Consumable Workbooks Many of the worksheets contained in the Chapter Resource Masters are available as consumable workbooks in both English and Spanish.

<table>
<thead>
<tr>
<th>MHID</th>
<th>ISBN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study Guide and Intervention Workbook</td>
<td>0-07-881054-X 978-0-07-881054-1</td>
</tr>
<tr>
<td>Skills Practice Workbook</td>
<td>0-07-881053-1 978-0-07-881053-4</td>
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<tr>
<td>Practice Workbook</td>
<td>0-07-881056-6 978-0-07-881056-5</td>
</tr>
<tr>
<td>Word Problem Practice Workbook</td>
<td>0-07-881055-8 978-0-07-881055-8</td>
</tr>
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</table>

Spanish Versions

<table>
<thead>
<tr>
<th>MHID</th>
<th>ISBN</th>
</tr>
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<tbody>
<tr>
<td>Study Guide and Intervention Workbook</td>
<td>0-07-881058-2 978-0-07-881058-9</td>
</tr>
<tr>
<td>Skills Practice Workbook</td>
<td>0-07-881057-4 978-0-07-881057-2</td>
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<td>Practice Workbook</td>
<td>0-07-881060-4 978-0-07-881060-2</td>
</tr>
<tr>
<td>Word Problem Practice Workbook</td>
<td>0-07-881059-0 978-0-07-881059-6</td>
</tr>
</tbody>
</table>

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

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

TeacherWorks Plus™ All of the materials found in this booklet are included for viewing, printing, and editing in this CD-ROM.


These masters contain a Spanish version of Chapter 3 Test Form 2A and Form 2C.
Contents

Teacher’s Guide to Using the Chapter 3 Resource Masters iv

Chapter Resources
Chapter 3 Student-Built Glossary 1
Chapter 3 Family Letter (English) 3
Chapter 3 Family Activity (English) 4
Chapter 3 Family Letter (Spanish) 5
Chapter 3 Family Activity (Spanish) 6
Chapter 3 Anticipation Guide (English) 7
Chapter 3 Anticipation Guide (Spanish) 8

Lesson 3-1 Writing Expressions and Equations
Lesson Reading Guide 9
Study Guide and Intervention 10
Skills Practice 11
Practice 12
Word Problem Practice 13
Enrichment 14

Lesson 3-2 Solving Addition and Subtraction Equations
Lesson Reading Guide 15
Study Guide and Intervention 16
Skills Practice 17
Practice 18
Word Problem Practice 19
Enrichment 20
Scientific Calculator Activity 21

Lesson 3-3 Solving Multiplication Equations
Lesson Reading Guide 22
Study Guide and Intervention 23
Skills Practice 24
Practice 25
Word Problem Practice 26
Enrichment 27

Lesson 3-4 Problem-Solving Investigation: Work Backward
Study Guide and Intervention 28
Skills Practice 29
Practice 30
Word Problem Practice 31

Lesson 3-5 Solving Two-Step Equations
Lesson Reading Guide 32
Study Guide and Intervention 33
Skills Practice 34
Practice 35
Word Problem Practice 36
Enrichment 37

Lesson 3-6 Measurement: Perimeter and Area
Lesson Reading Guide 38
Study Guide and Intervention 39
Skills Practice 40
Practice 41
Word Problem Practice 42
Enrichment 43
Spreadsheet Activity 44

Lesson 3-7 Functions and Graphs
Lesson Reading Guide 45
Study Guide and Intervention 46
Skills Practice 47
Practice 48
Word Problem Practice 49
Enrichment 50
TI-73 Activity 51

Chapter 3 Assessment
Student Recording Sheet 53
Rubric for Scoring Extended Response 54
Chapter 3 Quizzes 1 and 2 55
Chapter 3 Quizzes 3 and 4 56
Chapter 3 Mid-Chapter Test 57
Chapter 3 Vocabulary Test 58
Chapter 3 Test, Form 1 59
Chapter 3 Test, Form 2A 61
Chapter 3 Test, Form 2B 63
Chapter 3 Test, Form 2C 65
Chapter 3 Test, Form 2D 67
Chapter 3 Test, Form 3 69
Chapter 3 Extended-Response Test 71
Chapter 3 Standardized Test Practice 72
Unit 1 Test 75

Answers A1–A33
Teacher’s Guide to Using the
Chapter 3 Resource Masters

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 on the TeacherWorks Plus™ CD-ROM.

Chapter Resources

**Student-Built Glossary** (page 1) These masters are 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. Give this to students before beginning Lesson 3-1. Encourage them to add these pages to their mathematics study notebooks. Remind them to complete the appropriate words as they study each lesson.

**Family Letter and Family Activity** (pages 3–6) The letter informs your students’ families of the mathematics they will be learning in this chapter. The family activity helps them to practice problems that are similar to those on the state test. A full solution for each problem is included. Spanish versions of these pages are also included. Give these to students to take home before beginning the chapter.

**Anticipation Guide** (pages 7–8) This master, presented in both English and Spanish, is a survey used before beginning the chapter to pinpoint what students may or may not know about the concepts in the chapter. Students will revisit this survey after they complete the chapter to see if their perceptions have changed.

Lesson Resources

**Lesson Reading Guide** Get Ready for the Lesson reiterates the questions from the beginning of the Student Edition lesson. Read the Lesson asks students to interpret the context of and relationships among terms in the lesson. Finally, Remember What You Learned asks students to summarize what they have learned using various representation techniques. Use as a study tool for note taking or as an informal reading assignment. It is also a helpful tool for ELL (English Language Learners).

**Study Guide and Intervention** This master provides vocabulary, key concepts, additional worked-out examples and Check Your Progress exercises to use as a reteaching activity. It can also be used in conjunction with the Student Edition as an instructional tool for students who have been absent.

**Skills Practice** This master focuses more on the computational nature of the lesson. Use as an additional practice option or as homework for second-day teaching of the lesson.

**Practice** This master closely follows the types of problems found in the Exercises section of the Student Edition and includes word problems. Use as an additional practice option or as homework for second-day teaching of the lesson.
**Word Problem Practice** This master includes additional practice in solving word problems that apply the concepts of the lesson. Use as an additional practice or as homework for second-day teaching of the lesson.

**Enrichment** These activities may extend the concepts of the lesson, offer an historical or multicultural look at the concepts, or widen students’ perspectives on the mathematics they are learning. They are written for use with all levels of students.

**Graphing Calculator, Scientific Calculator, or Spreadsheet Activities** These activities present ways in which technology can be used with the concepts in some lessons of this chapter. Use as an alternative approach to some concepts or as an integral part of your lesson presentation.

**Assessment Options**

The assessment masters in the *Chapter 3 Resource Masters* offer a wide range of assessment tools for formative (monitoring) assessment and summative (final) assessment.

**Student Recording Sheet** This master corresponds with the Test Practice at the end of the chapter.

**Extended-Response Rubric** This master provides information for teachers and students on how to assess performance on open-ended questions.

**Quizzes** Four free-response quizzes offer assessment at appropriate intervals in the chapter.

**Mid-Chapter Test** This 1-page test provides an option to assess the first half of the chapter. It parallels the timing of the Mid-Chapter Quiz in the Student Edition and includes both multiple-choice and free-response questions.

**Vocabulary Test** This test is suitable for all students. It includes a list of vocabulary words and 10 questions to assess students’ knowledge of those words. This can also be used in conjunction with one of the leveled chapter tests.

**Leveled Chapter Tests**

- **Form 1** contains multiple-choice questions and is intended for use with below grade level students.
- **Forms 2A and 2B** contain multiple-choice questions aimed at on grade level students. These tests are similar in format to offer comparable testing situations.
- **Forms 2C and 2D** contain free-response questions aimed at on grade level students. These tests are similar in format to offer comparable testing situations.
- **Form 3** is a free-response test for use with above grade level students.

All of the above mentioned tests include a free-response Bonus question.

**Extended-Response Test** Performance assessment tasks are suitable for all students. Sample answers and a scoring rubric are included for evaluation.

**Standardized Test Practice** These three pages are cumulative in nature. It includes two parts: multiple-choice questions with bubble-in answer format and short-answer free-response questions.

**Answers**

- The answers for the Anticipation Guide and Lesson Resources are provided as reduced pages with answers appearing in red.
- Full-size answer keys are provided for the assessment masters.
## Student-Built Glossary

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.

<table>
<thead>
<tr>
<th>Vocabulary Term</th>
<th>Found on Page</th>
<th>Definition/Description/Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>formula</td>
<td></td>
<td></td>
</tr>
<tr>
<td>linear equation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>two-step equation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>work backward strategy</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Dear Parent or Guardian:

Knowing how to solve equations is a valuable skill. Sometimes we use this skill without even realizing it. For example, we use equations to decide how far we can travel on one tank of gasoline. Relating math skills to everyday events is just one way to help students appreciate what they are learning in our class.

In Chapter 3, Algebra: Linear Equations and Functions, your child will be learning how to write expressions and equations, to solve one and two-step equations, to find perimeter and area, to graph functions and relationships, and to work backward to solve problems. 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 practices how the math we will be learning in Chapter 3 might be tested. You may also wish to log on to glencoe.com for self-check quizzes and other study help. If you have any questions or comments, feel free to contact me at school.

Sincerely,

Signature of Parent or Guardian _________________________ Date ________
Family Activity

State Test Practice

Fold the page along the dashed line. Work each problem on another piece of paper. Then unfold the page to check your work.

1. Yvonne went to the store to purchase $10.00 worth of soda. It was on sale and only cost $2.50 for each 12-pack. How many 12-packs did she buy?

Which equation could be used to solve this problem?

A  $10 = 2.5n$
B  $\frac{n}{2.5} = 10$
C  $2.5n = 10$
D  $2.5 \cdot 10 = n$

2. Use the circles and tally marks below to help you solve the following equation:

\[
5n = 35
\]

\[
\begin{array}{c|c}
\text{Circle} & \text{Tally Marks} \\
\hline
1 & |||||||||
2 & |||||||||
3 & |||||
\end{array}
\]

A  $n = 5$
B  $n = 7$
C  $n = 175$
D  $n = \frac{1}{7}$

Fold here.

Solution

1. Hint: In order to write an equation, a letter is sometimes used to replace an unknown quantity. In this case, \( n \) is used to represent the number of 12-packs Yvonne purchased.

You know that a certain number of 12-packs \( n \) cost $10. You also know that each 12-pack costs $2.50. If you multiply the cost of the 12-packs by the number of 12-packs purchased \( (2.5 \times 10) \), it should be equal to total amount of money spent ($10).

The answer is C.

Solution

2. Hint: You should evenly divide the tally marks between the 5 circles. The number of tally marks in each circle will be the answer. This works because in order to solve a multiplication equation, you perform the inverse function, which is division.

The tally marks divide evenly into 5 groups of 7.

The answer is B.
Carta a la familia

Estimado padre o apoderado:

Saber resolver ecuaciones es una destreza valiosa que a veces utilizamos sin darnos cuenta. Por ejemplo, usamos ecuaciones para determinar cuánto camino podemos recorrer con un tanque de gasolina. Relacionar destrezas matemáticas con eventos cotidianos es sólo una manera de ayudar a los alumnos a apreciar lo que aprenden en nuestra clase.

En el Capítulo 3, Álgebra: Ecuaciones y funciones, su hijo(a) aprenderá a escribir expresiones y ecuaciones, a resolver ecuaciones de uno y dos pasos, a calcular el perímetro y el área, a graficar funciones y relaciones; y a resolver problemas trabajando al revés. En el estudio de este capítulo, su hijo(a) completará una variedad de tareas y actividades diarias y es posible que trabaje en un proyecto del capítulo.

Al firmar esta carta y devolverla con su hijo(a), usted se compromete a ayudarlo(a) a participar en su aprendizaje. Junto con esta carta, va incluida una actividad que puede realizar con él(ella) y la cual practica lo que podrían encontrar en las pruebas de los conceptos matemáticos que aprenderán en el Capítulo 3. Además, visiten glencoe.com para ver autocontroles y otras ayudas para el estudio. Si tiene cualquier pregunta o comentario, por favor contácteme en la escuela.

Cordialmente,

Firma del padre o apoderado ______________________________________ Fecha ______

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Actividad en familia

Práctica para la prueba estatal

Doblen la página a lo largo de las líneas punteadas. Resuelvan cada problema en otra hoja de papel. Luego, desdoblennla página y revisen las respuestas.

1. Yvonne fue a la tienda para comprar $10.00 de refrescos. Como estaban rebajados, cada paquete de 12 sólo costaba $2.50. ¿Cuántos paquetes de 12 compró?

¿Qué ecuación podría usarse para resolver este problema?

A 10n = 2.5  
B \[ \frac{n}{2.5} = 10 \]  
C 2.5n = 10  
D 2.5 \cdot 10 = n

2. Usen los círculos y los rótulos siguientes como ayuda para resolver la siguiente ecuación:

\[ 5n = 35 \]

A n = 5  
B n = 7  
C n = 175  
D n = \frac{1}{7}

Solución

1. Ayuda: Para escribir una ecuación, a veces se usa una letra para reemplazar una cantidad desconocida. En este caso, se usa n para representar el número de paquetes de 12 que compró Yvonne.

Saben que cierto paquete de 12 (n) cuesta $10. También saben que cada paquete de 12 cuesta $2.50. Si multiplican el costo de los paquetes de 12 por el número de paquetes de 12 comprado (2.5 \times 10), esto debe ser igual a la cantidad total del dinero gastado ($10).

La respuesta es C.

2. Ayuda: Deben dividir las marcas de conteo equitativamente entre los 5 círculos. La respuesta será el número de marcas de conteo en cada círculo. Esto funciona, pues para resolver una ecuación de multiplicación, se realiza la función inversa, que es división.

Las marcas de conteo se dividen equitativamente en 5 grupos de 7.

La respuesta es B.
Anticipation Guide

Algebra: Linear Equations and Functions

**Step 1**

*Before you begin Chapter 3*

- Read each statement.
- Decide whether you Agree (A) or Disagree (D) with the statement.
- Write A or D in the first column OR if you are not sure whether you agree or disagree, write NS (Not Sure).

<table>
<thead>
<tr>
<th>STEP 1</th>
<th>Statement</th>
<th>STEP 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, D, or NS</td>
<td></td>
<td>A or D</td>
</tr>
<tr>
<td>1.</td>
<td>The words <em>difference</em>, <em>less than</em>, and <em>decreased by</em> in a problem suggest subtraction.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>The words <em>twice</em>, <em>per</em>, and <em>separate</em> in a problem suggest multiplication.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td><em>Twice a number less than 3</em> is the same as $2n - 3$.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Addition and subtraction are inverse operations.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>The Addition Property of Equality states that if the same number is added to both sides of an equation, the two sides will remain equal.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>To solve the equation $2.4t = 12$, multiply both sides of the equation by 2.4.</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>To solve the equation $6x - 4 = 20$, you would first divide both sides of the equation by 6.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>The formula for the area of a rectangle is $A = \ell \cdot w$.</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>To graph the equation $y = 4x$, substitute one value for $x$ and solve for $y$.</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>An equation whose graph is a straight line is called a linear equation.</td>
<td></td>
</tr>
</tbody>
</table>

**Step 2**

*After you complete Chapter 3*

- Reread each statement and complete the last column by entering an A (Agree) or a D (Disagree).
- Did any of your opinions about the statements change from the first column?
- For those statements that you mark with a D, use a separate sheet of paper to explain why you disagree. Use examples, if possible.
Ejercicios preparatorios
Álgebra: Ecuaciones lineales y funciones

Antes de comenzar el Capítulo 3

- Lee cada enunciado.
- Decide si estás de acuerdo (A) o en desacuerdo (D) con el enunciado.
- Escribe A o D en la primera columna O si no estás seguro(a) de la respuesta, escribe NS (No estoy seguro(a)).

<table>
<thead>
<tr>
<th>PASO 1 A, D o NS</th>
<th>Enunciado</th>
<th>PASO 2 A o D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>En un problema, las palabras <em>diferencia, menos que</em> y <em>disminuido por</em> sugieren sustracción.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>En un problema, las palabras <em>dos veces, por y separa</em> sugieren multiplicación.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>El <em>doble de un número menor que 3</em> es lo mismo que $2n - 3$.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>La adición y la sustracción son operaciones inversas.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>La propiedad de adición de la igualdad establece que si un mismo número se suma a ambos lados de una ecuación, los dos lados permanecerán inalterados.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Para resolver la ecuación $2.4t = 12$, multiplica ambos lados de la ecuación por 2.4.</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Para resolver la ecuación $6x - 4 = 20$, primero dividirías ambos lados de la ecuación entre 6.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>La fórmula para el área de un rectángulo es $A = \ell \cdot w$.</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Para graficar la ecuación $y = 4x$, reemplaza un valor para $x$ y despeja $y$.</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Una ecuación cuya gráfica es una recta se llama ecuación lineal.</td>
<td></td>
</tr>
</tbody>
</table>

Después de completar el Capítulo 3

- Vuelve a leer cada enunciado y completa la última columna con una A o una D.
- ¿Cambió cualquiera de tus opiniones sobre los enunciados de la primera columna?
- En una hoja de papel aparte, escribe un ejemplo de por qué estás en desacuerdo con los enunciados que marcaste con una D.
Lesson Reading Guide

Writing Expressions and Equations

Get Ready for the Lesson

Read the introduction at the top of page 128 in your textbook. Write your answers below.

1. What operation would you use to find how many moons Saturn has? Explain.

2. Jupiter has about three times as many moons as Uranus. What operation would you use to find how many moons Jupiter has?

Read the Lesson

3. Write the symbol that each word or phrase represents.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Words</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>more than</td>
</tr>
<tr>
<td></td>
<td>is</td>
</tr>
<tr>
<td></td>
<td>quotient</td>
</tr>
</tbody>
</table>

4. Give two examples of a word or phrase that can suggest each operation.

<table>
<thead>
<tr>
<th>Operation</th>
<th>Words</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td></td>
</tr>
<tr>
<td>-</td>
<td></td>
</tr>
<tr>
<td>×</td>
<td></td>
</tr>
<tr>
<td>÷</td>
<td></td>
</tr>
</tbody>
</table>

5. Write a verbal sentence for each equation.

<table>
<thead>
<tr>
<th>Equation</th>
<th>Verbal Sentence</th>
</tr>
</thead>
<tbody>
<tr>
<td>$2x - 5 = -3$</td>
<td></td>
</tr>
<tr>
<td>$10 = a + 6$</td>
<td></td>
</tr>
<tr>
<td>$r \div 9 = 7$</td>
<td></td>
</tr>
</tbody>
</table>

Remember What You Learned

6. Work with a partner. Write down four or five real life math situations as sentences. Trade papers with your partner. Translate your partner’s sentences into symbols.
The table below shows phrases written as mathematical expressions.

<table>
<thead>
<tr>
<th>Phrases</th>
<th>Expression</th>
<th>Phrases</th>
<th>Expression</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 more than a number</td>
<td>$x + 9$</td>
<td>4 subtracted from a number</td>
<td>$h - 4$</td>
</tr>
<tr>
<td>the sum of 9 and a number</td>
<td></td>
<td>a number minus 4</td>
<td></td>
</tr>
<tr>
<td>a number plus 9</td>
<td></td>
<td>a number decreased by 4</td>
<td></td>
</tr>
<tr>
<td>a number increased by 9</td>
<td></td>
<td>the difference of $h$ and 4</td>
<td></td>
</tr>
<tr>
<td>the total of $x$ and 9</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Phrases</th>
<th>Expression</th>
<th>Phrases</th>
<th>Expression</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 multiplied by $g$</td>
<td>$6g$</td>
<td>a number divided by 5</td>
<td>$\frac{t}{5}$</td>
</tr>
<tr>
<td>6 times a number</td>
<td></td>
<td>the quotient of $t$ and 5</td>
<td></td>
</tr>
<tr>
<td>the product of $g$ and 6</td>
<td></td>
<td>divide a number by 5</td>
<td></td>
</tr>
</tbody>
</table>

The table below shows sentences written as an equation.

<table>
<thead>
<tr>
<th>Sentences</th>
<th>Equation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sixty less than three times the amount is $59.</td>
<td>$3n - 60 = 59$</td>
</tr>
<tr>
<td>Three times the amount less 60 is equal to 59.</td>
<td></td>
</tr>
<tr>
<td>59 is equal to 60 subtracted from three times a number.</td>
<td></td>
</tr>
<tr>
<td>A number times three minus 60 equals 59.</td>
<td></td>
</tr>
</tbody>
</table>

**Exercises**

Write each phrase as an algebraic expression.

1. 7 less than $m$
2. the quotient of 3 and $y$
3. the total of 5 and $c$
4. the difference of 6 and $r$
5. $n$ divided by 2
6. the product of $k$ and 9

Write each sentence as an algebraic equation.

7. A number increased by 7 is 11.
8. The price decreased by $4 is $29.
9. Twice as many points as Bob would be 18 points.
10. After dividing the money 5 ways, each person got $67.
11. Three more than 8 times as many trees is 75 trees.
12. Seven less than a number is 15.
3-1

Skills Practice

Writing Expressions and Equations

Write each phrase as an algebraic expression.

1. \( b \) plus 1
2. three more than \( x \)
3. twelve minus \( y \)
4. seven less than \( n \)
5. five years younger than Jessica
6. a number less eleven
7. four increased by \( a \)
8. eight dollars more than \( m \)
9. the product of \( c \) and 10
10. twice as many days
11. three times as many soft drinks
12. \( t \) multiplied by 14
13. Emily's age divided by 3
14. 24 divided by some number
15. a number divided by 2
16. the quotient of –15 and \( w \)

Write each sentence as an algebraic equation.

17. A number plus three is 9.
18. The sum of \( x \) and 2 is 10.
19. Four cents more than the price is 93¢.
20. Fifteen minus \( y \) is 7.
21. A number decreased by 5 is 12.
22. Five dollars less than Yumi’s pay is $124.
23. A number times four is 20.
24. Twice the number of cars is 40.
25. The product of \( z \) and 6 is 54.
26. A number divided by 6 is 12.
27. 72 divided by \( y \) is –9.
28. 175 students separated into \( n \) classes is 25.
29. One more than twice as many CDs is 17.
30. Four less than three times a number is 14.
3-1  Practice

Writing Expressions and Equations

Write each phrase as an algebraic expression.

1. the product of \(-5\) and \(x\)  
2. twenty increased by \(k\)

3. five inches more than the height  
4. one fourth of \(y\)

5. Bill’s weight decreased by eighteen  
6. the quotient of \(3\) and a number

7. five less than four times as many women  
8. $60 more than the rent payment

9. 9 minutes less than Chang’s time  
10. three more pancakes than his brother ate

Write each sentence as an algebraic equation.

11. Five times the number of books is 95.  
12. The difference of nine and a number is nine.

13. The sum of the average and four is \(-6\).  
14. Three meters longer than the pool is 8.

15. Twelve less a number is 40.  
16. The product of seven and Lynn’s age is 28.

For Exercises 17 and 18, write an equation that models each situation.

17. FURNITURE  The width of a bookshelf is 2 feet shorter than the height. If the width is \(1.5\) feet, what is the height of the bookshelf?

18. SPORTS  The circumference of a basketball, the distance around, is about three times the circumference of a softball. If the circumference of the basketball is 75 centimeters, what is the circumference of a softball?

GEOMETRY  For Exercises 19 and 20, describe the relationship that exists between the base and the height of each triangle.

19. The base is \(b\), and the height is \(b - 4\).

20. The height is \(h\), and the base is \(2h\).
3-1 Word Problem Practice

Writing Expressions and Equations

OLYMPICS For Exercises 1–4, use the table that shows the number of medals won by each country in the 2006 Winter Olympics.

<table>
<thead>
<tr>
<th>Country</th>
<th>Medals</th>
<th>Country</th>
<th>Medals</th>
<th>Country</th>
<th>Medals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>29</td>
<td>Norway</td>
<td>19</td>
<td>China</td>
<td>11</td>
</tr>
<tr>
<td>USA</td>
<td>25</td>
<td>Sweden</td>
<td>14</td>
<td>France</td>
<td>9</td>
</tr>
<tr>
<td>Canada</td>
<td>24</td>
<td>Switzerland</td>
<td>14</td>
<td>Netherlands</td>
<td>9</td>
</tr>
<tr>
<td>Austria</td>
<td>23</td>
<td>Korea</td>
<td>11</td>
<td>Finland</td>
<td>9</td>
</tr>
<tr>
<td>Russia</td>
<td>22</td>
<td>Italy</td>
<td>11</td>
<td>Czech Republic</td>
<td>4</td>
</tr>
</tbody>
</table>

Let \(x\) represent the number of medals won by Italy.

1. Write an expression using \(x\) to represent the number of medals won by Norway.

2. Write an expression using \(x\) to represent the number of medals won by the Czech Republic.

3. Which country’s number of medals can be represented by \(2x\)?

4. Which country’s number of medals can be represented by \(2x + 3\)?

5. GEOGRAPHY The Virgin Islands were acquired by the United States in 1927. This is 29 years after Puerto Rico was acquired. Write an equation to model this situation.

6. POPULATION According to the Census Bureau, the U.S. population grew from 281.4 million in April 2000 to 284.8 million in July 2001. Write an equation to model this situation.
3-1 Enrichment

**Expressions for Figurate Numbers**

Figurate numbers are numbers that can be shown with dots arranged in specific geometric patterns. Below are the first five square numbers.

![Dot Patterns for First Five Square Numbers](image)

The expression \( n^2 \) will give you the number of dots in the \( n \)th square number. The variable \( n \) takes on the values 1, 2, 3, 4, and so on. So, to find the 10th square number, you would use 10 for \( n \).

1. Match each set of dot patterns with its name and expression. Write exercise numbers in the boxes to show the matchings.

<table>
<thead>
<tr>
<th>Dot Patterns for Second and Third Numbers</th>
<th>Name of Figurate Number</th>
<th>Expression</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>pentagonal</td>
<td>( n(2n - 1) )</td>
</tr>
<tr>
<td>b.</td>
<td>hexagonal</td>
<td>( \frac{n(n + 1)}{2} )</td>
</tr>
<tr>
<td>c.</td>
<td>triangular</td>
<td>( \frac{n(3n - 1)}{2} )</td>
</tr>
</tbody>
</table>

Use the algebraic expressions on this page to compute each number. Then make a drawing of the number on a separate sheet of paper.

2. 6th square
3. 4th triangular
4. 4th pentagonal

5. 4th hexagonal
6. 5th triangular
7. 5th pentagonal

---

Chapter 3

14

Course 2
Solving Addition and Subtraction Equations

Get Ready for the Lesson

Read the introduction at the top of page 136 in your textbook. Write your answers below.

1. What does \( x \) represent in the figure?

2. What addition equation is shown in the figure?

3. Explain how to solve the equation.

4. How many games did Max have in the beginning?

Read the Lesson

5. Match the method of solving with the appropriate equation.

\[
\begin{align*}
  x + 5 &= 9 & \text{a. add 2 to each side} \\
  -2 + y &= 1 & \text{b. add 5 to each side} \\
  5 &= m - 1 & \text{c. subtract 5 from each side} \\
  r + 9 &= -7 & \text{d. add 1 to each side} \\
  k - 5 &= -2 & \text{e. subtract 9 from each side}
\end{align*}
\]

6. Explain in words how to solve each equation.

\[
\begin{align*}
  a - 10 &= 3 \\
  4 + t &= -12 \\
  18 &= n - 7
\end{align*}
\]

7. Solve each equation.

\[
\begin{align*}
  \text{a. } w + 23 &= -11 & \text{b. } 35 &= z - 15 & \text{c. } 42 + c &= -9
\end{align*}
\]

Remember What You Learned

8. Take turns with a partner explaining the Addition and Subtraction Properties of Equality in your own words. Then each of you write two addition and two subtraction equations. Trade equations and solve. Check your work by explaining to each other the method you used to solve the equations.
Example 1

Solve \( x + 5 = 11 \). Check your solution.

\[
x + 5 = 11 \quad \text{Write the equation.}
\]

\[
-5 = -5 \quad \text{Subtract 5 from each side.}
\]

\[
x = 6 \quad \text{Simplify.}
\]

Check \( x + 5 = 11 \)

\[
6 + 5 = 11 \quad \text{Replace } x \text{ with } 6.
\]

\[
11 = 11 \quad \text{This sentence is true.}
\]

The solution is 6.

Example 2

Solve \( 15 = t - 12 \). Check your solution.

\[
15 = t - 12 \quad \text{Write the equation.}
\]

\[
+12 = +12 \quad \text{Add 12 to each side.}
\]

\[
27 = t \quad \text{Simplify.}
\]

Check \( 15 = t - 12 \)

\[
15 \neq 27 - 12 \quad \text{Replace } t \text{ with } 27.
\]

\[
15 = 15 \quad \text{This sentence is true.}
\]

The solution is 27.

Exercises

Solve each equation. Check your solution.

1. \( \ h + 3 = 14 \)  
2. \( \ m + 8 = 22 \)  
3. \( \ p + 5 = 15 \)  
4. \( \ 17 = y + 8 \)

5. \( \ w + 4 = -1 \)  
6. \( \ k + 5 = -3 \)  
7. \( \ 25 = 14 + r \)  
8. \( \ 57 + z = 97 \)

9. \( \ b - 3 = 6 \)  
10. \( \ 7 = c - 5 \)  
11. \( \ j - 12 = 18 \)  
12. \( \ v - 4 = 18 \)

13. \( \ -9 = w - 12 \)  
14. \( \ y - 8 = -12 \)  
15. \( \ 14 = f - 2 \)  
16. \( \ 23 = n - 12 \)
3-2 Skills Practice
Solving Addition and Subtraction Equations

Solve each equation. Check your solution.

1. \( x + 2 = 8 \)  
2. \( y + 7 = 9 \)  
3. \( a + 5 = 12 \)

4. \( 16 = n + 6 \)  
5. \( q + 10 = 22 \)  
6. \( m + 9 = 17 \)

7. \( b - 4 = 9 \)  
8. \( 8 = c - 4 \)  
9. \( 11 = t - 7 \)

10. \( d - 10 = 8 \)  
11. \( x - 11 = 9 \)  
12. \( 2 = z - 14 \)

13. \( 72 = 24 + w \)  
14. \( 86 + y = 99 \)  
15. \( 6 + y = -8 \)

16. \( -5 = m + 11 \)  
17. \( n + 3.5 = 6.7 \)  
18. \( x + 1.6 = 0.8 \)

19. \( 98 = t - 18 \)  
20. \( 12 = g - 56 \)  
21. \( x - 18 = -2 \)

22. \( p - 11 = -5 \)  
23. \( a - 1.5 = 4.2 \)  
24. \( 7.4 = n - 2.6 \)
Solve each equation. Check your solution.

1. \( a + 4 = 11 \)  
2. \( 6 = g + 8 \)  
3. \( x - 3 = -2 \)

4. \( k + 8 = 3 \)  
5. \( j + 0 = 9 \)  
6. \( 12 + y = 15 \)

7. \( h - 4 = 0 \)  
8. \( m - 7 = 1 \)  
9. \( w + 5 = 4 \)

10. \( b - 28 = 33 \)  
11. \( 45 + f = 48 \)  
12. \( n + 7.1 = 8.6 \)

13. \( -14 + t = 26 \)  
14. \( d - 3.03 = 2 \)  
15. \( 10 = z + 15 \)

16. \( c - 5.3 = -6.4 \)  
17. \( 35 + p = 77 \)  
18. \( -15 = -15 + u \)

For Exercises 19 and 20, write an equation. Then solve the equation.

19. **CAFFEINE**  
A cup of brewed tea has 54 milligrams less caffeine than a cup of brewed coffee. If a cup of tea has 66 milligrams of caffeine, how much caffeine is in a cup of coffee?

20. **GEOMETRY**  
The sum of the measures of the angles of a trapezoid is 360°. Find the missing measure.
3-2

**Word Problem Practice**

**Solving Addition and Subtraction Equations**

**ANIMALS** For Exercises 1–4, use the table.

The average lifespans of several different types of animals are shown in the table.

<table>
<thead>
<tr>
<th>Animal</th>
<th>Lifespan (yr)</th>
<th>Animal</th>
<th>Lifespan (yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Bear</td>
<td>18</td>
<td>Guinea Pig</td>
<td>4</td>
</tr>
<tr>
<td>Dog</td>
<td>12</td>
<td>Puma</td>
<td>?</td>
</tr>
<tr>
<td>Giraffe</td>
<td>10</td>
<td>Tiger</td>
<td>16</td>
</tr>
<tr>
<td>Gray Squirrel</td>
<td>10</td>
<td>Zebra</td>
<td>?</td>
</tr>
</tbody>
</table>

1. The lifespan of a black bear is 3 years longer than the lifespan of a zebra. Write an addition equation that you could use to find the lifespan of a zebra.

2. Solve the equation you wrote in Exercise 1. What is the lifespan of a zebra?

3. The lifespan of a guinea pig is 8 years shorter than the lifespan of a puma. Write a subtraction equation that you could use to find the lifespan of a puma.

4. Solve the equation you wrote in Exercise 3. What is the lifespan of a puma?

5. **TECHNOLOGY** A survey of teens showed that teens in Pittsburgh aged 12-17 spend 15.8 hours per week online. Teens in Miami/Ft. Lauderdale spend 14.2 hours per week online. Write and solve an addition equation to find the difference in time spent online by teens in these cities.

6. **SPORTS** Annika Sorenstam won the 2006 MasterCard Classic with a final score of 8 under par, or \(-8\). Her scores for the first two of the three rounds were \(-5\) and \(-1\). What was Ms. Sorenstam’s score for the third round?
Enrichment

Equation Hexa-maze

This figure is called a hexa-maze because each cell has the shape of a hexagon, or six-sided figure.

To solve the maze, start with the number in the center. This number is the solution to the equation in one of the adjacent cells. Move to that cell. The number in the new cell will then be the solution to the equation in the next cell. At each move, you may only move to an adjacent cell. Each cell is used only once.
3-2 Scientific Calculator Activity

Solving Equations

A calculator may be helpful for solving addition and subtraction equations with decimals.

**Example 1**

Solve \( k + 0.009 = 8.1 \).

\[
k + 0.009 - 0.009 = 8.1 - 0.009 \\
k = 8.1 - 0.009
\]

Enter: \( 8.1 \) \(-\) \( 0.009 \) \(
\begin{align*}
\text{ENTER} & \quad 8.091
\end{align*}
\)

So, \( k = 8.091 \).

**Example 2**

Solve \( 12.346 = y - 7.29 \).

\[
12.346 + 7.29 = y - 7.29 + 7.29 \\
12.346 + 7.29 = y
\]

Enter: \( 12.346 \) \(+\) \( 7.29 \) \(
\begin{align*}
\text{ENTER} & \quad 19.636
\end{align*}
\)

So, \( y = 19.636 \).

**Exercises**

Solve each equation.

1. \( k + 0.4 = 13 \)
2. \( 3.7 + y = 9.6 \)
3. \( b - 50.67 = 84 \)
4. \( x - 0.82 = 9.1 \)
5. \( 17.5 = m - 12.34 \)
6. \( 3.211 + c = 54 \)
7. \( 64.25 + g = 90.2 \)
8. \( 17.9 = w - 8.7 \)
9. \( 98.7 + n = 100 \)
10. \( 27.91 = 8.2 + v \)
11. \( 87.7 = 3.001 + r \)
12. \( f + 9.0 = 10.0001 \)
13. \( 67.1 = d - 67.1 \)
14. \( 345 = j + 121.9 \)

15. **CHALLENGE** Each week for eight weeks, Mr. Patel's sales commission increased his previous week's commission by \$14.40. In the eighth week, his commission was \$336.84. What was his commission eight weeks before this?
3-3 Lesson Reading Guide

Solving Multiplication Equations

Get Ready for the Lesson

Complete the Mini Lab at the top of page 142 in your textbook.
Write your answers below.
Solve each equation using models or a drawing.

1. \[ \frac{x}{3} = 12 \]

2. \[ \frac{x}{2} = -8 \]

3. \[ 4x = 20 \]

4. \[ 8 = 2x \]

5. \[ 3x = -9 \]

6. What operation did you use to find each solution?

7. How can you use the coefficient of \( x \) to solve \( 8x = 40 \)?

Read the Lesson

8. Complete each sentence.
   a. To solve \( 4x = 36 \), divide each side by ________.
   b. To solve \( -27 = -3d \), divide each side by ________.
   c. To solve \( 15h = -75 \), divide each side by ________.
   d. To solve \( -8a = 96 \), divide each side by ________.

9. Write and solve two different equations that both require you to divide each side by \(-2\) in order to solve.

Remember What You Learned

10. In your own words, define the Division Property of Equality. Describe a real-life situation in which you may need to use the Division Property of Equality.
3-3 Study Guide and Intervention
Solving Multiplication Equations

If each side of an equation is divided by the same non-zero number, the resulting equation is equivalent to the given one. You can use this property to solve equations involving multiplication and division.

Example 1
Solve $45 = 5x$. Check your solution.

$45 = 5x$ Write the equation.

$\frac{45}{5} = \frac{5x}{5}$ Divide each side of the equation by 5.

$9 = x$ $45 \div 5 = 9$

Check $45 = 5x$ Write the original equation.

$45 \div 5(9)$ Replace $x$ with 9. Is this sentence true?

$45 = 45 \checkmark$

The solution is 9.

Example 2
Solve $-21 = -3y$. Check your solution.

$-21 = -3y$ Write the equation.

$\frac{-21}{-3} = \frac{-3y}{-3}$ Divide each side by $-3$.

$7 = y$ $-21 \div (-3) = 7$

Check $-21 = -3y$ Write the original equation.

$-21 \div -3(7)$ Replace $y$ with 7. Is this sentence true?

$-21 = -21 \checkmark$

The solution is 7.

Exercises
Solve each equation. Then check your solution.

1. $8q = 56$
2. $4p = 32$
3. $42 = 6m$
4. $104 = 13h$

5. $-6n = 30$
6. $-18x = 36$
7. $48 = -8y$
8. $72 = -3b$

9. $-9a = -45$
10. $-12m = -120$
11. $-66 = -11t$
12. $-144 = -9r$

13. $3a = 4.5$
14. $2h = 3.8$
15. $4.9 = 0.7k$
16. $9.75 = 2.5z$
Skills Practice

Solving Multiplication Equations

Solve each equation. Check your solution.

1. \(4c = 16\)
2. \(10x = 50\)
3. \(42 = 6s\)

4. \(9c = 45\)
5. \(49 = 7y\)
6. \(11t = 44\)

7. \(15a = 60\)
8. \(72 = 12c\)
9. \(18x = 162\)

10. \(14d = 154\)
11. \(24z = 288\)
12. \(16v = 256\)

13. \(-5b = 40\)
14. \(32 = -2f\)
15. \(-9x = -63\)

16. \(4g = -52\)
17. \(-5x = -85\)
18. \(-63 = 7a\)

19. \(0.6m = 1.8\)
20. \(1.5z = 6\)
21. \(0.6q = 3.6\)

22. \(1.8a = 0.9\)
23. \(1.2r = 4.8\)
24. \(2.4 = 0.2t\)
3-3

Practice

Solving Multiplication Equations

Solve each equation. Check your solution.

1. \(8e = 32\)  
2. \(4v = -8\)  
3. \(7k = -7\)

4. \(18 = 3y\)  
5. \(4j = 0\)  
6. \(\text{No solution}\)

7. \(5a = 5\)  
8. \(-1c = 8\)  
9. \(15 = 5b\)

10. \(-2w = -14\)  
11. \(9f = 45\)  
12. \(13m = -26\)

13. \(1.4t = 2.8\)  
14. \(0.9g = 5.4\)  
15. \(2.5 = 0.5h\)

16. \(3.74 = 1.7d\)  
17. \(4.1z = 16.81\)  
18. \(5.2q = 3.64\)

For Exercises 19 and 20, write an equation. Then solve the equation.

19. TRAVEL  A cheetah can travel at an amazing speed of 32 meters per second when chasing its prey. At that rate, how long would it take the cheetah to run 2,000 meters?

20. AUTO LOAN  Mrs. Kim borrowed $1,350 to buy a used automobile. If she repays $75 a month, how many months will it take to pay back the loan?
### Word Problem Practice

#### Solving Multiplication Equations

1. **TRAVEL** The speed limit on an Arizona highway is 75 miles per hour. Suppose a truck traveling at the speed limit drives 225 miles before the driver stops for a break. Write a multiplication equation to find the length of time the truck has traveled.

2. **TRAVEL** Solve the equation you wrote in Exercise 1. How long did the truck travel?

3. **FLOWERS** A gardening expert recommends that flower bulbs be planted to a depth of three times their height. Suppose Jenna determines that a certain bulb should be planted at a depth of 4.5 inches. Write a multiplication equation to find the height of the bulb.

4. **FLOWERS** Solve the equation you wrote in Exercise 3. What is the height of the bulb?

5. **EXERCISE** A 125-pound person uses 4.4 Calories per minute when walking. Write a multiplication equation to find the number of minutes of walking it will take for a 125-pound person to use 198 Calories.

6. **EXERCISE** Solve the equation you wrote in Exercise 5. How many minutes of walking it will take for a 125-pound person to use 198 Calories?

7. **ELECTRICITY** The electric company charges $0.06 per kilowatt hour of electricity used. Write a multiplication equation to find the number of kilowatt hours of electricity for which the Estevez family was charged if their electric bill was $45.84.

8. **ELECTRICITY** Solve the equation you wrote in Exercise 7. For how many kilowatt hours of electricity was the Estevez family charged?
3-3  Enrichment

Direct Variation

Equations of the form \( y = ax \) and \( y = x + a \) can be used to show how one quantity varies with another. Here are two examples.

Driving at a speed of 50 miles per hour, the distance you travel \( d \) varies directly with the time you are on the road \( t \). The longer you drive, the farther you get.

\[ d = 50t \]

It is also the case that the time \( t \) varies directly with the distance \( d \). The farther you drive, the more time it takes.

\[ t = \frac{d}{50} \]

Complete the equation for each situation. Then describe the relationship in words.

1. If you go on a diet and lose 2 pounds a month, after a certain number of months \( m \), you will have lost \( p \) pounds.

2. You and your family are deciding between two different places for your summer vacation. You plan to travel by car and estimate you will average 55 miles per hour. The distance traveled \( d \) will result in a travel time of \( t \) hours.

3. You find that you are spending more than you had planned on renting video movies. It costs $2.00 to rent each movie. You can use the total amount spent \( a \) to find the number of movies you have rented \( m \).

4. You spend $30 a month to take the bus to school. After a certain number of months \( m \), you will have spent a total of dollars \( d \) on transportation to school.

5. You are saving money for some new athletic equipment and have 12 weeks before the season starts. The amount you need to save each week \( s \) will depend on the cost \( c \) of the equipment you want to buy.
By working backward from where you end to where you began, you can solve problems. Use the four-step problem solving model to stay organized when working backward.

Example 1

Jonah put half of his birthday money into his savings account. Then he paid back the $10 that he owed his brother for dance tickets. Lastly, he spent $3 on lunch at school. At the end of the day he was left with $12. How much money did Jonah receive for his birthday?

Understand

You know that he had $12 left and the amounts he spent throughout the day. You need to find out how much money he received for his birthday.

Plan

Start with the amount of money he was left with and work backward.

Solve

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>He had $12 left.</td>
</tr>
<tr>
<td>2</td>
<td>Undo the $3 he spent on lunch. +3</td>
</tr>
<tr>
<td>3</td>
<td>Undo the $10 he gave back to his brother +10</td>
</tr>
<tr>
<td>4</td>
<td>Undo the half put into his savings account 2</td>
</tr>
<tr>
<td>5</td>
<td>So, Jonah received $50 for his birthday. 50</td>
</tr>
</tbody>
</table>

Check

Assume that Jonah receive $50 for his birthday. After putting half into his savings account he had $50 ÷ 2 or $25. Then he gave $10 to his brother for dance tickets, so he had $25 - $10 or $15. Lastly, he spent $3 on lunch at school, so he had $15 - $3, or $12. So, our answer of $50 is correct.

Exercises

Solve each problem by using the work backward strategy.

1. On Monday everyone was present in Mr. Miller’s class. At 12:00, 5 students left early for doctors’ appointments. At 1:15, half of the remaining students went to an assembly. Finally, at 2:00, 6 more students left for a student council meeting. At the end of the day, there were only 5 students in the room. Assuming that no students returned after having left, how many students are in Mr. Miller’s class?

2. Jordan was trading baseball cards with some friends. He gave 15 cards to Tommy and got 3 back. He gave two-thirds of his remaining cards to Elaine and kept the rest for himself. When he got home he counted that he had 25 cards. How many baseball cards did Jordan start with?
Skills Practice

Problem-Solving Investigation: Work Backward

Solve. Use the work backward strategy

1. **GOVERNMENT** There are 99 members in the Ohio House of Representatives. All of them were present when a vote was taken on a piece of legislation. If 6 of them did not vote, and 13 more voted “yes” than voted “no”, how many “no” votes were there?

2. **MONEY** Jessie and Amar eat lunch at a restaurant and their bill is $21.65. Amar gives the cashier a coupon for $6 off their bill, and also hands the cashier two bills. If he receives $4.35 in change, what were the denominations of the two bills he gave the cashier?

3. **AGE** Justine is 13 years younger than her uncle Stewart. Stewart is 18 years older than Justine’s sister, Julia. Julia’s mother is 8 year older than Stewart, and 28 years older than her youngest child, Jared. If Jared is 12 years old, how old is Justine?

4. **NUMBER THEORY** A number is divided by 6. Then 7 is added to the divisor. After dividing by 4, the result is 4. What is the number?

5. **COMPACT DISCS** Carmella borrowed half as many CDs from the library as her friend Ariel. Ariel borrowed 2 more than Juan, but four less than Sierra. Sierra borrowed 12 CDs. How many did each person borrow?

6. **TIME** Ashish needs to leave for the bus stop 15 minutes earlier than his friend Rami. Rami leaves five minutes later than Susan, but 10 minutes earlier than Raphael. If Raphael leaves for the bus stop at 8:15, what time does Ashish need to leave?
Use the work backward strategy to solve Exercises 1 and 2.

1. **NUMBER THEORY** A number is divided by 5. Then 3 is added to the quotient. After subtracting 10, the result is 30. What is the number?

2. **COUPONS** Kendra used 35 cents more in coupons at the store than Leanne. Leanne used 75 cents less than Teresa, who used 50 cents more than Jaclyn. Jaclyn used 40 cents in coupons. What was the value of the coupons Kendra used?

Use any strategy to solve Exercises 3–6. Some strategies are shown below.

<table>
<thead>
<tr>
<th>PROBLEM-SOLVING STRATEGIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Look for a pattern</td>
</tr>
<tr>
<td>- Guess and check.</td>
</tr>
<tr>
<td>- Work backward</td>
</tr>
</tbody>
</table>

3. **PATTERNS** What are the next three numbers in the following pattern?
   
   2, 3, 5, 9, 17, 33, …

4. **AGES** Mr. Gilliam is 3 years younger than his wife. The sum of their ages is 95. How old is Mr. Gilliam?

5. **GRAND CANYON** The elevation of the North Rim of the Grand Canyon is 2,438 meters above sea level. The South Rim averages 304 meters lower than the North Rim. What is the average elevation of the South Rim?

6. **WATER BILL** The water company charges a residential customer $41 for the first 3,000 gallons of water used and $1 for every 200 gallons used over 3,000 gallons. If the water bill was $58, how many gallons of water were used?
3-4

Word Problem Practice

Problem-Solving Investigation: Work Backward

For Exercises 1-3, use the information below.

WEATHER The temperature in Columbus, Ohio on Monday is 35 degrees warmer than it was on Sunday. Saturday’s temperature was 7 degrees cooler than Sunday’s. At 45 degrees, Friday’s temperature was 22 degrees warmer than Saturday’s.

1. What was the temperature on Monday?
2. Estimate the average temperature for the time period from Saturday to Monday.
3. How many degrees cooler was the temperature on Friday than Monday?

For Exercises 4-6, refer to the table below.

MONEY Shelly needs to go to the grocery store to get some items for a dinner party she is hosting with her brother Preston.

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Pepper</td>
<td>$1.79</td>
</tr>
<tr>
<td>Flank Steak</td>
<td>$8.54</td>
</tr>
<tr>
<td>Wild Rice</td>
<td>$3.29</td>
</tr>
<tr>
<td>Romaine Lettuce</td>
<td>$3.79</td>
</tr>
<tr>
<td>Cucumber</td>
<td>$0.99</td>
</tr>
</tbody>
</table>

4. How much money should she take to purchase the items contained in the table?
5. If Shelly has $24.00 in her purse before she goes to the store, how much will she have left after she shops?
6. If Preston pays Shelly for half the cost of the groceries, how much does he pay?

7. NUMBER THEORY How many different two-digit numbers can you make using the numbers 3, 7, 9, and 2 if no digit is repeated within a number?

8. PATTERNS The following numbers follow a pattern: 2, 8, 32, 128. What would the fifth number in the pattern be?
Lesson Reading Guide

Solving Two-Step Equations

Get Ready for the Lesson

Complete the Mini Lab at the top of page 151 in your textbook. Write your answers below.

Solve each equation using models or a drawing.

1. $2x + 1 = 5$
2. $3x + 2 = 8$
3. $2 = 5x + 2$

Read the Lesson

4. Describe in words each step shown for solving the equation.

$12 + 7s = -9$

\[ \begin{align*}
12 + 7s &= -9 \\
-12 &= -12 \\
7s &= -21 \\
\frac{7s}{7} &= \frac{-21}{7} \\
s &= -3
\end{align*} \]

5. Number the steps in the correct order for solving the equation $-4v + 11 = -5$.

_____ Simplify.  _____ Write the equation.

_____ Divide each side by $-4$.  _____ Simplify.

_____ Subtract 11 from each side.  _____ Check the solution.

6. Check the solution given for each equation. If it is correct, write correct. If it is incorrect, solve to show the correct solution.

a. $9a + 2 = -25; a = -4$
   b. $-6f - 10 = 32; f = -7$
   c. $-18 + 3n = 21; n = 9$

Remember What You Learned

7. In your own words, describe the steps necessary to solve a two-step equation. Will these steps work for all two-step equations?
3-5  

**Study Guide and Intervention**  

**Solving Two-Step Equations**

To solve two-step equations, you need to add or subtract first. Then divide to solve the equation.

**Example 1**  
Solve $7v - 3 = 25$. Check your solution.

\[
\begin{align*}
7v - 3 &= 25 & \text{Write the equation.} \\
+3 &= +3 & \text{Add 3 to each side.} \\
7v &= 28 & \text{Simplify.} \\
\frac{7v}{7} &= \frac{28}{7} & \text{Divide each side by 7.} \\
v &= 4 & \text{Simplify.}
\end{align*}
\]

**Check**  

\[
\begin{align*}
7v - 3 &= 25 & \text{Write the original equation.} \\
7(4) - 3 &= 25 & \text{Replace } v \text{ with 4.} \\
28 - 3 &= 25 & \text{Multiply.} \\
25 &= 25 & \text{The solution checks.}
\end{align*}
\]

The solution is 4.

**Example 2**  
Solve $-10 = 8 + 3x$. Check your solution.

\[
\begin{align*}
-10 &= 8 + 3x & \text{Write the equation.} \\
-8 &= -8 & \text{Subtract 8 from each side.} \\
-18 &= 3x & \text{Simplify.} \\
\frac{-18}{3} &= \frac{3x}{3} & \text{Divide each side by 3.} \\
-6 &= x & \text{Simplify.}
\end{align*}
\]

**Check**  

\[
\begin{align*}
-10 &= 8 + 3x & \text{Write the original equation.} \\
-10 &= 8 + 3(-6) & \text{Replace } x \text{ with } -6. \\
-10 &= 8 + (-18) & \text{Multiply.} \\
-10 &= -10 & \text{The solution checks.}
\end{align*}
\]

The solution is $-6$.

**Exercises**

Solve each equation. Check your solution.

1. $4y + 1 = 13$  
2. $6x + 2 = 26$  
3. $-3 = 5k + 7$  
4. $6n + 4 = -26$

5. $7 = -3c - 2$  
6. $-8p + 3 = -29$  
7. $-5 = -5t - 5$  
8. $-9r + 12 = -24$

9. $11 + 7n = 4$  
10. $35 = 7 + 4b$  
11. $15 + 2p = 9$  
12. $49 = 16 + 3y$

13. $2 = 4t - 14$  
14. $-9x - 10 = 62$  
15. $30 = 12z - 18$  
16. $7 + 4g = 7$

17. $24 + 9x = -3$  
18. $50 = 16q + 2$  
19. $3c - 2.5 = 4.1$  
20. $9y + 4.8 = 17.4$
Skills Practice

Solving Two-Step Equations

Solve each equation. Check your solution.

1. \(2x + 1 = 9\)
2. \(5b + 2 = 17\)

3. \(3w + 5 = 23\)
4. \(8n + 1 = 25\)

5. \(4t - 2 = 14\)
6. \(7k - 3 = 32\)

7. \(8x - 1 = 63\)
8. \(2x - 5 = 15\)

9. \(3 + 6v = 45\)
10. \(9 + 4b = 17\)

11. \(2p + 14 = 0\)
12. \(3y + 10 = -2\)

13. \(3w + 5 = 2\)
14. \(8x + 7 = -9\)

15. \(5d - 1 = -11\)
16. \(4d - 35 = -3\)

17. \(11x - 24 = -2\)
18. \(15a - 54 = -9\)

19. \(3g - 49 = -7\)
20. \(-2x - 4 = 8\)

21. \(-9d - 1 = 17\)
22. \(-4f + 1 = 13\)

23. \(-5b + 24 = -1\)
24. \(-6x + 4 = -2\)
Solve each equation. Check your solution.

1. \(4h + 6 = 30\)  
2. \(7y + 5 = -9\)  
3. \(-3t + 6 = 0\)

4. \(-8 + 8g = 56\)  
5. \(5k - 7 = -7\)  
6. \(19 + 13x = 32\)

7. \(-5b - 12 = -2\)  
8. \(-1n + 1 = 11\)  
9. \(9f + 15 = 51\)

10. \(5d - 3.3 = 7.2\)  
11. \(3 = 0.2m - 7\)  
12. \(1.3z + 1.5 = 5.4\)

13. **KITTENS**  Kittens weigh about 100 grams when born and gain 7 to 15 grams per day. If a kitten weighed 100 grams at birth and gained 8 grams per day, in how many days will the kitten triple its weight?

14. **TEMPERATURE**  Room temperature ranges from 20°C to 25°C. Find the range of room temperature in °F. Use the formula, \(F - 32 = 1.8C\), to convert from the Celsius scale to the Fahrenheit scale.
### Word Problem Practice

#### Solving Two-Step Equations

1. **GOLF** It costs $12 to attend a golf clinic with a local pro. Buckets of balls for practice during the clinic cost $3 each. How many buckets can you buy at the clinic if you have $30 to spend?

2. **MONEY** Paulo has $145 in his savings account. He earns $36 a week mowing lawns. If Paulo saves all of his earnings, after how many weeks will he have $433 saved?

3. **RETAIL** An online retailer charges $6.99 plus $0.55 per pound to ship electronics purchases. How many pounds is a DVD player for which the shipping charge is $11.94?

4. **MONEY** Caitlin has a $10 gift certificate to the music store. She has chosen a number of CDs from the $7 bargain bin. If the cost of the CDs is $32 after the gift certificate is credited, how many CDs did Caitlin buy?

5. **EMPLOYMENT** Mrs. Jackson earned a $500 bonus for signing a one-year contract to work as a nurse. Her salary is $22 per hour. If her first week’s check including the bonus is $1,204, how many hours did Mrs. Jackson work?

6. **PHOTOGRAPHY** Morgan subscribes to a website for processing her digital pictures. The subscription is $5.95 per month and 4 by 6 inch prints are $0.19 each. How many prints did Morgan purchase if the charge for January was $15.83?
Equations with Like Terms

Some equations contain two or more expressions that are called *like terms*. For example, in the equation $3a + 2a + 4 = 14$, the expressions $3a$ and $2a$ are like terms. When you see like terms, you can combine them into one expression.

$$3a + 2a = 5a$$

When you solve an equation containing like terms, combine them first before continuing to solve the equation. To solve $3a + 2a + 4 = 14$, proceed as follows.

$$\begin{align*}
3a + 2a + 4 &= 14 \\
5a + 4 &= 14 \\
5a &= 10 \\
a &= \frac{10}{5} \\
a &= 2
\end{align*}$$

Solve each equation. Then locate the solution on the number line below. Place the letter corresponding to the answer on the line at the right of the exercise.

1. $3x + 4x + 3 = -39$  
2. $-3x - 2 + 5x = 12$  
3. $-5 - 4x + 7x = 1$  
4. $-\frac{1}{2}x + 6x - 2 = 20$  
5. $-2.4x + 1.2 + 1.2x = 4.8$  
6. $\frac{1}{3}(6 - x) = -1$  
7. $1 = -\frac{1}{4}x + 5 + \frac{3}{4}x$  
8. $7x + (-2x) + x = 42$  
9. $\frac{2}{5}(5x + 5x) = -20$
Lesson Reading Guide

Measurement: Perimeter and Area

Get Ready for the Lesson

Read the introduction at the top of page 156 in your textbook. Write your answers below.

1. If the students run around the gym 5 times, how far would they run?

2. Explain how you can use both multiplication and addition to find the distance.

Read the Lesson

3. Explain in your own words what the formula \( p = 2l + 2w \) means?

4. How is the perimeter of a figure different from the area of the figure?

5. Explain how to find the perimeter and area of a rectangle whose length is 8 feet and whose width is 2 feet.

Remember What You Learned

6. The word perimeter comes from two Greek words that mean “a measure (metron) around (peri).” Tell how you can find the perimeter of a rectangle.
Study Guide and Intervention

Measurement: Perimeter and Area

The distance around a geometric figure is called the perimeter.
To find the perimeter of any geometric figure, you can use addition or a formula.
The perimeter of a rectangle is twice the length \( \ell \) plus twice the width \( w \).
\[ P = 2\ell + 2w \]

**Example 1** Find the perimeter of the figure at right.

\[ P = 105 + 105 + 35 + 35 \text{ or } 280 \]
The perimeter is 280 inches.

The measure of the surface enclosed by a geometric figure is called the area.
The area of a rectangle is the product of the length \( \ell \) and width \( w \).
\[ A = \ell \cdot w \]

**Example 2** Find the area of the rectangle.

\[ A = \ell \cdot w \]
\[ = 24 \cdot 12 \text{ or } 288 \]
The area is 288 square centimeters.

**Exercises**

Find the perimeter of each figure.
1. \[ \text{33 cm} \quad 7 \text{ cm} \]

Find the perimeter and area of each rectangle.
3. \[ \text{9 ft} \quad 4 \text{ ft} \]

5. \( \ell = 8 \text{ ft}, w = 5 \text{ ft} \)

7. \( \ell = 8 \text{ yd}, w = 4\frac{1}{3} \text{ yd} \)

4. \[ \text{3 in.} \quad 11 \text{ in.} \]

6. \( \ell = 3.5 \text{ m}, w = 2 \text{ m} \)

8. \( \ell = 29 \text{ cm}, w = 7.3 \text{ cm} \)
Skills Practice

Measurement: Perimeter and Area

Find the perimeter of each figure.

1. \( \text{Perimeter} = 2(8 \text{ cm}) + 2(38 \text{ cm}) = 88 \text{ cm} \)

2. \( \text{Perimeter} = 4 \times 9 \text{ m} = 36 \text{ m} \)

3. \( \text{Perimeter} = 2(9 \text{ yd}) + 2(10 \text{ yd}) = 38 \text{ yd} \)

Find the perimeter and area of each rectangle.

5. \( \text{Perimeter} = 2(5 \text{ yd}) + 2(15 \text{ yd}) = 40 \text{ yd} \)
   \( \text{Area} = 5 \text{ yd} \times 15 \text{ yd} = 75 \text{ yd}^2 \)

6. \( \text{Perimeter} = 2(20 \text{ cm}) + 2(20 \text{ cm}) = 80 \text{ cm} \)
   \( \text{Area} = 20 \text{ cm} \times 20 \text{ cm} = 400 \text{ cm}^2 \)

7. \( \text{Perimeter} = 2(6 \text{ m}) + 2(30 \text{ m}) = 72 \text{ m} \)

8. \( \text{Perimeter} = 2(15 \text{ cm}) + 2(8 \text{ cm}) = 50 \text{ cm} \)

9. \( \ell = 6 \text{ yd}, w = 4 \text{ yd} \)
   \( \text{Perimeter} = 2(6 \text{ yd}) + 2(4 \text{ yd}) = 20 \text{ yd} \)
   \( \text{Area} = 6 \text{ yd} \times 4 \text{ yd} = 24 \text{ yd}^2 \)

10. \( \ell = 8.2 \text{ m}, w = 7.1 \text{ m} \)
    \( \text{Perimeter} = 2(8.2 \text{ m}) + 2(7.1 \text{ m}) = 30.6 \text{ m} \)
    \( \text{Area} = 8.2 \text{ m} \times 7.1 \text{ m} = 58.62 \text{ m}^2 \)

11. \( \ell = 50 \text{ in.}, w = 10 \text{ in.} \)
    \( \text{Perimeter} = 2(50 \text{ in.}) + 2(10 \text{ in.}) = 120 \text{ in.} \)
    \( \text{Area} = 50 \text{ in.} \times 10 \text{ in.} = 500 \text{ in.}^2 \)

12. \( \ell = 10 \text{ cm}, w = 4\frac{1}{2} \text{ cm} \)
    \( \text{Perimeter} = 2(10 \text{ cm}) + 2(4\frac{1}{2} \text{ cm}) = 29 \text{ cm} \)
    \( \text{Area} = 10 \text{ cm} \times 4\frac{1}{2} \text{ cm} = 45 \text{ cm}^2 \)

13. \( \ell = 4.5 \text{ ft}, w = 3 \text{ ft} \)
    \( \text{Perimeter} = 2(4.5 \text{ ft}) + 2(3 \text{ ft}) = 15 \text{ ft} \)
    \( \text{Area} = 4.5 \text{ ft} \times 3 \text{ ft} = 13.5 \text{ ft}^2 \)

14. \( \ell = 7\frac{1}{2} \text{ mm}, w = 6\frac{3}{8} \text{ mm} \)
    \( \text{Perimeter} = 2(7\frac{1}{2} \text{ mm}) + 2(6\frac{3}{8} \text{ mm}) = 28\frac{5}{8} \text{ mm} \)
    \( \text{Area} = 7\frac{1}{2} \text{ mm} \times 6\frac{3}{8} \text{ mm} = 51\frac{3}{8} \text{ mm}^2 \)
3-6 Practice

Measurement: Perimeter and Area

Find the perimeter of each rectangle.

1. \[ \text{15 m} \quad \text{5 m} \]

2. \[ \text{2.9 mi} \quad \text{2.8 mi} \]

3. \[ \text{1 yd} \quad \text{0.5 yd} \]

Find the area of each rectangle.

1. \[ \text{26 in.} \quad \text{11 in.} \]

2. \[ \text{8.5 ft} \quad \text{7.6 ft} \]

3. \[ \text{12 cm} \quad \text{10 cm} \]

Find the missing side.

7. \( P = 83.4 \text{ km}, \ell = 27.8 \text{ km} \)

8. \( A = 337.68 \text{ yd}^2, w = 60.3 \text{ yd} \)

LAWN CARE For Exercises 9 and 10, use the following information.

Yuri’s dad needs to fertilize the grass in the yard. The back yard measures 55 feet by 30 feet, while the front yard is a square with a length of 42 feet on each side.

9. Yuri’s dad wants to rope off the two areas to keep people from disturbing the lawn after he fertilizes the grass. How much rope will he need to go around both areas?

10. If a bag of fertilizer covers 600 square feet of lawn, how many bags of fertilizer will Yuri’s dad need to fertilize the front and back yards?
### Word Problem Practice

**Measurement: Perimeter and Area**

<table>
<thead>
<tr>
<th>Problem</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. BUILD A FENCE</strong> Mrs. Chen wants to build a fence around her yard so that her dog, Fluffy, can run free. The yard she wants to fence is 60 feet by 30 feet. The fencing is sold by the linear foot, so in order to figure out how much fencing she needs, Mrs. Chen needs to know the perimeter of the yard. Find the yard’s perimeter.</td>
</tr>
<tr>
<td><strong>2. WINDOWS</strong> Mrs. Johnson was planning to caulk around the frame of her patio doors that measure 5 feet by $6\frac{1}{2}$ feet. In order to help her to know how much caulk to buy, find the perimeter of the doors.</td>
</tr>
<tr>
<td><strong>3. SOCCER</strong> The dimensions of a field for Men’s and Women’s NCAA soccer can be no more than 80 yards by 120 yards. If the field has those dimensions what is the perimeter of the field?</td>
</tr>
<tr>
<td><strong>4. FENCING</strong> Mr. Lao is planning to build a rectangular cattle pen that measures 50 feet by 75 feet. Find the total length of fencing that he will need to purchase.</td>
</tr>
<tr>
<td><strong>5. CARPET</strong> Mr. Yuji plans on buying carpet for his bedroom that measures 12 feet by 12 feet. So he will know how much carpet to buy, find the area of his bedroom.</td>
</tr>
<tr>
<td><strong>6. BORDER</strong> Mrs. Jackson is going to put up a wallpaper border along the top of the walls in her dining room. If the dining room measures 16 feet by 12 feet, how much border should she buy?</td>
</tr>
<tr>
<td><strong>7. LOBBY</strong> A hotel lobby measures 40 yards by 60 yards. Find the area and perimeter of the lobby’s floor.</td>
</tr>
<tr>
<td><strong>8. MURAL</strong> An artist painted a mural measuring 9 feet by $20\frac{1}{2}$ feet. Find the area and perimeter of the mural.</td>
</tr>
</tbody>
</table>
Two shapes can have the same area and different perimeters. Each of these shapes has an area of 16 square units, but their perimeters are different.

Among rectangles that have an area of 16 square feet, rectangles that are long and thin have the greatest perimeter. Rectangles with the least perimeter are more closely shaped to a square.

The grid shows the basic floor plan of the Smith’s house. The side of each grid represents 3 feet. The three bedrooms all have the same area.

1. Which of the rectangular bedrooms has the greater perimeter? What is another dimension that will create a rectangle with the same area?

2. Lisa’s bedroom has an irregular shape. How does the area of her bedroom compare to the other two bedrooms? How does the perimeter of her bedroom compare to the other two bedrooms?

3. The Smith’s are moving to a new house. Design two different floor plans for them from which they may choose. Your floor plans must have five rooms including three bedrooms. Each bedroom must have an area of 162 square feet (18 squares) but not the same perimeters. You may add any other features to the house that you want.
3-6 Spreadsheet Activity

Perimeter and Area

You can use a spreadsheet to investigate the relationship between perimeter and area of a rectangle.

Example 1: Use a spreadsheet to find the perimeter and area of a rectangle with width of 3 inches and a length of 5 inches.

Step 1: Use the first cell of the spreadsheet for width. Use cell B1 for the length.

Step 2: In cell C1, enter an equals sign followed by the formula for the perimeter. The formula is \(2A1 + 2B1\). Then press ENTER to return the perimeter of the rectangle.

Step 3: In cell D1, enter an equals sign followed by the formula for the area of a rectangle. The formula is \(A1 \times B1\). Then press ENTER to return the area.

The perimeter is 16 inches and the area is 15 square inches.

Example 2: Use a spreadsheet to find the perimeter and area of a rectangle with width of 6 inches and length of 10 inches.

Step 1: Enter the width and the length in the second row.

Step 2: Click on the bottom right corner of cell C1 and drag it to C2. This returns the perimeter of the rectangle. Click on the bottom right corner of cell D1 and drag it to D2. This returns the area of the rectangle.

The perimeter is 32 inches and the area is 60 square inches.

Answer the following questions.

1. The measurements in Example 2 are two times the measurements in Example 1. How does the perimeter in Example 2 compare to the perimeter found in Example 1?

2. How does the area in Example 2 compare to the area in Example 1?

3. Make a conjecture about what would happen to the perimeter and area if the width and length were multiplied by three. Test your conjecture using a spreadsheet.
Lesson Reading Guide

Functions and Graphs

Get Ready for the Lesson

Read the introduction at the top of page 163 in your textbook. Write your answers below.

1. Complete the function table for the total cost of admission.

<table>
<thead>
<tr>
<th>Number of Members</th>
<th>$15m$</th>
<th>Total Cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15(1)</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>15(2)</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>15(3)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Graph the ordered pairs (number of members, total cost).

3. Describe how the points appear on the graph.

Read the Lesson

4. Complete each function table.

a. $x \quad 2x - 1 \quad y$

<table>
<thead>
<tr>
<th>$x$</th>
<th>$2x - 1$</th>
<th>$y$</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b. $x \quad 4x \quad y$

<table>
<thead>
<tr>
<th>$x$</th>
<th>$4x$</th>
<th>$y$</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Graph the functions in Exercise 4 above.

a. 

b. 

Remember What You Learned

6. Draw a picture of a “machine” that shows how a function works. Your picture should illustrate input, a function rule, and output.
The solution of an equation with two variables consists of two numbers, one for each variable, that make the equation true. The solution is usually written as an ordered pair \((x, y)\), which can be graphed. If the graph for an equation is a straight line, then the equation is a linear equation.

### Example 1

**Graph** \(y = 3x - 2\).

Select any four values for the input \(x\). We chose 3, 2, 0, and \(-1\). Substitute these values for \(x\) to find the output \(y\).

<table>
<thead>
<tr>
<th>(x)</th>
<th>(3x - 2)</th>
<th>(y)</th>
<th>((x, y))</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>3(2) - 2</td>
<td>4</td>
<td>(2, 4)</td>
</tr>
<tr>
<td>1</td>
<td>3(1) - 2</td>
<td>1</td>
<td>(1, 1)</td>
</tr>
<tr>
<td>0</td>
<td>3(0) - 2</td>
<td>-2</td>
<td>(0, -2)</td>
</tr>
<tr>
<td>-1</td>
<td>3(-1) - 2</td>
<td>-5</td>
<td>(-1, -5)</td>
</tr>
</tbody>
</table>

Four solutions are \((2, 4)\), \((1, 1)\), \((0, -2)\), and \((-1, -5)\).

The graph is shown at the right.

### Exercises

Graph each equation.

1. \(y = x - 1\)
2. \(y = x + 2\)
3. \(y = -x\)
4. \(y = 4x\)
5. \(y = 2x + 4\)
6. \(y = 2x\)
Copy and complete each function table.

1. \( y = x - 1 \)
<table>
<thead>
<tr>
<th>( x )</th>
<th>( x - 1 )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. \( y = x + 7 \)
<table>
<thead>
<tr>
<th>( x )</th>
<th>( x + 7 )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. \( y = 3x \)
<table>
<thead>
<tr>
<th>( x )</th>
<th>( 3x )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
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<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. \( y = -4x \)
<table>
<thead>
<tr>
<th>( x )</th>
<th>( -4x )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
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<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. \( y = 3x + 1 \)
<table>
<thead>
<tr>
<th>( x )</th>
<th>( 3x + 1 )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. \( y = -2x + 3 \)
<table>
<thead>
<tr>
<th>( x )</th>
<th>( -2x + 3 )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Graph each equation.

7. \( y = x - 2 \)

8. \( y = x + 4 \)

9. \( y = -3x \)

10. \( y = 2x \)

11. \( y = 2x + 2 \)

12. \( y = 3x - 2 \)

13. \( y = 0.75x \)

14. \( y = 0.5x + 1 \)

15. \( y = 2x - 0.5 \)
### 3-7 Practice

#### Functions and Graphs

Graph each equation.

1. \( y = x - 2 \)
2. \( y = -x \)
3. \( y = 2x - 1 \)
4. \( y = 0.75x \)
5. \( y = x - 0.5 \)
6. \( y = 0.5x + 2 \)

Graph the function represented by each table.

7. | \( x \) | \( y \) |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>3.5</td>
</tr>
<tr>
<td>1</td>
<td>2.5</td>
</tr>
<tr>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>3</td>
<td>0.5</td>
</tr>
</tbody>
</table>

8. | \( x \) | \( y \) |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>0</td>
<td>4.5</td>
</tr>
<tr>
<td>-1</td>
<td>3</td>
</tr>
<tr>
<td>-2</td>
<td>1.5</td>
</tr>
</tbody>
</table>

9. PRESSURE  Ocean pressure increases about one atmosphere for every 10 meters of water depth. This can be represented by the function \( p = 0.1d \) where \( p \) represents the pressure in atmospheres at a depth \( d \). Represent this function with a graph.
## Word Problem Practice

### Functions and Graphs

1. **TECHNOLOGY** The fee for your pager service is $22 per month. Make a function table that shows your total charge for 1, 2, 3, and 4 months of service.

2. **TECHNOLOGY** Use the information in Exercise 1 to write an equation in which \(x\) represents the number of months and \(y\) represents the total charge. Then graph the equation.

3. **TRAINS** Between Hiroshima and Kokura, Japan, the bullet train averages a speed of 164 miles per hour, which is the fastest scheduled train service in the world. Make a function table that shows the distance traveled at that speed in 1, 2, 3, and 4 hours.

4. **TRAINS** Use the information in Exercise 3 to write an equation in which \(x\) represents the number of hours and \(y\) represents the distance. Then graph the equation.

5. **GEOMETRY** The formula for the volume of a rectangular prism whose base has an area of 8 square units is \(V = 8h\), where \(V\) is the volume and \(h\) is the height. Graph the function.

6. **ANIMALS** The fastest insect in the world is the dragonfly with a top speed of 36 miles per hour. Write an equation using \(x\) to represent hours and \(y\) to represent distance. Then graph the equation.
Fundraising for Charity

Jacqui is leading a fund-raising group for a charity. The group is going to make buttons and sell them at a counter for $6.00 each. Their goal is to raise $1000. Jacqui creates a table to predict their earnings.

1. Complete the table showing how much money will be raised based on the number of buttons sold.

<table>
<thead>
<tr>
<th>Buttons Sold</th>
<th>Money Raised</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>

2. Make a line graph representing the functions from Jacqui’s table.

3. At this rate, how many buttons does Jacqui’s group need to sell to raise $1000?

4. Write an equation that relates the amount of money raised if there is a $50 counter fee.

5. If the group calculates in the $50 counter fee, how many buttons do they need to sell in order to raise their goal of $1000?
Exercise 1

Suppose you have $25 saved and you earn $10 for mowing a neighbor's lawn. Suppose you save all the money you earn. How much money would you have after mowing the lawn 5 times? 20 times? Write an equation in which \( x \) is the number of lawns you mow and \( y \) is the total amount of money you have saved. Make a table where \( x \) has the values 0 through 20. Graph the function. Sketch the graph and mark the points (0, 25), (5, 75), and (20, 225) with their coordinates. Describe what each point means in terms of lawns mowed and dollars saved.

The equation is \( y = 25 + 10x \).

**Step 1** Enter the equation.

\[ Y= \text{CLEAR} \quad 25 \quad + \quad 10 \quad x \]

**Step 2** Set up the table. View the table and answer the questions.

\[
\begin{array}{c|c}
\text{X} & \text{Y^1} \\
\hline
0 & 25 \\
1 & 35 \\
2 & 45 \\
\end{array}
\]

When you mow 5 lawns, \( x = 5 \). When \( x = 5 \), \( y = 75 \). You have saved $75. When \( x = 20 \), \( y = 225 \). When you mow 20 lawns, you have saved $225.

**Step 3** Turn off any other plots. View the graph.

\[ \text{2nd} \quad \text{[PLOT]} \quad 4 \quad \text{ENTER} \quad \text{ZOOM} \quad 9 \]

**Step 4** Explore the graph using the TRACE feature.

The point (0, 25) represents 0 lawns mowed and $25 saved. (5, 75) is 5 lawns mowed and $75 saved. (20, 225) is 20 lawns mowed and $225 saved.

**Exercises**

Create a table. Graph the function. Sketch the graph and label three points with their coordinates. Describe what the points represent in terms of classrooms and students.

Suppose each classroom has 28 students. The number of students in the whole school is given by the function \( y = 28x \), where \( x \) represents the number of classrooms. The number of classrooms could be 1 up to 18. How many students are in a school with 9 classrooms? 15 classrooms?
Part 1: Multiple Choice

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

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

Part 2: Short Response/Grid in

Record your answer in the blank.

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

8. ____________
9. ____________ (grid in)

Part 3: Extended Response

Record your answers for Question 10 on the back of this paper.
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 10 Rubric

<table>
<thead>
<tr>
<th>Score</th>
<th>Specific Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>The graph of the ordered pairs at 40 miles per hour is correct. The graph of the ordered pairs at 60 miles per hour is correct. It is explained that the graph for 50 miles per hour would be between the graphs for 40 and 60 miles per hour since 50 is between 40 and 60.</td>
</tr>
<tr>
<td>3</td>
<td>The graph of the ordered pairs at 40 miles per hour is correct. The graph of the ordered pairs at 60 miles per hour is correct. The prediction for the graph of 50 miles per hour is incorrect.</td>
</tr>
<tr>
<td>2</td>
<td>The graph of the ordered pairs at 40 miles per hour and the prediction for the graph of 50 miles per hour are correct. The graph of the ordered pairs at 60 miles per hour is incorrect. OR The graph of the ordered pairs for 60 miles per hour and the prediction for the graph of 50 miles per hour are correct. The graph of the ordered pairs at 40 miles per hour is incorrect.</td>
</tr>
<tr>
<td>1</td>
<td>Only one part (graph of ordered pairs at 40 miles per hour, graph of ordered pairs at 60 miles per hour, or the prediction for the graph of 50 miles per hour) is correct.</td>
</tr>
<tr>
<td>0</td>
<td>Response is completely incorrect.</td>
</tr>
</tbody>
</table>
Write each phrase as an algebraic expression.

1. four times a number
2. six less than \(b\)
3. a number divided by 14

Write each sentence as an algebraic equation.

4. Ten more than the number of days is 35.
5. Seventeen minus a number is 23.
6. Forty divided by the number of people is 8.

Solve each equation. Check your solution.

7. \(t + 7 = 5\)
8. \(8 + x = -12\)
9. \(a - 3 = 9\)

10. **MULTIPLE CHOICE** In two hours, the temperature dropped 6°F. The final temperature was \(-4\)°F. What was the original temperature?
   A. \(-10\)°F   B. \(-2\)°F   C. \(2\)°F   D. \(10\)°F

---

Solve each equation. Check your solution.

1. \(3x = -12\)
2. \(-7d = -35\)
3. \(20 = 4n\)
4. \(-6a = 54\)

5. Lauren brings brownies to class one day. She gives 4 to Gareth, 3 to Tammy, and 8 to Louise. If she brought 20 brownies, how many did she have left for herself?
Chapter 3 Quiz 3
(Lessons 3-5 and 3-6)

Solve each equation. Check your solution.

1. \(3y + 8 = 14\)
2. \(-3 = 9 + 4c\)
3. \(2m - 5 = 17\)

4. Find the perimeter and area of the rectangle.

5. Find the perimeter and area of a rectangle with length 9 inches and width 1 inch.

Chapter 3 Quiz 4
(Lessons 3-7)

Graph each equation.

1. \(y = x + 2\)
2. \(y = 2x\)

Name two solutions for each question.

3. \(y = x - 5\)
4. \(y = 2x + 1\)

5. Name an ordered pair that describes a point in the graph of \(y = 2x - 3\).
Solve each equation. Check your solution.

1. \( r - 16 = -16 \)
   - A. \(-32\)  
   - B. \(-1\)  
   - C. \(0\)  
   - D. \(32\)

2. \( 4 + s = 15 \)
   - F. \(19\)  
   - G. \(11\)  
   - H. \(9\)  
   - J. \(-19\)

3. \( 10 = 19 + y \)
   - A. \(-11\)  
   - B. \(-10\)  
   - C. \(-9\)  
   - D. \(29\)

4. \( 21 = -3d \)
   - F. \(-7\)  
   - G. \(-6\)  
   - H. \(18\)  
   - J. \(24\)

5. \( 18 = 3r \)
   - A. \(-4\)  
   - B. \(6\)  
   - C. \(8\)  
   - D. \(15\)

6. \( 2.1f = -4.2 \)
   - F. \(6.3\)  
   - G. \(-0.5\)  
   - H. \(-2.1\)  
   - J. \(-2\)

7. \( g - 6 = 2 \)
   - A. \(-8\)  
   - B. \(-4\)  
   - C. \(4\)  
   - D. \(8\)

8. \( -8m = -40 \)
   - F. \(320\)  
   - G. \(32\)  
   - H. \(5\)  
   - J. \(-5\)

9. CATS Malik is saving $7 each week to buy a new scratching post for his cat. If the post costs $42, in how many weeks will he have enough money?

Write each phrase as an algebraic expression.

10. five inches more than the length

11. the quotient of a number and \(-7\)

12. six minus \(q\)

13. fourteen times a number

Write each sentence as an algebraic equation.

14. Seven less than a number is 9.

15. Eight times a number is \(-16\).
Write a term or number to make each a true sentence.

1. In solving the equation $6x - 3 = 15$, the first step is to add 3 to _____________.

2. The ____________ states that if you subtract the same number from each side of an equation, the two sides remain equal.

3. A(n) ____________ is an equation that has two different operations.

4. The ____________ of a rectangle is the product of the length and width.

5. The words decreased by sometimes suggest the operation of _____________.

6. To solve the equation $d = rt$ for $t$, divide each side by ________.

7. In solving the equation $-4 = 3x - 10$, the first step is to add ____________ to each side of the equation.

8. The algebraic expression representing the words two times the height $h$ is _____________.

9. A(n) ____________ is an equation whose graph is a straight line.

10. An equation that shows the relationship among certain quantities is called a(n) _____________.

Define each term in your own words.

11. work backward strategy

12. Division Property of Equality
Write the letter for the correct answer in the blank at the right of each question.

Solve. Use any strategy.

1. **AGES** Three times Geoff’s age plus 3 is Myrka’s age. Myrka is 48. What is Geoff’s age?
   - A. 15
   - B. 17
   - C. 135
   - D. 153
   1. _____

2. **BASKETBALL** In the basketball game, Rachael scored 6 points less than twice the number of points Trina scored. Trina scored 9 points. How many points did Rachael score?
   - F. 3 points
   - G. 12 points
   - H. 15 points
   - J. 18 points
   2. _____

Solve each equation. Check your solution.

3. \(9 + n = -2\)
   - A. \(-11\)
   - B. \(-7\)
   - C. 2
   - D. 7
   3. _____

4. \(14 = y - 10\)
   - F. \(-24\)
   - G. \(-4\)
   - H. 4
   - J. 24
   4. _____

5. \(5 = x + 3\)
   - A. \(-8\)
   - B. \(-2\)
   - C. 2
   - D. 8
   5. _____

6. \(t - 26 = -21\)
   - F. \(-47\)
   - G. \(-5\)
   - H. 5
   - J. 47
   6. _____

7. \(84 = 7d\)
   - A. 8
   - B. 12
   - C. 77
   - D. 91
   7. _____

8. \(6z = 12\)
   - F. 2
   - G. 6
   - H. 18
   - J. 72
   8. _____

9. Which line is the graph of \(y = x\)?
   - A. line \(a\)
   - B. line \(b\)
   - C. line \(c\)
   - D. line \(d\)
   9. _____

10. Which line is the graph of \(y = x + 4\)?
    - F. line \(a\)
    - G. line \(b\)
    - H. line \(c\)
    - J. line \(d\)
    10. _____

11. Find the perimeter of the figure.
    - A. 45 ft
    - B. 28 ft
    - C. 16 ft
    - D. 14 ft
    11. _____

12. **DRIVEWAYS** Find the area of a rectangular driveway with a length of 10 meters and a width of 3 meters.
    - F. \(49 \text{ m}^2\)
    - G. \(30 \text{ m}^2\)
    - H. \(26 \text{ m}^2\)
    - J. \(13 \text{ m}^2\)
    12. _____
Choose the correct algebraic expression for each phrase.

13. $s$ decreased by 10
   A. $s + 10$   B. $s - 10$   C. $10 - s$   D. $10 + s$  
   13. ____________

14. thirteen times $y$
   F. $y \div 13$   G. $13y$   H. $13 + y$   J. $y - 13$  
   14. ____________

15. twelve more than $z$
   A. $12z$   B. $12 - z$   C. $z + 12$   D. $12 \div z$  
   15. ____________

Choose the correct algebraic equation for each sentence.

16. Four times a number is 17.
   F. $4a = 17$   G. $4 = 17$   H. $\frac{4}{a} = 17$   J. $a - 4 = 17$  
   16. ____________

17. Twenty is a number minus 5.
   A. $20 = 5 - r$   B. $20 = r - 5$   C. $20r = -5$   D. $20 = r + 5$  
   17. ____________

Solve each equation. Check your solution.

18. $-8x + 3 = -29$
   F. 256   G. 4   H. 3   J. -40  
   18. ____________

19. $3x + 1 = -11$
   A. -36   B. -30   C. -4   D. -3  
   19. ____________

20. BIOLOGY The graph shows the relationship between peoples’ height and weight. Which table best represents the data in the graph?

   F. & H. Weight Height
      | (kg)   | (cm)   | (kg)   | (cm)   |
      | 59     | 157    | 157    | 59     |
      | 61     | 160    | 61     | 160    |
      | 63     | 163    | 63     | 163    |
      | 65     | 166    | 65     | 166    |

   G. & J. Weight Height
      | (kg)   | (cm)   | (kg)   | (cm)   |
      | 3      | 157    | 3      | 2      |
      | 5      | 160    | 5      | 5      |
      | 7      | 163    | 7      | 8      |
      | 9      | 166    | 9      | 11     |

   Bonus ICE CREAM An ice cream shop charges $2.50 for a medium dish of ice cream and one topping. Each additional topping costs $0.50. How many total toppings can you have if you have $4 to spend?

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

Solve. Use any strategy.

1. **AGES** Edwin’s mother is 57 years old. Her age is three years more than twice Edwin’s age. What is Edwin’s age?
   A. 30 years  B. 27 years  C. 15 years  D. 37 years  1. ____

2. **BASKETBALL** In a basketball game, Benito scored 3 points less than twice the number of points Mark scored. Mark scored 8 points. How many points did Benito score?
   F. 5 points  G. 11 points  H. 13 points  J. 16 points  2. ____

Solve each equation. Check your solution.

3. \( t + 16 = 7 \)
   A. \(-23\)  B. \(-9\)  C. \(9\)  D. \(23\)  3. ____

4. \( 22 = r - 18 \)
   F. \(-40\)  G. \(-4\)  H. \(4\)  J. \(40\)  4. ____

5. \( -11 = x + 5 \)
   A. \(-16\)  B. \(-6\)  C. \(6\)  D. \(16\)  5. ____

6. \( w - 6 = -23 \)
   F. \(-29\)  G. \(-17\)  H. \(17\)  J. \(29\)  6. ____

7. \( 81 = 3k \)
   A. \(27\)  B. \(78\)  C. \(84\)  D. \(243\)  7. ____

8. \( 3j = 2.7 \)
   F. \(8.1\)  G. \(0.9\)  H. \(0.3\)  J. \(-0.3\)  8. ____

9. Which line is the graph of \( y = x - 2 \)?
   A. line \(k\)  C. line \(m\)
   B. line \(\ell\)  D. line \(n\)
   9. ____

10. Which line is the graph of \( y = \frac{1}{2}x - 3 \)?
    F. line \(k\)  H. line \(m\)
    G. line \(\ell\)  J. line \(n\)
    10. ____

11. Find the perimeter of the figure.
    A. 128 cm  C. 52.4 cm
    B. 52.8 cm  D. 26.4 cm
    11. ____

12. **GARDENS** Find the area of a rectangular garden with a length of 14 feet and a width of 7 feet.
    F. 21 ft\(^2\)  H. 42 ft\(^2\)
    G. 35 ft\(^2\)  J. 98 ft\(^2\)
    12. ____
Choose the correct algebraic expression for each phrase.

13. 15 less than w
   A. $w + 15$  B. $w - 15$  C. $15 - w$  D. $15 + w$  13. ____

14. twelve times a number
   F. $12 + x$  G. $12 - x$  H. $12 \div x$  J. $12x$  14. ____

15. 17 divided by q
   A. $17 + q$  B. $17q$  C. $17 - q$  D. $17 \div q$  15. ____

Choose the correct algebraic equation for each sentence.

16. Twelve plus a number is 7.
   F. $12 + d = -7$  G. $12 = d - 7$  H. $12d = -7$  J. $12 = -7d$  16. ____

17. Sixteen times a number is 13.
   A. $16j = 13$  C. $16 = 13j$
   B. $16 + j = 13$  D. $16 + 4.1j = 13$  17. ____

Solve each equation. Check your solution.

18. $37 = 18q + 1$
   F. 0.5  G. 2  H. 12  J. 19  18. ____

19. $2y - 1.7 = 3.3$
   A. 0.8  B. 2.5  C. 3.2  D. 10  19. ____

20. **CARS** The graph shows the relationship between the number of cars in a parking lot and the time of day. Which table best represents the data in the graph?

   F. | Time | Number of Cars |
   -- |-----|---------------|
   8  | 5   |
   9  | 9   |
   10 | 14  |

   G. | Time | Number of Cars |
   -- |-----|---------------|
   8  | 5   |
   9.5| 9   |
   11 | 14  |

   H. | Time | Number of Cars |
   -- |-----|---------------|
   5  | 8   |
   9  | 9   |
   14 | 10  |

   J. | Time | Number of Cars |
   -- |-----|---------------|
   2  | 5   |
   5  | 9   |
   8  | 14  |

   **Bonus** If each function represented in the table was graphed on a coordinate plane, which line would be steeper? Explain.  B: _______________
Write the letter for the correct answer in the blank at the right of each question.

Solve. Use any strategy.

1. ART The Leungs sold a valuable painting for $55,000. This price is $1,000 more than twice the amount they originally paid for it. How much did they originally pay?
   A. $25,000  B. $27,000  C. $27,500  D. $28,000

2. VOLLEYBALL In a volleyball game, Alexis scored 4 points more than twice the number of points Jessica scored. Jessica scored 3 points. How many points did Alexis score?
   F. 1 point  G. 7 points  H. 10 points  J. 12 points

Solve each equation. Check your solution.

3. \( m - 12 = 11 \)
   A. \(-23\)  B. \(-1\)  C. 1  D. 23

4. \( 15 = t + 7 \)
   F. \(-22\)  G. \(-8\)  H. 8  J. 22

5. \( y + 9 = -21 \)
   A. \(-30\)  B. \(-12\)  C. 12  D. 30

6. \( -4 = w - 30 \)
   F. \(-34\)  G. \(-26\)  H. 26  J. 34

7. \( 6x = -48 \)
   A. \(-8\)  B. \(-7\)  C. 7  D. 8

8. \( 2.7a = 13.5 \)
   F. 0.2  G. 4  H. 5  J. 6.5

9. Which line is the graph of \( y = -x - 4 \)?
   A. line \( k \)  C. line \( m \)
   B. line \( \ell \)  D. line \( n \)

10. Which line is the graph of \( y = -3x \)?
    F. line \( k \)  H. line \( m \)
    G. line \( \ell \)  J. line \( n \)

11. Find the perimeter of the figure.
    A. 167.2 cm  C. 51.6 cm
    B. 59.2 cm  D. 29.6 cm

12. POOLS Find the area of a rectangular pool with a length of 12 meters and a width of 5 meters.
    F. 17 m\(^2\)  H. 48 m\(^2\)
    G. 34 m\(^2\)  J. 60 m\(^2\)
Choose the correct algebraic expression for each phrase.

13. a number decreased by 38
   A. \( c + 38 \)  \( \quad \) B. \( 38 - c \)  \( \quad \) C. \( c - 38 \)  \( \quad \) D. \( 38 + c \)  \( \quad \) 13. ___

14. six times a number
   F. \( 6v \)  \( \quad \) G. \( 6 + v \)  \( \quad \) H. \( 6 \div v \)  \( \quad \) J. \( v + 6 \)  \( \quad \) 14. ___

15. a number divided by thirteen
   A. \( s \times 13 \)  \( \quad \) B. \( s \div 13 \)  \( \quad \) C. \( 13 \div s \)  \( \quad \) D. \( s - 13 \)  \( \quad \) 15. ___

Choose the correct algebraic equation for each sentence.

16. Seventeen plus a number is -3.
   F. \( 17 + q = -3 \)  \( \quad \) G. \( 17q = -3 \)  \( \quad \) H. \( 17 = q - 3 \)  \( \quad \) J. \( 17 - q = -3 \)  \( \quad \) 16. ___

17. Sixteen multiplied by a number is 23.
   A. \( 16p = 23 \)  \( \quad \) B. \( 16 + p = 23 \)  \( \quad \) C. \( 16 - p = 23 \)  \( \quad \) D. \( 16 \div p = 23 \)  \( \quad \) 17. ___

Solve each equation. Check your solution.

18. \(-12 = 4.7k + 11.5\)
   \( F. \ -5 \)  \( \quad \) G. \( -3 \)  \( \quad \) H. \( -0.1 \)  \( \quad \) I. \( 5 \)  \( \quad \) 18. ___

19. \(-3m - 21 = -6\)
   A. \( -45 \)  \( \quad \) B. \( -5 \)  \( \quad \) C. \( 9 \)  \( \quad \) D. \( -81 \)  \( \quad \) 19. ___

20. **MONEY** The graph shows the relationship between the cost of an item and the length of time it lasts. Which table best represents the data in the graph?

   - **F.**
     | Time (min) | Cost ($) |
     |------------|----------|
     | 0.50       | 3        |
     | 0.65       | 7.5      |
     | 0.90       | 15       |
     | 1.00       | 20       |
   
   - **H.**
     | Time (min) | Cost ($) |
     |------------|----------|
     | 1          | 3        |
     | 2          | 7.5      |
     | 3          | 15       |
     | 4          | 20       |
   
   - **G.**
     | Time (min) | Cost ($) |
     |------------|----------|
     | 1          | 0.50     |
     | 2          | 0.65     |
     | 3          | 0.90     |
     | 4          | 1.00     |
   
   - **J.**
     | Time (min) | Cost ($) |
     |------------|----------|
     | 3          | 0.50     |
     | 7.5        | 0.65     |
     | 15         | 0.90     |
     | 20         | 1.00     |

**Bonus** If each function represented in the table was graphed on a coordinate plane, which line would be steeper? Explain.  \( B. \) __________________________

<table>
<thead>
<tr>
<th>( x )</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y_1 )</td>
<td>3</td>
<td>6</td>
<td>9</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>( y_2 )</td>
<td>4</td>
<td>8</td>
<td>12</td>
<td>16</td>
<td>20</td>
</tr>
</tbody>
</table>
Solve each equation. Check your solution.

1. \(12 + w = -4\)
2. \(m - 16 = -4\)
3. \(9 = r + 28\)
4. \(k - 31 = 17\)

Solve. Use any strategy.

5. **JOBS** Miguel earned $2,500 from his summer job at the grocery store. This is $350 more than twice what his friend Todd earned. How much did Todd earn from his summer job?

6. **MONEY** Mr. Maxwell started three separate bank accounts for his three children, Jerry, Tony, and Nina. He put the same amount of money in each child’s account. If Tony withdrew half of this money and spent it all on a $15 CD, how much money did Mr. Maxwell deposit in total?

Solve each equation. Check your solution.

7. \(9x = 72\)
8. \(-35 = 7m\)
9. \(2.8t = -47.6\)
10. \(-5 + 18a = -77\)
11. \(12 = 3.1y - 59.3\)

Write each phrase as an algebraic expression.

12. seven hits more than Sydney
13. a number decreased by 16
14. nine times the price
15. a number divided by twelve

Write each sentence as an algebraic equation.

16. Five more than the number of students is 26.
17. The product of twelve and a number is 42.
18. A number minus nineteen is negative twenty-eight.
19. Twenty-one meters longer than the path is 40.
20. Find the perimeter of the figure. 

![Figure Diagram]

Perimeter = 32.6 cm

21. **TABLES** Find the perimeter and area of a rectangular tabletop with a length of 6 feet and a width of 3 feet.

22. **PAINTING** A preschool teacher is painting a large rectangle on a classroom wall using chalkboard paint. The rectangle is going to be 1.8 meters high and have an area of 4.5 square meters. What is the length of the rectangle?

23. Graph each equation.

23. \( y = x - 3 \)

![Graph of \( y = x - 3 \)]

24. \( y = -2x + 1 \)

![Graph of \( y = -2x + 1 \)]

25. **DODGEBALL** At recess Mrs. Miller’s class decided to play dodgeball. The table shows how the number of throws of the ball is related to the number of players remaining inside the circle. Graph the function.

<table>
<thead>
<tr>
<th>Number of Throws</th>
<th>2</th>
<th>10</th>
<th>15</th>
<th>18</th>
<th>20</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Players Remaining</td>
<td>26</td>
<td>18</td>
<td>13</td>
<td>10</td>
<td>8</td>
<td>3</td>
</tr>
</tbody>
</table>

25. **Bonus** **SOCCER** Ellen ran 25 yards from one side of the soccer field to the other. If the perimeter is ten times that distance, what is half the field’s length?

B: ________________
Solve each equation. Check your solution.

1. \( s + 18 = -3 \)  
2. \( d - 15 = -11 \)  
3. \( 7 = q + 24 \)  
4. \( c - 6 = 35 \)

Solve. Use any strategy.

5. **SALES** Sara sold 126 boxes of cookies. This is 14 more than twice the number of boxes her sister sold. How many boxes of cookies did Sara’s sister sell?

6. **MONEY** Mr. Stevens started three separate bank accounts for his three children. He put the same amount of money in each child’s account. If the oldest child, Spencer, withdrew half of his money and spent it all on a $25 book, how much money did Mr. Stevens deposit in total?

Solve each equation. Check your solution.

7. \( 7r = 63 \)
8. \( -48 = -6n \)
9. \( 1.5c = -24 \)
10. \( 4 + 2.6z = -29.8 \)
11. \( 43 = 15b - 47 \)

Write each phrase as an algebraic expression.

12. eleven points more than Maile
13. a number decreased by 18
14. five times the width
15. a number divided by seventeen

Write each sentence as an algebraic equation.

16. Nine more than the number of tickets is 31.
17. The product of eighteen and a number is 25.
18. A number minus fourteen is negative eight.
19. Eleven meters taller than the tree is 22.
20. Find the perimeter of the figure.

![Perimeter Diagram]

21. **RUGS** Find the perimeter and area of a rectangular rug that has a length of 8 feet and a width of 5 feet.

22. **ART** Students are creating a rectangular billboard design on butcher paper. The design is to be 3 feet wide and have an area of 22.5 square feet. What is the length of the design?

Graph each equation.

23. \( y = x - 4 \)

24. \( y = -x + 3 \)

25. **FUNDRAISING** Becca is selling plants for a fundraiser. The table shows how the number of plants she sells is related to the amount of prize money she receives. Graph the function.

<table>
<thead>
<tr>
<th>Number of Plants Sold</th>
<th>25</th>
<th>50</th>
<th>75</th>
<th>100</th>
<th>150</th>
<th>200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prize Money ($)</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>30</td>
<td>40</td>
</tr>
</tbody>
</table>

**Bonus** **TENNIS** Samuel ran 30 feet from one side of the tennis court to the other. If the perimeter is eight times that distance, what is the court’s length?

B: ____________________
Solve each equation. Check your solution.

1. \(-81 = 26 + n\)
2. \(x + 17.3 = -4.7\)
3. \(r - 12 = 43\)
4. \(21.8 - g = 9.5\)

Solve. Use any strategy.

5. BASEBALL The number of infielders on a baseball team is one less than three times the number of pitchers. If there are eleven infielders, how many pitchers are there?

6. MONEY Three children each had the same amount of money in their savings accounts. One of the children withdrew a quarter of her money and spent it all on a $25 T-shirt. What was the total amount of money originally in the accounts?

Solve each equation. Check your solution.

7. \(2.9a = 11.6\)
8. \(-3.1u = 7.75\)
9. \(1.8t = -9.18\)
10. \(6m + 2.3 = -9.7\)
11. \(3.6 = -2p + 5.8\)

Write each phrase as an algebraic expression.

12. four times the height
13. seventeen more than a number
14. twelve less than \(f\)
15. the quotient of \(q\) and 3.4

Write each sentence as an algebraic equation.

16. Negative seven times a number is 42.
17. The product of eight and a number is \(-33.2\).
18. A number plus one is 57.5.
19. Thirteen less than a number is 63.
20. Find the perimeter of the figure.

21. **SIGN** Find the perimeter and area of a rectangular sign that has a length of 4.5 feet and a width of 2.75 feet.

22. **RUGS** A rectangular rug is 13 feet long and has an area of 81.25 square feet. What is the width of the rug?

Graph each equation.

23. \( y = 2x - 5 \)

24. \( y = -x + 1.5 \)

25. **HEIGHTS** Moez and Andrea’s parents measured their children’s height over a three-year period. The table shows how their heights are related. Graph the function.

<table>
<thead>
<tr>
<th>Measurement</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moez’s height (cm)</td>
<td>50</td>
<td>51</td>
<td>51</td>
<td>53</td>
<td>54</td>
<td>56</td>
</tr>
<tr>
<td>Andrea’s height (cm)</td>
<td>103</td>
<td>105</td>
<td>105</td>
<td>109</td>
<td>111</td>
<td>115</td>
</tr>
</tbody>
</table>

**Bonus** If each function represented in the table was graphed on the same coordinate plane, which line would be steeper? Explain.

B: ________________
Demonstrate your knowledge by giving a clear, concise solution to each problem. Be sure to include all relevant drawings and justify your answers. You may show your solution in more than one way or investigate beyond the requirements of the problem. If necessary, record your answer on another piece of paper.

1. The Ortiz family will travel from Indianapolis to Denver this summer. The driving distance between the two cities is 1,058 miles. They need to find out about how much the gas will cost round trip. Their car gets about 20 miles per gallon. They usually spend about $2.89 per gallon.

   a. Write and solve an algebraic equation to find out how many miles they will travel. Explain your steps.

   b. Write and solve an algebraic equation to find out how many gallons of gas they will use. Explain your steps.

   c. Write and solve an algebraic equation to find out how much the Ortiz’s will spend on gas round trip. Explain your steps.

   d. Suppose you know the total cost of the gas, but do not know the price per gallon. Explain how you would work backward to solve the problem.

2. Which figure has a greater area: a rectangle that is 8 inches wide and 4 inches long, or a square with a perimeter of 2 feet? Explain.

3. Every winter, students at Camden Middle School go on a class ski trip. For every inch of snow that falls, an additional 25 students sign up. When no snow falls, no students attend.

   a. Use a verbal model to show the function.

   b. Make a table of values to show the function.

   c. Write an equation to show the function.

   d. Graph the function. Explain your steps.
1. Find the square root of 169. (Lesson 1-3)
   \[ \text{A} \ 12 \quad \text{B} \ 13 \quad \text{C} \ 84.5 \quad \text{D} \ 338 \]
   1. 0 0 0 0

2. MEASUREMENT You can find the number of feet by evaluating
   the expression \( \frac{l}{12} \), where \( l \) is the length in inches. How many
   feet long is a 60-inch length of string? (Lesson 1-5)
   \[ \text{F} \ 5 \quad \text{G} \ 6 \quad \text{H} \ 10 \quad \text{J} \ 12 \]
   2. 0 0 0 0

3. If \( 6 - x = y \) and \( y = 19 \), what is \( x \)? (Lesson 1-6)
   \[ \text{A} \ 25 \quad \text{B} \ 13 \quad \text{C} \ -13 \quad \text{D} \ -25 \]
   3. 0 0 0 0

4. Solve \( 12b = 132 \) mentally. (Lesson 1-7)
   \[ \text{F} \ 10 \quad \text{G} \ 11 \quad \text{H} \ 12 \quad \text{J} \ 13 \]
   4. 0 0 0 0

5. SALES Juan sold 9 pens and he knows he has 37 left. Choose
   the equation to find how many pens he had originally.
   (Lesson 1-9)
   \[ \text{A} \ x - 9 = 37 \quad \text{B} \ x + 9 = 37 \quad \text{C} \ x - 37 = -9 \quad \text{D} \ x + 37 = 9 \]
   5. 0 0 0 0

6. Which description shows
   the relationship between a
   term and \( n \), and its position
   in the sequence? (Lesson 1-9)
   \[ \begin{array}{c|cccc}
   \text{Position} & 1 & 2 & 3 & 4 & n \\
   \text{Value of Term} & 5 & 10 & 15 & 20 \\
   \end{array} \]
   \[ \text{F} \ \text{add 5 to } n \quad \text{H} \ \text{Multiply } n \text{ by 5} \]
   \[ \text{G} \ \text{Divide } n \text{ by 5} \quad \text{J} \ \text{Subtract } n \text{ from 5} \]
   6. 0 0 0 0

7. If \( |x| = 6 \), what is the value of \( x \)? (Lesson 2-1)
   \[ \text{A} \ -6 \text{ or } 0 \quad \text{B} \ -6 \text{ or } 6 \quad \text{C} \ 0 \text{ or } 6 \quad \text{D} \ -6 \]
   7. 0 0 0 0

8. The ordered pairs \((-3, 5), (2, 0), \) and \( (2, 5) \) are coordinates of
   three of the vertices of a square. What are the coordinates of
   the fourth vertex? (Lesson 2-3)
   \[ \text{F} \ (0, 2) \quad \text{G} \ (5, -3) \quad \text{H} \ (-3, 2) \quad \text{J} \ (-3, 0) \]
   8. 0 0 0 0

9. WINDCHILL The windchill factor one week ago was \(-3^\circ F\).
   What is the windchill factor today if it has risen 12 degrees?
   (Lesson 2-4)
   \[ \text{A} \ -15^\circ F \quad \text{B} \ -9^\circ F \quad \text{C} \ 9^\circ F \quad \text{D} \ 15^\circ F \]
   9. 0 0 0 0

10. Which expression is represented by the model below? (Lesson 2-5)
    \[ \text{F} \ 0 - 1 \quad \text{G} \ 4 - 5 \quad \text{H} \ 0 + 4 \quad \text{J} \ 4 - 1 \]
    10. 0 0 0 0
11. Which sentence about integers is not always true? (Lesson 2-6)

A positive \times positive = positive
B positive \times negative = negative
C negative \times positive = positive
D negative \times negative = positive

12. Which of the following equations is equivalent to two times a number plus seventeen is nine? (Lesson 3-1)

F 2n + 9 = 17
G 2n + 17 = 9
H 2n − 9 = 17
J 2n − 17 = 9

13. Find \(t - 8 = -14\). (Lesson 3-2)

A −22  B −6  C 6  D 22

14. **TEMPERATURES** The lowest temperature ever recorded in Memphis, Tennessee, was −13 degrees Fahrenheit (°F). Find this temperature in degrees Celsius (°C) using \(F = 1.8C + 32\). (Lesson 3-4)

F 25°C
G 8.6°C
H −7°C
J −25°C

15. Find the area of the rectangle. (Lesson 3-6)

\(24 \text{ mm} \times 9.2 \text{ mm} = 220.8 \text{ mm}^2\)

A 33.2 mm\(^2\)  C 57.2 mm\(^2\)
B 42.4 mm\(^2\)  D 220.8 mm\(^2\)

16. Which is a solution of the equation \(y = 4x − 3\)? (Lesson 3-7)

F (1, 1)
G (1, 3)
H (2, 1)
J (2, 3)

17. Evaluate \(3(12 − 8) + (3 \times 5)\). (Lesson 1-4)

A 20  B 27  C 43  D 50

18. A number is multiplied by 8. Then 5 is added to the product. The final result is 65. What is the number? (Lesson 3-4)

F 7.5  G 8  H 8.5  J 8.75
19. **CAR WASH** Mason charges $8 to wash and $4 to dry cars. His total profit is represented by the expression $8x + 4x$, where $x$ is the number of cars washed and dried. If Mason washes and dries 8 cars this weekend, how much will he earn? (Lesson 1-6)

20. Order 5, −7, 12, −4, 0, and −12 from greatest to least. (Lesson 2-2)

21. Graph $y = x - 3$. (Lesson 3-7)

22. Solve $-15a = 45$. (Lesson 3-3)

23. Seven more than three times a number is 43. Find the number. (Lesson 3-5)

24. **MOVIES** The cost of a movie ticket is $9.50. (Lesson 3-7)
   a. Complete the table for the total costs.
   
<table>
<thead>
<tr>
<th>Number of Tickets</th>
<th>Total Cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

   b. Graph the ordered pairs to compare the number of tickets and the total cost.

   c. Write an equation that relates the number of tickets $n$ and the total cost $C$ for each theater.
Write an integer for each situation.
1. a gain of 15 yards
2. 2000 B.C.
3. Identify the point that represents −15.
4. Find \(|−2| + |2|\).

Replace each • with < or > to make a true sentence.
5. −13 • −21
6. −8 • 0

7. TEMPERATURE Order the temperatures in degrees Celsius 12, −18, −8, −12, 3, and 0 from least to greatest.

Name the ordered pair for each point graphed. Then name the quadrant or axis on which each point is located.
8. E
9. P

Add, subtract, multiply, or divide.
10. 6 − (−4)
11. −8 + (−4)
12. −(2^2)
13. 20 ÷ (−2)

Evaluate each expression if \(r = −5\) and \(s = 6\).
14. \(rs ÷ (−2)\)
15. −3(2s)
16. Evaluate \(16 + 10 ÷ 2 − 1\).

17. EXERCISE Nate jogs 6 miles one week, 10 miles the next, and 14 miles the third week. If the pattern continues, how many miles will he jog the fourth week?

18. BANKING Daphnie has $68 in the bank. She withdraws $29. Write an addition expression to describe the situation. Then find the sum.
19. Write the phrase *three hours longer than Tina’s time* as an algebraic expression.

Write each sentence as an algebraic equation.

20. Seven less than a number is 12.

21. Five more than twice a number is 19.

Solve each equation. Check your solution.

22. \(7 + p = -9\)

23. \(10 - r = 6\)

24. \(4s = 64\)

25. \(8m = -72\)

26. \(-10 + 14x = -38\)

27. \(15 = 7h + 1\)

Simplify each expression.

28. \((10 - 4) \div 2\)

29. \(18 \div 3^2 + 7\)

30. \((27 - 5) \cdot (9 + 1)\)

31. Find the perimeter of the figure.

32. **VOLLEYBALL** An outdoor volleyball court is a rectangle measuring 59 feet by 29.5 feet. Find the perimeter and area of the field.

33. **ADVERTISING** The chess club is having a bake sale. The table shows how the total sales of previous bake sales are related to the number of flyers advertising the bake sale were posted. Graph the function.

<table>
<thead>
<tr>
<th>Number of Flyers</th>
<th>20</th>
<th>30</th>
<th>50</th>
<th>60</th>
<th>80</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Sales (dollars)</td>
<td>30</td>
<td>45</td>
<td>75</td>
<td>90</td>
<td>120</td>
<td>150</td>
</tr>
</tbody>
</table>
Anticipation Guide

Algebra: Linear Equations and Functions

Before you begin Chapter 3

- Read each statement.
- Decide whether you Agree (A) or Disagree (D) with the statement.
- Write A or D in the first column OR if you are not sure whether you agree or disagree, write NS (Not Sure).

<table>
<thead>
<tr>
<th>STEP 1 A, D, or NS</th>
<th>Statement</th>
<th>STEP 2 A or D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The words difference, less than, and decreased by in a problem suggest subtraction.</td>
<td>A</td>
</tr>
<tr>
<td>2.</td>
<td>The words twice, per, and separate in a problem suggest multiplication.</td>
<td>D</td>
</tr>
<tr>
<td>3.</td>
<td>Twice a number less than 3 is the same as 2n – 3.</td>
<td>D</td>
</tr>
<tr>
<td>4.</td>
<td>Addition and subtraction are inverse operations.</td>
<td>A</td>
</tr>
<tr>
<td>5.</td>
<td>The Addtion Property of Equality states that if the same number is added to both sides of an equation, the two sides will remain equal.</td>
<td>A</td>
</tr>
<tr>
<td>6.</td>
<td>To solve the equation 2.4t = 12, multiply both sides of the equation by 2.4.</td>
<td>D</td>
</tr>
<tr>
<td>7.</td>
<td>To solve the equation 6x – 4 = 20, you would first divide both sides of the equation by 6.</td>
<td>D</td>
</tr>
<tr>
<td>8.</td>
<td>The formula for the area of a rectangle is A = l • w.</td>
<td>A</td>
</tr>
<tr>
<td>9.</td>
<td>To graph the equation y = 4x, substitute one value for x and solve for y.</td>
<td>D</td>
</tr>
<tr>
<td>10.</td>
<td>An equation whose graph is a straight line is called a linear equation.</td>
<td>A</td>
</tr>
</tbody>
</table>

After you complete Chapter 3

- Reread each statement and complete the last column by entering an A (Agree) or a D (Disagree).
- Did any of your opinions about the statements change from the first column?
- For those statements that you mark with a D, use a separate sheet of paper to explain why you disagree. Use examples, if possible.

Lesson Reading Guide

Writing Expressions and Equations

Get Ready for the Lesson

Read the introduction at the top of page 128 in your textbook.
Write your answers below.

1. What operation would you use to find how many moons Saturn has? Explain. The word more suggests addition.

2. Jupiter has about three times as many moons as Uranus. What operation would you use to find how many moons Jupiter has? multiplication

Read the Lesson

3. Write the symbol that each word or phrase represents.

4. Give two examples of a word or phrase that can suggest each operation. Sample answers given.

5. Write a verbal sentence for each equation. Sample answers given.

Remember What You Learned

6. Work with a partner. Write down four or five real life math situations as sentences. Trade papers with your partner. Translate your partner’s sentences into symbols. See students’ work.
### Writing Expressions and Equations

#### Writing Expressions

<table>
<thead>
<tr>
<th>Phrases</th>
<th>Expression</th>
<th>Phrases</th>
<th>Expression</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 more than a number</td>
<td>(x + 9)</td>
<td>4 subtracted from a number</td>
<td>(x - 4)</td>
</tr>
<tr>
<td>the sum of 9 and a number</td>
<td></td>
<td>4 less than a number</td>
<td>(h - 4)</td>
</tr>
<tr>
<td>a number plus 9</td>
<td></td>
<td>a number decreased by 4</td>
<td></td>
</tr>
<tr>
<td>a number increased by 9</td>
<td></td>
<td>the difference of (h) and 4</td>
<td></td>
</tr>
<tr>
<td>the total of (x) and 9</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Phrases</th>
<th>Expression</th>
<th>Phrases</th>
<th>Expression</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 multiplied by (g)</td>
<td>(6g)</td>
<td>a number divided by 5</td>
<td>(\frac{1}{5})</td>
</tr>
<tr>
<td>6 times a number</td>
<td></td>
<td>the quotient of (r) and 5</td>
<td></td>
</tr>
<tr>
<td>the product of (g) and 6</td>
<td></td>
<td>divide a number by 5</td>
<td></td>
</tr>
</tbody>
</table>

#### Writing Equations

<table>
<thead>
<tr>
<th>Sentences</th>
<th>Equation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sixty less than three times the amount is (59).</td>
<td>(3n - 60 = 59)</td>
</tr>
<tr>
<td>Three times the amount less 60 is equal to 59.</td>
<td></td>
</tr>
<tr>
<td>A number times three minus 60 equals 59.</td>
<td></td>
</tr>
</tbody>
</table>

### Exercises

1. \(7\) less than \(m\) \(m - 7\)
2. The quotient of \(3\) and \(y\) \(\frac{3}{y}\)
3. The total of \(5\) and \(c\) \(5 + c\)
4. The difference of \(6\) and \(r\) \(6 - r\)
5. \(n\) divided by 2 \(\frac{n}{2}\)
6. The product of \(k\) and 9 \(9k\)

Write each sentence as an algebraic equation.

7. A number increased by 7 is 11. \(n + 7 = 11\)
8. The price decreased by \(4\) is \(\$29\). \(p - 4 = 29\)
9. Twice as many points as Bob would be 18 points. \(2b = 18\)
10. After dividing the money 5 ways, each person got \(\$67\). \(\frac{m}{5} = 67\)
11. Three more than 8 times as many trees is 75 trees. \(8t + 3 = 75\)
12. Seven less than a number is 15. \(n - 7 = 15\)

21. A number decreased by 5 is 12. \(n - 5 = 12\)
22. Five dollars less than Yumi's pay is \(\$124\). \(y - 5 = 124\)
23. A number times four is 20. \(4n = 20\)
24. Twice the number of cars is 40. \(2c = 40\)
25. The product of \(x\) and 6 is 54. \(6x = 54\)
26. A number divided by 6 is 12. \(\frac{n}{6} = 12\)
27. 72 divided by \(y\) is \(-9\). \(\frac{72}{y} = -9\)
28. 175 students separated into \(n\) classes is 25. \(175 = \frac{25}{n}\)
29. One more than twice as many CDs is 17. \(2c + 1 = 17\)
30. Four less than three times a number is 14. \(3n - 4 = 14\)
OLYMPICS For Exercises 1–4, use the table that shows the number of medals won by each country in the 2006 Winter Olympics.

<table>
<thead>
<tr>
<th>Country</th>
<th>Medals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>29</td>
</tr>
<tr>
<td>USA</td>
<td>25</td>
</tr>
<tr>
<td>Canada</td>
<td>24</td>
</tr>
<tr>
<td>Austria</td>
<td>23</td>
</tr>
<tr>
<td>Russia</td>
<td>22</td>
</tr>
<tr>
<td>Norway</td>
<td>19</td>
</tr>
<tr>
<td>Sweden</td>
<td>14</td>
</tr>
<tr>
<td>Switzerland</td>
<td>14</td>
</tr>
<tr>
<td>Korea</td>
<td>11</td>
</tr>
<tr>
<td>Italy</td>
<td>11</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>4</td>
</tr>
</tbody>
</table>

Let \( x \) represent the number of medals won by Italy.

1. Write an expression using \( x \) to represent the number of medals won by Norway.  \( x + 8 \)
2. Write an expression using \( x \) to represent the number of medals won by the Czech Republic.  \( x - 7 \)
3. Which country's number of medals can be represented by \( 2x \)? Russia
4. Which country's number of medals can be represented by \( 2x + 3 \)? USA
5. GEOGRAPHY The Virgin Islands were acquired by the United States in 1927. This is 29 years after Puerto Rico was acquired. Write an equation to model this situation.  \( y + 29 = 1927 \)
6. POPULATION According to the Census Bureau, the U.S. population grew from 281.4 million in April 2000 to 284.8 million in July 2001. Write an equation to model this situation.  \( 281.4 + x = 284.8 \)
Chapter 3

3-1 Enrichment
Expressions for Figurate Numbers

Figurate numbers are numbers that can be shown with dots arranged in specific geometric patterns. Below are the first five square numbers.

[Diagrams of dot patterns for square numbers]

The expression \( n^2 \) will give you the number of dots in the \( n \)th square number. The variable \( n \) takes on the values 1, 2, 3, 4, and so on. So, to find the 10th square number, you would use 10 for \( n \).

1. Match each set of dot patterns with its name and expression. Write exercise numbers in the boxes to show the matchings.

<table>
<thead>
<tr>
<th>Dot Patterns for Second and Third Numbers</th>
<th>Name of Figurate Number</th>
<th>Expression</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>pentagonal</td>
<td>( n(2n - 1) )</td>
</tr>
<tr>
<td>b.</td>
<td>hexagonal</td>
<td>( \frac{n(n + 1)}{2} )</td>
</tr>
<tr>
<td>c.</td>
<td>triangular</td>
<td>( \frac{3n^2 - 11}{2} )</td>
</tr>
</tbody>
</table>

Use the algebraic expressions on this page to compute each number. Then make a drawing of the number on a separate sheet of paper.

2. 6th square
3. 4th triangular
4. 4th pentagonal
5. 4th hexagonal
6. 5th triangular
7. 5th pentagonal

3-2 Lesson Reading Guide
Solving Addition and Subtraction Equations

Get Ready for the Lesson
Read the introduction at the top of page 136 in your textbook. Write your answers below.

1. What does \( x \) represent in the figure? number of games initially had
2. What addition equation is shown in the figure? \( x + 2 = 6 \)
3. Explain how to solve the equation. Find the number that when added to 2 is 6.
4. How many games did Max have in the beginning? 4

Read the Lesson
5. Match the method of solving with the appropriate equation.
   \[ x + 5 = 9 \]
   a. add 2 to each side
   \[ -2 + y = 1 \]
   b. add 5 to each side
   \[ 5 = m - 1 \]
   c. subtract 5 from each side
   \[ r + 9 = -7 \]
   d. add 1 to each side
   \[ k - 5 = -2 \]
   e. subtract 9 from each side

6. Explain in words how to solve each equation.
   \[ a - 10 = 3 \]
   Add ten to each side and simplify.
   \[ 4 + t = -12 \]
   Subtract four from each side and simplify.
   \[ 18 = n - 7 \]
   Add seven to each side and simplify.

7. Solve each equation.
   a. \( w + 23 = -11 \) \( -34 \)
   b. \( 35 = z - 15 \) \( 50 \)
   c. \( 42 + c = -9 \) \( -51 \)

Remember What You Learned
8. Take turns with a partner explaining the Addition and Subtraction Properties of Equality in your own words. Then each of you write two addition and two subtraction equations. Trade equations and solve. Check your work by explaining to each other the method you used to solve the equations.

See students’ answers.
3-2

Study Guide and Intervention
Solving Addition and Subtraction Equations

Remember, equations must always remain balanced. If you subtract the same number from each side of an equation, the two sides remain equal. Also, if you add the same number to each side of an equation, the two sides remain equal.

Example 1
Solve \( x + 5 = 11 \). Check your solution.

\[ x + 5 = 11 \]
Write the equation.
\[ x = 6 \]
Subtract 5 from each side.
\[ x = 6 \]
Simplify.

Check \( x + 5 = 11 \)
Write the equation.
\[ 6 + 5 = 11 \]
Replace \( x \) with 6.
\[ 11 = 11 \]
This sentence is true.

The solution is 6.

Example 2
Solve \( 15 = t - 12 \). Check your solution.

\[ 15 = t - 12 \]
Write the equation.
\[ 12 + 12 = 12 \]
Add 12 to each side.
\[ 27 = t \]
Simplify.

Check \( 15 = t - 12 \)
Write the equation.
\[ 15 = 27 - 12 \]
Replace \( t \) with 27.
\[ 15 = 15 \]
This sentence is true.

The solution is 27.

Exercises

Solve each equation. Check your solution.

1. \( h + 3 = 14 \)
2. \( m + 8 = 22 \)
3. \( p + 5 = 15 \)
4. \( 17 = y + 8 \)
5. \( w + 4 = -1 \)
6. \( k + 5 = -3 \)
7. \( 25 = 14 + r \)
8. \( 57 + z = 97 \)
9. \( b - 3 = 6 \)
10. \( 7 - c = 5 \)
11. \( j - 12 = 18 \)
12. \( v - 4 = 18 \)
13. \( -9 = w - 12 \)
14. \( y - 8 = -12 \)
15. \( 14 = f - 2 \)
16. \( 23 = n - 12 \)
17. \( 15 = 4 \)
18. \( 14 = 1 + 4 \)
19. \( 16 = 24 + w \)
20. \( 18 + y = 99 \)
21. \( 12 = g - 56 \)
22. \( 21 = z - 2 \)
23. \( 27 = n - 2.6 \)
24. \( 7.4 = n - 2.6 \)
25. \( 48 = 24 + w \)
26. \( 14 = 86 + y = 99 \)
27. \( 15 = 6 + y = -8 \)
28. \( 16 = 8 \)
29. \( 18 = 24 + w \)
30. \( 15 = 6 + y = -8 \)
31. \( 16 = 8 \)
32. \( 15 = 6 + y = -8 \)
33. \( 16 = 8 \)
34. \( 15 = 6 + y = -8 \)
35. \( 16 = 8 \)
Solve each equation. Check your solution.

1. \( a + 4 = 11 \)  
   \( a = 7 \)

2. \( 6 = g + 8 \)  
   \( g = -2 \)

3. \( x - 3 = -2 \)  
   \( x = 1 \)

4. \( k + 8 - 3 \)  
   \( k = -5 \)

5. \( j + 0 - 9 \)  
   \( j = 9 \)

6. \( 12 + y - 15 \)  
   \( y = 3 \)

7. \( h - 4 = 0 \)  
   \( h = 4 \)

8. \( m - 7 = 1 \)  
   \( m = 8 \)

9. \( w + 5 = 4 \)  
   \( w = -1 \)

10. \( b - 28 = 33 \)  
    \( b = 61 \)

11. \( 45 + f = 48 \)  
    \( f = 3 \)

12. \( n + 7.1 = 8.6 \)  
    \( n = 1.5 \)

13. \( -14 + t = 26 \)  
    \( t = 40 \)

14. \( d - 3.03 = 2 \)  
    \( d = 5.03 \)

15. \( 10 = z + 15 \)  
    \( z = -5 \)

16. \( c - 5.3 = -6.4 \)  
    \( c = -1.1 \)

17. \( 35 + p = 77 \)  
    \( p = 42 \)

18. \( -15 = -15 + u \)  
    \( u = 0 \)

For Exercises 19 and 20, write an equation. Then solve the equation.

19. **CAFFEINE** A cup of brewed tea has 54 milligrams less caffeine than a cup of brewed coffee. If a cup of tea has 66 milligrams of caffeine, how much caffeine is in a cup of coffee?
   \( c - 54 = 66; c = 120; \) A cup of coffee has 120 milligrams of caffeine.

20. **GEOMETRY** The sum of the measures of the angles of a trapezoid is 360°. Find the missing measure.
   \[ \theta + 100° + 110° + 80° = 360°; \]
   \[ \theta = 70° \]

---

**ANIMALS** For Exercises 1–4, use the table.

<table>
<thead>
<tr>
<th>Average Lifespans of Animals</th>
<th>Animal</th>
<th>Lifespan (yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Black Bear</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Dog</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Giraffe</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Gray Squirrel</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Guinea Pig</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Puma</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Tiger</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Zebra</td>
<td>?</td>
</tr>
</tbody>
</table>

1. The lifespan of a black bear is 3 years longer than the lifespan of a zebra. Write an addition equation that you could use to find the lifespan of a zebra.
   \( z + 3 = 18 \)
   \( 15 \text{ yr} \)

2. Solve the equation you wrote in Exercise 1. What is the lifespan of a zebra?
   \( 15 \text{ yr} \)

3. The lifespan of a guinea pig is 8 years shorter than the lifespan of a puma. Write a subtraction equation that you could use to find the lifespan of a puma.
   \( p - 8 = 4 \)
   \( 12 \text{ yr} \)

4. Solve the equation you wrote in Exercise 3. What is the lifespan of a puma?
   \( 12 \text{ yr} \)

5. **TECHNOLOGY** A survey of teens showed that teens in Pittsburgh aged 12-17 spend 14.2 hours per week online. Write and solve an addition equation to find the difference in time spent online by teens in these cities.
   \( 14.2 + d = 15.8; \)
   \( 1.6 \text{ hours per week} \)

6. **SPORTS** Annika Sorenstam won the 2006 MasterCard Classic with a final score of 8 under par, or −8. Her scores for the first two of the three rounds were −5 and −1. What was Ms. Sorenstam’s score for the third round?
   \( −2 \)
This figure is called a hexa-maze because each cell has the shape of a hexagon, or six-sided figure.

To solve the maze, start with the number in the center. This number is the solution to the equation in one of the adjacent cells. Move to that cell. The number in the new cell will then be the solution to the equation in the next cell. At each move, you may only move to an adjacent cell. Each cell is used only once.

**Example 1**
Solve $k + 0.009 = 8.1$.

Enter: 8.1 \[8.091\]

$So, k = 8.091.$

**Example 2**
Solve $12.346 - 7.29 = y$.

Enter: 12.346 \[19.636\]

$So, y = 19.636.$

**Exercises**

Solve each equation.

1. $k + 0.4 = 13$  
2. $3.7 + y = 9.6$  
3. $b - 50.67 = 84$  
4. $x = 0.82 + 9.1$  
5. $17.5 - m = 12.34$  
6. $3.211 + c = 54$  
7. $64.25 + g = 90.2$  
8. $17.9 - w = 8.7$  
9. $98.7 + n = 100$  
10. $27.91 - 8.2 + v$  
11. $87.7 - 3.001 = r$  
12. $f + 9.0 = 10.001$  
13. $67.1 - d - 67.1$  
14. $345 - j + 121.9$  
15. **CHALLENGE** Each week for eight weeks, Mr. Patel's sales commission increased his previous week's commission by $14.40. In the eighth week, his commission was $336.84. What was his commission eight weeks before this? $221.64$
Lesson 3-3

Solving Multiplication Equations

Get Ready for the Lesson

Complete the Mini Lab at the top of page 142 in your textbook. Write your answers below.

Solve each equation using models or a drawing. Solutions are given.

1. \(3x = 12\)  \[\frac{x}{4}\]
2. \(2x = -8\)
   \[\frac{x}{4}\]

3. \(4x = 20\) \[x = 5\]
4. \(8 = 2x\) \[x = 4\]
5. \(3x = -9\) \[x = -3\]

6. What operation did you use to find each solution? **division**

7. How can you use the coefficient of \(x\) to solve \(8x = 40\)?
   Divide each side by 8.

Read the Lesson

8. Complete each sentence.
   a. To solve \(4x = 36\), divide each side by _______. \[4\]
   b. To solve \(-27 = -3d\), divide each side by _______. \[-3\]
   c. To solve \(15x = -75\), divide each side by _______. \[15\]
   d. To solve \(-8a = 96\), divide each side by _______. \[-8\]

9. Write and solve two different equations that both require you to divide each side by \(-2\) in order to solve. **Sample answer:** \(-2b = 14\), \[b = -7\]; \(26 = -2y\), \[y = -13\]

Remember What You Learned

10. In your own words, define the Division Property of Equality. Describe a real-life situation in which you may need to use the Division Property of Equality. **Sample answer:** When you divide each side of an equation by the same nonzero number, the two sides remain equal. Suppose you have 25 pieces of candy to share amongst 4 friends. This is represented by the equation \(5c = 25\) where \(c = 5\), so you and your 4 friends get 5 pieces of candy each.

Chapter 3 22 Course 2

Answers (Lesson 3-3)
Solve each equation. Check your solution.

1. \( 4e = 16 \) \( e = 4 \)
2. \( 10x = 50 \) \( x = 5 \)
3. \( 42 = 6s \) \( s = 7 \)
4. \( 3e = 45 \) \( e = 15 \)
5. \( 49 = 7y \) \( y = 7 \)
6. \( 11r = 44 \) \( r = 4 \)
7. \( 15a = 60 \) \( a = 4 \)
8. \( 72 = 12c \) \( c = 6 \)
9. \( 18x = 182 \) \( x = 10.11 \)
10. \( 14d = 154 \) \( d = 11 \)
11. \( 24z = 288 \) \( z = 12 \)
12. \( 16v = 256 \) \( v = 16 \)
13. \( -56 = 40 \) \( m = -9 \)
14. \( 32 = -2f \) \( f = -16 \)
15. \( -9e = -63 \) \( e = 7 \)
16. \( 4y = -52 \) \( y = -13 \)
17. \( -5x = -85 \) \( x = 17 \)
18. \( -63 = 7a \) \( a = -9 \)
19. \( 0.6m = 1.8 \) \( m = 3 \)
20. \( 1.5z = 6 \) \( z = 4 \)
21. \( 0.6y = 3.6 \) \( y = 6 \)
22. \( 1.8x = 0.9 \) \( x = 0.5 \)
23. \( 1.2r = 4.8 \) \( r = 4 \)
24. \( 2.4 = 0.2t \) \( t = 12 \)

For Exercises 19 and 20, write an equation. Then solve the equation.

19. TRAVEL A cheetah can travel at an amazing speed of 32 meters per second when chasing its prey. At that rate, how long would it take the cheetah to run 2,000 meters?
   \[ 2,000 = 32t; t = 62.5; \text{ It would take the cheetah 62.5 seconds to run 2000 meters.} \]

20. AUTO LOAN Mrs. Kim borrowed $1,350 to buy a used automobile. If she repays $75 a month, how many months will it take to pay back the loan?
   \[ 75m = 1,350; m = 18; \text{ It will take Mrs. Kim 18 months to repay the loan.} \]
3-3 Enrichment

Direct Variation

Equations of the form \( y = ax \) and \( y = x + a \) can be used to show how one quantity varies with another. Here are two examples.

Driving at a speed of 50 miles per hour, the distance you travel \( d \) varies directly with the time you are on the road \( t \). The longer you drive, the farther you get.

\[ d = 50t \]

It is also the case that the time \( t \) varies directly with the distance \( d \). The farther you drive, the more time it takes.

Complete the equation for each situation. Then describe the relationship in words.

1. If you go on a diet and lose 2 pounds a month, after a certain number of months \( m \), you will have lost \( p \) pounds. The longer you diet, the more weight you will lose.

\[ p = 2m \]

2. You and your family are deciding between two different places for your summer vacation. You plan to travel by car and estimate you will average 55 miles per hour. The distance traveled \( d \) will result in a travel time of \( t \) hours. The farther you drive, the more time it will take.

\[ t = \frac{d}{55} \]

3. You find that you are spending more than you had planned on renting video movies. It costs $2.00 to rent each movie. You can use the total amount spent \( a \) to find the number of movies you have rented \( m \). The greater the amount spent, the more movies rented.

\[ m = \frac{a}{2} \]

4. You spend $30 a month to take the bus to school. After a certain number of months \( m \), you will have spent a total of dollars \( d \) on transportation to school. The longer you ride the bus, the more you will spend.

\[ d = 30m \]

5. You are saving money for some new athletic equipment and have 12 weeks before the season starts. The amount you need to save each week \( s \) will depend on the cost \( c \) of the equipment you want to buy. The more expensive the equipment, the more money must be saved each week.

\[ s = \frac{c}{12} \]
Solve. Use the work backward strategy.

1. **GOVERNMENT** There are 99 members in the Ohio House of Representatives. All of them were present when a vote was taken on a piece of legislation. If 6 of them did not vote, and 13 more voted “yes” than voted “no”, how many “no” votes were there?
   
   There were 40 “no” votes.

2. **MONEY** Jessie and Amar eat lunch at a restaurant and their bill is $21.65. Amar gives the cashier a coupon for $6 off their bill, and also hands the cashier two bills. If he receives $4.35 in change, what were the denominations of the two bills he gave the cashier?
   
   They were both ten dollar bills.

3. **AGE** Justine is 13 years younger than her uncle Stewart. Stewart is 18 years older than Justine’s sister, Julia. Julia’s mother is 8 year older than Stewart, and 28 years older than her youngest child, Jared. If Jared is 12 years old, how old is Justine?
   
   Justine is 19 years old.

4. **NUMBER THEORY** A number is divided by 6. Then 7 is added to the divisor. After dividing by 4, the result is 4. What is the number?
   
   54

5. **COMPACT DISCS** Carmella borrowed half as many CDs from the library as her friend Ariel. Ariel borrowed 2 more than Juan, but four less than Sierra. Sierra borrowed 12 CDs. How many did each person borrow?
   
   Ariel 8 CDs
   Juan 5 CDs
   Carmella 4 CDs

6. **TIME** Ashish needs to leave for the bus stop 15 minutes earlier than his friend Rami. Rami leaves five minutes later than Susan, but 10 minutes earlier than Raphael. If Raphael leaves for the bus stop at 8:15, what time does Ashish need to leave?
   
   Ashish needs to leave at 7:50.
Problem-Solving Investigation: Work Backward

1. NUMBER THEORY A number is divided by 5. Then 3 is added to the quotient. After subtracting 10, the result is 30. What is the number? The number is 185.

2. COUPONS Kendra used 35 cents more in coupons at the store than Leanne. Leanne used 75 cents less than Teresa, who used 50 cents more than Jaclyn. Jaclyn used 40 cents in coupons. What was the value of the coupons Kendra used? Kendra used 50 cents in coupons.

Use any strategy to solve Exercises 3–6. Some strategies are shown below.

**Problem-Solving Strategies**
- Look for a pattern
- Guess and check
- Work backward

3. PATTERNS What are the next three numbers in the following pattern?
   - 2, 3, 5, 9, 17, 33, ...
   - 65, 129, and 257

4. AGES Mr. Gilliam is 3 years younger than his wife. The sum of their ages is 95. How old is Mr. Gilliam? Mr. Gilliam is 46 years old.

5. GRAND CANYON The elevation of the North Rim of the Grand Canyon is 2,438 meters above sea level. The South Rim averages 304 meters lower than the North Rim. What is the elevation of the South Rim? The South Rim averages 2,134 meters above sea level.

6. WATER BILL The water company charges a residential customer $41 for the first 3,000 gallons of water used and $1 for every 200 gallons used over 3,000 gallons. If the water bill was $58, how many gallons of water were used? 6,400 gallons

7. NUMBER THEORY How many different two-digit numbers can you make using the numbers 3, 7, 9, and 2 if no digit is repeated within a number? 12

8. PATTERNS The following numbers follow a pattern: 2, 8, 32, 128. What would the fifth number in the pattern be? 512

For Exercises 1–3, use the information below.

**WEATHER** The temperature in Columbus, Ohio on Monday is 35 degrees warmer than it was on Sunday. Saturday's temperature was 7 degrees cooler than Sunday's. At 45 degrees, Friday's temperature was 22 degrees warmer than Saturday's.

For Exercises 4–6, refer to the table below.

**MONEY** Shelly needs to go to the grocery store to get some items for a dinner party she is hosting with her brother Preston.

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Pepper</td>
<td>$1.70</td>
</tr>
<tr>
<td>Flank Steak</td>
<td>$8.54</td>
</tr>
<tr>
<td>Wild Rice</td>
<td>$3.20</td>
</tr>
<tr>
<td>Romaine Lettuce</td>
<td>$2.70</td>
</tr>
<tr>
<td>Cucumber</td>
<td>$0.99</td>
</tr>
</tbody>
</table>

1. What was the temperature on Monday? 65 degrees.
2. Estimate the average temperature for the time period from Saturday to Monday. The average temperature from Saturday to Monday is about 39 degrees.
3. How many degrees cooler was the temperature on Friday than Monday? 20 degrees.
4. How much money should she take to purchase the items contained in the table? $18.40
5. If Shelly has $24.00 in her purse before she goes to the store, how much will she have left after she shops? $5.60
6. If Preston pays Shelly for half the cost of the groceries, how much does he pay? $9.20
Lesson Reading Guide

Solving Two-Step Equations

Get Ready for the Lesson

Complete the Mini Lab at the top of page 151 in your textbook. Write your answers below.

Read the Lesson

4. Describe in words each step shown for solving the equation.
   \[12 + 7x = -9\]
   \[12 + 7x = -9\] Write the equation.
   \[-12 = -12\] Subtract 12 from each side.
   \[7x = -21\] Simplify.
   \[x = -3\] Divide each side by 7.

5. Number the steps in the correct order for solving the equation.
   \[2x + 1 = 5\]
   \[2x + 1 = 5\] 2
   \[2x = 4\] 3
   \[x = 2\] 1

Read the Lesson

2. Subtract 11 from each side.
   \[7 - 11 = -4\] Simplify.

3. Check the solution.

Remember What You Learned

7. In your own words, describe the steps necessary to solve a two-step equation. Will these steps work for all two-step equations?

   See students' work.

Solving Two-Step Equations

To solve two-step equations, you need to add or subtract first. Then divide to solve the equation.

Example 1

\[7v - 3 = 25\] Check your solution.

\[7v - 3 = 25\] Write the original equation.
\[7v = 28\] Subtract 3 from each side.
\[v = 4\] Divide each side by 7.
\[v = 4\] Simplify.

Check \[7v - 3 = 25\] Write the original equation.
\[7(4) - 3 = 25\] Replace \(v\) with 4.
\[26 - 3 = 23\] Multiply.
\[23 = 25\] The solution checks.

The solution is 4.

Example 2

\[-10 = 8 + 3x\] Check your solution.

\[-10 = 8 + 3x\] Write the original equation.
\[-18 = 3x\] Subtract 8 from each side.
\[x = -6\] Divide each side by 3.
\[x = -6\] Simplify.

Check \[-10 = 8 + 3x\] Write the original equation.
\[-10 = 8 + 3(-6)\] Replace \(x\) with -6.
\[-10 = 10\] Multiply.
\[-10 = -10\] The solution checks.

The solution is -6.

Exercises

Solve each equation. Check your solution.

1. \[4y + 1 = 13\]
   \[y = 3\] correct
   \[y = 13\] correct
2. \[6x + 2 = 26\]
3. \[-3 = 5k + 7\]
4. \[6x + 4 = -26\]
5. \[-3 = -3k - 2\]
6. \[-6y + 3 = -29\]
7. \[-5 = -5k - 5\]
8. \[-9x + 12 = -24\]
9. \[11 + 7n = 40\]
10. \[35 - 7 + 4b = 15\]
11. \[15 + 2p = 9\]
12. \[49 - 16 = 3p\]
13. \[2y = 14\]
14. \[-9x - 10 = 62\]
15. \[30 = 12z - 18\]
16. \[7 + 4y = 7\]
17. \[24 + 9x = -3\]
18. \[30 = 16q + 2\]
19. \[3x - 2.5 = 4.1\]
20. \[9y + 4.8 = 17.4\]
Solve each equation. Check your solution.

1. $2x + 1 = 9$
   
2. $5x + 2 = 17$

3. $3w + 5 = 23$

4. $8x + 1 = 25$

5. $4y - 2 = 14$

6. $7x - 3 = 32$

7. $8x - 1 = 63$

8. $2x - 5 = 15$

9. $3 + 6v = 45$

10. $9 + 4v = 17$

11. $2p + 14 = 0$

12. $3y + 10 = -2$

13. $3w + 5 = 2$

14. $8x + 7 = -9$

15. $5d - 1 = -11$

16. $4d - 35 = -3$

17. $11x - 24 = -2$

18. $15a - 54 = -9$

19. $3y - 49 = -7$

20. $-2x - 4 = -8$

21. $-9d - 1 = 17$

22. $-4d + 1 = 13$

23. $-5b + 24 = -1$

24. $-6b + 4 = -2$

13. **Kittens:** Kittens weigh about 100 grams when born and gain 7 to 15 grams per day. If a kitten weighed 100 grams at birth and gained 8 grams per day, in how many days will the kitten triple its weight?

   $100 + 8d = 300; d = 25$; The kitten will triple its weight in 25 days.

14. **Temperature:** Room temperature ranges from 20°C to 25°C. Find the range of room temperature in °F. Use the formula, $F = \frac{9}{5}C + 32$, to convert from the Celsius scale to the Fahrenheit scale.

   $F - 32 = 1.8(20); °F = 68$;
   $F - 32 = 1.8(25); °F = 77$;
   Room temperature ranges from 68°F to 77°F.
3-5

Word Problem Practice

Solving Two-Step Equations

1. GOLF It costs $12 to attend a golf clinic with a local pro. Buckets of balls for practice during the clinic cost $3 each. How many buckets can you buy at the clinic if you have $30 to spend? **6 buckets**

2. MONEY Paulo has $145 in his savings account. He earns $36 a week mowing lawns. If Paulo saves all of his earnings, after how many weeks will he have $433 saved? **8 wk**

3. RETAIL An online retailer charges $6.99 plus $0.55 per pound to ship electronics purchases. How many pounds is a DVD player for which the shipping charge is $11.94? **9 lb**

4. MONEY Caitlin has a $10 gift certificate to the music store. She has chosen a number of CDs from the $7 bargain bin. If the cost of the CDs is $32 after the gift certificate is credited, how many CDs did Caitlin buy? **6 CDs**

5. EMPLOYMENT Mrs. Jackson earned a $500 bonus for signing a one-year contract to work as a nurse. Her salary is $22 per hour. If her first week's check including the bonus is $1,204, how many hours did Mrs. Jackson work? **32 h**

6. PHOTOGRAPHY Morgan subscribes to a website for processing her digital pictures. The subscription is $5.95 per month and 4 by 6 inch prints are $0.19 each. How many prints did Morgan purchase if the charge for January was $15.83? **52 prints**

Equations with Like Terms

Some equations contain two or more expressions that are called like terms. For example, in the equation $3a + 2a + 4 = 14$, the expressions $3a$ and $2a$ are like terms. When you see like terms, you can combine them into one expression.

$$3a + 2a + 4 = 14$$

Combine like terms.

$$5a + 4 = 14$$

$$5a = 10$$

$$a = 2$$

Solve each equation. Then locate the solution on the number line below. Place the letter corresponding to the answer on the line at the right of the exercise.

1. $3x + 4x + 3 = -39$ **F**
2. $-3x - 2 + 5x = 12$ **A**
3. $-5 - 4x + 7x = 1$ **C**
4. $-\frac{1}{2}x + 6x - 2 = 20$ **T**
5. $-2.4x + 1.2 + 1.2x = 4.8$ **O**
6. $\frac{1}{2}(6 - x) = -1$ **R**
7. $1 = -\frac{1}{4}x + 5 + \frac{3}{4}x$ **I**
8. $7x + (-2x) + x = -42$ **A**
9. $\frac{2}{5}(5x + 5x) = -20$ **L**
Lesson Reading Guide

Measurement: Perimeter and Area

Get Ready for the Lesson

Read the introduction at the top of page 156 in your textbook.

Write your answers below.

1. If the students run around the gym 5 times, how far would they run?
   2,180 feet.

2. Explain how you can use both multiplication and addition to find the distance. Multiply 107 \times 2 and 111 \times 2. Add the two products together. Multiply the sum by 5.

3. Explain in your own words what the formula \( P = 2l + 2w \) means?
   Answers may vary; you double both the length and width of the figure and add the results together.

4. How is the perimeter of a figure different from the area of the figure?
   Sample answer: The perimeter is the distance around the figure. The area is the measure of the surface that is inside the figure.

5. Explain how to find the perimeter and area of a rectangle whose length is 8 feet and whose width is 2 feet. Sample answer: To find the perimeter, add two times the length and two times the width (20 ft). To find the area, multiply length times width (16 ft^2).

Remember What You Learned

6. The word perimeter comes from two Greek words that mean “a measure (metron) around (peri).” Tell how you can find the perimeter of a rectangle. Sample answer: The perimeter is the sum of twice the length and twice the width, or \( 2l + 2w \). It is the measure around the rectangle.

Study Guide and Intervention

Measurement: Perimeter and Area

The distance around a geometric figure is called the perimeter.

To find the perimeter of any geometric figure, you can use addition or a formula.

The perimeter of a rectangle is twice the length \( l \) plus twice the width \( w \).

\[ P = 2l + 2w \]

Example 1

Find the perimeter of the figure at right.

\[ P = 105 + 105 + 35 + 35 = 280 \text{ or } 280 \text{ inches} \]

The perimeter is 280 inches.

Example 2

Find the area of the rectangle.

\[ A = l \cdot w \]

\[ A = 24 \cdot 12 = 288 \text{ or } 288 \text{ square centimeters} \]

The area is 288 square centimeters.

Exercises

Find the perimeter of each figure.

1. \[ \text{33 cm} \]

2. \[ 80 \text{ cm} \]

3. \[ 112 \text{ m} \]

Find the perimeter and area of each rectangle.

4. \[ 26 \text{ ft}; 36 \text{ ft}^2 \]

5. \[ \ell = 8 \text{ ft}, w = 5 \text{ ft} \]

6. \[ \ell = 3.5 \text{ m}, w = 2 \text{ m} \]

7. \[ \ell = 8 \text{ yd}, w = 4\frac{1}{3} \text{ yd} \]

8. \[ \ell = 29 \text{ cm}, w = 7.3 \text{ cm} \]

\[ 24\frac{2}{3} \text{ yd}; 34\frac{2}{3} \text{ yd}^2 \]

\[ 72.6 \text{ cm}; 211.7 \text{ cm}^2 \]
3-6 Skills Practice

Measurement: Perimeter and Area

Find the perimeter of each figure.
1. 92 cm
2. 36 m
3. 38 yd
4. 220 in

Find the perimeter and area of each rectangle.
5. 40 yd; 78 yd²
6. 80 cm; 400 cm²
7. 72 m; 180 m²

Find the perimeter of each rectangle.
1. 15 m
2. 2.9 mi
3. 1 yd

Find the area of each rectangle.
1. 286 in²
2. 64.6 ft²
3. 120 cm²

Find the missing side.
7. \( P = 83.4 \text{ km}, \ell = 27.8 \text{ km} \)
8. \( A = 337.68 \text{ yd}², w = 60.3 \text{ yd} \)

Lawn Care

For Exercises 9 and 10, use the following information.
Yuri’s dad needs to fertilize the grass in the yard. The back yard measures 55 feet by 30 feet, while the front yard is a square with a length of 42 feet on each side.

9. Yuri’s dad wants to rope off the two areas to keep people from disturbing the lawn after he fertilizes the grass. How much rope will he need to go around both areas? 338 feet of rope

10. If a bag of fertilizer covers 600 square feet of lawn, how many bags of fertilizer will Yuri’s dad need to fertilize the front and back yards?

6 bags of fertilizer
Chapter 3

Enrichment

Perimeter and Area

Two shapes can have the same area and different perimeters. Each of these shapes has an area of 16 square units, but their perimeters are different.

Among rectangles that have an area of 16 square feet, rectangles that are long and thin have the greatest perimeter. Rectangles with the least perimeter are more closely shaped to a square.

The grid shows the basic floor plan of the Smith’s house.

1. Which of the rectangular bedrooms has the greater perimeter? What is another dimension that will create a rectangle with the same area?

2. Lisa's bedroom has an irregular shape. How does the area of her bedroom compare to the other two bedrooms? How does the perimeter of her bedroom compare to the other two bedrooms?

3. The Smith’s are moving to a new house. Design two different floor plans for them from which they may choose. Your floor plans must have five rooms including three bedrooms. Each bedroom must have an area of 162 square feet (18 squares) but not the same perimeters. You may add any other features to the house that you want. See students’ work.
Lesson Reading Guide

Functions and Graphs

Get Ready for the Lesson
Read the introduction at the top of page 163 in your textbook.
Write your answers below.

1. Complete the function table for the total cost of admission.

<table>
<thead>
<tr>
<th>Number of Members</th>
<th>15m</th>
<th>Total Cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15(1)</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>15(2)</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>15(3)</td>
<td>45</td>
</tr>
<tr>
<td>4</td>
<td>15(4)</td>
<td>60</td>
</tr>
<tr>
<td>5</td>
<td>15(5)</td>
<td>75</td>
</tr>
<tr>
<td>6</td>
<td>15(6)</td>
<td>90</td>
</tr>
</tbody>
</table>

2. Graph the ordered pairs (number of members, total cost).

3. Describe how the points appear on the graph. They appear to fall in a straight line.

Read the Lesson
4. Complete each function table.

a. \[ x \quad 2x - 1 \quad y \]
   -1 2(-1) -1 -3
   0 2(0) -1 -1
   1 2(1) -1 1

b. \[ x \quad 4x \quad y \]
   -1 4(-1) -4
   0 4(0) 0
   1 4(1) 4

5. Graph the functions in Exercise 4 above.

Remember What You Learned
6. Draw a picture of a “machine” that shows how a function works. Your picture should illustrate input, a function rule, and output. See students’ work.
The solution of an equation with two variables consists of two numbers, one for each variable, that make the equation true. The solution is usually written as an ordered pair \((x, y)\), which can be graphed. If the graph for an equation is a straight line, then the equation is a linear equation.

### Example 1
Graph \(y = 3x - 2\).

Select any four values for the input \(x\). We chose 3, 2, 0, and -1. Substitute these values for \(x\) to find the output \(y\).

<table>
<thead>
<tr>
<th>(x)</th>
<th>(3x - 2)</th>
<th>(y)</th>
<th>((x, y))</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>4</td>
<td>(2, 4)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>(1, 1)</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>-2</td>
<td>(0, -2)</td>
<td></td>
</tr>
<tr>
<td>-1</td>
<td>-5</td>
<td>(-1, -5)</td>
<td></td>
</tr>
</tbody>
</table>

Four solutions are (2, 4), (1, 1), (0, -2), and (-1, -5).

The graph is shown at the right.

### Exercises
Graph each equation.

1. \(y = x - 1\)
2. \(y = x + 2\)
3. \(y = -x\)
4. \(y = 4x\)
5. \(y = 2x + 4\)
6. \(y = 2x\)
7. \(y = x - 2\)
8. \(y = x + 4\)
9. \(y = -3x\)
10. \(y = 2x\)
11. \(y = 2x + 2\)
12. \(y = 3x - 2\)
13. \(y = 0.75x\)
14. \(y = 0.5x + 1\)
15. \(y = 2x - 0.5\)
Word Problem Practice

3-7 Functions and Graphs

1. TECHNOLOGY The fee for your pager service is $22 per month. Make a function table that shows your total charge for 1, 2, 3, and 4 months of service.

<table>
<thead>
<tr>
<th>x, Months</th>
<th>y, Total Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>22</td>
</tr>
<tr>
<td>2</td>
<td>44</td>
</tr>
<tr>
<td>3</td>
<td>66</td>
</tr>
<tr>
<td>4</td>
<td>88</td>
</tr>
</tbody>
</table>

2. TECHNOLOGY Use the information in Exercise 1 to write an equation in which \( x \) represents the number of months and \( y \) represents the total charge. Then graph the equation. \( y = 22x \)

3. TRAINS Between Hiroshima and Kokura, Japan, the bullet train averages a speed of 164 miles per hour, which is the fastest scheduled train service in the world. Make a function table that shows the distance traveled at that speed in 1, 2, 3, and 4 hours.

<table>
<thead>
<tr>
<th>x, Hours</th>
<th>y, Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>164</td>
</tr>
<tr>
<td>2</td>
<td>328</td>
</tr>
<tr>
<td>3</td>
<td>492</td>
</tr>
<tr>
<td>4</td>
<td>656</td>
</tr>
</tbody>
</table>

4. TRAINS Use the information in Exercise 3 to write an equation in which \( x \) represents the number of hours and \( y \) represents the distance. Then graph the equation. \( y = 164x \)

5. GEOMETRY The formula for the volume of a rectangular prism whose base has an area of 8 square units is \( V = 8h \), where \( V \) is the volume and \( h \) is the height. Graph the function.

6. ANIMALS The fastest insect in the world is the dragonfly with a top speed of 36 miles per hour. Write an equation using \( x \) to represent hours and \( y \) to represent distance. Then graph the equation. \( y = 36x \)
Fundraising for Charity

Jacqui is leading a fund-raising group for a charity. The group is going to make buttons and sell them at a counter for $6.00 each. Their goal is to raise $1000. Jacqui creates a table to predict their earnings.

1. Complete the table showing how much money will be raised based on the number of buttons sold.

<table>
<thead>
<tr>
<th>Buttons Sold</th>
<th>Money Raised</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>$60</td>
</tr>
<tr>
<td>12</td>
<td>$72</td>
</tr>
<tr>
<td>14</td>
<td>$84</td>
</tr>
<tr>
<td>16</td>
<td>$96</td>
</tr>
</tbody>
</table>

2. Make a line graph representing the functions from Jacqui’s table.

3. At this rate, how many buttons does Jacqui’s group need to sell to raise $1000? 167 buttons

4. Write an equation that relates the amount of money raised if there is a $50 counter fee. $y = 6x - 50$

5. If the group calculates in the $50 counter fee, how many buttons do they need to sell in order to raise their goal of $1000? 175 buttons

Exercises

Example 1
Suppose you have $25 saved and you earn $10 for mowing a neighbor’s lawn. Suppose you save all the money you earn. How much money would you have after mowing the lawn 5 times? 20 times? Write an equation in which $x$ is the number of lawns you mow and $y$ is the total amount of money you have saved. Make a table where $x$ has the values 0 through 20. Graph the function. Sketch the graph and mark the points (0, 25), (5, 75), and (20, 225) with their coordinates. Describe what each point means in terms of lawns mowed and dollars saved.

The equation is $y = 25 + 10x$.

Step 1 Enter the equation.

Step 2 Set up the table. View the table and answer the questions.

<table>
<thead>
<tr>
<th>Buttons Sold</th>
<th>Money Raised</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>25</td>
</tr>
<tr>
<td>5</td>
<td>75</td>
</tr>
<tr>
<td>10</td>
<td>125</td>
</tr>
<tr>
<td>15</td>
<td>175</td>
</tr>
</tbody>
</table>

Step 3 Turn off any other plots. View the graph.

Step 4 Explore the graph using the TRACE feature.

The point (0, 25) represents 0 lawns mowed and $25 saved. (5, 75) is 5 lawns mowed and $75 saved. (10, 125) is 10 lawns mowed and $125 saved.

Create a table. Graph the function. Sketch the graph and label three points with their coordinates. Describe what the points represent in terms of classrooms and students.

Suppose each classroom has 28 students. The number of students in the whole school is given by the function $y = 28x$, where $x$ represents the number of classrooms. The number of classrooms could be 1 up to 18. How many students are in a school with 9 classrooms? 15 classrooms?

See students’ work for graph; 9 = 252 students; 15 = 420 students.
Chapter 3 Assessment Answer Key

Quiz 1 (Lessons 3-1 and 3-2)
Page 55
1. _______ 4n _______
2. _______ b − 6 _______
3. _______ n ÷ 14 _______
4. _______ d + 10 = 35 _______
5. _______ 17 − n = 23 _______
6. _______ 40 ÷ n = 8 _______
7. _______ −2 _______
8. _______ −20 _______
9. _______ 12 _______
10. _______ C _______

Quiz 2 (Lessons 3-3 and 3-4)
Page 55
1. _______ −4 _______
2. _______ 5 _______
3. _______ 5 _______
4. _______ −9 _______
5. _______ 5 _______

Quiz 3 (Lessons 3-5 and 3-6)
Page 56
1. _______ 2 _______
2. _______ −3 _______
3. _______ 11 _______
4. _______ 40.4 mm; 98.4 mm² _______
5. _______ P = 20 in., A = 9 in² _______

Quiz 4 (Lesson 3-7)
Page 56
1. _______ _______
2. _______ _______
3. _______ _______
4. _______ F _______
5. _______ B _______

Mid-Chapter Test
Page 57
1. _______ C _______
2. _______ G _______
3. _______ C _______
4. _______ F _______
5. _______ B _______
6. _______ J _______
7. _______ D _______
8. _______ H _______
9. _______ 6 weeks _______
10. _______ ℓ + 5 _______
11. _______ n ÷ (−7) _______
12. _______ 6 − q _______
13. _______ 14n _______
14. _______ n − 7 = 9 _______
15. _______ 8n = −16 _______
### Vocabulary Test

**Chapter 3 Assessment Answer Key**

<table>
<thead>
<tr>
<th>Vocabulary Test</th>
<th>Form 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Page 58</td>
<td>Page 59</td>
</tr>
<tr>
<td></td>
<td>Page 60</td>
</tr>
</tbody>
</table>

1. each side of the equation
2. Subtraction Property of Equality
3. two-step equation
4. area
5. subtraction
6. \( r \)
7. 10
8. \( 2h \)
9. linear equation
10. formula

Sample answer: a problem-solving strategy in which you are given a final result and you use that result to find an earlier amount.

11. Sample answer: property that states if you divide each side of an equation by the same nonzero number, the two sides of the equation remain equal.
12. \( G \)

13. \( B \)
14. \( G \)
15. \( C \)
16. \( F \)
17. \( B \)
18. \( G \)
19. \( C \)
20. \( F \)

B: 4
Chapter 3 Assessment Answer Key

Form 2A
Page 61

1. B
2. H
3. B
4. J
5. A
6. G
7. A
8. G
9. D
10. F

13. B

16. F

19. B

20. G

y₂: the y-values are increasing faster.

Form 2B
Page 63

1. B
14. F
15. B
16. F
17. A
18. F
19. B
20. J

13. C

11. B

12. J

y₂: the y-values are increasing faster.

B: ______ faster.

Chapter 3

A25

Course 2
Chapter 3 Assessment Answer Key

Form 2C
Page 65

1. $-16$
2. $12$
3. $-19$
4. $48$
5. $\$1,075$

6. $\$90$
7. $8$
8. $-5$
9. $-17$
10. $-4$
11. $23$

12. $h + 7$
13. $n - 16$
14. $9p$
15. $n \div 12$

16. $s + 5 = 26$
17. $12n = 42$
18. $n - 19 = -28$
19. $p + 21 = 40$

B: $50$ yd

Page 66

20. $85.2$ cm

21. $18$ ft; $18$ ft$^2$

22. $2.5$ m

23. [Graph]

24. [Graph]

25. [Graph]
Chapter 3 Assessment Answer Key

Form 2D
Page 67

1. _______  -21 _______
2. _______  4 _______
3. _______  -17 _______
4. _______  41 _______
5. _______  56 boxes _______

6. _______  $150 _______
7. _______  9 _______
8. _______  8 _______
9. _______  -16 _______
10. _______  -13 _______
11. _______  6 _______

12. _______  $p + 11 _______
13. _______  $n - 18 _______
14. _______  $5w _______
15. _______  $n ÷ 17 _______

16. _______  $t + 9 = 31 _______
17. _______  $18n = 25 _______
18. _______  $n - 14 = -8 _______
19. _______  $t + 11 = 22 _______

Page 68

20. _______  83.4 cm _______

21. _______  26 ft; 40 ft$^2$ _______

22. _______  7.5 ft _______

23. _______  

24. _______  

25. _______  

B: _______  90 ft _______
Chapter 3 Assessment Answer Key

Form 3
Page 69

1. \(-107\)
2. \(-22\)
3. \(55\)
4. \(12.3\)
5. 4 pitchers
6. \($300\)
7. \(4\)
8. \(-2.5\)
9. \(-5.1\)
10. \(-2\)
11. \(1.1\)
12. \(4h\)
13. \(n + 17\)
14. \(f – 12\)
15. \(q \div 3.4\)
16. \(-7n = 42\)
17. \(8n = -33.2\)
18. \(n + 1 = 57.5\)
19. \(n – 13 = 63\)

Page 70

20. \(4.68\) m
21. \(14.5\) ft; \(12.375\) ft²
22. \(6.25\) ft
23. [Graph of linear relationship]
24. [Graph of linear relationship]
25. [Graph of linear relationship]

B: \(y_2\): The \(y\)-values are changing faster.
# Chapter 3 Assessment Answer Key

## Extended-Response Test, Page 71

### Scoring Rubric

<table>
<thead>
<tr>
<th>Level</th>
<th>Specific Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>The student demonstrates a <strong>thorough understanding</strong> 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.</td>
</tr>
<tr>
<td>3</td>
<td>The student demonstrates an <strong>understanding</strong> 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.</td>
</tr>
<tr>
<td>2</td>
<td>The student has demonstrated only a <strong>partial understanding</strong> 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.</td>
</tr>
<tr>
<td>1</td>
<td>The student has demonstrated a <strong>very limited understanding</strong> 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.</td>
</tr>
<tr>
<td>0</td>
<td>The student has provided a <strong>completely incorrect</strong> solution or uninterpretable response, or no response at all.</td>
</tr>
</tbody>
</table>
Chapter 3 Assessment Answer Key

Extended-Response Test, Page 71

Sample Answers

In addition to the scoring rubric found on page A29, the following sample answers may be used as guidance in evaluating extended response assessment items.

1. a. The distance \(d\) between the two cities is 1,058 miles. The round-trip distance will be twice that. So, the total number of miles \(t\) is \(2d = t;\)

\[ t = 2,116 \text{ miles}. \]

b. The Ortiz’s car gets 20 miles per gallon. Therefore, the number of gallons \(g\) needed is \(t \div 20 = g;\)

\[ g = 2,116 \div 20 = 105.8 \text{ gallons}. \]

c. The average price for gas is $2.89 per gallon. The total cost \(c\) for gas is

\[ c = 2.89g; c = 305.76. \]

d. The Ortiz’s spend $305.76 on gas, drive 2,116 miles, and know they get 20 miles per gallon gas mileage. Total miles \(t \div 20 = g\) (the number of gallons needed). Therefore, \(g = 105.8\) gallons. The total cost \(c = 305.76.\)

Divided by the number of gallons, 105.8, the price per gallon

\[ p = 305.76 \div 105.8 \text{ gallons}; \]

\[ p = 2.89. \]

2. Square; area of rectangle = 32 in\(^2\);

square has sides 6 in. long, so area of square = 36 in\(^2\).

3. a. The number of students to sign up equals 25 students times the number of inches of snow.

\[ 25 \times 0 = 0 \]

\[ 25 \times 1 = 25 \]

\[ 25 \times 2 = 50 \]

\[ 25 \times 3 = 75 \]

b. Let \(x\) represent the number of inches and \(y\) represent the total number of students; \(25x = y.\)

d. Based on the table above, four solutions of the equation \(25x = y\) are

\( (0, 0), (1, 25), (2, 50), \) and \( (3, 75). \)

\[ y \]

\[ x \]

\[ 0 \]

\[ 1 \]

\[ 2 \]

\[ 3 \]
Chapter 3 Assessment Answer Key

Standardized Test Practice

Page 72

1. ● ● ● ●

2. ● ● ● ●

3. ● ● ● ●

4. ● ● ● ●

5. ● ● ● ●

6. ● ● ● ●

7. ● ● ● ●

8. ● ● ● ●

9. ● ● ● ●

10. ● ● ● ●

Page 73

11. ● ● ● ●

12. ● ● ● ●

13. ● ● ● ●

14. ● ● ● ●

15. ● ● ● ●

16. ● ● ● ●

17. ● ● ● ●

18. ● ● ● ●
Chapter 3 Assessment Answer Key

Standardized Test Practice
Page 74

19. $96

20. $96

21. 

22. $96

23. $96

24. a. 

<table>
<thead>
<tr>
<th>Number of Tickets</th>
<th>Total Cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9.50</td>
</tr>
<tr>
<td>2</td>
<td>19.00</td>
</tr>
<tr>
<td>3</td>
<td>28.50</td>
</tr>
<tr>
<td>4</td>
<td>38.00</td>
</tr>
</tbody>
</table>

b. 

c. \( C = 9.5n \)
Chapter 3 Assessment Answer Key

Unit 1 Test
Page 75
1. ______ 15 ______
2. ______ -2000 ______
3. ______ A ______
4. ______ 4 ______
5. ______ > ______
6. ______ < ______
7. ______ -18, -12, -8, 0, 3, 12 ______
8. ______ (2, -3); IV ______
9. ______ (-3, 0); x-axis ______
10. ______ 10 ______
11. ______ -12 ______
12. ______ -4 ______
13. ______ -10 ______
14. ______ 15 ______
15. ______ -36 ______
16. ______ 20 ______
17. ______ 18 mi ______
18. ______ 68 + (-29); 39 ______

Page 76
19. ______ h + 3 ______
20. ______ n - 7 = 12 ______
21. ______ 2n + 5 = 19 ______
22. ______ -16 ______
23. ______ 4 ______
24. ______ 16 ______
25. ______ -9 ______
26. ______ -2 ______
27. ______ 2 ______
28. ______ 3 ______
29. ______ 9 ______
30. ______ 220 ______
31. ______ 45.8 cm ______
32. ______ 177 ft; 1740.5 ft^2 ______
33. ______

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