

Summer Learning Spotlight

Math

Middle/High School
Summer 2023

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Foster a positive attitude toward math

Students who have a positive attitude toward math solve problems more efficiently and remember math material more easily, research shows. To encourage a positive math mindset:

- **Set an example.** Even if you struggled with math in school or believe you're not good at math, stay positive. Say things like, "I love a good math challenge" or "That's a tough problem, but I know you can solve it!"
- **Talk about ways** you use math. Tell your teen, "My cash drawer was balanced at the end of my shift" or "I saved four dollars on a tank of gas by comparing prices."
- **Reinforce** what your teen does correctly. If your teen used an effective strategy to solve a problem but made a careless multiplication error, say, "You knew exactly how to tackle that problem. Just be sure to double-check those calculations."



- **Focus on effort and progress** rather than grades or "smarts." Studies show that saying "You've really learned a lot" instead of "You're so smart" can motivate students.
- **Encourage persistence.** Remind your teen of past successes. ("Algebra I was tough, but you stuck with it and got the hang of it. You'll succeed in Algebra II also.")
- **Point to role models.** Share biographies of mathematicians, scientists and engineers. Talk about real-life role models, like a cousin or neighbor who is studying math in college or uses math at work.

Source: "Positive Attitude Toward Math Predicts Math Achievement in Kids," Science Daily.

Add up energy savings

Here's a practical use for math that your teen may not have considered: It can help your family save energy and money. Challenge your teen to:

- **Analyze energy bills.** Show your teen how many kilowatts of electricity and gallons of water you used last month. Ask your teen to calculate the cost per kilowatt and per gallon. Together, brainstorm ways to save. For example, the average shower takes about eight minutes and uses roughly 17 gallons. How much does your family spend on showers? How much could you save if each person shortened their shower by one minute?
- **Cut back on gasoline.** Have your teen track how much your family spends on gas and how many miles per gallon your car gets. Your teen can come up with ways to spend less (walking or biking short distances, carpooling, etc.), then track savings.

Explore the math in nature

Nature is full of math, from the pattern of the tides to the symmetry of flowers. Show that math is all around us by encouraging your teen to:

- **Investigate patterns.** Your teen can use a weather app or website to learn about moon phases, sunrise and sunset times and high and low tides. How do the numbers change from

day to day? Can your teen spot mathematical relationships?

- **Research the Fibonacci** sequence. This series of numbers begins 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55. Challenge your teen to find the pattern and continue the sequence, then look it up in a library book or online. The sequence reflects patterns found

in nature, including in sunflowers, pineapples and seashells—and even hurricanes, the Milky Way galaxy and DNA molecules!

- **Hunt for concentric circles,** or circles within circles—like on a target. Can your teen find examples in nature (ripples in a pond, rings on a tree stump, layers of an onion, etc.)?

Practice grocery store math

The grocery store is a common place where people do math, so invite your teen to go shopping with you. Being a savvy shopper is an important life skill—and practicing math at the store will help to keep skills sharp while school is out. Have your teen:

- **Read advertising circulars.** Ask your teen to look at your grocery list and circulars from several stores. Which store has the best deals on the items you need?
- **Keep a running mental estimate** while you shop of how much your total grocery bill will be. How close can your teen come? If your teen shops with you on a regular basis, estimates will likely become more accurate.
- **Shop for deals** and calculate savings. Is it more cost-effective to buy individual apples or potatoes, or pre-

bagged ones? Should you buy individual salad ingredients or a salad kit? Also ask your teen to compare store brands with national brands and to determine which coupons will save you the most money.

- **Read nutrition labels** to make healthier choices. Ask your teen which bread has the most fiber or which yogurt contains the least amount of sugar.



Connect math to the future

Whether your teen is just starting to think about college or careers, or is ready to make decisions about the future, math should be part of the equation. Have your teen:

- **Evaluate college data.** At collegescorecard.ed.gov, your teen can search by school or major. Have your teen look for answers to questions like “What percentage of applicants does this school accept?” and “What percentage of students who enroll go on to graduate?” Also have your teen compare costs—factoring in room,

board and travel, as well as tuition.

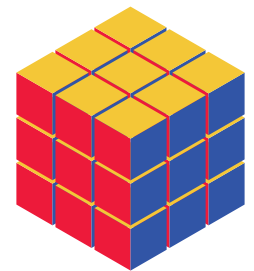
- **Explore math- and STEM-related careers.** Many of today’s fastest-growing occupations require workers who are skilled in math, including information data scientist, security analyst, statistician and logistician. Your teen can read job descriptions, education requirements and salary data at www.bls.gov/ooh or www.napequity.org/stemcareers.

Boost skills with games, puzzles and apps

Not all math involves numbers. Other skills, including logical thinking, spatial reasoning and pattern recognition, can help your teen do better in math. These skills are especially important in higher-level math courses. Encourage brain-stretching activities like these:

- **Board games**, including chess, Mastermind®, backgammon, Go and mancala. Look for gently used games at yard sales and thrift shops. Consider holding a summer-long family tournament!
- **Logic problems.** Your teen can find these in magazines (published by Penny Press or Dell) and online.

- **Puzzle toys.** Rubik’s Cube® and similar puzzles are available in a wide variety of



- colors, shapes and materials. Other popular puzzle toys include tangrams, lock puzzles and the classic Tower of Hanoi.
- **Jigsaw puzzles.** They’re fun for the whole family to work on together over the course of days or even weeks.
- **Free apps** like sudoku puzzles, or games that require your teen to fit shapes together, navigate mazes, “escape” from “rooms,” etc.

Promote financial literacy

Learning to manage money starts with a basic understanding of spending, saving and borrowing. Teaching these lessons early increases the chance that your teen will manage money effectively as an adult. You can:



- **Help your teen** open a bank account. Look for a bank with no minimum deposit and no fees. Rather than opening an account online, go to the bank with your teen. An employee will be happy to explain financial topics—and the lessons may sink in better if they come from a professional.
- **Demonstrate budgeting.** Ask your teen to set a budget for a family trip, celebration or project. Explain to your teen how you budget money. Encourage your teen to create a personal budget for money earned from an allowance or a job. Recommend that your teen save at least 20 percent for long-term financial goals.
- **Explain interest** paid on credit cards and loans, and interest earned on savings and retirement accounts. Give your teen a math problem like, “If you owe \$1,000 on a credit card with a 28 percent annual interest rate, and pay \$25 per month, how much interest will you pay in all?” (Explain that most credit cards charge interest on interest, which is called *compound interest*.) Or ask your teen, “If you open a savings account with \$200 and the bank pays 1.5 percent compound interest per month, how much money will you have in five years?”

Add a social dimension

For a productive way to spend free time this summer, encourage your teen to connect with others while doing math or math-related activities. Your teen might:

- **Tutor younger children.** Your teen will make a positive difference while reinforcing earlier math concepts. Plus, explaining math to others helps your teen understand the material on a deeper level.
- **Look into math-related** clubs and teams at the public library, community center and parks and recreation department. There may be a chess team, STEM club, robotics class, etc., where your teen can meet other students with shared interests.

Link math to everyday activities

From going for a run to making pizza, math is part of everyday life. Share these ways math comes in handy:

- **Hobbies.** How does math relate to your teen’s hobbies? Musicians use fractions, and athletes use measurement and statistics. And many crafts require math.
- **Exercise.** Your teen can log miles and times of walking, running, biking or swimming, calculate speed and calories burned, then graph the data.
- **Home projects.** Ask your teen to calculate how many gallons of paint you need to repaint a room, or measure furniture and draw a floor plan for rearranging a room.
- **Time management.** Estimate the time it will take to complete chores, assignments, etc.
- **Gardening.** How many seeds should your teen plant? How much space and soil are needed? What kind of yield can the number of plants produce?
- **Cooking and baking.** Your teen will need to measure ingredients and adjust recipes based on how many servings are needed.
- **Going out to eat with friends.** How can the group split the check fairly, taking tax and tip into account?



Support math success in summer school

If your teen is struggling with math and attending summer school, there are many ways you can help. The key is to tackle issues early so your teen doesn't fall further behind.

Start by talking to your teen's teacher, and work together to get your teen back on track. First, try to figure out exactly why your teen is struggling. Common reasons include:

- **A limited knowledge** of basic math facts. When students haven't mastered the basics, it is difficult for them to move on to more complicated concepts.
- **A lack of understanding** of a specific math process or concept.
- **Careless mistakes.** Math requires close attention to detail. If students don't read problems carefully or write numbers neatly, they are bound to make mistakes.

Once you understand what's going on, make a plan. Find out:

- **What you can do at home.** Should your teen use flash cards to practice math facts or use graph paper to keep numbers lined up correctly?
- **What support is available** at school. Can your teen stay after school for additional instruction? Is there an older student who could tutor your teen?
- **When you should touch** base again. To monitor your teen's progress, plan to check in regularly with teachers.



Prepare your teen for next year's math

Fall will be here before you know it. Doing a little prep work now will make your teen more confident and ready to learn when sitting down in a new math class. Suggest that your teen:

- **Review old tests and quizzes.** Your teen can learn from past successes—and mistakes.
- **Brush up on vocabulary** and formulas. Suggest that your teen make a colorful poster with words, numbers and

symbols, then hang it in a visible spot to remember important math concepts.

- **Research the type** of math to be studied in the upcoming school year. What is trigonometry or calculus, exactly? How do people use it in real life? Your teen can read about it online—or talk to older students who have already taken that course.

Play with math

Pass time in the car or while waiting with these fun family math games:

- **Guess my number.** Secretly choose a number between 1 and 100 for players to guess. After each guess, say whether your number is higher or lower than the guess. Can your teen figure out a strategy that will always lead to the right number in no more than eight guesses?
- **What's my word worth?** Give each letter of the alphabet a cent value (A = 1 cent, B = 2 cents, etc.). Try to make words whose letters add up to exactly \$1.00. For an added challenge, assign fractions, decimals or negative numbers to some letters.
- **"Plant" apple trees.** Pose this challenge to everyone: You have 19 apple trees. Figure out how to place them in 9 rows of 5 trees each. (Hints: Some rows will be at an angle, and some trees will count as being part of more than one row.)



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