Family Math Fair:
A Journey Through Mathematics

An Honors College Thesis
(Honors 499)

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Ball State University
Muncie, Indiana
April 1998

Graduation May 1998
Prologue

About the Author:

This manual for a Family Math Fair was written as part of my requirements for graduation from the Ball State University Honors College. As a Teacher’s College student of Elementary Education, I have also earned an endorsement in Mathematics. I am an active member of the Indiana Council of Teachers of Mathematics. I have also earned the awards of Magna Cum Laude, and membership to the Golden Key National Honor Society, Pi Lambda Theta Teaching Honorarium, and Kappa Delta Pi Teaching honorarium. I hope to be teaching in an elementary classroom in the Fall of 1998, and once there, I hope to implement The Family Math Fair again.

(An abstract follows on the next page.)
Abstract:

This project was developed after I attended a seminar by Ms. Ann Bear at the 1995 ICTM Annual Convention in Indianapolis. Ms. Bear’s presentation described her experiences in putting on a Family Math Fair. Following this seminar, I was extremely interested in the idea. I left curious as to the nature of the activities at the Family Math Fair. Ms. Bear’s presentation focused primarily on the logistics of her previous Math Fairs, and not so much on the content.

I felt that it would be a fantastic idea to create a manual that included all of the details of a Family Math Fair. In order to have the best perspective possible for writing this manual, I also felt it would be the most ideal to actually implement the program in an elementary school as part of my thesis project. On April 15, 1998 at Storer Elementary School in Muncie, Indiana, my idea came to full living color.

This manual includes every aspect of the Family Math Fair concept: a research based rationale for the Family Math Fair, a description of the event, the goals set for the event, a description of the event’s theme, information on publicity for the Math Fair, sources for donations for the
Math Fair, a list of materials, lesson plans for all forty-seven of the activities, the tasks of the volunteers, photographs, and an evaluation of the event. The goal was to create a manual that included the logistical side of the Math Fair as well as the actual content. It is my hope that teachers will be able to use this manual as a guideline to creating a Family Math Fair of their own. It is a “Do – it - Yourself - Kit for the Family Math Fair!” This manual provides the framework on which any creative teacher can build an enriching, educational program that is personally suited to his or her students’ needs.
Family Math Fair
A Journey Through Mathematics

A Complete Guide to and Review of A Math Fair Event

By:
Tamara Jo Phillips Klage
Table of Contents

I. Project Rationale ................................................................................................ 1

II. Project Description .......................................................................................... 6

III. Project Theme .................................................................................................. 8

IV. Goals and Objectives ...................................................................................... 32

V. Calandar ............................................................................................................. 34

VI. Budget ............................................................................................................. 36

VII. Facilities ......................................................................................................... 37

VIII. Volunteers ..................................................................................................... 42

IX. Publicity .......................................................................................................... 43

X. Proficiencies ..................................................................................................... 53

XI. Stations and Activities .................................................................................... 59
    Problem Solving ................................................................................................. 60
    Whole Number Sense ......................................................................................... 69
    Place Value ....................................................................................................... 74
I. Project Rationale

The Storer Elementary School Family Math Fair was designed to succeed at meeting three main goals. These goals were determined after careful consideration by the creator of the Storer Elementary School Family Math Fair. The goals included: to improve student and family attitudes toward mathematics, to increase family involvement in student education, and to develop mathematics skills. These goals were not unlike the goals set and achieved by previous programs. A similar program in Ontario helped to promote positive attitudes towards mathematics in both families and students (Onlsow 25). The Ontario Family Math Program got families involved with mathematics together which led to the same result as families who read together -- improved skill and attitude (Bobango 46). In Springfield, Massachusetts, the Family Math Program increased family involvement in student education, increased accomplishment over mathematics anxieties, and encouraged mathematics participation (Caldwell 23).

The first goal of the Storer Math Fair was to improve student and family attitudes toward mathematics. It has been found that positive mathematics attitudes and lessened mathematics anxiety lead to success in mathematics. In Williams’ study it was found that there was a direct relationship between mathematics anxiety and mathematics achievement -- high achievement in mathematics was directly related to low mathematics anxiety (98). In another study students exposed to a positive mood about mathematics completed more mathematics problems accurately than did the control group (Bryan 494).

The Storer Math Fair aimed to improve attitudes toward mathematics. First and foremost, this event was developed to be fun. Each activity was designed to be enjoyable and to provide opportunities for success. Students enjoyed these activities and were able to build their confidence in mathematics through their
success. Students who were more positive about mathematics were also more confident in their mathematics abilities (Kloosterman 378). Providing enjoyable activities and multiple successes in mathematics led to more confidence and improved attitudes.

The major factors that caused students to lose interest in mathematics, and develop negative attitudes towards it included teacher centered lessons, little student talk, little action, no hands-on work, and the same routine. Things that improved these attitudes were student centered, hands-on, active lessons full of student interaction and new relevant and applicable content (Boling 17-9). The activities in the Storer Elementary School Family Math Fair were all of these things. The activities centered on the student. The activities provided plenty of communication, action, and hands-on learning of relevant content that was applicable to the students daily lives.

The second goal of the Family Math Fair was to increase family involvement in students' educational success. There were many benefits to families' involvement in their students' education in previous studies. These benefits included less absenteeism, enhanced motivation of the student to learn and to do well in school, and improved academic achievement (Stanic 34). In her study of how family involvement affects academic success, Marcon found in 1993 that students whose families were not involved with the school were more likely than students whose families were involved to be retained during elementary school. Students whose families were involved had higher grades and higher achievement test scores (6-8). Research of students involved in family pairing for cooperative learning indicated that students involved in the partnering displayed higher problem-solving ability than those who were not (O'Connell 12). Families can work with students to help them understand math concepts, thereby easing anxiety and promoting enjoyment of mathematics (Schnieder 14). Families are also a key
factor, then, toward also meeting the first goal of The Storer elementary School Family Math Fair -- improving student attitudes.

A Family Math program strived to achieve this high level of family involvement. The similar program in Ontario led to an increased family understanding of the current teaching methods for mathematics (Onslow 24). If the family understands how their student is being taught mathematics, then the family can better help that student at home with mathematics in a way that facilitates what is done in the classroom. According to PTA Today families can help improve their student's mathematical skills in many ways including playing games, communicating about mathematics, and encouraging problem solving (15). The Storer Elementary School Family Math Fair activities did all of these things.

Although the research has discussed primarily parental involvement, the word family was used for the goals of the Storer Elementary School Family Math Fair. The Storer Elementary School Family Math Fair did not require a student to bring a parent. It was only asked that a student come with an adult. It was understood that the definition of the family is changing and becoming more broad. Any adult that is important in a student's life is important in their education as well. It is important for a student to have someone to be involved in their education, but this someone does not necessarily have to be a biological parent.

The third goal of the Storer Elementary School Family Math Fair was to improve mathematics scores. According to Everybody Counts, the National Research Council's publication on the future of mathematics education, "Mathematics is the key to opportunity...Quality mathematics education for all students is essential for a healthy economy...Current mathematical achievement of U.S. students is nowhere near what is required to sustain our nation's leadership in a global technological society...a complacent America has tolerated under achievement as the norm in mathematics education." (1-3)
The entire country is involved in a push to improve in this area. Mathematics is a part of everyday living, and cannot be avoided.

In order to design the Storer Elementary School Math Fair, certain areas of mathematics had to be chosen. Each station had a content area focus. In order to cover the most current areas of mathematics important for elementary school students, the creator chose to follow the guidelines set in the Indiana State Proficiency Guide. The stations at The Storer Elementary School Family Math Fair were all based on the essential skills in the Indiana State Mathematics Proficiency Guide (12-87). These are the areas on which students are tested on standardized tests. Three proficiencies, the skills of reasoning, communication, and estimation were not individual stations, but were covered throughout all of the stations. The other twelve proficiencies each had a station.

Although the Storer Elementary School Family Math Fair was a one time event, the activities were designed to extend beyond the evening. The activities were each printed out as handouts that families could take with them and continue at home. These handouts included objectives, materials, steps, and the proficiency targeted. There were also additional activity handouts of activities that were not offered at the Storer Elementary School Family Math Fair, but could be done at home. One evening could not by itself improve mathematical achievement, but it could begin a routine at home that will.

Another way that the Storer Elementary School Family Math Fair targeted at building mathematical skills and concepts was through the use of hands-on learning. Virtually every activity had some sort of manipulative that students could handle. Manipulatives increased the understanding of concepts for a number of students. In Ontario such use also tended to also lessen mathematics anxiety, which improved attitudes toward mathematics (Williams 96). Manipulatives then, met two of the goals of the Storer Elementary School Family Math Fair –
improved mathematics skill and improved mathematics attitudes. Before adolescence children have not yet reached the stage of abstract reasoning, so explanations of mathematical concepts must have a concrete, hands-on focus. Activities need to be rooted in real life situations (Schnieder 14). The use of manipulatives were also supported throughout the Indiana State Mathematics Proficiency Guide.

The Storer Elementary School Family Math Fair was designed, then to improve mathematics attitudes of students and families, to increase parental involvement, and to improve mathematics achievement. Following a similar event, Bobango stated that the payoff was clear through good public relations between the school and community, increased understanding of the practical applications of mathematics for both students and families, and increased communication between the school, families, students, and teachers around mathematics (47). "Neither the schools or families alone can turn around the problems caused by mathematics illiteracy in the U.S., but together, we can make a real difference" (Kahn 37).
II. Project Description

The Storer Elementary Family Math Fair was a school wide event for the Elementary School. All grades were included. Families could come and spend an enjoyable evening while they were learning and gaining better attitudes about mathematics.

The Math Fair began with registration where students and their parents or adult guest sign in. They could register for the raffle door prize drawing, and if they turned in their Family Math Scavenger Hunt (sent home from school earlier), they received an extra chance. The families received a "Travel Guide" to the Math Fair that guided them through the evening, and the students received a "Passport to Mathematics."

Next the Family chose one of twelve stations at which to begin. The stations included Whole Number Sense, Problem Solving, Geometry, Spatial Awareness, Measurement, Fractions, Decimals, Computation, Calculators, Geometry, Time and Money, Place Value, and Probability. These stations were based on the proficiencies in the Indiana State Proficiency Guide for Mathematics on which Standardized Tests are based. Each station had two or three different activities. The activities had various parts to try that covered a full range of ability. At every station there were Math Fair volunteer tour guides from Ball State University Teachers College to guide families through the activities and answer questions.

Each activity had a handout that explained the activity, described the materials needed for the activity, and related the activity to the proficiency area. These handouts could be taken home as well. Families could collect a packet of activities to take home and continue. Each station also had additional 'take-home' activity handouts for families to take home. These were activities that were not
available at the fair, but could be done at home. The activities directly focused on that station's proficiency. All of the stations focused on Mathematical Reasoning and Communication, Estimation, and the use of literature with Mathematics, so these areas of mathematics did not have their own stations.

Families could move through the stations at their own pace. Later in the evening, the door prize winners were announced. Some prizes included a Family Math book, and Mathematics Manipulatives. Families could spend as long as they liked at any one station or one activity. The students, as they left a station, got their "Mathematics Passport" stamped. After the family finished the evening, they left through the check out station. Here, the family, adult and student each, received a Family Math Fair Evaluation to leave their comments about the event. The students could show their completed stamped passport for a prize. The passport was then theirs to keep. Each child who participated received a prize. It was an enjoyable evening for all involved.
III. Theme

In order to make the Storer Elementary School Family Math Fair an even more original idea and different from other similar fairs, the Family Math Fair had an ongoing theme, Journey through Mathematics. This travel idea was carried over into all parts of the Math Fair. The volunteers were named as honorary tour guides for the evening and wore name tags with maps on them. These maps were cut from an inexpensive map of the U.S. and each guide chose a part of the country with some significance to them.

Many signs with the theme on them were also posted around the entire Family Math Fair. Banners were also hung. A Storer Elementary School Family Math Fair logo was created as well. Each station had a sign with the station’s name on it so that the families knew where they were traveling. The room was decorated with maps and flags of the world. These covered the walls of the entire Family Math Fair.

At registration, each student received a mathematics passport to carry with them on their journey. The passport was stamped at each station just like a real passport is stamped in each country. The drawing registration tickets were placed in a suitcase, and the evaluations were placed in another suitcase, in order to continue with the travel theme. Finally, using the logo that was developed, T-shirts and posters were made. All of the the signs and banners are included here on the following pages. Note that the banner begins on page 11 and ends on page 19. When each page was put together, the banner says “Welcome to the Family Math Fair, A Journey Through Mathematics!”
Family Math Fair 1988 Journey Through ~ Math ~
Take A Journey Through Mathematics!!!!!!
journey to
the Frey Tyth
Family Round
Mat

Mat
Signs for Each Station Follow
Problem Solving

If Joe has... How many does...?
Whole Number Sense
Place Value

100,000

10,000

100

10

1,000,000

1,000,000
Fractions

\[-\frac{1}{3}\]

\[\frac{10}{12}\]

\[\frac{3}{15}\]

\[\frac{8}{51}\]

\[\frac{1}{2}\]
Decimals

0.65
1.73
1.03
5.55
1.14
4.1
2.36
Computation
Calculators
Spatial Awareness
Measurement
Time & Money
Probability and Statistics
Geometry
IV. Goals and Objectives

The Family Math Fair has three main goals:

1. To improve attitudes of students toward mathematics.
2. To involve families in the student's educational success.
3. To provide mathematical learning experiences and growth opportunities for students.

From these goals, the following objectives have been created:

1. Following the Family Math Fair, students will demonstrate better attitudes toward mathematics by more active participation in classroom mathematics, completion of quality mathematics work at the best of their ability, by a decrease in complaints about mathematics at school, and by showing an active interest in mathematics through questions asked and participation to discover answers.

2. Following the Family Math Fair, students' families will show more involvement in students' educational success by responding to teacher's notes home, by active communication with the teacher, and by active participation in future school activities.
3. Following the Family Math Fair, students will demonstrate growth in the area of mathematics by achieving more classroom success in the subject area and higher mathematics scores.

Although these are lofty goals and objectives, and the Family Math Fair program alone will not completely achieve them, the Math Fair will add to the progress toward reaching these goals. As seen in the project's rational, the program has many benefits to students and their families. It is intended that the Math Fair be one of many programs aimed at improving mathematics attitudes, family involvement, and mathematics scores. Combined efforts of such programs will lead students and families toward reaching these goals.
V. Calandar

October 1997
Meet with faculty advisor and gain approval for project idea.

November 1997
Register for Honors 499 to complete project in the Spring.

December 1997
Call honors college and provide name of advisor, and set up a meeting for project approval.

January 1998
Meet with Dr. Joann Edmonds to acquire honors college approval for project.
Meet with Dr. Stump and Miss Kitt to begin plans.
Request application for student grant.
Meet with Mr. Roberts of Storer Elementary to request permission to hold the Family Math Fair at the school, and get a date on the calendar.
File paperwork with OPLE office to work with Storer.
Begin collecting activities.

February 1998
Create publicity materials for the Family Math Fair

Create student passports, door prize tickets, mathematics travel guides, registration sheets, and evaluations.

Write Description, Goals and Objectives, Rationale, Timeline, Budget, and Sources sections of the project.

File student grant application.

Contact possible donors for coupons and door prizes.

Continue to collect activities.
March 1998

Type up activities sheets.
Collect activities materials.
Create a Math Fair diagram.
Collect door prizes.
Provide Storer with publicity materials.
Finish writing Facilities, Proficiencies, Stations and Activities, Publicity, Volunteers, Sources, and Acknowledgments sections of project.
Send letters to parents and to teachers.

April 1998

Final Preparations
Parent Teacher Conferences
Send home newsletter, True and False Quiz, and Family Math Scavenger Hunt
Math Fair April 15th 7:00 - 8:30 PM !!!
Take photos.
Develop photos.
Return borrowed materials.
Write Evaluation section of project.
Print final copies of the project.
Submit copies to Storer, Honors College, my family, Miss Kitt, Dr. Stump, and others.
Send Thank You letters to all those who helped with the Family Math Fair.
VI. Budget

The main expense for this project is materials, primarily copies. Many items are copied 350 times, for each student attending the school. The expected number of families to attend the Math Fair is 100 families, so other items were copied 100 times. The following items must be copied:

- Posters: 1 page, 20x
- Letters to parents: 1 page, 350x
- Letters to teachers: 1 page, 30x
- Reminder "True and False" sent home: 2 page, 350x
- Family Math scavenger hunt: 1 page, 350x
- Mathematics Passports: 1 page, 100x
- Door prize tickets: 1 page, 100x
- Math Fair guides: 1 page, 100x
- Evaluation for Adult: 1 page, 100x
- Evaluation for Student: 1 page, 100x
- 47 Activities: 85 pages, 100x

9550 copies

These copies are provided by Storer Elementary School. At a cost of $.03 per copy, it would have cost $287 to make all of the copies.

Materials for activities is another expense. Things that could not be found in the school, library, or at home, are purchased for the Math Fair. There is not much that has to be bought. These items total only about $100.

The final expense for the program is the prizes. All of the prizes are donated by various contributors, so there is no cost to the program. The acknowledgments section lists these donors.
VII. Facilities

The Family Math Fair took place at Storer Elementary School in Muncie, Indiana on April 15, 1998. The school is attended by three hundred-forty one students kindergarten through grade five. These children come from about two hundred different families. This is a diverse school, including Caucasian Americans, African Americans, Hispanic Americans, and Asian Americans from all social classes. The school is also home to thirty-eight staff members including twelve regular classroom teachers, four special education teachers, a speech pathologist, a counselor and psychologist, art, vocal music, physical education and library teachers, a nurse, two building teacher’s aides, a library aide, five cafeteria and custodial workers, three child care providers for after school, two secretaries and the principal.

Storer Elementary School was established in September of 1956, and moved to the current location in 1988, a few blocks away. The Mission Statement for Storer is as follows:

The mission of the Storer Elementary School staff is to help children develop an excitement for learning, the ability to examine information, a feeling of self-worth, a sense of pride in their work, and respect for others.

To accomplish this mission we will ...

- Give priority to each student’s needs by providing academic, social, emotional, and physical services in a nurturing environment,

- Work cooperatively with parents and community,

- Provide guidance in all areas of learning,

- View each child as an individual, and

- Maintain a safe, positive, and accepting environment.
This mission statement reflects the main goals of Storer Elementary School.

Storer Elementary School has worked hard to achieve these goals. One way of demonstrating this achievement is through their ISTEP Scores. In 1997, Storer had the highest mathematics score in Delaware and the surrounding counties. They were near the top in reading and language arts as well, giving them the second highest overall score in the area.

The students at Storer are familiar with many mathematics manipulatives, including counting chips and blocks, base ten blocks, calculators, pattern blocks, balance scales, and number lines. The manipulatives used at the Math Fair correspond to those that the students use in their classrooms.

The Math Fair was held in the school cafeteria. We used tables around the room. We also had access to electrical outlets. The following pages show a map of the area, of the school, and of the Family Math Fair.
VIII. Volunteer Staff

In order to hold this Family Math Fair, it took a staff of volunteers. The creator of the Storer Elementary School Family Math Fair did not want to have to ask teachers from Storer to come back in the evening to help work. It was the intent that they would come and participate, and hopefully bring their own families. A faculty member teaching in a school may have been more able to try to involve their teachers more in the staffing, as well as the PTO or other parent groups. For this Math Fair there were fifteen volunteers, myself, the creator, and two mentors of the project. Some were friends, and many were from the project mentor’s Math 391 methods course and Math 201 methods course this semester at Ball State University. Those involved as volunteers were included in the acknowledgments section of this manual.

Volunteers helped out in many ways. People were needed to run registration and check out. Someone had to be in charge of the raffle drawing. A volunteer was the evening’s photographer. All the volunteers worked together to help set up, decorate, and later clean up from the Family Math Fair.

Most importantly, there had to be at least one person at each station who could guide the participants and answer any questions. All of the activities were demonstrated for the volunteers ahead of time, and they were familiar with them. They knew the rationale behind the Math Fair and behind each of the activities chosen. The Family Math Fair would not have been possible without all of the help from the fabulous volunteer staff.
IX. Publicity

In order to have a successful Storer Elementary School Family Math Fair, there had to be families present to participate in it. In order to have as many families as possible join in the Fair, quite a bit of publicity was done. Prizes were also offered during the Math Fair. All of the hard copies of the publicity are included in this section of the project.

The first notice of the Math Fair was in the Storer Newsletter in April. This was a short blurb to announce the Math Fair, what it was, when it was, and that more information was forthcoming. Prizes were also mentioned to encourage attendance. Signs were also posted around the school at this time.

After the newsletter went home, two letters were circulated. One was to the teachers, and one to the parents. Each of these letters described the Family Math Fair, the reason for it, the proficiencies on which the activities were based, and mentioned the prizes again. The letters mentioned the Family Math Scavenger Hunt that would be coming soon. The letter to the teachers also asked them to remind families at the parent conferences, and asked them to encourage participation of their students.

The next notice sent home was the Family Math Scavenger Hunt. Students answered the questions with their families. Bringing the scavenger hunt back to the Math Fair gave the family an extra chance to win a prize.

The last bit of publicity was a Family Math Fair True and False quiz. This was sent home right before the Math Fair. On the front were questions about the Fair, and on the back are the answers.

Finally, throughout the time before the Family Math Fair, announcements were made over the school’s intercom each day during the regular afternoon announcements.
Family Math Fair

April 15, 1998
7:00pm - 8:30pm
Storer Elementary School Cafeteria

Come and enjoy a fantastic evening. Spend quality time with your family, learning about mathematics, doing fun activities, enjoying math, finding out how much you already know about math, and maybe even winning prizes. Check it out! There will be eleven stations, for the eleven State Mathematics Proficiencies that Standardized Tests are based on, where you and your family can participate in activities at a variety of levels. Everything from time and money, to probability, to geometry, to problem solving will be included. Come and have a great time! Who knows, you may even decide that you and your family like Mathematics! Don't forget to fill out the Family Math Scavenger Hunt and bring it with you to the Math Fair for an extra chance at the prizes!!
FAMILY MATH FAIR

When: April 15, 1998
7:00pm to 8:30pm
Where: Storer Elementary
School Cafeteria
What: Really fun to do
activities in eleven math
areas!
Why: To have a great time with your
family, learn about Math, see
how much you already know
about Math, have fun with
Math, and maybe even win a
prize too!

Don't Forget to Bring your Family
Math Scavenger Hunt too!
Dear Teachers,

My name is Tammie Klage, and I am a senior honors college student at Ball State, majoring in Elementary Education with a Mathematics Endorsement. In order to graduate this May with an honors diploma, I must complete a culminating project. For my project I am planning a family Math Fair. Mr. Roberts has generously offered to allow me to present this program at your school. The Math Fair will be April 15, 1998 from 7:00pm to 8:30pm.

This is a one time, evening event, in which families can come and participate in Mathematics activities that are fun and educational. These activities are grouped into eleven areas that are based on the Indiana State Proficiencies. These areas include:

- Spatial Awareness
- Fractions
- Whole Number Sense
- Probability
- Computation
- Time & Money
- Measurement
- Problem Solving
- Place Value
- Decimals
- Calculators
- Geometry

Each area will have a variety of activities that are at multiple levels of ability. Reasoning, Estimating, and Communication will be covered at all areas. Children and parents can work together, sharing quality time, learning more about Mathematics, and developing positive attitudes about Mathematics.

A family math scavenger hunt will be sent home for children to complete with their families. They can return these to the Math Fair for prize and an extra chance in a raffle drawing. Prizes are also awarded for participation. In the past, some teachers have chosen to offer a homework pass for attendance, but this is up to individual teachers.

Mostly, I would just like to ask for your support of this event. If you could encourage students to attend, and perhaps remind families at parent conferences, I would be extremely thankful.

Thank You!!!

Tammie Klage
Dear Parents,

My name is Tammie Klage, and I am a senior honors college student at Ball State, majoring in Elementary Education with a Mathematics Endorsement. In order to graduate this May with an honors diploma, I must complete a culminating project. For my project I am planning a family Math Fair. Mr. Roberts has generously offered to allow me to present this program at your school. The Math Fair will be April 15, 1998 from 7:00pm to 8:30pm.

This is a one time, evening event, in which families can come and participate in Mathematics activities that are fun and educational. These activities are grouped into eleven areas that are based on the Indiana State Proficiencies. These are the areas on which Standardized Tests are based. These areas include:

- Spatial Awareness
- Fractions
- Whole Number Sense
- Probability
- Computation
- Time & Money
- Measurement
- Problem Solving
- Place Value
- Decimals
- Calculators
- Geometry

Each area will have a variety of activities that are at multiple levels of ability. Reasoning, Estimating, and Communication will be covered at all areas. Children and parents can work together, sharing quality time, learning more about Mathematics, and developing positive attitudes about Mathematics.

I will be sending home future reminders of the Family Math Fair, as well as a Family Math Scavenger hunt. The scavenger hunt can be turned in at the Math Fair for a prize. Completed Scavenger hunts will give your family an extra chance in a drawing for door prizes. Prizes can also be earned for participation at the Math Fair.

It is my sincerest hope that you will be able to join us for an enjoyable evening.

Thank You!!!

Tammie Klage
Family Math Fair

Family Math Scavenger Hunt

Your Name ____________ Your Teacher's Name __________________________

Have fun with your whole family! Go on a fun Family Math Scavenger Hunt. Write down the answers to these questions, and bring this paper with you to the Family Math Fair!

April 15, 1998    7:00pm - 8:30pm

Your paper will be an extra chance in the drawing to win prizes!

Write the Number:

of your street address. ______________
of your phone number. ______________
of feet that live in your home. ______________
of pets that live with you. ______________
of people who like Math in your home. ______________
of minutes it takes you to drive to school. ______________
of mailboxes on your street or in your building. ______________
of corners on the building you live in. ______________
of doors in your home. ______________
of windows in your home. ______________
of inches of the tallest person who lives in your home. ______________
of the shortest person. ______________
**Family Math Fair**

**April 15, 1998**

**7:00 pm - 8:30 pm**

**Storer Elementary Cafeteria**

---

**True and False Quiz**

1. **True or False**  Math is Boring.

2. **True or False**  Math is only Addition, Subtraction, Multiplication, and Division.

3. **True or False**  I will know how to do the activities at the Math Fair because someone will be there to show me what to do at each station.

4. **True or False**  Since I was never that terrific at Math in school, I should avoid coming to the Family Math Fair.

5. **True or False**  If I am unable to attend the Math Fair, my child can still attend it with another adult friend or family member.

6. **True or False**  There will prizes awarded at the Family Math Fair.

7. **True or False**  My family and I will learn Mathematics, spend quality time together, have fun with Mathematics, and be able to bring home some ideas of things to do at home at the Math Fair.

***See the back of this page for the correct answers!!***
Answers to the Family Math Fair Quiz

1. **False** The Family Math Fair will be full of exciting activities that make Math fun and rewarding!

2. **False** Math at the Family Math Fair will include Spatial Awareness, Number Sense, Computation, Measurement, Place Value, Decimals, Fractions, Probability, Time & Money, Problem Solving, and Computers & Calculators!!

3. **True** Each station at the Family Math Fair will have a person available to guide you through all the activities.

4. **False** One of the purposes of this Family Math Fair is to show everyone that Math is not so hard, not so boring, and that you know more about Math than you thought you did!

5. **True** We would love to see as many children at the Family math Fair as possible; children can bring any adult.

6. **True** We will have door prizes, scavenger hunt prizes, and prizes just for participating!

7. **True** It is our guarantee that you and your family will enjoy spending quality time together, learning about Math, having fun, and gathering ideas to bring home!
Announcements Made

WEDNESDAY APRIL 8
* Hey Storer Kids! I heard a rumor that there is going to be something extra special and exciting happening on Wednesday night, April 15th! I’m not sure what it is, but maybe we will find out tomorrow. Keep Listening!

THURSDAY APRIL 9
* Guess What I found out!!?? We know what it is that is so exciting and happening at Storer Elementary School Wednesday night, April 15th! It’s a Family Math Fair! I don’t know what it exactly is yet, but I bet we will find out tomorrow.

MMMMMMMMM, I wonder what a Family Math Fair is??

FRIDAY APRIL 10
*Now I know what the Family Math Fair is! We get to bring our families to school on Wednesday night April 15th. If Mom or Dad can’t come, maybe another adult can come with us. Wow! It sounds like fun. There will be games, puzzles, calculators, raffle prizes and more! I am definitely going to be here on April 15th from 7:00pm to 8:30 pm next Wednesday!

MONDAY APRIL 13
* Oh boy! The Family Math Fair is this week!! Let’s see if I remember what is happening. There are games and puzzles for all ages, kindergarten, first, second, third, fourth, and fifth grade. We will learn new games on calculators, pattern blocks, Tangrams, and Base Ten Blocks. I don’t even know what all those are, but you can bet I will be here to find out!
TUESDAY APRIL 14
* Man O Man O Man! I am REALLY excited about the Family Math Fair! It is Tomorrow night! Wednesday April 15th at 7:00 pm, right here at school in the cafeteria! Are you sure that it is not just boring math problems?? Oh no way! We are going to play all kinds of fun games! I will see you there tomorrow night!

WEDNESDAY APRIL 15
* It's here, It's here, It's finally here!! Did you hear? The Family Math Fair is tonight at 7:00 in our cafeteria, and we can play games, do puzzles, and maybe even win prizes! I can't wait!
X. Proficiencies

There were fifteen proficiencies that the Family Math Fair was based on. These are the areas by which Standardized Tests are developed. They came from the ICTM State Mathematics Proficiency Guide. Below, each elementary school proficiency is listed with a brief description including indicators of the proficiency. There are fifteen proficiencies listed, but there were only twelve stations at the Storer Elementary School Family Math Fair. Three proficiencies are of extreme importance and were covered throughout all of the stations. Each station had several activities that involve all of the given indicators of the proficiency. Each student did only the steps of each activity (chosen by the student) that his or her level would allow. For example, a first grader did not do as many steps as the fifth grader.

1. Develop Problem Solving Abilities.

The ability to solve problems is one of the main reasons for the study of mathematics. It is not an area of mathematics so much as a way to approach all mathematics. Students will attempt problems that involve mathematics and relate it to their everyday lives. They will be able to explain their thinking and the process that they used to solve the problem. They will use logic and reasoning. They will verify and interpret the results they achieve as they relate to the original problem. Finally, they will develop strategies to apply to a wide variety of problem situations.
2. Develop a Sense of Whole Numbers.

Students must understand the concept of what a number is before they make any sense of the way numbers are used. Whole number sense includes number identification versus numeral identification, more and less relationships, counting, grouping, and relationships between numbers. Students will classify, sort, and order objects according to specific characteristics. They will compare sets for equivalency. They will count and order numbers. Finally, they will recognize patterns.

3. Develop Place Value Concepts for Whole Numbers.

All mathematics operations depend on place value understanding. Grouping by tens and trading and exchanging are key concepts. Place value manipulatives are essential. Students will model numbers using manipulatives. They will use the grouping by tens system, and also group according to hundreds and thousands. They will be able to represent numbers with numerals and with words. They will round numbers. Finally, they will be able to apply this knowledge to decimals.

4. Develop a Sense of Fractions.

The real world is not made up of just whole numbers. In order to describe the real world, students must understand the concept of fractional parts. They can be applied to situations that involve measurement, geometry, statistics, and many other topics. Before a student can compute with these numbers, they must have a firm grasp of the concept of what fractions are. Again, manipulatives are essential. Students will model fractions and mixed numerals as parts of the whole with manipulatives as well as describe them with words and with numerals. Finally, students will demonstrate an understanding of equivalent fractions.
5. Develop an Understanding of Decimals

Decimals are another way to describe the real world. Much computation is done with decimals. Students must first grasp what a decimal is before computation can be done. Manipulatives are essential here. Students will model decimals with manipulatives and describe them in words and with numerals. Finally, students will demonstrate an understanding of decimals as fractions and in terms of place value.

6. Develop Computation Skills for Whole Numbers

Computation solves problems. Memorization of basic facts is necessary, but more important is the understanding of how these facts are arrived at. Students will develop the concept of addition as the joining of sets. They will develop a take-away, missing addend, or comparison concept of subtraction. They will develop division as sharing and multiplication as repeated additions. They will learn the symbols of +, -, x, ÷, and =. They will develop strategies to memorize facts. Finally, students will understand and develop computation algorithms.


In today's world many of the problems are solved mentally and solutions are estimated. Students must be able to function in these situations. They must also be able to use estimation to validate the reasonability of the solutions to their problems. Students must regularly use estimation skills. This proficiency is not a station at the Family Math Fair, but is included in all the stations.
8. Use of Calculators.

In the modern world, computers and calculators dominate. Although pencil and paper computation is essential for understanding, computers and calculators are fast taking away the tediousness of computations. These skills are essential so that students will be able to function as members in our society, in a highly technological world, and be prepared for the careers of their choice.


In order to produce results in problem solving and mathematical situations, students need to be able to relate the language of mathematics to the language of reality. The skills of communication - reading, writing, listening, discussing, and representing - provide the avenue for students to integrate this language of mathematics to their world. Writing requires deeper thought in reflecting, analyzing, and synthesizing concepts and ideas. Talking and listening helps students to clarify and also support and evaluate their ideas and those of others. Students need to explain why they arrive at the solution to the problem that they have reached. We want students to give more than just the answers. This communication opens a window to the students mind, illustrating thought processes, depth of understanding, and possible misconceptions. Discussion is encouraged throughout the Family Math Fair to promote this communication. Communication, therefore, does not have its own station.
10. Develop Reasoning Skills.

There are no "Math Gods." It is essential for students to understand that the way things are done in mathematics are done for a reason and that there is logic behind all mathematics. Mathematics is more than memorized facts, rules, and procedures. Developing their own rules and procedures is essential. Working to find patterns and moving between generalizations and specifics is the key to deductive and inductive reasoning. The thought process behind an answer is more valuable than the answer to a problem itself. Again, this proficiency is something that is worked with throughout all of the stations at the Family Math Fair, rather than at just one particular station.

11. Develop Spatial Awareness.

We live in a three-dimensional world. To appreciate and understand surroundings, students must be able to understand space relationships. Research has also shown that there is a high correlation between spatial ability and mathematical achievement. Spatial awareness includes making mental images, making and interpreting drawings and pictures, and visualizing and generalizing about environmental perceptions. Students will use position terms such as inside, outside, above, below, near, far, over, under, etc. They will copy and make shapes by tracing or drawing around manipulatives. They will visualize, draw and compare shapes in various positions. They will predict the result of combining, rotating, and changing shapes. Finally, students will construct three-dimensional shapes and draw them.
12. Measure Using Standard and Nonstandard Units.

Students use measurement in many ways throughout life. Comparisons are made. We measure with various non standard units. We see the need for standardization. Finally, the metric and English systems are introduced. Measurement includes length, mass, weight, area, and volume.

13. Develop the Attributes of Time and Money.

Time and money are part of everyday survival. Students must become aware of the system used in the real world. Although the digitization of clocks has lessened the urgency for telling time, a true understanding of the system of the clock is essential to grasping the meaning behind these digital time pieces. Money changes hands day in and day out. Students should be able to estimate the cost of purchases, the money to be paid, and the change to be received prior to entering a checkout lane in a store.

14. Use Data and Probability to Analyze Situations and Outcomes.

Probability and statistics have become very important in our society. Their instruction should be carried out in the spirit of investigation, experimenting, exploration, and discovery. Students will collect, organize, describe, interpret, and evaluate data. They will formulate and solve problems that involve these skills. Finally, they will explore the concepts of chance.

15. Discover Geometric Shapes

Geometry represents and describes our world. Students will recognize and describe three-dimensional and two-dimensional shapes. They will work with points, segments, lines, and rays. They will identify symmetry and congruency. Finally, they will recognize and describe angles.
XI. Stations and Activities

The Family Math Fair was held with twelve different stations based on the proficiencies for the elementary grades from the ICTM Indiana State Mathematics Proficiency Guide. These stations are listed below:

- Spatial Awareness
- Fractions
- Whole Number Sense
- Probability
- Computation
- Time & Money
- Measurement
- Problem Solving
- Place Value
- Decimals
- Calculators
- Geometry

Each of these stations was led by a volunteer staff member to guide families through various activities. Each station had three activities, each with a printed handout of directions, materials, and activity goals. Each station also contained a "Take Home" activity that included the same handout with goals, materials, and step by step directions, for families to take home and try. Often this was an activity that was unable to be done at the Math Fair due to the logistics, or was a modification of another Math Fair activity that included manipulatives that a family may not have at home, and that used items easily obtained in the home. These activities include multiple steps. Most activities are geared toward all elementary grade levels. Students with different abilities do different steps of the activity. The family chooses the steps most appropriate for the particular student's level. Following are the activities for each of the twelve stations.