

**Bridges in Mathematics** is a full K-5 curriculum that provides the tools, strategies, and materials teachers need to meet state and national standards. **Bridges** is published and distributed by The Math Learning Center, an Oregon-based nonprofit that has been working for more than 30 years to improve mathematics education for students, teachers, and families. First published in 1999, **Bridges** is now used in thousands of classrooms nationwide.

Developed with initial support from the National Science Foundation, **Bridges** offers a unique blend of problem-solving and skill building in a clearly articulated program that moves through each grade level with common models, teaching strategies, and objectives.

A **Bridges** classroom features a combination of whole-group, small-group, and independent activities. Lessons incorporate increasingly complex visual models - seeing, touching, working with manipulatives, and sketching ideas - to create pictures in the mind's eye that helps learners invent, understand, and remember mathematical ideas. By encouraging students to explore, test, and justify their reasoning, the curriculum facilitates the development of mathematical thinking for students of all learning styles.

Written and field-tested by teachers, **Bridges** reflects an intimate understanding of the classroom environment. Designed for use in diverse settings, the curriculum provides multiple access points allowing teachers to adapt to the needs, strengths, and interests of individual students.

### What makes Bridges different from other math curricula?

Like other strong elementary math curricula used in classrooms today, **Bridges in Mathematics** is based on the following goals for students and teachers:

- Provide opportunities for all students to be successful in math through the use of research-based teaching methods and visual models
- Help students master both essential skills and mathematical concepts so that they can solve a wide range of mathematical problems, from basic calculations to complex problems in real-world situations
- Foster all students' interest in and enjoyment of mathematics
- Help students develop the skills and confidence they need to be successful in middle-school math and beyond
- Help teachers improve their knowledge of mathematics and their ability to teach it

## K- 5 Mathematics Update

### Bridges In Mathematics

#### *Structures of the Program*

Teaching Strategies	<b>Mental Math</b> <b>Computational Fluency</b>  <b>Number Corner (NC)</b>  <i>"I do it" – "We do it"</i>    <i>15- 20 minutes daily</i>	<b>Whole Group Instruction</b>  <b>Sessions</b> <b><i>Problems and Investigations</i></b>  <i>"I do it" – "We do it"</i>
	<b>Small Group and Partner Work</b> <b>Differentiated Instruction</b> <b>Practice</b>  <ul style="list-style-type: none"><li>• NC Student Book</li><li>• Small Group Activities</li><li>• Work Place Stations</li></ul> <i>"You do it together"</i>	<b>Independent Practice</b>  <ul style="list-style-type: none"><li>• NC Student Book</li><li>• Practice Pages</li><li>• Home Connections</li><li>• Journals (grades 3-5)</li></ul> <i>"You do it alone"</i>

What makes the **Bridges** curriculum different is....

- *the extensive, careful use of visual models*
- *consistent attention to both basic skills and conceptual understanding.*

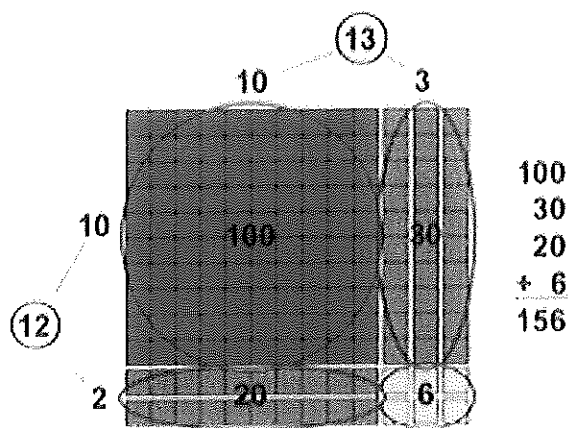
• **Visual Models Make New Ideas Easier to Understand and Remember.**

Many people are accustomed to seeing pictures when students are studying geometry, but **Bridges** helps students use pictures to understand concepts in all areas of mathematics, including algebra and computation. For example, fourth graders use rectangles to represent multi-digit multiplication problems. Although students ultimately calculate using numbers alone (either mentally, on paper, or with a calculator), the pictures help them understand why certain procedures work, and many students find it easier to remember a single picture than a set of steps.

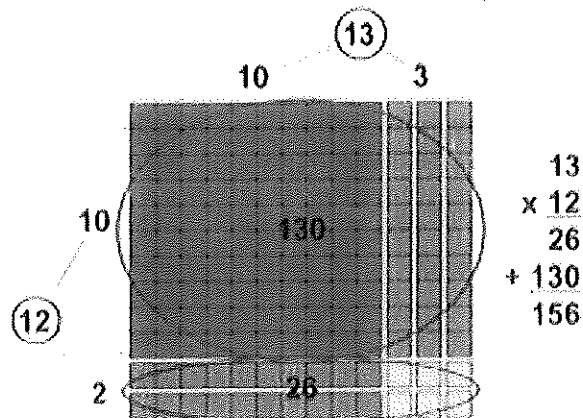
**Using a Picture to See Multiplication**

$$13 \times 12$$

First, students use the rectangle to multiply the ones and tens in each number and then add them to find the product.



Then, they see how these numbers can lead to a computational algorithm, which they practice first with pictures and numbers and then with numbers alone.

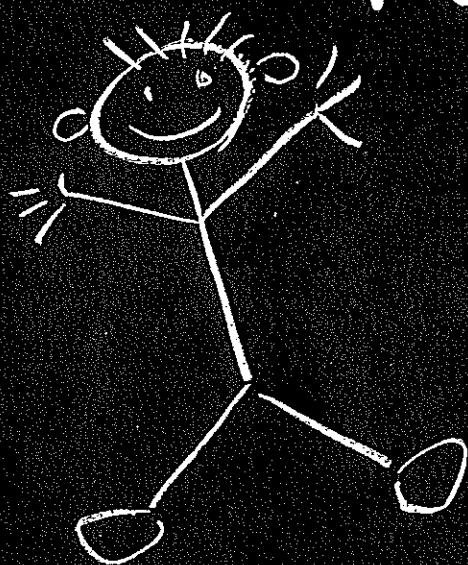


• **Basic Skills and Conceptual Understanding Are Both Essential.**

Students must use their understanding of mathematical concepts and their mastery of computational skills when they solve almost any problem. The examples below are drawn from Grades 2–4 of Bridges in Mathematics. You'll see that in all cases, students must apply both their conceptual understandings and their computational skills to solve the problems correctly. Because conceptual understanding and skills go hand-in-hand, Bridges teaches them together, while also offering skills practice that helps students keep their mastery of facts and procedures current: this practice takes the form of games (used more frequently in the lower grades) and paper-and-pencil assignments (used more frequently in the higher grades).

Problem	Concepts	Skills
<p>Mrs. Brown is the gym teacher. She has 15 soccer balls and 8 footballs.</p> <p>a. How many more soccer balls than footballs does Mrs. Brown have?</p> <p>b. How many soccer balls and footballs does Mrs. Brown have in all? (<i>Grade 2, middle of year</i>)</p>	<ul style="list-style-type: none"> <li>• Understand that finding the difference involves subtraction (not just taking away).</li> <li>• Understand that finding the total involves addition.</li> </ul>	<ul style="list-style-type: none"> <li>• Recall a basic subtraction fact (<math>15 - 8 = 7</math>).</li> <li>• Recall a basic addition fact (<math>15 + 8 = 23</math>).</li> </ul>
<p>Frank was measuring out some peanuts. He wanted exactly 1 kilogram of peanuts. So far, he has 300 grams. How many more grams does he need to get exactly 1 kilogram of peanuts? (<i>Grade 3, middle to end of year</i>)</p>	<ul style="list-style-type: none"> <li>• Understand that you need to convert 1 kilogram to 1,000 grams to determine the difference between what Frank has and what he needs.</li> <li>• Understand that you can add up or subtract to determine how many more grams Frank needs.</li> </ul>	<ul style="list-style-type: none"> <li>• Recall metric conversions (1,000 grams in 1 kilogram).</li> <li>• Recall or find the difference between 1,000 and 300 (<math>1,000 - 300 = 700</math>).</li> </ul>
<p>Mina went up to the fence to get a closer look at the animals and spotted 47 adorable piglets running around. The farmer was building pens to hold them and told Mina it would take 1 pen to hold every 6 piglets. How many pens will he need to build? (<i>Grade 4, end of year</i>)</p>	<ul style="list-style-type: none"> <li>• Understand that this situation (equal groups) calls for division.</li> <li>• Understand how to handle the remainder in this problem situation: 7 pens will hold just 42 piglets, so another pen is needed for the remaining 5 piglets. This means that the answer to the problem is 8, even though the answer to the calculation (<math>47 \div 6</math>) is 7 r5.</li> </ul>	<ul style="list-style-type: none"> <li>• Complete division with a remainder (<math>47 \div 6 = 7</math> r5) by recalling basic multiplication/division facts (<math>6 \times 7 = 42</math>) and subtracting (<math>47 - 42 = 5</math>).</li> </ul>

# Math + Reading + You Fun!



**M**ATH AND READING are two of the most fundamental skills your child needs to have to do well in school. With solid math and reading skills, your child can go on to learn any number of subjects—from science to history to a foreign language. Not to mention all the everyday benefits your child will reap—from being able to follow recipes and cook a tasty meal to exploring a new world through the pages of a novel.

You can help your child come to see math and reading as fun, useful skills by finding new and interesting ways to practice them.

## Read, discuss, repeat

Experts recommend reading to or with your child every day, starting at birth. If it's part of your daily routine already—keep it up! If not, it's never too late to start.

Set up a daily reading routine. Bedtime often works well—but any time when you and your child will both be relaxed and in a quiet place will do. Let your child pick out which book(s) to read each day.

When your child is just learning to read, read out loud to him or her. Run your finger under the text as you read it so your child can follow along. As your child gets older, take turns reading every other line, paragraph or page.

Bring stories to life by using different voices for each character. Change your tone and volume to show emotion. Use your enthusiasm!

When you're done reading, talk about what you read. Encourage your child to compare ideas and events from the story to things that have happened in his or her own life.

Remember that reading together doesn't have to be limited to books. For example, on road trips, have your child read signs and search for certain words and phrases, such as "exit," "bus stop" and "speed limit." Make it a contest—whoever finds a certain word first gets to pick the next song on the radio or what to have for dinner (within reason, of course).

## Measure up in math

There was probably a time in your school career when you asked: "Are we ever going to use this stuff in real life?" Of course, you now know that the answer was a clear "Yes!"

So put your hard-earned knowledge to work and help your child see the math in everyday life.

Encourage your child to count everything—food, people, cars and anything else you can think of. Again, make a game of it—if your child can point out 4 red cars and 5 blue cars, he or she wins a "prize."

(Keep it simple—a hug or a high-five will do.) As your child gets older, have him or her help you count the money you need to buy small items at the store or pay for a movie ticket.

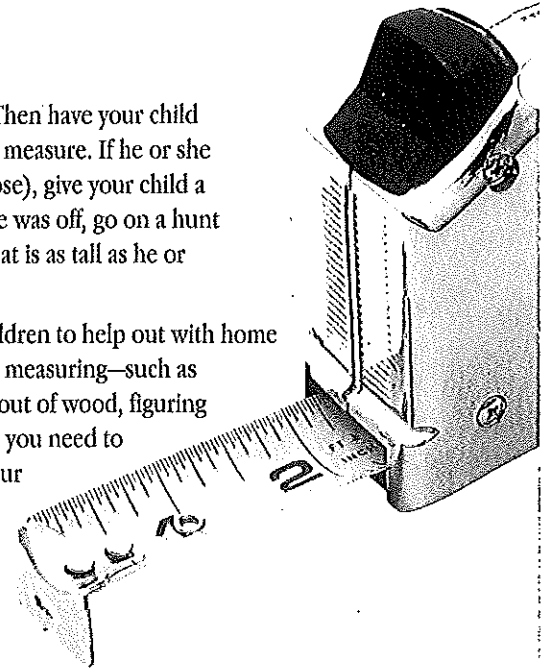
When your child is learning to add, subtract, multiply and divide, give him or her real-world examples to practice with. The grocery store can be a great place to start. For example, ask your child to figure out how much 3 boxes of pasta will cost if each box sells for \$1.50. Or have your child compare prices to find the best deal. (For example, ask your child to figure out whether it's a better deal to buy a 10-ounce box of cereal for \$3 or a 16-ounce box for \$3.50.)

Break out the measuring tools to help your child get hands-on with math. For example, have your child guess how many

**Put your hard-earned knowledge to work and help your child see the math in everyday life.**

inches tall you are. Then have your child measure with a tape measure. If he or she guessed right (or close), give your child a high-five. If he or she was off, go on a hunt to find something that is as tall as he or she guessed.

Encourage older children to help out with home projects that involve measuring—such as building something out of wood, figuring out how much paint you need to cover the walls in your living room or planning the size of a garden.



## Play to your child's tastes

Recipes can be a great way to practice both math and reading. Reading directions, measuring ingredients and timing how long a dish needs to cook all help your child practice key skills. The results can be pretty yummy. And you get some help in the kitchen!

Any recipe will do, but we've given you a kid-friendly one below to get you started. This veggie pizza is quick and easy, not to mention healthy. You'll sneak in learning—and nearly a full serving of vegetables. (Just be sure to help your child with the chopping and baking. Or do those steps for him or her.)

## Veggie Pizza

**Serves 1**

### Ingredients:

- 2 tablespoons pizza or spaghetti sauce
- 1 pocket bread (or bread slice)
- ½ cup chopped vegetables (broccoli, bell pepper, mushroom, zucchini, carrots, or any others you like)
- 2 tablespoons (½ ounce) grated cheese

### Directions:

1. Spread pizza sauce on pocket bread.
2. Sprinkle vegetables and cheese on top.
3. Place on a baking pan, and bake at 375°F until cheese melts—about 10 minutes.



# What Families Can Do

## Ideas to Help Your Child Succeed in and Enjoy Mathematics

1

### Be positive!

If you have a negative attitude about mathematics, chances are your child will, too. Help your child have a "can do" attitude by praising your child's efforts as well as her accomplishments. Acknowledge the facts that mathematics can be challenging at times and that persistence and hard work are the keys to success. Relate mathematics learning to other endeavors that require hard work and persistence, such as playing a sport. Struggling at times in mathematics is normal and is actually necessary to, and valuable in, understanding mathematics.

2

### Link mathematics with daily life

Every day, people face situations that involve mathematics, such as deciding whether one has enough money to purchase a list of items at the store, reading a map to find out where one is, building a budget, deciding on the shortest route to a destination, developing a schedule, or determining the price of an item on sale. Help your child realize that mathematics is a significant part of everyday life. Suggestions for discussing mathematics with your elementary, middle, or high school child during everyday activities are listed at the end of this section.

3

### Make mathematics fun

Play board games, solve puzzles, and ponder brain teasers with your child. Your child enjoys these kinds of activities while enhancing his mathematical thinking. Point out the mathematics involved, and have your child discuss the strategies he used.

4

### Learn about mathematics-related careers

Mathematics is foundational to a wide variety of interesting careers. Research different careers with your child, and find out what she should be doing now to prepare for these options. Help your child understand that the school courses she takes now and the grades she earns will affect her future. One source of information on the many career possibilities that involve mathematics is *Career Ideas for Kids Who Like Math*, by Diane Lindsey Reeves.



## 5

**Have high expectations**

Traditionally, in North America the belief that only some students are capable of learning mathematics has prevailed. For example, tracking has consistently disadvantaged groups of students through classes that concentrate on remediation and do not offer significant mathematical substance. Many students, especially those who are poor, nonnative speakers of English, disabled, female, or members of racial-minority groups, have become victims of low expectations. Today we are guided by a vision of mathematics for all. You would not expect your child not to read; similarly, you should not expect your child not to do mathematics. Your attitude and expectations are crucial to influencing the future opportunities for your child. Communicate high expectations to your child and his teachers, counselors, and administrators. Make sure that your child is getting the same opportunities in mathematics as everyone else, and is taking challenging mathematics classes each year, all the way through high school.

## 6

**Support homework, don't do it!**

Homework is an area that can cause trouble in most households. Relax, and remember whose homework it is. If you take over doing homework for your child, you encourage him to easily give up or seek help when working on a challenging problem. If you start to panic when you do not know how to do the mathematics, you may signal negative thoughts about mathematics to your child. Your child is not likely to be resourceful, persistent, or confident if you react in either of these ways.

Think of yourself as more of a guide rather than your child's teacher. Your role is not only to support her but also to help her take responsibility for herself. You can facilitate your child's homework by asking questions and listening to your child. The simple act of having your child explain something out loud can often help her figure out the problem. Encourage your child to also show all her calculations or a description of her thinking process on paper to support the solution to a problem. This recording gives the student something to look back on, either for review or to spot and fix a mistake. It can also furnish the teacher with useful information related to the student's reasoning and understanding.

Every day, people face situations that involve mathematics.