2009 Palm Beach County Elementary Mathematics and Science Fair

Coordinators Handbook

Sponsored by the School District of Palm Beach County
Department of K-12 Curriculum, Elementary Group

THE SCHOOL DISTRICT
REACH FOR EXCELLENCE
PALM BEACH COUNTY

THE SCHOOL DISTRICT OF PALM BEACH COUNTY

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2009 Palm Beach County Elementary Mathematics and Science Fair

CALENDAR OF EVENTS

Date		Time
Sept. 11, 2008	School Coordinators Meeting, New Horizons Elementary	4:00 - 6:00 PM
Oct. 14, 2008	School Coordinators Meeting, Pine Jog Elementary	4:00 - 6:00 PM
Oct. 31, 2008	 Intent to Participate entry form deadline (Appendix, p. 38)	3:00 PM
Dec. 19, 2008	 Hands-on Activity Table Request entry form deadline (Appendix, p. 36)	3:00 PM
April 24, 2009	 Project Registration Spreadsheet e-mail deadline	3:00 PM
May 4, 2009	 Coordinating Teachers set up projects and/or activity tables	12:00 - 4:00 PM
May 4, 2009	Judges' Reception	5:00 PM
May 4, 2009	Project Judging (FAIR CLOSED TO THE PUBLIC)	6:00 - 8:00 PM
May 5, 2009	 *School Field Trips* - students view projects and do hands-on activities (forms e-mailed to participating schools)	9:00 AM - 1:00 PM
	Project Displays open to the public	9:00 AM - 7:00 PM
May 6, 2009	 *School Field Trips* - students view projects and do hands-on activities (forms e-mailed to participating schools)	9:00 AM - 1:00 PM
	Project Displays open to the public	9:00 AM - 7:00 PM
May 7, 2009	 *School Field Trips* - students view projects and do hands-on activities (forms e-mailed to participating schools)	9:00 AM – 12:00 Noon
	Project Displays open to the public	9:00 AM – 12:00 Noon
	 Removal of projects and activity table displays Coordinating Teachers pick-up student projects	12:00 Noon - 4:00 PM

 School Coordinators responsibility  Field trip dates and times  E-mail communications

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INTRODUCTION

Fairs, exhibitions, and competitions are familiar features in American life. Most of us find great satisfaction in presenting our efforts to others. Project activities are successful in great part due to the participation of spectators - even for those spectators with little or no experience with the focus of the exhibition. Such competitions are pleasant and educational for everyone involved. The presenter learns a great deal in preparing the exhibit, and the viewer learns something new from seeing it.

Mathematics and science are integrated subjects in the real world. However, it is important to understand how math and science fair projects are different. Mathematics fair projects are distinct from science fair projects in that the learner's attention becomes focused on the "*relationships to mathematics*" in the project. When students become engaged mathematical problem solvers, they become confident in their ability to do mathematics. The process of developing a mathematics project provides an opportunity for learners to reason and communicate mathematically. Science fair projects focus on the scientific method, developing a hypothesis, forming an inquiry plan, experimenting, collecting and recording data, and drawing conclusions. Both types of projects include the integration of math and science, student understanding, problem solving ability and communication skills.

This handbook is designed to assist teachers, students and parents in preparing for their school and district mathematics and science fair competitions. From the initial planning of projects, through the development learning phases, to entering the school and district fairs, teachers, students and parents can work together to celebrate mathematics and science.

DEVELOPING A PROJECT

Mathematics
A mathematics project consists of all the effort expended in solving a problem, exploring an idea, or applying a mathematical principle - the initial planning, the study and the exhibit. It should develop a mathematical concept, demonstrate the application of a mathematical idea or principle, or show the relation of a mathematical idea or principle to another branch of mathematics or other academic area. The project itself is used to speak mathematically to the viewer and briefly share the student's idea of the mathematical concept or principle, or is used to answer a question posed by the student.

Science
The primary purpose of science fair projects is to involve students in critical thinking and investigative processes. Science fair projects give students the opportunity to investigate and study a subject of individual interest. The intent of the project is to support or reject a hypothesis by repeating an experiment or investigation at least three times for validity.

In completing a Mathematics or Science Fair project, students will use the scientific method. The scientific method consists of the following steps:

- identify the problem and state it carefully;
- collect as much information as possible about the problem (research);
- develop and state a hypothesis;
- test the hypothesis by experimentation or investigation;
- collect and organize data; and
- write a conclusion reflecting the results that supports or rejects the hypothesis

The project is the whole process, whereas the exhibit is the tangible display that shares and explains the project to others. Within this booklet the word *project* appears again and again - and each time it appears it is used to collectively describe all investigation endeavors that may ultimately be exhibited for others to learn from and enjoy. As the project's author, the student selects the mathematical and scientific language for the exhibit: drawings, graphs, models, pictures, or words. Project may be exhibited as an investigation, experiment, or inquiry model. It may be a repetition of a benchmark concept or an entirely original work.

As a Reminder
Before a student is required to do a mathematics or science fair project, he/she should have lots of opportunities to use the inquiry and computation process skills necessary to do such a project. Students need extensive practice in utilizing the basic process skills of observation and inference before they select a project topic. Simple class and group projects should be conducted at all grade levels before a student is assigned a group or individual project.

CHOOSING A PROJECT

The best projects grow out of students' interests and should, therefore, be chosen by the students themselves. The projects selected should express the students' broadest knowledge and highest skills. Above all, projects should be enjoyable to do! Teachers can stimulate the students' interest through suggestions, student-teacher conferences, workshops and demonstrations, and by making lists of previous projects available to students and families.

Topic selection is undoubtedly the most difficult part of a mathematics or science fair project. To eliminate this problem, utilize the natural curiosity of students by encouraging them to ask questions. Set the stage by taking your class outside or gather the students around an aquarium, terrarium, or bulletin board. Talk about things they might have wondered about.

Mathematics	**Science**
Why are some numbers square?	How does light affect crickets?
What are even and odd numbers?	How does color affect taste?
Are all rectangles the same?	How do freezing temperatures affect rocks?
How wide is a first grader's smile?	How does air pollution affect precipitation?

Most students respond quickly to this approach and begin contributing questions of their own. Introduce the concept of testable questions to which they can find answers by experimentation, versus questions that cannot be tested. Select some questions and ask the students how they could find the answers. If time permits, groups of students could conduct simple investigations. Once the students have learned to ask questions, they have conquered their biggest obstacle, "What can I do for a Mathematics or Science Fair project?"

Please refer to Appendix pages 23-25 for a list of ideas. These ideas may be used as a springboard to other topics. The Internet has many websites that suggest topics for Mathematic and Science Fair projects. In addition, posing questions during science and math lessons may help generate thought-provoking ideas. Inspire students to think about and question the world around them.

CHOOSING A PROJECT (Continued)

To promote questions and provide ideas for areas of interest, try the following techniques:

⇨**Take a new look around you.** Involve the students in a brainstorming session. List suggestions of familiar places, people, and things that might inspire a project like

- hobbies or free-time activities
- look in the refrigerator, under the sink, in the garage, etc.
- look in the backyard, schoolyard, neighborhood, park, or vacant lot
- look at pets, wildlife, insects, plants, etc.
- look around while going places on your bike, in the bus or car
- look through magazines, advertisements, newspapers, books

⇨**Check the idea bank.** Allow students to contribute to a resource center.

- bulletin board - combine words and picture collages of subjects to spark ideas
- collect and post "I wonder ..." questions
- product testing - empty boxes, advertisements
- show a thought-provoking video, DVD, or laserdisc

⇨**Help! I still can't decide.** Some children will still need additional suggestions. Utilize the following:

- books of experiments
- lists of specific projects
- teacher-student conferences
- Internet websites

As soon as a specific idea or problem has been chosen, it should be thought through carefully. The successive steps should be enumerated, and a timeline for completion should be developed. The timeline should be feasible and one that establishes a comfortable working pace for project and exhibit completion. By identifying possible problems or pitfalls during the planning stage, the timeline can be adjusted to accommodate extra time if needed.

During this time, the student may wish to discuss plans with other people. Discussing an idea with someone else often gives a new and clearer perspective. The expertise of family members, community and business representatives, teachers, professional mathematicians, and other students can enhance the student's understanding and help to fine-tune the project. The comments, constructive criticism, and suggestions of others enhance the student's depth of understanding and can assist the student with self-assessment during all stages of project development.

SUPPORT AND GUIDANCE

THE MATHEMATICS AND SCIENCE TEACHERS

One of the most important rolls of the math and science teacher is to model enthusiasm for project development and inspire their students to create testable math or science questions. The teacher should provide guidance, support and always be ready to reassure a student if the development process hits a snag.

Planning ahead is made easier with the following preparations:

- Make a wide selection of math and science project ideas and suggestions available to the student

- Provide all the information students will need to select and complete a project including:
    - materials that are available at school
    - assistance that the teacher will provide
    - criteria and standards for projects
    - timelines and rules

- Develop a timeline of due dates for components of the project. Give the list of dates to students, and send an additional copy home to family members. Due dates should be established for each of the following:
    - topic/title
    - purpose
    - hypothesis
    - student's progress report of investigation and observations
    - sketch of project display

- Plan for conferences/meetings with each student to help the student choose a project and to review the criteria for the project and the exhibit - before the work actually begins.

- Make certain that the project selected is interesting to the student and is within the student's developmental range and skills.

- Be ready to offer interesting and viable alternatives if a student selects a project that may be worthy of a Nobel Prize, BUT is very likely to cause many problems - and possibly end with a feeling of failure for the student. Don't move too quickly, however. Remember that all Nobel Prize winners were once young students!

- During the development process and, certainly, prior to "show time," the teacher and students should work together to check for correct use of mathematics and science principles and terms and accuracy in content, organization, grammar, and spelling.

- Although most errors will probably be identified and corrected during the development process, that final check is always necessary. If a word is misspelled, the spectators will always see it, and a dynamite project will lose some of its well-deserved attention.

FAMILY ASSISTANCE

Studies of winners in Mathematics and Science Fairs have shown that a child's interest in mathematics and science is strongly influenced by their family members - parents, guardians, brothers and sisters, aunts and uncles, and grandparents. If the family atmosphere includes enjoyment of learning and stimulating conversation, the child will likely develop such important habits and traits as independence, intellectual curiosity, perseverance, responsibility, and creativity.

Although a mathematics or science project is the student's responsibility, the family can be of assistance by showing genuine support. Generous portions of interest and encouragement should be served on a regular basis. Constructive criticism can be valuable and is more easily accepted by the child when the family has established its support for the project from the beginning.

With so many families struggling for time together due to busy schedules and multiple jobs, they often find it difficult to know "how" to support a child's homework responsibilities - let alone a mathematics or science project! Family members need to know what kinds of things they can do to support the child's efforts. Teachers and school centers can help families participate in the process by providing information and guidelines. The following considerations will be used to develop communication and establish a link between the child's family support team and the school center support team.

- The family will be informed that their child is participating in a Mathematics or Science Fair and will be working on a project or display at home and school.

- The child will explain the project - either verbally or by writing an explanation that is created at school. If your child can't explain it, then the wrong project has been selected.

- A list of the materials needed for the project can be made at home with the family or can be made at school with the teacher and reviewed at home with family members.

- If there are materials that cannot be provided by the family, the teacher needs to be made aware so that adjustments can be made. Ideally, family members should provide:

    - the necessary supplies/materials
    - an adequate place to work
    - the proper tools and appropriate supervision when tools are used
    - assistance in transporting the exhibit to and from school
    - encouragement, constructive criticism, or "shoulders to cry on" if necessary

The teacher is the best resource for determining how to inform and assist each student's family in supporting this worthwhile endeavor. Too often we miss opportunities for encouraging communication in the home because there is no communication between the school and the home. Most importantly, each student needs to believe that their participation is possible.

HELPFUL HINTS FOR STUDENTS

1. A Mathematics and Science Fair is a competition! Your project should show your learning and how you think mathematically and scientifically. It will be judged along with other projects at your grade level.
2. You will learn how and why something occurs. You will present your understanding.
3. Pick a topic that interests you - a topic that you want to learn more about.
4. Your project should solve a problem, show an experiment or investigation, and compare and contrast ideas.
5. Review the judging criteria to make sure your project is complete.
6. Gather materials and supplies from your home or school before you purchase anything.
7. Plan your time so you do not get caught at the last minute.
8. Keep a log or journal and record data as you complete each part of the project.
9. Once the investigation is complete, begin creating the parts of your display board.
10. Check spelling and grammar before gluing pieces on your display board.
11. Layout all pieces to make sure you have the correct spacing before gluing them on your display board.
12. Make sure you take your time to ensure your display board is neat and attractive.
13. Follow the rules and regulations to avoid disqualification from the competition.

RULES AND REGULATIONS
FOR MATHEMATICS AND SCIENCE PROJECTS

1. All projects must have a purpose and hypothesis that is tested by experimentation. Project board displays should have all the labels and description listed below.

   a. **Purpose**
   What are you doing? Why are you doing it?

   b. **Hypothesis**
   What is your prediction? What is your testable statement?

   c. **Materials**
   What tools and materials do you need to conduct your investigation? Write a list of what you use.

   d. **Procedure**
   How are you going to do your experiment? Write the steps you are going to following? Remember to REPEAT EACH TEST 3 TIMES and use averages when possible.

   e. **Observations and/or Data**
   Write descriptions of any qualities or quantities you observe before, during and after experimenting. Use a table or log to record (write) your observations.

   f. **Graphs**
   What graphics can be use to compare and contrast (*analyze or synthesize*) the observations and data collected in your experiment.

   g. **Relation to Mathematics – MUST BE EXPLAINED ON ALL MATH PROJECT BOARDS.** Write a statement explaining how/why mathematics, numbers, measurements, calculations and graphs are important in your investigation.

   h. **Conclusions**
   Write a statement about the results of your investigation, observations, and data analysis. Explain how or why your hypothesis was either supported or denied by the observations you collected during your experiment.

2. School and district-level officials reserve the right to prohibit the public display of any projects that are “unsafe" or "inappropriate for elementary audiences.”

3. Each project will be examined by the school’s Mathematics and Science Fair Coordinator and/or committee and approved for display before both the school and district fairs.

4. Any student enrolled in a public or private school or Parents Educating Children program may enter projects prepared by students during the current school year.

5. Students in grades K-3 may enter a class project as well as individual student projects.

RULES AND REGULATIONS (*Continued*)
FOR MATHEMATICS AND SCIENCE PROJECTS

6. Students in grades 4-5 can only submit individual student projects.

7. Grades 4-5 projects should reflect the student's own work. Professional or technically trained adults, including teachers and parents, may only advise and supervise.

8. Teacher and school name labels may only be placed on the back of the project board. No student and/or school name may be on the front of the project board.

9. Photographs of the experiment or tools used in the investigation are permitted on the display board but **no photographs that show student faces** are permitted and will be removed at the District Fair.

10. Project display boards can not be larger 36" H x 48" W.

11. Projects must be self-supporting (able to stand by themselves) and durably constructed. Use of other floor or wall space for signs, posters, charts, etc., is prohibited and will result in disqualification.

12. All projects must be mounted to a standard size (36" H x 48" W) cardboard display board. No ancillary objects (other than paper and/or pictures) should be glued, mounted or displayed on the project board. No objects are permitted to be displayed in front of the display board.

13. A student may enter one project per subject (math and science).

14. Project display boards written in any languages other than English will be accepted provided that all district rules and regulations are followed and a translation sheet in English is attached to the project board for judging. (See appendix, p. 35)

RULES ON SECURITY AND SAFETY
FOR MATHEMATICS AND SCIENCE PROJECTS

The school's coordinating teacher(s) should inspect all projects before registering them into the district fair. PROJECT BOARDS SHOULD NOT INCLUDE ANY ITEMS WHICH MIGHT BE EASILY REMOVED OR BECOME DANGEROUS TO THE PUBLIC.

1. NO LIVE ANIMALS, PRESERVED ANIMALS OR PARTS MAY BE DISPLAYED. Projects involving the use of animals may display appropriate drawings, pictures, charts, or graphs. NO HUMAN PARTS MAY BE DISPLAYED. Projects involving the use of humans may display appropriate drawings, pictures, charts, or graphs but **no photographs that show student faces.**

2. Photographs or other visual presentations of surgical techniques, dissections, autopsies and/or other laboratory techniques, depicting animals (including humans) in other than normal conditions may not be displayed on a project board.

3. THE FOLLOWING ITEMS ARE **NOT PERMITTED** ON DISPLAY BOARDS:

    - ANY MATERIAL NOT APPROPRIATE FOR GENERAL PUBLIC VIEWING
    - any organisms (living or dead)
    - preserved specimens, parts, or taxidermy
    - dirt, soil, minerals or compost samples
    - chemicals or liquids (including water)
    - any type of food**,** human or animal (including candy or treats)
    - any sharp items of any kind
    - medicines, poisons, drugs
    - dry ice or other sublimated solids
    - flammable materials, flames, or heating objects
    - batteries of any kind
    - school awards, ribbons, or medals from other fairs
    - real money coins or currency
    - photographs of students

5. THE SCHOOL DISTRICT MATHEMATICS AND SCIENCE FAIR COMMITTEE RESERVES THE RIGHT TO REMOVE ANY PROJECT CONSIDERED BEING UNSAFE OR INAPPROPRIATE FROM JUDGING AND/OR DISPLAYING.

HOW TO SET UP A SCHOOL MATHEMATICS/SCIENCE FAIR

Determine the date and location of the school fair. Schools may hold their fair in the cafeteria, media center or hallways or rotate form classroom to class room. The school fair may be held any time during the school year prior to **April 24, 2009**. Winning projects should be stored at the school until delivered to the District fair **May 4, 2009**.

All school fairs should conclude by **April 24, 2009** if winning projects are to be entered in the district fair. Schools may opt to have separate Mathematics and Science Fairs or they may choose to combine both into one fair.

Enlist volunteers to serve as judges. **Projects should be judged by grade level.** Try to have at least two to three judges per grade level. Judges may judge more than one grade level. **REFRAIN FROM USING SCHOOL PARENTS AS JUDGES.**

Enlist the following people to serve as judges:

- teachers from middle and high schools; college professors
- high school and college science students
- local professionals
- retired principals and teachers
- representatives from the community with interest in mathematics and science (*e.g.*, Pine Jog Environmental Education Center, Gumbo Limbo Nature Center, the Science Museum, the Palm Beach Zoo at Dreher Park, Solid Waste Authority, Palm Beach Soil and Water Conservation District, South Florida Water Management District, banks, medical offices, etc.)

Order school ribbons and certificates - it is suggested that each student who participates be given a certificate of participation. Consider awarding first and second place at each grade level as well as honorable mentions for deserving projects.

Conduct a Mathematics and Science Fair information session during a PTO/PTA meeting in the fall.

It is highly recommended that the District judging criteria and judging forms be used at the school level. (Appendix, pp. 27-29)

Establish a time frame for setting up and taking down projects.

Establish coverage for teachers monitoring the activities during the day of the fair.

Set up a schedule so that all classes may visit the fair after the judging is completed.

Schedule an Open House or a Mathematics and Science Fair Night to enable parents to view projects.

SCHOOL OFFICIALS RESERVE THE RIGHT TO PROHIBIT PUBLIC DISPLAY OF THOSE PROJECTS WHICH ARE OF A "SENSITIVE NATURE" OR WHOSE MATERIALS ARE "UNSUITABLE FOR IMMATURE AUDIENCES" OR "INAPPROPRIATE FOR THE

LEVEL OF MATURITY OF CERTAIN AUDIENCES".

SCHOOL AND DISTRICT FAIR PROCEDURES

A school fair or some competition must occur at each participating school before the District fair. Each school may enter the following number of projects form their school competition into the District's fair.

Type of Project	Category	Grades	Number of Entries Per Grade
CLASS School first place winners	ESE	K-3	1 math and 1 science project
	ELL		
	REGULAR		
	GIFTED		
INDIVIDUAL School first & second place winners	ESE	K-5	2 math and 2 science projects
	ELL		
	REGULAR		
	GIFTED		

✓ Ties at the school fair should be settled by the School Science Fair Coordinator.

✓ Two "Special Award" categories will be offered at the District fair this year

1. An ***Aviation Award*** – individual, math or science projects entries from grades 3-5 with a flight or flight safety theme.
2. A ***Green Award*** - Individual math or science projects entries from grades 3-5 with a *reduce, reuse, recycle* theme.

✓ Schools should follow all district guidelines, rules, regulations, and judging criteria to guarantee a smooth transition of projects entries from the school to the District fair.

IT IS THE SCHOOL DISTRICT COORDINATOR'S RESPONSIBILITY TO <u>DISQUALIFY</u> AND/OR REMOVED ANY PROJECTS CONSIDERED TO BE UNSAFE OR CONTAINING ANY UNACCEPTABLE DISPLAY ITEMS. REFER TO PAGES 12 and 13 OF THIS HANDBOOK.

GUIDELINES FOR ENTERING THE DISTRICT ELEMENTARY MATHEMATICS AND SCIENCE FAIR

The ***Intent to Participate*** form (Appendix, p. 37) must be submitted by **October 31, 2008**.

Upon receipt of your Intent to Participate form you will be emailed Student/Parent Packages, Field Trip forms and information and a Project Registration Spreadsheet to enter your school projects into the District Fair.

Schools wishing to sponsor a hands-on activity table(s) must submit the ***Hands-on Activity Table Registration*** form (Appendix, p.36) by **December 19, 2008**.

All projects entered in the District Elementary Mathematics and Science Fair must first be judged in a school competition held no later than **Thursday, April 23, 2009**.

Each project entered in the District fair will receive a "Certificate of Participation". Projects will be judged and first and second place ribbons awarded in every grade level category. Honorable mention ribbons will also be awarded by the District Fair Committee.

School projects must be entered in the District Fair by the School's Coordinator. Each participating school must email a ***Project Registration Spreadsheet*** before 3:00 P.M. **Friday, April 24, 2009**. **THIS DEADLINE IS FINAL!** A sample of the *Project Registration Spreadsheet is* in the Appendix, p. 30. (The school fair coordinator will be e-mailed the spreadsheet after they submit their *Intent to Participate* form.)

The school coordinator is responsible for labeling and setting up their projects at the fairgrounds. Set-up will begin at 12:00 noon and must be completed by 4:00 P.M. on **Monday, May 4, 2009**.

School coordinators must complete an *English Translation Form* (Appendix, p. 35) for projects written in any language other than English. Translation Forms must be clipped to the project board on **Monday, May 4, 2009, by 4:00 P.M.** or they can not be judged.

The coordinator should furnish any tools or materials necessary to set-up their projects.

All projects will on displayed to the public Monday through Wednesday, May 4-6, 2009, from 9 A.M. to 7 P.M. and on Thursday, May 7, 2009, from 9 A.M. to 12 Noon.

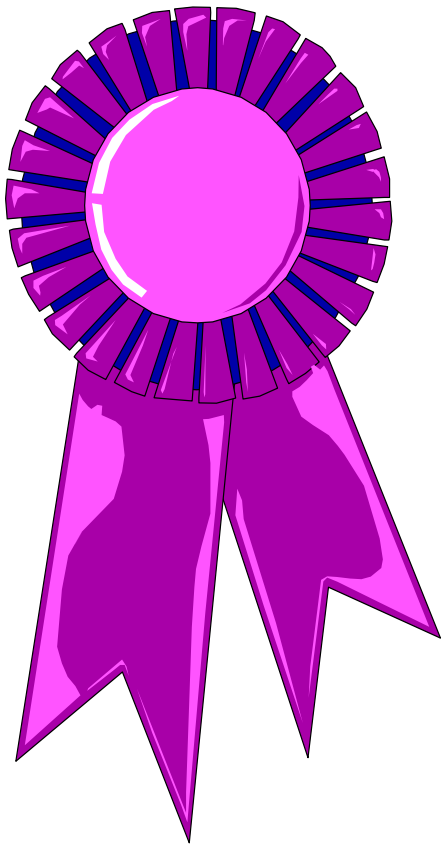
ALL PROJECTS MUST BE REMOVED FORM THE FAIRGROUNDS BY THE SCHOOL COORDINATORS BETWEEN THE HOURS OF 12:00 AND 4:00 P.M. on THURSDAY, MAY 7, 2009.

THE DISTRICT MATHEMATICS AND SCIENCE FAIR COMMITTEE RESERVES THE RIGHT TO DISQUALIFY AND REMOVE ANY PROJECT CONSIDERED UNSAFE OR UNACCEPTABLE FOR DISPLAY. SEE PAGE 13-14 OF THIS HANDBOOK FOR GUIDELINES

JUDGING INFORMATION

The men and women who take time from their busy schedules to judge projects do so because they value our young students and are interested in mathematics and science. Judges are encouraged to tentatively evaluate each project independently without the exhibitors or the public being present. Each judge is provided with criteria (Appendix, p. 27) by which to evaluate and determine scores for each project. The individual ratings may be discussed and re-evaluated if the judges determine that additional considerations are indicated.

At the completion of their duties, judges leave the fair amazed, still discussing and sharing the excitement generated by the students' projects.



JUDGING CRITERIA TO CONSIDER

The reasons for selecting a particular project should come from interest and curiosity. However, determining the format for exhibiting the project is not always an easy task because the interdependence of topic, required materials, and ease of explanation influences the ultimate display. Rather than discourage a project because a finished exhibit can't be visualized immediately, the teacher should encourage adequate time for brainstorming ideas for the display. By considering various options, the student has additional opportunities to develop skills in communicating.

During the brainstorming process, the criteria and standards used by the judges during a competition should be provided as guidelines for the student. The District fair judging criteria are listed below as a reminder that they are the focus of the competition.

Mathematics or Science Investigation (40 points)

Is the purpose and hypothesis stated on the display board?
Is the procedure that was used in developing and obtaining the solution explained?
Is the method of data acquisition or analysis explained?
Does the data support the conclusion?
Does the project include all these parts - **purpose**, **hypotheses**, **procedure**, **list of materials**, **observations/data**, **relation to math**-(Math projects only) and a **conclusion**?

Creative Ability (20 points)

Did the student design and construct the equipment or was it purchased?
Does the project display originality or is it one that has been performed many times?
Does the project rely on the research of others?
Is the data originally presented?
How creative is the display?

Thoroughness (15 points)

Was the experiment or investigation repeated at least three (3) times?
Does the display physically demonstrate the operation or results of the project?
Have variables affecting outcomes been considered?
Are the materials listed by amount?
How complete are any samples?

Skill (15 points)

Is the skill commensurate with age and grade level?
How attractive is the exhibit compared to others?
Does the project catch the eye?

Clarity/Neatness (10 points)

Is the written material clearly presented and data easy to understand?
Is the display well organized?
Is the material readable and logically arranged?
Is the spelling and grammar correct?

HANDS-ON ACTIVITY TABLES

Each school center is encouraged to set up a hands-on activity table or tables that will showcase their school and demonstrate the fun and excitement of mathematics and/or science. The hands-on activities should allow students and guests at the fair to engage in the dynamics of mathematics and science and expand their knowledge.

The "sky's the limit" for activities that could be used. The following list provides just a few examples of classroom activities that can be set up for active participation of students and guests at the fair:

Are You a Square? (AIMS)	Measurement Activities
Fishing for Facts	Microscope Activities
Golfing for Facts	Density Is Delightful
Algeblocks	Static Electricity
Pentominoes	Paper Airplane Throw
Tangrams	Fun with Magnets
Comparative Shopping	Newton's Laws of Motion
"Math Toss" Games	Buoyancy Is Baffling
Multiplication Bingo	Science Bingo
Mini-Metric Olympics (AIMS)	Mathematics/Science Card Activities

Requirements for setting up a hands-on activity table:

- All activity tables must be staffed during the school field-trip hours of the District Mathematics and Science Fair, 9 A.M. - 1 P.M. Teachers and students are encouraged to enlist assistance from school staff, volunteers, and parents.

- Each School Coordinator is responsible for supplying all necessary materials (such as extension cords, tablecloths, tape, pencils, etc.) needed for their tables.

PARTICIPATING IN SCHOOL FIELD TRIPS

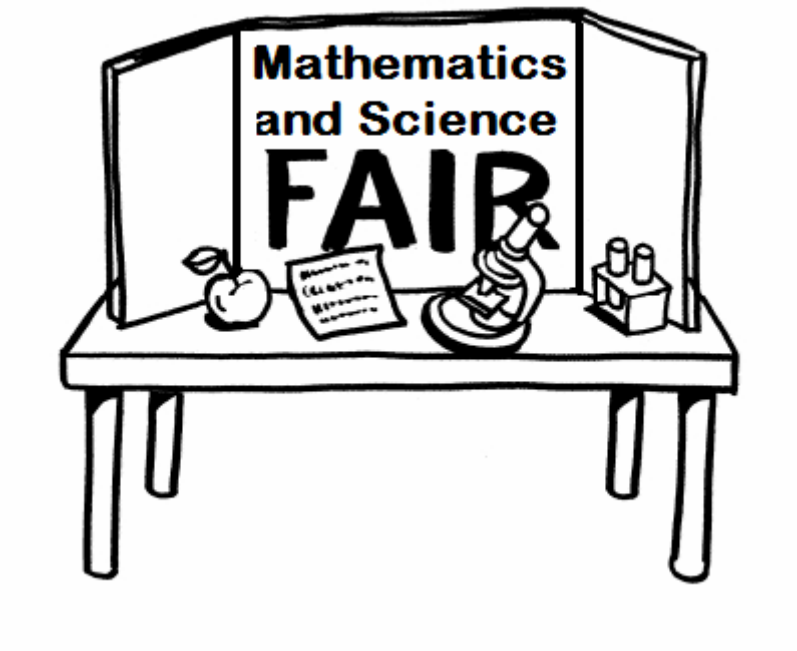
Only schools that enter projects and/or set up activity tables at the District Mathematics and Science Fair are eligible to bring students to the South Florida Fairgrounds during the exhibit field trip hours.

School Coordinators that indicate they are planning on reserving a field trip date for their school, on the *Intent to Participate* form, will receive e-mails with directions and the necessary forms to make their reservations.

Any questions or concerns regarding field trips to the fairgrounds should be emailed to Thomas Medcalf medcalft@palmbeach.k12.fl.us.

Teachers should prepare students for the field trip by identifying "learning tasks" to be accomplished while at the Mathematics/Science Fair. Those students who arrive at the Fair prepared with a list of questions to answers, or with a "scavenger's list" of things to find, will have a great opportunity to benefit from all the mathematics and science around them. When students are unprepared, they wander around and look, but often do not understand, enjoy or learn anything from what they see. With preparation, teachers can make this field trip an exciting experience that provides mathematics and science learning for all students!

Appendix

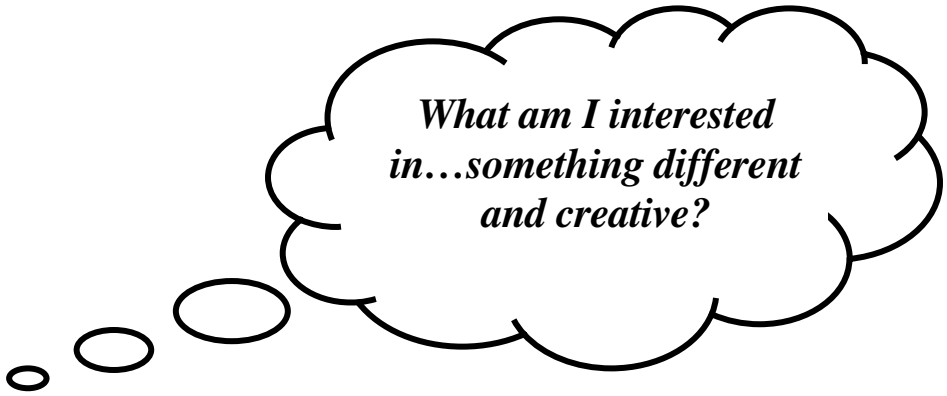


TOPICS FOR MATHEMATICS FAIR PROJECTS

Projects for Mathematics Fair need to focus on the role of mathematics — its role in the investigative process, in the comparison of information, in the consideration of options, in the solution of a problem. When selecting a mathematics project, foremost consideration should be given to how mathematics is used in developing the project.

A FEW IDEAS to trigger the imagination...

Symbols Past and Present
Magic Squares
Comparison Shopping
Napier Rods
Number Cubes (probability)
Probability and Predictions
Triangular and Square Numbers
Temperature
Printing Shapes
Scale Drawings
Famous Mathematicians
Roman Numerals
Peasant Multiplication
Combinations of Sets
Collecting Data
Computer Languages
Mathematical Analogies & Patterns
Music Notation & Fractions
Tangrams
Stock Market
Time Zones
Investigate "Big" Numbers
Catalan Numbers
Triangular Numbers
Fibonacci Numbers
Fractions in Advertising
Bank Services
Unit Pricing
Scientific Numbers
Measuring the Planets
Providing the Area of a Circle
Angles of a Triangle
Perfect Squares & Square Root
Graphs
Calculator Activities
Least Number of Coins
Money around the World
Binary Numbers
Divisibility
Weather Reports & the Almanac
Ordered Pairs in Art
Venn Diagrams
Symmetry in Nature
History of the Calendar
Optical Illusions
Abacus
How Computer Barcodes Work
Infinity
The Golden Mean



ELEMENTARY SCIENCE FAIR PROJECT IDEAS

PLANT PROJECTS
How does the duration of light affect plant growth?
How does the color of light affect the growth of plants?
What are the effects of temperature the germination of bean seeds?
What is the effect of spacing on the growth of radish seeds?
How does magnetism affect the height of bean seeds?
To what extent does pH affect the germination of rye grass?
What is the effect of different soil mixtures on plant growth?
What is the effect of planting depth on the germination of seeds?
To what extent do various concentrations of salt water affect plant growth?
How does acid rain affect leaf development?
What is the effect of detergents on the germination of bean seeds?
What is the effect of gravity on the roots of a plant?
What is the effect of temperature on the ripening of a banana?

ANIMAL PROJECTS
How does temperature affect the activity of meal worms?
To what extent does the amount of food affect the population size of mealworms?
How does different colored light affect the behavior of earthworms?
How does the intensity of light affect crickets?
What is the effect of background color on the color of a chameleon?
What is the effect of temperature on the behavior of goldfish?
How do different levels of salinity affect brine shrimp?
What is the effect of different pH on snails?
How do vibrations affect the behavior of ants?
What is the effect of height above ground on the attraction of birds to a feeder?

HUMAN BODY PROJECTS
Who generally have bigger hands (feet), boys or girls?
Who are generally taller, boys or girls?
Who generally have larger lung capacity, boys or girls?
How does vision effect the sensation of taste?
What is the effect of age on reaction time?
To what extent does age effect the sensation of hearing?
To what extent does age effect the sensation of smell?
What is the effect of exercise on pulse rate (or blood pressure)?
What is the effect of walking/skipping/running on respiration rate?
What is the effect of left/right handedness on reaction time?
To what extent does the amount of light affect the acuity of vision?
How does color affect the perceived taste sensations of noncarbonated beverages?
Does listening to different types of music affect how well you can perform mental tasks?
Does watching T.V. affect how well you can perform mental tasks?

EARTH & SPACE SCIENCE PROJCTS
Does the sun rise at the same time and in the same location in the sky?
Are the amount of hours of daylight and night the same year round?
Does the moon rise at the same time and in the same location in the sky?
What is the effect of freezing temperatures on rocks?
To what extent do different types of soils retain water?
What is the effect of rain on soil covered with different types of foliage?
What s the effect of wind on different mixtures of soil?
What is the effect of temperature on crystal growth?
What is the effect of temperature on the evaporation of water?
What is the effect of air pollution on precipitation?
What is the effect of the length of a wing on the length of flight of a paper airplane?
To what extent does sunlight affect the temperature of soil?

ELEMENTARY SCIENCE FAIR PROJECT IDEAS (Continued)

EARTH & SPACE SCIENCE PROJCTS (Continued)
To what extent does sunlight affect the temperature of water?
To what extent does humidity affect evaporation?
How does the pH of rain affect limestone?
What is the effect of time of day on shadows?
To what extent does the season affect shadow length?
To what extent does season affect shadow direction?
How does the angle of the sunlight affect the temperature of soil or water?
How do different surfaces absorb the sun's energy?

PHYSICAL SCIENCE PROJECTS
What is the effect differently shaped prisms on the production of a color spectrum?
What is the effect lenses shape has on the refraction of light?
How do color light filters affect perception of color of objects?
How does length, tension, or mass of a guitar string affect the pitch of sound?
How do different solids affect the transmission of sound?
How does the length of a vibrating body affect the sound?
To what extent do different solids (wood, plastic, metal) conduct heat?
What is the effect of temperature on the volume of air?
What is the effect of heat on different liquids?
To what extent do different insulating materials affect heat loss/gain of water?
How does the color of an object affect its reflection and absorption of solar energy?
What is the effect of household liquids and powders on red cabbage juice?
How is the strength of a magnet affected by different materials (glass, cardboard, paper)?
What is the best shape for a kite to lift off quicker?
How is the distance a skateboard rolls affected by the amount of mass on the skateboard?
How does wattage affect the radiation of heat from a light bulb?
How do different fabrics affect heat loss from an object?
To what extent does temperature affect the height that a ball will bounce?
How do the number of batteries and the way they are connected affect the brightness of a bulb?
How do the number of batteries and the way they are connected affect the strength of an electromagnet?
How does the number of wraps of wire around an electromagnet affect its strength?
What is the effect of the size of the iron core on the strength of an electromagnet?
What is the effect of density of an object on the buoyancy of an object?

ENVIRONMENTAL (GREEN) SCIENCE PROJECTS
What is the effect of recycling on the amount of wastes that goes to the landfill?
What materials that are thrown away at home could be reused at school for learning projects?
How do oil spills affect feathered animals, furry animals, fish, sand and shells?
Which plant and food wastes breakdown and can be composted easily into new garden soil?
Which native plants will attract hummingbirds, butterflies, or more birds into an environment?
Which native plants require less irrigation water and provide year round color to a landscape?
What natural remedies are effective at controlling harmful insect that attack garden plants?
What native plants can be introduced into irrigation ponds to promote aquatic habitats?
What steps can be taken at home or school do to reduce the trash sent to the landfill?
What steps can be taken to reduce energy consumption in your home or school over time?
What steps can be taken to reduce potable water use at home or school?

(SAMPLE LETTER FOR PARENTS)

Dear Parent/Guardian:

Your child will soon have the opportunity to compete in our School Mathematics and Science Fair. I will assist them by providing suggestions of project ideas and showing them the project procedures. I encourage you to lend your support to this process.

Completing a project can be a memorable experience for your child. The Mathematics and Science Fair is an adventure in learning, and the development of a project is an excellent activity for expanding your child's understanding of math and science applications.

Your child should select a project appropriate for their age and grade level. You can assist by providing encouragement, praise, necessary materials, and the appropriate guidance. Your child may ask you to take them to the public library to research project activities. Please limit your own involvement in the experimental process by encouraging your child to predict, experiment, and draw conclusions on their own. Emphasize the mathematical or scientific thinking and process skills they should use.

Their final project display board should measure 36" (high) x 48" (wide), must be self-supporting and should be made of reinforced cardboard. Displays should not exceed these dimensions. Please keep in mind that certain items are not permitted on display boards such as food, candy, medicine, animals, plants, money, and chemicals. A complete list of rules, regulations and safety considerations are included in this packet for you to review.

I look forward to seeing which questions the children will investigate!

Sincerely,

JUDGING CRITERIA

The questions under each of the following components of judging are guidelines for evaluating that component. Other related factors may be considered.

MATHEMATICS OR SCIENCE INVESTIGATION - 40 points

Is the purpose and hypothesis stated on the display board?

Is the procedure that was used in developing and obtaining the solution explained?

Is the method of data acquisition or analysis explained?

Does the data support the conclusion?

Does the project include all these parts - **purpose**, **hypotheses**, **procedure**, **list of materials**, **observations/data**, **relation to math**-(Math projects only) and a **conclusion**?

Creative Ability (20 points)

Did the student design and construct the equipment or was it purchased?

Does the project display originality or is it one that has been performed many times?

Does the project rely on the research of others?

Is the data originally presented?

How creative is the display?

Thoroughness (15 points)

Was the experiment or investigation repeated at least three (3) times?

Does the display physically demonstrate the operation or results of the project?

Have variables affecting outcomes been considered?

Are the materials listed by amount?

How complete are any samples?

Skill (15 points)

Is the skill commensurate with age and grade level?

How attractive is the exhibit compared to others?

Does the project catch the eye?

Clarity/Neatness (10 points)

Is the written material clearly presented and data easy to understand?

Is the display well organized?

Is the material readable and logically arranged?

Is the spelling and grammar correct?

MATHEMATICS PROJECT JUDGING FORM

Grade: ❑ K ❑1 ❑2 ❑3 ❑4 ❑5 **Division:** ❑ Individual ❑Class **Category**: ❑ Regular ❑ Gifted ❑ ESE ❑ ELL		MATHEMATICAL INVESTIGATION	CREATIVE ABILITY	THOROUGHNESS Is the relationship to mathematics explained?	SKILL	CLARITY AND NEATNESS	**TOTAL**
PROJECT #	**PROJECT NAME**	**40 pt**	**20 pt**	**15 pt**	**15 pt**	**10 pt**	**100 pt**

SCIENCE JUDGING FORM

Grade: ❑ K ❑1 ❑2 ❑3 ❑4 ❑5 **Division:** ❑ Individual ❑Class **Category**: ❑ Regular ❑ Gifted ❑ ESE ❑ ELL		SCIENCE INVESTIGATION	CREATIVE ABILITY	THOROUGHNESS Is the hypothesis confirmed or denied?	SKILL	CLARITY AND NEATNESS	**TOTAL**
PROJECT #	**PROJECT NAME**	**40 pt**	**20 pt**	**15 pt**	**15 pt**	**10 pt**	**100 pt**

SAMPLE OF THE DISTRICT PROJECT REGISTRATION SPREADSHEET FORM

2009 PBC District Elementary Math and Science Fair Registration

School Number | School Name | School PX or Phone

Contact Name | Contact E-mail Address

Science or Math	Individual/Class	Grade	Category	Student First Name	Student Last Name	Teacher First Initial	Teacher Last Name	Project Title	Special Judging Aviation = A Green = G
S	C	K	ESE						
S	C	K	ELL						
S	C	K	REG						
S	C	K	GIFT						
S	C	1	ESE						
S	C	1	ELL						
S	C	1	REG						
S	C	1	GIFT						
S	C	2	ESE						
S	C	2	REG						

SAMPLE ONLY

An excel spreadsheet will be emailed to each coordinator after they submit their "Intent to Participate" form.

MATHEMATICS PROJECT BOARD LAYOUT

PURPOSE

Explain why you are doing the investigation in one, two or three sentences.

Example
"The purpose of this project is ..."

TITLE OF PROJECT

Hint: Think of something creative and catchy.

PROCEDURE

Give step-by-step "recipe" directions of everything you did in performing your experiment.

Hint: Conduct the experiment at least three times.

HYPOTHESIS

Prediction of what you think will happen when you perform your investigation.

Example
"I think …"

TABLES AND/OR GRAPHS

Tables and graphs are a visual way to display the data you have collected.

RELATION TO MATHEMATICS

Explain the relation of the investigation to mathematics.

MATERIALS

Provide a list of all the materials you used in your experiment.

SAMPLES

A sample or photographs of your experiment may be attached to your project board. NO PICTURES OF STUDENT FACES ARE ALLOWED

NOTE: See page 14 of this handbook for list of items not permitted on display boards.

CONCLUSION

Review and briefly describe the results of your investigation.

Answer this question:
Did the results agree with the original hypothesis?

SAMPLE MATHEMATICS PROJECT

PURPOSE

The purpose of this project is to identify the most common shape used for street signs.

HYPOTHESIS

I think the square will be the most popular shape used for street signs.

MATERIALS

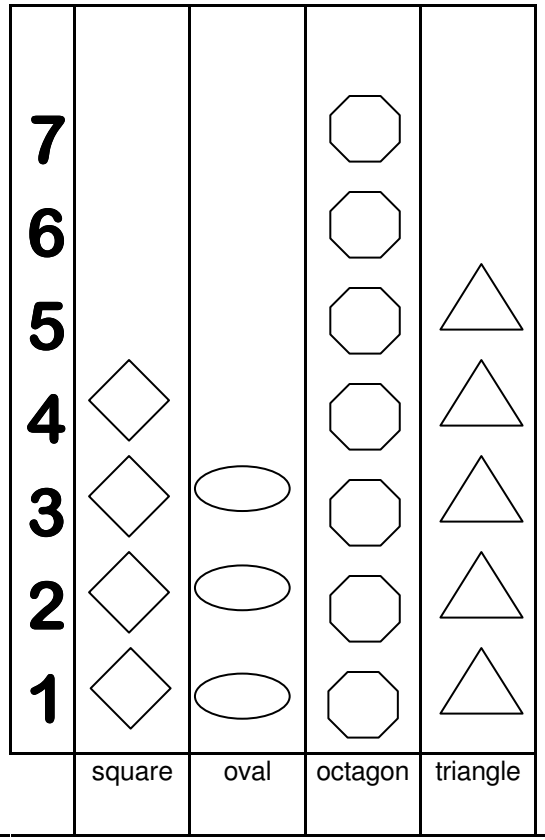
Paper, pencil, markers, ruler, film, camera, glue

PROCEDURE

After identifying what shapes are used to create signs by taking pictures of the shapes, I will have mom drive to school in three different directions. I will tally how many of each shape I see along the way.

Signs on the Road

What is the most common shape of street signs?



RELATION TO MATHEMATICS

I learned how to make a pictograph and understand the importance of each column initiating at the same baseline. Observers will be able to observe which shape is the most popular by finding the tallest column and which shape is the least popular by finding the shortest column.

CONCLUSION

From observing the graph, the hexagon was the most common shape and the circle the least common shape used for making street signs. My hypothesis of the square being the most common shape used for street signs was incorrect.

SCIENCE PROJECT BOARD LAYOUT

PURPOSE

Explain why you are doing the investigation in one, two or three sentences.

Example
"The purpose of this project is ..."

HYPOTHESIS

Prediction of what you think will happen when you test your Hypothesis through an investigation.

Example
“I think …” or “If this …, than that”

MATERIALS

Provide a list of all the materials you used in your experiment. List the quantity (how many) of each material.

PROJECT TITLE

Hint: Think of something creative and catchy.

TABLES AND/OR GRAPHS

Tables and graphs are a visual way to analyze and display the data you have collected.

PICTURES - PHOTOGRAPHS

Clip art or photographs of your experiment may be attached to your project board. NO PICTURES OF STUDENT FACES ARE ALLOWED.

NOTE: See page 14 of this handbook for list of items not permitted on display boards.

PROCEDURE

Give step-by-step "recipe" directions of everything you did to performing your experimental investigation.

Hint: REPEAT THE EXPERIMENT AT LEAST 3 TIMES. AVERAGE ANY NUMERIC DATA.

CONCLUSION

Review and briefly describe the results of your investigation.

HINT: Answer this question:
Did your end results help confirm (accept) or deny (reject) your original hypothesis (prediction)?

PURPOSE

The purpose of this project is to identify which brand of paper towel will hold the most weight.

HYPOTHESIS

I think the Mounty brand towel will hold the most weight.

MATERIALS

Paper towel (3 different brands), rolls of pennies (2-3), rubber bands (3), Styrofoam/plastic cups (3)

Tuff Towel

Which Brand of Paper Towel Holds the Most Weight?

Number of Pennies Each Towel Held

# of PENNIES	Paper Towel BRAND	Lefty	Sharmin	Mounty
8			x	
7			x	
6		x	x	
5		x	x	
4		x	x	x
3		x	x	x
2		x	x	x
1		x	x	x

PROCEDURE

Collect three different brands of paper towels. Separate each into single-ply sheets. Wrap the sheet around the opening of each cup and fully secure it with the rubber band. Begin resting pennies on the sheet until the pennies fall through the paper towel. Repeat for the other brands. Record the number of pennies from each trial.

CONCLUSION

From observing the graph, the Sharmin brand paper towel was able to hold the most pennies. This means that it was able to hold the greatest amount of weight. My hypothesis of the Mounty brand holding the most weight was rejected when compared to the other brands.

School District of Palm Beach County

DISTRICT ELEMENTARY MATHEMATICS AND SCIENCE FAIR

ENGLISH TRANSLATION FORM

Fair coordinators are required to translate the project information into English. Once this form is completed, clip it to the back of the project display board.

Purpose

_____

_____

Hypothesis

_____

_____

Materials

_____

Procedure

_____

_____

_____

_____

Observation Data

_____

_____

Relation to Mathematics (Math Projects only)

_____

_____

Conclusion

_____

_____

School District of Palm Beach County

2009 ELEMENTARY MATHEMATICS and SCIENCE FAIR

SCHOOL-SPONSORED HANDS-ON ACTIVITY TABLE(S) RESERVATION FORM

School: _____

Contact Person: _____

School Phone Number: _____

School FAX Number: _____

Number of Tables Requested: _____ Is Electricity Needed? ❑ Yes ❑ No

Please provide a title and brief description of your activities

_____

_____

_____

_____

_____

All sponsoring school is responsible for supplying all necessary materials such as extension cords, tablecloths, signs, tape, pencils, handouts, etc.

ALL ACTIVITY TABLES MUST BE STAFFED BY THE SPONSORING SCHOOL DURING FIELD TRIP HOURS

Coordinating Teacher's Name _____

Please complete this form and return it by Friday, December 19, 2008.

Pony to: Thomas Medcalf, FHESC, C-216
Email to: medcalft@palmbeach.k12.fl.us
FAX to: Thomas Medcalf, PX 48091, (561) 434-8091

School District of Palm Beach County

DISTRICT ELEMENTARY MATHEMATICS AND SCIENCE FAIR

INTENT TO PARTICIPATE

School: _____

Contact Person: _____

Contact Person's Email address: _____

School Phone Number: _____

School FAX Number: _____

Our school is planning to participate in the District Elementary Mathematics and Science Fair scheduled for May 4-7, 2009, at the South Florida Fairgrounds.

We plan to enter **mathematics projects** for judging. ❑ Yes ❑ No

We plan to enter **science projects** for judging. ❑ Yes ❑ No

We plan to sponsor a **hands-on mathematics activity table**. ❑ Yes ❑ No

We plan to sponsor a **hands-on science activity table**. ❑ Yes ❑ No

We plan to organize **field trips** to the district fair for our students. ❑ Yes ❑ No

We plan to conduct our school's Mathematics Fair on _____.

We plan to conduct our school's Science Fair on _____.

Please complete this form and send it, no later than Friday, October 31, 2008.

TO: THOMAS MEDCALF
K-12 Curriculum, FHESC, C-206
3310 Forest Hill Boulevard, West Palm Beach, FL 33406
PHONE (561) 357-7626, FAX (561) 434-8091