solve each of the following on a number line. Then solve.

7. $-8 - (-6)$ **Sample answer:** Change the subtraction sentence to an addition sentence. To subtract negative 6, add positive 6. Then, on a number line start at 0, move left 8 units, then move right 6 units; -2 .
8. $6 - 8$ **Sample answer:** Change the subtraction sentence to an addition sentence. To subtract 8, add negative 8. Then, on a number line start at 0, move right 6 units, then move left 8 units; -2 .

Helping You Remember

9. Write the rule that tells how to subtract integers. Then give an example. **To subtract an integer, add its opposite. Sample answer:**
 $12 - (-3) = 12 + 3 = 15$

Lesson 3-5

NAME _____ DATE _____ PERIOD _____

3-5 Practice: Word Problems

Subtracting Integers

Subtract.

<p>1. FOOTBALL A team gained 5 yards on their first play of the game. Then they lost 6 yards. Find the total change in yardage. -1 yd</p>	<p>2. CHECKING Your checking account is overdrawn by \$50. You write a check for \$20. What is the balance in your account? $-\\$70$</p>
<p>3. TEMPERATURE The average temperature in Calgary, Canada, is 22°C in July and -11°C in January. Find the range of the highest and lowest temperatures in Calgary. 33°C</p>	<p>4. ROLLER COASTER A roller coaster begins at 90 feet above ground level. Then it descends 105 feet. Find the height of the coaster after the first descent. -15 ft</p>
<p>5. SAVINGS Sonia has \$235 in her savings account. She withdraws \$45. What is left in her savings account? $\\$190$</p>	<p>6. BEACH Wai and Kuri were digging in the sand at the beach. Wai dug a hole that was 15 inches below the surface, and Kuri dug a hole that was 9 inches below the surface. Find the difference in the depths of their holes. 6 in.</p>

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3-5 Enrichment

Distance on the Number Line
To find the distance between two points on a number line, subtract their coordinates. Then, take the absolute value of the difference.

$-4 - 3 = -7$
 $|-7| = 7$

You can also find the distance by finding the absolute value of the difference of the coordinates.

$|-4 - 3| = 7$

Graph each pair of points. Then write an expression using absolute value to find the distance between the points.

- A at -5 and B at 2 $|-5 - 2| = 7$
- C at -7 and D at -1 $|-7 - (-1)| = 6$
- E at -5 and F at 5 $|-5 - 5| = 10$
- W at 0 and X at 6 $|0 - 6| = 6$
- Y at -4 and Z at 0 $|-4 - 0| = 4$

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3-6 Study Guide and Intervention

Multiplying Integers

The product of two integers with **different** signs is **negative**.
The product of two integers with the **same** sign is **positive**.

EXAMPLE 1 Multiply $5(-2)$.
The integers have different signs. The product is negative.
 $5(-2) = -10$

EXAMPLE 2 Multiply $-3(7)$.
The integers have different signs. The product is negative.
 $-3(7) = -21$

EXAMPLE 3 Multiply $-6(-9)$.
The integers have the same sign. The product is positive.
 $-6(-9) = 54$

EXAMPLE 4 Multiply $(-7)^2$.
There are 2 factors of -7 .
The product is positive.
 $(-7)^2 = (-7)(-7) = 49$

EXAMPLE 5 Simplify $-2(6c)$.
 $-2(6c) = (-2 \cdot 6)c$ Associative Property of Multiplication.
 $= -12c$ Simplify.

EXAMPLE 6 Simplify $2(5x)$.
 $2(5x) = (2 \cdot 5)x$ Associative Property of Multiplication.
 $= 10x$ Simplify.

EXERCISES

Multiply.

- $-5(8) = -40$
- $-3(-7) = 21$
- $10(-8) = -80$
- $-8(3) = -24$
- $-12(-12) = 144$
- $(-8)^2 = 64$

ALGEBRA Simplify each expression.

- $-5(7a) = -35a$
- $3(-2x) = -6x$
- $4(6f) = 24f$
- $7(6b) = 42b$
- $-6(-3y) = 18y$
- $7(-8g) = -56g$

ALGEBRA Evaluate each expression if $a = -3$, $b = -4$, and $c = 5$.

- $-2a = 6$
- $9b = -36$
- $ab = 12$
- $-3ac = 45$
- $-2c^2 = -50$
- $abc = 60$

NAME _____ DATE _____ PERIOD _____

3-6 Study Guide and Intervention

Multiplying Integers

The product of two integers with **different** signs is **negative**.
The product of two integers with the **same** sign is **positive**.

EXAMPLE 1 Multiply $5(-2)$.
The integers have different signs. The product is negative.
 $5(-2) = -10$

EXAMPLE 2 Multiply $-3(7)$.
The integers have different signs. The product is negative.
 $-3(7) = -21$

EXAMPLE 3 Multiply $-6(-9)$.
The integers have the same sign. The product is positive.
 $-6(-9) = 54$

EXAMPLE 4 Multiply $(-7)^2$.
There are 2 factors of -7 .
The product is positive.
 $(-7)^2 = (-7)(-7) = 49$

EXAMPLE 5 Simplify $-2(6c)$.
 $-2(6c) = (-2 \cdot 6)c$ Associative Property of Multiplication.
 $= -12c$ Simplify.

EXAMPLE 6 Simplify $2(5x)$.
 $2(5x) = (2 \cdot 5)x$ Associative Property of Multiplication.
 $= 10x$ Simplify.

EXERCISES

Multiply.

- $-5(8) = -40$
- $-3(-7) = 21$
- $10(-8) = -80$
- $-8(3) = -24$
- $-12(-12) = 144$
- $(-8)^2 = 64$

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- $3(-2x) = -6x$
- $4(6f) = 24f$
- $7(6b) = 42b$
- $-6(-3y) = 18y$
- $7(-8g) = -56g$

ALGEBRA Evaluate each expression if $a = -3$, $b = -4$, and $c = 5$.

- $-2a = 6$
- $9b = -36$
- $ab = 12$
- $-3ac = 45$
- $-2c^2 = -50$
- $abc = 60$

NAME _____ DATE _____ PERIOD _____

3-6 Study Guide and Intervention

Multiplying Integers

The product of two integers with **different** signs is **negative**.
The product of two integers with the **same** sign is **positive**.

EXAMPLE 1 Multiply $5(-2)$.
The integers have different signs. The product is negative.
 $5(-2) = -10$

EXAMPLE 2 Multiply $-3(7)$.
The integers have different signs. The product is negative.
 $-3(7) = -21$

EXAMPLE 3 Multiply $-6(-9)$.
The integers have the same sign. The product is positive.
 $-6(-9) = 54$

EXAMPLE 4 Multiply $(-7)^2$.
There are 2 factors of -7 .
The product is positive.
 $(-7)^2 = (-7)(-7) = 49$

EXAMPLE 5 Simplify $-2(6c)$.
 $-2(6c) = (-2 \cdot 6)c$ Associative Property of Multiplication.
 $= -12c$ Simplify.

EXAMPLE 6 Simplify $2(5x)$.
 $2(5x) = (2 \cdot 5)x$ Associative Property of Multiplication.
 $= 10x$ Simplify.

EXERCISES

Multiply.

- $-5(8) = -40$
- $-3(-7) = 21$
- $10(-8) = -80$
- $-8(3) = -24$
- $-12(-12) = 144$
- $(-8)^2 = 64$

ALGEBRA Simplify each expression.

- $-5(7a) = -35a$
- $3(-2x) = -6x$
- $4(6f) = 24f$
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ALGEBRA Evaluate each expression if $a = -3$, $b = -4$, and $c = 5$.

- $-2a = 6$
- $9b = -36$
- $ab = 12$
- $-3ac = 45$
- $-2c^2 = -50$
- $abc = 60$

Answers (Lesson 3-6)

NAME _____ DATE _____ PERIOD _____

3-6 Practice: Skills

Multiplying Integers

Multiply.

- $-4(6)$ **-24**
- $-2(-8)$ **16**
- $12(-4)$ **-48**
- $-6(5)$ **-30**
- $-10(-9)$ **90**
- $-(5)^2$ **-25**
- $(-5)^2$ **25**
- $-30(5)$ **-150**
- $20(-6)$ **-120**
- $-14(-6)$ **84**
- $(-13)^2$ **169**
- $-7(15)$ **-105**

ALGEBRA Simplify each expression.

- $-3(4y)$ **-12y**
- $7(5g)$ **35g**
- $3(-3y)$ **-9y**
- $7(-3x)$ **-21x**
- $7(7w)$ **49w**
- $-2(-10h)$ **20h**

ALGEBRA Evaluate each expression if $g = -5$, $h = -3$, and $k = 4$.

- $-3g$ **15**
- $5h$ **-15**
- $7gk$ **-140**
- $-2gh$ **-30**
- $-10h$ **30**
- $-2h^2$ **-18**

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Lesson 3-6

NAME _____ DATE _____ PERIOD _____

3-6 Practice: Word Problems

Multiplying Integers

Multiply.

<p>1. TEMPERATURE Suppose the temperature outside is dropping 3 degrees each hour. How much will the temperature drop in 8 hours? -24°</p>	<p>2. DIVING A deep-sea diver descends below the surface of the water at a rate of 60 feet each minute. What is the depth of the diver after 10 minutes? -600 ft</p>
<p>3. STOCK A computer stock lost 2 points each hour for 6 hours. Find the total points the stock fell. -12 points</p>	<p>4. DROUGHT A drought can cause the level of the local water supply to drop by a few inches each week. Suppose the level of the water supply drops 2 inches each week. How far will it have dropped in 4 weeks? -8 in.</p>
<p>5. MONEY Mrs. Rockwell lost money on an investment at a rate of \$4 per day. How much did she lose after two weeks? -\$56</p>	<p>6. TENNIS BALLS Josh purchased 8 cans of tennis balls. The cans came with 3 balls in each can. How many balls did Josh purchase? 24 tennis balls</p>

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NAME _____ DATE _____ PERIOD _____

3-7

Study Guide and Intervention

Dividing Integers

The quotient of two integers with different signs is negative.
The quotient of two integers with the same sign is positive.

EXAMPLE 1 Divide $30 \div (-5)$.

$30 \div (-5)$ The integers have different signs.
 $30 \div (-5) = -6$ The quotient is negative.

EXAMPLE 2 Divide $-100 \div (-5)$.

$-100 \div (-5)$ The integers have the same sign.
 $-100 \div (-5) = 20$ The quotient is positive.

EXERCISES

Divide.

1. $-12 \div 4$ **-3**
2. $-14 \div (-7)$ **2**
3. $\frac{18}{-2}$ **-9**
4. $-6 \div (-3)$ **2**
5. $-10 \div 10$ **-1**
6. $\frac{-80}{-20}$ **4**
7. $350 \div (-25)$ **-14**
8. $-420 \div (-3)$ **140**
9. $\frac{540}{-45}$ **12**
10. $\frac{-256}{16}$ **-16**

ALGEBRA Evaluate each expression if $d = -24$, $e = -4$, and $f = 8$.

11. $12 \div e$ **-3**
12. $40 \div f$ **5**
13. $d \div 6$ **-4**
14. $d \div e$ **6**
15. $f \div e$ **-2**
16. $e^2 \div f$ **2**
17. $\frac{-d}{e}$ **-6**
18. $ef \div 2$ **-16**
19. $\frac{d}{e^2}$ **4**
20. $\frac{de}{f}$ **12**

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NAME _____ DATE _____ PERIOD _____

3-7

Practice: Skills

Dividing Integers

Divide.

1. $-15 \div 3$ **-5**
2. $-24 \div (-8)$ **3**
3. $22 \div (-2)$ **-11**
4. $-49 \div (-7)$ **7**
5. $-8 \div (-8)$ **1**
6. $\frac{36}{-4}$ **-9**
7. $225 \div (-15)$ **-15**
8. $\frac{0}{-9}$ **0**
9. $-38 \div 2$ **-19**
10. $\frac{64}{4}$ **16**
11. $-500 \div (-50)$ **10**
12. $-189 \div (-21)$ **9**

ALGEBRA Evaluate each expression if $m = -32$, $n = 2$, and $p = -8$.

13. $m \div n$ **-16**
14. $p \div 4$ **-2**
15. $p^2 \div m$ **-2**
16. $m \div p$ **4**
17. $\frac{-p}{n}$ **4**
18. $p \div n^2$ **-2**
19. $\frac{p^2}{n^2}$ **16**
20. $\frac{18-n}{p}$ **-2**
21. $m \div (np)$ **2**
22. $\frac{m}{p} + n$ **6**

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<p style="text-align: center;">3-7 Practice: Word Problems <i>Dividing Integers</i></p> <p>NAME _____ DATE _____ PERIOD _____</p> <p>Divide.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;"> <p>1. STOCK MARKET During a 5-day workweek, the stock market decreased by 65 points. Find the average daily change in the market for the week. -13 points</p> </td> <td style="width: 50%; padding: 5px;"> <p>2. MOTION Mr. Diaz decreased the speed of his car by 30 miles per hour over a period of 10 seconds. Find the average change in speed each second. -3 mph per s</p> </td> </tr> <tr> <td style="width: 50%; padding: 5px;"> <p>3. WEATHER Over the past seven days, Mrs. Cho found that the temperature outside had dropped a total of 35 degrees. Find the average drop in temperature each day. -5 degrees per day</p> </td> <td style="width: 50%; padding: 5px;"> <p>4. BASKETBALL The basketball team lost their last 6 games. They lost by a total of 48 points. Find the average number of points by which each game was lost. -8 points per game</p> </td> </tr> <tr> <td style="width: 50%; padding: 5px;"> <p>5. POPULATION The enrollment at Davis Middle School dropped by 60 students over a 5-year period. What is the average yearly drop in enrollment? -12 students annually</p> </td> <td style="width: 50%; padding: 5px;"> <p>6. SUBMARINE A submarine descends at a rate of 60 feet each minute. How long will it take it to descend to a depth of 660 feet below the surface? 11 min</p> </td> </tr> </table>	<p>1. STOCK MARKET During a 5-day workweek, the stock market decreased by 65 points. Find the average daily change in the market for the week. -13 points</p>	<p>2. MOTION Mr. Diaz decreased the speed of his car by 30 miles per hour over a period of 10 seconds. Find the average change in speed each second. -3 mph per s</p>	<p>3. WEATHER Over the past seven days, Mrs. Cho found that the temperature outside had dropped a total of 35 degrees. Find the average drop in temperature each day. -5 degrees per day</p>	<p>4. BASKETBALL The basketball team lost their last 6 games. They lost by a total of 48 points. Find the average number of points by which each game was lost. -8 points per game</p>	<p>5. POPULATION The enrollment at Davis Middle School dropped by 60 students over a 5-year period. What is the average yearly drop in enrollment? -12 students annually</p>	<p>6. SUBMARINE A submarine descends at a rate of 60 feet each minute. How long will it take it to descend to a depth of 660 feet below the surface? 11 min</p>	<p style="text-align: center;">3-7 Reading to Learn Mathematics <i>Dividing Integers</i></p> <p>NAME _____ DATE _____ PERIOD _____</p> <p>Pre-Activity Complete the Mini Lab at the top of page 138 in your textbook. Write your answers below.</p> <p>Find each quotient using counters.</p> <ol style="list-style-type: none"> 1. $-6 \div 2 = -3$ 2. $-12 \div 3 = -4$ <p>Reading the Lesson</p> <p>Write two division sentences related to each of the following multiplication sentences.</p> <ol style="list-style-type: none"> 3. $-6(-3) = 18$ $18 \div (-3) = -6$; $18 \div (-6) = -3$ 4. $-21(-2) = 42$ $42 \div (-21) = -2$; $42 \div (-2) = -21$ 5. $-6(3) = -18$ $-18 \div 3 = -6$; $-18 \div (-6) = 3$ 6. $2(-21) = -42$ $-42 \div (-21) = 2$; $-42 \div 2 = -21$ <p>7. Complete each of the following sentences with the word <i>positive</i> or <i>negative</i>.</p> <ol style="list-style-type: none"> a. The quotient of two integers with different signs is negative. b. The quotient of two integers with the same sign is positive. <p>8. In the division sentence $-72 \div 8 = -9$, identify the dividend, the divisor, and the quotient. dividend: -72; divisor: 8; quotient: -9</p> <p>Helping You Remember</p> <p>9. Describe how the operations of multiplication and division are opposite of each other. Are these operations opposite in all cases? What is the one integer that cannot be a divisor? Multiplication is the opposite of division in that the product of a quotient and divisor gives the dividend. Even though you can take the product of zero and a number, zero cannot be a divisor.</p>
<p>1. STOCK MARKET During a 5-day workweek, the stock market decreased by 65 points. Find the average daily change in the market for the week. -13 points</p>	<p>2. MOTION Mr. Diaz decreased the speed of his car by 30 miles per hour over a period of 10 seconds. Find the average change in speed each second. -3 mph per s</p>						
<p>3. WEATHER Over the past seven days, Mrs. Cho found that the temperature outside had dropped a total of 35 degrees. Find the average drop in temperature each day. -5 degrees per day</p>	<p>4. BASKETBALL The basketball team lost their last 6 games. They lost by a total of 48 points. Find the average number of points by which each game was lost. -8 points per game</p>						
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NAME _____ DATE _____ PERIOD _____

3-7 Enrichment

Division by Zero?

Some interesting things happen when you try to divide by zero. For example, look at these two equations.

$$\frac{5}{0} = x \qquad \frac{0}{0} = y$$

If you can write the equations above, you can also write the two equations below.

$$0 \cdot x = 5 \qquad 0 \cdot y = 0$$

However, there is no number that will make the left equation true. This equation has no solution. For the right equation, *every* number will make it true. The solutions for this equation are “all numbers.”

Because division by zero leads to impossible situations, it is not a “legal” step in solving a problem. People say that division by zero is undefined, or not possible, or simply not allowed.

Describe the solution set for each equation.

1. $4x = 0$ **0** 2. $x \cdot 0 = 0$ **all numbers**

3. $x \cdot 0 = x$ **0** 4. $\frac{0}{x} = 0$ **all numbers but 0**

5. $\frac{0}{x} = x$ **no solution** 6. $\frac{0}{x} = 5$ **no solution**

What values for x must be excluded to prevent division by 0?

7. $\frac{1}{x^2} = 0$ **0** 8. $\frac{1}{x-1} = 1$ **1**

9. $\frac{1}{x+1} = -1$ **-1** 10. $\frac{0}{2x} = 0$ **0**

11. $\frac{1}{2x-2} = 1$ **1** 12. $\frac{1}{3x+6} = -2$ **-2**

Explain what is wrong with this “proof.”

13. Step 1 $0 \cdot 1 = 0$ and $0 \cdot (-1) = 0$

Step 2 Therefore, $\frac{0}{0} = 1$ and $\frac{0}{0} = -1$.

Step 3 Therefore, $1 = -1$.

Lesson 3-7

Chapter 3 Assessment Answer Key

Form 1
Page 165

1. A
2. H
3. B
4. I
5. B
6. H
7. A
8. G
9. A
10. H
11. D
12. F
13. B

Page 166

14. F
15. C
16. I
17. B
18. I
19. A
20. H
21. B
22. H
23. D
24. F
25. B
- B: 4

Form 2A
Page 167

1. C
2. F
3. D
4. G
5. A
6. H
7. B
8. G
9. A
10. I
11. C
12. G
13. D

(continued on
the next page)

Chapter 3 Assessment Answer Key

Form 2A (continued)
Page 168

14. F

15. B

16. F

17. C

18. I

19. B

20. H

21. B

22. H

23. A

24. I

25. B

B: 6

Form 2B
Page 169

1. B

2. H

3. A

4. I

5. A

6. G

7. D

8. F

9. B

10. H

11. A

12. G

13. D

Page 170

14. F

15. C

16. G

17. A

18. I

19. B

20. I

21. B

22. I

23. C

24. F

25. D

B: 10

Chapter 3 Assessment Answer Key

Form 2C
Page 171

1. 45

2. -5

3. 11

4. 10



6. >

7. <

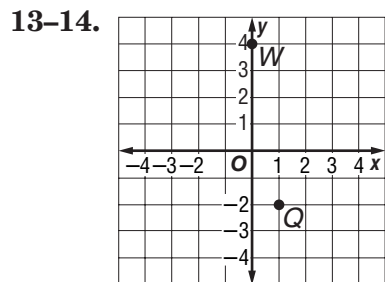
8. >

9. -2, -1, 0, 3, 5, 7

10. Athens

11. (-3, 2); II

12. (-1, -3); III



Page 172

15. -37

16. -88

17. -5

18. 6

19. 9

20. -3

21. -17

22. 2

23. 21

24. -5

25. 4

26. 18

27. -2

28. 2

29. -24

30. -1

31. -15a

32. -12c

33. -11

B: 12

(continued on the next page)

Chapter 3 Assessment Answer Key

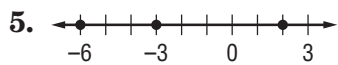
Form 2D
Page 173

1. 300

2. -13

3. 13

4. 8



6. <

7. >

8. <

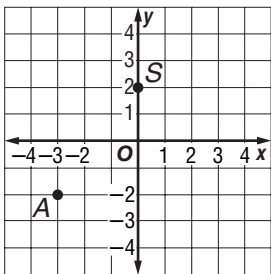
9. -8, -5, -1, 2, 3, 4

10. St. Paul

11. (3, 1); I

12. (1, -2); IV

13-14.



Page 174

15. 2

16. -70

17. -20

18. 9

19. 25

20. -12

21. -17

22. 2

23. 13

24. -8

25. 7

26. 30

27. -4

28. -3

29. -40

30. -6

31. -30z

32. 8y

33. -9

B: 14

Chapter 3 Assessment Answer Key

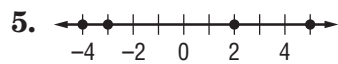
Form 3
Page 175

1. 380

2. -11

3. 16

4. 2



6. >

7. <

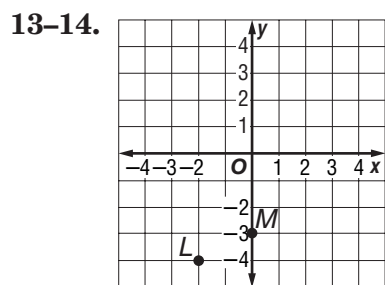
8. >

9. -7, -5, -3, 0, 4, 10

10. Chicago

11. $(-3, 3)$; II

12. $(2, 0)$; x-axis



Page 176

15. -28

16. -24

17. 0

18. -6

19. -121

20. 3

21. 3

22. 8

23. -13

24. 80

25. -12

26. 3

27. -45

28. -2

29. 1

30. -6

31. $-35e$

32. $-6bc$

33. 6

B: $6, -3$; Divide the previous term by -2 .

Chapter 3 Assessment Answer Key

Page 177, Extended Response Assessment Scoring Rubric

Level	Specific Criteria
4	The student demonstrates a thorough understanding of the mathematics concepts and/or procedures embodied in the task. The student has responded correctly to the task, used mathematically sound procedures, and provided clear and complete explanations and interpretations. The response may contain minor flaws that do not detract from the demonstration of a thorough understanding.
3	The student demonstrates an understanding of the mathematics concepts and/or procedures embodied in the task. The student's response to the task is essentially correct with the mathematical procedures used and the explanations and interpretations provided demonstrating an essential but less than thorough understanding. The response may contain minor errors that reflect inattentive execution of the mathematical procedures or indications of some misunderstanding of the underlying mathematics concepts and/or procedures.
2	The student has demonstrated only a partial understanding of the mathematics concepts and/or procedures embodied in the task. Although the student may have used the correct approach to obtaining a solution or may have provided a correct solution, the student's work lacks an essential understanding of the underlying mathematical concepts. The response contains errors related to misunderstanding important aspects of the task, misuse of mathematical procedures, or faulty interpretations of results.
1	The student has demonstrated a very limited understanding of the mathematics concepts and/or procedures embodied in the task. The student's response to the task is incomplete and exhibits many flaws. Although the student has addressed some of the conditions of the task, the student reached an inadequate conclusion and/or provided reasoning that was faulty or incomplete. The response exhibits many errors or may be incomplete.
0	The student has provided a completely incorrect solution or uninterpretable response, or no response at all.

Chapter 3 Assessment Answer Key

Page 177, Extended Response Assessment Scoring Rubric

In addition to the scoring rubric found on page A26, the following sample answers may be used as guidance in evaluating extended response assessment items.

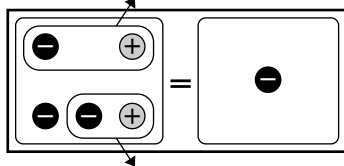
1. a. You can use a number line to compare integers. The values increase as you go right and decrease as you go left.

b. $-3, -1, +2, +4$

c. The absolute value of a number is the number of units its graph is from the graph of 0 on the number line.

d. $|-3| = 3$

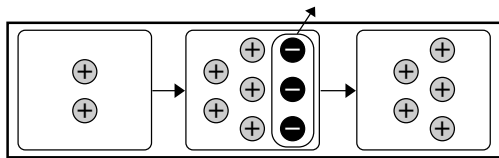
e. $-3 + (+2)$



Glen's score after two rounds is -1 .

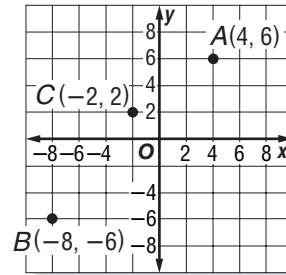
f. $-1 + (-3) = -4$

g. $+2 - (-3)$



The difference between Horatio's first and second round scores is 5.

2.



a. Graph $A(4, 6)$ by starting at the origin, moving 4 units to the right and 6 units up. Point A lies in quadrant I.

b. $4 \cdot (-2) = -8$ and $6 \cdot (-1) = -6$, so point B has coordinates $(-8, -6)$. Point B lies in quadrant III.

c. $-8 \div 4 = -2$ and $-6 \div (-3) = 2$, so point C has coordinates $(-2, 2)$. Point C lies in quadrant II.

Chapter 3 Assessment Answer Key

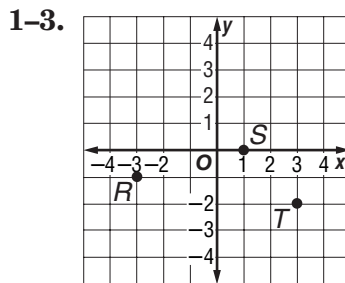
Vocabulary Test/Review Page 178

1. absolute value
2. integer
3. graph
4. additive inverse
5. x-coordinate
6. y-axis
7. negative integer
8. origin
9. opposites
10. quadrant
11. Sample answer: a plane in which a horizontal number line and a vertical number line intersect at their zero points
12. Sample answer: the pair of numbers (*x*-coordinate, *y*-coordinate) used to locate a point in the coordinate plane

Quiz (Lessons 3-1 and 3-2) Page 179

1. C
2. -15
3. 24
4. 3
5. 9
6. 15
7. >
8. <
9. >
10. >

Quiz (Lessons 3-3 and 3-4) Page 179



4. 5
5. -4

Quiz (Lessons 3-5 and 3-6) Page 180

1. -13
2. 30
3. -81
4. 35
5. -18
6. -10
7. 11
8. -56
9. -18e
10. -20s

Quiz (Lesson 3-7) Page 180

1. -4
2. 7
3. -3
4. -6
5. 2

Chapter 3 Assessment Answer Key

Mid-Chapter Test Page 181

1. B
2. F
3. D
4. I
5. A
6. G
7. 50
8. -3
9. >
10. <
11. (5, 4); I
12. (-6, -1); III
13. (3, -2); IV
14. (-1, 4); II
15. -11

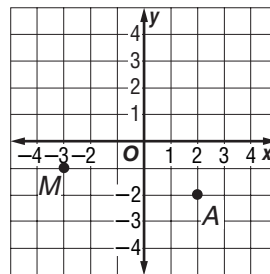
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1. 18
2. 16
3. 25; 23; 22 and 35; 51

Sample answer: The mean and median number of wins are close, indicating the data are fairly well-centered in the middle of the range of possible wins. About half of the data values cluster

4. from 17 to 35.
5. 1
 -72, -31, -12,
6. 12, 50, 61
7. 8

8-9.



10. 0
11. -30
12. 30
13. -4

Chapter 3 Assessment Answer Key

Standardized Test Practice

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1. A B C D

2. F G H I

3. A B C D

4. F G H I

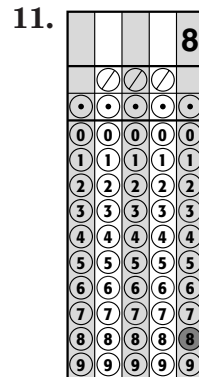
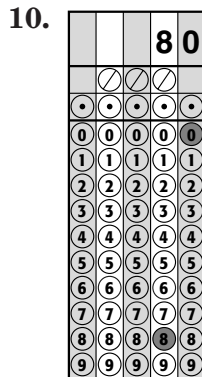
5. A B C D

6. F G H I

7. A B C D

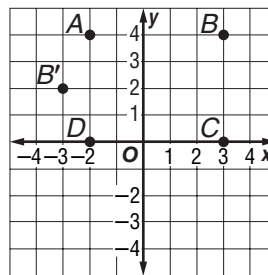
8. F G H I

9. A B C D



12. interval 5; scale
0 to 24

13. -6



14. a. Graph $A(-2, 4)$ by starting at the origin, moving 2 units to the left and 4 units up.

b. $-1 \cdot 3 = -3$ and $\frac{1}{2} \cdot 4 = 2$, so point B' has coordinates $(-3, 2)$. Point B' lies in quadrant II.