Growing a Summer Math Garden
By Wendy Petti

It's no surprise that math skills suffer when they are neglected. More than 70 percent of recently-surveyed middle school math teachers recognize that students regress more in math than in any other subject during the summer break -- and take longer to get back up to speed in the fall. Two thirds of those math teachers believe their students would need to practice or apply math skills for only 15 -60 minutes a week to maintain competence.
(Source: MathMovesU)

Help your students keep their math skills blooming during the summer months by encouraging them to participate in the following activities with their families.

PLANTING A MATH GARDEN

Think "real life."
Think "student-centered."
Think "differentiated."
Think "meaningful."
Don't think "worksheets."

How do your students and their families relax during the summer? Their activities might include reading, playing sports, playing games, watching TV, going on the computer, exploring their home town, shopping, enjoying nature, traveling, or…. Of course, your students will be eating and sleeping and growing, too.

Math is our invisible friend in all those activities. If we can help our students and their families enjoy finding and using math everywhere in the world around them, we are planting special seeds indeed.

For "wildflower gardens," provide students with the mixed seed packets below:

* Figure This! Math Challenges for Families
This Web site, a project of the NCTM (national Council of teachers of Mathematics) and the National Action Council for Minorities in Engineering, includes 80 printable math challenges for middle school students and their families, with additional helpful resources in the "Family Corner."
* Math: Everyday Uses
This page provides links to a variety of sites with real-world math connections.
* Fun activities to promote math skills
This page suggests real-world math activities for families of third-graders; the site includes similar pages for grades K-2.

For math gardens with a special theme, read on. (Suggestions for the next seven sections are directed to students.)

MATH BEDTIME STORIES

Do you love curling up with a good book or hearing a good bedtime story at home? How about a math story? You'll find some great suggestions at the sites below.

* Math in Children's Literature
* Mathematics & Literature (A List of Literature Books by Math Concept)

MATH AND SPORTS

Do you root for a local baseball team? You'll probably enjoy following the team's statistics in the newspaper throughout the summer. You might make a graph to track changes over time. If you play a sport, try keeping track of your own statistics.

What about the geometry of sports? Playing fields and balls are geometric shapes. Take a look at how a baseball or a football is formed from several flat shapes. Can you make an indoor softball or football or soccer ball by cutting and sewing together pieces of cloth and filling with a soft material? Try researching the math terms for familiar shapes: Of course a baseball is a sphere, but did you know that a football is a "prolate spheroid" and a soccer ball is a "truncated icosahedron?" What do those terms mean? What's the story behind the shape of the football?

* Sports Math
Can you solve these student-created logic and math problems involving sports?
* Multiplication Football
This student-developed Thinkquest site is a bit of a hodgepodge, but you might enjoy the math-rich fact pages on football, skateboarding, baseball, basketball, and a few well-known sports figures.
* Mathletics
This Web site shows how to calculate a batting average, a basketball player's field goal and free throw percentages, bowling scores, and distances on a football field.
* The Math Forum Math Library -- Sports
Some of the resources here are geared for students and some are for teachers.

MATH IN GAMES

Naturally, any game that requires keeping score uses math. You and your family might also enjoy inventing some new card, dice, or outdoor games, or devising scoring variations for familiar games. Maybe you could share new game ideas or scoring variations with your classmates so they can try them over the summer too.

* Top Ten Math Games -- Money
* Summer Math Fun
indoor and outdoor math games and activities

MATH AND TV

Have you seen CBS's *Numb3rs* or PBS's *Cyberchase*? You could make a graph showing how much time you spend watching TV each week. Or you could make a graph comparing your TV time to your computer time, your outdoor time, your reading time, or another activity you enjoy.

MATH + COMPUTERS = A GREAT EQUATION

The Web is full of wonderful math resources to reinforce skills and stimulate creative thinking. The portals below will help you find what you're looking for:

For skill practice, try:
* Internet 4 Classrooms -- Math
* Summer Family Learning in Math and Science -- Elementary School Math Links

For stimulating, open-ended math explorations, visit
* A Treasure Map to Math Jewels

MATH AT HOME, AROUND TOWN, AND IN NATURE

What's the biggest building in town? How can you find or estimate its dimension? How many windows does it have?

Take a home inventory: How many books or dishes or toys or items of clothing or pairs of shoes are in your home?

Take a math hike. What geometric shapes can you find in your neighborhood or in your own home? What comes in clusters? What's symmetrical? See April's Springtime Math column for more ideas, including math in nature.

SHOPPING

The local **grocery store** is a great place to apply math skills at all age levels:

- Use estimation skills to predict how much the grocery bill will be.
- Comparison shopping: How much do you save per ounce (or another unit) by buying in bulk?
- Look at expiration dates: Which products have short shelf lives? long shelf lives? Why?
- How much can you save by buying products on sale?

Math at **the mall**:

- Compare clothing prices at two or more stores.
- Dream-shop without spending: What if you had $1,000 to spend? Take some time to look around your favorite stores and make a wish list. How close can you come to spending exactly $1,000?
- Math scavenger hunt: What is the most expensive item you can find in the entire mall? What is the cheapest item? What is the biggest item? (How large is it?) What is the smallest item? What is the size and cost of the largest TV? the smallest TV? Make up your own questions and keep exploring.
- Food Court: Where can you get the best deal on a meal?
- Can you figure sales tax in your head?

Once you get started, you'll soon realize there's no limit to the math challenges you can create for yourself on a routine or just-for-fun shopping trip.

MATH TRAVELS

Are you planning a road trip?

- Use a map's scale of miles to estimate distances and travel times.
- How many miles per gallon does your car average on highways? in town?
- What are the highest and lowest gas prices you can find on your trip? How much money can you save by filling up your car at the lowest price?
- How much is the trip likely to cost, taking into account gasoline, tolls, meals, lodging, recreation, and souvenirs? You might compare the actual costs of the trip to your prediction.
- License plate math: Add or subtract or multiply or divide the numbers you find on license plates. You can work with as many digits as you wish. For instance, you might treat the first number on a license plate as a divisor and the next three numbers as a three-digit dividend.

EATING, SLEEPING, AND GROWING

Here are a few ideas to get your creative juices flowing as you eat, sleep, and grow this summer:

- Arrange the food on your plate as symmetrically as possible. Can you make two lines of symmetry? Which foods are asymmetrical and which are more symmetrical?
- Help prepare a meal, using fraction skills to adjust portions as needed.

SAVORY SUMMERTIME ESTIMATION

David M. Schwartz, the author of *How Much Is a Million?,* writes a Blog entry about estimating and then counting the number of seeds in a watermelon at a family gathering. You might like to try the same activity. Or…

- Keep a record of bedtimes and rising times, and calculate how long you slept each night. How does your summer sleep schedule compare to your school-year sleep schedule?
- With help from a family member or friend, measure your height at the start and end of the summer and mark your height on a doorway. Did you grow during the summer? How much? Did your friends grow? Who grew most?

KEEPING A RECORD OF SUMMER MATH ACTIVITIES

Check with the teachers of the next grade level to see how they'd like summer math activities to be documented. Younger students might enjoy coloring a "math flower" every time they complete a summer math activity, and write the name of the activity or a few words of description on the stem. Many students are accustomed to keeping a reading record where they list the books they've read, and sometimes the pages they've read, by date. You could set up a similar "Summer Math Activity Chart" for your students, and perhaps a second record for skill practice.

You might ask students to try at least five math activities in addition to regular computer-based skill practice. Let them know if you'd like them to turn in any graphs or calculations or practice sheets, or if the summary charts will suffice. Students need not comment on every activity; alternatively, you might ask them to select three of their favorite summer math activities (or three favorite math sites) and write a paragraph describing and assessing each.

Will there be a penalty for a summer "math drought?" Will there be an incentive (a certificate, small reward, or an "A" quiz grade) for completing a certain number of summer math activities?

As you think about helping students' math skills thrive over the summer, also consider the skills, concepts, and attitudes you hope to find in your new students next fall. You might like to share some of these ideas with other teachers at your school and work together to help every student's garden grow.

About the Author

Wendy Petti is the creator of the award-winning Math Cats Web site, author of _Exploring Math with MicroWorlds EX_ (LCSI, 2005), and a frequent presenter at regional and national math and technology conferences. She teaches grade 4 math at Washington International School.