

Math+Science Connection

Beginning Edition

Building Excitement and Success for Young Children



TOOLS & TIDBITS

Bowling for numbers

Using masking tape and a marker, help your child number 10 empty water bottles, 1–10. He can arrange them in a triangle shape (like bowling pins). To play, take turns rolling a ball toward the pins, trying to knock down as many as possible. Add the numbers on the pins knocked down—that's your score.



Oil and water

Let your youngster add blue food coloring to a cup of water. Then, she could measure 4 tbsp. of the blue water and 4 tbsp. of vegetable oil into a clear jar, screw on the lid, and shake. When she sets the bottle down, she'll see that the oil floats on top of the blue water—because oil and water won't mix!

Book picks

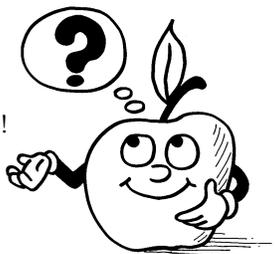
Read *Two of Everything* (Lily Toy Hong), and your child will double over with laughter as a magic pot multiplies everything by 2.

Mad Margaret Experiments with the Scientific Method (Eric Braun) is an amusing introduction to the way scientists conduct experiments.

Just for fun

Q: How many apples grow on a tree?

A: All of them!



Algebra for beginners

At school, your youngster is learning early algebra skills. With these ideas, she'll enjoy playing with algebra after school, too.

Patterns

Working with patterns of objects will help your child see patterns in numbers—a basic principle of algebra:

- Challenge her to line family members up in a pattern. For instance, she might arrange you by gender (boy, girl, boy, girl) or hair color (brown, brown, blond, brown, brown, blond). Have her tell you what would come next (brown hair).
- Together, make a growing pattern. For example, draw ☺♥☺♥♥☺♥♥♥ on a sheet of paper. Ask your youngster which part of the pattern is changing (the hearts) and how (they are growing by one more each time). Then, have her extend the pattern (☺♥♥♥♥).

Parts of a whole

These part-part-whole relationship games will help your child see that numbers are made up of two or more parts:



- Make “bunny ears” for each other by placing your hands on top of your heads. Hold up any number of fingers, and the other person has to say the number needed to make 10. *Example:* Raise 3 fingers, and your youngster says, “7.” That's like doing the algebra equation $3 + x = 10$.
- Show your youngster a group of pebbles (say, 8), and have her close her eyes. Drop a few, one at a time, into a pie pan. She should count the number she hears drop into the pan (6) and tell you how many pebbles are left in your hand (2). What number sentences could she make? ($6 + 2 = 8$ and $8 - 6 = 2$).

Flying saucer

Amaze your child with this demonstration of static electricity.

Cut a circular strip from a plastic produce or newspaper bag to create a “flying saucer” (a round band). Then, blow up a balloon, and knot the end. Let your youngster rub a cotton T-shirt on the balloon for about 45 seconds. Immediately, hold the flying saucer about a foot above the balloon, and let go. It will fly!

How did that happen? When your child rubbed the balloon, it created a negative charge. The plastic band also has a negative charge—so the two like charges repel (push away from) each other.



Sort your toys

When is clean-up time a math and science lesson? When your child sorts his toys by different *attributes*. Try these strategies, and he'll learn about classification as well as responsibility.

What goes where?

Say he has been playing with his blocks. Now it's time to put them away. What would be a good way to sort the pieces into different bins? He might organize them by type, color, shape, or size.



What doesn't belong?

Help your youngster see why something doesn't fit into a category. If he's sorting his toy vehicles by where they are used, you could pick up a toy airplane and ask if it goes in the pile with boats. When he giggles and says, "No!" ask him to explain why not.

What's my rule?

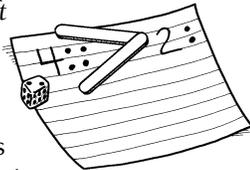
Play "What's my rule?" He can decide how to sort books and get started. As he moves them onto shelves, you guess what attribute he is sorting by (perhaps by whether they're hardback or paperback). Then, swap roles, and let him figure out how you decided to sort another toy (say, puzzles, by number of pieces).

MATH CORNER

Number muncher

Making a "number muncher" is a clever way for your youngster to compare numbers.

Materials: 2 craft sticks, glue, paper, dice, pencil



1. Help your child glue two craft sticks into a V-shape. Turn it sideways, and it becomes a "muncher," or a tool for showing $>$ (greater than) or $<$ (less than). Explain that the open part faces the higher number—like it's a mouth about to "munch" it!

2. Have your youngster roll a die, write that number (4) on the left side of a sheet of paper, and draw dots to match (4 dots). Then, she should roll the die again and put that number (2) and 2 dots on the right side. She can use her "muncher" to decide which number is bigger. Ask her to say the number sentence: "4 is greater than 2." *Note:* If the numbers are the same, they are equal.

3. Once she's comfortable with single digits, move on to double-digit numbers. This time, she'll roll two dice and use them to create a number (roll a 4 and a 5, and she can make 45 or 54).

SCIENCE LAB

Leaky cup?

This simple water pressure experiment will surprise—and delight—your child.

You'll need: empty plastic food container with a lid, pushpin, bowl, water

Here's how: Have your youngster turn the container upside down and use the pushpin to poke a few holes in the bottom. Let her fill a bowl with water, and completely immerse the container (right side up) in the water so it fills with water and snap on the lid. Then, she should lift the closed container completely out of the water.

What happens? Water does *not* leak out of the holes! Now, have her poke a hole in the top of the lid—water will begin dripping out of the bottom holes.

Why? The first time, air could not get into the container to push the water out. But once a hole is poked in the top, the air pushes on the water and forces it out the bottom holes.



PARENT TO PARENT

Race to a dollar

My son, Andy, seemed confused by how much coins were worth. I asked his teacher about this, and she suggested games to play at home.

So far our favorite is Trading Up. First, we get out a handful of change, making sure we have plenty of pennies and also some nickels, dimes, and quarters. We need a few dollar bills, too.

Then, we take turns rolling a die and taking that many pennies. If

Andy rolls a 4, he gets 4 pennies. Once he has enough to trade for a bigger coin, he does—for instance, he'd trade 5 pennies for a nickel. When he has a nickel and 5 more pennies, he trades for a dime.

The first one to be able to swap coins for a dollar bill wins! Andy loves the game, and I can see that it's really helping him to learn what each coin is worth.



OUR PURPOSE

To provide busy parents with practical ways to promote their children's math and science skills.

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Math+Science Connection

Intermediate Edition

Building Understanding and Excitement for Children

INFO BITS



Open-door angles

Doors in your house are the perfect place for hands-on practice with angles. Take turns opening or closing a door and asking, “Acute, right, or obtuse?” Partially open a door, and it’s an acute angle. Open it straight out, and it’s a right angle. Open it wider, and it’s obtuse.

Habitat for rent

Help your child think about what animals need to survive (shelter, food, water). Then, have her choose an animal (monkey) and write a classified ad for a home that will meet its needs. *Example:* “Tall tree in a tropical rain forest. Large river nearby for drinking. Plenty of leaves, fruit, and insects to eat.”

Book picks

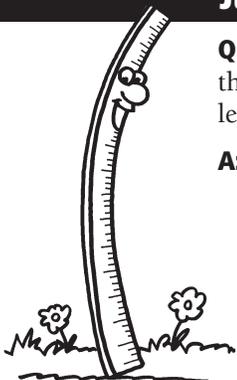
▣ *The Man Who Counted: A Collection of Mathematical Adventures* (Malba Tahan) combines an adventure story with interesting math puzzles.

▣ Learning about the solar system is fun when planets tell the story themselves. Dan Green’s *Astronomy: Out of This World!* contains fascinating facts and details along with cartoon illustrations your youngster is sure to love.

Just for fun

Q: What has three feet but no legs or arms?

A: A yard.



Fractions of fun

Understanding fractions is much easier when your child can visualize them. Here are ideas to help her see—and use—fractions.

Keep a diary

Show your youngster that fractions are a part of everyday life. For a week, have her record and illustrate each one she notices. For instance, she might write, “We had a half day of school today,” or “Mom asked for $1\frac{1}{3}$ pounds of turkey at the store.” How many examples can she find and draw?

Play a game

Have each player cut a sheet of construction paper into six horizontal strips. She should leave the first one whole and then cut the second one in half (fold it, and cut along the fold), and the others into thirds, fourths, sixths, and eighths. With bits of masking tape, label a die: $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{6}$, $\frac{1}{8}$, and “wild.” To play, roll the die,



and lay the matching piece of paper on your whole strip (for “wild,” choose any piece). The goal is to be the first one to fill your strip without overlapping any pieces (*example:* $\frac{1}{2} + \frac{1}{4} + \frac{1}{4} = 1$ whole strip).

Put in order

Together, make a set of fraction cards, with one fraction per index card ($\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, 2). Shuffle the cards, and see how quickly your child can put them in order. Then, while she closes her eyes, lay the cards in order but leave out a few. Give her the missing cards, and have her put them where they go. 

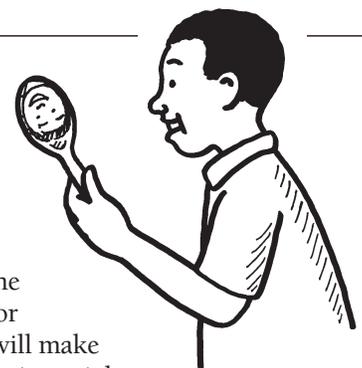
Look at me!

Help your youngster learn about the science of *optics* with this mealtime activity.

Have him look at himself in a clean spoon. What happens if he looks in the bowl of the spoon? (He’s upside down.) What happens on the other side? (He’s right side up.)

Next, have him bring his finger toward the spoon and watch what happens on each side. The bowl (the *concave* side) will magnify his finger, or make it look larger. The back (the *convex* side) will make his finger look smaller. Ask your child how scientists might use this information to make eyeglasses, cameras, or telescopes.

Tip: He can remember which side is which by thinking of concave as “caves in.” 



Multiply and divide

Learning to multiply and divide can be more about *thinking* than memorizing. Strategies like these can help your child practice.

Make it fun. Practice using toys or food. If your child collects toy animals, you might ask, “How many legs do 4 horses have?” He can “skip count” the legs by 4s (4, 8, 12, 16) to see that $4 \times 4 = 16$. If he has 17 pretzels and wants to give 3 friends an equal amount, he can “deal them out.” He’ll see that each person gets 5, and there are 2 left over. ($17 \div 3 = 5$, remainder 2)



Use what you know. Encourage your youngster to look for clues to help him solve problems. For 8×7 , he could consider other facts he knows. “I know 4 groups of 7 = 28. I need 8 groups, so I can double that answer. If $28 + 28 = 56$, then $8 \times 7 =$

56.” For $30 \div 5$, he might say, “I know $10 \div 5 = 2$. There are three 10s in 30, and $3 \times 2 = 6$. So $30 \div 5$ must be 6.”

Q & A Ask math questions

Q: I've never felt comfortable with math. How should I talk to my children about what they're learning in math class?

A: Try to show enthusiasm for what your youngsters are doing in math. You might ask them each day at dinner or homework time what they studied in math that day. Let them explain the concepts they're working on, and follow up with questions. For instance, if they're learning about decimals, you could ask how decimal points are used in money (they separate the parts of a dollar from the whole dollar).



Then, when your children finish their homework, have them show you how they solved a few problems. As they explain their methods to you, they'll be reinforcing their own skills. And they'll be proud to be teaching you something!

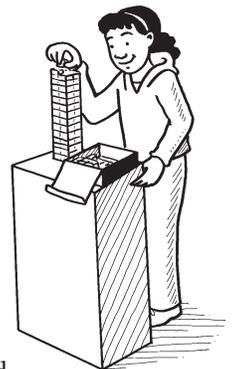
MATH CORNER

Find, build, compute

What do a shoebox, book, and refrigerator have in common? They are all rectangular prisms, or solid shapes with rectangles for their faces (sides). Encourage your child to explore geometry with this common shape.

Volume. Let her build a rectangular prism out of dice, sugar cubes, or same-sized Legos. Her model should be solid, with no hidden spaces. When she finishes, have her figure out the volume (count the cubes along the height, width, and length, and multiply the three numbers together). To check her math, she can take apart her structure and count all the cubes.

Dimensions. Give your youngster 36 blocks, and see how many different sizes of rectangular prisms she can build. Have her record dimensions of each one. *Examples:* $2 \times 2 \times 9$ and $2 \times 3 \times 6$. What do the sets have in common? (Each product equals 36.)



SCIENCE LAB

Save your breath

Your youngster can inflate a balloon without using his breath. A chemical reaction will do the job for him!

You'll need: empty plastic soda bottle (20 fl. oz.), $\frac{1}{4}$ cup water, 1 tsp. baking soda, uninflated balloon, lemon juice

Here's how: Have your child add the water and baking soda to the bottle, close the cap, and swirl it around until the water is cloudy. Then, help him stretch out the

balloon and place the opening over the top of the bottle, leaving a small space. He should very quickly add a little lemon juice, seal the balloon completely over the bottle, and shake lightly.

What happens? The balloon inflates.

Why? When you mix an acid (lemon juice) with a base (baking soda), they create carbon dioxide. The molecules spread out as the gas forms, pushing against the walls of the balloon and causing it to inflate.



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