

How to Talk Math With Your Child

You can help your child study math by helping her/him understand some important things.

1. Problems can be solved in different ways.

We often think that because there's usually only one solution that means that there's only one pathway to the solution. However, the beauty of math is that there may be many ways to get to an answer. Nowadays, learning math means not just finding the correct answer, but it also means recognizing more than one pathway to a solution, solving similar problems, and applying what you've learned to new problems. Too often in the past we've focused on teaching students one way to solve problems. However, that means that students with different learning styles are too often left in the dark.

2. Wrong answers are sometimes helpful.

You are probably re-reading that statement and asking how can that be! Making mistakes is not fun but learning from the mistakes is an extremely important part of the learning process. Analyzing wrong answers can help with understanding the math concepts within the problem. Wrong answers can also help develop reasoning skills. As a parent, you can use your child's wrong answer to help her/him figure out why a mistake was made.

3. Take risks.

Help your child become a risk taker. There is great value in trying to solve a problem even if it's difficult. When a student works hard to solve a difficult problem or to understand a complex idea, the child experiences a special feeling of accomplishment. This effort leads to a willingness to continue trying tough things and also contributes to self-confidence.

4. Work with paper and pencil.

Did you notice we didn't say, Use an eraser? Working with paper and pencil allows your student to explore ideas and to test out possible connections or solutions. Working with a pencil on paper provides practice and leaves a trail of thoughts that can spark new ideas.

5. Math is not a spectator sport.

In order to learn mathematics a person must do mathematics. This learning means taking notes, doing homework, attending class, paying attention to the teacher and classmates, and asking questions to deepen the understanding. It does not mean simply memorizing formulas.

6. Stick to it.

Research shows that effort is important and contributes to learning mathematics. When children believe their efforts to learn make them "smarter," they show greater persistence in learning math.

Helping Your Child With Homework

How can I help my child with the math homework that's due tomorrow?

Relax—think of yourself as more of a guide than a teacher. Your goal is to get your child to figure out as much as she/he can independently (that is, constructing meaning by taking her/his existing knowledge and use it to develop specific new knowledge). Oftentimes, simply asking your child to explain something out loud is enough to help your child figure out the problem. Encourage your child to show all work including written descriptions of all thinking processes. This written record of thinking will give your child something to look back on, either to review or to fix a mistake, and can also help both you and the teacher understand how the problem was solved.

The ancient Greek philosopher, Socrates, used questions to educate his students. That two thousand year old teaching method of asking questions is the best thing you can do to help your child make sense of mathematics, build self-confidence, and encourage mathematical thinking and communication. A good question expands a problem and supports different ways of thinking about it. Here are some questions you might try. (Notice that none of them can be answered with a simple "yes" or "no".)

1. Getting Started

- What do the instructions or directions say?
- What do you need to find out?
- What do you need to know?
- Where do you think you should begin?
- How can you get the information?
- What math terms or words do you understand or not understand?
- Have you solved similar problems that would help?

2. While Working on a Problem

- What have you done so far?
- Is there anything you already know that can help you work through the problem?
- How can you organize the information?
- Can you make a drawing (model) to explain your thinking?
- Are there other possibilities?
- What would happen if . . . ?
- Can you describe an approach (strategy) you can use to solve this?
- Can you find help in your notes or text?
- What do you need to do next?
- Do you see any patterns or relationships that will help solve this?
- How does this relate to . . . ?
- Can you make a prediction?

- What assumptions are you making?
- What did you try that did not work?

3. Reflecting About the Solution

- How do you know your solution (conclusion) is reasonable?
- How did you arrive at your answer?
- How can you convince me that your answer makes sense?
- Has the question been answered?
- Can the explanation be made clearer?

4. Responding—Helping Your Child to Clarify and Extend Her or His Thinking

- Tell me more.
- Can you explain it in a different way?
- Is there another possibility or strategy that would work?
- Help me understand this part.

5. Getting Unstuck

- Would it help to go on to another problem and come back to this one later?
- Can you look for some help on the Internet?
- If you only do part of a problem, will the teacher give you some credit?
- Do you have a classmate you can call?
- Can you write down what you've tried and what you didn't understand?
- Can you go in before or after school for help from the teacher?
- Remember, everyone gets stuck sometimes.
Shall we do something different for a while and then come back to this?

Remember, don't do homework for your child—support it! Math is not a spectator sport! Support your child by acknowledging that sometimes progress is made by not giving up.

Besides supporting your child with homework, show the importance of learning math by helping your child connect math with daily life. Point out your own activities that involve mathematics, such as deciding if you have enough money to buy items on a shopping list, estimating how long it will take to make a trip, determining how much carpet or wallpaper to buy for a room, or developing a schedule to complete a series of tasks. Talking about these everyday situations will give you a chance to increase your child's appreciation for the usefulness of math!

Helping Your Child Get Organized

An important part of being successful in mathematics (or in other subjects) is taking responsibility for one's own learning. Students should use a notebook to record class discussions of problems and mathematical reflections. Students should also develop and record a vocabulary list. Finally, students should record all homework and assessment items. The notebook serves as a resource for the student (and for you) throughout the year. The following suggestions will help with developing good organizational and study habits.

- Provide a study place. If possible, have these materials readily available: pencils; graph paper and notebook paper; ruler with both metric and standard units; counters; and a dictionary.
- Many children need help with organizing and maintaining a notebook. Help your child develop a system for organizing and expect your child to maintain the notebook and notes.
- Help your child develop a system for writing down assignments, as well as keeping track of progress. Many schools provide student planners or assignment sheets, but that does not mean students use them consistently. Check to make sure that these are being used consistently and appropriately.
- Help your child develop a system for taking meaningful notes. Frequently, note taking is taught during class, so it may just be a matter of seeing whether your child is taking and using notes. Learning to take notes that make sense even when reviewed many days later is an important skill.
- Encourage your child to identify study buddies or another math student she/he can call to work with on assignments, get clarification, find out about makeup work, and so on. Some parents/guardians have established study teams and times so that students have planned opportunities to study together after school.
- Encourage and expect your child to get work done on time, to stay caught up, to get help in a timely manner, and to correct errors in work. You may want to help your child go over incorrect or incomplete work and talk about how the work could be improved.
- By middle school, students should know the basic addition, subtraction, multiplication, and division facts as well as whole number computation. If your child is not proficient with these skills, help her/him master the needed skills.

Parental Involvement

Get to know your child's teacher. Be sure to attend Back-to-School Night, Family Math Night, open house, parent-teacher conferences, and other scheduled events to ask questions and find out more about your child's math program and how he or she is doing and how you can help.

Offer to volunteer. There are many ways both inside and outside of the classroom that your time and willingness to help would be very much appreciated by your child's teacher. Please contact your child's teacher to find out about ways that your assistance would be helpful.

Included below are a set of suggested activities that you can do at home to support your child's mathematical development. Your involvement in these types of activities is extremely beneficial.

Activities at Home

Number Sense

Everyday activities can be used to develop and improve young children's number sense by counting and with addition and subtraction. Young children may not recognize numbers all around them so pointing out numbers on everyday items also increases their number sense.

Pre-School

Walk and Count

- Take your child for a walk. You can walk around the neighborhood, through a park, or just around the rooms in your home. As you walk, say fun things for her/him to do, such as the following:
 - Take two big steps and three little steps
 - Take three little steps, hop one time, take three big steps
 - Take one little step, turn around two times
 - Hop four times, turn around one time
 - Take three big steps forward and two big steps backward.
- Count aloud each kind of action that your child performs—"1, 2 – 1, 2, 3 – 1, 2. That's great!"
- Let your child say silly things for you to do as you walk.

Count

- Throughout the day with your pre-schooler find ways to let your child use counting skills. For example, "How many magazines came in the mail?" "How many more letters will we need to get to have 10 letters?" "Which are there more of, magazines or letters?"

Find It

- Place several boxes, cans, and bottles of food and other household supplies on the kitchen table. Sit with your child and point out one or two numbers on each item. (Numbers can be found in the names of some products, as well as in the list of contents and in addresses. However, rather than pointing to a very large number, such as a ZIP code, point to one digit in the code—a 6 or a 3 or 8.)
- Point to one of the items and say a number that is easy to see. Ask your child to find it. Then have her/him look for that number on other items.
- Have your child choose a number for you to find on one of the containers.

Kindergarten - Grade 2

Count and Walk

- Ask your Kindergartner to "guess" (estimate) how many of her/his steps it will take, for example, to get from the tree to the corner. After she/he makes the estimate have her/him count steps to see how close the estimate is. Next ask how many of your steps it will take. Will it take you more steps or fewer steps to go the same distance? Again, have her/him count to see how close the estimate is.

In the News(paper)

- Give your child a newspaper and a set of numbers to look for—for example, from 1 to 25 (or 1 to 100 if she/he is familiar with the higher numbers). Have her/him cut out the numbers and glue them in numerical order onto a large piece of paper. Call attention to any ways in which the numbers differ—for example, some will be in a bigger font size than others, some will be in bold or italic type. Have your child read the numbers to you, then put the paper aside. Have her/him practice counting up to that number then counting down from it. Also have your child try to count by 2s or 5s.
- Next, have your child make a counting book by using pictures she's/he's cut from the newspaper. Have her/him write the page numbers at the bottom of each blank page and paste one item on page 1, two items on page 2, and so forth. Explain that all of the things glued on a page must be alike in some way—all animals, all basketball players, all cars and so on. Help your child write the name of the item on the appropriate page.
- Have your child read the book to you. Afterwards, ask her/him questions such as the following:
 - How many pictures did you cut out altogether ($1 + 2 + 3 + \dots + 10$)?
 - How many total pictures are on pages 1-3? on pages 1-6?
 - We know that $6 = 2 \times 3$. Are there twice as many pictures on page 6 as on page 3?
 - Which are there more of: pictures on pages 2, 3, and 4, or pictures on pages 5 and 6?
- Newspapers can also be used to help your child recognize numbers in different sizes and kinds of font and to understand that the way a number looks does not change its value.

Grades 2 - 3

Fraction Action

- For this activity, use a large clear container, masking tape, a marker, unpopped popcorn, and measuring cups ($\frac{1}{2}$, $\frac{1}{3}$, or $\frac{1}{4}$ cup measure). Invite your child to help you make popcorn for the family. Begin by having her/him put a piece of masking tape from top to bottom on one side of the large container. Choose the unit of measure and fill the measuring cup with popcorn. Give the cup to your child and ask her/him questions such as the following:
 - How many whole cups do you think the container will hold?
 - How many $\frac{1}{2}$ cups (or $\frac{1}{3}$ cups or $\frac{1}{4}$ cups) do you think it will hold?
- Let your child pour the measured popcorn into the clear container. Have her/him continue to pour the same amount into the container until it is full. As she/he pours each equal amount, have her/him mark the level on the container by drawing a line on the tape. Then have your child write the fraction, corresponding to the unit of measure, on the line. After the container is full, have your child count up the total number of cup increments ($\frac{1}{2}$, $\frac{1}{3}$, or $\frac{1}{4}$) and compare it to her/his estimate.
- As you measure out the popcorn to pop, ask your child to answer questions such as the following:
 - How many $\frac{1}{2}$ cups equal a cup? Two cups?
 - How many $\frac{1}{4}$ cups equal $\frac{1}{2}$ cup? A whole cup?
- Pop the corn and enjoy!

Grades 3 - 5

Check It Out

- As you wait in a grocery checkout lane, use the time to have your child estimate what the total cost of your groceries will be. Tell her/him that one easy way to estimate a total is to round off numbers. That is, if an item cost 98 cents, round it off to \$1. Explain that the answer she/he gets won't be the exact cost, but it will be about that. Tell her/him that the word about shows that the amount you say is just an estimate.
- Using the estimated total, ask your child: "If the groceries cost \$16 and I have a \$20 bill, how much change should the checker give back to me? If the cost is \$17.25, what coins is the checker likely to give me?"
- At the checkout counter, ask your child to watch as the items are rung up. What's the actual total cost of the groceries? How does this amount compare to the estimate? When you pay for the items, will you get change back from your \$20 bill, or will you have to give the checker more money?
- If you receive change, have your child count it to make sure the amount is correct.

Sorting, Matching, Classifying, and Estimating

Sorting and matching activities introduce young children to many mathematical concepts including classification and measurement and estimation. Filling empty containers provides opportunities to explore concepts such as "more or less" and volume.

Pre-School-Kindergarten

Sort It Out

- When you're sorting and folding clean laundry, have your child join you and do things similar to the following:
 - Hold up a pair of matching socks that belong to her/him and say, for example, "These socks go together because each sock is red and each one fits the same size foot - yours!"
- Pick up another sock and ask your child to look through the pile for the sock that matches it. When a sock is chosen, have your child tell you how she/he knows it's the right one. Continue holding up socks until your child has paired them all.
- After you've done this activity several times, let your child choose the socks for you to pair. (Occasionally choose a wrong sock to give her/him the chance to help you correct your mistake!)
- Have your child help you sort the laundry to be washed. Ask her/him, for example, to put all the blue things together, all the whites, all the towels and so forth. You might also ask your child to count as the sorting takes place. How many towels are there? How many shirts? Try saying, "I count five shirts. Is that right?" Then have your child count aloud the number of shirts. From time to time, give an incorrect number so that she/he can count the items one by one and show you that you've made a mistake.

A Weigh We Go!

- At the grocery store, show your child two objects, such as a five-pound bag of sugar and a 10-pound bag of potatoes, and ask her/him to guess which weighs the most. Show her/him how to use a scale to weigh the objects and see if the guess is right or wrong.

Grades 1 - 2

Fill It Up

- • On a table, put four large glasses of equal size and shape in a row. Fill them with water as follows: $\frac{1}{3}$ cup, $\frac{1}{2}$ cup, $\frac{3}{4}$ cup, 1 cup. Ask your child questions that encourage her/him to compare, estimate and think about measurement. Ask, for example, "Which glass has more water? Which has less?"

- Pour more water into one of the glasses to make it equal to the amount of water in another glass. Move the glasses around so that the glasses that have the same amount of water are not next to each other. Ask your child to find the glasses that have the same amount of water.
- Help your child do math in her/his head. Ask questions such as, "If I have four cups of water and I need seven, how many more do I need to pour?"

Grades 1 - 5

Put It Away

- Make a game out of putting away the groceries. As you empty the bags, group the items according to some common feature. You might, for example, put together all the items that go in the refrigerator or all the items in cans.
- Tell your child that you're going to play "Guess My Rule." Explain that in this game, you sort the items and she/he has to guess what rule you used for grouping the items.
- After your child catches on to the game, reverse roles and ask her/him to use another "rule" to group these same items. The child might, for example, group the refrigerator items into those that are in glass bottles or jars and those in other kinds of packaging, or into those with vegetables, those with fruit and those with soup. When the group is done, you get to guess what rule was used.

Shapes

Using objects that are familiar to young children can be a good way to introduce them to differences in shapes and to classification. Learning about symmetry gives children a good sense of geometric concepts and calls on their mathematical reasoning abilities. A shape is symmetrical if it can be cut along a straight line into two halves that are mirror images of each other.

Pre-School-Kindergarten

Shape Up

- Fill a bowl with snack crackers in shapes such as circles, triangles and squares. Point to a cracker and say, for example, "Look, this one's round. This one has three sides. See, 1-2-3. This one has four sides. Let's count them—1-2-3-4." Place a circular cracker on the table and ask your child to find other crackers that have the same shape. Continue with the other shapes.
- As you make sandwiches, cut the bread into circles, squares and triangles so that you have two each of each shape. Ask your child to match the pairs of shapes to make Shape Sandwiches.
- Ask your child to search for and point out different shapes on her/his clothes or in the room.

Grades 3 - 5

Simply Symmetrical

- Cut some shapes, such as a circle, a square, and a rectangle that is not a square from some heavy paper. As your child watches, show her/him the square that you've made. Fold it in half and show her/him that the two parts are exactly alike—or symmetrical. Do the same with the circle and the rectangle. Then give the shapes to your child and ask her/him to make the folds. Extend the activity by doing the following:
 - Find as many ways as possible to fold half of the square onto the other half. *[There are four ways: two diagonals and two lines "down the middle"]*
 - Do the same for the rectangle that is not a square. *[There are only two ways: down the middle of the long side, then down the middle of the short side.]*
 - Do the same with the circle. *[Circles can fold along any diameter. You can also use this activity to introduce your child to the word "diameter"—the length of a straight line that passes through the center of a circle.]*
 - Ask your child to find the center of the circle by folding it in half twice. *[Any diameter passes through the center of the circle, an idea that will prepare your child for understanding more complicated geometry later on.]*
- Show your child a rectangular piece of paper. Ask, "What shape will you get if you fold this piece of paper in half?" Have her/him fold the paper, then ask, "Did you get a square or another rectangle?" Using scissors to cut the paper, show her/him that a rectangle will fold to a square only if it is twice as long as it is wide.
- Fold a sheet of paper in half lengthwise. Have your child draw half of a circle, heart or butterfly from top to bottom along the fold on each side of the paper. Have her/him cut out the shapes that were drawn. Unfold the paper to see the symmetrical figure.
- With your child, explore your house for symmetrical designs—things that have equal sides. Ask your child how many she can find. Tell her/him to look at wallpaper, floor tiles, pictures, bedspreads, and appliances.
- Have your child print the alphabet.
 - Then ask her/him to find a letter that has only one line of symmetry—only one way to be divided in half. *[B has one.]*
 - Ask her/him to find a letter that has two lines of symmetry—two ways to be divided in half. *[H has two.]*
 - Ask which letters look the same when they're turned upside down?
[H, I, N, O, S, X, and Z.]

Money!

Activities that involve money are a good way to develop mathematical reasoning and to reinforce what children are learning in school about numbers and addition and subtraction.

Kindergarten - Grade 1

Penny, Nickel, Dime

- You will need dice, pennies, nickels, and dimes and several family members. Have each player roll the dice and say the number. Then give the player that number of pennies. Explain that each penny is worth one cent. When a player gets five pennies, replace the pennies with a nickel. Explain that five pennies have the same value as one nickel—that is, five cents. When she/he gets five more pennies, replace the pennies and the nickel with a dime. Help her/him to see that the value of five pennies plus the value of a nickel equals 10 cents, which is the value of a dime. The first player to reach a set amount—25 or 50 cents, for example—wins.

Grade 1 - 2

Clip and Save

- You will need pennies, nickels, dimes, quarters, grocery store coupons, and pencil and paper. Show your child a grocery store coupon for a product that she/he likes to eat. Have your child count out the coins to show how much money the coupon saves on the product. For example, if the coupon is for 30 cents off a jar of peanut butter, give your child nickels and dimes and tell her/him to count out three dimes or six nickels. Give your child all the coins and challenge her/him to figure out how many different coin combinations she/he can make to total 30 cents.
- Ask your child how much money you can save with two or three 20-cent coupons. Show her/him the other coupons and ask how much money could be saved with each one. Have her/him write the amounts and then add them to show how much could be saved if all the coupons were used.

Grade 2 - 5

What Coins Do I Have?

- You will need coins of different denominations, paper, and pencil. Choose coins so that your child can't see, then hold out your closed hand and ask questions such as the following:
 - I have three coins in my hand. They're worth 7 cents. What coins do I have?
[a nickel and 2 pennies]
 - I have three coins in my hand. They're worth 16 cents. What coins do I have?
[a dime, a nickel, a penny]
 - I have three coins in my hand. They're worth 11 cents. What coins do I have?
[2 nickels and 1 penny]

Frequently Asked Questions

1. What will students do in math class?

There are 8 units of study at each grade level. Each unit includes 20 lessons and takes approximately 4 weeks to complete. Each lesson takes a single class period. In addition to the main lesson of the day, students also work on their skills in 15- to 20-minute Number Corner exercises, many of which provided time for students to be introduced or practice number sense skills. If you viewed your child's math class you would see children who play an active role in their own learning and in the classroom community. Children who talk about math by sharing observations, explaining their thinking, and asking questions. The use of hands-on activities and a variety of math tools and visual models to understand how mathematical concepts work. Their classroom is a place where stamina for solving complex problems that require perseverance is being built. Children playing games in small groups to practice what they learn.

2. How often should we expect homework?

Homework is a chance for students to practice what they have learned and for families to see what students are doing in math class. Homework is assigned with increasing frequency as students progress from kindergarten through fifth grade. In the lower grades, assignments are sent home about once a week; by fifth grade, you can expect to see assignments two or three times a week. In addition, teachers may send home supplemental practice pages if students need more practice with a particular skill or if there is a desire for more frequent homework.

3. Why is it important for students to show their work and explain their thinking?

Asking students to show their work provides more information for teachers and improves student learning: when students explain how they solved a problem, they come to understand the mathematical concepts more deeply. Showing their work also provides detailed evidence that teachers can use to see what students know and where their misconceptions lie. This evidence is essential: it allows teachers to adjust the way they teach to meet students' needs, and to document student learning over time, which helps them communicate with families about students' progress. For similar reasons, state tests often require students to explain how they solved a problem. Students are better prepared for such test items when they explain their solutions on a regular basis.

4. What is Bridges in Mathematics? Who developed the program?

Bridges in Mathematics is a complete elementary mathematics curriculum for use in kindergarten through fifth grade. Bridges is published and distributed by The Math Learning Center. The Math Learning Center grew out of a project funded by the National Science Foundation (NSF) to improve the teaching of mathematics. The founders spent several years traveling to schools to observe classrooms and visit with teachers and students. Over time they developed a philosophy that emphasizes building a deeper understanding before engaging more abstract concepts. Motivated to continue creating new methods of math instruction, they established MLC as a nonprofit corporation in 1976.

5. How can Bridges help students who struggle in math?

Bridges helps teachers address the needs of struggling students in the following ways:

- Using visual models that make new ideas and skills accessible to all students, particularly those who are visual learners.
- Incorporating manipulatives that give all students a hands-on way to understand new concepts and skills.
- Allowing time to work with small groups or individual students who need more attention.
- Encouraging students to solve problems in the ways that make the best sense to them.
- Giving students more than one opportunity to master new concepts and skills.
- Providing additional support materials (e.g., practice games and assignments) to help struggling students become proficient with new concepts or skills.

6. How can Bridges help students who are very talented in math?

In a Bridges classroom, students practice basic facts and learn to do calculations with larger numbers, but they also spend a lot of time working through complex problems that require more mathematical sophistication and creativity. All Bridges students are invited to extend their thinking, make generalizations, and support their answers on a regular basis. For example, third graders are challenged to consider whether the sum of two odd numbers will always be even and explain why. Students who answer this question quickly and easily might be invited to predict whether a wide variety of number combinations will have an odd or even sum. The teachers' guides include many specific suggestions that help the teacher prompt students to take a problem to the next level.

Problems like these don't just keep gifted students busy: they call upon students' computational skills, ability to find patterns and make generalizations, and mathematical creativity. The goal is to keep gifted students engaged, deepen their understandings, and foster their love of mathematics by presenting problems that they have the tools to solve, but which require them to work at a higher, more interesting level.

7. How does Bridges prepare students for middle-school math?

Below are the expectations middle school teachers have of their incoming sixth graders accompanied by an explanation of how Bridges ensures students are prepared.

Fluency with Basic Facts

Middle school teachers want students to be able to recall basic facts from memory so that they can concentrate on solving more complex problems. Bridges includes the clear expectations, explicit instruction, and opportunities for practice that students need to master their facts by the end of fourth grade.

Ability to Calculate with Larger Numbers

By the end of fifth grade, students will have learned efficient ways to add, subtract, multiply, and divide larger numbers. They practice using standard algorithms and other efficient methods of computing.

Estimation Skills and Good Number Sense

Bridges requires students to make estimates that help them evaluate the reasonableness of their answers. This frequent use of estimation promotes very good number sense and mental math skills. The visual models students use to represent different kinds of numbers ensure that Bridges students have a clear sense of larger numbers into the millions as well as fractions and decimals.

A Good Attitude about Math

Bridges students tend to enjoy math class and find doing mathematics to be an interesting and worthwhile activity. Through playing mathematical games, engaging in mathematical discussions, and solving all kinds of problems, Bridges students develop the skills, confidence, and persistence required for success in middle school and beyond.