

1-1**A Plan for Problem Solving** (pages 6–9)

You can use a four-step plan to solve a problem.

Explore	Read the problem carefully. Ask yourself questions like, “What facts do I know?”
Plan	See how the facts relate to each other. Make a plan for solving the problem. Estimate the answer.
Solve	Use your plan to solve the problem. If your plan does not work, revise it or make a new one.
Examine	Reread the problem. Ask, “Is my answer close to my estimate and does my answer make sense?” If not, solve the problem another way.

EXAMPLE

Efrain wants to buy a used book that costs 99 cents. He has three quarters and four dimes in his pocket. Does he have enough money to buy the book?

Explore	You need to find out if Efrain has enough money to buy the book. With the coins he has, you estimate that he has enough money.
Plan	Multiply the number of quarters he has by 25, and the number of dimes he has by 10. Add the two products to find out how much money he has.
Solve	$3 \times 25 + 4 \times 10 = 115$ cents, and $115 > 99$
Examine	Since Efrain has 115 cents, or \$1.15, he can buy the book.

Try This Together

- Lawanda sells candy bars for \$2 each. How many bars must she sell to raise \$60? *HINT: What must you multiply by \$2 to get a product of \$60?*

PRACTICE

Use the four-step plan to solve each problem.

- Find the next three numbers in the pattern 2, 3, 5, 8, ?, ?, ?.
- Food** Erika is making cookies. The recipe she has makes 20 cookies, but she wants to make 60 cookies. If she needs 2 cups of flour for 20 cookies, how many cups of flour will she need for 60 cookies?



- Standardized Test Practice** Miguel rode his bike to swimming practice and home again every day for 80 days over the summer. The ride was 3 miles to practice and 3 miles back home. Altogether, how many miles did Miguel ride his bike to and from swimming practice?

A 560 miles**B** 240 miles**C** 480 miles**D** 125 miles

Answers: 1. 30 candy bars 2. 12, 17, 28 3. 6 cups 4. C

1-2**Divisibility Patterns** (pages 10–13)

When you divide a whole number by another whole number, and the quotient is a whole number, then the first number is divisible by the second. For example, 12 is divisible by 2 because the quotient $12 \div 2$ is 6. You can test for divisibility mentally by using the divisibility rules below.

Divisibility Rules for 2, 3, 4, 5, 6, 9, 10

A number is divisible by:

- 2 if the ones digit is divisible by 2.
- 3 if the sum of the digits is divisible by 3.
- 4 if the number formed by the last two digits is divisible by 4.
- 5 if the ones digit is 0 or 5.
- 6 if the number is divisible by both 2 and 3.
- 9 if the sum of the digits is divisible by 9.
- 10 if the ones digit is 0.

EXAMPLES

A Is 34 divisible by 2?

The ones digit is 4. Since $4 \div 2 = 2$, 4 is divisible by 2. So, 34 is divisible by 2.

B Is 52 divisible by 3?

The sum of the digits is $5 + 2$, or 7. Since 7 is not divisible by 3, 52 is not divisible by 3.

Try These Together

1. Is 70 divisible by 5?

HINT: Is the ones digit 0 or 5?

2. Is 208 divisible by 9?

HINT: Is the sum of the digits divisible by 9?

PRACTICE

Tell whether the first number is divisible by the second number.

3. 984; 2

4. 533; 4

5. 935; 5

6. 570; 3

7. 2,861; 2

8. 626; 6

9. 5,650; 10

10. 8,844; 6

11. 77,787; 9

Tell whether each number is divisible by 2, 3, 4, 5, 6, 9, or 10.

12. 365

13. 1,170

14. 887

15. 486

16. 620

17. 2,865

18. 350

19. 4,544

20. 51

21. **Design** The fourth grade class at Chavez Elementary School is having a group photo taken. There are 102 students in the fourth grade. Can they form 6 equal rows for the photo?

22. **Standardized Test Practice** Which number is divisible by both 2 and 9?

A 5,148

B 5,618

C 8,364

D 9,782

Answers: 1. yes 2. no 3. yes 4. no 5. yes 6. yes 7. no 8. no 9. yes 10. yes 11. yes 12. 5 13. 2, 3, 5, 6, 9, 10 14. none 15. 2, 3, 6, 9 16. 2, 4, 5, 10 17. 3, 5 18. 2, 5, 10 19. 2, 4 20. 3 21. yes 22. A

1-3

Prime Factors (pages 14–17)

A **composite number** is any whole number greater than one that has more than two factors.

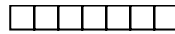
A number with only 2 factors, 1 and the number itself, is a **prime number**. The numbers 0 and 1 are neither prime nor composite.

Every composite number can be expressed as a product of prime numbers. This is called the **prime factorization** of the number. You can use a **factor tree** to find prime factorizations.

EXAMPLES

A Is 7 a prime number?

How many rectangles can you make out of 7 squares?

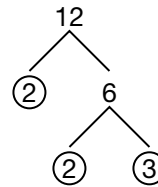


$$1 \times 7$$

Only one rectangle, so the factors of 7 are 1 and 7. Since there are only 2 factors, 7 is a prime number.

B Find the prime factorization of 12.

Use a factor tree.



Factor 12. 12 is divisible by 2. Circle the prime number 2.

Factor 6. 6 is divisible by 2. Circle the prime numbers 2 and 3. The prime factorization is $2 \times 2 \times 3$.

Try These Together

1. Is 22 a prime number?

HINT: Does it have more than 2 factors?

2. Find the prime factorization of 18.

HINT: Use a factor tree to find prime factors.

PRACTICE

Tell whether each number is prime, composite, or neither.

3. 2

4. 11

5. 14

6. 1

7. 84

8. 31

9. 111

10. 0

11. 113

Find the prime factorization of each number.

12. 10

13. 33

14. 87

15. 54

16. 29

17. 34

18. 61

19. 57

20. 112

21. **Entertainment** A cable system has 42 channels. Express 42 as a product of primes.



22. **Standardized Test Practice** What is the least prime number greater than 50?

A 51

B 53

C 57

D 59

Answers: 1. no 2. $2 \times 3 \times 3$ 3. prime 4. prime 5. composite 6. neither 7. composite 8. prime 9. composite 10. neither 11. prime 12. 2×5 13. 3×11 14. 3×29 15. $2 \times 3 \times 3 \times 3$ 16. prime 17. 2×17 18. prime 19. 3×19 20. $2 \times 2 \times 2 \times 7$ 21. $2 \times 2 \times 3 \times 7$ 22. B

1-5

Order of Operations (pages 24–27)

When you have more than one operation, the order of operations tells you which operation to use first.

Order of Operations	<ol style="list-style-type: none"> 1. Simplify the expressions inside grouping symbols, like parentheses. 2. Find the value of all powers. 3. Multiply and divide in order from left to right. 4. Add and subtract in order from left to right.
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EXAMPLES

Find the value of each expression.

A $25 - 2^2 \times 6$

$$\begin{aligned} 25 - 2^2 \times 6 &= 25 - 4 \times 6 && \text{Find } 2^2. \\ &= 25 - 24 && \text{Multiply 4 and 6.} \\ &= 1 && \text{Subtract 24 from 25.} \end{aligned}$$

B $(2 + 10) \div 3$

$$\begin{aligned} (2 + 10) \div 3 &= 12 \div 3 && \text{Add 2 and 10.} \\ &= 4 && \text{Divide 12 by 3.} \end{aligned}$$

Try These Together

Find the value of each expression.

1. $8 - 5 + 13$

HINT: Add and subtract from left to right.

2. $(3^2 + 7) \times 2$

HINT: Simplify within parentheses first.

PRACTICE

Find the value of each expression.

3. $10 - 5 + 3^3$

4. $8 \times 2 - 16$

5. $(15 - 3) \times 2$

6. $(12 + 4) \times 3$

7. $1 + (4 - 3) \times 2^3$

8. $2^2 \times (3 - 1)$

9. $5 \times (5^2 + 5)$

10. $6 \times 10 - (40 + 2)$

11. $24 \div 3 - 6$

12. $50 \div 5 + 15$

13. $27 \div 9 \times 4$

14. $(18 - 3) \times 5$

15. Find the value of $2^2 + 8 \times 3 - 6$.

16. What is the value of 10 times 3 divided by 6?

17. **Money Matters** Cassie makes \$2 for taking out the trash and \$1 for making her bed. If she took out the trash 3 times, and made her bed 2 times, how much money did she make?



18. **Standardized Test Practice** Jackson had 10 baseball cards. He bought 10 more. Then he divided the cards evenly between 5 people. How many baseball cards did each person receive?

A 3

B 6

C 5

D 4

Answers: 1. 16 2. 32 3. 32 4. 0 5. 24 6. 48 7. 9 8. 8 9. 150 10. 18 11. 2 12. 25 13. 12 14. 75 15. 22 16. 5 17. \$8 18. D

1-6**Variables and Expressions** (pages 28–31)

In algebra, **variables**, usually letters, are used to represent numbers.

Algebraic expressions are combinations of variables, numbers, and at least one operation. If you replace variables with numbers, you can **evaluate**, or find the value of, an algebraic expression.

EXAMPLES

Evaluate each expression if $h = 9$.

A $26 - h$

$$\begin{aligned} 26 - h &= 26 - 9 && \text{Replace } h \text{ with } 9. \\ &= 17 && \text{Subtract } 9 \text{ from } 26. \end{aligned}$$

B $4h + 8$

$$\begin{aligned} 4h + 8 &= 4 \times 9 + 8 && \text{Replace } h \text{ with } 9. \\ &= 36 + 8 && \text{Multiply } 4 \text{ by } 9. \\ &= 44 && \text{Add } 36 \text{ and } 8. \end{aligned}$$

Try These Together

Evaluate each expression if $q = 7$ and $r = 4$.

1. $q + r - 1$

HINT: Replace the variables.

2. $3q + r$

HINT: Replace the variables, then multiply first.

PRACTICE

Evaluate each expression if $x = 4$ and $y = 9$.

3. $x + 7$

4. $18 - y$

5. $6x - 10$

6. $6 + y$

7. $2xy$

8. $y \div 1$

9. $x + 3x$

10. $x \times y$

11. $40 \div 5x$

Evaluate each expression if $a = 9$, $b = 18$, and $c = 3$.

12. $b \div 6$

13. $b - c$

14. ca

15. $a + b + c$

16. $ab - c$

17. $54 \div a$

18. $cb + 2a$

19. $b - 2a$

20. $b - 3a \div c$

21. Architecture To find the perimeter of a rectangle, you can use the expression $2\ell + 2w$ where ℓ and w represent the length and width of the rectangle. Find the perimeter of a rectangle with length 4 m and width 7 m.



22. Standardized Test Practice Evaluate $15 - st$ if $s = 2$ and $t = 3$.

A 23

B 10

C 9

D 21

Answers: 1. 10 2. 25 3. 11 4. 9 5. 14 6. 15 7. 72 8. 9 9. 16 10. 36 11. 2 12. 3 13. 15 14. 27 15. 30 16. 159
17. 6 18. 72 19. 0 20. 9 21. 22 m 22. C

1-7**Solving Equations** (pages 34–37)

In mathematics, an **equation** is a sentence that contains an equals sign, =. Equations can be either true or false. An equation with a variable is neither true nor false until the variable is replaced with a number.

$y + 2 = 9$ Replace y with 5. Is $5 + 2 = 9$ a true sentence? $7 = 9$ No, the sentence is false.	$y + 2 = 9$ Replace y with 7. Is $7 + 2 = 9$ a true sentence? $9 = 9$ Yes, the sentence is true. The solution of $y + 2 = 9$ is 7.
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EXAMPLES

A Is $12 - z = 10$ true if $z = 3$?

$$12 - 3 \stackrel{?}{=} 10 \quad \text{Replace } z \text{ with } 3.$$

$$9 = 10 \quad \text{Subtract 3 from 12.}$$

No, the sentence is false.

B Is $3a + 1 = 13$ true if $a = 4$?

$$3 \cdot 4 + 1 \stackrel{?}{=} 13 \quad \text{Replace } a \text{ with } 4.$$

$$12 + 1 \stackrel{?}{=} 13 \quad \text{Multiply 3 by 4.}$$

$$13 = 13 \quad \text{Add 12 and 1.}$$

Yes, the sentence is true. The solution of $3a + 1 = 13$ is 4.

Try These Together

Identify the solution of each equation from the list given.

1. $s + 15 = 19$; 3, 4, 5

HINT: Replace the variable, then evaluate.

2. $n - 7 = 2$; 7, 8, 9

HINT: Replace the variable, then evaluate.

PRACTICE

Tell whether the equation is true or false by replacing the variable with the given value.

3. $75 + s = 120$; $s = 45$

4. $95 \div x = 5$; $x = 17$

5. $y - 22 = 56$; $y = 78$

6. $6m = 48$; $m = 7$

Identify the solution of each equation from the list given.

7. $j + 4 = 21$; 17, 18, 19

8. $b - 77 = 32$; 107, 109, 111

9. $45 = 15r$; 3, 4, 5

10. $27 + w = 45$; 17, 18, 19

Solve each equation mentally.

11. $6 + p = 14$

12. $75 = 3t$

13. $18v = 36$



14. Standardized Test Practice Solve $39 \div s = 3$.

A 3

B 6

C 11


D 13

Answers: 1. 4 2. 9 3. true 4. false 5. true 6. false 7. 17 8. 109 9. 3 10. 18 11. 8 12. 25 13. 2 14. D

1-8

Area of Rectangles (pages 39–41)

The **area** (A) of a closed figure is the number of square units needed to cover its surface. You can use algebra to help you find the area of a rectangle.

Area of a Rectangle	The area of a rectangle is the product of its length ℓ and width w , or $A = \ell \cdot w$.	
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EXAMPLES

A Find the area of a rectangle with a length of 9 cm and a width of 4 cm.
 $A = \ell \cdot w$
 $A = 9 \cdot 4$
 $A = 36$
 $\ell = 9$ and $w = 4$
The area is 36 square centimeters.

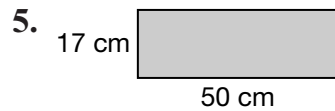
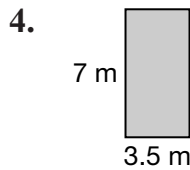
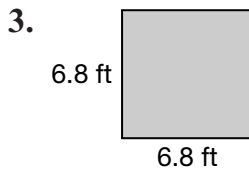
B Find the area of a rectangle with a length of 12 ft and a width of 6 ft.
 $A = \ell \cdot w$
 $A = 12 \cdot 6$
 $A = 72$
 $\ell = 12$ and $w = 6$
The area is 72 square feet.

Try These Together

- Find the area of a rectangle with a length of 8 yd and a width of 5 yd.
HINT: Area of a rectangle is length times width.
- Find the area of a rectangle with a length of 9 m and a width of 7 m.

PRACTICE

Find the area of each figure.



6. square: $s = 7.1$ in.

7. rectangle: $\ell = 33$ ft,
 $w = 70$ ft

8. square: $s = 6.2$ cm

9. square: $s = 12.5$ yd

10. rectangle: $\ell = 5$ m,
 $w = 9$ m

11. rectangle: $\ell = 24$ in.,
 $w = 66$ in.



12. Standardized Test Practice A rectangle is 6 cm long, and its area is 18 cm^2 . What is its width?

A 9 cm

B 6 cm

C 5 cm

D 3 cm

Answers: 1. 40 yd^2 2. 63 m^2 3. 46.24 ft^2 4. 24.5 m^2 5. 850 cm^2 6. 50.41 in^2 7. 2310 ft^2 8. 38.44 cm^2 9. 156.25 yd^2 10. 45 m^2 11. $1,584 \text{ in}^2$ 12. D

1

Chapter 1 Review

Password Search

The Middle School Math Club has just started their Web site. For fun, they put a password on their site. You can find the password using the clues.

Clue 1: Write the second step in the four-step problem solving plan here. Write the first letter of this word in blank 1 in the box at the bottom of the page.

Clue 2: The sixth number of the following pattern.

71, 62, 53, ____, ____, ?

Find the value of each expression. Use the chart to translate each solution to a letter. Write the letter in the blank that matches the number of the clue.

Clue 3: $15 + 8 \div 2 \times 3 - 3$

Clue 4: $a^3 - 5b$ if $a = 3$ and $b = 5$

Clue 5: Use mental math to solve $42 \div w = 7$.

Number	Letter	Number	Letter
1	X	14	U
2	E	15	L
3	C	16	I
4	A	17	D
5	Z	18	G
6	R	19	K
7	Y	20	N
8	S	21	Q
9	M	22	V
10	T	23	P
11	B	24	W
12	F	25	H
13	J	26	O

What is the password?

Password

When you enter the Middle School Math Club Web site, you will gain math . . .

— — — — —

1 2 3 4 5

Answers are located on p. 105.