PALM BEACH COUNTY SCHOOL DISTRICT

2017 DISTRICT ELEMENTARY MATHEMATICS AND SCIENCE FAIR

Student - Parent Guide

THE SCHOOL DISTRICT OF PALM BEACH COUNTY
REACH FOR EXCELLENCE

STUDENT - PARENT GUIDE

What is the District Elementary Mathematics and Science Fair?

The School District's Elementary Mathematics and Science Fair is an academic competition, held annually for public, private, charter, and home school organizations. Students must first participate in a School Fair and win first or second place in their grade-level, category to advance to the District Fair competition. The District Fair is the highest level of competition for elementary students in kindergarten through grade five for mathematics and science.

What Type of Projects can Students Enter?

MATH Division projects that investigate a problem, collect and record data, and explain the results mathematically. The focus is on math skills and the data collected to explain the results. Consumer product surveys are good examples of math projects. Consumers are polled about their likes and dislikes. The data gathered is analyzed mathematically by the learner and the results of the survey are explained.

SCIENCE Division projects that do an experiment to test a hypothesis *(prediction).* The focus is on the science skills and the data collected to explain the results. The learner identifies a problem, forms a hypothesis, and writes an experimental procedure to test their hypothesis. Three trials are conducted and data collected and recorded for each trial. The data *(evidence)* is then used to support any conclusions *(claims)* the learner makes about the results of their experiments.

The Design and Engineering Process

NEW this year, students may choose to use *the design and engineering process* instead of the traditional scientific method to display the results of their math or science projects. The focus is on the design and engineering process and data collected to explain the results. The student asks a question, imagines a possible solution, and then draw-up a plan *(to test it).* Lists the materials they need to build it. Creates a way to test the design a minimum of three (3) times, and improves the design after each test. Then communicates the results of their solution. All design and engineering projects **must have** the following **dual labels** explaining all the steps used to solve the problem.

1) **PURPOSE** / ***ASK*** - "What is the problem?"

2) **HYPOTHESIS** / ***IMAGINE*** - "What is a solution?"

3) ***PLANS*** - Drawings of the design, completed with a title, labels, and measurements and units of my final solution. Accurate and precise enough so others could replicate the design.

4) **MATERIALS** - A list of the materials used to build my design.

5) **PROCEDURE** / ***CREATE*** - A step-by step description of how to test my design.

6) **DATA** / ***IMPROVE*** - Each experimental test *(for 3 separate trials),* along with a written record of what is improved and how it worked after each trial until it works perfectly.

7) **CONCLUSIONS** / ***COMMUNICATE*** explaining what was learned in writing. Write about what is observed through the design and engineering process and describe how the design provides a solution.

Engineering projects without these dual labels **will not** be judged. Students may enter design and engineering into either the math or science division in the following categories. Grades K, 1, and 2 may only enter CLASS Projects. Grades 2, 3, 4, and 5 may enter TEAM projects or 3, 4, and 5 INDIVIDUAL projects.

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What are S.T.E.M. themes?

S.T.E.M. theme projects can be math, science, or design and engineering process projects. There are four S.T.E.M. themes students can choose from to do a project.

1. **Aviation** project themes investigating the principals of *flight or flight safety*.
2. **Green** project themes investigating *recycling materials, conserving, or preserving resources*.
3. **Physical Science** projects which feature a *hand-made (not store bought) mechanical or design engineered part or tool* used to test the hypothesis in an experiment.
4. **Energy** projects themes which investigate *energy* use or *energy conservation*.

Projects done on the S.T.E.M. theme topics above are judged separately for awards sponsored by our community partners.

All Project Boards Should Include the Following Labeled Steps

1. **Purpose** - a statement explaining what you are trying to investigate. It can also be written as a question. You can also use all or part of your purpose statement/question as the Title of your project. Collect as much information as you can about your investigation. Spend some time in the library or on the internet learning more about it. Your research will help you understand the question a little better and help you write a testable question or "hypothesis" that can be tested by collecting experimental data.
2. **Hypothesis** - a prediction that can be tested by conducting an experiment. A hypothesis is an informed (researched) question. It uses the information you collect about your purpose (statement/question) to explain the observations made before, during, and after doing your experimental test trials.
3. **Materials** - a list of all the equipment and materials you use in your investigation. List each item by quantity, in a column. Use metric tools, measures with units when possible (customary English measuring tools, and measures with units will also be accepted).
4. **Procedure** - a list of all the steps in your experimental trials, in the exact order you perform them. Be clear, but keep it simple. Other scientists should be able to replicate your experimental results by following the same procedures.

Every experiment should have 'control' variables which should always stay the same. Just one 'dependent' variable which you manipulate to test your hypothesis, and one 'independent' variable which you observe and measure as you experiment. Write a procedure for your experiment. Show it to your teacher. When your teacher has approved your procedure *(for safety or the humane treatment of animal or human subjects),* you may begin experimenting. Repeat your experiment 3 times in trials, or test 3 samples in groups. Record any number data with measurements and/or write any descriptions of observations in a Data Table.

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All Project Boards Should Include ... *(continued)*

5) **DATA TABLE -** a written record of all the observations *(changes)* and measurements made in your experimental trials. It is important to record everything that takes place. Record both qualitative and quantitative descriptions and measurements. Your data should be recorded in a table. Take photographs that show the changes you observe, but **do not** photograph any *human faces (of the investigator or subjects)*. Once you have finished your first experimental trail, run two more trails following the same procedure exactly *(for a minimum of 3 trials)*. If you are testing samples, you must test a new sample each time *(for a minimum of 3 sample-groups).* Make sure to record all numbers with their units of measurements. Be precise in your counting or measuring and accurate with any calculations.

Next compare and contrast your observations. Make as many true statement *(claims)* as possible about your recorded data. Match each claim with some data *(evidence) which* you have recorded. If possible plot any two factors of data *(i.e., size over time, temperature over time)* into a graph. With each graph you make, explain any patterns or trends you observe in the graph. Bar, line, circle, and leaf-plot graphs are all excellent ways to compare and contrast your data.

6) **RELATIONSHIP TO MATHEMATICS** is required on all math projects - and explains any math skills, computations, or processes that were used in your investigation and/or design and engineering process.

7) **CONCLUSIONS –** any true statements/*claims* explaining the results/outcome of your investigation. What data/evidence did you record in your experimental trials that supports each statement? Do your experiment support or reject your hypothesis? What problems, if any, happened during your experimental trials that may have affected your results? All findings should be explained. Any claims you make should be supported by the data recorded in your tables/charts.

8) **REAL LIFE CONNECTIONS -** (*NEW* this year) If applicable, explain why your project is important or what applications it may have to real-life.

If you are using the design and engineering process, use the dual labels show on page 2 under New this year.

All project boards must show the entire investigation process. Because students are **not** present during judging, only the information written and displayed on their project board will communicate what they've learned in their investigation to the judges.

Layout the information for the steps above, in order from 1 through 7 so that they read from the left-side panel across the middle panel and finally down the right-side panel on the board display.

Before a student is required to do a math or science fair project independently, they should have an opportunity to use the science inquiry process, or math skills that are necessary to complete it. Learners need to follow the steps of the project in order: Purpose, Hypothesis, Materials, Procedure, Data,

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The Classroom Teacher's Role

The classroom teacher's role is to model the process and coach their students how to create testable questions. Classroom teachers should provide all the appropriate oversight, guidance, and support the learner's need to succeed. The checklist below lists the classroom teacher's responsibilities.

Model the math investigation, science experiment, and design and engineering processes.

Provide learners with topic ideas and other idea resources.

Assign individual projects.

Make certain each idea is appropriate for the learner's grade level and skills.

Approve any animal or human subject experiments.

Explain the timeline and chunk any assignments by due date.

Inform the parents of all expectations and keep them in the communication loop.

Provide materials, tools, and an appropriate place to work (if necessary).

Provide ongoing instruction and support with fidelity.

Show learners how to organize and lay-out their project board.

Check the spelling, grammar, skill, accuracy, and content for completeness.

Assess the learner's performance.

Enter completed projects into your School Fair.

The Parent's Role

Parents play an important role in their child's success in completing a project. The following checklist will assure parents they are not doing too much.

Discuss the learning expectations of the project with your child.

Review the timeline and assignment due dates.

Provide any materials, tools, or resources they need to complete the project.

Set a time and quiet place to do the work.

Encourage your child to do their best and monitor their progress.

Only assist them in completing their assignment, DO NOT DO THE PROJECT FOR THEM.

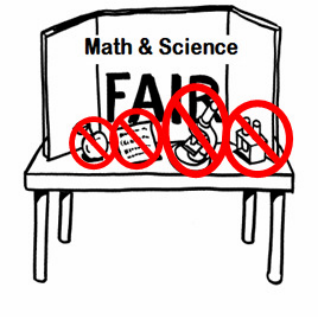
Check their spelling, grammar, skill, accuracy, and content for completeness.

Help them to plan and organize the project board layout before gluing anything down.

Tell them only paper, pictures, and graphs can go on their boards, no other objects.

Help them with suggestions, DO NOT DO THE BOARD FOR THEM.

Help deliver their projects to school safely by the due date.



Remember!

The project board tells the judges everything that took place in the project investigation process. Students may not be present to explain their work at the School Fair competition and will not be present at the District Fair competition. So, it is very important to include everything needed to clearly understand the project. Research papers, logs, or notebooks are NOT scored in the District Fair and should not be display. No models, parts, equipment, or samples are allowed to be displayed either.

ANIMAL SUBJECTS APPROVAL FORM

School: _____ Today's date: _____/_____/_____

Coordinator: _____ Work email: _____

Teacher: _____ Work Email: _____

Parent: _____ Email: _____

Student(s): _____ Grade level: _____

Project Title: _____

Type: ☐ Math ☐ Science ☐ Individual ☐ Team **Category:** ☐ **E**.S.E., ☐ E.**L**.L., ☐ **R**egular, or ☐ **G**ifted

Type of animal(s) being tested _____ How many? _____

Where will this experiment be done? _____

Start date: ___ /___/____ End date: ___ /___ /_____ Adult supervisor _____

Describe the normal diet of the animal(s) _____

Describe the housing and care of the animal(s) _____

What will happen to the animal(s) after the experiment?

_____ *(add more pages if needed)*

Purpose:

Hypothesis: *(expected result)*

Materials: *(equipment used)*

Procedure: *(Describe the activities with the animal, any the equipment is used, safety precautions, and adult oversight)*

Parent _____ Teacher _____

I have reviewed and give my consent and supervision ***I have reviewed and discussed safety precautions with student***

Coordinator _____ Date ___/___/_____

I have reviewed and approved with these conditions

APPROVED with the following conditions

- ☐ No harm comes to the test animal(s)
- ☐ Student investigator follows all suggested safety precautions
- ☐ All test animal(s) continue their normal diet and rest

NOT APPROVED because

- ☐ to much risk to the animal(s)
- ☐ procedure needs a veterinarian's approval
- ☐ procedure needs a qualified scientist's approval

HUMAN SUBJECTS APPROVAL FORM

School: _____ Today's date: _____/_____/_____

Coordinator: _____ Work email: _____

Teacher: _____ Work email: _____

Parent: _____ Email: _____

Student(s): _____ Grade level: _____

Project Title: _____

Type: ☐ Math ☐ Science ☐ Individual ☐ Team **Category:** ☐ **E**.S.E., ☐ E.**L**.L., ☐ **R**egular, or ☐ **G**ifted

How many test subjects are needed? _____ What ages? _____

Where will this experiment be done? _____

Start date: ___ /___/____ End date: ___ /___ /_____ Adult supervisor _____

Describe everything ingested or inhaled.

Describe any physical activity involving the subjects.

☐ I have attached all surveys or questionnaires I will be using. *(add extra pages if needed)*

Purpose:

Hypothesis: *(expected result)*

Materials: *(include any food or drink or items to smell, touch, taste or eat)*

Procedure: *(describe all activities with test subjects, how materials and equipment are used, safety precautions, surveys or questions, and adult oversight)*

Parent _____ Teacher _____

I have reviewed and give my consent and supervision ***I have reviewed and discussed safety precautions with student***

Coordinator _____ Date ___/___/_____

I have reviewed and approved with these conditions

APPROVED with the following conditions

☐ Student explains test procedure to all test subjects
☐ Test subjects agree to be tested
☐ Student subjects need a parental permission slip

NOT APPROVED because

☐ unsafe for test subjects
☐ procedure needs to be revised
☐ materials pose potential risks to test subjects