

MONROE COUNTY SCHOOL DISTRICT



Elementary Science Fair Guidelines

Prepared for: Grades K-5

Prepared by: MCSD Science Curriculum Team

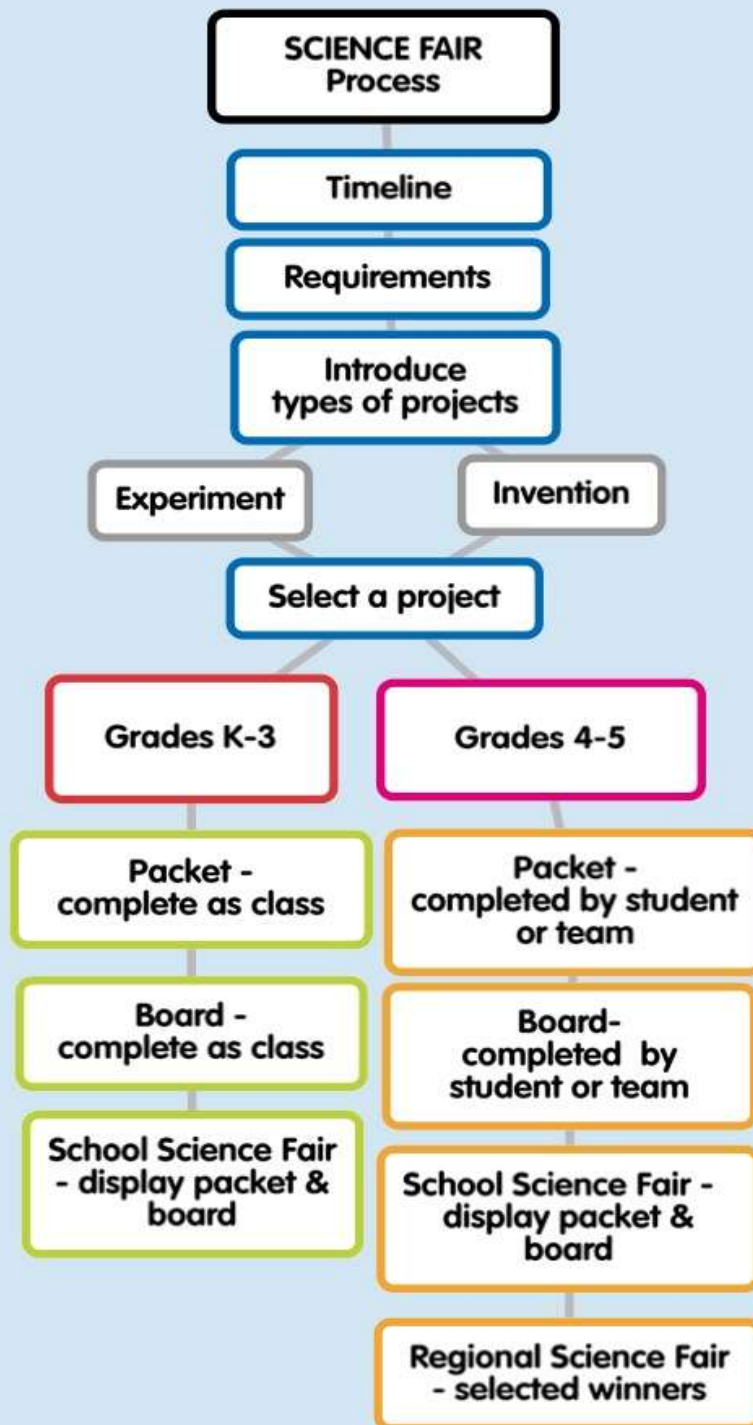
June 2015



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SCIENCE FAIR PROCESS



TIMELINE

Date	To Do
August	Teachers review Science Fair Guidelines
September	Introduce Science Fair and projects to students
K-3	Select a project to do as a class. Use MEA, if you choose.
	Print Student Packet. Fill out as a class.
4-5	Do MEA as sample Science Fair Project. Complete sample board & packet.
	Print & handout Student Packet for Individual/Team Projects
	Determine schedule of due dates for sections of Student Packet.
November	Projects in progress. Completed by the end of month.
December	Hold School STEM Fair.
January 25	Regional District STEM Fair

REQUIREMENTS

Grade	Requirement
K-3	Class Project
4-5	Individual or Team Project
All	Complete Student Packet
	Complete Project Display Board
	Display at School Science Fair
4-5	Selected students advance to Regional Science Fair
Competition Rules	Student, Teacher, School Name on back center panel of project board only.
	Photographs cannot show student faces.
	Photographs of the experiment, data samples, measurements are permitted on the board.
	Project boards must be 36" H x 45" W and should be free-standing, cardboard which shutter folds to the center.
	Boards must close flat & cannot have anything sticking out of the top, bottom, or sides of the board.
	Only paper and photos are allowed on the board.
	Only glue and tape should be used to secure the paper or pictures. No staples.
	Projects involving animals must be observation only.
	No product testing.

PROJECT TOPICS

CHOOSING A TOPIC – Teacher Discussion

Original project ideas grow out of individual interests and should be chosen by the learner themselves. Proper topic selection should appropriately reflect the learner’s grade-level, skills and ability. Choosing a topic can be difficult for the learner.

Engage them by asking: “What questions are you wondering about... at home, at school, in nature?” “Do you see products that could be improved on?”

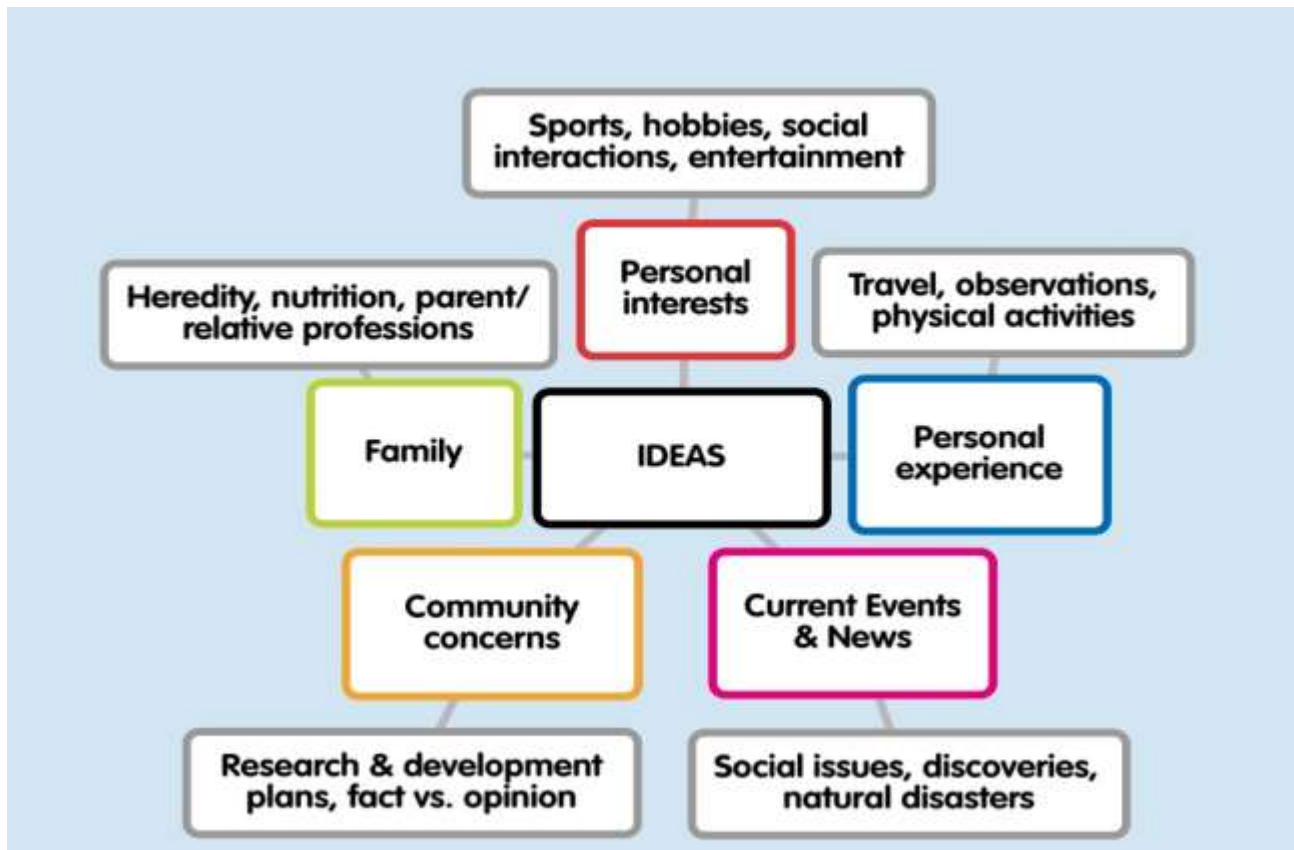
Asking guiding questions can help them develop their topic into a project. Below are some example guiding questions to use throughout the process.

- What predictions could you test? (*Hypothesis*)
- What materials and tools will you need to test it? (*Materials*)
- What steps should you follow in your experiment? (*Procedure*)
- What “changes” (*variables*) should you look for? (*Observations*)
- What should “stay the same” (*control*) in your experiment? (*Observations*)
- What metric tool(s) can you use to measure your results? (*Collecting Data*)
- What measurements and observations should you record? (*Recording Data*)
- Should you record your data in a table or log? (*Organizing Data*)
- How can you compare, contrast or graph your data? (*Analyzing Data*)
- What claims can you make from your data? (*Drawing Conclusions*)
- What data (*evidence*) supports your claims? (*Drawing Conclusions*)
- How should you display your work so the judges know what you discovered? (*Layout*)

The classroom teacher should model the process first. Then, provide topic ideas, guide questions, and support the learner and parents by suggesting an appropriate time frame in which they should complete their individual projects.

PROJECT TOPICS

CHOOSING A TOPIC – Helping Students Choose an Original Project Topic



Brainstorm ways people get ideas, then model the process in class:

1. Bring in an example of a jingle (from TV, video, radio, magazine, newspaper).
Explain what a jingle is.
2. Assignment for homework:
Every student has to bring at least two or three jingles that catch their attention
3. The teacher compiles the student ideas on the front board.
4. Form students into groups.
5. Have each group select their favorite jingle (or have the whole class select one).
6. Have the students write, in their own words, a claim being made in the jingle.
7. Have students turn the claim into a question.
8. Then have students discuss and collect personal experiences with the claim.
9. Students form a testable, educated guess as to whether the claim is true or not.
10. Students will then design a way to test the product claim.
11. Have each group share what they have come up with.
12. Remind students that on their own projects, they need to move on to performing the experiment, observing and recording data, organizing the results to show patterns, drawing conclusions, and writing an abstract. Student projects cannot include product testing.

Problem
Question
Research
Hypothesis
Experiment Design

PROJECT TOPICS

EXPERIMENT IDEAS

Plants

- 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 on 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?
- 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?

Animals

- 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 lizard?
- What is the effect of temperature on the behavior of fish?
- How do different levels of salinity affect shrimp?
- 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

- 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?
- 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?

PROJECT TOPICS

Earth & Space

- Does the sun rise at the same time and in the same location in the sky?
- 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 is 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 the length of a wing on the length of flight of a paper airplane?
- To what extent does sunlight affect the temperature of soil?
- To what extent does sunlight affect the temperature of water?
- How do different surfaces absorb the sun's energy?

Physical

- How does length, tension, or mass of a guitar string affect the pitch of sound?
- How do different solids affect the transmission of sound?
- What is the effect of heat on different liquids?
- 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?
- To what extent does temperature affect the height that a ball will bounce?
- How do the number of batteries & the way they are connected affect the brightness of a bulb?
- How does the density of an object affect its buoyancy?

Environmental

- 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 steps can be taken at home or school 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 water use at home or school?

PROJECT TOPICS

ENGINEERING IDEAS - Design, test, and improve...

FLIGHT ENGINEERING

- ways weight can be used to balance wing length for the longest flight of a model airplane.
- the wing span of a model airplane to increase its flight air time
- different launch systems(vertical, 45 degree, and horizontal) for maximum flight distance
- safety restraint designs for infants traveling on aircrafts.
- sound separation systems to separate adult air passengers from crying babies.
- comfortable seating for longer flights

WASTE RECYCLING ENGINEERING

- a system to insure all paper, plastic and/or aluminum cans are being recycled properly
- a trash can to reduce the space recyclables such as paper, plastic, aluminum take up
- a trash can that motivates kids to sort recyclables properly
- new ways to reuse commonly wasted materials so they don't take up space in our landfill
- a system to reuse or recycle school supplies so they aren't wasted
- a way to keep people from disposing of harmful liquids and solids down the sink drain
- a way to reuse old clothes
- inexpensive and safe ways to compost vegetation and/or food scraps back into soil

MECHANICAL ENGINEERING

- your favorite furniture
- your favorite sports equipment
- easy, safe ways to mount you favorite music player to your bike
- a wind powered device that moves water up hill
- a rubber band powered cart or train (connected carts)
- a hand powered coin sorter
- a mechanical arm that throws balls to a hitter
- a Ping-Pong ball throwing catapult

ENERGY CONSERVATION ENGINEERING

- a portable solar powered chocolate s'more cooker
- an LED clock powered by a fruit or veggie battery
- a wind powered LED light reading visor
- a solar powered personal fan for a baseball cap
- a solar powered speed racer

PROJECT TOPICS

FIELD TRIPS & GUEST SPEAKERS

Consider taking a field trip to a local business or environmental/educational facility. Have a guest speaker come to your classroom from one of these places. Students will get ideas and may even be able to continue research already in progress as their Science Fair project.

Florida Keys Electric Cooperative
Florida Keys Aqueduct Authority
Florida Keys National Marine Sanctuary
Mosquito Control

Upper Keys & Homestead

Pennekamp State Park
Biscayne National Park
Dolphins Plus
Windley Key Geological Site
Florida Keys Wild Bird Center

Everglades National Park
Florida International University
Reef Environmental
History of Diving Museum

Middle Keys

Dolphin Research Center
Curry Hammock
Aquarium Adventures

Turtle Hospital
Pigeon Key
Marathon Wild Bird Center

Lower Keys & Key West

Dry Tortugas National Park
Key Deer Wildlife Refuge
Key West Botanical Garden
Eco Discovery Center
NOAA Weather Station
Keys Energy

Bahia Honda State Park
Sea Camp
Butterfly Conservatory
Key West Aquarium
Reef Relief

SUPPORT & GUIDANCE

THE CLASSROOM TEACHER'S ROLE

The most important part of 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 science fair process.
- ✓ 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 each idea and explain any safety precautions before experiments begin.
- ✓ 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 to assign a grade (*if applicable*).
- ✓ Enter the projects into the 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 project's expectations with your child.
- ✓ Review the timeline and assignments with them.
- ✓ 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.
- ✓ Tell 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 only with suggestions, **DO NOT DO THE BOARD FOR THEM.**
- ✓ Help them get their projects to school safely by the due date.



Dear Families,

It is that time of year again - STEM Fair! One of the science goals of Monroe County School District is that each child should be able to design an experiment, plan it on paper, show his or her work, and come to a conclusion. Students should observe the world around them and ask questions about the things they observe to get ideas that interest them. They may choose from the following fields; science, technology, engineering or math to explore. Please refer to the packet for step-by-step instructions for completion of this project.

The project will be completed outside of the classroom. Please review the attached packet with your child. Be aware of the project that your child has chosen and the materials/time requirements that are necessary for his or her particular project. If your child is having difficulty choosing a project, please see your teacher for a list of possible experiments or websites that can be helpful.

School based STEM fairs will be held prior to December 18, 2015.

Projects will be reviewed for grades as outlined by the classroom teacher. This information, as well as a sample of the display board layout, is included in the attached packet.

Selected projects will compete in the school STEM Fair and winners will advance to the district fair.

Please contact your student's classroom teacher with questions.

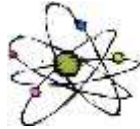
Thank you for your support,

Courtney Oliver
MCSD Science Supervisor/Coordinator

PROJECT TITLE

A large empty rectangular box with a black border, intended for the project title.





Investigation Plan

The plan needs to be completed before beginning the investigation.

Student Name: _____

School: _____

Title of Project: _____

Adult Sponsor: _____

Where will you complete your experiment?

Home

School

Field(outside)

Category:

Physical

Earth/Space

Life

Environmental

What is the question you are trying to answer or problem you are trying to solve?

Describe the methods, materials, and procedures you intend to use.

Parent/Guardian approval: _____ Date: _____

Teacher approval: _____ Date: _____

STUDENT PACKET – PLAN

Things to Consider When Choosing Your Investigation

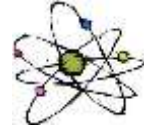
What types of things do you enjoy in science? There are 3 different science categories your idea may fit into:

Physical Science: Do you find yourself wondering why or how things work? If so then you might want to choose Physical Science for your category. Topic examples may include things about matter, electricity, magnetism, sound, light, or energy.

Earth and Space Science: Do you find yourself curious about our Earth or outer space? If so then this may be the category for you. Topic examples may include things about weather, geology (things that make up the Earth such as rocks, fossils or volcanoes), or our Sun, stars and planets. Just a reminder, a model is not an experiment, so be careful when thinking about your investigation.

Life Science: Do you like plants, animals or are curious about why humans behave certain ways? If so then Life Science may be the category your investigation could fall under. (There are special rules anytime you work with animals. Please talk to your teacher to ensure you are following any rules).





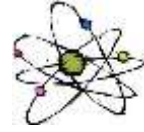
Research to Help Support Your Investigation

- After choosing your investigation category, it is important to complete some research to better understand what your investigation is about.
- Use this information to assist in developing your hypothesis, designing your experiment or prototype (if applicable), collecting data, drawing conclusions, and communicating like a real scientist.
- Write down your research or attach printed information. Make sure to include the title, author, and date published or accessed.

Books or Articles about my topic:

Internet Websites about my topic:

People I talked to about my topic:



Question I am Answering or Problem I am Trying to Solve

Once a category has been chosen and research has been conducted begin to think about what type of question you are going to answer OR type of problem you are going to solve.

Example(s):

- Question I am going to answer: “How much water do plants need for optimal growth?” This is a good question which would allow students to go through the scientific process manipulating only one variable; the amount of water.
- Problem I am going to solve: “I am constantly losing things out of my pant pockets. How can I create a pant pocket that keeps items inside?” This problem would allow the student to design a solution and test its effectiveness.

My question I am going to answer or problem I am going to solve:

Hypothesis

The purpose of creating your hypothesis is to identify what you think will happen based on research that was collected. The hypothesis needs to be worded as an “If... then...because” statement explaining the cause and effect relationship that is being investigated. Evidence from your research needs to be used to support and justify your thinking.

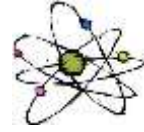
Example(s):

- Question I am going to answer: If I give varying amounts of water to the plants, then the plant given 10ml of water a day will grow the best because it is not too much or too little water.
- Problem I am trying to solve: If I create a magnetic pocket casing, then I will lose fewer items out of my pockets because magnets provide a tight seal due to their characteristics.

If _____,

then _____

because _____



Variables

A variable is a fancy word for things that you will be changing or keeping the same throughout your investigation. There are 3 types of variables:

- Independent: This is the variable that will be changed in your investigation.
- Dependent: This is the variable that will show an effect in your investigation.
- Controlled: These are all the things that will be kept the same throughout your investigation to make sure it is valid.

Example(s):

Question I am going to answer: If I give varying amounts of water to the plants, then the plant given 10ml of water a day will grow the best because it is not too much or too little water.

- Independent variable: The amount of water.
- Dependent variable: The growth of the plant.
- Controlled variables: location of plants, soil, size & type of container, plant

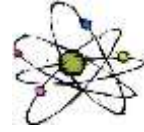
Problem I am trying to solve: If I create a magnetic pocket casing, then I will lose fewer items out of my pockets because magnets provide a tight seal due to their characteristics.

- Independent: The different types of materials tested to create the pocket casing.
- Dependent : The number of shakes the pant pocket can withstand before losing its contents.
- Controlled: same pair of pants and sized pocket, same items placed in the pocket casing

The Independent Variable that I will change in my investigation will be:

The Dependent Variable that will show an effect on my investigation will be:

The Controlled Variables in my investigation are:

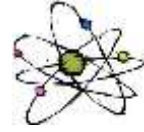


Data and Results

When conducting your investigation it is important to collect some data (information) to help either prove or disprove your hypothesis. When you are collecting data please make sure to be as precise as possible in using labels, dates, and even pictures. It is important to record your data/results into a table and then organize it into a chart or graph to easily communicate your findings. Use additional pages, if needed.

Data Table

Graph



Conclusion

During your investigation you have learned many new things including whether or not you were able to prove or disprove your hypothesis. Your conclusion should be a summary of your results and state whether or not your investigation supported your hypothesis. Use the questions below to help guide you in sharing what you learned.

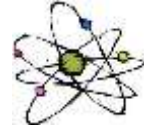
- Did your results support your hypothesis (was your hypothesis correct)?

- What did you learn from the trials you conducted in your investigation?

- What types of problems did you encounter throughout your investigation?

- If you conducted this investigation again, what would you do differently?

- How does your investigation make connections to real life (APPLICATION)?



Abstract

The abstract is the part in your project log in which you summarize the entire investigation. Remember to include things such as the questions you were trying to answer or problem you were trying to solve, hypothesis, procedure, data/results, and conclusions based on evidence collected. Use the following starter questions to help write the abstract, if needed.

- The question I was trying to answer was (or) The problem I was trying to solve was...

- My hypothesis was..._____

- I decided to test my hypothesis by..._____

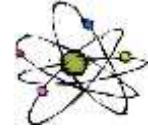
- What I discovered was..._____

- I think this happened because..._____

- Recommendations I would like to make are ..._____

STUDENT PACKET- ACKNOWLEDGEMENTS

Due Date _____



Acknowledgements

Who helped you with your project? How did they help you?



Congratulations!

You have completed your project and are ready to display your results for the Science Fair!

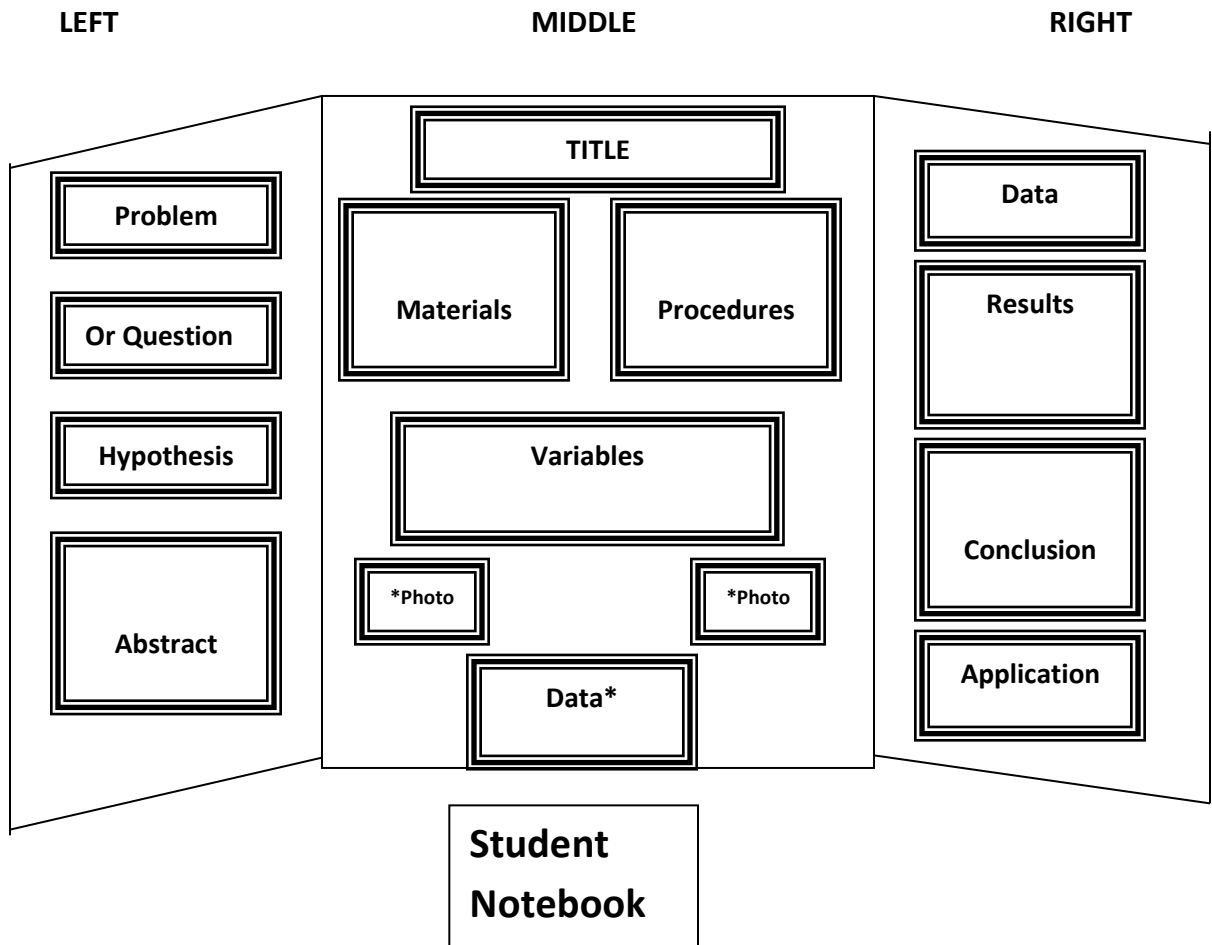
Project Display Board

After all the research, experimentation, time & effort spent on the preparation of the science fair project, the student’s project display board should show off his/her hard work. Use your Student Notebook you just finished that has all the information for your board.

Boards are judged on: Creativity, Scientific Thought, Thoroughness, and Neatness.

All items must be typed and placed in the correct location and order.

Board must lay flat when closed. Use only glue or tape. No staples.



Display Board Checklist :

- | | | |
|--|--|---|
| <input type="checkbox"/> Problem | <input type="checkbox"/> Purpose | <input type="checkbox"/> Hypothesis |
| <input type="checkbox"/> Abstract Summary (4/5 th) | <input type="checkbox"/> Title | <input type="checkbox"/> Materials |
| <input type="checkbox"/> Procedure | <input type="checkbox"/> Variables | <input type="checkbox"/> *Photos (optional) |
| <input type="checkbox"/> Data (*overflow area) | <input type="checkbox"/> Data (minimum of one) | <input type="checkbox"/> Results |
| <input type="checkbox"/> Conclusion | <input type="checkbox"/> Application | |

Date Due*	Section Due:	Total Points	Points Earned	Comments
	Plan - Parent Acknowledgement Form	5		
Pre-Experiment				
	Research	10		
	References	5		
	Question or Problem	5		
	Hypothesis	5		
The Experiment				
	Materials	5		
	Procedures	10		
	Variables	10		
	Data & Results	10		
	Conclusion	10		
	Application	5		
	Abstract	5		
	Acknowledgements	5		
	Neatness/readability	10		
	TOTAL POINTS	100		
* Dates are subject to change				

STUDENT PACKET - DISPLAY BOARD RUBRIC

Students _____

Components	Total Points	Points Earned	Comments
Display Board: Neatness/ Appearance	20		
Scientific Method: Complete and ordered correctly	40		
Thoroughness	25		
Conventions: Grammar; Mechanics	15		
Total	100		

Science Fair Judging Form Grade 4-5 Projects

Scientific Method – 15 Points

Strongly Disagree Disagree Agree Strongly Disagree

	0	1	2	3	
Did the student formulate a clear problem statement and hypothesis ?	0	1	2	3	
Do the procedures help to support or falsify the hypothesis?	0	1	2	3	
Do the procedures include 3+ test replicates ?	0	1	2	3	
Does the experiment have a control , an independent , and a dependent variable ?	0	1	2	3	
Is there a conclusion and is it proven by numerical data?	0	1	2	3	
TOTAL					

Subject Knowledge – 9 Points

Do the students thoroughly understand the project?	0	1	2	3	
Did the students do the majority of the work?	0	1	2	3	
Does the student effectively answer questions?	0	1	2	3	
TOTAL					

Verbal Presentation - 6 points

Do the students speak clearly and refer to display board?	0	1	2	3	
Are the students able to communicate their research?	0	1	2	3	
TOTAL					

Backboard Display - 6 points:

Does it tell the story of the project?	0	1	2	3	
Is the display neat and legible, with no obvious spelling or grammatical errors?	0	1	2	3	
TOTAL					

Data Treatment - 6 points:

Did the student create graphs, tables or illustrations to support their data?	0	1	2	3	
Does the data presented on the board agree with the data in the log book?	0	1	2	3	
TOTAL					

Supporting Documents - 6 points:

Does the Lab/Log Book reflect learned information and document the project?	0	1	2	3	
Does the data presented on the board agree with the data in the log book?	0	1	2	3	
TOTAL					

Comments for Students:

/48
Grand
Total

Important Dates:

School-wide STEM Fair
Complete prior to December 18th.

Monroe Regional STEM Fair
January 25, 2016
Stanley Switlik Elementary

Websites:

Florida State Science and Engineering Fair:

<http://www.ssefflorida.com/>

Monroe County Science Sharepoint

<https://portal.monroe.k12.fl.us/PortalSites/is/Science/default.aspx>

