Rising into Fifth Grade

All rising into fifth grade students must read the required book choice at their grade level and complete the accompanying assignment(s)/ activities. They must also read one additional book of their choice from the approved book list at their grade level, and then complete a one-page written summary. Each assignment is due on the first day of school.

Novel	Author
*REQUIRED: **The Jungle Book*	Rudyard Kipling
The Red Badge of Courage	Stephen Crane
Caddie Woodlawn	Carol Ryne Brink
The Matchlock Gun	Walter D. Edmonds
Gettysburg	MacKinlay Kantor
Rifles for Watie	Harold Keith
The Magician's Nephew	C.S. Lewis

The Jungle Book Reading Assignment:

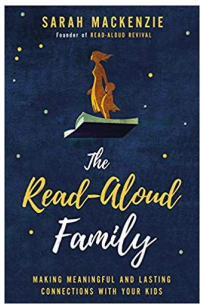
You are about to embark on a beautiful, timeless, and exciting journey. The Jungle Book is known as a literary classic; a literary classic is a work of the highest excellence that has something important to say about life and/ or the human condition and says it with great artistry. A classic, through its enduring presence, has withstood the test of time and is not bound by time, place, or customs. It speaks to us today as forcefully as it spoke to people one hundred or more years ago, and as forcefully as it will speak to people of future generations. For this reason, a classic is said to have universality.

When reading this story by Mr. Rudyard Kipling, you become a participant of decades of history, all the while coming to learn what makes us human. It's a great privilege, and I so hope you can learn to appreciate it.

For this novel, please complete the following using complete sentences:

1. **Name each main character** you come across. Along with their name, **please provide a character description** for them. Who are they? What character traits make them who they are?
2. Who is/ are the **protagonist(s)** and the **antagonist(s**) in the story? (Look up terms if you are unfamiliar with them.) **How do you know?** Provide text-based evidence!
3. While reading, **look for overarching themes** that define the purpose of the story. Write these themes down and **provide two textual examples** to prove your findings.
4. What is the main **conflict** of the story? How do you know? Provide textual evidence!
   - **Choose between the following conflict options:**
   - a. Man vs. Man
   - b. man vs. self
   - c. Man vs. Society
   - d. Man vs. Nature
   - e. Man vs. God/ Fate
5. Why do you think the author wrote this story? What is your opinion of the novel?
6. Please have a parent/ guardian sign the first page of the stapled finished work to turn in to your teacher upon return to school.

Compelling Questions to Ask Your Reader



Parents: You don't have to ask all of these questions during every story/chapter. Picking one or two is perfectly fine!

1. **What does the character want, and why can't he or she have it?**
    a. Every story's main character wants something and can't have it-- that's the conflict. Something is inhibiting the character from getting what he or she most desires. There usually isn't only one right answer to this question.
2. **Should he or she have done that?**
    a. Should is an incredibly powerful word-- one must be thought through, reasoned with, and backed up. The answer might seem obvious on the surface, but ask this question once or twice, and you may be surprised at how much fun you can have with it.
3. **How is X like Y? Or how is X different from Y?**
    a. Considering how something is like or different from something else is how we develop metaphors. Metaphors matter because they are how we understand and communicate ideas to one another.
    b. Do not limit the comparisons to characters alone-- include places and objects.
4. **Who is the most _____ in the story?**
    a. Insert any character trait into the blank space. You'll probably need to follow up this question with a second one-- something like, "What makes you say that?" or, "Can you give me an example?"
    b. Here are some character traits to get you started: *ambitious, bold, brave, bright, calm, capable, careful, cautious, charming, considerate, cowardly, creative, dangerous, dauntless, deceptive, disloyal, demanding, determined, faithful, foolish, friendly, generous, grateful, greedy, happy, hard-working, honest, humorous, intelligent, loving, merciful, mysterious, naughty, nervous, noble, obnoxious, persistent, pleasant, proud, reliable, resourceful, restless, sad, selfish, selfless, sharp-witted, sincere, thoughtful, unkind, unselfish, virtuous, wise, witty…*
5. **What does this story or character remind you of?**
    a. Again, we want our children to learn to think in metaphor, because metaphors are how we understand and communicate ideas.
6. **What is the character most afraid of?**
    a. We learn a lot about a person by talking time to consider their greatest fears. This doesn't have to be the main character-- you can ask it about any of the central characters in the story who have their own fears and desires.

7. **What would you change about the setting or main character if you were writing this book?**
    a. This question might work best for children over age seven. They get the benefit of using someone else's world and characters as they play with language and plot twists.
8. **What surprised you most?**
    a. We can discover a lot about our kids by finding out what catches them off-guard, and is especially good after reading picture books, as picture book authors and illustrators often work very hard to surprise their readers.
9. **Which character most reminds you of yourself?**
    a. Most often we'll relate to the main character, but the conversations that follow this realization can lead to some great discussions and a new understanding of each other.
    b. Seeing ourselves in the books we read can shed a lot of light-- not just on the story, but on our own strengths and weaknesses as we live out our real day-to-day lives.
10. **What is something you don't want to forget from this book (or from this chapter)?**
    a. To answer this question, the reader must recall the story and bring to mind a specific scene.
    b. It's an easier question to answer than "What was your favorite part of the story?" because there's no pressure to find the very best answer. You can simply name any one thing you don't want to forget.

The conversations you unleash by asking open-ended questions in an easygoing, friendly way are limitless. You may find that one or two questions are your own go-tos, your favorites to ask your kids time and time again. A friendly disposition and a collection of open-ended questions such as these are all you need to have meaningful, lasting conversations with your kids about books.

Remember, the habit of asking compelling questions is more important than getting compelling answers. Make asking questions and having conversations as frequent and natural as asking your kids how their day went, or what they did at their friend's house. Don't worry too much about whether their answers are profound. That will come with time and practice. Instead, focus on helping your child develop a habit of asking questions.

*Questions and descriptions taken from the book, The Read-Aloud Family, by Sarah Mackenzie, copyright 2018.

Summer Math Homework

Rising Fifth Grade Students

Dear parents,

The following math packet for your scholar includes the first 8 lessons in the Saxon Math 7/6 textbook that we use to teach our fifth graders. This packet has a WARM-UP section for quick mental math practice,as well as, a NEW CONCEPTS section where it explains the lesson and provides various examples for the scholar to follow. Finally, there is the LESSON PRACTICE and MIXED PRACTICE sections, where your scholar will be completing their work. The LESSON PRACTICE contains problems that directly relate to the lesson being taught. The MIXED PRACTICE is a spiral review of the previous lessons and concepts learned in fourth grade.

Assignment

Please have your scholar complete the MIXED PRACTICE questions 1-30 for *each* lesson over the summer. We recommend breaking up each lesson into one week working on a few problems each night. This is to ensure your scholar is not overwhelmed at the end of the summer with all eight lessons.

Please make sure each lesson is completed neatly and correctly numbered with the scholar's name in the upper right hand corner of their paper, followed underneath by the lesson number, and the number of questions completed which is 1-30. Scholars *must* show their work for all required problems.

This packet is to be turned in to your scholar's fifth grade teacher on the **first day of school** and will be taken as their first math grade of the year.

Thank you for your continued support in your scholar's education and have a wonderful summer!!

Sincerely,

The Fifth Grade Team

LESSON 1

• Adding Whole Numbers and Money
• Subtracting Whole Numbers and Money
• Fact Families, Part 1

Power Up[1] *Building Power*

facts Power Up A

mental math

a. **Number Sense:** 30 + 30

b. **Number Sense:** 300 + 300

c. **Number Sense:** 80 + 40

d. **Number Sense:** 800 + 400

e. **Number Sense:** 20 + 30 + 40

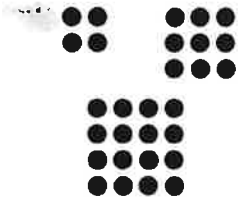
f. **Number Sense:** 200 + 300 + 400

g. **Measurement:** How many inches are in a foot?

h. **Measurement:** How many millimeters are in a centimeter?

problem solving

Sharon made three square patterns using 4 coins, 9 coins, and 16 coins. If she continues forming larger square patterns, how many coins will she need for each of the next three square patterns?



Understand We are given 4, 9, and 16 as the first three square numbers. We are asked to extend the sequence an additional three terms.

Plan We will *find the pattern* in the first three terms of the sequence, then use the pattern to extend the sequence an additional three terms.

Solve We see that the number of coins in each square can be found by multiplying the number of coins in each row by the number of rows: $2 \times 2 = 4$, $3 \times 3 = 9$, and $4 \times 4 = 16$. We use this rule to find the next three terms: $5 \times 5 = 25$, $6 \times 6 = 36$, and $7 \times 7 = 49$.

Check We found that Sharon needs 25, 36, and 49 coins to build each of the next three squares in the pattern. We can verify our answers by drawing pictures of each of the next three terms in the pattern and counting the coins.

[1] For instructions on how to use the Power Up, please consult the preface.

New Concepts

Increasing Knowledge

adding whole numbers and money

To combine two or more numbers, we add. The numbers that are added together are called **addends.** The answer is called the **sum.** Changing the order of the addends does not change the sum. For example,

$$3 + 5 = 5 + 3$$

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

When adding numbers, we add digits that have the same place value.

Example 1

Add: 345 + 67

Solution

When we add whole numbers on paper, we write the numbers so that the place values are aligned. Then we add the digits by column.

$$\begin{array}{rl} {\scriptstyle 11} & \\ 345 & \text{addend} \\ +\ 67 & \text{addend} \\ \hline \mathbf{412} & \text{sum} \end{array}$$

Changing the order of the addends does not change the sum. One way to check an addition answer is to change the order of the addends and add again.

$$\begin{array}{rl} {\scriptstyle 11} & \\ 67 & \\ +\ 345 & \\ \hline 412 & \text{check} \end{array}$$

Example 2

Add: $1.25 + $12.50 + $5

Solution

When we add money, we write the numbers so that the decimal points are aligned. We write $5 as $5.00 and add the digits in each column.

$$\begin{array}{r} \$1.25 \\ \$12.50 \\ +\ \$5.00 \\ \hline \mathbf{\$18.75} \end{array}$$

Thinking Skill

Connect

$5 means five dollars and no cents. Why does writing $5 as $5.00 help when adding money amounts?

If one of two addends is zero, the sum of the addends is identical to the nonzero addend. This property of addition is called the **Identity Property of Addition.**

$$5 + 0 = 5$$

subtracting whole numbers and money

We subtract one number from another number to find the **difference** between the two numbers. In a subtraction problem, the **subtrahend** is taken from the **minuend.**

$$5 - 3 = 2$$

In the problem above, 5 is the minuend and 3 is the subtrahend. The difference between 5 and 3 is 2.

Verify Does the Commutative Property apply to subtraction? Give an example to support your answer.

Example 3

Subtract: 345 − 67

Solution

When we subtract whole numbers, we align the digits by place value. We subtract the bottom number from the top number and regroup when necessary.

$$\begin{array}{r} {\scriptstyle 2\,13\,{\scriptstyle 1}} \\ 3\,\not{4}\,5 \\ -\ \ 6\,7 \\ \hline \mathbf{2\,7\,8} \end{array}$$

difference

Example 4

Jim spent $1.25 for a hamburger. He paid for it with a five-dollar bill. Find how much change he should get back by subtracting $1.25 from $5.

Solution

Thinking Skill
When is it necessary to line up decimals?

Order matters when we subtract. The starting amount is put on top. We write $5 as $5.00. We line up the decimal points to align the place values. Then we subtract. Jim should get back **$3.75.**

$$\begin{array}{r} {\scriptstyle 4\,9\,{\scriptstyle 1}} \\ \$5.\not{0}\,0 \\ -\ \$1.2\,5 \\ \hline \$3.7\,5 \end{array}$$

We can check the answer to a subtraction problem by adding. If we add the answer (difference) to the amount subtracted, the total should equal the starting amount. We do not need to rewrite the problem. We just add the two bottom numbers to see whether their sum equals the top number.

Subtract Down			**Add Up**
To find the	↓	↑	To check
difference			the answer
	$5.00		
	− $1.25		
	$3.75		

fact families, part 1

Addition and subtraction are called **inverse operations.** We can "undo" an addition by subtracting one addend from the sum. The three numbers that form an addition fact also form a subtraction fact. For example,

$$4 + 5 = 9 \qquad 9 - 5 = 4$$

The numbers 4, 5, and 9 are a **fact family.** They can be arranged to form the two addition facts and two subtraction facts shown below.

$$\begin{array}{rrrr} 4 & 5 & 9 & 9 \\ +\,5 & +\,4 & -\,5 & -\,4 \\ \hline 9 & 9 & 4 & 5 \end{array}$$

Example 5

Rearrange the numbers in this addition fact to form another addition fact and two subtraction facts.

11 + 14 = 25

Solution

We form another addition fact by reversing the addends.

$$14 + 11 = 25$$

We form two subtraction facts by making the sum, 25, the first number of each subtraction fact. Then each remaining number is subtracted from 25.

$$25 - 11 = 14$$

$$25 - 14 = 11$$

Example 6

Rearrange the numbers in this subtraction fact to form another subtraction fact and two addition facts.

$$\begin{array}{r} 11 \\ -\ 6 \\ \hline 5 \end{array}$$

Solution

The Commutative Property does not apply to subtraction, so we may not reverse the first two numbers of a subtraction problem. However, we may reverse the last two numbers.

$$\begin{array}{r} 11 \\ -\ 6 \\ \hline 5 \end{array} \qquad \begin{array}{r} 11 \\ -\ 5 \\ \hline 6 \end{array}$$

For the two addition facts, 11 is the sum.

$$\begin{array}{r} 5 \\ +\ 6 \\ \hline 11 \end{array} \qquad \begin{array}{r} 6 \\ +\ 5 \\ \hline 11 \end{array}$$

Practice Set

Simplify:

a. 3675 + 426 + 1357

b. \$6.25 + \$8.23 + \$12

c. 5374 − 168

d. \$5 − \$1.35

e. ***Represent*** Arrange the numbers 6, 8, and 14 to form two addition facts and two subtraction facts.

f. ***Connect*** Rearrange the numbers in this subtraction fact to form another subtraction fact and two addition facts.

$$25 - 10 = 15$$

Written Practice

Strengthening Concepts

1. What is the sum of 25 and 40?

2. At a planetarium show, Johnny counted 137 students and 89 adults. He also counted 9 preschoolers. How many people did Johnny count in all?

3. ***Generalize*** What is the difference when 93 is subtracted from 387?

4. Keisha paid $5 for a movie ticket that cost $3.75. Find how much change Keisha should get back by subtracting $3.75 from $5.

5. ***Explain*** Tatiana had $5.22 and earned $4.15 more by taking care of her neighbor's cat. How much money did she have then? Explain how you found the answer.

6. The soup cost $1.25, the fruit cost $0.70, and the drink cost $0.60. To find the total price of the lunch, add $1.25, $0.70, and $0.60.

7.
$$\begin{array}{r} 63 \\ 47 \\ +\ 50 \\ \hline \end{array}$$

8.
$$\begin{array}{r} 632 \\ 57 \\ +\ 198 \\ \hline \end{array}$$

9.
$$\begin{array}{r} 78 \\ 9 \\ +\ 987 \\ \hline \end{array}$$

10.
$$\begin{array}{r} 432 \\ 579 \\ +\ 3604 \\ \hline \end{array}$$

11. $345 - 67$

12. $678 - 416$

13. $3764 - 96$

14. $875 + 1086 + 980$

15. $10 + 156 + 8 + 27$

16.
$$\begin{array}{r} \$3.47 \\ -\ \$0.92 \\ \hline \end{array}$$

17.
$$\begin{array}{r} \$24.15 \\ -\ \$1.45 \\ \hline \end{array}$$

18.
$$\begin{array}{r} \$0.75 \\ +\ \$0.75 \\ \hline \end{array}$$

19.
$$\begin{array}{r} \$0.12 \\ \$0.46 \\ +\ \$0.50 \\ \hline \end{array}$$

20. What is the name for the answer when we add?

21. What is the name for the answer when we subtract?

*** 22.** ***Represent*** The numbers 5, 6, and 11 are a fact family. Form two addition facts and two subtraction facts with these three numbers.

*** 23.** ***Connect*** Rearrange the numbers in this addition fact to form another addition fact and two subtraction facts.

$$27 + 16 = 43$$

*** 24.** ***Connect*** Rearrange the numbers in this subtraction fact to form another subtraction fact and two addition facts.

$$50 - 21 = 29$$

25. Describe a way to check the correctness of a subtraction answer.

* We encourage students to work first on the exercises on which they might want help, saving the easier exercises for last. Beginning in this lesson, we star the exercises that cover challenging or recently presented content. We suggest that these exercises be worked first.

LESSON 2

• Multiplying Whole Numbers and Money
• Dividing Whole Numbers and Money
• Fact Families, Part 2

Power Up

Building Power

facts

Power Up A

mental math

a. **Number Sense:** 500 + 40

b. **Number Sense:** 60 + 200

c. **Number Sense:** 30 + 200 + 40

d. **Number Sense:** 70 + 300 + 400

e. **Number Sense:** 400 + 50 + 30

f. **Number Sense:** 60 + 20 + 400

g. **Measurement:** How many inches are in 2 feet?

h. **Measurement:** How many millimeters are in 2 centimeters?

problem solving

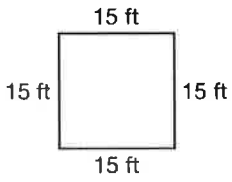
Sam thought of a number between ten and twenty. Then he gave a clue: You say the number when you count by twos and when you count by threes, but not when you count by fours. Of what number was Sam thinking?

New Concepts

Increasing Knowledge

multiplying whole numbers and money

Courtney wants to enclose a square garden to grow vegetables. How many feet of fencing does she need?



When we add the same number several times, we get a sum. We can get the same result by multiplying.

$$\underbrace{15 + 15 + 15 + 15}_{\text{Four 15s equal 60.}} = 60$$

$$4 \times 15 = 60$$

Numbers that are multiplied together are called **factors.** The answer is called the **product.**

To indicate multiplication, we can use a times sign, a dot, or write the factors side by side without a sign. Each of these expressions means that l and w are multiplied: $l \times w$ $\quad l \cdot w$ $\quad lw$

Notice that in the form $l \cdot w$ the multiplication dot is elevated and is not in the position of a decimal point. The form lw can be used to show the multiplication of two or more letters or of a number and letters, as we show below.

$$lwh \qquad 4s \qquad 4st$$

The form lw can also be used to show the multiplication of two or more numbers. To prevent confusion, however, we use parentheses to separate the numbers in the multiplication. Each of the following is a correct use of parentheses to indicate "3 times 5," although the first form is most commonly used. Without the parentheses, we would read each of these simply as the number 35.

$$3(5) \qquad (3)(5) \qquad (3)5$$

Thinking Skill

Discuss

Why do we multiply 28 by 4, by 10, and then add to find the product?

When we multiply by a two-digit number on paper, we multiply twice. To multiply 28 by 14, we first multiply 28 by 4. Then we multiply 28 by 10. For each multiplication we write a partial product. We add the partial products to find the final product.

$$\begin{array}{rl} 28 & \text{factor} \\ \times\ 14 & \text{factor} \\ 112 & \text{partial product } (28 \times 4) \\ 280 & \text{partial product } (28 \times 10) \\ 392 & \text{product } (14 \times 28) \end{array}$$

When multiplying dollars and cents by a whole number, the answer will have a dollar sign and a decimal point with two places after the decimal point.

$$\begin{array}{r} \$1.35 \\ \times\quad 6 \\ \$8.10 \end{array}$$

Example 1

Find the cost of two dozen pencils at 35¢ each.

Solution

Two dozen is two 12s, which is 24. To find the cost of 24 pencils, we multiply 35¢ by 24.

$$\begin{array}{r} 35¢ \\ \times\ 24 \\ 140 \\ 700 \\ 840¢ \end{array}$$

The cost of two dozen pencils is 840¢, which is **$8.40.**

The **Commutative Property** applies to multiplication as well as addition, so changing the order of the factors does not change the product. For example,

$$4 \times 2 = 2 \times 4$$

One way to check multiplication is to reverse the order of factors and multiply.

$$\begin{array}{rr} 23 & 14 \\ \times\ 14 & \times\ 23 \\ \hline 92 & 42 \\ 230 & 280 \\ \hline 322 & 322 \end{array} \quad \text{check}$$

The **Identity Property of Multiplication** states that if one of two factors is 1, the product equals the other factor. The **Zero Property of Multiplication** states that if zero is a factor of a multiplication, the product is zero.

Represent Give an example for each property.

Example 2

Multiply: $\begin{array}{r} 400 \\ \times\ 874 \end{array}$

Thinking Skill

Discuss

Why does writing trailing zeros not change the product?

Solution

To simplify the multiplication, we reverse the order of the factors and write trailing zeros so that they "hang out" to the right.

$$\begin{array}{r} 21 \\ 874 \\ \times\ \ 400 \\ \hline \mathbf{349{,}600} \end{array}$$

dividing whole numbers and money

When we separate a number into a certain number of equal parts, we divide. We can indicate division with a division symbol (÷), a division box $\big)\overline{\quad}$, or a division bar (—). Each of the expressions below means "24 divided by 2":

$$24 \div 2 \qquad 2\overline{)24} \qquad \frac{24}{2}$$

The answer to a division problem is the **quotient.** The number that is divided is the **dividend.** The number by which the dividend is divided is the **divisor.**

dividend ÷ divisor = quotient
$\text{divisor}\overline{)\text{dividend}}$ (quotient)
$\frac{\text{dividend}}{\text{divisor}} = \text{quotient}$

When the dividend is zero, the quotient is zero. The divisor may not be zero. When the dividend and divisor are equal (and not zero), the quotient is 1.

Example 3

Divide: 3456 ÷ 7

Solution

On the next page, we show both the long-division and short-division methods.

Thinking Skill

Discuss

Why must the remainder always be less than the divisor?

Long Division

$$\begin{array}{r} 493\text{ R }5 \\ 7\overline{)3456} \\ \underline{28} \\ 65 \\ \underline{63} \\ 26 \\ \underline{21} \\ 5 \end{array}$$

Short Division

$$\begin{array}{r} 4\,9\,3\text{ R }5 \\ 7\overline{)34^{6}5^{2}6} \end{array}$$

Using the short-division method, we perform the multiplication and subtraction steps mentally, recording only the result of each subtraction.

To check our work, we multiply the quotient by the divisor. Then we add the remainder to this answer. The result should be the dividend. For this example we multiply 493 by 7. Then we add 5.

$$\begin{array}{r} {\scriptstyle 62} \\ 493 \\ \times\quad 7 \\ \hline 3451 \\ +\quad 5 \\ \hline 3456 \end{array}$$

When dividing dollars and cents, cents will be included in the answer. Notice that the decimal point in the quotient is directly above the decimal point in the division box, separating the dollars from the cents.

$$\begin{array}{r} \$.90 \\ 4\overline{)\$3.60} \\ \underline{36} \\ 00 \\ \underline{0} \\ 0 \end{array}$$

fact families, part 2

Multiplication and division are inverse operations, so there are multiplication and division fact families just as there are addition and subtraction fact families. The numbers 5, 6, and 30 are a fact family. We can form two multiplication facts and two division facts with these numbers.

$$5 \times 6 = 30 \qquad 30 \div 5 = 6$$

$$6 \times 5 = 30 \qquad 30 \div 6 = 5$$

Example 4

Rearrange the numbers in this multiplication fact to form another multiplication fact and two division facts.

$$\mathbf{5 \times 12 = 60}$$

Solution

By reversing the factors, we form another multiplication fact.

$$\mathbf{12 \times 5 = 60}$$

By making 60 the dividend, we can form two division facts.

$$\mathbf{60 \div 5 = 12}$$

$$\mathbf{60 \div 12 = 5}$$

Practice Set

a. $20 \times 37¢$ **b.** $37 \cdot 0$ **c.** $407(37)$

d. $5\overline{)\$8.40}$ **e.** $200 \div 12$ **f.** $\frac{234}{3}$

g. Which numbers are the divisors in problems **d, e,** and **f?**

h. ***Represent*** Use the numbers 8, 9, and 72 to form two multiplication facts and two division facts.

Written Practice[1]

Strengthening Concepts

1. (2) If the factors are 7 and 11, what is the product?

2. (1) ***Generalize*** What is the difference between 97 and 79?

3. (1) If the addends are 170 and 130, what is the sum?

4. (2) If 36 is the dividend and 4 is the divisor, what is the quotient?

5. (1) Find the sum of 386, 98, and 1734.

6. (1) Fatima spent $2.25 for a book. She paid for it with a five-dollar bill. Find how much change she should get back by subtracting $2.25 from $5.

7. (1) Luke wants to buy a $70.00 radio for his car. He has $47.50. Find how much more money he needs by subtracting $47.50 from $70.00.

8. (2) ***Explain*** Each energy bar costs 75¢. Find the cost of one dozen energy bars. Explain how you found your answer.

9. (1)
$$\begin{array}{r} 312 \\ -\ 86 \\ \hline \end{array}$$

10. (1)
$$\begin{array}{r} 4106 \\ +\ 1398 \\ \hline \end{array}$$

11. (1)
$$\begin{array}{r} 4000 \\ -\ 1357 \\ \hline \end{array}$$

12. (1)
$$\begin{array}{r} \$10.00 \\ -\ \$2.83 \\ \hline \end{array}$$

13. (2) $405(8)$

14. (2) $25 \cdot 25$

15. (2) $\frac{288}{6}$

16. (2) $\frac{225}{15}$

17. (2) $\$1.25 \times 8$

18. (2) 400×50

19. (2) $1000 \div 8$

20. (2) $\$45.00 \div 20$

[1] The italicized numbers within parentheses underneath each problem number are called *lesson reference numbers.* These numbers refer to the lesson(s) in which the major concept of that particular problem is introduced. If additional assistance is needed, refer to the discussion, examples, or practice problems of that lesson.

* **21.** (2) ***Represent*** Use the numbers 6, 8, and 48 to form two multiplication facts and two division facts.

* **22.** (2) ***Connect*** Rearrange the numbers in this division fact to form another division fact and two multiplication facts.

$$4\overline{)36}\quad 9$$

* **23.** (1) ***Connect*** Rearrange the numbers in this addition fact to form another addition fact and two subtraction facts.

$$12 + 24 = 36$$

24. (1) **a.** Find the sum of 9 and 6.

b. Find the difference between 9 and 6.

25. (2) The divisor, dividend, and quotient are in these positions when we use a division sign:

$$\text{dividend} \div \text{divisor} = \text{quotient}$$

On your paper, draw a division box and show the positions of the divisor, dividend, and quotient.

26. (2) Multiply to find the answer to this addition problem:

$$39¢ + 39¢ + 39¢ + 39¢ + 39¢ + 39¢$$

27. (2) 365×0 **28.** (2) $0 \div 50$ **29.** (2) $365 \div 365$

* **30.** (2) ***Explain*** How can you check the correctness of a division answer that has no remainder?

Early Finishers
Real-World Application

A customer at a bank deposits 2 one hundred-dollar bills, 8 twenty-dollar bills, 5 five-dollar bills, 20 one-dollar bills, 2 rolls of quarters, 25 dimes and 95 pennies. How much money will be deposited in all? Note: One roll of quarters = 40 quarters.

LESSON 3

• Unknown Numbers in Addition
• Unknown Numbers in Subtraction

Power Up

Building Power

facts

Power Up B

mental math

a. **Number Sense:** 3000 + 4000

b. **Number Sense:** 600 + 2000

c. **Number Sense:** 20 + 3000

d. **Number Sense:** 600 + 300 + 20

e. **Number Sense:** 4000 + 300 + 200

f. **Number Sense:** 70 + 300 + 4000

g. **Measurement:** How many inches are in 3 feet?

h. **Measurement:** How many millimeters are in 3 centimeters?

problem solving

Tad picked up a number cube. His thumb and forefinger covered opposite faces. He counted the dots on the other four faces. How many dots did he count?

Understand We must first establish a base of knowledge about **standard number cubes.** The faces of a standard number cube are numbered with 1, 2, 3, 4, 5, or 6 dots. The number of dots on opposite faces of a number cube always total 7 (1 dot is opposite 6 dots, 2 dots are opposite 5 dots, and 3 dots are opposite 4 dots). Tad's thumb and forefinger covered opposite faces. We are asked to find how many dots were on the remaining four faces altogether.

Plan We will *use logical reasoning* about a number cube and *write an equation* to determine the number of dots Tad counted.

Solve Logical reasoning tells us that the four uncovered faces form two pairs of opposite faces. Each pair of opposite faces has 7 dots, so two pairs of opposite faces have 2×7, or 14 dots.

Check We determined that Tad counted 14 dots. We can check our answer by subtracting the number of dots Tad's fingers covered from the total number of dots on the number cube: $21 - 7 = 14$ dots.

New Concepts

Increasing Knowledge

unknown numbers in addition

Below is an addition fact with three numbers. If one of the addends were missing, we could use the other addend and the sum to find the missing number.

$$\begin{array}{rl} 4 & \leftarrow \text{addend} \\ +\ 3 & \leftarrow \text{addend} \\ \hline 7 & \leftarrow \text{sum} \end{array}$$

Cover the 4 with your finger. How can you use the 7 and the 3 to find that the number under your finger is 4?

Now cover the 3 instead of the 4. How can you use the other two numbers to find that the number under your finger is 3?

Notice that we can find a missing addend by subtracting the known addend from the sum. We will use a letter to stand for a missing number.

Example 1

Find the value of *m*:

$$\begin{array}{r} 12 \\ +\ m \\ \hline 31 \end{array}$$

Solution

One of the addends is missing. The known addend is 12. The sum is 31. If we subtract 12 from 31, we find that the missing addend is **19.** We check our answer by using 19 in place of *m* in the original problem.

$$\begin{array}{r} {}^{2}\cancel{3}^{1}1 \\ -\ 12 \\ \hline 19 \end{array} \quad \text{Use 19 in place of } m. \quad \begin{array}{r} {}^{1}12 \\ +\ 19 \\ \hline 31 \end{array} \quad \text{check}$$

Example 2

Find the value of *n*:

$$36 + 17 + 5 + n = 64$$

Solution

First we add all the known addends.

$$\underbrace{36 + 17 + 5}_{58} + n = 64$$

$$+\ n = 64$$

Then we find *n* by subtracting 58 from 64.

$$64 - 58 = 6 \quad \text{So } n \text{ is } \mathbf{6}.$$

We check our work by using 6 in place of *n* in the original problem.

$$36 + 17 + 5 + 6 = 64 \quad \text{The answer checks.}$$

unknown numbers in subtraction

Discuss Cover the 8 with your finger, and describe how to use the other two numbers to find that the number under your finger is 8.

$$\begin{array}{rl} 8 & \leftarrow \text{minuend} \\ -\ 3 & \leftarrow \text{subtrahend} \\ \hline 5 & \leftarrow \text{difference} \end{array}$$

Now cover the 3 instead of the 8. Describe how to use the other two numbers to find that the covered number is 3.

As we will show below, we can find a missing minuend by adding the other two numbers. We can find a missing subtrahend by subtracting the difference from the minuend.

Example 3

Find the value of *w*:

$$\begin{array}{r} w \\ -\ 16 \\ \hline 24 \end{array}$$

Solution

We can find the first number of a subtraction problem by adding the other two numbers. We add 16 and 24 to get **40.** We check our answer by using 40 in place of *w*.

Use 40 in place of *w*.

$$\begin{array}{r} {\scriptstyle 1}\ 16 \\ +\ 24 \\ \hline 40 \end{array} \qquad \begin{array}{r} {\scriptstyle 3\ 1}\ \not{4}0 \\ -\ 16 \\ \hline 24 \end{array}$$ check

Example 4

Find the value of *y*:

$$236 - y = 152$$

Solution

One way to determine how to find a missing number is to think of a simpler problem that is similar. Here is a simpler subtraction fact:

$$5 - 3 = 2$$

In the problem, *y* is in the same position as the 3 in the simpler subtraction fact. Just as we can find 3 by subtracting 2 from 5, we can find *y* by subtracting 152 from 236.

Thinking Skill

Discuss

What is another way we can check the subtraction?

$$\begin{array}{r} {\scriptstyle 1\ 1}\ \not{2}36 \\ -\ 152 \\ \hline 84 \end{array}$$

We find that *y* is **84.** Now we check our answer by using 84 in place of *y* in the original problem.

$$\begin{array}{r} {\scriptstyle 1\ 1}\ \not{2}36 \\ -\ 84 \\ \hline 152 \end{array} \quad \begin{array}{l} \leftarrow \text{Use 84 in place of } y. \\ \leftarrow \text{The answer checks.} \end{array}$$

Statements such as $12 + m = 31$ are equations. An **equation** is a mathematical sentence that uses the symbol = to show that two quantities are equal. In algebra we refer to a missing number in an equation as an **unknown.** When asked to find the unknown in the exercises that follow, look for the number represented by the letter that makes the equation true.

Practice Set

Math Language

We can use a lowercase or an uppercase letter as an unknown:

$a + 3 = 5$

$A + 3 = 5$

The equations have the same meaning.

Analyze Find the unknown number in each problem. Check your work by using your answer in place of the letter in the original problem.

a. $\begin{array}{r} A \\ +\ 12 \\ \hline 45 \end{array}$

b. $\begin{array}{r} 32 \\ +\ B \\ \hline 60 \end{array}$

c. $\begin{array}{r} C \\ -\ 15 \\ \hline 24 \end{array}$

d. $\begin{array}{r} 38 \\ -\ D \\ \hline 29 \end{array}$

e. $e + 24 = 52$

f. $29 + f = 70$

g. $g - 67 = 43$

h. $80 - h = 36$

i. $36 + 14 + n + 8 = 75$

Written Practice

Strengthening Concepts

Math Language

Remember that **factors** are multiplied together to get a **product.**

1. (2) If the two factors are 25 and 12, what is the product?

2. (1) If the addends are 25 and 12, what is the sum?

3. (1) What is the difference of 25 and 12?

4. (2) Each of the 31 students brought 75 aluminum cans to class for a recycling drive. Find how many cans the class collected by multiplying 31 by 75.

5. (2) Find the total price of one dozen pizzas at $7.85 each by multiplying $7.85 by 12.

6. (1) ***Explain*** The basketball team scored 63 of its 102 points in the first half of the game. Find how many points the team scored in the second half. Explain how you found your answer.

7. (2) $\begin{array}{r} \$3.68 \\ \times\ \ 9 \\ \hline \end{array}$

8. (2) $\begin{array}{r} 407 \\ \times\ 80 \\ \hline \end{array}$

9. (2) $\begin{array}{r} 28¢ \\ \times\ 14 \\ \hline \end{array}$

10. (2) $\begin{array}{r} 370 \\ \times\ 140 \\ \hline \end{array}$

11. (2) $100 \cdot 100$

12. (2) $144 \div 12$

13. (2) $(12)(5)$

14. (1) $\begin{array}{r} 3627 \\ 598 \\ +\ 4881 \\ \hline \end{array}$

15. (1) $\begin{array}{r} 5010 \\ -\ 1376 \\ \hline \end{array}$

16. (1) $\begin{array}{r} \$10.00 \\ -\ \$0.26 \\ \hline \end{array}$

Find the unknown number in each problem.

17. (3) $\begin{array}{r} A \\ +\ 16 \\ \hline 48 \end{array}$

18. (3) $\begin{array}{r} 23 \\ +\ B \\ \hline 52 \end{array}$

19. (3)
$$\begin{array}{r} C \\ -\ 17 \\ \hline 31 \end{array}$$

20. (3)
$$\begin{array}{r} 42 \\ -\ D \\ \hline 25 \end{array}$$

21. (3) $x + 38 = 75$

22. (2) $x - 38 = 75$

23. (3) $75 - y = 38$

24. (3) $6 + 8 + w + 5 = 32$

*** 25.** (1) **Connect** Rearrange the numbers in this addition fact to form another addition fact and two subtraction facts.

$$24 + 48 = 72$$

*** 26.** (2) **Connect** Rearrange the numbers in this multiplication fact to form another multiplication fact and two division facts.

$$6 \times 15 = 90$$

Math Language
Remember the **divisor** is divided into the **dividend.** The resulting answer is the **quotient.**

27. (2) Find the quotient when the divisor is 20 and the dividend is 200.

28. (2) **Connect** Multiply to find the answer to this addition problem:

$$15 + 15 + 15 + 15 + 15 + 15 + 15 + 15$$

29. (2) $144 \div 144$

*** 30.** (3) **Explain** How can you find a missing addend in an addition problem?

Early Finishers
Real-World Application

Petrov's family has a compact car that gets an average of 30 miles per gallon of gasoline. The family drives an average of 15,000 miles a year.

a. Approximately how many gallons of gas do they purchase every year?

b. If the average price of gas is $2.89 a gallon, how much should the family expect to spend on gas in a year?

LESSON 4

• Unknown Numbers in Multiplication
• Unknown Numbers in Division

Power Up

Building Power

facts

Power Up A

mental math

a. **Number Sense:** 600 + 2000 + 300 + 20

b. **Number Sense:** 3000 + 20 + 400 + 5000

c. **Number Sense:** 7000 + 200 + 40 + 500

d. **Number Sense:** 700 + 2000 + 50 + 100

e. **Number Sense:** 60 + 400 + 30 + 1000

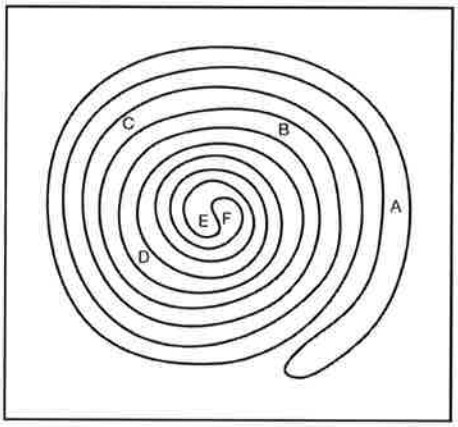
f. **Number Sense:** 900 + 8000 + 100 + 50

g. **Measurement:** How many feet are in a yard?

h. **Measurement:** How many centimeters are in a meter?

problem solving

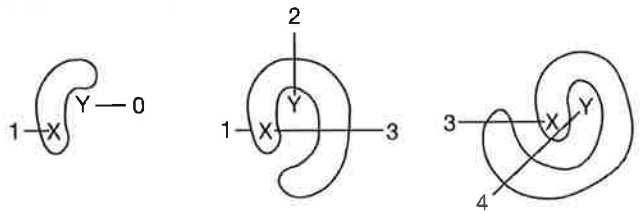
The diagram below is called a *Jordan curve.* It is a simple *closed curve* (think of a clasped necklace that has been casually dropped on a table). Which letters are on the inside of the curve, and which letters are on the outside of the curve?



Understand We must determine if A, B, C, D, E and F are inside or outside the closed curve.

Plan We will make the problem simpler and use the simpler problems to find a pattern.

Solve We will draw less complicated closed curves, and place an X inside and a Y outside each of the closed curves.



On our simpler curves, we notice that lines drawn from the outside of the curve to the X cross 1 or 3 lines. Lines drawn to the Y cross 0, 2, or 4 lines. We see this pattern: lines drawn to letters on the inside of the curve cross an odd number of lines, and lines drawn to letters on the outside of the curve cross an even number of lines.

We look at the Jordan curve again.

- A line drawn to A crosses 1 line, so it is inside the closed curve.
- A line drawn to B crosses 4 lines, so it is outside.
- A line drawn to C crosses 3 lines, so it is inside.
- A line drawn to D crosses 5 lines, so it is inside.
- A line drawn to E crosses 9 lines, so it is inside.
- A line drawn to F crosses 10 lines, so it is outside.

Check We determined that A, C, D, and E are inside the closed curve and that B and F are outside of the closed curve. We found a pattern that can help us quickly determine whether points are on the inside or outside of a closed curve.

New Concepts

Increasing Knowledge

unknown numbers in multiplication

This multiplication fact has three numbers. If one of the **factors** were unknown, we could use the other factor and the product to figure out the unknown factor.

$$\begin{array}{r} 4 \\ \times\ 3 \\ \hline 12 \end{array}$$

Thinking Skill

Discuss

Why can we use division to find a missing factor?

Explain With your finger, cover the factors in this multiplication fact one at a time. Describe how you can use the two uncovered numbers to find the covered number. Notice that we can find an unknown factor by dividing the product by the known factor.

Example 1

Find the value of *A*:

$$\begin{array}{r} A \\ \times\ 6 \\ \hline 72 \end{array}$$

Solution

The unknown number is a factor. The product is 72. The factor that we know is 6. Dividing 72 by 6, we find that the unknown factor is **12.** We check our work by using 12 in the original problem.

$$\begin{array}{r} 12 \\ 6\overline{)72} \end{array} \longrightarrow \begin{array}{r} {\scriptstyle 1} \\ 12 \\ \times\ 6 \\ \hline 72 \end{array} \quad \text{check}$$

Example 2

Find the value of *w*: $6w = 84$

Solution

Reading Math
In this problem $6w$ means "6 times w."

We divide 84 by 6 and find that the unknown factor is **14.** We check our work by multiplying.

$$\begin{array}{r} 14 \\ 6\overline{)84} \end{array} \longrightarrow \begin{array}{r} {\scriptstyle 2} \\ 14 \\ \times\ 6 \\ \hline 84 \end{array} \quad \text{check}$$

unknown numbers in division

This division fact has three numbers. If one of the numbers were unknown, we could figure out the third number.

$$6\overline{)24}^{\,4}$$

Cover each of the numbers with your finger, and describe how to use the other two numbers to find the covered number. Notice that we can find the dividend (the number inside the division box) by multiplying the other two numbers. We can find either the divisor or quotient (the numbers outside of the box) by dividing.

Example 3

Find the value of *k*: $\frac{k}{6} = 15$

Solution

The letter k is in the position of the dividend. If we rewrite this problem with a division box, it looks like this:

$$6\overline{)k}^{\,15}$$

We find an unknown dividend by multiplying the divisor and quotient. We multiply 15 by 6 and find that the unknown number is **90.** Then we check our work.

$$\begin{array}{r} {\scriptstyle 3} \\ 15 \\ \times\ 6 \\ \hline 90 \end{array} \longrightarrow 6\overline{)90}^{\,15} \quad \text{check}$$

Example 4

Find the value of m: $126 \div m = 7$

Solution

The letter m is in the position of the divisor. If we were to rewrite the problem with a division box, it would look like this:

$$m\overline{)126}\ \ 7$$

We can find m by dividing 126 by 7.

$$7\overline{)12^{5}6}\ \ 18$$

We find that m is **18.** We can check our division by multiplying as follows:

$$\begin{array}{r} {\scriptstyle 5} \\ 18 \\ \times\ \ 7 \\ \hline 126 \end{array}$$

In the original equation we can replace the letter with our answer and test the truth of the resulting equation.

$$126 \div 18 = 7$$

$$7 = 7$$

Practice Set

Analyze Find each unknown number. Check your work by using your answer in place of the letter in the original problem.

a. $\begin{array}{r} A \\ \times\ \ 7 \\ \hline 91 \end{array}$ **b.** $\begin{array}{r} 20 \\ \times\ \ B \\ \hline 440 \end{array}$ **c.** $7\overline{)C}\ \ 15$ **d.** $D\overline{)144}\ \ 8$

e. $7w = 84$ **f.** $112 = 8m$

g. $\frac{360}{x} = 30$ **h.** $\frac{n}{5} = 60$

i. ***Formulate*** Write a word problem using the equation in exercise **h.**

Written Practice

Strengthening Concepts

1. (2) Five dozen carrot sticks are to be divided evenly among 15 children. Find how many carrot sticks each child should receive by dividing 60 by 15.

2. (2) Matt separated 100 pennies into 4 equal piles. Find how many pennies were in each pile. Explain how you found your answer.

3. (2) Sandra put 100 pennies into stacks of 5 pennies each. Find how many stacks she formed by dividing 100 by 5.

4. (2) For the upcoming season, 294 players signed up for soccer. Find the number of 14-player soccer teams that can be formed by dividing 294 by 14.

5. (1) Angela is reading a 280-page book. She has just finished page 156. Find how many pages she still has to read by subtracting 156 from 280.

6. (2) Each month Bill earns \$0.75 per customer for delivering newspapers. Find how much money he would earn in a month in which he had 42 customers by multiplying \$0.75 by 42.

* ***Analyze*** Find each unknown number. Check your work.

7. (4)
$$\begin{array}{r} J \\ \times\ 5 \\ \hline 60 \end{array}$$

8. (3)
$$\begin{array}{r} 27 \\ +\ K \\ \hline 72 \end{array}$$

9. (3)
$$\begin{array}{r} L \\ +\ 36 \\ \hline 37 \end{array}$$

10. (3)
$$\begin{array}{r} 64 \\ -\ M \\ \hline 46 \end{array}$$

11. (3) $n - 48 = 84$

12. (4) $7p = 91$

13. (4) $q \div 7 = 0$

14. (4) $144 \div r = 6$

15. (2) $6\overline{)\$12.36}$

16. (2) $\frac{5760}{8}$

17. (2) $526 \div 18$

18. (1) $563 + 563 + 563 + 563$

19. (2) $\$3.75 \cdot 16$

20. (1) $\$3 + \$2.86 + \$0.98$

21. (1) $\$10 - \$6.43$

22. (4) If the divisor is 3 and the quotient is 12, what is the dividend?

23. (4) If the product is 100 and one factor is 5, what is the other factor?

* **24.** (1) ***Connect*** Rearrange the numbers in this subtraction fact to form another subtraction fact and two addition facts.

$$17 - 9 = 8$$

* **25.** (2) ***Connect*** Rearrange the numbers in this division fact to form another division fact and two multiplication facts.

$$72 \div 8 = 9$$

26. (3) $w + 6 + 8 + 10 = 40$

27. (2) Find the answer to this addition problem by multiplying:

$$23¢ + 23¢ + 23¢ + 23¢ + 23¢ + 23¢ + 23¢$$

28. (4) $25m = 25$

29. (4) $15n = 0$

* **30.** (4) ***Explain*** How can you find an unknown factor in a multiplication problem?

LESSON 5

• Order of Operations, Part 1

Power Up

Building Power

facts Power Up B

mental math

a. **Number Sense:** 560 + 200

b. **Number Sense:** 840 + 30

c. **Number Sense:** 5200 + 2000

d. **Number Sense:** 650 + 140

e. **Number Sense:** 3800 + 2000

f. **Number Sense:** 440 + 200

g. **Measurement:** How many days are in a week?

h. **Measurement:** How many hours are in a day?

problem solving

Use the digits 5, 6, 7, and 8 to complete this addition problem. There are two possible arrangements.

$$\begin{array}{r} \_\_ \\ +\ 9 \\ \hline \_\_ \end{array}$$

Understand We are shown an addition problem with several digits missing. We are asked to complete the problem using the digits 5, 6, 7, and 8. Because the bottom addend is 9, we know that the ones digit of the sum will be one less than the ones digit of the top addend.

Plan We will intelligently guess and check for the ones place in the top addend by trying the numbers in an orderly way. We will then use logical reasoning to fill in the remaining digits of the problem.

Solve We quickly eliminate 5 as a possibility for the ones digit of the top addend because we do not have a 4 to place in the sum. We try 6 for the ones digit of the top addend. Six plus 9 is 15, so we write a 5 as the ones digit of the sum. If we write 7 as the tens digit of the top addend, we get 76 + 9. We add the two numbers and get 85. Placing an 8 in the sum, we see that we have used all the digits 5, 6, 7, and 8. We have found the first of two possible arrangements.

Next, we try 7 as the ones digit of the top addend. Seven plus 9 is 16, so we place a 6 in the sum. Now we must use the digits 5 and 8 in the tens column. We try 57 + 9 = 66. That does not work, because it does not use the 8. We try 87 + 9 = 96. That also does not work, because it omits the 5.

Finally, we try 8 in the top addend and 7 in the sum. This leaves 5 and 6 for the tens column. We try 58 + 9 = 67, and find the second solution to the problem.

Check The digits 5, 6, 7, and 8 can be used to form two solutions for our missing digit problem:

$$\begin{array}{r} 76 \\ +\ 9 \\ \hline 85 \end{array} \qquad \begin{array}{r} 58 \\ +\ 9 \\ \hline 67 \end{array}$$

New Concept *Increasing Knowledge*

Thinking Skill

Analyze

Why is it important to have rules for the order of operations?

When there is more than one addition or subtraction step within a problem, we take the steps in order from left to right. In this problem we first subtract 4 from 9. Then we add 3.

$$9 - 4 + 3 = 8$$

If a different order of steps is desired, parentheses are used to show which step is taken first. In the problem below, we first add 4 and 3 to get 7. Then we subtract 7 from 9.

$$9 - (4 + 3) = 2$$

These two rules are part of the rules for the **Order of Operations** in mathematics.

Example 1

a. 18 − 6 − 3 **b. 18 − (6 − 3)**

Solution

a. We subtract in order from left to right.

$\underline{18 - 6} - 3$ First subtract 6 from 18.

$12 - 3$ Then subtract 3 from 12.

9 The answer is 9.

b. We subtract within the parentheses first.

$18 - \underline{(6 - 3)}$ First subtract 3 from 6.

$18 - 3$ Then subtract 3 from 18.

15 The answer is 15.

When there is more than one multiplication or division step within a problem, we take the steps in order from left to right. In this problem we divide 24 by 6 and then multiply by 2.

$$24 \div 6 \times 2 = 8$$

If there are parentheses, then we first do the work within the parentheses. In the problem below, we first multiply 6 by 2 and get 12. Then we divide 24 by 12.

$$24 \div (6 \times 2) = 2$$

Example 2

a. 18 ÷ 6 ÷ 3 **b. 18 ÷ (6 ÷ 3)**

Solution

a. We take the steps in order from left to right.

$\underline{18 \div 6} \div 3$ First divide 18 by 6.

$3 \div 3$ Then divide 3 by 3.

1 The answer is 1.

b. We divide within the parentheses first.

$$18 \div (6 \div 3) \quad \text{First divide 6 by 3.}$$
$$18 \div 2 \quad \text{Then divide 18 by 2.}$$
$$9 \quad \text{The answer is 9.}$$

Only two numbers are involved in each step of a calculation. If three numbers are added (or multiplied), changing the two numbers selected for the first addition (or first multiplication) does not change the final sum (or product).

$$(2 + 3) + 4 = 2 + (3 + 4) \qquad (2 \times 3) \times 4 = 2 \times (3 \times 4)$$

This property applies to addition and multiplication and is called the **Associative Property.** As shown by examples 1 and 2, the Associative Property does not apply to subtraction or to division.

Example 3

$$\frac{5 + 7}{1 + 2}$$

Solution

Before dividing we perform the operations above the bar and below the bar. Then we divide 12 by 3.

$$\frac{5 + 7}{1 + 2} = \frac{12}{3} = 4$$

Practice Set

a. $16 - 3 + 4$

b. $16 - (3 + 4)$

c. $24 \div (4 \times 3)$

d. $24 \div 4 \times 3$

e. $24 \div 6 \div 2$

f. $24 \div (6 \div 2)$

g. $\frac{6 + 9}{3}$

h. $\frac{12 + 8}{12 - 8}$

i. *Connect* Rewrite exercise **g** using parentheses instead of a bar.

Written Practice

Strengthening Concepts

1. (1) Jack paid $5 for a sandwich that cost $1.25 and milk that cost $0.60. How much change should he get back?

2. (1) In one day the elephant ate 82 kilograms of hay, 8 kilograms of apples, and 12 kilograms of leaves and raw vegetables. How many kilograms of food did it eat in all?

3. (1) What is the difference of 110 and 25?

4. (2) What is the total price of one dozen apples that cost 25¢ each?

5. (3) What number must be added to 149 to total 516?

* **6.** (2) ***Explain*** Judy plans to read a 235-page book in 5 days. How can you find the average number of pages she needs to read each day.

7. (5) $5 + (3 \times 4)$

8. (5) $(5 + 3) \times 4$

9. (5) $800 - (450 - 125)$

10. (5) $600 \div (20 \div 5)$

11. (5) $800 - 450 - 125$

12. (5) $600 \div 20 \div 5$

13. (5) $144 \div (8 \times 6)$

14. (5) $144 \div 8 \times 6$

15. (5) $\$5 - (\$1.25 + \$0.60)$

* **16.** (2) ***Represent*** Use the numbers 63, 7, and 9 to form two multiplication facts and two division facts.

17. (4) If the quotient is 12 and the dividend is 288, what is the divisor?

Reading Math
Read expressions such as (4)(6) as "four times six." The parentheses indicate multiplication.

18. (2) $25\overline{)\$10.00}$

19. (2) $(378)(64)$

20. (2)
$$\begin{array}{r} 506 \\ \times\ 370 \\ \hline \end{array}$$

21. (1)
$$\begin{array}{r} \$10.10 \\ -\ \$9.89 \\ \hline \end{array}$$

* ***Analyze*** Find each unknown number. Check your work.

22. (3) $n - 63 = 36$

23. (3) $63 - p = 36$

24. (3) $56 + m = 432$

25. (4) $8w = 480$

26. (3) $5 + 12 + 27 + y = 50$

27. (4) $36 \div a = 4$

28. (4) $x \div 4 = 8$

* **29.** (1) ***Represent*** Use the numbers 7, 11, and 18 to form two addition facts and two subtraction facts.

30. (5) $3 \cdot 4 \cdot 5$

Early Finishers

Real-World Application

A painter is painting three exam rooms at a veterinarian's office. If each exam room requires 2 gallons of paint and the total cost of the paint is $270, how much does each gallon of paint cost?

LESSON 6

• Fractional Parts

Power Up

Building Power

facts Power Up C

mental math

a. **Number Sense:** 2500 + 400

b. **Number Sense:** 6000 + 2400

c. **Number Sense:** 370 + 400

d. **Number Sense:** 9500 + 240

e. **Number Sense:** 360 + 1200

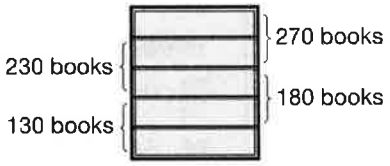
f. **Number Sense:** 480 + 2500

g. **Measurement:** How many seconds are in a minute?

h. **Measurement:** How many minutes are in an hour?

problem solving

Carrisa's school library received a gift of 500 new reference books. The books were arranged on a bookcase as shown in the diagram at right. How many books are on each shelf?



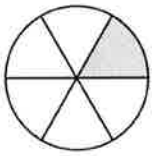
New Concept

Increasing Knowledge

As young children we learned to count objects using whole numbers. As we grew older, we discovered that there are parts of wholes—like sections of an orange—that cannot be named with whole numbers. We can name these parts with **fractions.** A common fraction is written with two numbers and a fraction bar. The "bottom" number is the **denominator.** The denominator shows the number of equal parts in the whole. The "top" number, the **numerator,** shows the number of the parts that are being represented.

Example 1

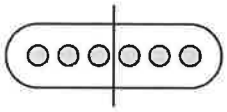
What fraction of this circle is shaded?



Solution

The circle has been divided into 6 equal parts. We use 6 for the bottom of the fraction. One of the parts is shaded, so we use 1 for the top of the fraction. The fraction of the circle that is shaded is one sixth, which we write as $\frac{1}{6}$.

We can also use a fraction to name a part of a group. There are 6 members in this group. We can divide this group in half by dividing it into two equal groups with 3 in each half. We write that $\frac{1}{2}$ of 6 is 3.



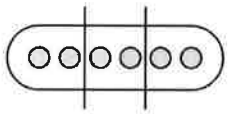
$\frac{1}{2}$ of 6 is 3.

Thinking Skill

Explain

How would we find $\frac{1}{6}$ of 6?

We can divide this group into thirds by dividing the 6 members into three equal groups. We write that $\frac{1}{3}$ of 6 is 2.



$\frac{1}{3}$ of 6 is 2.

Example 2

a. What number is $\frac{1}{2}$ of 450?

b. What number is $\frac{1}{3}$ of 450?

c. How much money is $\frac{1}{5}$ of $4.50?

Solution

a. To find $\frac{1}{2}$ of 450, we divide 450 into two equal parts and find the amount in one of the parts. We find that $\frac{1}{2}$ of 450 is **225.**

$$2\overline{)450} \quad 225 \longrightarrow \frac{1}{2} \text{ of } 450 \text{ is } 225.$$

b. To find $\frac{1}{3}$ of 450, we divide 450 into three equal parts. Since each part is 150, we find that $\frac{1}{3}$ of 450 is **150.**

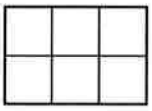
$$3\overline{)450} \quad 150 \longrightarrow \frac{1}{3} \text{ of } 450 \text{ is } 150.$$

c. To find $\frac{1}{5}$ of $4.50, we divide $4.50 by 5. We find that $\frac{1}{5}$ of $4.50 is **$0.90.**

$$5\overline{)\$4.50} \quad \$0.90 \longrightarrow \frac{1}{5} \text{ of } \$4.50 \text{ is } \$0.90.$$

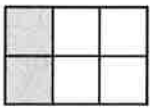
Example 3

Copy the figure at right, and shade $\frac{1}{3}$ of it:



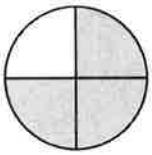
Solution

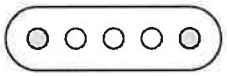
The rectangle has six parts of equal size. Since $\frac{1}{3}$ of 6 is 2, we shade any two of the parts.

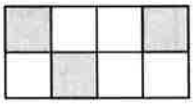


Practice Set

Use both words and numbers to write the fraction that is shaded in problems **a–c.**

a. 

b. 

c. 

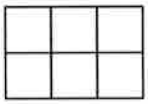
d. What number is $\frac{1}{2}$ of 72?

e. What number is $\frac{1}{2}$ of 1000?

f. What number is $\frac{1}{3}$ of 180?

g. ***Explain*** How much money is $\frac{1}{3}$ of $3.60?

h. ***Represent*** Copy this figure and shade one half of it.



Written Practice

Strengthening Concepts

1. (6) What number is $\frac{1}{2}$ of 540?

2. (6) What number is $\frac{1}{3}$ of 540?

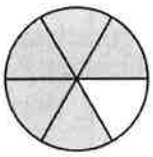
3. (1) In four days of sight-seeing the Richmonds drove 346 miles, 417 miles, 289 miles, and 360 miles. How many miles did they drive in all?

4. (1) Tanisha paid $20 for a book that cost $12.08. How much money should she get back?

5. (2) How many days are in 52 weeks?

*** 6.** (2) ***Analyze*** How many $20 bills would it take to make $1000?

7. (6) Use words and numbers to write the fraction of this circle that is shaded.



8. (1)
$$\begin{array}{r} 3604 \\ 5186 \\ +\ 7145 \\ \hline \end{array}$$

9. (1)
$$\begin{array}{r} \$30.01 \\ -\ \$15.76 \\ \hline \end{array}$$

10. (2)
$$\begin{array}{r} 376 \\ \times\ 87 \\ \hline \end{array}$$

11. (2)
$$\begin{array}{r} 470 \\ \times\ 203 \\ \hline \end{array}$$

12. (1) $\$20 - \$11.98$

13. (5) $596 - (400 - 129)$

14. (5) $32 \div (8 \times 4)$

15. (2) $8\overline{)4016}$

16. (2) $15\overline{)6009}$

17. (2) $36\overline{)9000}$

Find each unknown number. Check your work.

18. (4) $8w = 480$

19. (3) $x - 64 = 46$

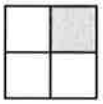
20. (4) $\frac{49}{N} = 7$

21. (4) $\frac{M}{7} = 15$

22. (3) $365 + P = 653$

23. (3) $36¢ + 25¢ + m = 99¢$

*** 24.** (6) ***Conclude*** The square at right was divided in half. Then each half was divided in half. What fraction of the square is shaded?



*** 25.** (6) ***Represent*** Copy this figure on your paper, and shade one fourth of it.

26. (2) $\$6.35 \cdot 12$

27. (1) Use the numbers 2, 4, and 6 to form two addition facts and two subtraction facts.

28. (2) Write two multiplication facts and two division facts using the numbers 2, 4, and 8.

*** 29.** (2) ***Connect*** Write a multiplication equation to solve this addition problem.

$$38 + 38 + 38 + 38 + 38 + 38 + 38 + 38 + 38 + 38$$

*** 30.** (6) ***Formulate*** Make up a fractional-part question about money, as in Example 2 part c. Then find the answer.

LESSON 7

• Lines, Segments, and Rays
• Linear Measure

Power Up

Building Power

facts

Power Up C

mental math

a. **Number Sense:** 800 − 300

b. **Number Sense:** 3000 − 2000

c. **Number Sense:** 450 − 100

d. **Number Sense:** 2500 − 300

e. **Number Sense:** 480 − 80

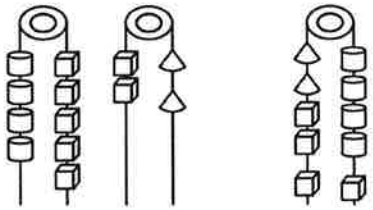
f. **Number Sense:** 750 − 250

g. **Measurement:** How many weeks are in a year?

h. **Measurement:** How many days are in a year?

problem solving

A pulley is in *equilibrium* when the total weight suspended from the left side is equal to the total weight suspended from the right side.



The two pulleys on the left are both in equilibrium. Is the pulley on the right in equilibrium, or is one side heavier than the other?

Understand We are shown three pulleys on which three kinds of weights are suspended. The first two pulleys are in equilibrium. We are asked to determine if the third pulley is in equilibrium or if one side is heavier than the other.

Plan We will *use logical reasoning* to determine whether the third pulley is in equilibrium.

Solve From the first pulley we see that four cylinders are equal in weight to five cubes. This means that cylinders are heavier than cubes. The second pulley shows that two cubes weigh the same as two cones. This means that cubes and cones weigh the same.

On the third pulley, the bottom cubes on either side have the same weight. We are left with two cones and two cubes on one side and four cylinders on the other. We know that cylinders are heavier than cubes and cones, so the pulley is not in equilibrium. The right side is heavier, so the pulley will pull to the right.

Check We can confirm our conclusion by looking at the third pulley as five cubes on the left (because the two cones are equal in weight to two cubes). From the first pulley, we know that five cubes are equal in weight to four cylinders. Another cube on the right side makes the right side heavier.

New Concepts

Increasing Knowledge

lines, segments, and rays

Thinking Skill

Conclude

If two opposite-facing rays are joined at their endpoints, what is the result? What do those endpoints become?

In everyday language the following figure is often referred to as a line:

However, using mathematical terminology, we say that the figure represents a **segment,** or line segment. A segment is part of a line and has two **endpoints.** A mathematical **line** has no endpoints. To represent a line, we use arrowheads to indicate a line's unending quality.

A **ray** has one endpoint. We represent a ray with one arrowhead.

A ray is roughly represented by a beam of sunlight. The beam begins at the sun (which represents the endpoint of the ray) and continues across billions of light years of space.

linear measure

Line segments have length. In the United States we have two systems of units that we use to measure length. One system is the **U.U.S. Customary System.** Some of the units in this system are inches (in.), feet (ft), yards (yd), and miles (mi). The other system is the **metric system (International System).** Some of the units in the metric system are millimeters (mm), centimeters (cm), meters (m), and kilometers (km).

Some Units of Length and Benchmarks

U.S. Customary System		Metric System	
inch (in.)	width of thumb	millimeter (mm)	thickness of a dime
foot (ft)	length of ruler, 12 inches	centimeter (cm)	thickness of little finger tip, 10 millimeters
yard (yd)	a long step, 3 ft or 36 inches	meter (m)	a little over a yard, 100 centimeters
miles (mi)	distance walked in 20 minutes, 5280 feet	kilometer (km)	distance walked in 12 minutes, 1000 meters

In this lesson we will practice measuring line segments with an inch ruler and with a centimeter ruler, and we will select appropriate units for measuring lengths.

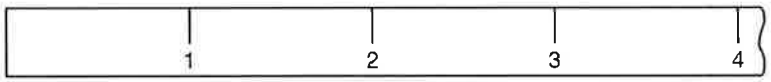
Activity

Inch Ruler

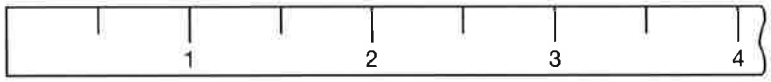
Materials needed:

- inch ruler
- narrow strip of tagboard about 6 inches long and 1 inch wide
- pencil

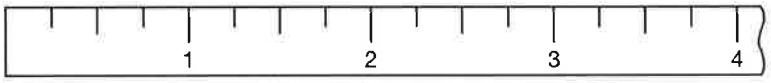
Model Use your pencil and ruler to draw inch marks on the strip of tagboard. Number the inch marks. When you are finished, the tagboard strip should look like this:



Estimate Now set aside your ruler. We will use estimation to make the rest of the marks on the tagboard strip. Estimate the halfway point between inch marks, and make the half-inch marks slightly shorter than the inch marks, as shown below.



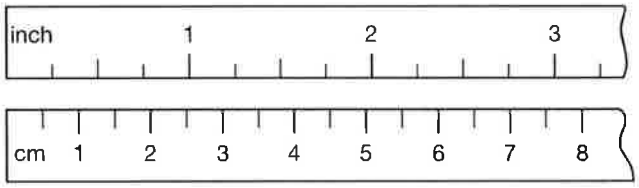
Now show every quarter inch on your tagboard ruler. To do this, estimate the halfway point between each mark on the ruler, and make the quarter-inch marks slightly shorter than the half-inch marks, as shown below.



Save your tagboard ruler. We will be making more marks on it in a few days.

Connect A metric ruler is divided into centimeters. There are 100 centimeters in a meter. Each centimeter is divided into 10 millimeters. So 1 centimeter equals 10 millimeters, and 2 centimeters equals 20 millimeters.

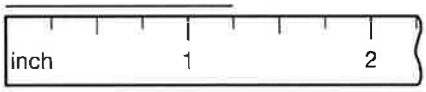
By comparing an inch ruler with a centimeter ruler, we see that an inch is about $2\frac{1}{2}$ centimeters.



A cinnamon stick that is 3 inches long is about $7\frac{1}{2}$ cm long. A foot-long ruler is about 30 cm long.

Example 1

How long is the line segment?



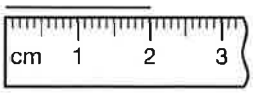
Solution

The line is one whole inch plus a fraction. The fraction is one fourth. So the length of the line is **$1\frac{1}{4}$ in.**

Reading Math
The abbreviation for inches (in.) ends with a period so it is not confused with the word *in*.

Example 2

How long is the line segment?



Solution

We simply read the scale to see that the line is **2 cm** long. The segment is also **20 mm** long.

Example 3

Select the appropriate unit for measuring the length of a soccer field.

A centimeters **B** meters **C** kilometers

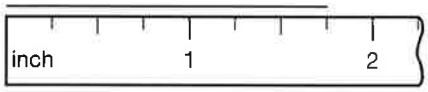
Solution

An appropriate unit can give us a good sense of the measure of an object. Describing a soccer field as thousands of centimeters or a small fraction of a kilometer can be accurate without being appropriate. The best choice is **B meters** for measuring the length of a soccer field.

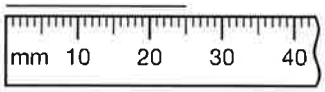
Practice Set

How long is each line segment?

a.



b.



c. ***Connect*** Measure the following segment twice, once with an inch ruler and once with a centimeter ruler.

Use the words *line, segment,* or *ray* to describe each of these figures:

d.

e.

f.

g. Which of these units is most appropriate for measuring the length of a pencil?

A inches **B** yards **C** miles

h. Select the appropriate unit for measuring the distance between two towns.

A centimeters **B** meters **C** kilometers

1. (2) To earn money for gifts, Debbie sold decorated pinecones. If she sold 100 pinecones at $0.25 each, how much money did she earn?

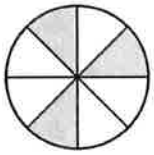
2. (1) There are 365 days in a common year. April 1 is the 91st day. How many days are left in the year after April 1?

3. (5) The Cardaso family is planning to complete a 1890-mile trip in 3 days. If they drive 596 miles the first day and 612 miles the second day, how far must they travel the third day? (*Hint:* This is a two-step problem. First find how far they traveled the first two days.)

4. (6) What number is $\frac{1}{2}$ of 234?

5. (6) How much money is $\frac{1}{3}$ of $2.34?

6. (6) Use words and digits to write the fraction of this circle that is shaded.



7. (1)
$$\begin{array}{r} 3654 \\ 2893 \\ +\ 5614 \\ \hline \end{array}$$

8. (1)
$$\begin{array}{r} \$41.01 \\ -\ \$15.76 \\ \hline \end{array}$$

9. (2)
$$\begin{array}{r} 28¢ \\ \times\ 74 \\ \hline \end{array}$$

10. (2)
$$\begin{array}{r} 906 \\ \times\ 47 \\ \hline \end{array}$$

11. (2) $6\overline{)5000}$

12. (2) $800 \div 16$

13. (2) $60\overline{)3174}$

14. (3) $3 + 6 + 5 + w + 4 = 30$

15. (5) $300 - 30 + 3$

16. (5) $300 - (30 + 3)$

17. (2) $\$4.32 \cdot 20$

18. (2) $24(48¢)$

19. (2) $\$8.75 \div 25$

Find each unknown number. Check your work.

20. (4) $W \div 6 = 7$

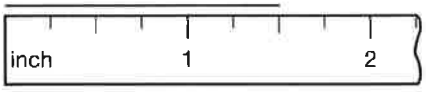
21. (4) $6n = 96$

22. (4) $58 + r = 213$

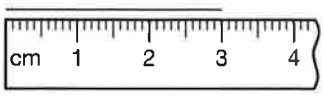
*** 23.** (1) **Connect** Rearrange the numbers in this subtraction fact to form another subtraction fact and two addition facts.

$$60 - 24 = 36$$

24. (7) How long is the line segment below?



25. (7) Find the length, in centimeters and in millimeters, of the line segment below.



*** 26.** (2) ***Connect*** Use the numbers 9, 10, and 90 to form two multiplication facts and two division facts.

*** 27.** (4) ***Explain*** How can you find a missing dividend in a division problem?

28. (3) $w - 12 = 8$

29. (3) $12 - x = 8$

30. (7) **a.** A meterstick is 100 centimeters long. One hundred centimeters is how many millimeters?

b. The length of which of the following would most likely be measured in meters?

A a pencil **B** a hallway **C** a highway

Early Finishers

Real-World Application

The district championship game will be played on an artificial surface. One-fifth of the team needs new shoes for the game. There are 40 players on the team, and each pair of shoes sells for $45.

a. How many players need new shoes?

b. How much money must the booster club raise to cover the entire cost of the shoes?

LESSON 8

• Perimeter

Power Up

Building Power

facts

Power Up A

mental math

a. **Number Sense:** 400 + 2400

b. **Number Sense:** 750 + 36

c. **Number Sense:** 8400 + 520

d. **Number Sense:** 980 − 60

e. **Number Sense:** 4400 − 2000

f. **Number Sense:** 480 − 120

g. **Measurement:** How many feet are in 2 yards?

h. **Measurement:** How many centimeters are in 2 meters?

problem solving

The digits 2, 4, and 6 can be arranged to form six different three-digit numbers. Each ordering is called a **permutation** of the three digits. The smallest permutation of 2, 4, and 6 is 246. What are the other five permutations? List the six numbers in order from least to greatest.

Understand We have been asked to find five of the six permutations that exist for three digits, and then list the permutations from least to greatest.

Plan To make sure we find all permutations possible, we will make an organized list.

Solve We first write the permutations of 2, 4, and 6 that begin with 2, then those that begin with 4, then those that begin with 6: 246, 264, 426, 462, 624, 642.

Check We found all six permutations of the digits 2, 4, and 6. Writing them in an organized way helped us ensure we did not overlook any permutations. Because we wrote the numbers from least to greatest as we went along, we did not have to re-order our list to solve the problem.

New Concept

Increasing Knowledge

The distance around a shape is its **perimeter.** The perimeter of a square is the distance around it. The perimeter of a room is the distance around the room.

Activity

Perimeter

Model Walk the perimeter of your classroom. Start at a point along a wall of the classroom, and, staying close to the walls, walk around the room until you return to your starting point. Count your steps as you travel around the room. How many of your steps is the perimeter of the room?

Discuss

a. Did everyone count the same number of steps?

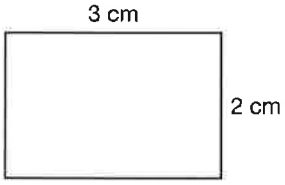
b. Does the perimeter depend upon who is measuring it?

c. Which of these is the best real-world example of perimeter?

1. The tile or carpet that covers the floor.

2. The molding along the base of the wall.

Here we show a rectangle that is 3 cm long and 2 cm wide.

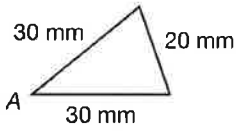


If we were to start at one corner and trace the perimeter of the rectangle, our pencil would travel 3 cm, then 2 cm, then 3 cm, and then 2 cm to get all the way around. We add these lengths to find the perimeter of the rectangle.

$$3 \text{ cm} + 2 \text{ cm} + 3 \text{ cm} + 2 \text{ cm} = \mathbf{10 \text{ cm}}$$

Example 1

What is the perimeter of this triangle?



Solution

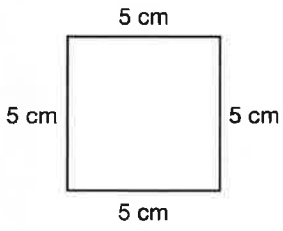
The perimeter of a shape is the distance around the shape. If we trace around the triangle from point *A*, the point of the pencil would travel 30 mm, then 20 mm, and then 30 mm. Adding these distances, we find that the perimeter is **80 mm.**

Example 2

The perimeter of a square is 20 cm. What is the length of each side?

Solution

The four sides of a square are equal in length. So we divide the perimeter by 4 to find the length of each side. We find that the length of each side is **5 cm.**



Practice Set

Thinking Skill

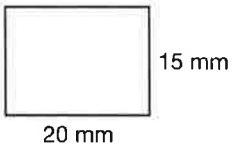
Verify

Why can we find the perimeter of a regular polygon when we know the length of one side?

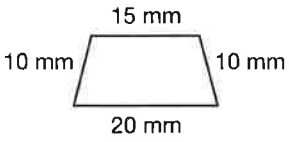
What is the perimeter of each shape?

a. square

b. rectangle

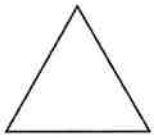


c. trapezoid

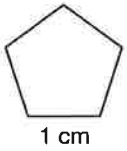


Figures **d** and **e** below are regular polygons because all of their sides are the same length and all of their angles are the same size. Find the perimeter of each shape.

d. equilateral triangle



e. pentagon



f. ***Conclude*** The perimeter of a square is 60 cm. How long is each side of the square?

g. ***Represent*** Draw two different figures that have perimeters that are the same length.

h. Select the appropriate unit for measuring the perimeter of a classroom.

A inches **B** feet **C** miles

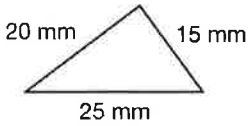
Written Practice *Strengthening Concepts*

1. (2) In an auditorium there are 25 rows of chairs with 18 chairs in each row. How many chairs are in the auditorium?

*** 2.** (1) ***Explain*** The sixth-graders collected 765 cans of food for the food pantry last year. This year they collected 1750 cans. How many fewer cans did they collect last year than this year? Explain how you found the answer.

3. (2) A basketball team is made up of 5 players. Suppose there are 140 players signed up for a tournament. How many teams will there be of 5 players per team?

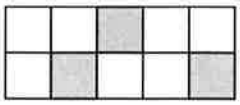
4. (8) What is the perimeter of this triangle?



5. (6) How much money is $\frac{1}{2}$ of \$6.54?

6. (6) What number is $\frac{1}{3}$ of 654?

*** 7.** (6) ***Represent*** What fraction of this rectangle is shaded?



8. (2) $4\overline{)\$9.00}$ **9.** (2) $10\overline{)373}$ **10.** (2) $12\overline{)1500}$ **11.** (2) $39\overline{)800}$

12. (5) $400 \div 20 \div 4$ **13.** (5) $400 \div (20 \div 4)$

*** 14.** (2) ***Connect*** Use the numbers 240, 20, and 12 to form two multiplication facts and two division facts.

15. (1) Rearrange the numbers in this addition fact to form another addition fact and two subtraction facts.

$$60 + 80 = 140$$

16. (8) The ceiling tiles used in many classrooms have sides that are 12 inches long. What is the perimeter of a square tile with sides 12 inches long?

17. (1, 2) **a.** Find the sum of 6 and 4.

b. Find the product of 6 and 4.

18. (3) $\$5 - M = \$1.48$ **19.** (5) $10 \times 20 \times 30$

20. (2) $825 \div 8$

Find each unknown number. Check your work.

21. (3) $w - 63 = 36$ **22.** (3) $150 + 165 + a = 397$

23. (4) $12w = 120$

24. (4) If the divisor is 8 and the quotient is 24, what is the dividend?

*** 25.** (7) ***Estimate*** **a.** Measure the length of the line segment below to the nearest centimeter.

b. Measure the length of the segment in millimeters.

*** 26.** (7) ***Model*** Use a ruler to draw a line segment that is $2\frac{3}{4}$ in. long.

27. (3) $w - 27 = 18$ **28.** (3) $27 - x = 18$

29. (2) Multiply to find the answer to this addition problem:

$$35 + 35 + 35 + 35$$

*** 30.** (8) ***Explain*** How can you calculate the perimeter of a rectangle?