Helping children at home with math assignments can be a real challenge for parents. Teachers must take action to help families understand the math curriculum for their child’s grade level, and how math is taught to their children. With clear information, more families will be confident about how to discuss math at home, monitor the completion of homework, and help their child develop positive attitudes about math. Parents and community partners also can bring valuable resources to the math class by volunteering, tutoring, and discussing real world applications of math at home, at work, and in life.

The Promising Partnership Practices in this Sampler come from members of NNPS who, over the years, shared family and community involvement in math. The examples, at all grade levels, include family math nights, workshops for parents, math volunteers, celebrations of math skills, and other creative partnerships. The practices, organized alphabetically, activate all six types of involvement in the NNPS framework: parenting, communicating, volunteering, learning at home, decision making, and collaborating with the community. The activities help families better understand teachers’ approaches, talk with their children about math, and support students’ math learning. Some also show how community partners can enrich and support classroom instruction, family involvement, and student learning.

The Sampler includes just a few of many excellent activities in our annual collections. See more at www.partnershipschools.org. Follow the paths to Success Stories and to a particular year’s book and click on Math. Each year a new collection of members’ best practices is published. Visit the NNPS website to see what is new, tried, and true.

Recommendations from Research

- Schools need to do more to involve families in their children’s mathematics education.
- Parental monitoring and involvement is related to higher levels of math achievement through high school.
- Schools can develop and implement practices that help parents understand how to support their children’s learning in mathematics.
- Use of interactive homework can help improve family involvement with students on math, students’ attitudes about math, completion of math homework, and math achievement.

This Sampler was developed by Marsha D. Greenfeld, Steven B. Sheldon, Joyce L. Epstein, Darcy J. Hutchins, Brenda G. Thomas, and Jenn Ganss. NNPS thanks MetLife Foundation for its support to increase family and community involvement in schools and districts, nationwide. © Baltimore: National Network of Partnership Schools, Johns Hopkins University, 2009.
Review of Research: Family and Community Involvement in Math

Steven B. Sheldon, NNPS Director of Research

Math is a core school subject at all grade levels. Just about every school is working to improve students’ math achievement. There are fewer studies of family and community involvement in math than in reading. Indeed, one review of research on the effects of different math interventions noted that few programs aimed to communicate with students’ families about math, and when they did the practices were “add ons.” The lack of serious attention to family and community involvement in math runs counter to other research that suggests that systematic interventions are needed to motivate and support students’ learning math.  

Parents Influence Students’ Attitudes. School-family partnerships are important because parents socialize their children in ways that affect their children’s self-perceptions of ability and achievement in math. Surprisingly, children’s self-concept of math ability has been shown to be more closely related to their parents’ perceptions of their ability than to their own report card grades in math. This indirect influence is important because other evidence suggests that early self-perceptions shape children’s later course choices and career decisions.

Parents Contribute to Students’ Achievement. Other studies found that parental involvement directly influenced children’s math achievement. Across racial and ethnic groups and school levels, students performed better and took more math courses if they discussed school with their parents and if parents were active volunteers at the school or members of the PTA or PTO. Also, higher parental expectations for their children and positive neighborhood characteristics predicted higher math achievement through high school.

Parents Need Help to Assist Students in Math. There is ample evidence indicating that many, if not most, families need help in interacting with their children about math. One study found that although parents believed in the value of progressive instructional strategies in math (e.g., having children talk about their work and learn from mistakes), they actually gave their children directives with few opportunities to discover their own solutions to math problems. Other studies indicated that parents’ abilities to help their children with math homework vary greatly. Overall, researchers concluded that school-family partnerships are needed to help all families understand how to provide children the support and encouragement they need for maintaining positive attitudes about math and learning math skills across the grades.

One effective strategy for building strong school and family partnerships has been teachers’ use of interactive homework that requires children to show and discuss their math work and ideas with a family partner. A study of the Teachers Involve Parents in Schoolwork (TIPS)–Math process in the middle grades found that students receiving interactive homework reported more parental involvement in math than did other students. Another study at the elementary level compared students in TIPS math and non-TIPs control classes. Students assigned TIPS-Math interactive homework reported greater family involvement in math, had more positive attitudes about math homework, and higher levels of math achievement compared to students in control classes. The study’s strong research design suggested that teachers can help all families support student learning in math without making parents think that they have to “teach” math skills. Learn more about TIPS Interactive Homework for math in the elementary and middle grades at www.partnershipschools.org. Click on TIPS.

Other studies suggest that schools can help students improve math achievement by developing a welcoming school climate that has the support of parents, other family members, and the community. Schools that are welcoming places and that focus everyone’s attention on student learning are more likely to encourage students to work hard in mastering math skills, leading to higher math achievement on standardized tests.

Math presents some unique challenges for family involvement. The progressively difficult nature of mathematics curricula and many parents’ “math phobias” make it especially important for district leaders, school principals, and math teachers to design thoughtful partnership programs and practices that help families feel confident about interacting with their children in math from preschool on.

1) For details on these and other studies and complete references, see:
AFTER SCHOOL TUTORING FOR NINTH-GRADE STUDENTS
James Ford Rhodes High School
Cleveland, Ohio

James Ford Rhodes High School wanted to increase the number of ninth-grade students passing the Ohio proficiency test. The school recruited community and teacher volunteers to tutor students after school to assist in improving students’ math skills.

The school sent flyers to education departments of local colleges inviting students to an open house in October. There, college students learned about the tutoring program and agreed to tutor students as part of their community service. Retired educators, grandparents, and parent alumni also offered their tutoring services.

The tutoring sessions ran three times per week from 2:30-4:30 pm, September until May. Each participating ninth grader had his/her own tutor. The tutors used proficiency materials and workbooks focused on fractions, division, and word problems.

Attendance varied, particularly dropping off after spring break. The program communicated to parents to encourage their children to attend the tutoring. Students also had a difficult time remaining focused on the importance of the tutoring helping them pass all areas of the ninth-grade proficiency test. Committed guidance counselors, teachers, college students, and interested parents took struggling students under their wings.

One hundred out of 500 ninth graders received tutoring. Student test scores on the proficiency test did increase from October to March. In particular, reading scores increased 7%, writing scores increased from 72% to 90%, and math scores rose 18%.

Increasing test scores on the ninth grade proficiency test will continue to be a goal. Thanks to the volunteer efforts of college students, retired teachers, grandparents, and parent alumni, Rhodes High School is on the road to success.

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Family Cultural Math Nights

Wing Luke Elementary School
Seattle, Washington

While good communication is an issue in many schools, it presents an even greater challenge at Wing Luke Elementary because the students speak more than 15 different native languages. With mathematics as the common denominator, school staff undertook four Family Cultural Math Nights. These get-togethers gave families the opportunity to learn about the school’s math curriculum from teachers and speak to other parents who share their native tongue.

Math teachers, working with the staff of Wing Luke’s ELL department, designed the program for these math nights. School newsletters and specific invitations went home with students, inviting parents in many languages.

School staff members grouped parents by language. “We met with the families with the topic of math in mind, but the goal for the evenings was that parents would talk among themselves with their own ethnic/language group about math and any needs they perceived in the area of math instruction,” said the principal. The school brought in translators so that the different groups could communicate.

The teachers learned that they needed to give the families time to talk among themselves after the formal presentations covering the math program for grades K–5. “We wanted to fill all silences and that was not necessary once the families engaged with each other,” said the principal. “Our job was to listen and record their concerns and ideas.” The teachers also learned what the parents wanted. More substantive homework and a calendar of math content for the year topped their list.

After the math nights, teachers reported that their students had more enthusiasm for homework and completed more assignments. The approximately 60 parents who attended said they were excited about having their concerns heard, and they enjoyed getting to know other parents. The events also meshed with the larger school goals of increasing family involvement and learning from parents how to better serve their students.

Wing Luke plans to repeat the activity, using more and different math assignments. Staff members also plan to create a Map of Math Content, as the parents requested, so they can follow the path of their child’s math instruction during the school year.
Family Math Day

Spooner Elementary School
Spooner, Wisconsin

Games and activities focusing on mathematics filled the hallways, classrooms, gymnasium, and cafeteria at Spooner Elementary for its 4th Annual Family Math Day last February. Even though the school has sponsored the event for several years, it remains popular—more than 70 percent of parents and other caregivers attended the fun-filled morning of activities.

The school’s Action Team for Partnership (ATP) started the event to help with a district-wide initiative to boost math skills. Putting their heads together, team members decided that a morning full of practical and entertaining math games would show students that math is more than isolated problems and encourage their parents to do more math with their children at home.

“The event illustrates all the different resources and activities that have minimal to no cost to play at home. It gives the parents ideas and makes learning fun for all,” said one of the organizers of this year’s math day.

On a Friday morning in late winter, approximately 300 parents and other family members participated in Family Math Day. Registration began at 8:30. Parents received a folder with a list and location of the games as well as a lunch ticket. Dozens of volunteers from the community helped staff registration tables and run the games. High school students provided childcare for parents who needed it.

For the rest of the morning, parents moved from one activity to the next with their children, stopping to play a math game or do origami. Parents and children selected from about 30 games, all of which included recommendations for grade and skill levels.

Community members, including the mayor, police officers, and business owners participated in the activities and accompanied students whose parents were not able to attend. School lunch was included in the day’s events.

The biggest challenge, organizers said, is keeping the math day activities new and interesting so families will return and students will want them to. This year the school used grant money to buy new games, and redesigned the layout of some repeat activities. These innovations obviously worked, as the attendance increased again this year. Another challenge is one the ATP doesn’t mind—families wanting to stay past lunch and continue playing the games!

In addition to their own students in kindergarten through fourth grade, the staff at Spooner partnered with a nearby family resource center to encourage preschool students and their families to participate. They scheduled the event on an early dismissal day so that these young guests would not get too worn out by all the activities.

School administrators plan to continue Family Math Day. They will fine-tune the activities to keep the math new and challenging, and find more efficient ways to organize the volunteers who make this truly a community event.
Family Math Night: “Get a Clue”

Prairie Elementary School
Naperville, Illinois

Who stole Mrs. Gorman’s Jolly Ranchers? That was the mystery facing 50 teams of sleuths at Family Math Night: Get A Clue. It took keen eyes and math skills to crack the arithmetic and geometry clues to find the culprit.

It was late in January when 51 students and 43 parents arrived at the school. The principal and a local police officer directed them to an area where staff members doled out pencils, gloves, badges, and problem sets. As soon as everyone had gathered in the lobby, the honors math teacher led them to the crime scene—Mrs. Gorman’s classroom.

Yellow crime scene tape cordoned off six empty Jolly Rancher bags. Student-parent detective teams worked through eight word problems to solve the mystery. The teams solved the first two problems in Mrs. Gorman’s classroom. Then they moved to the school’s library where they examined evidence set up on projector screens.

Students and parents ruled out suspects by completing sets of problems. Teachers, as the likely suspects, circled the room pleading with students not to finger them. The night ended well, with the apprehension of the candy thief (one teacher volunteered to be the bad guy), and the recovery of the candy.

All of the junior detectives enjoyed the Jolly Ranchers, and a few lucky students won prizes—various math and problem-solving board games, including Clue.

The School Family Community Partnership (SFCP) team at Prairie had not hosted a math event for some time. The idea for the mystery motif came from a book, Solve a Mystery Using Real Life Math Skills, which one of the team members recommended because she and her own third-grader had thoroughly enjoyed it. The group spied a novel approach to reinforcing math skills for students in Grades 3 to 5, and the event was underway.

The SFCP team recruited school staff to participate, even asking a Naperville police officer, who works with the drug education program, if she would be willing to donate her time and some crime scene tape. Team members collected data, such as height, weight, and shoe sizes, from seven staff members who would become the likely suspects. Then the team set to work writing the mystery.

The staff promoted the event by setting the scene of the fictitious crime, giving a few details, and telling students and parents that the investigation would continue at the math night event.

The math mystery night was a great success, SFCP team members said. “Parents and children absolutely loved the evening. Many families personally complimented and thanked us for this program,” said one member. “Teachers really loved role-playing during this event, and thought that it was a very creative way to enhance math skills.”

With that kind of response, a math mystery night is sure to be repeated. Organizers would like to develop a three-year cycle of mystery scenarios so that students would solve different mysteries as they proceeded from grade 3 to grade 5. The SFCP team would also like to create a similar program for students in kindergarten through second grade.
MONEY TALKS. AT GRASONVILLE ELEMENTARY, THE FAMILY MATH NIGHT FOCUSING ON MONEY SKILLS—SPENDING, SAVING, EARNING, REACHING FINANCIAL GOALS—SAID A LOT ABOUT STUDENT AND FAMILY INTEREST AND ABOUT THE PARENT INVOLVEMENT COMMITTEE’S (PIC) ABILITY TO PUT TOGETHER A SUCCESSFUL ACADEMIC NIGHT.

The PIC followed the recommendations of the school’s mathematics specialist on what topics would best supplement the students’ classroom work and help parents increase their children’s learning at home. This year’s recommendation was: Money. A recent addition to the parent library at school of Kiplinger’s Raising Money-Smart Kids added to the money theme. The school is always looking for new ways to acquaint parents with the material available in the Parent Resource Center.

Family Math Night took the form of a game and a challenge, with the students setting financial goals and the adults serving as financial advisors. Each student received a wallet with $20 in play money and a form to keep track of their earnings and expenditures. Each student set a money goal—less than $50, $51–$100, and $101 and up—and enlisted the help of their financial advisor.

Around the cafeteria were activity stations for earning and spending money. Students moved through the stations. There were money bingo tables, dice rolls with opportunities to earn money for extra chores or as birthday gifts, and a windfall spin. The spending stations included a super-shopper stop and a pick-a-trip option.

Community partner PNC Bank provided the last stop—the bank where volunteers counted the money and determined whether students were above or below their goals or right on the money. PNC gave each child a piggy bank and a pencil that looked like it was wrapped in a dollar bill. The bank also provided information on children’s savings accounts and financial services for adults. The math specialist prepared packets for parents filled with tips and web sites to use to build money skills at home.

Nearly 80 parents and 100 students participated in the family night. “Everyone was involved. Everyone had fun. Everyone learned,” said one of the organizers. “The teachers were given a glimpse of the power that parents working together with their child can offer.”

The PIC also showed that working together paid off. School staff members provided materials and worked at the event; parent volunteers worked behind the scenes to organize the night and spread the word to other parents; the community partner donated banks and offered helpful information; and the Parent Teacher Association board members assisted with event planning and funding. For all, it was a worthwhile investment.

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Jungle Math Night

Robert Frost Elementary School
Pasco, Washington

Lions, tigers, and bears couldn’t stop students at Robert Frost Elementary from using their numbers during Jungle Math Night.

Members of the school’s Action Team for Partnership (ATP) are always on the prowl to find new and fun ways to present math concepts to students and their families. During the 2007-08 school year, the ATP borrowed ideas from other Family Math Nights around the district to come up with the safari-themed event. They wanted a unique event that would grab the attention of parents and children and bring them together to foster student achievement. Frost Elementary figured that the exotic jungle theme would give families a taste of the tropics during Washington’s frigid February.

On the evening of February 28th, approximately 245 participants from 100 families arrived at the school to partake in some jungle-style math activities. Guests entering the school encountered a life-sized jungle diorama, featuring vines and jungle animals. Over 45 volunteers—ATP members, teachers, staff, and high school students—donned safari hats and distributed goodie bags that included pencils, fast food coupons, and fake paper money. ATP members asked students to “purchase” various items with the fake money. A cookie cost $1 and a book cost $5. The “big-ticket” item was a set of dice with which students played several of the games.

Parent-child pairs chose to participate in several math activity tables set up around the gymnasium and in Robert Frost’s hallways. At the estimation station, participants worked to determine the length of a stuffed snake and count the number of worms in a jar. A few tables down, they used monkey stamps to label the cost of different items in the jungle store. Across the hallway in the Technologically Tropical Rain Forest (otherwise known as the computer lab), students visited a jungle math web site: www.rainforestmaths.com.

No school event would be complete without food! Students and parents listed shapes they used while making s’mores and constructed necklace patterns out of Jungle Fruity Loops.

ATP members hoped that parents would be inspired by the activities and get ideas for activities to do at home with their kids. In order to accommodate Robert Frost’s diverse family population, teachers and volunteers conducted all of the activities in English, Spanish, and Russian.

In all, teachers, students, and parents proclaimed the event a success. The principal expressed excitement about the evening and hopes to host a similar one next year. At a monthly ATP meeting when the members debriefed the event, everyone agreed that Jungle Math Night was a great example of what the school is all about: bringing the school, community, and families together to foster student achievement.

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Robert Frost Elementary School
Pasco, Washington
Fourth-grade students at Ballentine Elementary celebrated their 100th day at school by counting and categorizing hundreds of items they collected for a local charity.

For the past four years, Ballentine has observed the 100th day of its school year with a “spectacular event” that includes all grades, with different activities for different grades. The younger children ate 100 Cheerios each at snack time and decorated their clothes with 100s. For past events, the fourth-graders read 100 books each, worked together to write 100-word poems, and made graphs of 100 items. This year, seven fourth-grade teachers put a twist on the 100th Day of School Celebration.

They decided to merge the 100-day event with a goal in their School Improvement Plan—encouraging students to participate in community service projects. The teachers asked each fourth-grade classroom to collect 100 personal hygiene items for a local charity. They donated the items to a local outreach center called Sharing God’s Love.

The project was a great success, with the students far exceeding the goal of 700 items. At least one class went so far over its goal that it was a challenge to store all of the donated items—a mark of true success, according to school officials. Before the donations were delivered to needy individuals, however, the students had some work to do.

Teachers set aside their morning meeting periods to discuss the donations and to count them. On the 100th day of school, each class tallied its grand total. Then the students in math classes separated the items by category, such as toothpaste, hand soap, combs, and brushes. They calculated percentages, and made brightly colored pie charts with illustrations. Teachers had students come up with averages for the number of bottles of shampoo and toothbrushes across classes.

More than 120 students and 240 parents worked on the 100-item drive. The project garnered great reviews from just about everyone. “Parents stepped up by making sure their child had items to donate; teachers helped each other and devised a place to put the items; community members came to make sure the items got to our charity,” said one of the organizers. “The students’ excitement drove the project. This activity was a perfect example of our district’s motto: All hands pulling on the same rope.”

People at the outreach center were equally impressed by the students’ efforts. “It was nice to see the kids caring about the community,” one said.

The fourth-grade team is certain it will have a similar project next year. The teachers plan to involve their students from the beginning, in coming up with an idea and suggesting charities.
Show Me the Math

Tacoma School District #10
Tacoma, Washington

More than 150 businesses in Tacoma opened their doors to middle school students to prove that math is important. Show Me the Math encouraged students to visit many different businesses in their community to see how mathematics is used outside the classroom.

More than 300 students from three middle schools took up the challenge, with impressive results.

A principal got the program going by posing this question, “Wouldn’t it be great to do a project around math with our local businesses?” That query led to the formation of a community action team, with business owners, parents, students, school and district staff members coming together.

The group set to work asking local businesses to participate by creating and demonstrating a math problem from their everyday business for students who visited. Businesses were also asked to display a Show Me the Math poster to identify theirs as a math-friendly place.

The district involved three middle schools in the pilot project. Each school kicked off the project in its own way. All students received a Show Me the Math game book that lists 15 different businesses they needed to visit, completing a math problem at each. Businesses included gas stations, restaurants, dentists, auto repair shops and more. Each week students would turn a completed page from their workbook in to their teacher.

For the next few months, students diligently completed the problems in the game book. Students went with their parents, in groups, or by themselves to participating businesses.

Math teachers saw a marked increase in enthusiasm from many students. One student came back from one visit and asked to do a presentation on how gas price increases would affect how much he would have to raise his prices to mow lawns this summer. A teacher shared a story about another student who had never turned in any homework, but completed every page in his Show Me the Math book.

Parents were equally impressed. “It was amazing watching my quiet, soft-spoken son getting outside his comfort zone and having to approach people he didn’t know. We spent an average of 30 minutes at each business, because they were so excited to have us there,” one said.

A particularly heart-warming story featured a student who went into an auto shop to complete his math problems and connected with the owner. The student asked if he could visit periodically and the owner agreed. A long time later, the student’s mother visited the business to tell the owner that her son had not been doing well in school and was not attending regularly until he started visiting the shop. Now, he’s on track.

These and other stories will be the stuff of a documentary that the district would like to produce on this project. The district is planning to repeat the initiative next year, and is looking for ways to attract even more students.
ST. JUDE’S MATH-A-THON

Bel Air Elementary School
Cumberland, Maryland

The ways to serve others are many and varied. At Bel Air elementary, students are reminded how, sometimes, the best thing that you can do to help those who need it may also involve helping yourself.

Bel Air is one of a large number of schools that participate in St. Jude’s Math-a-Thon, a fundraising drive for St. Jude’s Children’s Research Hospital. Every March, students in grades K–5 solicit pledges from their families and the Bel Air community. After acquiring pledges, students receive workbooks of math problems. Donors have the choice of giving a certain amount per correctly-answered problem—10¢, 20¢, or more—or simply making a donation to St. Jude’s.

The 134 Bel Air students who participated—representing over 60% of the total student body—raised $5,841.03 for the charity. But the benefits extended beyond the quantifiable. While students are actively participating in a service activity, the program also encourages students to make a mental link between doing good for others and doing well in school.

The math activities in the St. Jude Math-a-Thon Funbooks are more colorful and entertaining than what students are accustomed to in their everyday homework exercises. Many of the grade-appropriate Math-a-Thon activities involve fun, real-world applications of mathematical concepts. A sampling of the problems is available at http://www.mathathon.org.

The St. Jude’s Math-a-Thon is one of several events that the Bel Air Action Team for Partnerships (ATP) held this year to raise funds for a worthy cause. The school has participated in a Breast Cancer Awareness drive, a Diabetes Research drive, and several holiday food and clothing drives. Because the area that Bel Air Elementary serves is a less affluent part of the county—and because of the weakened national economy—ATP organizers were concerned about requesting funds from the families and community. However, due to overwhelming community generosity—with some extra outreach work by ATP members—the donations this year were greater than ever before.

The ATP helped get the word out by directly mailing information to community business partners. “Writing letters was more beneficial than e-mail or telephone calls,” wrote the Team Chair. “Communication on school letterhead, with a detailed description of the activity, was helpful to companies when they were considering their donations.”

Two of the community partners donated directly to the school and another pledged matching funds for money raised by the children of its employees. One partner specifically donates to the Math-a-Thon fundraiser because he believes that the math activities are important to student development and he “appreciates the effort the students make to succeed in this event.”

As a result of the continuation of this practice, the Chair proudly reported that former Bel Air Elementary students continue participating in the Math-a-Thon after they graduated and moved on to middle school. Furthermore, many parents ask when the Math-a-Thon is going to be held each year, eagerly awaiting the opportunity to work with their children on the activity. The ATP noted that “our students will participate in the Math-a-Thon for as long any [of our members] is employed at the school. We hope it will continue even longer than that.”
MAKE A MATH DATE WITH YOUR CHILD

BIRDNECK ELEMENTARY SCHOOL  
VIRGINIA BEACH, VIRGINIA

Parents and students “did lunch,” as well as math during a series of date days at Birdneck Elementary. Everyone seemed to enjoy the special occasions that brought parents right into math classes to problem solve alongside their children.

Make A Math Date with Your Child invited parents into mathematics classes to see the skills that teachers taught at various grade levels, to learn the math objectives for each grade, and to observe their children’s strengths and weaknesses. Parents were also invited to have lunch with their children either before or after class.

More than 100 parents and other caregivers accepted the invitation and made a date to see their child in class. Teachers prepared hands-on math activities that adults and children could do together. Each grade level had its own day so that parents with more than one child at Birdneck could participate with each student. The school accommodated parents’ busy schedules by hosting the events in both the morning and the afternoon.

In addition to class and lunch, parents were treated to a math presentation by resource teachers and administrators. They also received a packet of math games and activities and an Everyday Math deck of cards that they could play at home with their children to increase math skills.

“The event proved to be a fun, as well as eye-opening, opportunity for parents while they learned which math skills their child needed to practice,” said the parent involvement coordinator. The impetus for the date days was the school’s goal to improve math scores on standardized tests.

Despite invitations, flyers and other publicity, some parents were initially reluctant to attend. Tying the event to lunch increased participation, and those who came were happy to have had the opportunity to spend time in school with their child. These parents said that they would be better able to help their children at home with math assignments and questions. Children, of course, were happy to have their parents in school and at lunch.

Birdneck plans to have more Math Date days, and will work hard to encourage more parents to pencil them in.