

Math+Science Connection

Intermediate Edition

Building Understanding and Excitement for Children

September 2019



INFO BITS

Roll a pattern

A pair of dice is all you need for this pattern game. Let your child roll the dice and use the numbers to start a pattern for you to continue. If he rolls 2 and 5, he could say, “2, 5, 11, 23” (multiply by 2 and add 1). You would say, “47, 95, 191, 383.” Now you roll the dice and begin a pattern for him.

Paper chain challenge

Challenge your youngster to engineer the longest possible paper chain using



only one piece of construction paper, scissors, and tape or glue. Encourage her to measure her finished chain. How could she redesign it to make it longer? For example, she might change the length or width of the strips.

Book Picks

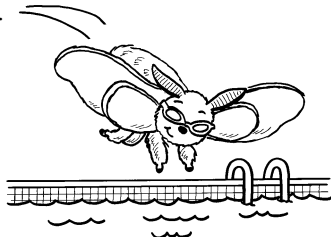
Follow along on a mysterious adventure while solving math and logic puzzles in *Math and Magic in Wonderland* (Lilac Mohr).

Your child can read about animals from all seven continents, from Australia’s Tasmanian devil to Africa’s Nile crocodile, in *The Animal Book* (Ruth Martin).

Just for fun

Q: Why did the moth take swimming lessons?

A: He wanted to learn the butterfly stroke.



Ready, set, math!

Coming right up: One fantastic year of math! Help your youngster plan for and celebrate success with these activities.

Poster of resolutions

Encourage your child to make math resolutions. *Examples:* “Double-check my math answers.” “Ask questions when I don’t understand something.” She could cut construction paper into colorful geometric shapes, write a resolution on each, and glue the shapes on poster board.



Scrapbook of success

Suggest that your youngster start a scrapbook for her math papers. She can decorate a binder and add pockets for assignments she’s proud of. Maybe she’ll save a homework assignment she stuck with even though it was difficult or a test where she showed improvement. Throughout the year, she can flip through her binder to see her progress.

Jar of marbles

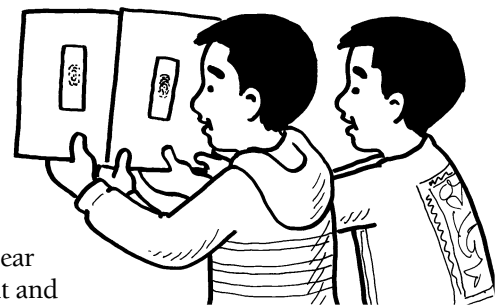
Let your child get a clear jar, marbles, and a notebook. Whenever she uses math *outside* of school, she can add a marble to her jar and write about the math in her notebook. (“I measured my little brother’s height.” “I multiplied fractions to double a muffin recipe.”) She’ll have a visual reminder of how useful math is—and an interesting list to read when the year is over!

Fingerprint analysis

Scientists have never discovered two identical fingerprints—not even among twins! Your child will learn about fingerprints with this investigation.

Have each family member use a pencil to shade in a dark circle on a sheet of paper, then press his finger into the circle. Now he should put clear tape on his finger to capture the print and carefully place the tape on a clean sheet of paper.

Using a magnifying glass, your youngster can look for fingerprint features like loops (bean shape), whorls (round), and arches (like a rainbow). Which one is most common in your family? Does anyone have a feature that no one else has?



Strategies for multiplication

As a child begins to learn and master multiplication, practicing with objects helps him visualize and learn the facts. Try these ideas.

Equal groups. Give your youngster a multiplication problem, perhaps 7×3 , and let him use school supplies to solve it. He could form equal groups (say, 7 piles of 3 crayons).



How many does he have in all? He can think $3 + 3 + 3 + 3 + 3 + 3 + 3 = 21$ or skip count 3, 6, 9, 12, 15, 18, 21 to find the answer.

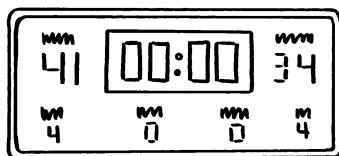
Arrays. A checkerboard is an example of an array, or a regular arrangement of rows and columns. If your child is solving $2 \times 6 = \underline{\quad}$, he can use checkers to cover a section of the board 2 squares tall and 6 squares wide. How many checkers did he use? (12) Or give him a certain number of checkers to make an array with (say, 24). Have him say the problem that matches (perhaps 6×4 or 3×8).



PARENT TO PARENT

Football math

Our family loves football season! As we started watching games together this year, I realized that our children could use the scores to play with math.



Each week, we look at the final scores in the newspaper and figure out ways they might have been earned. Last weekend, one score was 41 – 34. Our daughter said 41 points may have come from 5 touchdowns (each with an extra point) and 2 field goals: $(5 \times 7) + (2 \times 3) = 41$. Our son said you can also earn 41 points with 6 touchdowns if only 5 included an extra point: $(6 \times 6) + (5 \times 1) = 41$.

This activity has added a new level of fun to football season—and it's giving the kids a new way to use math.

OUR PURPOSE

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

Resources for Educators,
a division of CCH Incorporated
128 N. Royal Avenue • Front Royal, VA 22630
800-394-5052 • rfeustomer@wolterskluwer.com
www.rfeonline.com

SCIENCE LAB

A "centripetal" penny

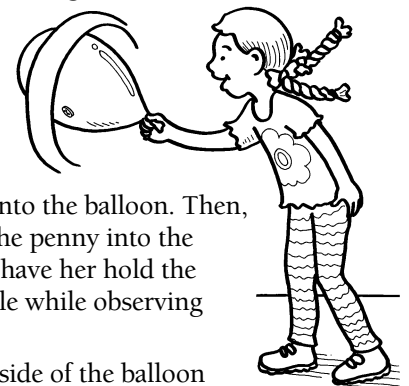
What do a rocket and a penny have in common? By themselves, not much—but when you add the right forces, their motion can be similar.

You'll need: light-colored balloon, penny

Here's how: Let your youngster put the penny into the balloon. Then, blow up the balloon for her (being sure to shake the penny into the bottom so it couldn't be inhaled), and tie it. Next, have her hold the tied end of the balloon and spin it rapidly in a circle while observing the penny's motion.

What happens? The penny spins around the inside of the balloon in a circular motion.

Why? Spinning the balloon in a circle creates *centripetal force*. The force pushes the penny to the sides of the balloon, and the balloon's shape keeps the penny moving in that circular direction. A rocket orbiting the Earth also has centripetal force, this time caused by gravity.



MATH CORNER

Grams in the balance

How many grams does a serving of your child's favorite cereal weigh? He can check the nutrition label to find out—the answer is right next to the serving size. Then, use the foods in your pantry to help him practice estimating weight.

1. Have your youngster make a scale. He should use yarn to tie two identical cups to opposite corners of a coat hanger. Then, he can put the hanger on a doorknob.
2. Let your child choose a food (say,



crackers), read the label to see how much a serving weighs (15 grams), and put 1 serving in the cup.

3. Ask your youngster to pick a different food and, without looking at the label, take out an amount that he estimates weighs the same as the crackers (perhaps 20 almonds).

4. He can place the almonds in the other cup to check his estimate, then add or subtract almonds to balance the scale.

5. Choose new foods, and do the activity again.

Math+Science Connection

Intermediate Edition

Building Understanding and Excitement for Children

October 2019

INFO BITS

Take a perimeter walk

Build your child's "measurement sense" with this outdoor activity. Let her estimate the number of heel-to-toe steps it will take her to walk the perimeter of your yard or a playground. Then, she can count her steps to check. To calculate the perimeter in inches, she could measure her step size in inches and multiply that by her number of steps.

Nature's carvings

Water and wind gradually erode, or wear away, rocks and soil to create amazing natural wonders. Outdoors or in photographs, help your youngster find examples (caves, canyons, river gorges). Then, have him model erosion by making a "mountain" of dirt and



gently blowing on it through a straw or pouring water over it. How does it change?

Book picks

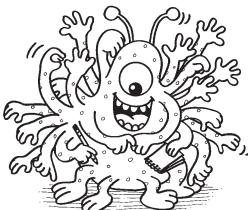
▣ The Number Investigators are gearing up for their school math bee, which is in 14 days—or 1,209,600 seconds—in the story of *Charlotte Morgan and the Great Big Math Problem* (Martin Tiller).

▣ Your child will discover interesting ways to combine science and art in *STEAM Lab for Kids: 52 Creative Hands-On Projects for Exploring Science, Technology, Engineering, Art, and Math* (Liz Lee Heinecke).

Just for fun

Q: How does a monster count to 100?

A: On his fingers and toes.



Everyday fractions

Does your child know why a 25-cent coin is called a quarter? It's one quarter, or $\frac{1}{4}$, of a dollar. Help him discover fractions like that all around him with these ideas.

Spot 'em

Challenge your youngster to look (and listen) for fractions at home and on the go. He might pour juice from a $\frac{1}{2}$ -gallon carton, attend a game with four quarters, or see a freeway sign for an exit in $\frac{3}{4}$ mile. Or perhaps he'll hear you say, "It's a quarter to seven" or "I'm a third of the way through my book."

Fold 'em

Turn laundry time into fraction time. Let your child fold a towel in half and then in half again. Ask him how it's folded now (into fourths). What happens if he folds a towel into thirds and then in half? (It's folded into sixths.) To see the fractions more easily, suggest that he make the same folds in paper. Then,

he can unfold to see the creases. How could he fold and get eighths? Twelfths?

Show 'em

Quarters are great tools for modeling fractions. Gather a few, and ask your youngster to show you $\frac{3}{4}$ of a dollar (3 quarters) or $1\frac{1}{2}$ dollars (6 quarters is $\frac{6}{4}$ or $\frac{3}{2}$ or $1\frac{1}{2}$). Now have him tell you a fraction to show in quarters. ▣



Good vibrations (for spiders)

A spider's web helps it gather food and stay safe from predators. Your youngster can learn how by building a model of a web.

Help her stretch yarn tightly between two chairs, weaving and tying the strands into a web. Have your child hold one strand and close her eyes while you pluck a different strand—first gently, and then harder. Does she feel the difference?

Spiders sense different vibrations in their webs. The vibrations may signal danger, rain, or even another spider. Other vibrations mean it's dinnertime—a bug has been caught in the web. And spiders know the difference! ▣




Shapes with a purpose

Engineers often use triangles as supports in bridges and buildings, while bees use hexagons to construct their honeycombs. These activities will encourage your youngster to explore the practical side of shapes.

Triangles. A triangle is considered a sturdy shape for building. To see why, let your child bend one drinking straw into a triangle and another into a square, taping each shape's ends together. Now have her try to carefully



sides with no wasted space between them, but the circles leave lots of gaps. 

transform each one into a different shape—without bending its sides. The square can become a parallelogram, but the triangle stays rigid.

Hexagons. Bees use hexagons to build their honeycombs so they can store the most honey possible. Your youngster can see how by drawing a few rows of hexagons linked together and then a few rows of circles side by side.

She'll see how the hexagons share



MATH CORNER


In my head

Practicing mental math is fun with this variation on a popular road-trip game.



Take turns naming an item to take on a trip and telling how many you'd take. ("I'm going on a trip, and I'm taking 24 grapes. That's 24 items in all.") Your youngster repeats your item and adds her own. ("I'm going on a trip, and I'm taking 24 grapes and 6 shirts. That's 30 items.")

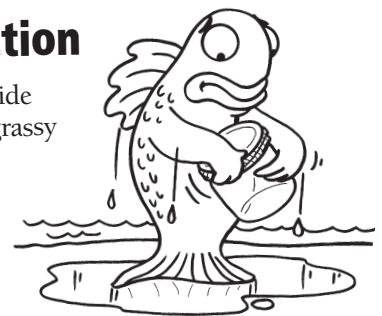
Keep playing until someone forgets an item or adds incorrectly. If you make it to 100 items without a mistake, everyone wins!

Variation: Include multiplication with statements like, "I'm going on a trip, and I'm taking 10 pairs of socks. $2 \times 10 = 20$. That's 20 items." 

SCIENCE LAB

Fascinating friction


Your child can slide down a playground slide much more easily than he can slide down a grassy hill. That's because the smooth metal surface creates less friction—the resistance of movement when two surfaces rub together. Let him try this experiment to see how friction works.



You'll need: screw-top jar with lid, soap, water

Here's how: Screw the lid on the jar as tightly as you can. Then, your youngster should wet his hands with soap and water and try to unscrew the jar. Next, have him rinse and dry his hands and the jar—and try again.

What happens? The jar is easier to open when his hands are dry.

Why? The friction between his hands and the lid helps him unscrew it. The water and soap reduced that friction, so his hands slipped instead of gripping the lid to remove it. 

Q & A

Math and science extracurriculars


Q: My son is trying to choose an after-school activity. He loves math and science—any ideas for extracurriculars related to those subjects?

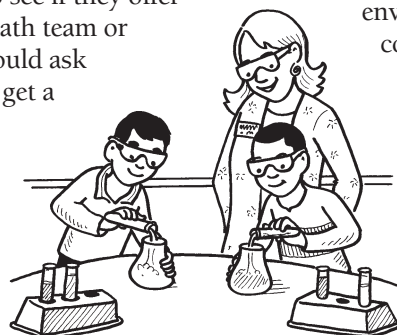
A: Start by calling your son's school or visiting the website to see if they offer any activities like a math team or science club. Or he could ask a teacher to help him get a new group started.

Also, check the public library, the parks and recreation department, and nature centers. You may find STEM

classes, chess clubs, or nature programs about plants or animals.

If he joins Scouts, he could earn merit badges in everything from astronomy to chemistry to forestry. Or consider your local 4-H club, where kids explore the environment, agriculture, computer science, and more.

Idea: Suggest that your child ask a friend or two to join a group or club with him. He'll have someone he knows there, and you may be able to carpool with the other parents. 



OUR PURPOSE

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

Resources for Educators,
a division of CCH Incorporated
128 N. Royal Avenue • Front Royal, VA 22630
800-394-5052 • rfeustomer@wolterskluwer.com
www.rfeonline.com

INFO BITS



Geometry George

Play this version of “Simon Says” to help your child practice geometry terms. Take turns giving each other instructions like “Geometry George says, ‘Draw perpendicular lines’” or “Geometry George says, ‘Hold your arms parallel.’” If you follow the instructions when the person doesn’t say “Geometry George,” you’re out!

Have a heart

Your youngster’s heart pumps more than 1 gallon of blood every minute! To see how hard it works, she can pretend a gallon jug is a heart. Poke a hole in it, and insert a straw (an “artery”). Then, let her fill the jug with water, replace the lid, and squeeze it over a sink. How much water can she pump out through the straw in 1 minute?



Book picks

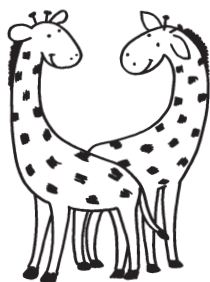
📖 Rumpelstiltskin has returned—with a magic multiplying stick. In *Multiplying Menace: The Revenge of Rumpelstiltskin* (Pam Calvert), a boy must use math to defeat the fairy tale villain.

📖 *When the Sun Goes Dark* (Andrew Fraknoi and Dennis Schatz) explains what happens during a total eclipse of the sun.

Just for fun

Q: When do giraffes have eight feet?

A: When there are two of them.



A place for each number

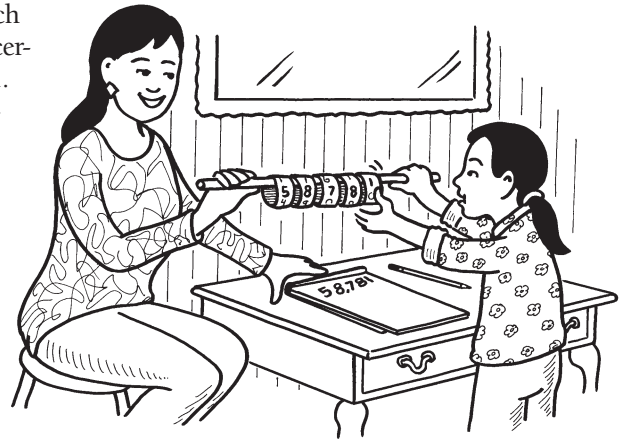
While \$1, \$10, and \$100 each start with 1, your child would certainly rather have \$100 than \$1. The 1 in \$100 is worth more—since a digit’s value depends on its place in a number. Try these place value activities to bring this concept to life.

See the value

Ask your youngster to pick any three-digit number (perhaps 263) and name something close to the value of each digit. She might say she ran 200 meters in PE (hundreds place), a tissue box has 60 tissues (tens place), and there are 3 people in the room (ones place). Although 2 is less than 6 and 3, its place in 263 gives it the greatest value.

Rotate the rings

Your child can read large numbers with this place value tool. Help her cut a paper towel tube into five rings and write the digits 0–9 around each ring. Now ask her to slide the rings onto a stick or ruler, rotate them a few times, and read any number whose digits are



lined up in front of her. Example: “Fifty-eight thousand seven hundred eighty one” for 58,781.

Rearrange the digits

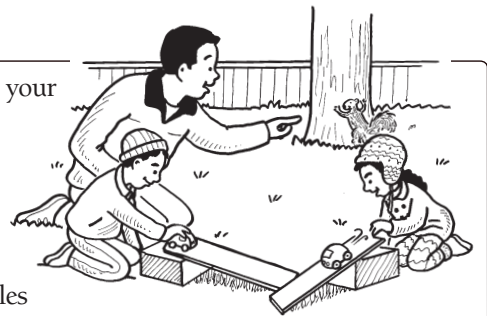
Make the biggest six-digit number to win this game. Use playing cards, ace (1) through 9. Each person draws six cards and arranges them faceup in the order drawn. On each turn, a player makes her number larger by swapping places for any two of her cards. (For 351,642, switch 6 and 3 to make 651,342.) After three turns, the player with the highest number wins. 🎲

Two kinds of energy

What’s the difference between a ball in your youngster’s hands and a ball that’s flying through the air? The ball he’s holding has *potential* (stored) energy. The one in the air has *kinetic* energy—it’s in motion. Let him explore these two types of energy.

1. Potential. Help your child find examples of potential energy. He might spot a squirrel ready to scamper up a tree, a toy car at the top of a ramp, or a ceiling fan that’s turned off.

2. Kinetic. Can he turn potential energy into kinetic energy? For instance, he could push the car down the ramp or turn on the fan. The squirrel? He’s on his own! 🎲

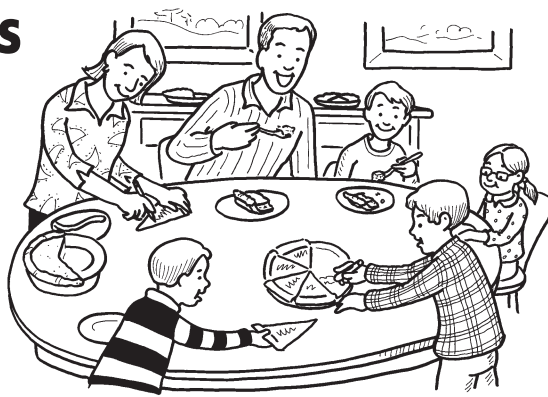


Fall-themed graphs

Pie, acorns, pinecones ... encourage your youngster to use fall's treasures to practice graphing.

Slices of pie

Let your child cut a paper plate into one slice per family member. Each person labels his slice with his favorite kind of pie and colors it (red for apple, orange for pumpkin). Now your youngster can glue the slices onto a second paper plate, putting slices with the same answer next to each other. It's a pie graph about pie! Ask questions he could



answer by analyzing the data in his graph: "Which pie is most popular?" "What fraction of people chose pumpkin?"

Natural objects

Have your youngster gather items from the ground and show his findings on a *scaled picture graph*. This type of graph uses one picture to represent a chosen number of objects. Have him draw a key, for example:

= 5 acorns = 5 leaves

So if he collected 20 acorns and 15 leaves, he would draw a graph with 4 acorns ($4 \times 5 = 20$) and 3 leaves ($3 \times 5 = 15$).

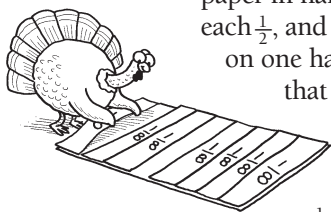


MATH CORNER

Prove it!

My daughter Amanda was making careless mistakes on her math homework, so we made up an activity we call "Prove it." She has to find a creative way to prove that her answers are correct.

When she solved $\frac{1}{2} + \frac{3}{8} = \frac{7}{8}$, for example, Amanda cut one piece of paper into 8 equal parts and labeled each strip $\frac{1}{8}$. Then, she folded a second piece of paper in half, labeled each $\frac{1}{2}$, and laid 4 strips on one half to show that $\frac{4}{8} = \frac{1}{2}$. Finally, Amanda put 3 of the $\frac{1}{8}$ strips on the other half and counted to show that $\frac{7}{8}$ was correct.



For an assignment about the commutative property (which states that you can add or multiply numbers in any order and get the same answer), I asked her to prove that $9 \times 5 = 5 \times 9$. So she drew 9 rows of 5 stars each. When she turned her paper sideways to show 5 rows of 9 stars, she proved that there were still 45 stars.

Our activity is helping Amanda to correct her mistakes—and learn from them—as she goes.

OUR PURPOSE

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

Resources for Educators,
a division of CCH Incorporated
128 N. Royal Avenue • Front Royal, VA 22630
800-394-5052 • rfcustomer@wolterskluwer.com
www.rfeonline.com

SCIENCE LAB

Sundial time

In ancient times, sundials were used to tell time. Your youngster can see how as she builds her own clock on a sunny day.

You'll need: straight stick, clock, rocks, permanent marker, patch of soil

Here's how: On a sunny weekend morning, when the clock strikes the hour (say, 7 a.m.), have your child push the stick vertically into the ground. She should place a rock in the stick's shadow and use the marker to write the time on it. As the clock strikes each additional hour, she should write the times on the rocks and place them around the stick. She'll notice that the rocks need to be placed closer together as the sun gets higher in the sky and farther apart again as it gets lower.

What happens? The sundial will let your youngster tell time. For instance, if the shadow falls about halfway between the 1 p.m. and 2 p.m. rocks, it's about 1:30 p.m.

Why? With Earth's rotation, the position of the stick's shadow changes over time with the position of the sun.

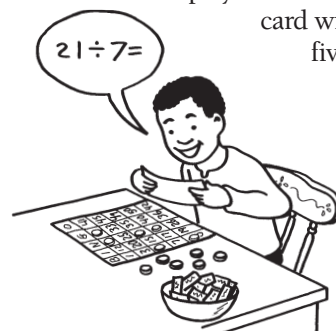


PARENT TO PARENT

Bingo night, division-style

Turn bingo night into an evening of family math fun. Making—and playing—this game will help your child work on division facts.

First, everyone can make bingo cards out of construction paper (draw grids with 6 rows and 5 columns and put the letters "B-I-N-G-O" across the top boxes). Then, each person writes random numbers on his card: 1–10 under B, 11–20 under I, 21–30 under N, 31–40 under G, and 41–50 under O.



On separate slips of paper, write 50 division problems whose answers are between 1 and 50 ($21 \div 7 = \underline{\quad}$, $300 \div 6 = \underline{\quad}$). Put all the slips in a bowl.

To play, the caller pulls out slips one at a time and reads the problem. Each player should cover the answer on his card with a token. The first to get five in a row (down, across, or diagonal) calls "Bingo!"

As a check, he says the math problems and answers aloud. If they're all correct, he wins that round. Trade cards, and play again.