Sample Pages from
*Exploring Math: An Intervention & Reinforcement Resource*

*Level C*

- Teacher Resource Guide Introduction
- Unit 1: Reading and writing numbers
- Problem Solving Strategy Card: Looking for a Pattern
- Real Life Problem Solving Card: The Tallest Trees in the World
Introduction

*Exploring Math: An Intervention and Reinforcement Resource* is a mathematics program that offers intervention and reinforcement opportunities in key areas of the math curriculum. This program can be used for summer school, after school and tutoring programs, or to support a year-long mathematics program.

Each kit includes:

- Teacher Resource Guide
- 7 units of lessons, with each unit focused on a specific set of content and process skills
- 7 Problem-Solving Strategy Cards, to be used with problem-solving lessons in the units
- 14 Real-Life Problem-Solving Cards, to be used with problem-solving lessons in the units
- 14 Skill Application Games to reinforce skills introduced in unit lessons
- CD-ROM with downloadable practice pages, tests, problem-solving and strategy cards, reproducibles, and *PowerPoint®* Lessons
- 42 transparencies of problem-solving and strategy cards, for use with problem-solving lessons

**Teacher Resource Guide**

The guide provides the teacher with a variety of tools and information to use with the materials in this kit. It is divided into these sections:

- Introduction
- Management (includes standards correlations and a listing of objectives for each unit)
- Placement Test
- Problem-Solving Strategies
- Skill Application Games
- Glossary (a teacher/student guide to terms commonly used in the units)

The units in this kit contain specific, sequential lessons by topic, and are divided into units that target the following content goals and processes:

- Numbers & Numeration
- Operations & Computation
- Fractions
- Geometry
- Measurement
- Data Analysis
- Problem Solving
- Algebraic Thinking
- Mathematical Reasoning
Introduction

About the Units

Each unit is organized as follows:

Table of Contents and Introductory Pages

Lessons

• Teacher Lesson
• Student Page(s)
• Pre-Test/Post-Test Page

Answer Keys

• Keys for Student Pages
• Keys for Pre-Tests/Post-Tests

Reproducible Pages

• commonly-used reference pages

Every unit in the Exploring Math kit contains the lessons, student activity pages, pre-tests and post-tests, answer keys, and reproducibles for the unit. Since the units are self-contained and topic-specific, they are also ideal for use as replacement units in the classroom.

Note: With each lesson, the teacher has the option of choosing from two forms of presentations. The first method is to use the lessons as written in the unit. For those who wish to use an alternative method, we have provided PowerPoint® slide shows that meet the same lesson objectives, and include warm-up activities and the main lesson as well. A thumbnail copy of the PowerPoint® slides is included in the lessons, and each PowerPoint® lesson presentation can be found on the CD-ROM.

The administration of Pre-Tests and Post-Tests provides a method of assessing student achievement. Pre-Tests should be given prior to each lesson, to assist the teacher in determining classroom needs. Forms for recording test scores for each student can be found at the beginning section of each unit.

Answer keys for both the student pages and the Pre-Tests and Post-Tests are located within each unit. The student page answer keys are presented first, followed by the test answer keys.

The last section of each unit contains reproducible pages that may be commonly used throughout the unit. Material on some of the pages are used as manipulatives. Other pages provide reference information for the students.

The following pages provide additional details of the lesson content and organization.
About the Units: Lesson Organization

The lesson is identified by number. The first number is the unit, the second number represents the lesson.

Each lesson identifies the topic area or skill to be covered in the lesson.

A visual representation of the lesson tests, student pages, and reproducibles is provided.

Focused learning objectives are identified. A standards correlations chart, located in the Teacher Resource Guide, matches lesson objectives to national standards.

Lessons identify specific resources, including any related practice pages from the CD-ROM, reproducible pages, game-board activities, or suggested classroom manipulatives.

**Note:** For PowerPoint® lesson options, arrange for the necessary equipment in advance.

The Warm-Up Activity reinforces mental math and number skills and actively engages students prior to the lesson. Activities help develop students’ abilities to think mathematically. Content may or may not link directly to the main body of the lesson.

**Note:** As with the main lesson and group work, the alternative PowerPoint® warm-up lesson can replace this written lesson.
About the Units: Lesson Organization

This is the whole-class or whole-group section of the lesson. The interactive lesson focuses on the skills listed in the learning objectives. The text includes questions to ask the students and examples that reinforce the skills being taught. The Whole-Class Skills Lesson is a suggested plan for teaching the objectives. You can adapt the contents to meet the needs of your students.

Reminders about Pre-Test administration and preparation for Differentiated-Group Skill Practice activities are provided.

The text is numbered, providing easy-to-follow steps as the lesson is presented.
Introduction

About the Units: Lesson Organization

Use the differentiated-group practice suggestions to reinforce the skills taught in the lesson. Groups can be determined by pre-test results and/or general understanding of the concepts and skills introduced in the lesson. The Differentiated-Group Skills Practice portion of the lesson provides an opportunity for more focused learning and addresses the various ability levels within the class.

The symbols indicate levels of difficulty (On Level, Below Level, Above Level).

Suggestions for the Lesson Review are included. They provide an opportunity for group discussion and reflection.

Some group activities are facilitated by the teacher, while other group practice is assigned as small group or independent work. The method of presentation is noted within the text.

These optional activities may include a homework assignment or activity that challenges students to extend their thinking.

A Post-Test reminder is included. Use test results to assess students’ understanding of the skills and concepts introduced in the lesson.

Check here for any related practice pages from the CD-ROM and/or Skill Application Game cards that reinforce some of the skills taught in the lesson.
About the Units: Lesson Organization

With the exception of the two strategy-based problem-solving lessons, the teacher has the option of choosing from two forms of presentation. The first method is to use the lesson as written in the unit. For those who wish to use an alternative method, we have provided PowerPoint® slide shows that meet the same lesson objectives. If you decide to use the PowerPoint® lesson option, keep in mind that you will need the same resources and general preparation as in the written lesson.

The slides present only the Warm-Up Activity and Whole-Class Skills Lesson components.

The slide presentation meets the common objective(s) of the lesson, but the content and examples are not exact duplicates of the written lesson. It is an alternative plan for teaching the warm ups and main lessons.

**Suggestion:** If the written lesson has been given, and students need further review, consider using the PowerPoint® Lesson Option as additional reinforcement.

Once you have completed the Warm-Up Activity and the Whole-Class Skills Lesson slides, you are directed to the group practice activities. The last slide indicates what each group will focus on as they practice and reinforce the skills learned in the main lesson. This is only an introduction to the activities. For group details, see the information provided in the Differentiated-Group Skills Practice section of the written lesson.

Following the group practice activities, continue as you would with the written lesson by completing the Lesson Review, administering the Post-Test, and introducing the optional Extension Activities.
Exploring Math: Intervention and Reinforcement Resource allows the teacher to focus on math topics in which students need additional reinforcement. It is especially important in intervention and other support programs to determine areas of greatest need as soon as possible.

Getting Started: Placement Tests

The first step in using the materials in this kit is to administer the Placement Test. The results will help you evaluate your students’ skill levels in each of the units in the kit. We have provided a placement test in this guide (pages 47–67) that should be administered prior to formal instruction. The placement test consists of 15 items for each unit in the kit. Test items are representative of the units’ content, and have been named Unit 1, Unit 2, Unit 3, and so on, to correlate with the unit guides.

Reproduce a copy of the test for each student. Students can write on the copy (circling the appropriate answer choices), or the test copy can be used for reading only, and students can use the bubble-in test answer sheets found on pages 68 and 69. In either case, students should show their work on the test, or on separate paper. An Answer Key is provided on page 70.

You may wish to administer the test in two or three sessions. This allows time for scoring between test-taking sessions. A Placement Test Class Record is available on pages 71 and 72. Record student names and test results on this form for an overview of class test results. After a test is scored, write in the number of correct responses for each student in the appropriate columns. For example, if Johanna scored 11 out of 15 correct on the Multiplication and Division test items, write in “11” in the top section of the scoring box for that unit.

When all sections of the test have been administered, and the students’ scores are recorded, review the test score record form. First, find the mean scores for each unit by averaging the columns and writing the average at the bottom of each column. The results will provide you with an overview of the students’ overall performance and help you prioritize the unit(s) that need the most reinforcement. If mean scores are similar, and the overall results are fairly equal, plan to start with the math topic that is generally most essential to your math curriculum needs.

Evaluation of the placement test results will help you establish the unit(s) on which to focus attention. If, for example, students score lowest on a set of multiplication and division items in the placement test, you should consider the Multiplication and Division unit a priority. See pages 25–27 for pacing plans.
Getting Started: Placement Tests (cont.)

It is recommended that you keep a file for each student, in which to store placement tests, pre-tests and post-tests, and other documentation of progress the student is making as he or she moves through the unit(s) in the kit.

Using the Lessons

After the placement test scores have been recorded and reviewed, select the unit(s) you feel need the most reinforcement. Look over the information in the written lessons or the PowerPoint® lesson presentations.

Tests

Before you start a lesson, give the students the pre-test for that lesson. The Pre-Test can be administered at the end of a previous lesson, at the beginning of the day, or at some other point in your schedule that will allow you time to score it. Because the test is short, scoring time is minimal. (Information on the tests, preparing individual student files, and record-keeping forms are provided on pages 8–11 of each unit.)

To prepare the tests, reproduce copies of each for the students. Cut the copies in half along the dashed line, separating the Pre-Tests from the Post-Tests. Store the tests until needed. (Copy all the unit tests at once in this way, or only prepare a few units at a time.)

Use Pre-Test results to evaluate students’ needs as they relate to the content of the lesson, and to determine your student groups during the Differentiated-Group Skills Practice portion of the lesson. Since there will inevitably be variations in ability within each group, some flexibility is advised in assigning group work. However, the Pre-Tests can serve as a tool for determining initial grouping for the lesson.

Overall assessment of each student’s progress can be checked with the Post-Test, administered at the end of the lesson. Record scores on the record-keeping form provided in each of the units.
Learning Objectives

✓ Read and write whole numbers to 10,000.
✓ Know what each digit represents.
✓ Identify the place value for each digit to the thousands place.

Resources

• 10 cubes
• number cubes
• “Windows” (page 19)
• counters
• Number Cards 0–9 (page 142)
• calculators
• Pre-Test/Post-Test (page 20)

Warm-Up Activity

1. Give each student a set of number cards 0–9.
2. Tell students, “Today we will be practicing number facts.”
3. Show students that you are holding 10 cubes.
4. Put the 10 cubes behind your back, then show six of them.
5. Ask, “How many cubes are still behind my back?” Students can hold up a number card to show their answer.
6. Repeat the steps above for other quantities of cubes.
7. Emphasize to students the need for speed of recall.
Whole-Class Skills Lesson

If the Pre-Test (page 20) has not yet been given, administer it at this time. (See pages 8–11 for information.)

Prepare to group students for the Differentiated-Group Skills Practice which follows the Whole-Class Skills Lesson.

Use the directions below, or the PowerPoint® presentation (see PowerPoint® Lesson Option preview, page 18), to teach this lesson.

1. Tell students, “Today we will be looking at large numbers up to 10,000 and seeing what each digit in the number represents.”

2. Write the number 4,238 on the board and ask what each digit represents.

3. Write the value of each number on the board.

4. Ask the following questions:
   - “What other numbers can be made with these digits?”
   - “What number cards would you need to make those numbers?”

5. Write the headings Thousands, Hundreds, Tens, and Ones on the board or overhead projector.

6. Have students use their number cards 0–9 to make four-digit numbers. Tell them to make four numbers using the digit 7 in a different position each time. The students should write these down on some paper. Ask, “What is the value of the 7 in each number?”

7. Now have students make a four-digit number with no hundreds. Ask, “How do I say this number?”

8. Then tell students to make a number closest to 5,000. In each case have a volunteer read his or her number. Point to different digits and ask what each one represents.

9. Repeat step 8 making the number closest to 0.
Differentiated-Group Skills Practice

Below Level – Teacher Directed

- For each pair of students, you will need “Windows” (page 19), some counters in two different colors, a set of number cards 0–9, and four number cubes.
- Read the directions for “Windows” together.
- Each pair of students will roll four number cubes and arrange them to make the highest number possible.
- Demonstrate how this number is made using a set of number cards.
- Separate the cards to show how the number is made up before choosing one part to cover a window on the page.
- Students should play in pairs, making the numbers with their number cards first to determine the highest number possible.
- As students play, ask them to say the number out loud and discuss what each digit represents.
- If some students are not confident with numbers of this size, play a revised version of the game using only three number cubes.

On Level/Above Level – Student Directed

- Have students play “Windows” with a partner, according to the directions on the activity sheet. (Optional: Play a variation of the game by making the smallest four-digit number possible after rolling the four number cubes.)

Lesson Review

Ask students to input 5,163 on their calculators. Ask them how they can reduce it to 5,063; to 5,003; to 3; and to 0. As students explain their subtraction methods, record the information on the board.

Emphasize place value, and try additional numbers. When each new number is formed, ask the class to say it aloud. This is especially helpful when the hundreds or tens digit is 0 since many students experience difficulty with these numbers.

Administer the Post-Test (page 20) at this time. (See pages 8–11 for information.)

Extension

Extend the lesson by asking students to make different four-digit numbers using only the digits 0, 1, 2, and 3. Students can practice with combinations of other four-digit, five-digit, and six-digit numbers as well.

Additional Extension Resources

- CD-ROM Practice Pages: 1–3, 7–9
- Skill Application Game: Butterfly Count
Today’s Lesson
Reading and Writing Numbers

Warm-Up Activity
Today we will be practicing number facts. Be ready to answer questions about the following pictures.

There are ten cubes. How many are hidden?

Now how many are hidden?

There are ten cubes. How many are hidden now?

Whole-Class Skills Lesson
Today we will work with large numbers up to 10,000 and decide what each digit in the number represents.

4 2 3 8
Say what each digit represents?

Place Value Headings
Thousands Hundreds Tens Ones

What other place value headings do you know?

Make a four-digit number with a 5 in it. How do you say this number?

What is the value of the 5 in your number?

What is the value of the 5 this time?

Group Work

Make a four-digit number with a 5 in it. How do you say this number?

The number must be the closest it can be to 5,000.

Make another four-digit number with a 5 in it.

Make two more four-digit numbers with a 5 in them.

Say the numbers.

Say what the value of the 5 is each time.
**Instrucciones:** Juega con un compañero. Para jugar, necesitan cuatro dados numéricos y fichas de dos colores (un color por jugador). Lancen y ordenen los dados para formar el mayor número de cuatro dígitos posible. Lean el número en voz alta. Escojan el valor de cualquiera de los dígitos del número y cubran la ventana correspondiente. Por ejemplo, si el número es 4,321, pueden cubrir 1, 20, 300, ó 4,000. Ganará el primero en cubrir cuatro ventanas en fila.
### Evaluación previa

<table>
<thead>
<tr>
<th></th>
<th>Evaluación previa</th>
<th>Evaluación posterior</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>¿Qué número representa cinco unidades de millar, cero centenas, tres decenas y dos unidades?</td>
<td>¿Qué número representa ocho unidades de millar, cero centenas, seis decenas y cinco unidades?</td>
</tr>
<tr>
<td></td>
<td>A 5,320</td>
<td>A 8,065</td>
</tr>
<tr>
<td></td>
<td>B 5,032</td>
<td>B 80,605</td>
</tr>
<tr>
<td></td>
<td>C 50,302</td>
<td>C 8,605</td>
</tr>
<tr>
<td></td>
<td>D 5,203</td>
<td>D 8,056</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2</th>
<th>¿Cuál es el valor del 4 en 14,068?</th>
<th>El monte McKinley, en Alaska, tiene veinte mil trescientos veinte pies de altura. ¿Qué número representa esta altura?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F 4 unidades</td>
<td>F 2,302</td>
</tr>
<tr>
<td></td>
<td>G 4 decenas</td>
<td>G 20,320</td>
</tr>
<tr>
<td></td>
<td>H 4 centenas</td>
<td>H 2,032</td>
</tr>
<tr>
<td></td>
<td>J 4 millares</td>
<td>J 20,203</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3</th>
<th>El auditorio de la escuela de Juan tiene 805 asientos. Este número se lee así:</th>
<th>¿Cuál es el valor del 3 en 18,372?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A ochenta y cinco</td>
<td>A 3 millares</td>
</tr>
<tr>
<td></td>
<td>B ocho mil cinco</td>
<td>B 3 centenas</td>
</tr>
<tr>
<td></td>
<td>C ochocientos cinco</td>
<td>C 3 decenas</td>
</tr>
<tr>
<td></td>
<td>D ochocientos cincuenta</td>
<td>D 3 unidades</td>
</tr>
</tbody>
</table>
Open-Ended Problem Solving

Open-ended problems challenge a learner’s thinking. In looking at open-ended problems, students explore problems that may be answered in a number of ways. However, these problems should always be accurately computed.

These problem-solving activities are vitally important, and assist teachers to gauge the level at which their students are achieving, because students respond to challenges at their own level of development. The process that is used is more important than simply achieving the answer. When structuring problems, words such as create, make, design, investigate, and explore should be used.

Ask students to develop their own open-ended problems. It is important that students develop their own open-ended problems and solutions as this involves them in developing their thinking and phrasing. If you are helping students solve problems they have set up, model your work as you solve them, as students will learn from your approach to their problems.

There are some specific skills and strategies that are useful when working with this approach.

Using Numbered or Labeled Counters

When problems become involved, using numbered or labeled counters can help students visualize a problem and its solutions. The counters can be easily manipulated and altered and other combinations found. Changes can easily be made if work is incorrect. When the correct solution is found, it can be written down.

Trying Different Combinations of Numbers

For example, if attempting to solve a problem in which you are to determine the largest product possible using five different numbers, start by using the largest three-digit number and then the largest two-digit number to see the different answers.

(See also Example 1.)
Problem-Solving Lesson
Using Strategies to Solve Real-Life Problems

Introducing the Strategy

Problem-Solving Strategy Card: Looking for a Pattern

Resources

✓ Problem-Solving Strategy Card and transparencies: “Looking for a Pattern”
✓ Real-Life Problem-Solving Card and transparencies: “How Do People Grow?”

If an overhead projector is unavailable, use the problem-solving card provided (or download from the CD-ROM) to prepare copies of the cards for students to use during the lesson.

Introduce the Strategy

Introduce or review the strategy using the following steps.


2. Work through the problem on the bottom of the page. Ask students to explain how drawing a table helped organize the information and determine the answer. Point out how the table helped the pattern become more obvious.

3. Place the transparency for Side B of the strategy card, “Using the Strategy,” on the overhead projector. Read and discuss the Sample Problem.

4. Read and discuss each of the four steps shown (Understanding the Problem, Planning and Communicating a Solution, Reflecting and Generalizing, and Extension) as it applies to the Sample Problem. Reinforce with students the importance of reflecting on how the solution was reached. Have them think of other problems that could be created as an extension of the original one.

Review the Strategy

1. Reread the strategy card with the students and review key information. Remind students that when using this strategy, they are organizing information in a table in order to help them find a pattern that will lead them to a solution.

2. Review with students how to create a table. They should understand that they will need to determine the number of rows and columns a table will need. Point out that the rows and columns should be related to the pattern they are looking to find.

3. To use patterns and tables to find a solution, students will need to understand the question being asked. Reinforce that they must determine what information they will need to solve the problem.

4. Read the problem to determine the information already known. Suggest that underlining, highlighting, or making a quick list of the information from the problem may be useful. Then, transfer to the table the information given in the problem.
Problem-Solving Lesson
Using Strategies to Solve Real-Life Problems

Applying the Strategy

Real-Life Problem-Solving Card: “How Do People Grow?”

**UNDERSTANDING THE PROBLEM**

**Getting Ready**

- Place the transparency for Side A of “How Do People Grow?” on an overhead projector.
- Together, read and discuss the information on Side A of the problem-solving card. Discuss the differences in height in the classroom. Ask questions such as, “Is everyone who’s the same age the same height?”
- Explain to students that they will be assigned to a group and given a specific problem to solve based on the information on Side A of the card. They will use the strategy of drawing a table to solve the problem.
- Divide the class into groups based on ability levels indicated on Side B of the card (Problem A: Below Level, Problem B: On Level, Problem C: Above Level).

**What do I know?**

- Help students identify information that will be needed to solve the problem. Provide any measurement tools students will need to find information necessary for solving the problem.

**Problem A**

Some students may know how tall they are. One foot equals twelve inches.

**Problem B**

Some students may know how tall they are. The problem assumes you grow two inches per year.

**Problem C**

Some students may know how tall they are. Some people grow faster than others. The problem assumes that an individual person grows the same amount each year.

**What do I need to find out?**

- Identify what question needs to be answered when solving the problem.
- Have students write the question(s) that needs to be answered at the top of their work papers.

**Problem A**

How tall am I? What is my height in inches? How many feet does that equal?

**Problem B**

How tall am I? What is my height in inches? What pattern can I find in my growth?

**Problem C**

How tall am I? How can I find two different patterns in my growth? How many years do I need to show of my growth to solve the problem?
Applying the Strategy (cont.)

Real-Life Problem-Solving Card: “How Do People Grow?” (cont.)

**Problem A**

Students will benefit from using a measuring tool that shows both inches and feet. Examination of the tool should reveal the pattern that twelve inches equals one foot. Students can then make a table showing the number of inches in one foot, two feet, three feet, four feet, and five feet. They should see that they could fill in the table by using repeated addition.

**Problem B**

Students should look for a pattern in the problem and recognize that the pattern is their height will go up by 2 inches per year. Students could create a table or use repeated addition or multiplication to solve this problem. They should recognize that repeated addition and multiplication are patterns.

**Problem C**

Students should recognize that this problem has two patterns. One pattern is their height will increase by two inches every year. Another is they will grow by 3.5 inches per year. They should also notice there is a pattern in the years the problem is asking for heights in. Students may wish to create a table to solve this problem or use multiplication to solve.

**Solutions**

Answers will vary depending on students’ heights. Sample answers for the problems follow.

**Problem A**

Repeated addition could be used to solve this problem.

\[4 \text{ feet } 2 \text{ inches} = 12 + 12 + 12 + 12 + 2 = 50 \text{ inches}\]

If students make a table of feet to inches, it should be similar to the following:

<table>
<thead>
<tr>
<th>Feet</th>
<th>Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>2</td>
<td>24</td>
</tr>
<tr>
<td>3</td>
<td>36</td>
</tr>
<tr>
<td>4</td>
<td>48</td>
</tr>
<tr>
<td>5</td>
<td>60</td>
</tr>
</tbody>
</table>

**Problem B**

Since the problem states the student will grow 2 inches per year they can just count up by twos from their current height to solve the problem.

\[4 \text{ feet } 2 \text{ inches} = 50 \text{ inches now. } 50, 52, 54, 56, 58. \] I will be 52 inches in one year, 54 inches in two years, 56 inches in three years, and 58 inches in four years.

Students could also use repeated addition or multiplication to solve. For example, \[50 + 2 = 52 + 2 = 54 + 2 = 56 + 2 = 58.\]
Problem C

Students should recognize the pattern of 2 inches growth per year and 3.5 inches growth per year. They should also see the pattern of three years between 3, 6, and 9 years. They can use this information to solve the problem with multiplication. 4 feet 2 inches = 50 inches now. 3 years x 2 inches/year = 6 inches growth every 3 years. 50 + 6 = 56 inches. 3 years x 3.5 inches/year = 10.5 inches growth every 3 years. 50 + 10.5 = 60.5 inches.

Students could also find this pattern by creating a table that starts with their current height and adds 2 inches to it every year. Students could create another row or column, or another table to show the pattern of 3.5 inches per year. An example is in the table below:

<table>
<thead>
<tr>
<th></th>
<th>2 Inches per Year</th>
<th>3.5 Inches per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height Now</td>
<td>50 inches</td>
<td>50 inches</td>
</tr>
<tr>
<td>3 Years</td>
<td>56 inches</td>
<td>60.5 inches</td>
</tr>
<tr>
<td>6 years</td>
<td>62 inches</td>
<td>71 inches</td>
</tr>
<tr>
<td>9 years</td>
<td>68 inches</td>
<td>81.5 inches</td>
</tr>
</tbody>
</table>

Problem B

What pattern did you use to help you find the correct answer to this problem? How is repeated addition like a pattern? How is multiplication like a pattern? How would you have solved this problem if you didn’t have a pattern to use?

Problem C

Have students reflect on the three different patterns they found in Problem C. How did each of these patterns help you solve the problem faster? Look at the problem again and try adding 3.5 inches each year up to nine years from your original height. Why was multiplication easier to do in this problem?

Help students recognize that they were able to solve the problem faster, because they found a pattern. They were also able to solve the problem using a pattern, because the problem said they grew the same amount every year. If the problem said you didn’t grow the same amount every year, could you have solved it by looking for a pattern?

Extensions

Have students do additional research to see if the patterns of 2 or 3.5 inches of growth a year would be probable for actual student growth.

Use the Class Challenge to solve an additional problem related to the topic. Answers will vary.

Challenge students to create additional problems with the data provided in the article on Side A of “How Do People Grow?” You may also have students take measurements in your classroom or hallway of tiles on the floor and solve problems similar to the ones they have completed.

La mayoría de las mujeres son más bajas que los hombres. La mujer promedio de Estados Unidos mide 5 pies y 4 pulgadas. El hombre promedio de Estados Unidos mide 5 pies y 9 pulgadas. La mayoría de los bebés al nacer miden entre 18 y 24 pulgadas. Crecen hasta alrededor de los 18 años de edad. La mayoría de la gente deja de crecer después de los 18. Curiosamente, Robert Wadlow era de tamaño promedio al nacer. ¿Cuánto crecerás?
¿Cuál es el Problema?

Muchos doctores pueden decir qué tan alto va a llegar a ser un niño. Saben muchas cosas acerca de cómo la gente crece. Usa información sobre tu altura para responder a las preguntas siguientes.

Usa la información de ambos lados de la tarjeta para responder a las preguntas. Se te pedirá que resuelvas uno de los problemas. Antes de empezar, encuentra la información que necesitas.

Recuerda: Si se te dificulta resolver el problema, vuelve a leerlo y piensa otra vez en la estrategia. Cuando tengas la solución, decide si la respuesta es lógica.

Estrategia para resolver problemas: busca un patrón

Problema A
Mide tu estatura en pies y pulgadas. Cambia la estatura a sólo pulgadas. ¿Cuántas pulgadas mides en total?

Pista: Haz una tabla para mostrar tu estatura en pulgadas. No olvides mostrar cuántas pulgadas equivalen un pie, conforme notes un patrón en la tabla.

Problema B
Mide tu estatura en pies y pulgadas. ¿Cuántas pulgadas mides en total? Si creces un promedio de 2 pulgadas por año, ¿cuánto medirás en cuatro años?

Pista: Multiplica para resolver.

Problema C
Algunas personas crecen más rápido que otras. Si creces 2 pulgadas por año, ¿cuánto medirás en tres años? Si creces 3.5 pulgadas por año, ¿cuánto medirás en tres años?

Reto para la clase
Midan la estatura de cada alumno. Hagan una tabla o gráfica de las estaturas. Averigüen la estatura promedio o media. ¿Hay alguien con esa estatura? Encuentren el modo de las estaturas. ¿Cuál es la mediana de las estaturas?
El árbol de secoya es uno de los árboles más altos del mundo. Su tronco puede medir hasta 300 metros de altura. Eso es tan alto como un edificio de 30 pisos. Las secoyas crecen a una altura sorprendente cuando son jóvenes. Después, crecen más lento.

El árbol de secoya gigante es uno de los seres vivos más grandes de la tierra. Uno de los árboles de secoya más altos se llama “General Sherman”. Mide 275 pies de altura. Tiene un diámetro de más de 14 pies. El General Sherman mide más de 100 pies alrededor de la base. Se cree que algunos árboles de secoya tienen más de 4,000 años. Se cree que la mayoría de los árboles de secoya en los Estados Unidos tienen alrededor de 650 años. Muchos de estos ya miden más de 200 pies de altura.

Puedes visitar los árboles gigantes de secoya en los parques nacionales de California. En el parque nacional Sequoia y Kings Canyon, puedes visitar los árboles y aprender más sobre ellos de los guardabosques. El parque es el hogar de varias de las secoyas más altas del mundo. Se les han dado nombre a estos árboles, como al General Sherman. Un grupo de árboles altos ha sido nombrado “Las tres hermanas” porque están uno al lado del otro.

### Secoyas gigantes de los parques nacionales Sequoia y Kings Canyon en California

<table>
<thead>
<tr>
<th>Nombre del Árbol</th>
<th>Altura (en pies)</th>
<th>Circunferencia (en pies)</th>
<th>Ubicación</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazelwood</td>
<td>282</td>
<td>104</td>
<td>Giant Forest Grove</td>
</tr>
<tr>
<td>General Sherman</td>
<td>276</td>
<td>103</td>
<td>Giant Forest Grove</td>
</tr>
<tr>
<td>Rey Arturo</td>
<td>270</td>
<td>104</td>
<td>Garfield Grove</td>
</tr>
<tr>
<td>Nelder</td>
<td>264</td>
<td>90</td>
<td>Nelder Grove</td>
</tr>
<tr>
<td>Génesis</td>
<td>258</td>
<td>85</td>
<td>Mountain Home Grove</td>
</tr>
<tr>
<td>Washington</td>
<td>252</td>
<td>101</td>
<td>Giant Forest Grove</td>
</tr>
<tr>
<td>Pershing</td>
<td>246</td>
<td>91</td>
<td>Giant Forest Grove</td>
</tr>
<tr>
<td>PreLadont</td>
<td>240</td>
<td>93</td>
<td>Giant Forest Grove</td>
</tr>
<tr>
<td>Washington</td>
<td>234</td>
<td>95</td>
<td>Mariposa Grove</td>
</tr>
<tr>
<td>Jefe Sequoyah</td>
<td>228</td>
<td>90</td>
<td>Giant Forest Grove</td>
</tr>
<tr>
<td>Franklin</td>
<td>222</td>
<td>95</td>
<td>Giant Forest Grove</td>
</tr>
</tbody>
</table>
¿Cuál es el problema?

Te acabas de enterar que tu familia irá de vacaciones al parque Secoya y Kings Canyon. Has recibido por correo un paquete de información del Servicio Nacional de Parques con datos acerca de las giras que puedes tomar y los árboles que puedes ver. Ahora, tu tarea es ayudar a planear el viaje para ver esos gigantes.

Usa la información de ambos lados de la tarjeta para responder a las preguntas. Se te pedirá que resuelvas uno de los problemas. Antes de empezar, encuentra la información que necesitas.

Recuerda: Si se te dificulta resolver el problema, vuelve a leerlo y piensa otra vez en la estrategia. Cuando tengas la solución, decide si la respuesta es lógica.

Estrategia para resolver problemas: busca un patrón

Problema A

La primera gira que viste se llama “Minitour” y te lleva a los siguientes árboles en el orden escrito: Génesis, Nelder, Rey Arturo, General Sherman y Hazelwood.

¿Cuál es el patrón del orden de los árboles que visitarás?

Pista: Compara las alturas en la tabla y escríbelas en orden para encontrar el patrón.

Si el Servicio Nacional de Parques quisiera agregar dos árboles más al principio de esta gira, ¿cuáles serían? ¿Por qué?

Problema B

La “Gira máxima” te lleva a los 11 árboles de la lista. La primera escala en la gira es Franklin. Continúas en orden y acabas en Hazelwood. ¿Cuál es el patrón en el orden de los árboles que visitarás? Conforme estudies más detenidamente la tabla, verás un patrón en las alturas de los árboles en la gira. ¿Qué notas acerca de la diferencia en la altura de los árboles a lo largo del viaje? Si se agregara un doceavo árbol al principio del tour, ¿cuánto mediría?

Pista: Usa la resta para encontrar un patrón.

Problema C

La “Gira de gigantes gentiles” te lleva a los siguientes árboles en éste orden: Franklin, Jefe Sequoyah, Presidente, Pershing, Washington, General Sherman y Hazelwood.

Hay dos patrones en esta lista de escalas del tour. ¿Cuáles son? ¿Por qué crees que el tour acaba en Hazelwood en vez de empezar ahí? Si estuvieras en el tour, ¿de qué forma sería diferente tu experiencia si empezaras en la escala 7 y acabaras en la escala 1?

Reto para la clase

Miren la tabla y vean si pueden encontrar otros patrones. En grupo, usen la Red o la biblioteca para investigar los nombres de los árboles y ver si hay un patrón en sus nombres.
About the Skill Application Games (cont.)

In general, the games provided for a given unit can be used as your students work on the lessons and activities for that unit. However, for a more specific connection between the objectives of a game card and a set of lessons within a unit, refer to the Extension section of the lessons. If the objective(s) and activities on the Skill Application Game card reinforce a particular lesson, the card title will be noted among the suggested extensions.

Preparing the Cards

Read the information provided in the Skill Application Games section of this book. Reproduce the materials and prepare the game as directed. You may wish to copy and store the materials in resealable plastic bags or in envelopes and place them inside the folded game cards. Cards can be stored in boxes in a math center. Copy the student directions, and place a copy inside the game card as well. If you choose this method, students will have a copy of the directions in front of them as they play the game.

For students who need additional support with math calculations, keep calculators, number lines, addition/multiplication charts, base-10 blocks, and other manipulatives on hand as they play the games. For additional materials, see the reproducibles sections of each of the units.

Using the Skill Application Games

Since the games are organized by unit, you can choose the appropriate cards to have ready at a center. You could include game boards from other units, provided students are able to perform the math calculations required to complete the activities. Make a schedule indicating when students can use the center and the cards. Be sure to discuss with students the classroom rules for using the center and appropriate student behavior while working on the game cards.

The games can be used over and over again to reinforce the skills and concepts students have learned. As you and your students become more familiar with the activities, you may wish to change the rules of play or the objectives of the game by adding more complex math calculations or a different way to win the game.
Introduction

About the Skill Application Games

- Reinforcing Skills
  A set of 14 game cards is provided. These full-color cards are ideal for centers and small-group interaction. The cards are coordinated with the lesson units. They reinforce several skills taught within each unit. Many cards are designed to make math content “real” to students by providing a real-life setting, or a content area connection. Each card includes student directions as well as reproducible page information. For information about the games, see the Management and Skill Application Games sections of this guide.

About the CD-ROM

- A Source for Printable Materials
  A CD-ROM is included in the back of this guide. It contains the following materials:

  - Placement Tests from Units 1–7
  - Pre-Test and Post-Test pages from Units 1–7
  - Student Activity Pages from Units 1–7
  - Skill Application Games (student directions and related reproducible information)
  - Problem-Solving Strategy Cards
  - Real-Life Problem-Solving Cards
  - PowerPoint® Lesson Options (slide presentations) for all unit lessons (The PowerPoint® lesson offers an alternative method for teaching the Warm-Up Activity and the Whole-Class Skills Lesson, as well as a listing Differentiated-Group Skills Practice activities of the lesson.)
  - Reproducibles from the last section of each unit
  - Additional Practice Pages (Over 100 pages of student practice to reinforce basic skills are introduced in each of the units. Answer keys are included.)
  - Glossary from Teacher Resource Guide

Note: The printable pages on this CD-ROM allow you to download and print copies of the materials listed above. Simple directions for using the CD-ROM are presented in the READ ME files.
Pacing Plans

The Exploring Math kit is designed for flexibility, especially when used in summer intervention or after-school programs where sessions are limited.

Below are some suggestions for using the kit for different purposes and/or in different time frames.

Special Programs—Summer School/Limited Session

**Daily Eight-Week Program (40 class sessions)**

Over a period of two to three sessions, administer and score the Placement Test to determine which units to use throughout the eight-week session. Rank these units according to the overall class score for each (See Placement Test Class Record, pages 71 and 72.).

To plan the number of sessions per unit, divide the remaining sessions (about 37) by the number of units. You may wish to adjust this number so that more sessions are devoted to the unit on which the students scored the lowest.

**Option A: Target Lessons for 2–4 Units**

<table>
<thead>
<tr>
<th>Sample Pacing Chart: Daily Eight-Week Program (3 Units)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Week</strong></td>
</tr>
<tr>
<td><strong>Day</strong></td>
</tr>
<tr>
<td>Mon</td>
</tr>
<tr>
<td>Tues</td>
</tr>
<tr>
<td>Wed</td>
</tr>
<tr>
<td>Thurs</td>
</tr>
<tr>
<td>Fri</td>
</tr>
</tbody>
</table>

This sample pacing chart was developed after the Placement Test results indicated that units 2, 4, and 5 should be covered in the eight-week session. Since skills and concepts from Unit 2 need the most attention, more sessions were scheduled to teach lessons from this unit.
Daily Eight-Week Program (40 class sessions)

Option B: Teach One Unit
Administer the Placement Test as suggested in Option A. If only one unit is to be completed during this time, you will have an opportunity to cover some lessons over a two-day period. This gives you time to provide additional practice on difficult skills and to investigate the Extension activities more thoroughly. You should also plan more problem-solving practice time, using the strategies learned in the unit.

Option C: Choose Lessons from All Units
Administer the Placement Test as suggested in Option A. If the curriculum guidelines from your intervention program (and/or the Placement Test scores) indicate that all topics should to be covered, it will be necessary to reduce the number of lessons offered for each unit. In an eight-week session, for example, you could teach four to five lessons per week, allowing five or six sessions for problem-solving practice. Since each unit contains an average of 20 lessons, you will need to decide which lessons to choose from each unit. (The unit pre-tests can serve as an indicator.)

Daily Six-Week and Four-Week Programs
In a six-week session, with 30 class periods, it is recommended that you select no more than three units on which to focus. This allows you to complete about eight lessons per unit, with remaining sessions devoted to the initial testing and the problem-solving lessons.

Four-week programs provide you with 20 class periods. Since time is limited, your students’ needs would be best served if you plan to cover two units at the most.

Whether your program is four weeks or six weeks long, the pacing plan can be similar to the sample daily eight-week program, with adjustments made to cover three-fourths or one-half of the material scheduled for eight weeks.

Ongoing Regular and After-School Programs
Exploring Math was designed as an intervention and reinforcement program. The lessons in the kit cover essential topics that are taught throughout the regular school year. The lessons can support your existing core mathematics program (based on a 40-week time frame, with a minimum of 2.5 to 4 hours of mathematics instruction per week). As you develop a pacing plan for your existing program, include related lessons from this kit that can be used (during or after school) as reinforcement for specific groups of students with diagnosed needs.
Pacing Plans (cont.)

Note: Depending on the length of each day’s session, it is possible to complete two related lessons in one day. Most lessons take between 50 and 60 minutes to complete. If your summer school, or other limited-session program, has daily sessions of 2 to 2 1/2 hours, it is possible to double up on the lessons. (Adjust pre- and post-testing accordingly.)

Problem-Solving Practice: If possible, provide as much problem-solving practice as possible during the sessions. Since two Problem-Solving Lessons are provided in each unit, students will be exposed to at least two opportunities to use specific strategies and organized methods for solving problems. Once students learn how to apply a strategy, they should not be limited to the lessons in the unit. If possible, allow some time each week to solve a few problems using a particular strategy.

Additional Practice: Where appropriate, assign homework from the Extension activities in the lessons, or from selected practice pages located on the CD-ROM.

Summary

Whether you are planning an intervention program for the summer, or working within a regular or after-school program, use the following “3 D’s” to organize your daily schedule.

- **Diagnose** areas of greatest need by administering and scoring the Placement Test to determine your students’ needs.

- **Decide** which units (and the number of lessons) to include within the specific time frame of your program.

- **Develop** a pacing chart to plan the specific lessons and suggested activities prescribed in this kit.