LESSON 6

• Adding Whole Numbers

Power Up

facts Power Up A

count aloud Count up and down by 20s between 0 and 200. Count up and down by 200s between 0 and 2000.

mental math

a. **Addition:** 400 + 50 + 300 + 40

b. **Addition:** 320 + 300

c. **Addition:** 320 + 30

d. **Addition:** 320 + 330

e. **Addition:** 60 + 200 + 20 + 400

f. **Addition:** 400 + 540

g. **Money:** $40 + $250

h. **Measurement:** 450 yards + 450 yards

problem solving Choose an appropriate problem-solving strategy to solve this problem. Dave purchased milk from the vending machine for 60¢. He used 6 coins. As Dave inserted the coins into the machine, the display counted up as follows: 5¢, 30¢, 35¢, 45¢, 55¢, 60¢. What coins did Dave use to purchase the milk?

New Concept

Numbers that are added are called **addends.** The answer to an addition problem is the **sum.** We may add numbers in any order to find their sum. For example, 5 + 6 gives us the same sum as 6 + 5. This property of addition is called the **Commutative Property of Addition.** When adding more than two numbers, this property allows us to add in any order we choose. On the next page we show three ways to add 6, 3, and 4. We point out the two numbers we added first.

$$\begin{array}{r} 6 \\ 3 \\ +\,4 \\ \hline 13 \end{array} \qquad \begin{array}{r} 3 \\ 4 \\ +\,6 \\ \hline 13 \end{array} \qquad \begin{array}{r} 6 \\ 4 \\ +\,3 \\ \hline 13 \end{array}$$

As shown in the last example, we can sometimes find pairs of numbers that add up to 10. This makes the addition easier.

Example 1

What is the sum of 7, 4, 3, and 6?

$$\begin{array}{r} 7 \\ 4 \\ 3 \\ +\,6 \\ \hline \mathbf{20} \end{array} \qquad 10 \qquad 10$$

We add to find the sum. We may either add the numbers as they are written (horizontally) or align them in a column. Here we write the numbers in a column. We choose an order that makes the work a little easier.

Example 2

Justify **Four one-digit whole numbers are added. Is the sum more than or less than 40? How do you know?**

We do not know the numbers, so we do not know the sum. However, we know that the sum is **less than 40, because the greatest one-digit number is 9, and the sum of four 9s is only 36.** The sum of the four whole numbers is actually any whole number less than 37, including zero if the four numbers added were all zero.

If zero is added to any number, the sum is identical to that number. Here are some examples:

$$2 + 0 = 2 \qquad 37 + 0 = 37 \qquad 999 + 0 = 999$$

This property of addition is called the **Identity Property of Addition.**

In arithmetic we add, subtract, multiply, and divide numbers using **algorithms.** An algorithm is a procedure for getting an answer. Algorithms allow us to solve problems.

Adding money can help us understand the addition algorithm.

Model Use your \$100, \$10, and \$1 money manipulatives to act out the example below.

Example 3

Jamal had \$462. Maria paid Jamal \$58 rent. Then how much money did Jamal have?

First we will use bills to model the problem:

Jamal had $462.


4


6


2

Maria paid Jamal $58 rent.


5


8

When Jamal added Maria's rent money to the money he already had, he ended up with four $100 bills, eleven $10 bills, and ten $1 bills.


4


11


10

Discuss What did Jamal need to exchange to have the fewest number of bills?

Conclude How much money did Jamal have after Maria paid him for rent?

Now we will show a pencil-and-paper solution that uses the addition algorithm. When using this addition algorithm, we are careful to line up digits that have the same place value.

Jamal had $462.

Maria paid Jamal $58.

Then Jamal had . . .

$$\begin{array}{r} \$462 \\ +\ \$\ \ 58 \\ \hline \end{array}$$

First we add the ones, then the tens, and then the hundreds.

First add ones.
Then add tens.
Then add hundreds.

$$\begin{array}{r} {\scriptstyle 1\,1} \\ \$462 \\ +\ \$\ \ 58 \\ \hline \$520 \end{array}$$

Notice we exchange 10 ones for 1 ten. Then we exchange 10 tens for 1 hundred.

Connect How are these exchanges similar to paper-money exchanges?

Lesson Practice

Find each sum. When adding, look for combinations of numbers that add up to 10.

a. 8 + 6 + 2

b. 4 + 7 + 3 + 6

c. 9 + 6 + 4

d. 4 + 5 + 6 + 7

e. 7 + 3 + 4

f. 2 + 6 + 3 + 5

g. 6 + 7 + 5

h. 8 + 7 + 5 + 3

i. **Multiple Choice** The sum of 5 one-digit whole numbers is certain to be _____.

A greater than 4 **B** less than 50

C an odd number **D** an even number

Use the addition algorithm to find each sum. When putting the numbers into columns, remember to line up the last digits.

j. $463 + $158

k. 674 + 555

l.
$323
$142
+ $365

m. 543 + 98

n. $47 + $485

Written Practice

Distributed and Integrated

*1. (6) **Model** You may use money manipulatives to answer the question in this word problem:

Iggy had $520. After Hannah paid him $86 rent, how much money did Iggy have?

*2. (5) **Represent** Use words to name $212.50.

3. (3) In the number 274, which digit shows the number of hundreds?

Classify Describe each number as odd or even:

4. (2) 1234

5. (2) 12,345

6. (2) 1,234,567

7. (5) Use digits to write five hundred eight dollars.

8. (5) Use words to name 580.

Find each sum. Look for combinations of 10.

9. 1 + 6 + 9 *(6)*

10. 7 + 6 + 4 *(6)*

11. 8 + 3 + 1 + 7 *(6)*

12. 4 + 5 + 6 + 7 *(6)*

13. *(6)*
$$\begin{array}{r} \$436 \\ +\ \$527 \\ \hline \end{array}$$

14. *(6)*
$$\begin{array}{r} 592 \\ +\ 408 \\ \hline \end{array}$$

15. *(6)*
$$\begin{array}{r} 963 \\ +\ 79 \\ \hline \end{array}$$

16. *(6)*
$$\begin{array}{r} \$180 \\ +\ \$747 \\ \hline \end{array}$$

17. *(2)* **Multiple Choice** All the books were put into two piles. There was one more book in one pile than in the other pile. The total number of books in both piles could *not* be _____.

A 28 **B** 29 **C** 33 **D** 55

Predict Find the eighth term in each counting sequence:

18. 10, 20, 30, . . . *(1)*

19. 6, 12, 18, . . . *(1)*

20. 7, 14, 21, . . . *(1)*

21. 8, 16, 24, . . . *(1)*

22. *(4)* Compare: nine hundred sixteen ◯ nine hundred sixty

23. *(4, 5)* **Represent** Write this comparison using digits and a comparison symbol:

Six hundred ninety is greater than six hundred nine.

***24.** *(4, 6)* **Analyze** Compare: 5 + 5 + 5 ◯ 4 + 5 + 6

25. *(2)* The smallest even two-digit whole number is 10. What is the smallest odd two-digit whole number?

***26.** *(2)* **Analyze** Is the smallest three-digit number odd or even?

27. *(1, 2)* **Predict** Is the 29th term in this counting sequence odd or even? Explain how you know.

2, 4, 6, 8, . . .

***28.** *(2)* **Analyze** Tabitha needs to read nine pages in her history book. If she wants to read half of those pages before dinner, how many pages does she need to read?

Use this table to answer problems **29** and **30:**

Number of Quarters	1	2	3	4
Number of Nickels	5	10	15	20

29. (1) **Generalize** Write a rule that describes how to find the number of quarters for any number of nickels.

***30.** (1) How many quarters are represented by fifty nickels?

Early Finishers

Real-World Connection

Darius had $356 in his savings account. He earned $64 and deposited it in his account. How much money is in his account now?

a. Use money manipulatives to model the problem. Which bills did Darius need to exchange to have the fewest number of bills?

b. Show how to solve the problem using the addition algorithm.

LESSON 7

- **Writing and Comparing Numbers Through Hundred Thousands**
- **Ordinal Numbers**

Power Up

facts Power Up A

count aloud Count up and down by 20s between 0 and 200. Count up and down by 200s between 0 and 2000.

mental math

a. **Money:** \$25 + \$25
b. **Money:** \$300 + \$450
c. **Money:** \$250 + \$250
d. **Addition:** 30 + 450
e. **Money:** \$75 + \$25
f. **Money:** \$750 + \$250
g. **Money:** \$50 + \$350
h. **Time:** 360 seconds + 360 seconds

problem solving Choose an appropriate problem-solving strategy to solve this problem. The sum of 12 and 21 is 33. What is the sum of the six three-digit numbers that each have the digits 1, 2, and 3? If the six numbers are arranged vertically, what is the sum of the digits in each column? Why is the sum of the digits in each column the same?

New Concepts

We have practiced naming whole numbers with three or fewer digits. In this lesson we will begin naming whole numbers with four, five, and six digits.

Writing and Comparing Numbers Through Hundred Thousands

Reading Math

Our place-value system is a **base-ten system.** Each place value is 10 times greater than the place value to its right.

The value of a digit depends upon its position in a number. The following chart lists the values of the first six whole-number places.

hundred thousands	ten thousands	thousands		hundreds	tens	ones
___	___	___	,	___	___	___

Discuss Describe the relationship between the thousands place and the hundreds place.

Commas are often used to write a whole number with many digits so that the number is easier to read. To place commas in a whole number, we count digits from the right-hand end of the number and insert a comma after every three digits.

54,321

The comma in this number marks the end of the thousands. To name this number, we read the number formed by the digits to the left of the comma and then say "thousand" at the comma. Finally, we read the number formed by the last three digits.

54,321

fifty-four thousand, three hundred twenty-one

Notice that we place a comma after the word *thousand* when we use words to name a number. Here we show some other examples:

$27,050	twenty-seven thousand, fifty dollars
125,000	one hundred twenty-five thousand
203,400	two hundred three thousand, four hundred

Whole numbers with four digits may be written with a comma, but in this book, four-digit whole numbers will usually be written without a comma.

Example 1

Use words to name 52370.

To help us read the number, we write it with a comma:

52,370

We name the number formed by the digits in front of the comma, write "thousand" and a comma, and then name the number formed

by the digits after the comma. So 52,370 is **fifty-two thousand, three hundred seventy.**

Justify Why didn't we place the comma between the 3 and the 7? Explain your answer.

Example 2

Use digits to write "one hundred fifty thousand, two hundred thirty-four."

We use digits to write "one hundred fifty" and write a comma for the word *thousand.* Then we use digits to write "two hundred thirty-four."

150,234

Example 3

Compare: 23,465 ◯ 23,654

Since the digits in the ten-thousands place and the thousands place match, we look to the hundreds place to make the comparison.

23,465 < 23,654

Example 4

Three of the longest underwater tunnels in North America are in New York City. The Brooklyn-Battery Tunnel is 9117 feet long, the Lincoln Tunnel is 8216 feet long, and the Holland Tunnel is 8558 feet long. Write the names and lengths of these tunnels in order from shortest to longest.

Arranging the numbers in order from least to greatest arranges the tunnels in order from shortest to longest: **Lincoln Tunnel (8216 feet), Holland Tunnel (8558 feet), Brooklyn-Battery Tunnel (9117 feet).**

Ordinal Numbers

Numbers used to name position or order are called **ordinal numbers.** The following table shows two ways to write the first twelve ordinal numbers.

Math Language

Cardinal numbers such as 1, 2, 3, 4, and 5 tell *how many.* Ordinal numbers such as first, second, and third tell *which one.*

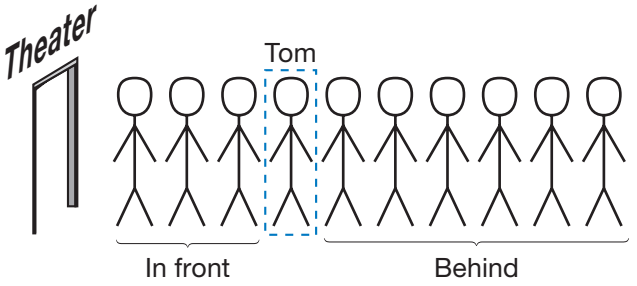
Ordinal Numbers for 1–12

1st	first
2nd	second
3rd	third
4th	fourth
5th	fifth
6th	sixth
7th	seventh
8th	eighth
9th	ninth
10th	tenth
11th	eleventh
12th	twelfth

Example 5

Tom was the fourth person in a line of ten people waiting for a movie. How many people were in front of Tom? How many people were behind Tom?

We draw a picture to illustrate the problem.



By counting people in our picture, we find that there are **three people in front** of Tom and **six people behind** him.

Lesson Practice

Represent Use words to name each number. (*Hint:* Begin by writing the number with a comma.)

a. 36420

b. $12300

c. 4567

Represent Use digits to write each number:

d. sixty-three thousand, one hundred seventeen

e. two hundred fifty-six thousand, seven hundred

f. fifty thousand, nine hundred twenty-four

g. seven hundred fifty thousand dollars

h. **Analyze** Christina was the sixth person in a line of ten people. How many people were in front of Christina, and how many people were behind her?

Written Practice

Distributed and Integrated

***1.** (6) **Model** Use money manipulatives to answer the question in this word problem:

Nevaeh had $462. After she was paid $88 rent, how much money did Nevaeh have?

2. (7) Which digit is in the tens place in 567?

3. (5) **Represent** Use digits to write seven hundred seven.

4. (7) Mount Everest, in Asia, has the highest peak in the world. The peak is 29,035 feet above sea level. Use words to name this height.

5. (6) Find the sum of 54 and 246.

Find each sum:

6. (6)
$$\begin{array}{r} \$463 \\ +\ \$364 \\ \hline \end{array}$$

7. (6)
$$\begin{array}{r} \$286 \\ +\ \$414 \\ \hline \end{array}$$

8. (6)
$$\begin{array}{r} 709 \\ +\ 314 \\ \hline \end{array}$$

Predict Find the seventh term in each counting sequence:

9. (1) 10, 20, 30, …

10. (1) 5, 10, 15, …

11. (1) 6, 12, 18, …

12. (1) 7, 14, 21, …

13. (1) 8, 16, 24, …

14. (1) 9, 18, 27, …

15. (4) Compare: two hundred fifty ◯ two hundred fifteen

***16.** (4, 6) **Explain** Compare. How can you answer the comparison without adding?

$$365 + 366 \ \bigcirc\ 365 + 365$$

Find each sum:

17. (6)
$$\begin{array}{r} \$436 \\ \$\ 72 \\ +\ \$\ 54 \\ \hline \end{array}$$

18. (6)
$$\begin{array}{r} 361 \\ 493 \\ +\ 147 \\ \hline \end{array}$$

19. (6)
$$\begin{array}{r} 506 \\ 79 \\ +\ 434 \\ \hline \end{array}$$

20. (4, 5) **Represent** Write this comparison using digits and a comparison symbol:

Four hundred eight is less than four hundred eighty.

21. (1) **Multiple Choice** We can count to 24 by 2s or by 3s. We do not count to 24 when counting by _____.

A 4s **B** 5s **C** 6s **D** 8s

Classify Describe each number as odd or even:

***22.** (2) 1969

***23.** (2) 1492

***24.** (2) 1776

25. (2) The smallest even three-digit number is 100. What is the smallest odd three-digit number?

***26.** (7) **Analyze** Of the twelve people in line, Rosario was fifth. How many people were in front of Rosario? How many were behind her?

***27.** (2) **Predict** Is the twentieth term in this counting sequence odd or even?

1, 3, 5, 7, …

28. (2) **Explain** Five birds were perched on a branch. Could half of the birds fly away? Why or why not?

Generalize Use this table to answer problems **29** and **30:**

Number of Dimes	1	2	3	4
Number of Pennies	10	20	30	40

29. (1) Write a rule that describes how to find the number of pennies for any number of dimes.

30. (1) How many pennies are represented by eight dimes?

LESSON 8

• Relationship Between Addition and Subtraction

Power Up

facts Power Up A

count aloud Count up and down by 50s between 0 and 500. Count up and down by 500s between 0 and 5000.

mental math

a. **Addition:** 3000 + 3000

b. **Addition:** 5000 + 5000

c. **Addition:** 350 + 450

d. **Addition:** 370 + 580

e. **Money:** $275 + $25

f. **Money:** $350 + $500

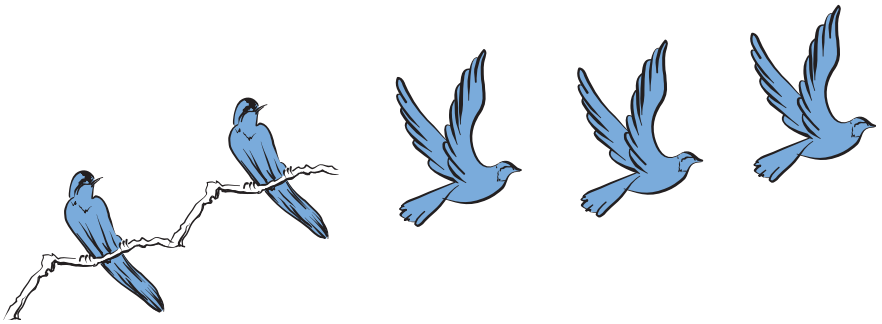
g. **Addition:** 750 + 750

h. **Measurement:** 250 millimeters + 750 millimeters

problem solving Choose an appropriate problem-solving strategy to solve this problem. The sum of the six numbers that have the digits 1, 2, and 3 is 1332. What is the sum of the six three-digit numbers that each have the digits 2, 4, and 6? What do you notice about the two sums?

New Concept

Subtraction involves taking one number from another number. If five birds were perched on a branch and three flew away, then two birds would be left on the branch.



A number sentence for this problem is

$$5 - 3 = 2$$

We read this number sentence, "Five minus three equals two." The dash (–) between the 5 and the 3 is called a **minus sign.** *The minus sign tells us to subtract the number to the right of the sign from the number to the left of the sign.* Order matters when we subtract. The answer to $5 - 3$ does not equal the answer to $3 - 5$. When we see $5 - 3$, we must start with 5 and subtract 3.

When a subtraction problem is written in a column (with one number above the other) we start with the top number and subtract the bottom number. The two forms below mean the same thing. With both forms, we start with 5 and subtract 3.

$$5 - 3 = 2 \qquad \begin{array}{r} 5 \\ -\ 3 \\ \hline 2 \end{array}$$

The answer when we subtract is called a **difference.** We can say "the difference of 5 and 3 is 2."

Example 1

When 7 is subtracted from 12, what is the difference?

We start with 12 and subtract 7. If we write the numbers horizontally, we write the 12 on the left. If we write the numbers in a column, we position the 12 on top and the 7 below the 2 in 12. This way, digits with the same place value are in the same column. We find that the difference of 12 and 7 is **5.**

$$12 - 7 = 5 \qquad \begin{array}{r} 12 \\ -\ \ 7 \\ \hline 5 \end{array}$$

Example 2

What is 8 minus 3?

The word *minus* means "take away." For this problem, we take 3 away from 8. When we see the word *minus,* we may put a minus sign in its place. We find that 8 minus 3 equals **5.**

$$8 - 3 = 5 \qquad \begin{array}{r} 8 \\ -\ 3 \\ \hline 5 \end{array}$$

Addition and subtraction are closely related. We say that addition and subtraction are **inverse operations** because one operation "undoes" the other. If we add 3 to 5, we get 8. If we then subtract 3 from 8, we again have 5. By subtracting 3, we undid the addition of 3.

Thinking Skill

Connect

Name the addends and the sum.

For every addition fact, we can form a subtraction fact. With the numbers 2, 3, and 5, for example, we can form two addition facts and two subtraction facts.

$$\begin{array}{r} 2 \\ +\ 3 \\ \hline 5 \end{array} \qquad \begin{array}{r} 5 \\ -\ 3 \\ \hline 2 \end{array} \qquad \begin{array}{r} 3 \\ +\ 2 \\ \hline 5 \end{array} \qquad \begin{array}{r} 5 \\ -\ 2 \\ \hline 3 \end{array}$$

We call the three numbers 2, 3, and 5 a **fact family.**

Example 3

Write two addition facts and two subtraction facts for the fact family 3, 4, and 7.

3 + 4 = 7 4 + 3 = 7 7 − 3 = 4 7 − 4 = 3

Lesson Practice

Subtract:

a. 17 − 9 **b.** 12 − 8 **c.** 15 − 9

d. 11 − 5 **e.** 17 − 8 **f.** 16 − 8

Write two addition facts and two subtraction facts for each fact family:

g. 7, 8, 15

h. 5, 7, 12

Written Practice

Distributed and Integrated

1. Which digit in 3654 is in the thousands place? *(7)*

* **2.** Name the five odd, one-digit numbers. *(2)*

3. When seven is subtracted from 15, what is the difference? *(8)*

4. When 56 is added to 560, what is the sum? *(6)*

5. What is seven minus four? *(8)*

6. What is sixty-four plus two hundred six? *(6)*

* **7.** **Represent** Use words to name $812,000. *(7)*

* **8.** **Represent** Use digits to write eight hundred two. *(5)*

9. Write a two-digit odd number using 5 and 6. *(2)*

* **10.** **Represent** Use words to name the number for "4 hundreds plus 4 tens plus 4 ones." *(3)*

Generalize Describe the rule for each counting sequence, and write the ninth term.

11. 6, 12, 18, . . . *(1)*

12. 3, 6, 9, . . . *(1)*

13. **Connect** Write two addition facts and two subtraction facts for the fact family 4, 8, and 12. *(8)*

* **14.** **Verify** Think of two odd numbers and add them. Is the sum odd or even? Explain how you found your answer. *(2)*

Subtract to find each difference:

15. 18 − 9 *(8)*

16. 15 − 7 *(8)*

17. 12 − 5 *(8)*

18. 11 − 8 *(8)*

19. 14 − 6 *(8)*

20. 13 − 9 *(8)*

Add to find each sum:

21. (6) $36 + $403 + $97

22. (6) 572 + 386 + 38

23. (6) 47 + 135 + 70

24. (6) $590 + $306 + $75

25. (2, 6) **Analyze** If the greatest odd number in the list below is added to the smallest even number in the list, then what is the sum?

364 287 428 273

26. (2) Write the smallest four-digit whole number. Is the number odd or even?

27. (2) Half of the 18 students were girls. How many girls were there?

28. (2) From Adelio's house to school and back is five miles. How far is it from Adelio's house to school?

Generalize Use this table to answer problems **29** and **30:**

Number of Weeks	1	2	3	4
Number of Days	7	14	21	28

29. (1) Write a rule that describes how to find the number of weeks for any number of days.

30. (1) How many weeks are represented by fifty-six days?

Early Finishers

Real-World Connection

The United States flag has 13 stripes. Seven stripes are red and six are white. Use this information to write a fact family that contains two addition equations and two subtraction equations.

LESSON 9

• Practicing the Subtraction Algorithm

Power Up

facts Power Up B

count aloud Count up and down by 50s between 0 and 500. Count up and down by 500s between 0 and 5000.

mental math

a. **Money:** \$250 + \$250

b. **Addition:** 6000 + 6000

c. **Money:** \$75 + \$125

d. **Addition:** 750 + 750

e. **Measurement:** 60 degrees – 20 degrees

f. **Subtraction:** 600 – 200

g. **Subtraction:** 6000 – 2000

h. **Addition:** 860 + 70

problem solving Choose an appropriate problem-solving strategy to solve this problem. The letters P, T, and A can be arranged in six different orders. Write the six possible orders, and circle the ones that spell words.

New Concept

We may find a subtraction answer by counting, by using objects, or by remembering fact families. When subtracting larger numbers, it is helpful to have a method. Recall from Lesson 6 that a method for solving a problem is an *algorithm.* In this lesson we will practice an algorithm for subtraction. We will use a money example to help us understand the algorithm.

Model Use your $100, $10, and $1 money manipulatives to model the following problem.

> *Maribel has $524. She must pay Tynice $58 for rent. After she pays Tynice, how much money will she have?*

We will use five $100 bills, two $10 bills, and four $1 bills to show how much money Maribel has.

5 2 4

From $524, Maribel must pay Tynice $58, which is five $10 bills and eight $1 bills. Maribel has enough money to pay Tynice, but she doesn't have enough $10 bills and $1 bills to pay her the exact amount. Before Maribel pays Tynice, she must exchange one $10 bill for ten $1 bills. Then she will have enough ones.

5 1 14

Discuss Maribel still does not have enough tens. What does she need to do?

4 11 14

Now Maribel can pay Tynice with five $10 bills and eight $1 bills. Taking away 5 tens and 8 ones leaves this much:

4 6 6

After she pays Tynice, Maribel will have $466.

We exchanged bills to show the subtraction. We also exchange when we use the pencil-and-paper algorithm. We write the subtraction problem and begin by subtracting the ones.

Subtract ones.

$$\begin{array}{r} \$524 \\ -\ \$\ \ 58 \\ \hline \end{array}$$

We cannot subtract \$8 from \$4. We need more ones. We look at the tens column and see 2 tens. We exchange 1 ten for 10 ones, which gives us 1 ten and 14 ones. Now we can subtract the ones.

$$\begin{array}{r} {\scriptstyle 1} \\ \$5\,\cancel{2}^{\,1}\,4 \\ -\$\;\;5\,8 \\ \hline 6 \end{array}$$

Next we subtract the tens. We cannot subtract 5 tens from 1 ten, so we will exchange again. This time we exchange 1 hundred for 10 tens, which gives us 4 hundreds and 11 tens. Now we finish subtracting.

$$\begin{array}{r} {\scriptstyle 4}\,{\scriptstyle 1} \\ \$\cancel{5}\,\cancel{2}^{\,1}\,4 \\ -\$\;\;5\,8 \\ \hline \$4\,6\,6 \end{array}$$

Connect How are these exchanges similar to the exchanges using paper money?

Since the value of every column is 10 times the value of the column to its right, we can use this method any time we come to a column in which we cannot subtract.

Example

Use the subtraction algorithm to find each difference:

a. $\begin{array}{r} \$346 \\ -\ \$264 \\ \hline \end{array}$ **b.** 219 − 73 **c.** $\begin{array}{r} 600 \\ -\ 123 \\ \hline \end{array}$

a. $\begin{array}{r} {\scriptstyle 2} \\ \$\cancel{3}^{\,1}\,4\,6 \\ -\ \$2\,6\,4 \\ \hline \$\;\;8\,2 \end{array}$ **b.** $\begin{array}{r} {\scriptstyle 1} \\ \cancel{2}^{\,1}\,1\,9 \\ -\quad 7\,3 \\ \hline 1\,4\,6 \end{array}$

c. $\begin{array}{r} {\scriptstyle 5}\,{\scriptstyle 9} \\ \cancel{6}\,\cancel{0}^{\,1}\,0 \\ -\ 1\,2\,3 \\ \hline 4\,7\,7 \end{array}$ or $\begin{array}{r} {\scriptstyle 5}\,{\scriptstyle 9} \\ \cancel{6}\,\cancel{0}^{\,1}\,0 \\ -\ 1\,2\,3 \\ \hline 4\,7\,7 \end{array}$

Notice part **c.** When we try to exchange 1 ten for 10 ones, we find that there are zero tens in the tens column. We must go to the hundreds column to create some tens. We show two ways to do this. In the first method we exchange 1 hundred for 10 tens, and then we exchange 1 of those tens for 10 ones. In the second method we think of 600 as 60 tens. Taking 1 of the tens leaves 59 tens. Some people think this method of subtracting across zeros is easier and neater than the first.

Lesson Practice

Subtract:

a. $496 − $157

b. 400 − 136

c. $315 − $264

d. $500 − $ 63

e. 435 − 76

f. 800 − 406

g. 86 − 48

h. $132 − $40

i. 203 − 47

Written Practice

Distributed and Integrated

*1. (9) **Model** You may use money manipulatives to answer the question in this story:

Jermaine had $550. After she paid a tax of $75, how much money did Jermaine have?

*2. (2) **List** Name the five even, one-digit numbers.

3. (3) Which digit in 596 shows the number of tens?

*4. (3) **Analyze** One hundred is equal to how many tens?

5. (8) When seven is subtracted from 15, what is the difference?

*6. (8) **Connect** Write two addition facts and two subtraction facts for the fact family 7, 8, and 15.

7. (5, 6) What is the sum of one hundred ninety and one hundred nineteen?

8. (4, 5) **Represent** Write this comparison using digits and a comparison symbol:

Five hundred forty is greater than five hundred fourteen.

9. (7) **Represent** Yosemite National Park in California is one of the oldest national parks in the United States. Yosemite covers 761,266 acres and became a national park in the year 1890. Use words to name the number of acres in Yosemite National Park.

10. (2, 4) **Analyze** Write a three-digit even number less than 200 using the digits 1, 2, and 3.

11. (9)
$$\begin{array}{r} \$346 \\ -\ \$178 \\ \hline \end{array}$$

12. (9)
$$\begin{array}{r} 56 \\ -\ 38 \\ \hline \end{array}$$

13. (9)
$$\begin{array}{r} \$219 \\ -\ \$\ 73 \\ \hline \end{array}$$

14. (9)
$$\begin{array}{r} 600 \\ -\ 321 \\ \hline \end{array}$$

15. (9)
$$\begin{array}{r} 300 \\ -\ 124 \\ \hline \end{array}$$

16. (9)
$$\begin{array}{r} \$500 \\ -\ \$246 \\ \hline \end{array}$$

17. (9)
$$\begin{array}{r} 608 \\ -\ 314 \\ \hline \end{array}$$

18. (9)
$$\begin{array}{r} 415 \\ -\ 378 \\ \hline \end{array}$$

19. (6)
$$\begin{array}{r} \$787 \\ \$156 \\ +\ \$324 \\ \hline \end{array}$$

20. (6)
$$\begin{array}{r} 573 \\ 90 \\ +\ 438 \\ \hline \end{array}$$

21. (6)
$$\begin{array}{r} \$645 \\ \$489 \\ +\ \$\ 65 \\ \hline \end{array}$$

22. (6)
$$\begin{array}{r} 429 \\ 85 \\ +\ 671 \\ \hline \end{array}$$

Predict Write the ninth term in each counting sequence:

23. (1) 7, 14, 21, . . .

24. (1) 9, 18, 27, . . .

25. (1) 8, 16, 24, . . .

26. (2, 5) **Classify** Is three hundred seventy an odd number or an even number? Explain how you know.

27. (4, 9) Compare. (Try to answer the comparison before subtracting. Then subtract and compare.)

$$31 - 12 \bigcirc 31 - 15$$

28. (2) Half of 20 is 10. What number is half of 21?

Generalize Use this table to answer problems **29** and **30:**

Number of Insects	1	2	3	4
Number of Legs	6	12	18	24

29. (1) Write a rule that describes how to find the number of legs for any number of insects.

30. (1) What number of legs represents 7 insects?

LESSON 10

• Missing Addends

Power Up

facts Power Up B

count aloud Count up and down by 25s between 0 and 200. (*Hint:* Think of quarters.) Count up and down by 20s between 0 and 200.

mental math

a. **Money:** \$5000 + \$4500

b. **Subtraction:** 6000 − 4000

c. **Money:** \$750 + \$250

d. **Addition:** 380 + 90

e. **Subtraction:** 500 − 400

f. **Measurement:** 125 yards + 125 yards

g. **Addition:** 640 + 260

h. **Number Sense:** 6 + 6 − 2 + 5

problem solving Choose an appropriate problem-solving strategy to solve this problem. Arrange the letters R, T, and A in six different orders. Circle the arrangements that spell words.

New Concept

In the number sentence below, there is a missing addend. The letter *w* is used to represent the missing addend.

$$8 + w = 15$$

Math Symbols

Any uppercase or lowercase letter may be used to represent a number.

A number sentence with an equal sign is often called an **equation.** Since eight plus seven equals 15, we know that the missing addend in this equation is seven. Notice that we can find a missing addend by subtracting. For the number sentence $8 + w = 15$, we subtract eight from 15 to find the missing number:

$$15 - 8 = 7$$

Example 1

Find the missing addend:

$$\begin{array}{r} \mathbf{24} \\ +\ \boldsymbol{m} \\ \hline \mathbf{37} \end{array}$$

There are two addends and the sum.

$$\begin{array}{rl} 24 & \text{addend} \\ +\ m & \text{addend} \\ \hline 37 & \text{sum} \end{array}$$

One of the addends is 24. The sum is 37. We subtract 24 from 37 and find that the missing addend is **13.** Then we substitute 13 into the original problem to be sure the answer is correct.

$$\begin{array}{r} 37 \\ -\ 24 \\ \hline 13 \end{array} \quad \rightarrow \quad \begin{array}{r} 24 \\ +\ 13 \\ \hline 37 \end{array}$$

Discuss Why do we use addition to check a subtraction problem?

Example 2

Find the missing addend:

$$\mathbf{15 + 20 + 6 + \boldsymbol{w} = 55}$$

In this equation there are four addends and the sum. The known addends are 15, 20, and 6. Their total is 41.

$$\begin{array}{r} \left.\begin{array}{r} 15 \\ 20 \\ 6 \end{array}\right\} 41 \\ +\ \ w \\ \hline 55 \end{array}$$

So 41 plus w equals 55. We can find the missing addend by subtracting 41 from 55, which gives us **14.** Then we check the answer.

$$\begin{array}{r} 55 \\ -\ 41 \\ \hline 14 \end{array} \quad \rightarrow \quad \begin{array}{r} 15 \\ 20 \\ 6 \\ +\ 14 \\ \hline 55 \end{array}$$

We see that the answer is correct.

Example 3

A baseball team has nine players. Four of the players (the first baseman, second baseman, shortstop, and third baseman) are called infielders.

Which equation can be used to find the number of players on the team who are not infielders?

A $n + 5 = 9$ **B** $4 + n = 9$

C $9 + 4 = n$ **D** $5 + 9 = n$

The number of infielders (4) plus the number of other players on the team (n) totals 9. We can use equation **B** to find the number of other players on the team.

Lesson Practice

Find each missing addend:

a. $35 + m = 67$ **b.** $n + 27 = 40$

c. $5 + 7 + 9 + f = 30$ **d.** $15 + k + 10 + 25 = 70$

e. **Explain** How do you know your answers are reasonable?

f. **Multiple Choice** Yasmin had sixteen pebbles in her pocket. She gave some away. At the end of the day she had 6 pebbles. Select and use the correct equation below to find how many pebbles Yasmin gave away.

A $16 - 6 = g$ **B** $g - 16 = 6$

C $16 - g = 6$ **D** $g - 6 = 16$

Written Practice

Distributed and Integrated

*1. (6) **Model** Use money manipulatives to answer the question in this word problem:

Yvette won $200 in an essay contest. If she had $467 before she won the contest, how much money did she have after she won the contest?

2. (8) **Connect** Write two addition facts and two subtraction facts for the fact family 4, 5, and 9.

3. (4, 5) **Represent** Write this comparison using digits and a comparison symbol:

Six hundred thirteen is less than six hundred thirty.

***4.** (2, 4) **Analyze** Use the digits 4, 5, and 6 to write a three-digit odd number that is greater than 500.

5. (10) $34 + m = 61$

6. (5, 9) What is five hundred ten minus fifty-one?

7. (3) Which digit in 325,985 shows the number of hundreds?

8. (1) **Multiple Choice** We can count to 30 by 3s or by 10s. We do not count to 30 when counting by

A 2s **B** 4s **C** 5s **D** 6s

9. (2) Think of one odd number and one even number and add them. Is the sum odd or even?

10. (4, 9) **Explain** Compare. How can you answer the comparison without subtracting?

$$100 - 10 \bigcirc 100 - 20$$

11. (9)
$$\begin{array}{r} \$363 \\ -\ \$179 \\ \hline \end{array}$$

12. (9)
$$\begin{array}{r} 400 \\ -\ 176 \\ \hline \end{array}$$

13. (9)
$$\begin{array}{r} \$570 \\ -\ \$\ 91 \\ \hline \end{array}$$

14. (9)
$$\begin{array}{r} 504 \\ -\ 175 \\ \hline \end{array}$$

15. (6)
$$\begin{array}{r} \$367 \\ \$\ 48 \\ +\ \$135 \\ \hline \end{array}$$

16. (6)
$$\begin{array}{r} 179 \\ 484 \\ +\ 201 \\ \hline \end{array}$$

17. (6)
$$\begin{array}{r} \$305 \\ \$897 \\ +\ \$725 \\ \hline \end{array}$$

18. (6)
$$\begin{array}{r} 32 \\ 248 \\ +\ 165 \\ \hline \end{array}$$

19. (9) $\$463 - \$85$

20. (6) $432 + 84 + 578$

21. (10) $18 + w = 42$

22. (10) $12 + r = 80$

Conclude Write the next four terms in each counting sequence:

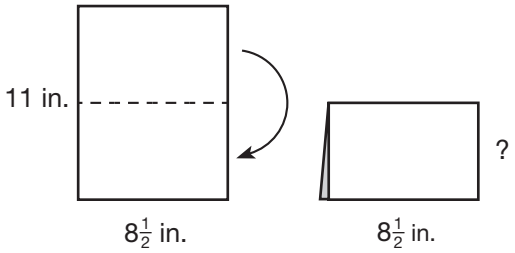
23. 3, 6, 9, 12, . . . *(1)*

24. 4, 8, 12, 16, . . . *(1)*

25. 6, 12, 18, 24, . . . *(1)*

***26.** How many $100 bills are needed to total $1000? *(3, 7)*

***27.** **Analyze** Sabrina folded an $8\frac{1}{2}$-by-11-inch piece of paper in half as shown below. The folded paper made a rectangle that was $8\frac{1}{2}$ inches by how many inches? *(2)*



28. **Explain** Is half of 37,295 a whole number? Why or why not? *(2)*

Generalize Use this table to answer problems **29** and **30:**

Number of Dogs	1	2	3	4
Number of Paws	4	8	12	16

29. Write a rule that describes how to find the number of dogs for any number of paws. *(1)*

30. How many dogs are represented by 28 paws? *(1)*

Early Finishers
Real-World Connection

Nika, Rhonda, and Alpesh collect trading cards. Together they have a total of 63 cards. If Nika has 27 cards and Rhonda has 15 cards, how many cards does Alpesh have?

INVESTIGATION 1

Focus on

• Translating and Writing Word Problems

In this investigation we will study four types of word problems: problems about **combining,** problems about **separating,** problems about **equal groups,** and problems about **comparing.**

We will see one example of each type of problem. All the problems contain three numbers. A problem becomes a word problem when one of its numbers is replaced with a question. We will make three different word problems for each problem in this investigation by replacing the numbers with questions. In later lessons we will practice solving word problems.

Word Problems about Combining

We combine two (or more) quantities by adding them together. We start with some and add some more. Here is a problem about combining:

a. The troop hiked 8 miles in the morning.

b. The troop hiked 7 miles in the afternoon.

c. Altogether, the troop hiked 15 miles.

Notice that there are three numbers. The numbers in **a** and **b** add up to the number in **c.** If we know any two of the numbers, we can figure out the third number. The problem is written in three sentences.

Formulate Suppose sentence **a** were missing. Read sentences **b** and **c** and then write a question that asks for the number in sentence **a.** Start the question with the words, "How many miles. . . ."

Formulate Now suppose sentence **b** were missing from the problem. Read sentences **a** and **c** and then write a question that asks for the number in sentence **b.** Start with the words, "How many miles. . . ."

Formulate Finally, suppose sentence **c** were missing. Read sentences **a** and **b** and then write a question that asks for the number in **c.** This time start the question with the words, "Altogether, how many miles. . . ."

Word Problems about Separating

We separate one quantity from a larger quantity by taking some away, or subtracting. Here is a problem about separating:

d. Jack went to the store with $28.

e. Jack spent $12 at the store.

f. Jack left the store with $16.

This is a problem about Jack's money. Jack had some money; then some money "went away" at the store. There are three numbers in the problem. If one of the numbers were missing, we could figure out the missing number.

Formulate Suppose sentence **d** were missing. Read sentences **e** and **f** and then write a question that asks for the number in sentence **d.** Start with the words, "How much money. . . ."

Formulate Now suppose sentence **e** were missing. Read sentences **d** and **f;** and then write a question that asks for the number in sentence **e.** Start with the words, "How much money. . . ."

Formulate Finally, suppose sentence **f** were missing. Read sentences **d** and **e** and then write a question that asks for the number in sentence **f.**

Word Problems about Equal Groups

Some problems are about items that are clustered in groups of equal size. These problems might describe the number of groups, the number in each group, and/or the total number in all groups. By multiplying the number in each group by the number of groups, we can find the total in all groups. Here is an example of an "equal groups" problem:

At Lincoln School there are the same number of students in each fifth grade class.

g. At Lincoln School there are 4 classes of fifth grade students.

h. There are 30 students in each fifth grade class.

i. Altogether, there are 120 fifth grade students at Lincoln School.

Again we see three numbers in the problem. If we know two of the numbers, we can figure out the third number.

Formulate Suppose sentence **g** were missing. Read sentences **h** and **i** and then write a question that asks for the number in sentence **g.** Start with the words, "How many classes. . . ."

Formulate Now suppose sentence **h** were missing. Read sentences **g** and **i** and then write a question that asks for the number in sentence **h.** Start with the words, "How many students . . ."

Formulate Finally, suppose sentence **i** were missing. Read sentences **g** and **h** and then write a question that asks for the number in sentence **i.** Start with the words, "Altogether, how many . . ."

Word Problems about Comparing

One way to compare two numbers is to find how much larger or how much smaller one number is than the other. By subtracting the smaller number from the larger number, we find the difference of the numbers. Consider this problem about comparing:

j. Abe is 5 years old.

k. Gabe is 11 years old.

l. Gabe is 6 years older than Abe.

A comparison may be stated two ways. For example, sentence **l** could have been written, "Abe is 6 years younger than Gabe."

Formulate Once again, our problem has three numbers. If we know two of the numbers, we can figure out the third number. Suppose sentence **j** were missing. Read sentences **k** and **l** and then write a question that asks for the number in sentence **j.**

Formulate Now suppose sentence **k** were missing. Read sentences **j** and **l** and then write a question that asks for the number in sentence **k.**

Formulate Finally, suppose sentence **l** were missing. Read sentences **j** and **k** and then write a question that asks for the number in sentence **l.** You should be able to phrase the question two different ways.

Activity

Writing Word Problems

Material needed:

- **Lesson Activity 17**

Use **Lesson Activity 17** to write word problems about combining, separating, multiplying, and dividing. Then illustrate one of your word problems.

1. Below is a three-frame problem about Arnold's trip to the store. Help Arnold find out how much money he will get back.

2. Write a combining word problem that can be solved by adding.

3. Write a separating word problem that can be solved by subtracting.

4. Write an equal groups word problem that can be solved by multiplying.

5. Write an equal groups word problem that can be solved by dividing.

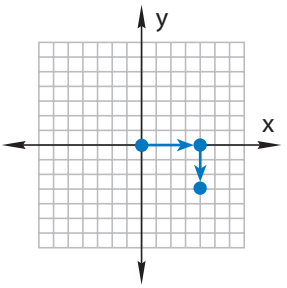
6. Write a comparison word problem that can be solved by subtracting.

7. Select one of your problems from **2–6** and illustrate it in three frames.

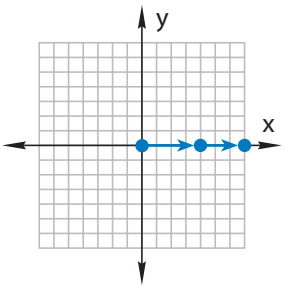
Investigate Further

a. Multiple Choice Jamaal began at his home and walked 4 blocks east. Then he turned and walked 3 blocks north. Which diagram below best represents the path that Jamaal walked?

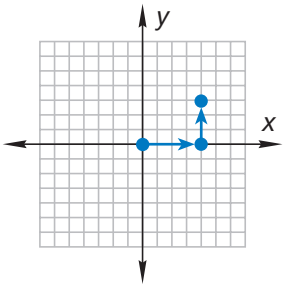
A



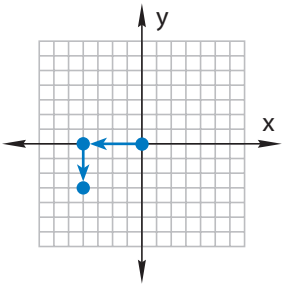
B



C



D



b. **Justify** The group of color names below were sorted by one common attribute.

Green Brown Mauve Peach Beige

These color names do not belong in the above group.

Red Lavender Blue Yellow

Name another color that belongs in the first group. Justify your answer by explaining why it is reasonable.

c. Multiple Choice One hundred percent represents all of the gases in our atmosphere. About twenty-one percent of our atmosphere is oxygen. Which equation can be used to estimate the percent of our atmosphere that is *not* oxygen?

A $21\% + 100\% = n$
B $100\% + n = 21\%$
C $21\% + n = 100\%$
D $21\% - n = 100\%$