Intermediate Edition

Math+Science Connection

Building Understanding and Excitement for Children

Calvin A. Hunsinger School

INFO BITS

Jigsaw geometry

Do a jigsaw puzzle together, then let your child find its perimeter and area. First, have her measure each side and add the four measurements to get the perimeter (24 + 24 + 18 + 18 = 84 inches). For the area, she should multiply length x width (24 x 18 = 432 square inches). Without checking the box or counting each piece, can she use math to say how many pieces are in the perimeter? The whole puzzle?

Family stargazing

Head outdoors on a clear night to observe the sky with your youngster. You could take along a library book or download a free app to identify stars, constellations, or planets. *Idea:* Encourage him to sketch the night sky and connect stars to create and name his own constellation.

Book picks

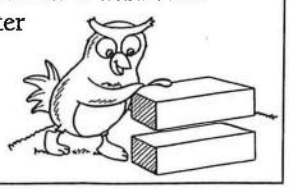
The little girl in *Math Curse* (Jon Scieszka and Lane Smith) finds math everywhere. She adds words, subtracts shoes, and even puts math symbols in her art project.

Your child can make glowing clothes, dancing bubbles, silly putty, and more with the help of *Real Chemistry Experiments: 40 Exciting STEAM Activities for Kids* (Edward P. Zovinka).

Just for fun

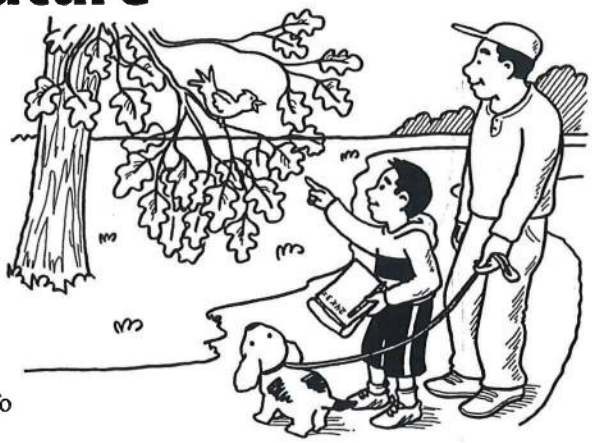
Q: Why was the equal sign so humble?

A: Because it knew it wasn't less than or greater than anything else.



Math in nature

Right outside your door is a math "classroom" for your youngster. Try these ideas for practicing math while enjoying nature.



Estimate the leaves

How many leaves are on that tree? Your child could count the leaves on a small branch (say, 24) and the branches on a limb (3), and multiply (24 x 3 = 72). To estimate the total number of leaves on the tree, he can estimate the number of limbs (maybe 22) and multiply by the number of leaves per limb (22 x 72 = 1,584). He'll see how estimating and multiplying are helpful when he can't count things one by one.

Tell a story

Ask your youngster to make up and solve story problems based on what he sees outside, perhaps bees buzzing from flower to flower. *Example:* "One day, Miss Bee buzzed around collecting pollen. She visited 240 flowers in 2 hours and spent the same amount of time on each flower. How many flowers did she visit per minute?" (240 flowers ÷ 120 minutes = 2 flowers per minute)

Add it up

Help your child use natural materials as place value tools. He might find small pebbles ("ones"), medium-size rocks ("tens"), and large rocks ("hundreds"). Then, let him arrange them to form an addition problem like 132 + 259. He can add them, trading tens for ones and hundreds for tens when necessary. He'll end up with 3 large rocks, 9 medium rocks, and 1 pebble—or 391.

Cover your sneeze!

Does your child know how far a sneeze can travel? Easily 6 feet or more! This activity will show her why covering up a sneeze helps stop the spread of germs.

Have your youngster fill a spray bottle with water and line up six pieces of 9-inch by 12-inch construction paper on the floor, end to end. Now she can stand at one end of the 6-foot line of paper, spray the water, and see where droplets land. Are there wet spots on all the papers?

Let your child try again with fresh sheets of paper, this time covering the nozzle with her hand. The droplets don't go far at all. Now she'll see that she should cover her own sneezes with a tissue (or sneeze into her elbow if she doesn't have a tissue).

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Part of a whole, part of a group

A fraction can describe part of a whole ("I ate $\frac{1}{6}$ of the pizza") or part of a group ("$\frac{3}{10}$ of the beads are green"). These activities will help your youngster work with both types of fractions.

Play dough. Let your child make a play-dough pizza and cut it into equal slices. Then, she can use a toothpick to label each piece with a fraction that tells what part of the whole it is. If her pizza has 8 slices, she would carve $\frac{1}{8}$ into each one. Now she can roll out the dough, divide it into a different number of slices, and write new fractions.

Beads. Have your youngster sort 20 beads by color. What fraction of the group is each color? She can find out by writing the number of each color (the numerator, or top number) over the number in the group (the denominator). Say she has 5 blue beads ($\frac{5}{20}$), 9 yellow beads ($\frac{9}{20}$), and 6 red beads ($\frac{6}{20}$). If she adds the three fractions, her answer will equal $\frac{20}{20}$, or 1—because all the parts together equal the group.

SCIENCE LAB Musical science

To tune a violin or cello, a musician must loosen or tighten the strings. How does that affect the instruments' sounds? Let your child make his very own string instrument to find out!

You'll need: empty rectangular tissue box, four identical rubber bands

Here's how: Let your child stretch the rubber bands around the box crosswise. Have him play the instrument by plucking the "strings" over the box opening, listening to the sound they make. Now he can remove the strings, stretch them lengthwise around the box, and pluck them again.

What happens? Plucking the looser strings (those stretched crosswise) creates a lower pitch than plucking the tighter ones (those that are stretched lengthwise).

Why? Plucking the strings causes vibrations that produce sound. Looser strings vibrate less frequently, while tighter ones vibrate more frequently. The more frequent the vibration, the higher the pitch.

MATH CORNER Multiplication is in the cards

Watch the fun multiply in this game that lets your youngster practice multiplication facts.

1. Remove the face cards from a deck of playing cards and shuffle the rest (ace = 1). Arrange them faceup to create an S-shaped game-board path.

2. Start at one end of the path. Take turns rolling two dice (say, 3 and 4) and moving a game token that number of cards (7).

3. Multiply the sum of the dice by the value of the card you land on for your score. If you land on a 5, you would say "7 x 5 = 35" and score 35 points.

4. Keep rolling, multiplying, and adding to your score until everyone reaches the end of the path (exact count not required). High score wins.

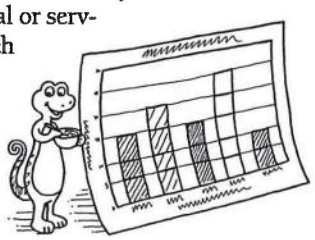
Variation: For a bigger challenge, include jacks (11) and queens (12).

Q & A What can I graph?

Q: *My son always enjoys making graphs in school. Any suggestions for creating graphs at home?*

A: Your child can turn almost anything your family does into a graph! For one month, suggest that he track the foods everyone eats for breakfast or the kinds of exercises they do. He could make a tally mark for each bowl of cereal or serving of eggs eaten, or for each time someone runs or rides a bike.

As he collects data, he can put it into a bar graph. He should divide a sheet of paper into rows and columns and write breakfast foods or exercises across the bottom. Next, he'll need to decide what the scale will be (say, 1 square = 5 servings of a food) and write numbers (0, 5, 10, 15, 20, 25, 30) up the left side.



From time to time, ask your son questions like "Which kind of breakfast food have we eaten the most of so far?" or "How many more times did we run than ride bikes this week?" He'll see what's most common—and help you know what to buy at the grocery store.

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INFO BITS

Let's skip count

Can your child skip count by numbers other than 2s, 5s, or 10s? Give him a random number (say, 7) and a starting point (perhaps 65). He would count 65, 72, 79, 86. Then, have him skip count backward. Maybe you'll have him begin at 103 and count back by 11s (103, 92, 81, 70).

Making mountains

Have your youngster lay two sheets of paper on a baking sheet so they overlap slightly and spread sand (or soil) over the seam. Holding down the top sheet with one hand, she should slowly push the other sheet underneath. The sand starts to mound. This shows how underground movements help form mountains over time.

Book picks

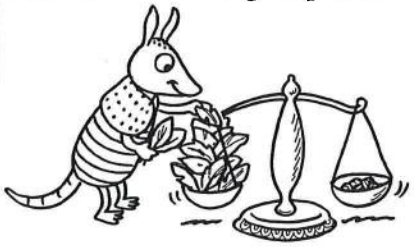
Marty views every situation like a math equation in *The Math Wiz* (Betsy Duffey). But can he solve the problem of being picked last in gym class?

Captivate your child with fascinating facts about tarantulas, diving bell spiders, jumping spiders, and more in *Spiders* (Kay de Silva).

Just for fun

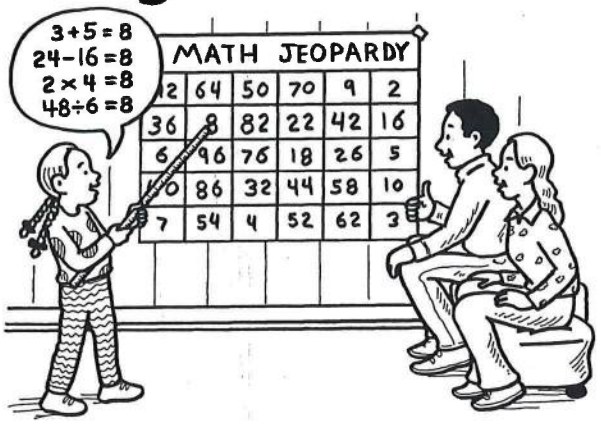
Q: Which weighs more, 1 pound of rocks or 1 pound of feathers?

A: Neither—each weighs 1 pound!



Mental math games

The more often your youngster does math in her head, the more efficient she'll become. Play these games that will inspire her to come up with strategies for solving problems—without pencil and paper.



Math Jeopardy

In this game, players first choose answers and then call out problems. Let your child draw a Jeopardy board (6 columns, 5 rows) and write a one- or two-digit number in each box.

Take turns picking an answer (say, 8) and stating four problems (addition, subtraction, multiplication, division) that equal it. *Example:* 5 + 3, 60 – 52, 4 x 2, 16 ÷ 2. Your youngster will practice doing all four operations in her head!

Check problems on a calculator. If they're all correct, score 8 points and cross out the 8. When all answers are chosen, the person with the highest score wins.

Fact fluency race

Who can score closest to 100 points without going over? Each player rolls a die to get her starting score. On each additional roll, she may add the number rolled to her score *or* multiply the number by her score.

Say your youngster has 32 points and rolls 5. By using the mental math strategy of rounding, she'll realize that 32 x 5 would put her over 100, since 30 x 5 = 150. So adding (32 + 5 = 37) is the better choice.

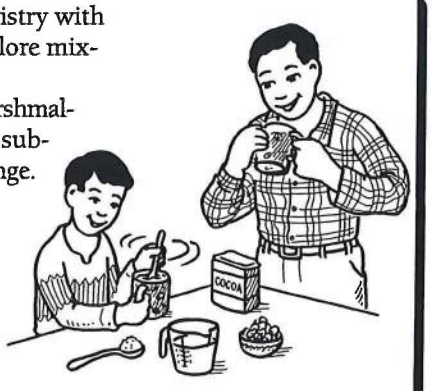
Keep track of scores on paper. A player may choose to stop rolling at any time—the winner is the person who gets closest to 100.

Mixtures and solutions

Stir up your child's enthusiasm for chemistry with some hot chocolate! Here's how he can explore mixtures and solutions.

First, let him scoop cocoa powder and marshmallows into a mug. It's a *mixture* because the substances don't dissolve, melt, or otherwise change. What happens when he adds hot milk? It becomes a *solution* because the cocoa dissolves and the marshmallows melt.

Together, think of more examples of mixtures and solutions. Your youngster might say that trail mix is a mixture and lemonade is a solution.



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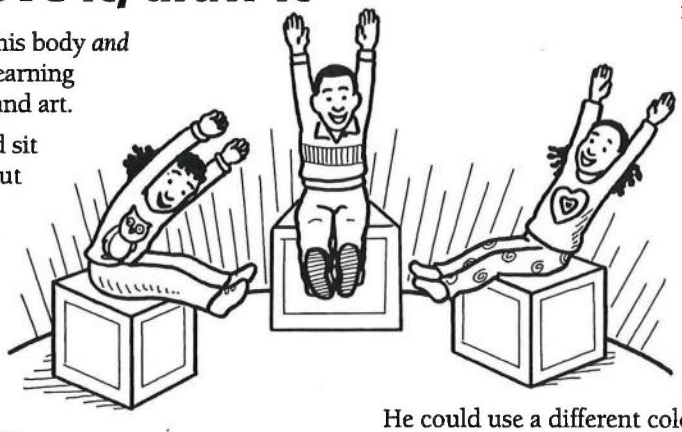
Geometry: Move it, draw it

Your youngster can stretch his body *and* his mind with these ideas for learning geometry through movement and art.



Strike a pose. Have your child sit upright with his legs straight out in front of him and his arms stretched above his head. He's a right angle (90°). How could he make an acute angle (less than 90°)? (Lean forward.) An obtuse angle (more than 90°)? (Lean backward.) Now suggest that he hold his arms so they're parallel lines (lines that never touch). Can he make perpendicular lines (lines that intersect at right angles) with his arms?

Create abstract art. Encourage your youngster to draw a dozen straight, crisscrossing lines all over a piece of paper and color the shapes he forms. He could use a different color for each type of shape (trapezoid, rhombus, pentagon) and count how many of each there are. Now let him display his colorful work of art on the refrigerator.

PARENT TO PARENT

Solving for *x*

I noticed my daughter Lucy's math assignments had problems with *x* in them. Since I didn't do equations like that until middle school, I asked her teacher why they were already doing algebra.

He explained that teaching kids to solve for *x* is an early algebra skill that builds number sense and gives them a head start on the more advanced math they'll do later. That made sense to me, so I asked how I could help Lucy work on algebra.

The teacher said we might make up problems with numbers missing in different places, such as $x + 7 = 12$, $5 + x = 12$, or $5 + 7 = x$. He pointed out that Lucy doesn't have to use *x*—she could draw a heart, a star, or anything she likes.

Lucy decided to write problems on the sidewalk using pictures in place of *x*. Sometimes, we leave equations on sticky notes for each other to find—under dinner plates or on the bathroom mirror, for instance. Her current favorite math activity? Typing equations on my phone or tablet—with emojis in place of *x*.

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MATH CORNER

Place-value scarecrow

This twist on "Hangman" will build your child's understanding of place value.

1. Secretly think of a four- or five-digit number. (You may use the same digit more than once.) Draw a blank line for each place. *Example:* For 5,078, write _, _ _ _.

2. Your youngster should guess a digit (0–9). If he guesses 7, you would say, "There's a 7 in the tens place," and he would write a 7 in the correct blank (_ , _ 7 _).

3. If he guesses a digit that's not in your number, he draws a scarecrow body part and writes the digit next to it.

4. When all the blanks are filled in, ask your child to read the number to you ("Five thousand seventy-eight").

5. Switch roles, and play until your scarecrow is complete.

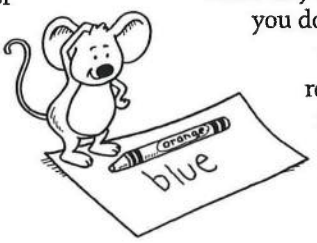
SCIENCE LAB

Why does my brain do that?

Your family may get tongue-tied with this brain-testing experiment.

You'll need: 2 sheets of white paper, 8 different-color crayons or markers, stopwatch

Here's how: On one piece of paper, have your child write 8 color words with matching crayons (blue with a blue crayon). On the second sheet, she should write the same words, but this time in a different order and in the "wrong" colors (blue might be written in orange). Time family members as they quickly say the colors of the words on the first page. Repeat with the second page—make sure to say the colors and not read the actual words (say, "orange" rather than "blue").



What happens? You say the colors when they match the words faster than you do when they don't match.

Why? One part of the brain reads words and another part identifies colors. When you try to simply name the colors, your brain instead tries to read the words.

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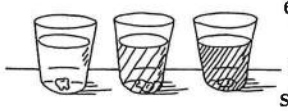
INFO BITS

Cookie symmetry

Your youngster will enjoy serving these symmetrical "cookies." Let her flatten play dough and cut it into circles, stars, and hearts. How would she cut each cookie so each side is a mirror image of the other? (Down or across the middle.) If she flips one half over the *line of symmetry* (where she cut), it should match the other side exactly.

Teeth and soda

Let your child see for himself the effects of soda on his teeth. He can use baby teeth you might have saved or use eggshells (rinsed, dried), since they have calcium like teeth do. Have him soak one in water, one in orange juice, and one in cola. How do the teeth look after a week? A month?



Book picks

Get a kick out of math with *Riddleiculous Math* (Joan Holub), a joke book of riddles and equations.

Through poetry, *Leaf Litter Critters* (Leslie Bulion) tells about earthworms, bacteria, and other creatures that live in leaf piles.

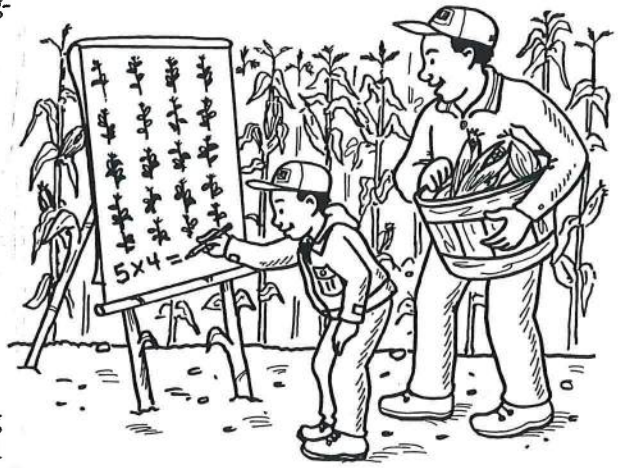
Just for fun

Q: What falls in autumn but never hits the ground?

A: The temperature.

Thanksgiving multiplication

This month, your youngster can be thankful for multiplication! Share these Thanksgiving-themed ideas to let him learn multiplication facts in playful ways.



Turkey facts

Have your child draw a dozen turkeys, each with 12 tail feathers, on separate sheets of paper. He can number the turkeys 1–12 and write a matching multiplication fact on each feather. For instance, on turkey number 8, his "feather facts" would be $8 \times 1 = 8$, $8 \times 2 = 16$, and so on up to $8 \times 12 = 96$. You can quiz each other ("What is 7×6?") and use the "feathers" to check the answer (42).

Cornfield arrays

While the corn pudding is in the oven, your youngster can make cornfield arrays. Let him draw a cornfield with even rows and columns (perhaps 5 rows of 4 cornstalks) and say the equation shown ($5 \times 4 = 20$). Then he can draw the same number of stalks a different way (4 rows of 5 stalks) and give the problem ($4 \times 5 = 20$). How else could he make 20?

Mealtime equations

Suggest that your child write and illustrate scrumptious word problems to share at Thanksgiving dinner. *Example:* "We used 2 12-oz. bags of cranberries to make the cranberry sauce. How many ounces of cranberries did we use?" He can write the equation on the back: $2 \times 12 = 24$ oz.

Be a bird-watcher

"That bright red bird is a cardinal!"

Your youngster can observe and identify birds with this project. Let her make a bird feeder by spreading peanut butter or shortening on a pinecone or an empty cardboard tube and rolling it in birdseed or dry oats.

Then, she can hang it from a tree branch with yarn or string. When birds visit, have her take photos or draw pictures and identify her feathered friends. She might check out a field guide from the library, use a free app like Seek, or search the internet for "bird identification."

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Number sense with decimals

Let's get straight to the point—the decimal point, that is! Here are ways for your child to practice reading and comparing decimals.

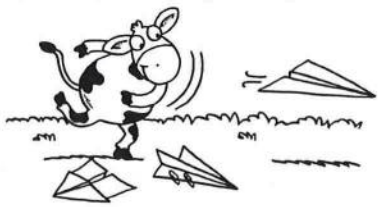
Mark the number line. Using sidewalk chalk outside, have your youngster draw a long horizontal line and add 11 short vertical lines to divide it into 10 equal parts. She should label the first mark 0 and the last mark 1. Then, counting each mark in between as 0.1, she can fill in her number line (0.1, 0.2, 0.3). Now have her stand on any number and "hop" to math problems. If she's on 0.2, you might ask, "What is 0.2 + 0.3?" (She would hop three tenths to 0.5.)

Place the decimal. Get a deck of cards (no face cards, ace = 1), one marble per player, and a die. For the die, cover 4, 5, and 6 with squares of masking tape, and mark 1, 2, and 3 on them. Stack the cards facedown. Each player draws three cards and lays them faceup in the order drawn (say, 9, 5, 3). Take turns rolling the die—roll 1 and put your marble (decimal point) before the first digit (0.953), roll 2 and place it before the second digit (9.53), or roll 3 and it goes before the third (95.3). Who made the biggest decimal? The smallest?

Q & A Back to the drawing board

Q: *My son mentioned that he's learning the engineering design process in school. How can he try it out at home?*

A: The engineering design process is creative problem solving in five main steps: ask/identify, imagine/brainstorm, plan, create, and compare/improve.



Get your son's wheels turning by helping him identify an engineering problem. Perhaps he wants to create a paper airplane that will fly all the way across the room. He could brainstorm different designs, then choose one to make and test. Now how could he improve his design? Maybe he'll try different kinds of paper or folds. Or perhaps he'll add paper clips.

After each "flight," ask questions like "What worked well?" or "Why do you think your plane nosedived?" You'll encourage him to analyze his design and see any flaws as areas for improvement.

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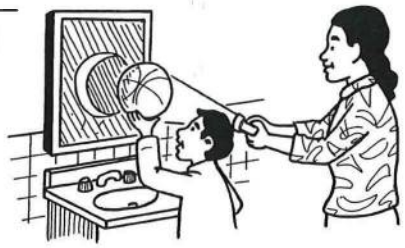
SCIENCE LAB Watch the "moon" glow

The moon isn't a star—so why does it appear to shine? Your child will find out with this demonstration.



You'll need: washable marker, mirror, flashlight, soccer ball or basketball

Here's how: Have your child draw a big round moon on a bathroom mirror, close the bathroom door, and turn off the light. Now shine a flashlight (the "sun") at the moon. Then, let him use the ball (the "Earth") to partially block the sun. Can he create a crescent moon and a half moon?

What happens? Your youngster can't see the moon when the sun isn't shining on it. When he points the sun at the moon, the moon appears to shine. And the Earth casts a shadow on the moon.

Why? The moon reflects sunlight. When the Earth blocks the sun, all or part of the moon is dark.

MATH CORNER Choose the best unit

Your youngster wouldn't use millimeters to measure an elephant—but she might for an ant. Help her pick the best measurement unit for the job with this idea.

Animals

Take turns naming animals and choosing the unit that makes sense for measuring their length. Your child might pick inches or centimeters for a chipmunk because smaller units would be more precise for tiny animals. And she'd use feet or meters for a buffalo—it would take too long to measure a huge animal with small units.

Household objects

Give your youngster a tape measure and a ruler, and send her on a mission to find the length or height of 10 items. She'll discover that either tool works for smaller things like a book or a remote control. But a tape measure is better for a bookcase or refrigerator so she doesn't have to keep moving the ruler.

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World records

World records offer a fun way for your child to compare numbers. Encourage him to look up records that interest him (the speed of the fastest animals, the length of Olympic-winning long jumps). Then, help him set his own records by timing his speed for running around the block or measuring his jumps.

Family science fair

"Welcome, scientists!" Let your youngster host a science fair where you take turns conducting experiments. She might ask younger siblings to predict which objects will sink or float, then test the items in a sink while everyone watches. *Idea:* Hold a science fair with extended family via video chat.

Book picks

Zookeepers use fractions as they hand-raise two tiny cubs in *Polar Bear Math: Learning About Fractions from Klondike and Snow* (Ann Whitehead Nagda and Cindy Bickel).

With *Science You Can Eat: 20 Activities That Put Food Under the Microscope* (Stefan Gates), your child can make instant ice cream, edible slime, and more.

Just for fun

Q: Why isn't your nose 12 inches long?

A: Because then it would be a foot!

Explore number patterns

Find the next number in this pattern: 1, 2, 4, 8, 16, 32, 64. It's 128, because the "rule" is to double the number each time. Your child can recognize all kinds of patterns and develop her math thinking with these playful ideas.

Keep it going

Have your youngster cover a baking sheet with a thin layer of sugar. Write a simple number pattern (3, 5, 7, 9) in the sugar for her to continue. She'd write 11, 13, 15, and 17, because your rule is add 2. Next, let her smooth out the sugar to erase the numbers and begin a different pattern for you to extend.

Step it up

Think of a pattern rule with at least two steps (multiply by 3, add 1). Write numbers in the pattern on separate sticky notes (3, 10, 31, 94), number the backs to indicate the order (1, 2, 3, 4), and hide the notes around the room. Your child should search for them, arrange them in order, and figure out the rule they follow. Now it's her turn to hide numbers in a two-step pattern for you.

Predict it

Show your youngster that patterns let her make predictions. Start a pattern with toy vehicles (car, car, truck, train, car, car, truck, train) or beads (red, blue, green, red, red, blue, green, red). Ask her what the 21st toy (car) or bead (red) in the pattern will be—and why. She can continue the pattern, using more objects (or drawing pictures) to check her predictions.

Build a cantilever

A house of cards is quite an engineering feat—but it's not the only thing your youngster can construct with cards. Here's how to make a *cantilever*, a structure that's supported on just one side (like a balcony).

Let him lay down a card with one end lined up at the edge of a table. Ask him to place a card on top that extends slightly over the edge of the table and another that extends over the edge of the card below it. It's a cantilever! How many cards can he add before the cantilever falls?

Why this works: The weight of the overhanging cards is supported by the other cards pressing down on top of them.

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Money games

10 quarters + 25 nickels + 8 dimes + 16 pennies = 1 handful of fun (and $4.71). Help your child make sense of dollars and cents with these activities.

Three in a row. This twist on tic-tac-toe lets your youngster practice adding coin values. Have him stack any combination of coins in each square of a tic-tac-toe board, and give each player a different color crayon. Take turns removing any pile, counting the coins, and writing the total value in the square. *Example:* Pick up 1 quarter, 3 dimes, and 4 pennies, then write "59 cents." The game ends when one person gets three in a row. Add up all the coins you've removed—the player with the most money wins.

Shopping relay. Place three store flyers or catalogs around the room. Each player gets a $50 budget and lists three items to "buy" (shoes, shampoo, book). On "Go," race to each catalog and "shop," subtracting the price of each item from your budget. The winner is the first person to finish shopping, stay within budget—and get the math right!

MATH CORNER

Geometry "Pictionary"

Illustrating math terms in pictures only—no words or symbols allowed!—can boost your youngster's understanding of math concepts. Try this game.

- **Set up:** On separate index cards, ask your child to write math vocabulary words he's learned in school this year. *Examples: denominator, factor, multiple, trapezoid, parallelogram, pyramid, divide, area, perimeter.* He should fold the cards in half and put them in a bowl. Divide players into two equal teams.

- **Play:** Teams take turns picking a card, setting a 2-minute timer, and having one teammate illustrate the word on a whiteboard or paper. The other players on his team try to name the term. Your youngster might sketch a fenced-in field for *perimeter*, and a sliced pie for *divide*.

- **Score:** Earn a point for each vocabulary word your team identifies correctly.

OUR PURPOSE

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

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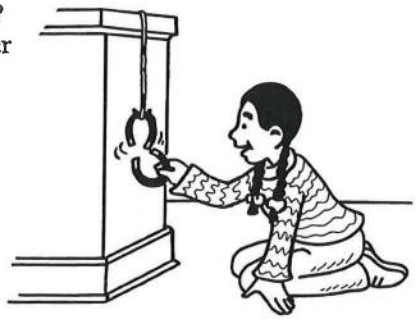
SCIENCE LAB

Magnetism: Opposites attract

An invisible force field? Sounds like science fiction—but your youngster can observe this very real physical property of magnets in this experiment.



You'll need: tape, yarn, two magnets, table

Here's how: Help your child tape one end of the yarn to one magnet and the other end to a tabletop, so that the magnet dangles off the table. Now have her hold the second magnet and move it toward the hanging one. She should move her magnet back and forth so each side, or *pole*, has a chance to attract the hanging magnet.

What happens? The hanging magnet moves toward the one your youngster holds. It turns around (or doesn't) depending on which pole of her magnet is facing it.

Why? Every magnet has a north and south pole. Opposite poles attract. When two north or two south poles face each other, the poles repel each other—in this case, causing the hanging magnet to turn around.

PARENT TO PARENT

Baking, the metric way

Our family has been baking a lot lately: bread, muffins, cookies, you name it! Recently, my daughter Caitlin found a recipe with standard *and* metric units. She wondered why 1 cup flour was 120 grams while 1 cup sugar was 200 grams—and frankly, so did I.

I bought an inexpensive food scale, and Caitlin measured the ingredients. She decided sugar must weigh more because it's denser, so we looked it up online, and she was right. And she realized something else: Using a scale makes measurements more precise, since it's hard to eyeball whether you have a level cupful or spoonful.

Now she converts all our recipes to metric units and weighs the ingredients. Not only does she bake delicious cookies, she also gets an extra helping of math practice with the metric system every time we bake.

Intermediate Edition

Math+Science Connection

Building Understanding and Excitement for Children

Calvin A. Hunsinger School

INFO BITS

My favorite number

Suggest that your child survey family members about their favorite numbers (1–10) and see how her data compares to this fun fact: 7 is the most common favorite number. She can make a picture graph or bar graph to show the results and share them with everyone. Was 7 the most popular number?

Center of mass

Have your youngster sit on a chair with his feet together, flat on the floor. Place your thumb on his forehead—can he stand up without pushing against your thumb? His center of mass (the point at which his weight is most concentrated) is over the seat. To stand, he must lean forward to shift his center of mass.

Book picks

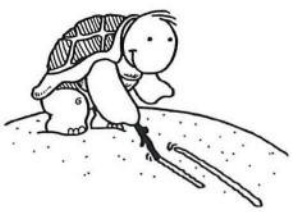
Your child will enjoy the lift-the-flap fun of *Mesmerizing Math* (Jonathan Litton) with creative examples of decimals, prime numbers, and shapes.

Discover how wildlife survives harsh climates and freezing temperatures in *Winter Bees & Other Poems of the Cold* (Joyce Sidman).

Just for fun

Q: How can you make a line longer without touching it?

A: Draw a shorter line next to it. Now the first one is longer.



Fractions make my day

If your youngster reads for 2 hours, that's a fraction of his day ($\frac{2}{24}$, or $\frac{1}{12}$) well spent! Here's how to weave fractions into his whole day.

Reading time

Encourage your child to create a fraction bookmark. He can draw lines to divide a strip of cardboard into equal sections, one for each chapter in a book he plans to read. When he finishes a chapter, he gets to color one section of the bookmark before sticking it into his book. Can he tell you what fraction of the book he has read?

Snack time

Make fruit salad with your youngster. Before eating, have him count how many pieces of each type of fruit are in his bowl. *Example:* 7 grapes, 5 mandarin orange segments, 3 banana slices, 2 apple chunks. Now he could add to find the total number of pieces (7 + 5 + 3 + 2 = 17) and say what fraction of his serving each fruit makes up (grapes = $\frac{7}{17}$, oranges = $\frac{5}{17}$).

Game time

Invite fractions to family game night. Play Scrabble, assigning fractional values to letters. Ten-point letters like Z and Q could be worth more (maybe $2\frac{1}{2}$ points) and 1-point letters like A and S worth less (perhaps $\frac{1}{4}$ point). Your child will add fractions to calculate scores. Or play bingo with fractions instead of numbers. Equivalent fractions count—so if $\frac{4}{5}$ is called, a player could put a chip on $\frac{8}{10}$.

What's in an ecosystem?

Let your child take an up-close look at an ecosystem—a community of living and nonliving things—with this activity.

In your backyard or at a park, help your youngster spread a blanket on the ground. She can lie down and examine the ground through a magnifying glass. Encourage her to draw and label what she observes, perhaps, rocks, grass, plants, soil, and insects.

Then, suggest that she think about how everything is related (insects eat plants, plants grow in soil). She could draw arrows from the insect to the plant and from the plant to the soil.

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Hands-on solid shapes

Help your youngster grasp 3-D, or solid shapes, and find real-life examples with this idea.

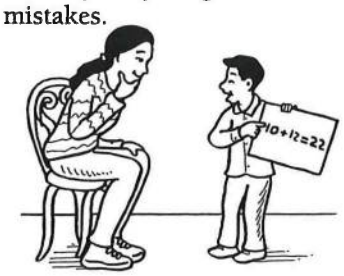
1. Collect. Have your child label a separate container for each of these 3-D geometric shapes: rectangular prism, cylinder, cone, cube. Each of you can choose a container and gather household objects in that 3-D shape. She might find a tissue box (rectangular prism), an oatmeal canister (cylinder), a paperweight that's cone-shaped, and a die (cube).

2. Make. Encourage your youngster to build solid shapes out of 2-D shapes. She can look at a solid shape (perhaps a can of beans that's a cylinder), and think about which 2-D shapes it includes (1 rectangle, 2 circles). Then, she could cut the flat shapes from paper and cardboard and use duct tape to make a cylinder. She'll learn which 2-D shapes make up each 3-D one.

Q & A Explain your math thinking

Q: *On math assignments, my son has to explain how he gets the answers. He always says, "Because I know." Why does he need to explain?*

A: Tell your son that his teacher wants to know what's going on inside his head when he does math! Reading his explanations tells the teacher whether your child understands the steps involved in getting the answer. Plus, explaining math thinking will often lead your youngster to correct his mistakes.



Ask your son to pretend you don't know anything about math and he needs to teach you to solve the problem. His explanation might go something like this: "10 + 12 = 22 because 10 + 10 = 20, 12 is 2 more than 10, and 20 + 2 = 22." Then, encourage him to write down what he said.

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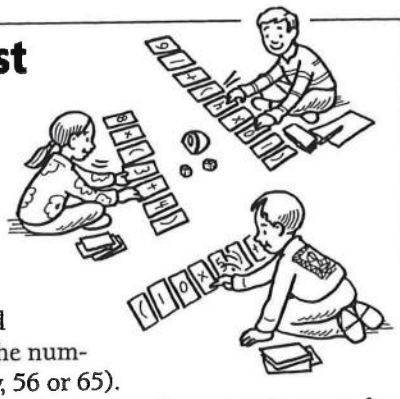
MATH CORNER Parentheses first



Play this game to help your child solve equations with parentheses.

Materials: index cards, pencils, paper, 2 dice, timer

Have each person make a set of index cards with the numbers 0–9, signs for the four operations (+, –, ×, ÷), and opening and closing parentheses. Roll the dice, and use the numbers rolled to create a two-digit number (say, 56 or 65).

Set a timer for 5 minutes. Each person arranges her cards to form equations equaling that number and lists the equations on her paper. Every equation must include parentheses and at least two different signs (remind your youngster that problems in parentheses are solved first). For 56, your child might make "8 × (3 + 4)" and "(10 × 5) + 6."

When time's up, trade papers, and check each other's math. Get the most correct equations to win the round and roll the dice for the next round.

SCIENCE LAB A frosty experiment

Your youngster can make frost with this indoor experiment that lets him explore the science of condensation.

You'll need: two metal bowls or empty soup cans (rinsed, labels removed), ice, water, measuring cup, salt, timer

Here's how: Have your child fill each bowl with $\frac{1}{2}$ cup cold water and 6 ice cubes. He should add $\frac{1}{4}$ cup salt to one bowl and stir. Encourage him to observe the outside of the bowls. What does he notice after 5 minutes? 10 minutes?

What happens? Water droplets collect on the bowl containing only water and ice. Frost forms on the bowl with ice and salt water.

Why? Salt makes ice melt faster and lowers water temperature, so the bowl containing salt is colder than the bowl with just water and ice. Water from the air formed condensation on the outside of both bowls, and on the colder bowl, the condensation froze—now it's frost!

Intermediate Edition

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INFO BITS

Spatial reasoning

Don't throw away that cereal box! Your child can use it to build spatial reasoning, which includes visualizing shapes and how they fit together. Let him cut an empty box into separate panels, mix up the pieces, and put it back together with tape. *Idea:* Suggest that he build his own boxes using construction paper.

Science in the news

Encourage your youngster to see the science going on around us every day. Together, look through newspapers, magazines, or news websites, and point out articles about topics like extreme weather, new medicines, or robots. She could save interesting articles and keep them in a binder. They just may provide inspiration for a future career!

Book picks

Can You Count to a Googol? (Robert E. Wells) illustrates big numbers like millions and billions and teaches children that numbers go on forever.

Mistakes That Worked: 40 Familiar Inventions & How They Came to Be (Charlotte Foltz Jones) reveals the accidental beginnings of x-rays, Silly Putty, chocolate chip cookies, and more.

Just for fun

Q: How do you make time fly?

A: Throw a clock out the window.

Divide and conquer

These are the years when your child tackles division. Use the following ideas to help her become as comfortable with dividing as she is with adding and subtracting.

Play games

Add and divide. On your turn, roll six dice at once, and add the numbers in your head. Then, roll one die, and divide your total by that number. *Example:* Roll 3, 1, 5, 3, 2, and 4 for a total of 18. Roll a 3, and score 6 (18 ÷ 3 = 6). After five rounds, the player with the low score wins.

Cut in half. Remove the face cards from a deck of cards. Turn over two cards at a time to make a 2-digit number, and divide by 2. *Example:* Draw a 7 and a 1, make 71, and your score is 35.5, because 71 ÷ 2 = 35.5. Play until no cards are left. High score wins. *Variation:* For a bigger challenge, divide by 3, 4, or 5 instead of 2.

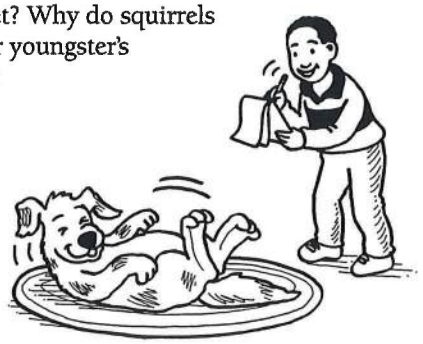
Use in real life

Figure out quantities. Let your youngster divvy up snacks for family members. If there are 20 pretzels and 4 people, for instance, each person would get 5 pretzels (20 ÷ 4 = 5).

Calculate tips. Ask her to figure out restaurant or delivery tips. For 15 percent, she can divide the check (say, $25) by 10 ($2.50), divide that number by 2 ($1.25), and add those numbers together ($2.50 + $1.25 = $3.75 tip). For 20 percent, have her divide the tab by 10 and double that number ($25 ÷ 10 = $2.50; $2.50 x 2 = $5 tip).

Study animal behavior

Why do dogs roll around on the carpet? Why do squirrels stick their tails straight up? Harness your youngster's curiosity about animals with this activity.



Observe. Encourage your child to watch an animal closely and take notes on its movements and sounds. Then, he could write explanations for what the behaviors might mean. ("I think the dog is trying to scratch her back.")

Research. Together, read library books or websites to check his ideas. He may discover that dogs roll around to scratch or to mark a spot with their scent. And squirrels use their tails to balance.

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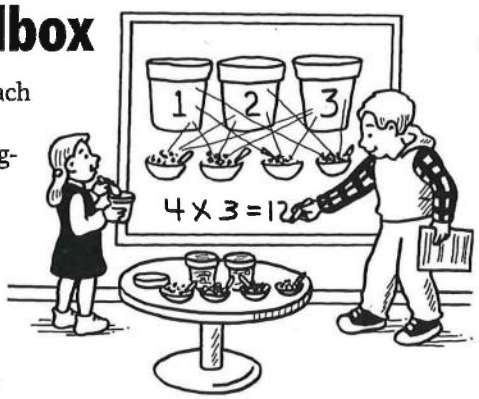
A word problem toolbox

Good problem solvers know how to approach word problems in different ways. Share these sample problems and strategies for your youngster to try.

Problem: *A shop sells 3 flavors of ice cream and 4 kinds of toppings. If you could order 1 flavor and 1 topping, how many different combinations are there in all?*

Strategy: Draw a picture. Your child could sketch 3 tubs of ice cream and 4 bowls of toppings. Then, he can draw lines to connect each flavor to each topping. He'll see that each of the 3 flavors has 4 possible toppings (3 flavors × 4 toppings = 12 combinations).



Problem: *There are 17 animals on a farm with only horses and cows. There are 9 more horses than cows. How many cows are there?*

Strategy: Work backward. Encourage your youngster to start by reading the question at the end of the problem. He'll know right away what piece of information he is looking for (the number of cows). Next, he should reread the entire problem. Finally, he could use trial and error, plugging in various numbers to see which ones have a difference of 9 and a sum of 17. (*Answer:* 13 horses and 4 cows, because 13 + 4 = 17 and 13 – 4 = 9.)

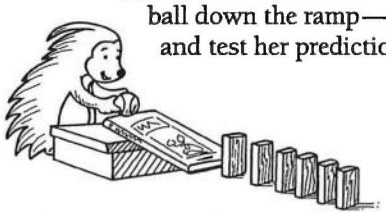
SCIENCE LAB

It's a chain reaction

With this experiment, your youngster will discover how energy transfers when objects collide during a chain reaction.

You'll need: shoebox, hardback book, rectangular building blocks, tennis ball

Here's how: Have your child place a shoebox in the center of a table and prop a book against it to make a ramp. Then, help her line up a row of same-size blocks on end, each about 1 inch apart, from the bottom of the ramp to the edge of the table. Ask her to predict what will happen when she rolls the ball down the ramp—and test her prediction.

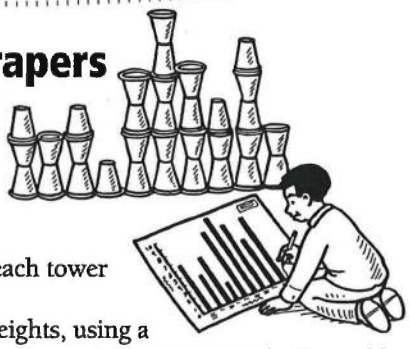


What happens? The ball knocks down the first block. That block knocks over the next one, and so on, until the last block falls off the table.

Why? A chain reaction occurs when the ball transfers its energy to the first block. That block transfers energy to the next, and the energy transfer continues down the line.

MATH CORNER

Graphing skyscrapers



If your youngster were to graph the actual heights of skyscrapers, he'd need a lot of paper! Unless, of course, he drew a *scaled* bar graph. Here's how.

Suggest that your child stack plastic cups into towers of different heights. Have him give each tower a name and measure and record its height.

Now your youngster can graph the towers' heights, using a scale so his graph will fit on paper (say, 1 cm on paper = 10 cm on towers). He could write numbers of centimeters up the left side and the towers' names along the bottom. He should also include his key: 1 cm = 10 cm.

Then, let your child draw a bar to show how tall each tower is. If his "Super Spire" tower is 72 cm tall, he would color in a bar 7.2 cm high. That's 1 cm on paper for every 10 cm of the actual tower (72 ÷ 10 = 7.2 cm).

PARENT TO PARENT

I ♥ math

"When will I ever use this math?" I had to smile when my daughter Emily asked me that question the other day—I used to ask my mother the same thing when I was her age! So I gave her the same idea my mother gave me. I had her write "I love math because" at the top of a sheet of paper and post it on the fridge for everyone to add to.

Emily was surprised when, after about a week, the page was almost full. She had listed things like "I can figure out how much snow we got by measuring it with a ruler" and "Multiplication helped me make a double batch of cookies." I added, "I save money by comparing prices on groceries." And Emily helped her little brother write, "I can count my stuffed animals."

Now when Emily asks how she'll use a particular type of math, like fractions or decimals, I encourage her to pay attention to her daily routines and see if she can find a real-life example. More often than not, she's able to add to her list.

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