# Table of Contents

<table>
<thead>
<tr>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Forward</td>
<td>1</td>
</tr>
<tr>
<td>2) Acknowledgements</td>
<td>2</td>
</tr>
<tr>
<td>3) Introduction</td>
<td></td>
</tr>
<tr>
<td>a) Vision, Coherence, Balance</td>
<td>4</td>
</tr>
<tr>
<td>b) How to Use the Guide</td>
<td>6</td>
</tr>
<tr>
<td>c) Assessment Calendar</td>
<td>12</td>
</tr>
<tr>
<td>4) Main Body</td>
<td></td>
</tr>
<tr>
<td>a) Quarter 1:</td>
<td></td>
</tr>
<tr>
<td>Concept Organizer</td>
<td>1</td>
</tr>
<tr>
<td>Instructional Roadmap</td>
<td>2</td>
</tr>
<tr>
<td>Mathematics Reasoning Standards</td>
<td>5</td>
</tr>
<tr>
<td>Assessment Blueprint</td>
<td>7</td>
</tr>
<tr>
<td>Concept Lesson</td>
<td>8</td>
</tr>
<tr>
<td>b) Quarter 2 (repeat of above resources)</td>
<td>1 – 7</td>
</tr>
<tr>
<td>c) Quarter 3 (repeat of above resources)</td>
<td>1 – 8</td>
</tr>
<tr>
<td>d) Quarter 4 (repeat of above resources)</td>
<td>1 – 8</td>
</tr>
<tr>
<td>e) Sample Assessment Items – Grade 1</td>
<td>1 - 6</td>
</tr>
<tr>
<td>5) Appendices</td>
<td></td>
</tr>
<tr>
<td>a) Standards-Based Instruction – Model Classrooms</td>
<td>1</td>
</tr>
<tr>
<td>b) The Importance of Equity and Access</td>
<td>6</td>
</tr>
<tr>
<td>c) Family Involvement</td>
<td>7</td>
</tr>
<tr>
<td>d) Meeting the Needs of Diverse Learners</td>
<td></td>
</tr>
<tr>
<td>i) Differentiated Instruction</td>
<td>8</td>
</tr>
<tr>
<td>ii) English Learners</td>
<td>10</td>
</tr>
<tr>
<td>iii) Students with Disabilities</td>
<td>11</td>
</tr>
<tr>
<td>iv) Advanced Learners and Gifted and Talented Students</td>
<td>13</td>
</tr>
<tr>
<td>v) Culturally Relevant and Responsive Pedagogy in Mathematics</td>
<td>14</td>
</tr>
<tr>
<td>e) Pedagogical Strategies</td>
<td></td>
</tr>
<tr>
<td>i) Research Based Best Practices</td>
<td>16</td>
</tr>
<tr>
<td>ii) Thinking Through the Lesson Protocol</td>
<td>17</td>
</tr>
<tr>
<td>iii) Classroom Discourse</td>
<td>19</td>
</tr>
<tr>
<td>iv) Asking Questions</td>
<td>20</td>
</tr>
<tr>
<td>v) Problem Solving</td>
<td>21</td>
</tr>
<tr>
<td>vi) Drill vs. Practice</td>
<td>23</td>
</tr>
<tr>
<td>vii) Mathematics Connections to Literature</td>
<td>25</td>
</tr>
<tr>
<td>viii) Combination Classrooms</td>
<td>27</td>
</tr>
<tr>
<td>f) Assessment</td>
<td>29</td>
</tr>
<tr>
<td>6) Bibliography</td>
<td>31</td>
</tr>
</tbody>
</table>
A Message from Superintendent Romer

Dear Teachers:

I am passionate about reforming urban education and believe that knowledgeable teachers and principals are critical to improving student achievement. Over the past five years we have implemented the Elementary Mathematics Plan. The key elements of this initiative: a coherent curriculum, standards-based materials, embedded professional development and coaching, periodic diagnostic assessments, and active and knowledgeable leadership, have provided a firm foundation for improvement in both the teaching and learning of mathematics.

Since 1999, elementary scores on the California Standards Test have consistently risen at all grade levels. The Academic Performance Index for our elementary schools has improved 197 points. This is 51 points greater than the gains made by elementary schools in the State. I am constantly asking myself, how can we ensure that our elementary school students continue to make strong gains in mathematics and close the achievement gap for students who are not meeting standards?

In the District’s Mathematics Reform, we are constantly assessing our own progress, the progress of students, and the strategic plans for achieving our goals. As a result of this assessment, the Mathematics Instructional Guide was updated. This Guide has been improved, but is not drastically different from the current Guide. Special attention has been given to organizing each instructional unit around big ideas in mathematics, providing a balanced mathematics program that includes instruction in mathematical skills, problem solving, and conceptual understanding. The Guide is a tool to assist teachers in the collaborative planning of rigorous, culturally relevant instruction at each grade level. It provides guidance to teachers in using the core mathematics textbook, supplementary materials, and new Concept Lessons. The Concept Lessons have been added to engage students in critical thinking and application of mathematical skills. The Guide is a roadmap for teaching and assessing the mathematics content standards in grades K-5.

Your support is critical to the utilization of the Guide so that students benefit from a standards-based system. In this system, curriculum, instruction, and assessment are tightly interwoven to support student learning and ensure ALL students have equal access to a rigorous curriculum.

We must all participate in ongoing reflection and take responsibility for improving student learning and closing the achievement gap for every student.

ROY ROMER
Superintendent of Schools
Acknowledgements

This Elementary Mathematics Instructional Guide reflects the collaborative effort of many educators. This publication is based on the *Mathematics Framework for California Public Schools, Kindergarten Through Grade Twelve*.

Special acknowledgement is extended to the many authors and educators who have assisted the Elementary Mathematics Team by providing professional development and challenging our thinking with regard to deeply understanding and implementing effective instructional practices.

Appreciation is also extended to the following educators who worked on this publication:

### Local District Personnel

<table>
<thead>
<tr>
<th>District 1:</th>
<th>Marilyn Anderson, Coordinator</th>
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<tbody>
<tr>
<td>District 2:</td>
<td>Caroline Piangerelli, Coordinator</td>
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<td>Raymond Little, Advisor</td>
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<td>District 3:</td>
<td>Merrie Wartik, Coordinator</td>
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<td>Helen Jordan, Advisor</td>
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<td>District 4:</td>
<td>Enrique Franco, Coordinator</td>
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<td>Luis Ochoa, Advisor</td>
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<td>Kenny Yau, Advisor</td>
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<td>Elizabeth Bernal, Expert</td>
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<td>Darlene Torres, Advisor</td>
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<td>Araceli Rodriguez, Advisor</td>
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<tr>
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</tbody>
</table>
Elementary Mathematics Instructional Guide Development Team

<table>
<thead>
<tr>
<th>Joan Abu-Bakir</th>
<th>Claudia Gallegos</th>
<th>Karen Michelle Magallon</th>
<th>Rosamaria Rodriguez</th>
</tr>
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<tbody>
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<td>Antonia P. Alvarez</td>
<td>Lucio Garcia</td>
<td>Roy Maier</td>
<td>Darlene Roker</td>
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<td>Lorena Anaya</td>
<td>Mark Gendernalik</td>
<td>Joe Martinez</td>
<td>Alan Salit</td>
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<td>Corby Arthur</td>
<td>Melissa Glen-Lambert</td>
<td>Sonia Martin-Solis</td>
<td>Usha Sampath</td>
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<td>Nancy Brown</td>
<td>Isis Gonzalez</td>
<td>Brian McKinney</td>
<td>Marlene Sanchez</td>
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<td>Margaret Browning</td>
<td>Vivian Green</td>
<td>Julie Medina</td>
<td>Dena Saumers</td>
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<tr>
<td>Yvonne Burch-Bush</td>
<td>Joan Greenlee</td>
<td>Debbie Michels</td>
<td>Mary Seay</td>
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<td>Christie Caric</td>
<td>Lisa Guerrero</td>
<td>Ricky Mikelman</td>
<td>Lorraine Singer-Watson</td>
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<td>William Chang</td>
<td>Ellen Halio</td>
<td>Sachiko Miyaji</td>
<td>Linda Slater</td>
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<td>Carol Corwen</td>
<td>Jeanette Hanciles</td>
<td>Salvador Mota</td>
<td>Terry Snyder</td>
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<td>George Crowder</td>
<td>Leanne Hannah</td>
<td>J B Nudell</td>
<td>Sandra Soriano</td>
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<td>Robin Wynn Davis</td>
<td>Barbara Healy-Sprague</td>
<td>Rossana Ola</td>
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<td>Tricia Douglas</td>
<td>Ann Holtzinger</td>
<td>Connie Ordway</td>
<td>Amy Tindell</td>
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<td>Eva Dowdell</td>
<td>Marvin Horner</td>
<td>Aleta Parker-Taylor</td>
<td>Kirk Thomas</td>
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<tr>
<td>Mark Duncan</td>
<td>Jennifer Jim</td>
<td>Richard Piccoli</td>
<td>Sandra Trass</td>
</tr>
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<td>David Eisenberg</td>
<td>Tim Kessler</td>
<td>Lauren Poncefranco</td>
<td>Vicki von Arx</td>
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<tr>
<td>Amy Eshelman</td>
<td>Gary Krawitz</td>
<td>Patti Poon</td>
<td>Annette Ward</td>
</tr>
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<td>Barbara Felman</td>
<td>Christopher Llovera</td>
<td>Brenda Pratt</td>
<td>Chuck Warner</td>
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<td>Olivia Fields</td>
<td>Mark Loneran</td>
<td>Theo Quinonos</td>
<td>Charity Weber</td>
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<tr>
<td>Aimee Freyer-Stewart</td>
<td>Oscar Madrigel</td>
<td>Sylvia Reyes</td>
<td>Renee Wong</td>
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<tr>
<td>Mindy Friedman</td>
<td>Patricia Madrigel</td>
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</tr>
</tbody>
</table>

Central Office and Support Personnel

LAUSD Central Office
Alma Peña Sanchez, Assistant Superintendent, Instructional Services
Dr. Norma Baker, Director, Instructional Services
Gary Domnitz, Coordinator, Elementary Mathematics
Marlene Felix, Coordinator, Elementary Instructional Services
Marie Stevens, Coordinator, Elementary Mathematics
Andrew Jenkins, Specialist, Elementary Mathematics
Dr. Stacy Sinclair, Teacher on Special Assignment

The Institute For Learning
Dr. Harold Asturias
Patti Magruder
Mary Lou Metz

Approved by:
Ronni Ephraim, Chief Instructional Officer, Elementary
**Introduction**

The *Elementary Mathematics Instructional Guide* (MIG) is designed to help teachers provide students with a balanced mathematics curriculum as part of a coherent educational program.

The vision of the Los Angeles Unified School District is to provide students with:

- a designed curriculum based on the *Mathematics Content Standards for California Public Schools* and the *Mathematics Framework for California Public Schools*.
- a balanced curriculum that supports the teaching of mathematical skills, conceptual understanding, and problem solving.

Why do we need balance? (based on excerpts from the *Mathematics Framework for California Public Schools*)

According to the *California Mathematics Framework*, mathematics education must provide students with a balanced instructional program. In such a program, students become proficient in *basic computational and procedural skills*, develop *conceptual understanding*, and develop *problem solving strategies*. All three components are important and no single component should be
overemphasized or neglected. However, balance is not simply allocating equal amounts of time for each of the three components. At times students may concentrate on lessons or tasks that focus on one component, and at other times the focus may be on two or all three of the components. The Elementary Mathematics Instructional Guide (MIG) supports teachers in providing balance for all students.

**Computational and procedural skills** are a discrete body of knowledge that all students should learn to use routinely and automatically. Students must practice basic computational and procedural skills sufficiently and use them frequently enough to commit them to memory. Work on skills involves:

- practice,
- accurate/automatic use, and
- memorization.

**Conceptual understanding** refers to knowledge that students can rely upon to solve simple and complex problems. Students must be able to represent concepts in multiple ways and explain them to others. Mathematics makes sense to students who have a conceptual understanding of the domain. Students know how to apply skills, when to apply them, and why they are being applied. Students see the structure and logic of mathematics and use it flexibly, effectively, and appropriately. In seeing the larger picture and in understanding the underlying concepts, students are in a stronger position to apply their knowledge to new situations and problems as well as to recognize when they have made procedural errors. Work on conceptual understanding involves:

- using,
- representing, and
- explaining mathematical concepts.

**Problem solving** in mathematics is a goal-related activity that involves applying skills, understandings, and experiences to resolve new, challenging, or perplexing mathematical situations. Problem solving involves a sequence of activities directed toward a specific mathematical goal, such as solving a word problem. Such tasks often involve a series of mathematical procedures and the ability to conceptually represent the problem to be solved. Work on problem solving involves three phases:

- formulation,
- analysis, and
- translation.
A mathematical program that balances the focus on skills, conceptual understanding and problem solving will lead to higher student achievement when provided within a coherent system wherein all parts of the system are aligned. The LAUSD provides a balanced, coherent system as represented in the diagram below:

![Diagram showing Standards, Curriculum, Professional Development, and Assessments]

**How to Use the Elementary Mathematics Instructional Guide (MIG)**

This guide illustrates the organization and clustering of the California content standards in order to:

- promote the connections between and among mathematics skills, concepts, and problem solving strategies within and across different areas of mathematics content areas;
- provide opportunities for students to develop a deep conceptual understanding as a foundation for their learning;
- continue the use of strong teaching strategies (see PERB report); and
- provide students with a coherent learning experience that includes access to the necessary skills, concepts, and problem solving.

*How is the guide organized?*

**Quarterly Concept Organizer** - The content standards are clustered around *big ideas* that will help students and teachers make connections, and the standards are linked to *concepts* and *skills* with which students will develop proficiency through lessons referenced in the guide. A Quarterly Concept Organizer (see sample below) is at the beginning of each quarter in order to facilitate instructional planning and student learning.
**Number Relationships, Equivalence, and Place Value**

Numerical values can be represented in multiple ways.

| Equivalent values can have different numerical representations. |
| Numbers have a unique point on the number line. Two numbers are equal when they represent the same point on the number line. |
| Numbers can be classified as prime or composite. Numbers can be expressed as a product of factors. |

- Read and write whole numbers in the millions.
- Represent fractions, decimals, and mixed numbers in multiple ways.
- Round whole numbers to the millions and decimals to two decimal places.
- Order and compare numbers.
- Place numbers (including positive and negative integers) on the number line.
- Show equivalence of fractions and decimals.
- Decompose whole numbers down to their factors.
- Identify prime and composite numbers.

<table>
<thead>
<tr>
<th>Big Idea</th>
<th>Concept</th>
<th>Skills</th>
<th>Standards</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>CA MATH STANDARDS</th>
<th>NS 1.1</th>
<th>NS 1.2</th>
<th>NS 1.3</th>
<th>NS 1.4</th>
<th>NS 2.2</th>
<th>NS 4.1</th>
<th>NS 4.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEY STANDARDS</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
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<td>☑</td>
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<tr>
<td>CONCEPT LESSON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>3</td>
<td>3</td>
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**Concept Lesson includes this standard**

**Number of items assessed quarterly:**

- NS 1.1: 3
- NS 1.2: 3
- NS 1.3: 3
- NS 1.4: 2/CR
- NS 2.2: 2
- NS 4.1: 2
- NS 4.2: 2

LAUSD Elementary Mathematics Instructional Guide - Introduction, Page 7
Big Ideas - Each quarter is designed around a big idea within which work on conceptual understanding, specific skills, and problem solving is balanced.

Content Standards - At the beginning of each instructional quarter the content standards for the quarter are provided.

Assessment Tools - Blueprints and sample assessment items aligned with the periodic assessment program are provided. Teachers are encouraged to use them when planning a standards-based program.

Quarterly Instructional Roadmaps - Instructional roadmaps, (such as the one on the next page) outline available resources that can be used to teach the concepts and skills that are aligned to the content standards within each quarter. All adopted textbook resources and additional resources that address the standards within a quarter are referenced. It is incumbent upon teachers and instructional support staff at a school site to select the lessons and the order in which to teach them that best fit the needs of each classroom and/or grade level. In order to meet the needs of diverse learners and to differentiate instruction within a grade level and within classrooms not all lessons will need to be covered. Furthermore, in order to develop proficiency and conceptual understanding, this guide serves as a springboard for designing and implementing instruction.
## Fourth Grade: Quarter One
### Quarterly Instructional Roadmap

### Concepts

<table>
<thead>
<tr>
<th>Concepts</th>
<th>Standards</th>
<th>Scott Foresman Resources</th>
<th>Additional Resources</th>
<th>Time Frame**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equivalent values can have different numerical representations.</td>
<td>*NS 1.1</td>
<td>* Math Background for Teachers, pp. 1C, 1D: Rounding Numbers</td>
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<tr>
<td></td>
<td>*NS 1.2</td>
<td>* Lessons: 1.1 – 1.3, 1.5</td>
<td>• The Place Value Game, pp. 65-67</td>
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<tr>
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<td>*NS 1.3</td>
<td>* Universal Access, A Million Times, p. 1E: Activity D</td>
<td>• Comparing Fractions, p. 125</td>
<td></td>
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<td>*NS 1.4</td>
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### Standards

- **NS 1.1**: Read and write whole numbers in the millions.
- **NS 1.2**: Order and compare whole numbers and decimals to two decimal places. *(Focus on whole numbers.)*
- **NS 1.3**: Round whole numbers through the millions to the nearest ten, hundred, thousand, ten thousand, or hundred thousand.
- **NS 1.4**: Decide when a rounded solution is called for and explain why such a solution may be appropriate.
- **NS 1.5**: Explain different interpretations of fractions, for example, parts of a whole, parts of a set, and division of whole numbers by whole numbers; explain equivalents of fractions.
- **NS 1.6**: Write tenths and hundredths in decimal and fraction notations and know the fraction and decimal equivalents for halves and fourths (e.g., \( \frac{1}{2} = 0.5 \) or \( 0.50 \); \( \frac{7}{4} = 1 \frac{3}{4} \) or \( 1.75 \)).
- **NS 1.7**: Write the fraction represented by a drawing of parts of a figure; represent a given fraction by using drawings; and relate a fraction to a simple decimal on a number line.
- **NS 1.8**: Use concepts of negative numbers (e.g., on a number line, in counting, in temperature, in “owing”).
- **NS 1.9**: Identify on a number line the relative position of positive fractions, positive mixed numbers, and positive decimals to two decimal places. *(Focus on fractions and mixed numbers.)*
- **NS 2.2**: Round two-place decimals to one decimal or the nearest whole number and judge the reasonableness of the rounded answer.
- **NS 4.1**: Understand that many whole numbers break down in different ways (e.g., \( 12 = 4 \times 3 = 2 \times 6 = 2 \times 2 \times 3 \)).
- **NS 4.2**: Know that numbers such as 2, 3, 5, 7 and 11 do not have any factors except 1 and themselves and that such numbers are called prime numbers.

### Teacher Resources

- **Math Background for Teachers, pp. 1C, 1D: Rounding Numbers**
- **Lessons: 1.1 – 1.3, 1.5**
- **Universal Access, A Million Times, p. 1E: Activity D**
- **50 Problem Solving Lessons (Burns)**
  - The Place Value Game, pp. 65-67
  - Comparing Fractions, p. 125
Concept lessons, centered on rigorous mathematical tasks, are required lessons provided for each quarter. Their purpose is to introduce a concept and to link prior learning to the development of new understanding. They model effective practices in the teaching and learning of mathematics and will become the focus of lesson study at school sites.

Using the Guide to Plan Lessons

Before using the Guide to plan instruction, teachers must be familiar with the Mathematics Content Standards for California Public Schools and the Mathematics Framework for California Public Schools. In particular, teachers must be familiar with the standards for the grade level they are teaching.

In order for this Guide to be of greatest benefit, teachers must:

1. become acquainted with the Elementary Mathematics Instructional Guide (Guide) by answering the following questions:
   - How is this Guide different than others we have used?
   - What are the different elements of the Guide?
   - What does a balanced curriculum look like?
   - What do I teach each quarter?
   - What are the standards?
   - Which parts of my textbook should I use?
   - What additional resources do I need to complete my program?

2. focus on one quarter at a time, using the Quarterly Concept Organizer to guide instruction by answering the following questions:
   - What are the key concepts and skills my students will learn this quarter to increase their mathematical understanding and prepare them for success on the CST?
   - What concepts should my students learn well this quarter?
   - What skills should my students practice this quarter?
   - What problems should my students be able to solve this quarter?
3. examine the *Quarterly Instructional Roadmap* for the quarter and select those lessons from the textbook and additional resources to see how the selected lessons build students’ understanding of the concepts, skills, and problem solving by answering the following questions:

- Does every page of the textbook have to be used?
- What additional resources could be used to teach students the concepts they need to learn?

4. use the *Mathematics Reasoning Standards* chart to guide the selection of lessons so that the classroom instructional program reflects a balance of skills, conceptual understanding, and problem solving. This chart indicates those reasoning standards that are addressed in the textbook and additional resource lessons. By incorporating this focus into long term instructional planning, students will have multiple opportunities to explain their reasoning, apply strategies from simpler problems to more complex problems, develop generalizations, and apply these ideas in new contexts.

5. study the *Concept Lesson* for the quarter by answering the following questions:

- What content and mathematics reasoning standards are addressed by this concept lesson?
- What important mathematics concepts should the students learn through this concept lesson?
- How does the concept lesson support rigorous instruction for all students?
- Where in the quarter does the concept lesson fit?
- What lessons should precede the teaching of this lesson?
- What lessons will help students to continue to apply their learning?
LOS ANGELES UNIFIED SCHOOL DISTRICT  
Instructional Services  
Elementary Mathematics Program  

Periodic Assessment Calendar  
2008 – 2009

Three Track

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<td>Dec 9-11</td>
<td>Apr 21-23</td>
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<td>Aug 19-21</td>
<td>Dec 9-11</td>
<td>Feb 17-19</td>
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<td>C</td>
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Four Track

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<th>Quarter 3</th>
<th>Quarter 4</th>
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Single Track

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<td>Feb 3-5</td>
<td>Apr 14-16</td>
<td>Jun 9-11</td>
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First Grade Quarterly Concept Organizer

Geometry through Patterns
Patterns can be extended in predictable ways.

• Classify and analyze plane and solid shapes by their attributes.
• Create, describe, and extend patterns using numbers.
• Explain ways to get to the next element of a pattern.

Number Relationships, Equivalence, and Place Value
Numbers have absolute value and relative size.

• Count, read, and write whole numbers up to 50.
• Count and group objects in tens and ones.
• Compare whole numbers up to 50.

Patterns can be defined by their predictable elements.

The same number can be represented in multiple ways.

• Represent equivalent forms of the same number through the use of physical models.
• Show the meaning of addition and subtraction.

Numbers beyond 9 are composed of groups of ten and ones.

CA MATH STANDARDS

<table>
<thead>
<tr>
<th>STANDARDS</th>
<th>NS 1.1</th>
<th>NS 1.2</th>
<th>NS 1.3</th>
<th>NS 1.4</th>
<th>AF 1.2</th>
<th>AF 1.3</th>
<th>MG 2.1</th>
<th>MG 2.2</th>
<th>SDAP 2.1</th>
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### Standards:

- **MG 2.1**
  - Identify, describe and compare triangles, rectangles, squares, and circles, including the faces of three-dimensional objects.

- **MG 2.2**
  - Classify familiar plane and solid objects by common attributes, such as color, position, shape, size, roundness, or number of corners, and explain which attributes are being used for classification.

- **SDAP 2.1**
  - Describe, extend and explain ways to get to a next element in simple repeating patterns (e.g., rhythmic, numeric, color, and shape).

### Concepts and Resources

<table>
<thead>
<tr>
<th>Concepts</th>
<th>Standards</th>
<th>Scott Foresman Resources</th>
<th>Additional Resources</th>
<th>Time Frame**</th>
</tr>
</thead>
</table>
| Patterns can be defined by their predictable elements. | MG 2.1, MG 2.2, SDAP 2.1 | • Math Background for Teachers, pp. 1C – 1D  
• Lessons: 1.12 – 1.13  
• Universal Access, Even and Odd, p. 1E: Activity B  
• Lesson: 5.5  
• Lesson: 6.7  
• Lesson: 8.13  
• Universal Access, Label the Pictures, p. 241E: Activity A | About Teaching Mathematics (Burns)  
• Coloring 0-99 Patterns, p. 181  
• Introducing Patterns, pp. 112 – 113 | **Dates to be determined at school site** |

**Legend:**
- Key Standard
- Quarterly Assessed Standard
- Dates to be determined at school site

---

**Concept Lesson** should be used at this point in instruction to introduce SDAP 2.1.
### Number Relationships, Equivalence, and Place Value

Numbers have absolute value and relative size.

#### Standards:

- **NS 1.1** Count, read, and write whole numbers to 100. *(Focus on whole numbers to 50.)*
- **NS 1.2** Compare and order whole numbers to 100 by using the symbols for less than, equal to, or greater than (<, =, >). *(Focus on whole numbers to 50.)*
- **NS 1.3** Represent equivalent forms of the same number through the use of physical models, diagrams, and number expressions (to 20) (e.g., 8 may be represented as 4 + 4, 5 + 3, 2 + 2 + 2 + 2, 10 − 2, 11 − 3). *(Focus on equivalent forms to 10.)*
- **NS 1.4** Count and group objects in ones and tens (e.g., three groups of 10 and 4 equals 34, or 30 + 4).
- **AF 1.2** Understand the meaning of the symbols +, −.
- **AF 1.3** Create problem situations that might lead to given number sentences involving addition and subtraction.

#### Concepts | Standards | Scott Foresman Resources | Additional Resources | Time Frame**
--- | --- | --- | --- | ---
The same number can be represented in multiple ways. | *NS 1.3  
*AF 1.2  
AF 1.3 | • Math Background for Teachers, pp. 37C – 37D  
• Lessons: 2.1 – 2.12  
• Universal Access, Altogether Now, p. 37E: Activity A  
• Universal Access, 8 Web, p. 37F: Activity G  
• Universal Access, Math Matching, p. 37E: Activity C  
• Universal Access, Key Information, p. 37E: Activity B  
• Universal Access, Turn the Numbers Around, p. 37E: Activity D  
• Universal Access, Sum First, p. 37F: Activity F  
• Universal Access, Picture Problem Solving, p. 37F: Activity H  
• Math Background for Teachers, pp. 71C – 71D  
• Lessons: 3.1 – 3.11  
• Universal Access, Take Away, p. 71E: Activity A  
• Universal Access, Related Facts Train, p. 71E: Activity C  
• Universal Access, Subtraction Riddles, p. 71F: Activity G  
• Universal Access, How Many More?, p. 71E: Activity B  
• Universal Access, Related Problem Solving, p. | *About Teaching Mathematics* (Burns)  
• Snap It, p. 170  
• Build a Stack, p. 168  
*Lessons for Algebraic Thinking, Grades K-2* (von Rotz & Burns)  
• Chapter 4: Dot Cards, Version 1, pp. 34-36  
• Chapter 14: Dot Cards, Version 2, pp. 188-212  
*Developing Number Concepts, Book 2* (Richardson)  
• Chapter 3: Developing Strategies for Adding and Subtracting, pp. 99 – 172  
*Literature Connections*  
• *Animals on Board* by Stuart J. Murphy  
• *Anno’s Magic Seeds* by Mitsumasa Anno  
• *M&M’s Counting Book* by Barbara McGrath  
• *Mission: Addition* by Loreen Leedy | ** Dates to be determined at school site

Legend:
- Key Standard
- Quarterly Assessed Standard
- ** Dates to be determined at school site
<table>
<thead>
<tr>
<th>Concepts</th>
<th>Standards</th>
<th>Scott Foresman Resources</th>
<th>Additional Resources</th>
<th>Time Frame**</th>
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| Numbers beyond 9 are composed of groups of ten and ones. | *NS 1.1, *NS 1.2, *NS 1.4 | • Lessons: 1.3 – 1.5, 1.7, 1.8  
• About Teaching Mathematics (Burns)  
• Five Tower Game, p. 179  
• Fill the Cube, p. 178  
• Stars, p. 178 (Substitute a simple figure.)  
• How Many Pockets, p. 174  

* A Collection of Math Lessons from Grades 1 through 3 (Burns & Tank)  
• Chapter 7: A Place-Value Menu, pp. 71 – 82  
• Chapter 6: Making Tens and Ones, pp. 63 - 70  

Lessons for Algebraic Thinking Grades K - 2 (von Rotz & Burns)  
• Chapter 2: Comparing Handfuls, pp. 12 – 23  

* Developing Number Concepts, Book 1 (Richardson)  
• Chapter 3: Concepts of More and Less, pp. 125 - 174  

Literature Connections:  
• *Ten Black Dots* by Donald Crews  
• Two Ways to Count to Ten by Ruby Dee  
• From One to One Hundred by Teri Sloat  
• What Comes in 2’s, 3’s, and 4’s by Suzanne Aker  
• The King’s Commissioners by Aileen Friedman |

Legend:  
- Key Standard  
- Quarterly Assessed Standard  
** Dates to be determined at school site
First Grade  Mathematical Reasoning Alignment for Lessons  Quarter 1

Standards:

**MR 1.0** Students make decisions about how to set up a problem:
- MR 1.1 Determine the approach, materials, and strategies to be used.
- MR 1.2 Use tools, such as manipulatives or sketches, to model problems.

**MR 2.0** Students solve problems and justify their reasoning:
- MR 2.1 Explain the reasoning used and justify the procedures selected.
- MR 2.2 Make precise calculations and check the validity of the results in the context of the problem.

**MR 3.0** Students note connections between one problem and another.

<table>
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<tr>
<th>Lessons</th>
<th>Standards</th>
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**ADDITIONAL LESSONS**

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**Number Relationships, Equivalence, and Place Value**

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Key:
- UA = Universal Access
- ATM = About Teaching Mathematics
- DNC1 = Developing Number Concepts Book 1
- DNC2 = Developing Number Concepts Book 2
- CML 1-3 = A Collection of Math Lessons from Grades 1 - 3
- LAT K – 2 = Lessons for Algebraic Thinking Grades K - 2

LAUSD Mathematics Program
Elementary Instructional Mathematics Reasoning Standards, Grade 1
Scott Foresman: Quarter 1
Page 5
### Lessons and Standards

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**Additional Lessons**

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---

**LAUSD Mathematics Program**

*Elementary Instructional Mathematics Reasoning Standards, Grade 1*
Scott Foresman: Quarter 1
Page 6
### LOS ANGELES UNIFIED SCHOOL DISTRICT
Instructional Services, District Mathematics Program
Periodic Assessment Blueprint – First Grade, Quarter 1

<table>
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<th>STANDARD</th>
<th>Description</th>
<th>Multiple Choice</th>
<th>Constructed Response</th>
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<td>NS 1.1</td>
<td>Count, read, and write whole numbers to 100. <em>(Focus on whole numbers to 50.)</em></td>
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<td>NS 1.2</td>
<td>Compare and order whole numbers to 100 by using the symbols for less than, equal to, or greater than <em>(&lt;, =, &gt;).</em> <em>(Focus on whole numbers to 50.)</em></td>
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<td>NS 1.3</td>
<td>Represent equivalent forms of the same number through the use of physical models, diagrams, and number expressions (to 20) <em>(e.g., 8 may be represented as 4 + 4, 5 + 3, 2 + 2 + 2 + 2, 10 – 2, 11 – 3).</em> <em>(Focus on equivalent forms to 10.)</em></td>
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<td>NS 1.4</td>
<td>Count and group objects in ones and tens <em>(e.g., three groups of 10 and 4 equals 34, or 30 + 4).</em></td>
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<td>AF 1.2</td>
<td>Understand the meaning of the symbols +, -, =.</td>
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<td>SDAP 2.1</td>
<td>Describe, extend, and explain ways to get to a next element in simple repeating patterns <em>(e.g., rhythmic, numeric, color, and shape).</em></td>
<td>2</td>
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**TOTAL:** 20

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Key standard
Number Relationships, Equivalence, and Place Value

Whole numbers represent sets of items that can be composed (put together) and decomposed (taken apart).

Numbers beyond 9 are composed of groups of tens and ones.

Addition means putting together and increasing (join and part-part-whole). Subtracting is taking away, comparing, and finding a difference (separate and compare).

Numbers repeat in predictable ways.

- Count, read, and write whole numbers up to 100.
- Count and group objects in tens and ones.
- Identify one more than, one less than, 10 more than, 10 less than a given number.
- Compare and order whole numbers to 100 by using the symbols for less than, equal to or greater than (<, =, >).

- Use addition facts (sums to 20) and the corresponding subtraction facts.
- Perform the operation that corresponds to the symbols +, −, =.

- Identify and count the value of pennies, nickels, and dimes.
- Count by 2s, 5s, 10s, and 100s.

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<th>CA MATH STANDARDS</th>
<th>NS 1.1</th>
<th>NS 1.2</th>
<th>NS 1.4</th>
<th>NS 1.5</th>
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Number Relationships, Equivalence, and Place Value
Whole numbers represent sets of items that can be composed (put together) and decomposed (taken apart).

Standards:

- **NS 1.1** Count, read, and write whole numbers to 100.
- **NS 1.2** Compare and order whole numbers to 100 by using the symbols for less than, equal to, or greater than (<, =, >).
- **NS 1.4** Count and group objects in ones and tens (e.g., three groups of 10 and 4 equals 34, or 30 + 4).
- **NS 1.5** Identify and know the value of coins and show different combinations of coins that equal the same value.
- **NS 2.1** Know the addition facts (sums to 20) and the corresponding subtraction facts and commit them to memory.
- **NS 2.3** Identify one more than, one less than, 10 more than, and 10 less than a given number.
- **NS 2.4** Count by 2s, 5s, and 10s to 100.
- **NS 2.5** Show the meaning of addition (putting together, increasing) and subtraction (taking away, comparing, finding the difference).
- **AF 1.2** Understand the meaning of the symbols +, -, =.

Concept Lesson should be used at this point in instruction to introduce NS 2.3.

<table>
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<tr>
<th>Concepts</th>
<th>Standards</th>
<th>Scott Foresman Resources</th>
<th>Additional Resources</th>
<th>Time Frame**</th>
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<td>About Teaching Mathematics (Burns)&lt;br&gt;Five Tower Game, p. 179&lt;br&gt;Fill the Cube, p. 178&lt;br&gt;Stars, p. 178 (Substitute a simple figure.)&lt;br&gt;How Many Pockets, p. 174&lt;br&gt;Arrow Arithmetic, p. 135</td>
<td>LAUSD Mathematics Program&lt;br&gt;Elementary Instructional Guide, Quarterly Roadmap: Grade 1&lt;br&gt;Scott Foresman: Quarter 2&lt;br&gt;Page 2</td>
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<td>A Collection of Math Lessons from Grades 1 through 3 (Burns &amp; Tank)&lt;br&gt;Chapter 7: A Place-Value Menu, pp. 71 – 82&lt;br&gt;Chapter 6: Making Tens and Ones, pp. 63-70</td>
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| Addition means putting together and increasing (join and part-part-whole). Subtracting is taking away, comparing, and finding a difference (separate and compare). | *NS 2.1  
*NS 2.5  
*AF 1.2  | • Math Background for Teachers, pp. 103C – 103D  
• Lessons: 4.1 – 4.11  
• Universal Access, Bag It, p. 103E: Activity A  
• Universal Access, Tap, Talk, and Count On, p. 103E: Activity C  
• Universal Access, Number Line Walk, p. 103E: Activity B  
• Universal Access, Fact Strategies Web, p. 103F: Activity E  
• Universal Access, Counting-Back Facts, p. 103F: Activity G  
• Universal Access, Watch the Signs, p. 103E: Activity D  
• Universal Access, All in the Family, p. 103F: Activity F  
• Universal Access, High Five, p. 103F: Activity H  
• Universal Access Games: All Aboard & The Bear Facts | About Teaching Mathematics (Burns)  
• Number Sums, pp. 126 – 127  
• Number Bracelets, p. 130  
Lessons for Algebraic Thinking Grades K – 2 (von Rotz & Burns)  
• Chapter 6: Two of Everything, pp. 68 – 78  
• Chapter 15: Graphing Sums, pp. 213 – 224  
Developing Number Concepts Book 2 (Richardson)  
• Chapter 3: Developing Strategies for Addition and Subtraction, pp. 99 – 172  
Literature Connections:  
• How Many Feet in the Bed? by Dianne Johnston Hamm  
• Little Bear’s New Year’s Party by Janice  
• Elevator Magic by Stuart J. Murphy  
• Sea Sums by Joy N. Hulme  
• Under the Picnic Tree by Rozanne Lanczak Williams | ** Dates to be determined at school site |

| Numbers repeat in predictable ways. | *NS 1.5  
*NS 2.4  | • Math Background for Teachers, p. 173D  
• Lessons: 6.10 – 6.11  
• Universal Access, Number Patterns, p. 173F: Activity G  
• Math Background for Teachers, p. 279C  
• Lessons: 9.1 – 9.4  
• Universal Access, Coins from Around the World, p. 279E: Activity A  
• Universal Access, Cross it out!, p. 279E: Activity C  
• Universal Access, Partner Coin Counting, p. 279E: Activity B  
• Universal Access, Count by 10s, p. 279F: Activity F | Lessons for Algebraic Thinking Grades K – 2 (von Rotz & Burns):  
• Chapter 10: People Patterns, pp. 114 – 137  
Literature Connections:  
• Pancakes for Breakfast by Tomie dePaola  
• 100 Hungry Ants by Elinor Pinczes  
• Arctic Fives Arrive by Elinor Pinczes  
• Spunky Monkeys on Parade by Stuart J. Murphy  
• The Penny Pot by Stuart J. Murphy  
• A Chair for My Mother by Vera B. Williams | ** Dates to be determined at school site |

Legend:  
- Key Standard  
* Quarterly Assessed Standard  
** Dates to be determined at school site  

LAUSD Mathematics Program  
Elementary Instructional Guide, Quarterly Roadmap: Grade 1  
Scott Foresman: Quarter 2  
Page 3
First Grade  Mathematical Reasoning Alignment for Lessons  Quarter 2

**MR 1.0**  
Students make decisions about how to set up a problem:  
- MR 1.1  Determine the approach, materials, and strategies to be used.  
- MR 1.2  Use tools, such as manipulatives or sketches, to model problems.

**MR 2.0**  
Students solve problems and justify their reasoning:  
- MR 2.1  Explain the reasoning used and justify the procedures selected.  
- MR 2.2  Make precise calculations and check the validity of the results in the context of the problem.

**MR 3.0**  
Students note connections between one problem and another.

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Key:  
UA = Universal Access  
DNC1 = Developing Number Concepts Book 1  
DNC2 = Developing Number Concepts Book 2  
ATM = About Teaching Mathematics  
CML K–3 = A Collection of Math Lessons from Grades K - 3  
LAT K–2 = Lessons for Algebraic Thinking Grades K - 2  

LAUSD Mathematics Program  
Elementary Instructional Mathematics Reasoning Standards, Grade 1  
Scott Foresman: Quarter 2  
Page 4
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Key:
UA = Universal Access
DNC1 = Developing Number Concepts Book 1
DNC2 = Developing Number Concepts Book 2
ATM = About Teaching Mathematics
CML 1-3 = A Collection of Math Lessons from Grades 1 - 3
LAT K – 2 = Lessons for Algebraic Thinking Grades K - 2

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<td>NS 1.1</td>
<td>Count, read, and write whole numbers to 100.</td>
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<td>NS 1.2</td>
<td>Compare and order whole numbers to 100 by using the symbols for less than, equal to, or greater than (&lt;, =, &gt;).</td>
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<td>Count and group objects in ones and tens (e.g., three groups of 10 and 4 equals 34, or 30 + 4).</td>
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<td>Identify and know the value of coins and show different combinations of coins that equal the same value.</td>
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<td>Know the addition facts (sums to 20) and the corresponding subtraction facts and commit them to memory.</td>
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<td>Identify one more than, one less than, 10 more than, and 10 less than a given number.</td>
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<td>Count by 2s, 5s, and 10s to 100.</td>
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<td>Show the meaning of addition (putting together, increasing) and subtraction (taking away, comparing, finding the difference).</td>
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<td>AF 1.2</td>
<td>Understand the meaning of the symbols +, -, =.</td>
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**TOTAL:** 20 1
Please replace this page with the
First Grade, Quarter 2 Concept Lesson
Number Relationships, Equivalence, and Place Value
Whole numbers represent sets of items that can be composed (put together) and decomposed (taken apart).

Numbers beyond nine are composed of groups of tens and ones.

- Count, read, and write whole numbers to 100.
- Compare whole numbers up to 100.
- Make reasonable estimates when comparing larger or smaller numbers.

The same number can be represented in multiple ways.

- Represent equivalent forms of the same number through the use of diagrams and number expressions (to 20).
- Use the inverse relationship between addition and subtraction to solve problems.
- Make precise calculations and check validity of results from context of problem.
- Write and solve number sentences from problem situations that express relationships involving addition and subtraction.
- Identify and know the values of coins and show different combinations of coins that equal the same value.

Data Analysis
Data can be interpreted from organized visual representations.

- Use pictures/picture graphs.
- Use bar graphs.
- Use tally marks.

CA MATH STANDARDS

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<th>NS 1.2</th>
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**Number Relationships, Equivalence, and Place Value**

Whole numbers represent sets of items that can be composed (put together) and decomposed (taken apart).

**Standards:**

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<th>Additional Resources</th>
<th>Time Frame**</th>
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<td>Spill and Compare, p. 169</td>
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Legend:

- Key Standard
- Quarterly Assessed Standard
- ** Dates to be determined at school site
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<td>• Chapter 3: Developing Strategies for Adding and Subtracting, pp. 99 - 172</td>
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<td>• Build a Stack, p. 168</td>
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<td>• Chapter 14: Dot Cards, Version 2, pp. 188 – 212</td>
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<td>• One Gorilla by Atsuko Morozumi</td>
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<td>• Ant Friends by Fay Robinson</td>
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<td>• Roll for $1.00, pp. 57 – 59</td>
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<td>Universal Access, Describe the Coins, p. 279F: Activity E</td>
<td>• Pigs Go To Market: Fun with Math and Shopping by Amy Axelrod</td>
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<td>• Arthur’s Funny Money by Lillian Hoban</td>
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<td>• 26 Letters and 99 Cents by Tana Hoban</td>
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<td>• My Rows and Piles of Coins by Tolowa Mollel</td>
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Legend:
- Key Standard
- Quarterly Assessed Standard
- Dates to be determined at school site

LAUSD Mathematics Program
Elementary Instructional Guide, Quarterly Roadmap: Grade 1
Scott Foresman: Quarter 3
Page 3
# Data Analysis

Data can be interpreted from organized visual representations.

## Standards:

<table>
<thead>
<tr>
<th>SDAP 1.1</th>
<th>Sort objects and data by common attributes and describe the categories.</th>
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<tbody>
<tr>
<td>* SDAP 1.2</td>
<td>Represent and compare data (e.g., largest, smallest, most often, least often) by using pictures, bar graphs, tally charts, and picture graphs.</td>
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## Concepts

<table>
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<th>Concepts</th>
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</table>
| Data can be sorted, classified, represented and compared. | SDAP 1.1
*SDAP 1.2 |

## Scott Foresman Resources

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| • Lesson: 1.6
• Lesson: 7.6
• Lesson: 10.11
• Universal Access, Coin Flip!, p. 311F: Activity H |

## Additional Resources

<table>
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| • *About Teaching Mathematics* (Burns)
  • The Name Graphs, p. 184
  • Graphing in the Classroom, pp. 75 – 78
| 50 Problem Solving Lessons (Burns)
• Counting Cats, pp. 13 – 14
• Planting Bulbs, pp. 19 – 20
• The Name Graph, pp. 69 - 72 |

## Literature Connections

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<th>Literature Connections</th>
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| • Chrysanthemum by Kevin Henkes
• *Is It Rough? Is It Smooth? Is It Shiny?* by Tana Hoban
• Lemonade for Sale by Stuart J. Murphy |

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**Legend:**
- Key Standard
- * Quarterly Assessed Standard
- ** Dates to be determined at school site
# First Grade Mathematical Reasoning Alignment for Lessons Quarter 3

## Standards:

**MR 1.0** Students make decisions about how to set up a problem:
- MR 1.1 Determine the approach, materials, and strategies to be used.
- MR 1.2 Use tools, such as manipulatives or sketches, to model problems.

**MR 2.0** Students solve problems and justify their reasoning:
- MR 2.1 Explain the reasoning used and justify the procedures selected.
- MR 2.2 Make precise calculations and check the validity of the results in the context of the problem.

**MR 3.0** Students note connections between one problem and another.

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**Number Relationships, Equivalence, and Place Value – ADDITIONAL RESOURCES**

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**Key:**
- **UA** = Universal Access
- **ATM** = About Teaching Mathematics
- **DNC1** = Developing Number Concepts Book 1
- **DNC2** = Developing Number Concepts Book 2
- **CML 1-3** = A Collection of Math Lessons from Grades 1 - 3
- **LAT K – 2** = Lessons for Algebraic Thinking Grades K - 2
- **LAUSD Mathematics Program**
- **Elementary Instructional Mathematics Reasoning Standards, Grade 1**
- **Scott Foresman: Quarter 3**
- **Page 5**
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<th>CONSTRUCTED RESPONSE</th>
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<td>NS 1.1</td>
<td>Count, read, and write whole numbers to 100.</td>
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<td>NS 1.2</td>
<td>Compare and order whole numbers to 100 by using the symbols for less than, equal to, or greater than ((&lt;, =, &gt;)).</td>
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<td>NS 1.3</td>
<td>Represent equivalent forms of the same number through the use of physical models, diagrams, and number expressions (to 20) (e.g., 8 may be represented as 4 + 4, 5 + 3, 2 + 2 + 2 + 2, 10 – 2, 11 – 3).</td>
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<td>NS 1.5</td>
<td>Identify and know the value of coins and show different combination of coins that equal the same value.</td>
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<td>Use the inverse relationship between addition and subtraction to solve problems.</td>
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<td>AF 1.1</td>
<td>Write and solve number sentences from problem situations that express relationships involving addition and subtraction.</td>
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<td>SDAP 1.2</td>
<td>Represent and compare data (e.g., largest, smallest, most often, least often) by using pictures, bar graphs, tally charts, and picture graphs.</td>
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Key standard
Please replace this page with the
First Grade, Quarter 3 Concept Lesson
Number Relationships, Equivalence, and Place Value
Whole numbers represent sets of items that can be composed (put together) and decomposed (taken apart).

Addition and subtraction are related operations that are used to solve problems in a variety of contexts with different models.

- Know addition and subtraction facts to 20.
- Solve one- and two-digit addition/subtraction problems in real-life situations.
- Find the sum of three one-digit numbers.

Measurement and Geometry
Objects and two-dimensional shapes can be quantified, classified, described, and analyzed by their attributes and by using unit amounts.

Plane and solid shapes can be classified and analyzed by their attributes.

- Identify, describe, and compare plane and solid objects.
- Arrange and describe objects by proximity, position, and direction.

Direct comparison and nonstandard units are used to determine the measurement of objects/time.

- Compare length, volume, and weight.
- Tell time to the nearest half-hour.

CA MATH STANDARDS

<table>
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<tr>
<th>KEY STANDARDS</th>
<th>NS 2.1</th>
<th>NS 2.6</th>
<th>NS 2.7</th>
<th>AF 1.1</th>
<th>MG 1.1</th>
<th>MG 1.2</th>
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LOS ANGELES UNIFIED SCHOOL DISTRICT
First Grade: Quarter Four
Quarterly Instructional Roadmap

Number Relationships, Equivalence, and Place Value
Whole numbers represent sets of items that can be composed (put together) and decomposed (taken apart).

Standards:
* NS 2.1 Know the addition facts (sums to 20) and the corresponding subtraction facts and commit them to memory.
* NS 2.6 Solve addition and subtraction problems with one- and two-digit numbers (e.g., \(5 + 58 = \_\_\_\_\_\_\_\_\_\)).
* NS 2.7 Find the sum of three one-digit numbers.
AF 1.1 Write and solve number sentences from problem situations that express relationships involving addition and subtraction.

<table>
<thead>
<tr>
<th>Concepts</th>
<th>Standards</th>
<th>Scott Foresman Resources</th>
<th>Additional Resources</th>
<th>Time Frame**</th>
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</table>
| Addition and subtraction are related operations that are used to solve problems in a variety of contexts with different models. | *NS 2.1 AF 1.1 | • Math Background for Teachers, p. 211D  
• Lessons: 7.2 – 7.6, 7.9, 7.10  
• Universal Access, Have a Seat, p. 211E: Activity C  
• Universal Access, Who’s in the Family?, p. 211E: Activity A  
• Universal Access, Starting Number, p. 211F: Activity G  
• Universal Access, Block It Out, p. 211E: Activity D  
• Universal Access, Act It Out!, p. 211E: Activity B | Developing Number Concepts Book 2 (Richardson)  
• Chapter 3: Developing Strategies for Addition and Subtraction, pp. 99 – 172 |  |
| | | | About Teaching Mathematics (Burns)  
• How Many Reds?, p. 162  
• Empty the Bowl, p. 163  
• Introducing Addition and Subtraction with Word Problems, pp. 163 – 164  
• Cross Out Singles, p. 191  
• Addition Table Explorations, p. 132 |  |
| | *NS 2.7 | • Lesson: 8.6  
• Universal Access, Bean Bag Toss, p. 241F: Activity F |  |  |
| | *NS 2.6 | • Math Background for Teachers, pp. 377C – 377D  
• Lessons: 12.1 – 12.3, 12.6 – 12.8, 12.10  
• Universal Access, Counting Tens, p. 377E: Activity C  
• Universal Access, The Greatest Sum, p. 377F: Activity G |  |  |

Legend:
• Key Standard
* Quarterly Assessed Standard
** Dates to be determined at school site
### Measurement and Geometry

Objects and two-dimensional shapes can be quantified, classified, described, and analyzed by their attributes and by using unit amounts.

#### Standards:

- **MG 1.1** Compare the length, weight, and volume of two or more objects by using direct comparison or a nonstandard unit.
- **MG 1.2** Tell time to the nearest half hour and relate time to events (e.g., before/after, shorter/longer).
- **MG 2.1** Identify, describe, and compare triangles, rectangles, squares, and circles, including the faces of three-dimensional objects.
- **MG 2.2** Classify familiar plane and solid objects by common attributes, such as color, position, shape, size, roundness, or number of corners, and explain which attributes are being used for classification.
- **MG 2.3** Give and follow directions about location.
- **MG 2.4** Arrange and describe objects in space by proximity, position, and direction (e.g., near, far, below, above, up, down, behind, in, front of, next to, left or right of).

#### Concepts and Standards

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<td>• Universal Access, Problem Solving Buddies, p. 377E: Activity A</td>
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**Legend:**
- **Key Standard**
- * Quarterly Assessed Standard
- ** Dates to be determined at school site
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| Direct comparison and nonstandard units are used to determine the measurement of objects/time. | *MG 1.1 | • Math Background for Teachers, pp. 343C – 343D  
• Lessons: 11.1 – 11.3, 11.5 – 11.8, 11.10, 11.11  
• Universal Access, Comparing Lengths, p. 343E: Activity C  
• Universal Access, Measure It!, p. 343F: Activity E  
• Universal Access, More or Less Than a Pound, p. 343E: Activity A | • Cubes, Cones, Cylinders, and Spheres by Tana Hoban | About Teaching Mathematics (Burns)  
• Estimate and Measure, p. 189  
• Introduction to Measurement, pp. 46 - 47 | Literature Connections  
• The Best Bug Parade by Stuart J. Murphy  
• Inch by Inch by Leo Lionni  
• Measuring Penny by Loreen Leedy  
• Room for Ripley by Stuart J. Murphy  
• Pigs on a Blanket: Fun with Math and Time by Amy Axelrod  
• The Grouchy Ladybug by Eric Carle  
• Isn’t it Time? by Judy Hindley  
• In a Minute by Virginia Miller | |
| | *MG 1.2 | • Math Background for Teachers, p. 311C  
• Lessons: 10.1 – 10.4, 10.6, 10.8  
• Universal Access, The Clock Face!, p. 311E: Activity C  
• Universal Access, Time It!, p. 311F: Activity E  
• Universal Access, Floor Clock, p. 311F: Activity F  
• Universal Access, Minute by Minute, p. 311E: Activity D  
• Universal Access, The Days of the Week, p. 311E: Activity A  
• Universal Access, How Long Does It Take?, p. 311F: Activity G | | |

Legend:  
† Key Standard  
* Quarterly Assessed Standard  
** Dates to be determined at school site
### Standards:

**MR 1.0**  Students make decisions about how to set up a problem:
- MR 1.1  Determine the approach, materials, and strategies to be used.
- MR 1.2  Use tools, such as manipulatives or sketches, to model problems.

**MR 2.0**  Students solve problems and justify their reasoning:
- MR 2.1  Explain the reasoning used and justify the procedures selected.
- MR 2.2  Make precise calculations and check the validity of the results in the context of the problem.

**MR 3.0**  Students note connections between one problem and another.

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**Measurement and Geometry**
- Scott Lesson 5.1  | X |
- Scott Lesson 5.2  | X |
- Scott Lesson 5.3  | X |
- Scott Lesson 5.4  | X | X |
- Scott Lesson 5.7  | X | X |

Key:
- UA = Universal Access
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LAUSD Mathematics Program
Elementary Instructional Mathematics Reasoning Standards, Grade 1
Scott Foresman: Quarter 4
Page 5
<table>
<thead>
<tr>
<th>Lessons</th>
<th>Standards</th>
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<td>UA Floor Clock</td>
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<td>UA How Long Does It Take?</td>
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## LOS ANGELES UNIFIED SCHOOL DISTRICT
### Instructional Services, District Mathematics Program
#### Periodic Assessment Blueprint – First Grade, Quarter 4

<table>
<thead>
<tr>
<th>STANDARD</th>
<th>Description</th>
<th>Multiple Choice</th>
<th>Constructed Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS 2.1</td>
<td>Know the addition facts (sums to 20) and the corresponding subtraction facts and commit them to memory.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>NS 2.6</td>
<td>Solve addition and subtraction problems with one- and two-digit numbers (e.g., 5 + 58 = __).</td>
<td>2</td>
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<tr>
<td>NS 2.7</td>
<td>Find the sum of three one-digit numbers.</td>
<td>2</td>
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<tr>
<td>MG 1.1</td>
<td>Compare the length, weight, and volume of two or more objects by using direct comparison or a nonstandard unit.</td>
<td>3</td>
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</tr>
<tr>
<td>MG 1.2</td>
<td>Tell time to the nearest half hour and relate time to events (e.g., before/after, shorter/longer).</td>
<td>2</td>
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<tr>
<td>MG 2.1</td>
<td>Identify, describe, and compare triangles, rectangles, squares, and circles, including the faces of three-dimensional objects.</td>
<td>2</td>
<td>1</td>
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<tr>
<td>MG 2.2</td>
<td>Classify familiar plane and solid objects by common attributes, such as color, shape, size, roundness, or number of corners, and explain which attributes are being used for classification.</td>
<td>2</td>
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<tr>
<td>MG 2.3</td>
<td>Give and follow directions about location.</td>
<td>2</td>
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</tr>
<tr>
<td>MG 2.4</td>
<td>Arrange and describe objects in space by proximity, position, and direction (e.g., near, far, below, above, up, down, behind, in front of, next to, left or right of).</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

**Total:** 20 1

Key standard
Please replace this page with the
First Grade, Quarter 4 Concept Lesson
Sample Assessment Items - Grade 1

The purpose of these sample assessment items is to provide teachers with examples of questions that address the assessed standards. Although the assessment items will not be identical to these samples, the test format, level of rigor, and type of questions will be similar. Not all assessed standards are represented by this selection. The intent is to neither create a pretest nor an additional assessment for teacher use.

MULTIPLE CHOICE QUESTIONS

Sample Item #1

Strand: Number Sense

Standard Set: 1.0 Students understand and use numbers up to 100:

*Standard: 1.3 Represent equivalent forms of the same number through the use of physical models, diagrams, and number expressions (to 20) (e.g., 8 may be represented as 4+4, 5+3, 2+2+2+2, 10-2, 11-3)

[What goes in the box to make the number sentence true?] (Answer: A)

\[ 2 + 3 + 4 = \]

A 1 + 8  B 2 + 6  C 3 + 7

Sample Item #2

Strand: Number Sense

Standard Set: 1.0 Students understand and use numbers up to 100:

*Standard: 1.4 Count and group objects in ones and tens (e.g., three groups of 10 and 4 equals 34, or 30+4).

[How many blocks does Maya have?] (Answer: D)

<p>| | | |</p>
<table>
<thead>
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<tbody>
<tr>
<td>A</td>
<td>45 blocks</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>46 blocks</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>55 blocks</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>56 blocks</td>
<td></td>
</tr>
</tbody>
</table>
Sample Item #3
 reimbursement
Strand: Number Sense
Standard Set: 2.0 Students demonstrate the meaning of addition and subtraction and use these operations to solve problems:
*Standard: 2.1 Know the addition facts (sums to 20) and the corresponding subtraction facts.

[What is six minus two?] (Answer: B)

\[ 6 - 2 = \square \]

A 3  B 4  C 6  D 8

Sample Item #4
Strand: Number Sense
Standard Set: 2.0 Students demonstrate the meaning of addition and subtraction and use these operations to solve problems:
*Standard: 2.3 Identify one more than, one less than a given number, 10 more than, and 10 less than a given number.

[Which number is one more than nineteen?] (Answer: D)

A 9  B 18  C 19  D 20
Sample Item #5

Strand: Measurement and Geometry

Standard Set: 1.0 Students use direct comparison and nonstandard units to describe the measurements of objects:

* Standard: 1.1 Compare the length, weight, and volume of two or more objects by using direct comparison or a nonstandard unit.

[Which object weighs more than a loaf of bread?] (Answer: B)

A  
B  
C  
D  

Sample Item #6

Strand: Number Sense

Standard Set: 2.0 Students demonstrate the meaning of addition and subtraction and use these operations to solve problems:

Standard: 2.6 Solve addition and subtraction problems with one- and two-digit numbers (e.g., 5 + 58 = ___ )

[Twenty-six people were watching a soccer game. Five more people came to watch. How many people were watching the game in all?] (Answer: D)

A 21 people  B 26 people  C 30 people  D 31 people
Sample Item #7
Strand: Number Sense

Standard Set: 1.0 Students understand and use numbers up to 100:
* Standard: 1.2 Compare and order whole numbers to 100 by using the symbols for less than, equal to, or greater than (<, =, >).

[Which of the following number sentences is true?] (Answer: A)

A 41 < 63  B 41 = 63  C 41 > 63

Sample Item #8
Strand: Number Sense

Standard Set: 2.0 Students demonstrate the meaning of addition and subtraction and use these operations to solve problems:
* Standard: 2.5 Show the meaning of addition (putting together, increasing) and subtraction (taking away, comparing, finding the difference).

[Sasha used two eggs from the basket to make cookies. Which number sentence shows how many eggs are left in the basket?] (Answer: A)

A 6 – 2 = 4  B 4 + 2 = 6  C 6 + 2 = 8
CONSTRUCTED RESPONSE

Strand: Statistics, Data Analysis, and Probability

Standard Set: 2.0 Students sort objects and create and describe patterns by numbers, shapes, sizes, rhythms, or colors:

*Standard: 2.1 Describe, extend, and explain ways to get to a next element in simple repeating patterns (e.g., rhythmic, numeric, color, and shape).

[Look at the objects below.]

- [Describe the pattern.]
- [What two shapes would come next in this pattern?]
- [If the pattern continued, what would the thirteenth object be?]
Rubric:

4-point response: The student shows **complete understanding** of describing, extending, and explaining simple repeating patterns by doing the following:
- The student accurately describes the pattern. (e.g., ABB pattern; baseball glove, baseball, baseball, baseball glove, baseball, baseball, repeating).
- The student identifies that 2 baseballs would be next.
- The student identifies the thirteenth object as a baseball glove.

3-point response: The student shows **understanding** of describing, extending, and explaining simple repeating patterns by doing the following:
- The student accurately describes the pattern. (e.g., ABB pattern; baseball glove, baseball, baseball, baseball glove, baseball, baseball, repeating).
- The student correctly identifies one of the shapes that follow.
- The student correctly identifies the thirteenth object.

*OR*
- The student incorrectly describes the pattern.
- The student identifies that 2 baseballs would be next.
- The student correctly identifies the thirteenth object.

2-point response: The student shows **partial understanding** of describing, extending, and explaining simple repeating patterns by doing the following:
- The student provides an **accurate explanation of the pattern**. (e.g., ABB pattern; baseball glove, baseball, baseball, baseball glove, baseball, baseball, repeating).
- The student incorrectly identifies the shapes that follow.
- The student attempts to identify the thirteenth object.

*OR*
- The student provides an **incomplete explanation of the pattern**.
- The student correctly identifies one of the shapes that follow.
- The student attempts to identify the thirteenth object.

1-point response: The student shows **little or no understanding** of describing, extending, and explaining simple repeating patterns by doing the following:
- The student incorrectly describes the pattern.
- The student incorrectly identifies the shapes that follow.
- The student incorrectly identifies the thirteenth object.

*OR*
- The student provides no response.
Appendices

Standards-Based Instruction – Model Classrooms

The Mathematics Standards-Based Instruction Model Classroom, was created as an important tool for teachers, coaches, and site administrators to use in planning instruction and in guiding professional development. The document is grounded in best practices for mathematics instruction as outlined in the Mathematics Framework for California Public Schools, the California Standards for the Teaching Profession and supported by research from the University of Pittsburgh, Institute for Learning. The purpose of the Model Classroom document is to give staff a starting point for discussions around school-wide expectations for instruction and for creating benchmarks for student achievement.

Model Classrooms focus on five main areas of design for effective teaching:

- **Teacher Content and Pedagogical Knowledge** – on the understanding of mathematics content and use of effective instructional delivery;
- **Classroom Instruction** – on the use of effective strategies to meet the needs of all students;
- **Student Work Products** – on the design of assessments that result in rigorous student-generated written and oral work products;
- **Assessment Use** - on the use of a comprehensive assessment system including student self-assessment;
- **Classroom Environment** - on the creation of an environment that promotes clear and high expectations.

For each of the areas stated above, a series of Goals and Expectations for Effective Mathematics Teaching are provided. These are practices that should be visible during mathematics instruction in all classrooms.

The column entitled **Indicators**, is purposefully left blank. It is intended to be a tool developed and used by school teams over time to identify specific evidence for the grade level that supports the identified goal / expectation.
## Mathematics Standards-Based Instruction

### Model Classroom

<table>
<thead>
<tr>
<th>Area</th>
<th>Goals/Expectations for Effective Mathematics Teaching</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Teacher Content and Pedagogical Knowledge</strong></td>
<td><em>Teacher understands and organizes subject matter for student learning</em></td>
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<tr>
<td></td>
<td>1. Demonstrates awareness of culture of student population in teaching practices and home/school communications</td>
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<td>2. Understands the sequential development of mathematical concepts</td>
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<td>3. Implements pedagogy and content in the classroom acquired from ongoing professional development</td>
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<td>4. Demonstrates knowledge of subject matter content based upon the California Mathematics Content Standards</td>
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<td>5. Uses the Mathematics Instructional Guide to organize curriculum to support student understanding</td>
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<td>6. Develops and sequences academically rigorous activities in which students use manipulatives, models, graphic organizers, or technology to facilitate student understanding</td>
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<td>7. Uses a variety of effective instructional strategies to facilitate student interaction through the use of partners and <em>flexible small and large groups</em> to develop mathematics content and concepts</td>
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<td>8. Interrelates ideas and information to develop students’ ability to make mathematical connections through accountable talk</td>
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<td>9. Uses <em>differentiated instruction</em> to meet the needs of all students</td>
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<tr>
<td><strong>Classroom Instruction</strong></td>
<td><em>Teacher engages and supports all students in learning</em></td>
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<td>1. Provides students with clear expectations by stating goals and outlining proficiency expectations of standard(s) to students</td>
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<td>2. Facilitates learning experiences that promote student interaction for mastering grade level standards through a lesson design which includes an <em>opening/introduction, work session/investigation, and closing/debriefing</em></td>
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<td>3. Structures purposeful tasks that enable different possibilities, strategies, and products to emerge</td>
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<td>4. Engages students in critical thinking and investigative activities with <em>multiple entry points</em> that promote dialogue and sharing of strategies</td>
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<tr>
<td>Area</td>
<td>Goals/Expectations for Effective Mathematics Teaching</td>
<td>Indicators</td>
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</tbody>
</table>
| Classroom Instruction       | 5. Engages students in activities that allow them to make sense of the mathematics they are learning and build on previous learning  
6. Uses a variety of instructional strategies and resources that address students’ diverse needs including:  
   • *Scaffolding*  
   • *SDAIE*  
   • *Culturally relevant learning*  
7. Encourages student-to-student inquiry through a non-judgmental *facilitative model*  
8. Models thinking process aloud for students to demonstrate forms of reasoning through talk  
9. Uses *questioning techniques* that allows student processing/thinking time to explain their understanding |             |
| Student Work Products       | **Students generate work products that demonstrate academic rigor**  
1. Written work products:  
   • Use *multiple strategies*  
   • Use pictures, diagrams, models  
   • Explain thought process  
   • Provide justifications of solutions  
   • Record all steps that lead to their *solution path*  
   • Summarize and extend mathematical understanding  
2. Oral presentations:  
   • Engage in accountable talk  
   • Demonstrate or model solutions  
   • Justify solutions  
   • Use pictures, diagrams, models  
   • Use *technological resources* |             |
| Assessment Use              | **A. Teacher guides students in assessing their own learning**  
1. Uses a variety of assessment tools such as:  
   • Daily checks for individual understanding  
   • Student conferencing /interviewing  
   • Periodic Benchmark Assessments  
   • Specific feedback to students with the goal of improving their work |             |
<table>
<thead>
<tr>
<th>Area</th>
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</table>
|                             | • Student work products  
2. Engages students in ongoing effective practices including:  
   • Using criteria charts and rubrics to self-evaluate  
   • Explaining thinking and justifying answers orally and in writing                                                                                                                                                                           |             |
| B. **Teacher adjusts instruction based on specific needs by analyzing student assessment data**  
1. Provides *scaffolding* through reteaching with different strategies  
2. Provides *targeted assistance* using flexible groupings  
3. Provides *targeted enrichment* using flexible groupings |             |
| **Classroom Environment**   | **Teacher creates a physical and supportive environment that engages all students and promotes clear and high expectations**  
1. Develops daily routines and materials management to maximize student time on task  
2. Establishes a climate that promotes fairness and respect  
3. Organizes classroom to allow for flexible small and large group instruction and student-to-student interaction  
4. Posts current student work products that address the standard(s) with *constructive commentary* that helps students understand how to improve their work  
5. Utilizes and posts criteria charts and rubrics to communicate expectations for problem solving and investigative lessons  
6. Promotes accountable talk and academic language development by posting math vocabulary, teacher-student developed teaching charts and graphic organizers |             |
### Academic Rigor in a Thinking Curriculum

#### Commitment to a Knowledge Core
- There is an articulated curriculum in each subject that avoids needless repetition and progressively deepens understanding of core concepts.
- The curriculum and instruction are clearly organized around major concepts specified in the standards.
- Teaching and assessment focus on students’ mastery of core concepts.

#### High-thinking Demand
- In every subject students are regularly expected to raise questions, to solve problems, to think, and to reason.
- Students are doing challenging, high-level assignments in every subject.
- Assignments in each subject include extended projects in which original work and revision to standards is expected.
- Students are challenged to construct explanations and to justify arguments in each subject.
- Instruction is organized to support reflection on learning processes and strategies.

#### Active Use of Knowledge
- Each subject includes assignments that require students to synthesize several sources of information.
- Students in each subject are challenged to construct explanations and to test their understanding of concepts by applying them and discussing them.
- Students’ prior knowledge and out-of-school knowledge is used regularly in the teaching and learning process.
- Instructional tasks and classroom discourse require students to interpret texts and construct solutions.

### Principles of Learning: Accountable Talk

#### Accountability to the Learning Community
- Active participation in classroom talk
- Listen attentively
- Elaborate and build on each other’s ideas
- Work to clarify or expand a proposition

#### Accountability to Knowledge
- Specific and accurate knowledge
- Appropriate evidence for claims and arguments
- Commitment to getting it right

#### Accountability to Rigorous Thinking
- Synthesize several sources of information
- Construct explanations and test understanding of concepts
- Formulate conjectures and hypotheses
- Employ generally accepted standards of reasoning
- Challenge the quality of evidence and reasoning
The Importance of Equity and Access

Equity and access presupposes that all students, regardless of race, ethnic group, gender, socioeconomic status, geographic location, age, language, disability, or prior mathematics achievement, deserve equitable access to challenging and meaningful mathematics learning and achievement. Educators and community members are beginning to recognize that many students, including a disproportionate number of women, minorities, and the poor, leave school without the mathematical skills they need to thrive in an increasingly complex, global economy.

A tradition of low expectations, changing workforce needs, economic necessity, and shifting demographics calls for unprecedented change in mathematics education. To ensure this change, stakeholders must have the conviction that all students can learn mathematics and the entire school community must have high expectations for every child's mathematics education. These high expectations include: equitable access to challenging and meaningful mathematics learning and achievement for all students;

1. promoting and modeling a belief in the importance of diversity, excellence, and high-quality mathematics instruction in teachers’ work with students, colleagues, and the community;
2. supporting and modeling a belief in the importance of equity and excellence in mathematics education by administrators, school board members, parents, and other members of the school community;
3. raising expectations throughout the school community for the mathematics achievement of all students, most notably females, minorities, and students with disabilities;
4. teacher- and student-related factors that influence minority participation and performance in mathematics (e.g., expectations, previous experiences, assessment practices, language, stereotypes);
5. addressing gender inequities in mathematics;
6. increasing participation and achievement in mathematics by students from underserved groups;
7. making mathematics more meaningful for traditionally underrepresented students;
8. improving students' self-esteem and confidence in their mathematical abilities by enabling them to have "success experiences" in challenging and meaningful areas;
9. using flexible grouping practices and encouraging frequent collaboration between students of diverse ability, age, gender, socioeconomic status, and cultural background in order to increase student achievement;
10. using mathematics assessments to promote equity;
11. avoiding culturally biased assessment practices;
12. evaluating all assessments - including alternative assessments - based on equitable criteria;
13. participation of teachers in professional development experiences designed to support the reexamination of beliefs, expectations, and cultural sensitivities; development of skills for teaching in diverse classrooms; improvement of practice using new curriculum, instruction, and assessment strategies; and redefining roles and responsibilities in support of equity in mathematics; and
14. involvement of parents as partners in the mathematical education of their children.

Additional Resources: [http://www.ncrel.org/sdrs/areas/issues/content/cntareas/math/ma100.htm](http://www.ncrel.org/sdrs/areas/issues/content/cntareas/math/ma100.htm)
References: NCREL. Critical Issue: Ensuring Equity and Excellence in Mathematics, North Central Regional Educational Laboratory.
Family Involvement

Families demonstrate the many ways they use mathematics every day by nurturing a positive attitude towards the subject and providing their children with early experiences in mathematics that build an important foundation for learning.

Professional development activities designed for families to improve their own mathematical proficiency help them to become partners in their child’s education. *Mathematics Family Nights* and parent workshops are designed to help parents become familiar with current strategies for guiding their children.

Informing families about the grade-level mathematics standards their children are expected to meet helps to give parents / guardians insight about the mathematical concepts that their students are learning. Providing resources that enable parents to be partners in their children’s mathematics education contributes towards students’ mathematical success.

*Online Mathematics Resources for Parents*:

- [www.school.discovery.com](http://www.school.discovery.com) Mathematics games, puzzles, challenges, and information
- [www.Harcourtschool.com](http://www.Harcourtschool.com) Online math help to accompany textbook materials
- [www.Mathforum.org](http://www.Mathforum.org) A commercial online math help with “Dr.Math” and other resources
- [www.Coolmath.com](http://www.Coolmath.com) A commercial mathematics help line and resource center for parents and students
- [www.Kidsource.com](http://www.Kidsource.com) A commercial list of online links to various resources of interest to parents
- [www.scottforesman.com](http://www.scottforesman.com) Home-School connections to accompany textbook materials
- [www.onlineintervention.com](http://www.onlineintervention.com) Resources aligned with Pearson Publishing (Scott Foresman and Prentice Hall)
- [www.greatsource.com](http://www.greatsource.com) Parent Guides (Helping Your Child Succeed in Mathematics)
- [www.ed.gov](http://www.ed.gov) U.S. Department of Education Publications online:
  - *Math in the Home*
  - *Math at the Grocery Store*
  - *Math on the Go*
  - *Math for the Fun of It*
  - *What Our Children Are Learning*
  - *What You Can Do To Help Your Child Achieve in Math*
  - *How Will Math Look in Your Child’s Classroom*

* websites were accurate at the time of this printing.
Meeting the Needs of Diverse Learners

Differentiated Instruction

“…Creating multiple paths so that students of different abilities, interests, or learning needs experience equally appropriate ways to absorb, use, develop and present concepts as a part of the daily learning process.” (Tomlinson, 1999)

*Differentiated Instruction IS:*  
- Proactive planning/reactive adjustments  
- Qualitative not quantitative  
- Variety of ongoing assessments  
- Grouping  
- Content, Product, Process

*Differentiated Instruction is NOT:*  
- Individualized instruction of the 70’s  
- Chaotic  
- Homogeneous grouping  
- Same but more  
- Magic- one size fits all!

Teachers can differentiate...

![Diagram showing differentiation based on Content, Process, Product, Readiness, Interest, Learning Modalities]

Teachers differentiate:

- *content* by adapting or modifying how they give students access to what they want them to learn;
- *process* by adapting or modifying the ways in which students interact with the ideas and information to which they have been introduced; and
- *product* by adapting or modifying the ways in which students provide them with evidence of students’ understanding of the curriculum.
The effective teacher:

- plans for what students should know, understand, and be able to do at the end of a sequence of learning by identifying each student’s current knowledge, skill, and understanding;
- uses assessment data to create flexible groups for instruction;
- creates tiered assignments that are parallel, engaging tasks at varied levels of complexity and depth; and
- groups students by interest in think-pair-share groupings.

Differentiated instruction can dignify each student with learning that is “whole,” important, and meaning-making. The core content that students learn remains the same, but how the student learns, including the degree of difficulty, working arrangements, modes of expression, and types of scaffolding may vary considerably. Differentiation is not so much the what as the how.

References:


**English Learners**

Students acquiring English can be successful in mathematics when lessons are carefully planned to meet their linguistic and cultural needs. Research shows that five to seven years of appropriate instruction are needed for students to acquire a deep grasp of a second language (Krashen, 1982, Hakuta, Butler & Witt, 2000). This, however, does not mean that rigorous content instruction is postponed until English Learners (ELs) gain full mastery of English.

Customarily, teachers design lessons with scaffolding strategies to provide ELs with opportunities to successfully access rigorous content. Within this design, students are encouraged to take risks, develop oral and written language, deepen higher-order thinking and cultivate habits of mind in a safe learning environment. To achieve this, teachers should provide:

- a safe classroom environment that *reduces student anxiety* and offers opportunities for *active involvement*;
- instruction that ensures that students are given new ideas *utilizing language in context*; and
- opportunities for students to increase comprehensible output (*verbal interaction i.e., accountable talk*)

*Teachers must:*

- maintain rigorous content while providing access to the mathematics ideas.
- select tasks that require all students to think critically about mathematical concepts.
- build upon existing language skills, prior mathematical understanding, and informal mathematical thinking.
- expect and support active student engagement and discourse.
- provide multiple opportunities for students to develop and communicate their mathematical thinking (*through listening, speaking, reading, and writing*).
- amplify, rather than simplify, mathematical language.
- acknowledge students’ mathematical thinking by paraphrasing and restating ideas.
- pause and allow for wait time so students can process what is asked of them and prepare responses.
- model (using visuals, realia, and developing key vocabulary), guide, and move students toward mathematical independence.

*References:*

A variety of Internet links for teachers and schools on education and diversity topics

A Framework for Teaching English Learners

Valdez, G. (posted: 2002) Critical Issue: *Mastering the Mosaic—Framing Impact Factors to Aid Limited-English-Proficient Students in Mathematics and Science*, from [http://www.ncrel.org/sdrs/areas/issues/content/cntareas/math/ma700.htm](http://www.ncrel.org/sdrs/areas/issues/content/cntareas/math/ma700.htm)
Students with Disabilities

The Individuals with Disabilities Education Act (IDEA) 2004 requires that students with disabilities be involved and progress in the general education curriculum. The LAUSD Mathematics Instructional Guide provides the framework for the general education curriculum and as such, is used as the guiding instructional document for all students; including those with disabilities whose Individual Education Program (IEP) has determined will participate in the District general education curriculum for his/her grade level or the District general education curriculum using accommodations/modifications identified in the IEP. This information is located in Section M of the student’s IEP.

Special Education Supports and Services
A continuum of special education services and supports are provided to students with disabilities to support meaningful participation and progress in the general education curriculum. These begin with co-planning between general educators, special educators, and math coaches. Co-planning provides teachers with the opportunity to develop instructional strategies, scaffolds, and accommodations needed for students to access rigorous instruction. It is also a time when teachers determine co-teaching roles and responsibilities. Co-teaching, the next layer of support, consists of two teachers teaching together in the same room. There are a variety of co-teaching methods that provide needed support for all learners in the general education classroom. Another layer of support is the use of the Learning Center. Students can use the Learning Center for short interludes during the instructional period (pullout) or for an extended period provided as an elective. Instruction in the Learning Center includes pre-teaching the concepts, re-teaching previously learned material, and instruction in basic skills or strategies.

Evidenced-based strategies
Many instructional strategies used to teach students with disabilities are the same effective strategies used for students without disabilities. The use of differentiated instruction and appropriate scaffolds assist teachers in meeting the needs of the diverse learners within the Los Angeles Unified School District. Additional strategies are listed below:

- Scaffold instruction
- Use of mnemonics, pictures or manipulatives to support retention of concepts
- Use of graphic organizers to effectively chunk information
- Small chunks of instruction interspersed with opportunities for guided practice
- Variation in instructional groupings: whole group, small cooperative groups, peer assisted learning, etc.
- Repetition of instructions
- Use of small incremental steps in instruction or presentation
- Provision of corrective feedback

Accommodations
The determination of accommodations or modifications a student needs to meaningfully participate and progress in the general education curriculum is determined by the IEP team. Identified accommodations or modifications are found in section J of the IEP.
Accommodations are considered “changes in course content, teaching strategies, test presentation, location, timing, scheduling student response, or environmental structuring that do not substantially change the standards or expectations for student performance.” Accommodations are changes to how the student demonstrates mastery of skills associated with meeting grade level standards.

Modifications:
Modifications are “changes in course content, teaching strategies, test presentation, location, timing, scheduling student response, or environmental structuring that do substantially change the standards or expectations for student performance.” Modifications are changes to the content of instruction and expected learning.

A variety of accommodations might be considered by the IEP team. Examples are listed below:
- Use of cue sheets
- Use of a marker or place holder
- Testing in smaller groups
- Reducing the number of problems required to demonstrate mastery
- Use of the calculator (If it does not violate the construct being taught. This cannot be used in standardized testing.)
- Use of manipulatives
- Extended time for learning or task completion

This list is not exhaustive. IEP teams will want to access the Special Education Accommodations/Modifications lists from the California State Testing and Reporting (STAR) program available at: [www.cde.ca.gov/ta/tg/sa/documents/matrix5.pdf](http://www.cde.ca.gov/ta/tg/sa/documents/matrix5.pdf) to determine appropriate accommodations for STAR testing.

**Resources:**
- [http://dse-web.lausd.k12.ca.us/](http://dse-web.lausd.k12.ca.us/) Division of Special Education website
- [www.carsplus.org](http://www.carsplus.org) California Association of Resource Specialists & Special Education Teachers (CARS+)
- [www.idealpractices.org](http://www.idealpractices.org) IDEA Practices
- [www.cast.org](http://www.cast.org) Center for Applied Special Technology
Advanced Learners and Gifted and Talented Students

Advanced Learners and Gifted and Talented Education (GATE) students demonstrate academic performance that exceeds that of their grade level peers. Ensuring mastery of the mathematics standards through challenging and enriched instruction is the goal for advanced learners. Students who readily understand the basic underpinnings of the standards pursue a richer understanding of standards-based mathematics content. Advanced Learners must be encouraged to extend their knowledge through available enrichment opportunities. Enrichment lessons have high levels of standards-based mathematics content proportionate to the amount of time that the lesson takes. Enrichment projects should be designed so that the student does most of the work in the classroom. Differentiating instruction for the Advanced Learner is to provide depth and breadth to the content of grade-level standards.

The state has mandated that all school districts provide a comprehensive continuum of services and program options responsive to the needs, interests, and abilities of gifted students.

Teachers can address the needs of GATE students through differentiated instruction that can be demonstrated by:

- use of open, flexible classroom space and varied levels of materials;
- encouragement to express students’ thoughts and ideas and engagement in cooperative and individual learning;
- monitoring and accurately evaluating students’ skills;
- developing strategies that enable students to form personal goals;
- permitting students to engage in self-talk as well as dialogue with others in order to increase their problem-solving capabilities;
- encouraging students to exhibit independence through projects that culminate in real products and employ the methods of inquiry used by real scholars;
- facilitating communication of thoughts and ideas in ways that nurture and develop multiple intelligences; and
- varied placement of students in learning groups (i.e., provide experiences in both heterogeneous and homogeneous groups).

Additional Resources:
www.lausd.k12.ca.us/lausd/offices/GATE
www.cagifted.org

LAUSD Gifted/Talented Programs
California Association for the Gifted
Culturally Relevant and Responsive Pedagogy in Mathematics

Culturally Relevant and Responsive Education (CRRE) is defined as “adjusting how we teach to the needs and experiences of students by using their cultural knowledge, prior experiences, frames of reference, and performance styles to make learning encounters more relevant and effective for them.” The purpose of culturally relevant teaching is to maximize learning for all students, including those who have historically had difficulty succeeding in the public education system.

Research affirms that culture, teaching, and learning are interconnected and that there is a direct link between student achievement and the extent to which teaching employs the cultural referents of students (Gay, 2000). LAUSD must commit to improving the congruence between how the educational process is ordered and delivered in order to promote access to rigorous standards-based curricula for all students.

*Culturally Responsive Teaching:*

- encompasses content, learning context, classroom environment, student-teacher relationships, instructional techniques, and performance assessment;
- develops intellectual, social, emotional, and political learning by using cultural referents to impart knowledge, skills, and attitudes;
- fosters academic competence, personal confidence, and courage; and
- uses the cultures and experience of students of color as worthwhile resources for teaching and learning, recognizes the strengths of these students and enhances them further in the instructional process.

*References:*


**CRRP in Mathematics Instruction:**

<table>
<thead>
<tr>
<th>Identify a Principle and/or Domain of Culturally Relevant and Responsive Pedagogy</th>
<th>Connections relevant to MATHEMATICS INSTRUCTION and examples of CRRP principles applied to enhance student outcomes.</th>
<th>Student outcomes and success indicators and other classroom markers of high implementation of CRRE.</th>
</tr>
</thead>
</table>
| **PRINCIPLE #4:** Ability is not static or finite, as human beings we build our brains through our engagement with experience. | **Teacher engages and supports all students in learning:**  
1. Provides students with clear expectations by stating goals and outlining proficiency expectations of standard(s) to students;  
2. Facilitates learning experiences that promote student interaction for mastering grade level standards through a lesson design that includes an *opening*, *work session / investigation*, and *closing/debriefing*;  
3. Structures purposeful tasks that enable different possibilities, strategies and products to emerge;  
4. Engages students in critical thinking and investigative activities with *multiple entry points* that promotes dialogue and sharing of strategies;  
5. Engages students in activities that allow them to make sense of the mathematics they are learning and build on previous learning;  
6. Uses *questioning techniques* that allows student processing / thinking time to explain their understanding;  
7. Uses a variety of instructional strategies and resources that address students’ diverse needs including:  
   • *Scaffolding*  
   • *SDAIE*  
   • *Culturally relevant learning*  
8. Encourages student-to-student inquiry through a non-judgmental *facilitative model*;  
9. Models thinking process aloud for students to orally demonstrate forms of reasoning | • Student culture is reflected in the context of lessons, tasks, classroom environment and home / school communications  
• All students are engaged in rigorous mathematics tasks that facilitate learning of grade level content standards  
• Evidence supports that all students are valued and high expectations are held for all  
• Evidence supports an established system to ensure that all students participate in activities  
• Manipulatives, models, graphic organizers and technology are available for student use  
• Primary language is used as needed to support the understanding of mathematical concepts  
• Objectives are clearly stated and understood by all students  
• Students work in pairs, small groups and within whole group settings with the teacher as a facilitator  
• Probing, clarifying, and connecting questions are being asked  
• Teacher circulates throughout the room to listen for misconceptions and barriers to achievement  
• A variety of solutions to problems are sought and accepted by teacher  
• Dialogue during class discussion reveals how students strive to make new learnings  
• Students assist other students to understand concepts including translating for those needing English language support  
• Teachers share their own thinking as a model for students  
• Teachers use wait time to give students the opportunity to process and think |
Pedagogical Strategies

Research Based Best Practices

In order for a mathematics program to be successful, instructional planning and lesson delivery must focus on developing conceptual understanding and seeing mathematical relationships. Students need to have opportunities to make sense of the mathematics they are learning. Students need engagement with a variety of tasks so that connections can be made to the concepts underlying the mathematics, so teachers need to provide opportunities for students to engage with the content. Tasks that ask students to perform memorized procedures lead to only one kind of learning while tasks that demand students to make connections with concepts and mathematical ideas lead to multiple kinds of learning that are purposeful and meaningful for the student (Stein, et. al., 2000).

Teaching procedures and concepts separately leads to misunderstandings by students. Lessons need to include a variety of instructional strategies sufficient to address different learning styles and the diversity of students. Manipulatives and models should be used as often as possible to help the student move from the concrete to the abstract. Lessons should be rigorous, and relevant to the learner. Helping students see the connection of mathematics to their everyday experiences gives the work purpose and meaning. Utilizing both probing and open-ended questions will allow students to formulate sufficiently responses that demonstrate both conceptual and procedural understanding of the standard(s) being addressed.

The more opportunities students have to discuss mathematics the better able they will be to make sense of the content. Discussions around the mathematics allow opportunities for alternative strategies to be developed while at the same time encouraging students to reflect upon and make clear their solution paths. In order for learning to occur, students must have opportunities to reflect on and communicate their thinking (Hiebert, 1997).

References:


Thinking Through the Lesson Protocol (TTLP)

The purpose of the Thinking Through a Lesson Protocol (TTLP) is to engage teachers in thinking deeply about a specific lesson to be taught that is based on a cognitively challenging mathematical task. The following questions will guide the teacher in the preparation of the lesson.

Part 1: Selecting and Setting up a Mathematical Task

- What are the mathematical objectives for the lesson (i.e., what is it that the students are to know and understand about mathematics as a result of this lesson?)
- In what ways does the task build on students’ previous knowledge? What definitions, concepts, or ideas do students need to know in order to begin to work on the task?
- What are all the ways the task can be solved?
  - Which of these methods will your students use?
  - What misconceptions might students have?
  - What errors might students make?
- What are the expectations for students as they work on and complete this task?
  - What resources or tools will students have to use in their work?
  - How will the students work – independently, in small groups, or in pairs – to explore this task? How long will they work individually or in small groups/pairs? Will students be partnered in a specific way? If so, in what way?
  - How will students record and report their work?
- How will the students be introduced to the activity so as not to reduce the demands of the task? What will be heard that indicates that the students understood the task?

Part 2: Supporting Students’ Exploration of the Task

- As students are working independently or in small groups:
  - What questions will be asked to focus students’ thinking?
  - What will be seen or heard that indicates that the students are thinking about the mathematical ideas?
  - What questions will be asked to assess students’ understanding of key mathematics ideas, problem solving, or representations?
  - What questions will be asked to advance students’ understanding of the mathematics ideas?
  - What questions will be asked to encourage students to share their thinking with others or to assess their understanding of their peers’ ideas?
- How will students remain engaged in the task?
  - What will be done if a student does not know how to begin to solve a task?
If a student finishes the task almost immediately and becomes bored or disruptive?

What will be done if students focus on non-mathematical aspects of the activity (e.g., spend most of their time making a beautiful poster of their work?)

Part 3: Sharing and Discussing the Task

- How will the class discussion be orchestrated so that the mathematical objectives are accomplished? Specifically:
  - Which solution paths will be shared during class discussion? In what order will the solutions be presented? Why?
  - In what ways will the order in which solutions are presented help develop students’ understanding of the mathematical ideas that are the focus of the lesson?
  - What specific questions will be asked so that students will:
    - make sense of the mathematical ideas that need to be learned?
    - expand on, debate, and question the solutions being shared?
    - make connections between the different strategies that are presented?
    - look for patterns?
    - begin to form generalizations?

- What will be seen or heard that indicates that the students understand the mathematical ideas taught?

- What will be done tomorrow to build on this lesson?

References:


Classroom Discourse

Why have classroom discourse / accountable talk?

In order for students to make sense of their learning, they need to be engaged in meaningful dialogue with one another about the mathematics they are learning. By encouraging students to engage in classroom discussions, they will:

- try new ideas.
- hear the ideas of others and think about mathematics in new ways.
- learn how to work and talk together.
- learn and be accountable for learning.
- synthesize learning.

Discussions are effective when everyone listens to the one person who is speaking. Teachers should have firm, clear expectations. If sideline conversations are going on, the speaker should be stopped and the teacher should insist on attention on the speaker. There are times when a comment sparks a spontaneous reaction and students may break into discussion. This type of talking is important for interpreting ideas and making sense of them.

Sometimes students need a few minutes to talk among themselves and voice opinions in small groups. This strategy allows more students to be engaged in the talk. Later, students can discuss their new ideas with the larger group.

Establishing a classroom environment that encourages safe risk-taking is essential. Teacher modeling on how to be respectful and supportive, and then expecting students to follow this lead with one another, develops this type of environment.

Resources:


Asking Questions

For students to have deeper mathematical understanding, the process of asking questions reveals what they truly understand about procedures and problem solving in mathematics. By asking open-ended, thought-provoking questions, teachers:

- engage and guide students’ thinking to deeper levels;
- gain insight into what students understand and the depth of that understanding;
- engage and guide the class in deeper mathematical thinking about the concepts; and
- place greater emphasis on mathematical thinking and reasoning.

Because these questions cannot be answered effectively with single-word responses, students should be asked to formulate more elaborate responses to promote learning. Some strategies for maintaining a low-stress, low-anxiety environment in the classroom in order to facilitate learning through open-ended questioning are:

- anticipating the questions students will likely ask;
- organizing students in ways that allow them to interact more freely with one another;
- using wait time to allow students more time to process the questions and develop multiple responses; and
- honoring all responses and remaining neutral in order to allow students opportunities to validate each others’ responses.

References:


LAUSD Grades 4 and 5 Intervention Kits


Problem Solving

Problem solving in mathematics is a goal-related activity that involves applying skills, understandings, and experiences to resolve new, challenging, or perplexing mathematical situations. Problem solving involves a sequence of activities directed toward a specific mathematical goal such as solving word problems that often involve the use of mathematical procedures and conceptual representations (Geary 1994; Siegler & Crowley 1994; and Mayer 1985).

Problems occur in many forms. Some are simple and routine, providing practice for skill development. Others are more complex and take a longer time to complete. Whatever their nature, it is important that the kinds of problems students are asked to solve balance situations in the real world with more abstract situations. The process of solving problems generally has three stages. (Geary 1994; Mayer 1985)

The first stage is formulation, analysis, and translation. The student’s ability to recognize potential mathematical relationships is an important problem-solving technique, as is the identification of basic assumptions made directly or indirectly in the description of the situation. Important considerations in the formulation and analysis of any problem situation include determining mathematical hypotheses, making conjectures, recognizing existing patterns, searching for connections to known mathematical structures, and translating the ideas behind the problem into mathematical representations.

The second stage is integration and representation. Integration involves putting together different pieces of information that are presented in complex problems. However such problems are represented, a wide variety of basic and technical skills are needed in solving them; and, given this need, a mathematics program should include a substantial number of ready-to-solve exercises that are designed specifically to develop and reinforce such skills.

The third stage is solutions and justifications. Students should have a range of strategies to use in solving problems and should be encouraged to think about all possible procedures that might be used to aid in solving any problem. Some of the strategies are:

- referring to and developing graphs, tables, diagrams, and sketches
- computing
- finding a simpler related problem
- looking for patterns
- estimating, conjecturing, and verifying
- working backwards

Once the information in a complex problem has been integrated and translated into a mathematical representation, the student must be skilled at solving the associated equations and verifying the correctness of the solution. Students might also identify relevant mathematical generalizations and seek connections to similar problems. From the earliest years, students should be able to communicate and justify their solutions, starting with informal mathematical reasoning and advancing over the years to more formal mathematical proofs.
References:


Drill vs. Practice

According to John Van de Walle (2004), drill refers to “repetitive, non-problem-based exercises designed to improve skills or procedures already acquired”, while practice refers to “different problem-based tasks or experiences, spread over numerous class periods, each addressing the same basic ideas.”

Drill Provides

• increased facility with strategies that students already know. For example, once students have mastered “doubles” facts (2+2, 3+3, etc.) they can be drilled to become faster at recalling those facts.

• increased focus on a single method (e.g. a single computational strategy such as regrouping in subtraction across zeros), excluding alternatives.

• the “appearance” of understanding. Students can produce many correct answers quickly by working procedures with little need to understand the mathematical concepts behind how those procedures work.

• a rule-oriented view of what math is about.

Practice Provides

• increased opportunities to help students develop conceptual ideas and make more elaborate and useful connections between concepts and ideas.

• the opportunity to develop alternative and flexible strategies. Rather than learning and using a single strategy for one type of problem, students assemble a repertoire of strategies that can be useful in a variety of situations.

• a greater chance for all students to understand mathematical ideas. Students are often encouraged to use strategies that make sense to them.

• an understanding that mathematics is about figuring things out and making sense.

When is Drill Appropriate?

Teachers should use drill strategies when automaticity with a skill is desired, but only if the students already have an efficient strategy for the skill in place. For example, if students are still using fingers to find the results of addition facts, they should not be drilled on them. These students will become fast finger counters, rather than use efficient mental strategies to recall those facts.

Practice As Homework

Homework can be a way to extend problem-solving approaches from the classroom into the home. A task could be described in class, completed at home, and discussed in class the following day.
Drill As Homework

Drill should only be assigned when a skill is present and automaticity is desired. When assigning drill for homework, some things to consider are to:

• keep the drill short. It is better to practice 10 facts correctly than 100 facts incorrectly.
• provide students with an answer key. Students can correct their homework at home, and immediately know which facts or types of computation are problematic for them.
• avoid grading students in class on whether they have correct answers (especially if they have already been provided an answer key), but to focus on whether or not the work was completed.
• avoid going over drill homework in class. By spending less time on drill in class, more time in the classroom can be spent on tasks that are more rigorous.

Reference:

Mathematics Connections to Literature

Many mathematical ideas take shape through our attempts to communicate, and therefore find their way into our literature. Humans express mathematical ideas in stories, essays, poems, books, and other forms of literature that convey life experiences, real or imagined. One way of connecting school mathematics to everyday life is to reveal the mathematics inherent in human thinking and communication about life experiences.

There is no suggestion that mathematics should be taught only through children's literature. There are many ways to teach mathematics effectively... the use of literature is one more approach teachers can use in providing their students with varied experiences with mathematics. It should not be overused any more than it should be underused. Not every book is meant for mathematics, and this connection should not be forced.

Advantages of Using Literature with Mathematics

Literature provides a way for children to make mathematics learning more personal and to give it meaning. Some suggest that the literature connection motivates students, provokes interest, helps students connect mathematical ideas to their personal experiences, accommodates children with different learning styles, promotes critical thinking, or provides a context for using mathematics to solve problems. Literature has even been used to help students see mathematics as a tool for making life easier. Whitin and Gary (1994) state that, "using math-related children's literature can help children realize the variety of situations in which people use mathematics for real purposes." These teachable moments occur throughout the course of a regular day and are reflected in many quality examples of children's literature, including: calendar time, birthdays, daily schedules, attendance, lunch count, and sharing materials.

Selection of Literature

Spann (1992) makes several suggestions about how teachers should go about selecting books to use in the teaching of mathematics. Teachers must develop their own understanding of what mathematics concepts children at their grade level should understand. The Elementary Mathematics Instructional Guide provides some examples of quality literature teachers may choose from in planning and implementing instruction. Through the books, teachers can take advantage of teachable moments to solidify students’ understanding of the mathematical concepts the books are based on.

Ways to use Literature in Teaching Mathematics

Though many children's books are explicitly about mathematics, such as books about counting or shapes, other books have mathematics embedded within a larger context. These books are generally not perceived as "math books," but mathematics appears as a natural element within stories, problems, personal vignettes, or cultural events. Literature that incorporates mathematics can be used to:

1. encourage students to read literature and to view such reading as a worthwhile activity.
2. provide a context or model for an activity with mathematical content.
3. introduce manipulatives that will be used in varied ways (not necessarily as in the story).
4. inspire a creative mathematics experience for children.
5. pose an interesting problem.
6. prepare for a mathematics concept or skill.
7. develop, explain, or review a mathematics concept or skill.
8. promote the cross-curricular connection between English language arts and mathematics curricula.

Though any given book could likely be used in multiple ways, the common element in these various approaches is the intent to use literature to provide vicarious mathematical experiences based on real problems or situations of interest to teachers and students.

Context

Books selected should provide a pleasurable and authentic literary experience as well as the opportunity to use mathematics for authentic purposes. Context is key… through attention to the mathematics in literature, we can help students realize that mathematics, including arithmetic, is a spontaneous and natural expression of human minds attempting to capture important aspects of our world (both real and imagined).

Resources:


Combination Classrooms

Combination classes present a special challenge for teachers and administrators as they develop daily classroom schedules that provide grade level instruction supporting the requisite minutes identified within each of the core curricular frameworks, especially for the one hour of daily mathematics instruction. Skillful teaching and a deep knowledge of the standards are essential elements in successfully navigating the complexity of providing effective grade level instruction. Careful planning and classroom management are essential when presenting the mathematics content standards to students in multiple grade levels.

A teacher of a combination classroom may focus on the mathematics content that is common to both grades levels. During each quarter of instruction, the Mathematics Instructional Guide provides many opportunities for common content lessons to be developed. The grade level Quarterly Concept Organizers and Quarterly Instructional Roadmaps are organized by big ideas and mathematical concepts. In each quarter, common big ideas and concepts appear across adjacent grade levels. These big ideas and concepts found within the content standards provide opportunities for teachers to present lessons that share a common mathematical thread. Through the use of direct grade level instruction and independent work time the needs of students in each grade level can be met.

The grade level Quarterly Instructional Roadmaps indicate the standards to be taught in each quarter. Because the alignment of standards between adjacent grade levels was carefully considered, teachers can conduct a common opening or presentation to daily lessons. The charts below show the alignment of the Number Sense standards in Grades 1 and 2, for Quarter Two, and in Grades 4 and 5, for Quarter One.

<table>
<thead>
<tr>
<th>Quarter Two</th>
<th>Grade 1</th>
<th>Grade 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number Sense Standards Taught</strong></td>
<td><strong>Number Sense Standards Taught</strong></td>
<td><strong>Number Sense Standards Taught</strong></td>
</tr>
<tr>
<td>• Count, read, and write whole numbers up to 100</td>
<td>• Count, read, and write numbers to 500 and identify place value</td>
<td>• Count, read, and write numbers to 500 and identify place value</td>
</tr>
<tr>
<td>• Count and group objects in tens and ones</td>
<td>• Use words, models, and expanded form to show numbers to 500</td>
<td>• Order and compare numbers to 500</td>
</tr>
<tr>
<td>• Count by 2s, 5s, 10s, and 100s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Identify and count the value of pennies, nickels, and dimes</td>
<td>• Solve problems using combination of coins</td>
<td></td>
</tr>
<tr>
<td>• Use addition facts (sums to 20) and the corresponding subtraction facts</td>
<td>• Check results using the inverse relationships of addition and subtraction</td>
<td></td>
</tr>
</tbody>
</table>
Grade 4

- Represent fractions, decimals, and mixed numbers in multiple ways
- Show equivalence of fractions and decimals
- Round whole numbers to the millions and decimals to two decimal places
- Identify prime and composite numbers
- Identify and represent positive fractions and mixed numbers on the number line

Grade 5

- Find decimal and percent equivalents for common fractions
- Estimate and round numbers
- Determine prime factors and write in exponential form
- Identify and represent positive fractions, mixed numbers and decimals on the number line

The chart below shows a suggested schedule, which reflects the time for the common lesson elements and the specific grade level instruction for each grade level. At the conclusion of the lesson the common problem solving strategies and Accountable Talk dialogue should be modeled and shared across grade levels.

<table>
<thead>
<tr>
<th>Time</th>
<th>Grade Level “A”</th>
<th>Grade Level “B”</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number Sense lesson presentation with an emphasis on Big Ideas and concepts.</td>
<td>Direct instruction by teacher</td>
</tr>
<tr>
<td></td>
<td>Independent practice and mathematics centers</td>
<td>Independent practice and mathematics centers</td>
</tr>
<tr>
<td></td>
<td>Discussion of common problem solving strategies and development of Accountable Talk</td>
<td>Direct instruction by teacher</td>
</tr>
</tbody>
</table>
Assessment

Assessment is an integral part of the teaching and learning process that guides instruction. The Mathematics Framework for California Public Schools states that assessment should be the basis for instruction, and different types of assessment interact with the other components of an effective mathematics program. Therefore, assessment is aligned with and guides instruction. Effective assessment tools provide teachers with insight into effective teaching strategies and provide students and parents with valuable feedback that motivates further learning.

Students are assessed frequently to determine whether they are progressing steadily towards achieving the standards, and the results of these assessments are useful in identifying instructional priorities and guiding the modification of curriculum and instruction.

Assessments serve different purposes and are designed accordingly. Formative, or frequent monitoring of student learning provides the teacher with useful information regarding student progress towards the mastery of the content within the standards. Summative evaluation, which takes place at the end of a series of lessons, provides specific information about those standards students have or have not mastered over time. Quality assessment tools reflect the balance (computational and procedural skills, conceptual understanding, and problem solving) emphasized in instruction. Feedback from assessments can guide teachers and help students set goals, assume responsibility for their own learning, and become more independent learners. For example, scoring guides and rubrics can help articulate the characteristics of a complete response to a challenging task.

Classroom Assessments:

Every day teachers make decisions regarding their classroom instruction. Assessment has an important role in providing teachers accurate information upon which to make effective decisions regarding their instruction. The instructional decisions made by teachers, such as, how to revisit difficult concepts or how to adapt tasks for students who are struggling or for those who need enrichment, are based on teachers’ judgment. Various assessment tools can be used as the evidence upon which this judgment is based. Because different students show what they know in different ways, a variety of assessment strategies and tools should provide ways to capture student learning. There are a variety of ways that teachers can assess student understanding, including open-ended problems, constructed-response tasks, selected-response items, performance tasks, observations, oral conversations, journals, and portfolios to name a few.

LAUSD Periodic Assessment:

Periodic mathematics assessments are administered to all students in grades Kindergarten – Algebra. The assessments are low stakes in nature and measure areas of student strength and weakness on the standards covered in the instructional quarter. The data from the assessments allows teachers to obtain information on the effectiveness of their instructional approach in order to reflect on the strengths of their program and target strategies to improve student achievement. The data also facilitates targeted professional development and strategic support for teachers. Administered quarterly, the Periodic Assessment’s test items are aligned with the standards taught during the quarter. In addition to multiple-choice items, each assessment includes a constructed response question that requires the student to demonstrate a clear understanding of the mathematics content being learned.
The California Standards Test (CST):

The California Standards Test (CST) is part of the California Standardized Testing and Reporting (STAR) Program. Students in grades two through eleven participate in the STAR program annually following the guidelines for participation set forth by the California Department of Education (CDE).

Within the process of scoring, the student’s raw score is equated to a set of criteria to determine the students’ performance level as advanced, proficient, basic, below basic, or far below basic. The goal is for all students to score at the proficient level or above.

The CDE provides reports on individual student achievement for STAR in the areas of English-language arts, mathematics, and science at Grade 5 to be shared with parents. Students’ scores are compiled into teacher reports and electronic reports to show aggregate student achievement by grade level and all subgroups (e.g. gender, race, economic disadvantage, English fluency, and students with disabilities). These aggregate reports (which protect the individual students’ identity) are available publicly at the school, district, and county level so that results can be used for program review.

The CSTs are a major component of California’s accountability system for schools and districts. Student achievement from STAR is used to calculate each school’s Academic Performance Index (API), a scaling instrument to compare schools with similar demographic challenges against their statistical potential for student academic growth. These results are also used within the federal accountability system under the No Child Left Behind (NCLB) Act of 2001 to determine the rate at which a school is increasing the percent of students scoring at the proficient level and above.

References:


Bibliography


LAUSD Grades 4 and 5 Intervention Kits.


North Central Regional Educational Laboratory. Critical issue: Ensuring equity and excellence in mathematics.


Valdez, G. (posted: 2002) Critical Issue: Mastering the mosaic—Framing impact factors to aid Limited-English-Proficient students in mathematics and science, from [http://www.ncrel.org/sdrs/areas/issues/content/cntareas/math/ma700.htm](http://www.ncrel.org/sdrs/areas/issues/content/cntareas/math/ma700.htm).


**Web-based Resources:**

- [http://www.goenc.com](http://www.goenc.com)
- [www.carsplus.org](http://www.carsplus.org)
- [www.cde.ca.gov/sp/se/](http://www.cde.ca.gov/sp/se/)
- [http://dse-web.lausd.k12.ca.us/sepg2spg2_practices.htm](http://dse-web.lausd.k12.ca.us/sepg2spg2_practices.htm)
- [www.ldonline.org](http://www.ldonline.org)
- [http://www2.edc.org/accessmath/](http://www2.edc.org/accessmath/)
- [www.lausd.k12.ca.us/lausd/offices/GATE.](http://www.lausd.k12.ca.us/lausd/offices/GATE.)
- [www.cagifted.org](http://www.cagifted.org)


California Association of Resource Specialists & Special Education Teachers’ (CARS+)

The California Department of Education, Special Education Division

Position Paper 4 titled *Secondary Instruction and Services — Students with Disabilities Accessing the Core Curriculum*. LD Online

Addressing Accessibility in Mathematics

LAUSD Gifted/Talented Programs

California Association for the Gifted