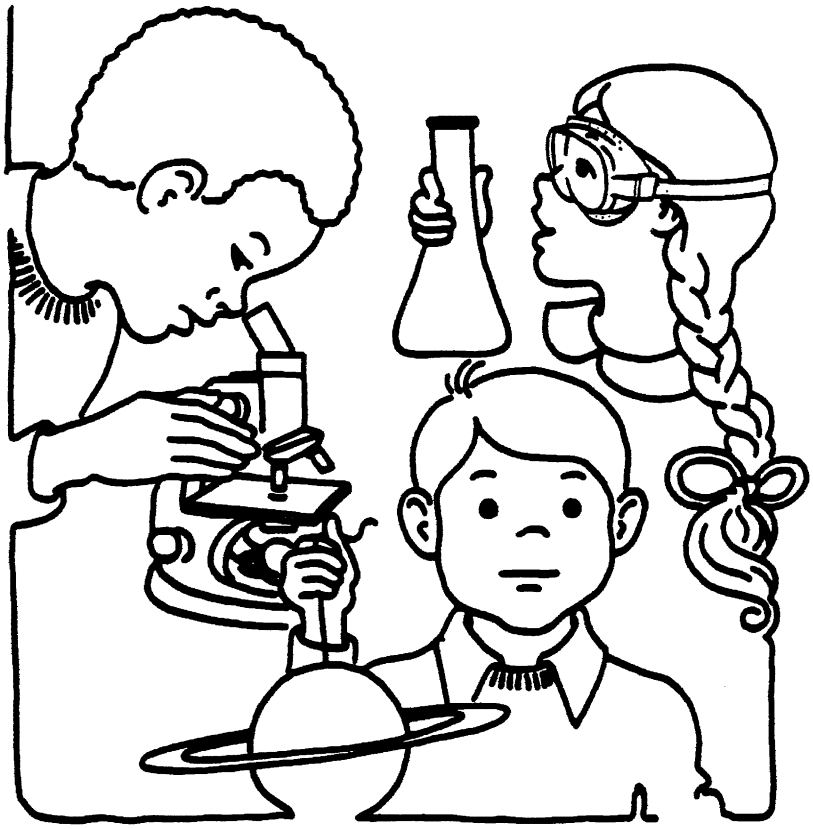
SCIENCE FAIR STUDENT HANDBOOK

Grades K-5



McKinney ISD

Wolford Elementary School

Science Fair Dates: December 6 and 7

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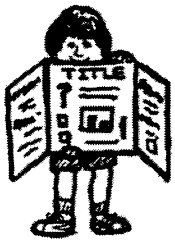


Please read this carefully as you decide upon your topic and prepare your science fair project.

Purpose of the Science Fair

The science fair is conducted for many reasons:

- To focus attention on scientific experiences in school.
- To stimulate interest in scientific investigation beyond routine class work.
- To recognize and commend youthful scientific talent and hobby pursuits.
- To offer an opportunity for display of scientific talent through exhibit and demonstration.
- To stimulate public interest in the scientific abilities of students.

SCIENCE FAIR PROJECT
AN INTEGRATION OF CURRICULA

A science fair project is an exciting and meaningful learning experience for each child. Not only can children enter and compete for ribbons, trophies, and awards, but more importantly children have an opportunity to apply the many skills they are learning in the various academic subjects. A science fair project cuts across almost every curriculum. Examples are as follows:

Thinking Skills – This is perhaps the most important product of a science fair project. Students put much time, effort, and thought into a project. They see the result of their thinking in the form of a project. They have developed or utilized problem-solving skills.

Organizational Skills – Another important skill that students utilize when preparing a project is organization. Students will need the support and advice from teachers and parents, but this is an opportunity to plan, prepare, and organize a project from start to finish.

Science – Children have an opportunity to investigate a myriad of topics of interest to them in science. They apply the skills of scientific inquiry when investigating their topics. Students learn to investigate, experiment, and discover the many wonders of science.

Language Arts – Children use many language arts skills when preparing a project. They must read for information to better understand their topics. Children utilize library skills and study skills when they research the projects. Writing is also an integral part of each science fair project. Students use these skills when displaying their projects, writing for information from organizations or other sources, and/or writing a paper to accompany the projects. Oral language skills are also tapped when students interview professionals for assistance and/or seek help from parents or teachers.

Math – Measurement is an essential component of science projects. Students have opportunities to apply the use of metric measurement and organize data using tables and graphs in meaningful activities.

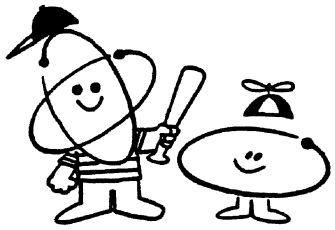
Social Studies – Many topics that students investigate are related to this curriculum. Mapping is a skill that may be used when preparing a project.

Art – The display of a project is almost as important as the project itself. Children get a chance to design their displays to best enhance their projects.

INFORMATION ABOUT SCIENCE FAIR PROJECTS

A Successful Science Project:

- Represents your work--not that of an expert or your parents
- Indicates an understanding of the science area chosen
- Shows careful planning that would eliminate a "rush" project
- Has a notebook showing a complete record of all your work
- Has a simple, well-stated title and neat lettering
- Includes photographs, charts, pictures, graphs, etc., that might be necessary to explain your work
- Has accurate, valid, and correct observations
- Tells a complete story--Problem and Solution
- Is original in approach and presentation
- Is self-explanatory
- Is attractive and organized
- Does not have to cost much money
- Is one that gives credit to those who gave help



A Science Fair Project Is Not:

- Only a report
- Necessarily a new discovery or an original piece of research
- Constructing a plastic model from a hobby kit
- An enlarged model or drawing
- A weekend chore
- One, two, or even three posters
- Something done by your parents or teachers

Steps in Making a Science Project:

- Choose a topic and discuss it with your teacher. Ask your teacher for help and suggestions.
- Once you have chosen your topic problem, find out as much about the topic as possible.
- Keep a science project notebook and record all of your thoughts, preparations, and ideas. Keep a record of your readings.
- Set up a work area somewhere around your house where you can work on your project. Make sure the area is off limits to your pets or younger brothers and sisters.
- Work on your project a little each day. Don't wait until the last minute.
- Collect the materials needed for the project.
- Check with your teacher for suggestions and materials. He or she might be able to save you time and money.
- Construct your exhibit.
- Mount your pictures, graphs, charts, etc.
- Present your science project to your parents, classmates, and judges.
- Have fun and enjoy the pride and satisfaction of a job well done!

GETTING STARTED

Scientific research tries to solve a problem or answer a question. When choosing a topic, give careful thought to how your research might enhance the world and its inhabitants.

Pick Your Topic. Choose something that interests you. Ideas might come from hobbies or problems you see that need solutions. Be curious!

Research Your Topic. Find out as much about it as you can. Go to the library and/or search the web. Observe related events. Gather existing information and talk to professionals in the field.

Organize and Theorize. Organize everything you have learned about your topic. At this point you should determine your hypotheses by focusing on a particular problem/idea.

Make a Timetable. Choose a topic that can be completed in the amount of time you have. Use a calendar to identify important dates. Allow plenty of time to experiment and collect data. You may have to repeat the experiment several times. Leave time to write a report and build a display.

Plan Your Experiment. Once you have a project idea, write a research plan. This plan should explain how you will do your experiment.

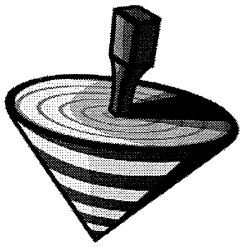
Consult Your Teacher or Adult Sponsor. Make sure your project adheres to all Rules and Guidelines and ensures the safe and humane treatment of humans and animals. At a minimum, your teacher must approve your project.

Conduct Your Experiments. During experimentation, keep detailed notes. Do not rely on your memory! Remember to change only one variable at a time and include control experiments in which none of the variables change.

Examine Your Results. When you complete your experiments, examine and organize your findings. Did your experiments give you the expected results? Why or why not? Statistically analyze your data.

Draw conclusions. Which variables are important? Did you collect enough data? Do you need to conduct more experimentation? Keep an open mind. Even if your results do not support your original hypothesis, you still have accomplished successful scientific research.

Further Questions: What further questions do you have about your experiment? What else would you like to know about this topic?



SAMPLE PROJECT

Effects of Surface Types Upon the Spinning Time of an Upside-Down Top

Question
Will an upside-down top spin longer on a wooden floor or on a tile floor?

Hypothesis
On average, the upside-down top will spin longer on a wooden floor than on the tile floor because the wood is smoother.

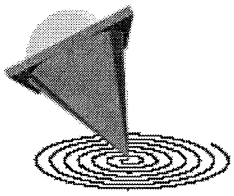
Variables Controlled
Vibrations, health of spinner, condition of top, spinning effort, surface flatness, wind, humidity, spinning force, dropping height, obstructions, type of top.

Surface Type	Trials (time in seconds)										Average Time (in seconds)
	1	2	3	4	5	6	7	8	9	10	
Wooden floor	21	21	13	18	17	17	13	17	15	18	17
Tile floor	14	24	21	21	24	17	15	14	23	17	19

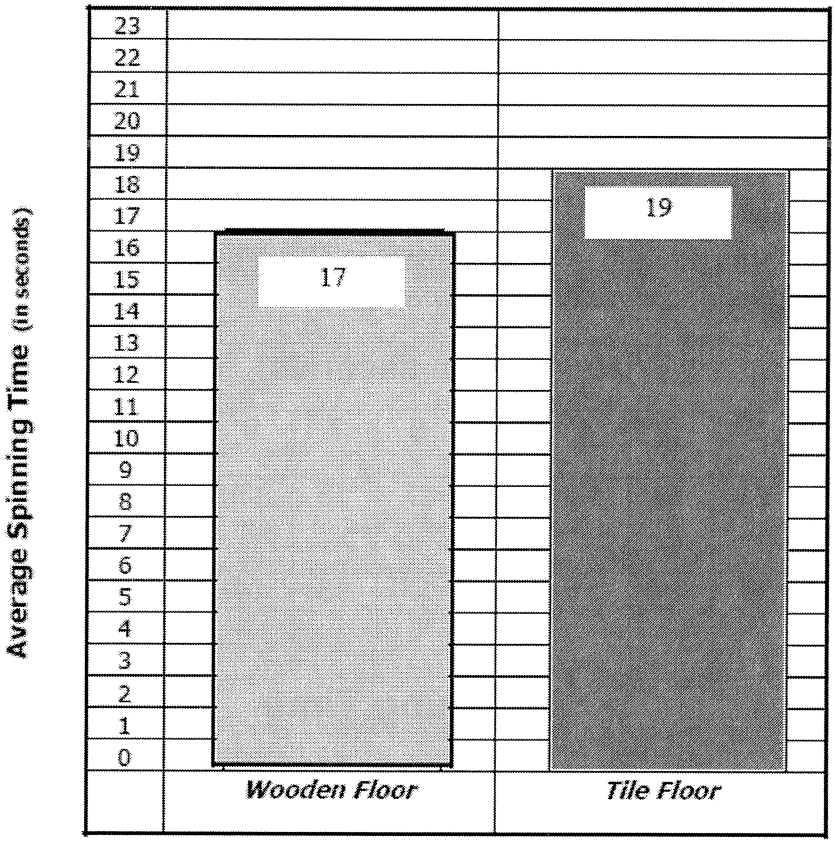
Spinning Time

Results
On average, the upside-down top spun longer on the tile floor (19 sec) than on the wooden floor (17 sec).

Conclusion
An upside-down top will spin longer on a wooden floor than on a tile floor. The average time the top spun on tile floor (19 seconds) was 2 seconds longer than the average time it spun on the wooden floor (17 seconds). The tile floor was better for spinning. The data does not support my hypothesis because I thought the wooden floor would be better for getting the top to spin the best. I think the tile floor produced better results because it was smoother than the wooden floor. Therefore, there was less friction between the tile floor and the top than there was between the wooden floor and the top. When the force of friction was greater, the top slowed and stopped sooner. I wonder if my data would have been different if I had better controlled how I released the upside-down top each time. I also wonder if there is a better surface than tile for getting the top to spin the most.



Sample Data Graph



ALL ABOUT VARIABLES

SOME DEFINITIONS of Variables and Control(s)

Manipulated Variable (also called the independent variable) - What you change **on purpose** in the course of your procedure.

Responding Variable (also called the dependent variable) - What you do not change directly, but rather changes by itself in **response to** changes in **the manipulated variable** during the course of your procedure.

Controls: - The factors you keep constant or hold fixed. A control is held fixed so that it doesn't affect the outcome of the experiment.

Students must only change one variable at a time, conduct repeated trials, and note their results. If they change more than one variable at a time, they will not know what affects their results.

EXAMPLES OF VARIABLES

Let's say that the following hypothesis had been selected:

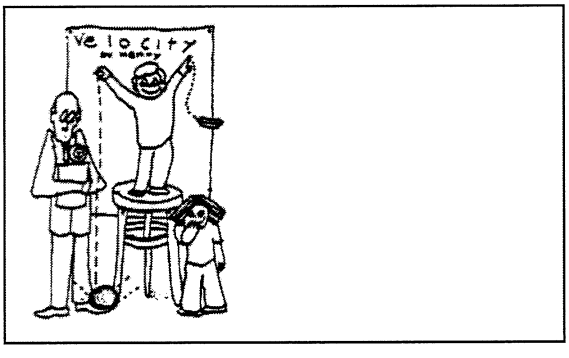
The cheaper the paper towel, the less water it will absorb.

Manipulated Variable (Independent Variable): price (Brand) of paper towel

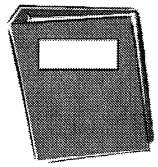
Responding Variable (Dependent Variable): amount of water that is absorbed

Control(s):

size of paper towel
amount of water poured on each towel
temperature of the water used
container in which towels are placed
method of pouring



YOUR SCIENCE PROJECT NOTEBOOK



This is an important part of your project. All the data gathered during your experiment should be carefully recorded in a notebook. This includes the data gathered as a result of the experiment itself and much more.

Your notebook should include:

- a list of all the materials used.
- notes on all the preparations you made prior to starting your experiment.
- information about the resources you use (books, people, libraries, Internet, etc.).
- detailed day-by-day notes on the progress of the project.
- what you are actually doing.
- problems you encounter with the experiment.
- things you would change if you were doing this investigation again.
- any drawings that might help explain your work.
- data that was gathered during the course of the experiment (notes, charts, tables, graphs).
- Be sure to date each entry in your notebook

Your notebook will be displayed with your project.

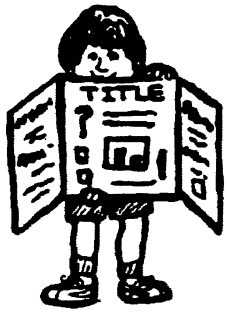
REPORT AND DISPLAY

Possibly the most important and, at the same time, the most neglected phase of the scientific method is the compilation of a complete report. If scientists as a group fail to report their results, then each of us must wake up in a whole new world every day, doomed to repeat the failures of the past or else to waste time and effort in the rediscovery of old knowledge.

Your report should include:

1. Your question.
2. Your hypothesis, along with your reasoning for why you arrived at that hypothesis.
3. Your research.
4. List of variables.
5. A summary of your observations and results from the experiment.
6. Statement of support or non-support of the original hypothesis based on the data gathered in your experiment.
7. Description of any problems or unusual events that occurred during the investigation that might have affected your results.
8. What changes you would recommend for next time, and what further experiments might need to be done to fully answer the question?
9. What further questions do you have about the topic? What ideas do you have for studying the topic in the future.
10. Anything you learned in addition to what you expected to discover.
11. Acknowledgments. You should always credit those who assisted you including individuals, businesses, and institutions.
12. References.

If this information looks familiar to you, it should. The report is simply a summary of all your work. That's why people tend to neglect it -- they are eager to move on to the next problem. Remember, however, it's the most important part of real-world science!



Scientific Process Report Steps

These steps are **essential** to every science fair project:

Questions/Problem: (What are you trying to learn?)

Hypothesis: (What do you think will happen? Why do you think so?)

Variables: (What things may change or influence the outcome of your experiment?)

Materials:

Procedures:

Data: (What do you observe?)

Conclusions: (What do you learn from your results?)

Further Questions: (What other questions do you have about this topic?)

HELPFUL HINTS

A GOOD TITLE
Your title is an extremely important attention-grabber. A good title should simply present your research and should make the casual observer want to know more.

TAKE PHOTOGRAPHS
Many projects involve elements that may not be safely exhibited at the Fair but are an important part of the project. Photographs of these phases of experimentation can be used in the display. You may NOT use photographs depicting animal dissections or other surgical techniques. You must receive permission to photograph or videotape human test subjects. REMEMBER: Be sure photographs included in your display DO NOT SHOW FACES.

BE ORGANIZED
Make sure your display is logically presented and easy to read.

EYE-CATCHING
Make your display stand out. Use neat, colorful headings, charts and graphs.

CORRECTLY PRESENTED AND WELL-CONSTRUCTED
Be sure to adhere to the size limitations and safety rules when constructing your display. Display all required forms in your lab notebook.

ADVICE FOR A WINNING PROJECT

CAREFULLY PREPARE YOUR SCIENCE PROJECT NOTEBOOK
A science project notebook is your most valuable piece of work. It is a day-to-day record of the experiment. Accurate and detailed notes make for a logical and winning project. Good notes show consistency and thoroughness to the judges, and help when writing a paper.

VISUAL DISPLAY
You want to attract and inform. Construct a clear and concise display. Make headings stand out and label everything clearly and correctly.

HOW PARENTS CAN HELP

Things a parent may do:

1. Give encouragement, support, and guidance. Be positive!

2. Make sure your child feels it is his or her project. Make sure the project is primarily the work of the child.

3. Realize that the main purpose of a science fair project is to help your child use and strengthen the basic skills he or she has learned and to develop higher-level skills.

4. Realize your child will need help in understanding, acquiring, and using the major science process skills (researching, organizing, measuring, calculating, reporting, demonstrating, experimenting, collecting, constructing, presenting).

5. Realize that your child may be using reading, writing, arithmetic, and social skills in a creative way to solve a problem.

6. Help your child plan a mutually agreed upon schedule, to prevent a last minute project and a disrupted household. A 4 to 8 week plan that uses a check-off sheet is best. The following steps (You may want to add more) should be on your schedule. Always begin with entries in a science notebook as your child starts thinking about a project.
    - Find a topic.
    - Narrow down the topic to a specific scientific problem that is appropriate to the child's ability level.
    - Research what is already known about the problem.
    - Develop a hypothesis. (What outcome do you expect?)
    - Develop a procedure/investigation to test the hypothesis. List variables.
    - Make observations and collect appropriate data in a science notebook.
    - Interpret the data and other observations.
    - State and display the results using graphs, tables, and/or pictures.
    - Draw appropriate conclusions.
    - Create the exhibit.
    - Write the research paper.
    - Present the project.

7. Help your child design a safe project that is not hazardous in any way.

8. Provide transportation to such places as libraries, nature centers, universities, etc. to help find project information.

9. Help your child write letters to people who can help on the science project and be sure the letters are mailed.

10. Help the child develop the necessary technical skills and/or help the child do the technical work such as building the exhibit and doing the photography.

11. Help your child understand that science is not just a subject, but a "way of looking at the world around us".

12. Be sure that the child states in the paper and/or exhibit the help he or she has received from you or others. This will help judges to make a fairer evaluation of the project.

13. Look over the project to check for good grammar, neatness, spelling and accuracy. Make suggestions on how it can be corrected.

14. Buy or help find the necessary materials to complete the project.

15. Realize that a good project doesn't have to cost a lot of money. Many times a simple project that is well displayed and explained is the best.

16. Help the child understand that a weekend chore, or one or two posters, is not a project.

17. Help the child keep a record (science project notebook) of all he or she does and a list of references used.

18. Find an area in the house where the child can work on the project and not have to worry about pets or brothers and sisters.

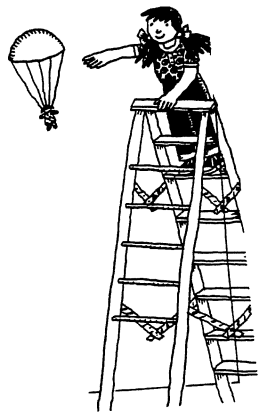
19. Explain to the child that he or she should consult with you or the teacher when problems arise. Set aside time for help sessions. Make them short and constructive. Be an interested and enthusiastic listener.

20. Have your child present his or her science project to you before he or she takes it to school.

21. Help transport child and the science fair project to and from the school/regional science fairs.

22. Be positive and supportive if your child doesn't win a prize at the science fair. The skills the child has gained are worth all the effort. Help your child to begin to plan for next year.

23. Feel a sense of pride and satisfaction when the project and the science fair are finished. Share this with your child, you have both earned it!



Appendix A

Sample Project Display

Display Safety Rules

Safety Rules

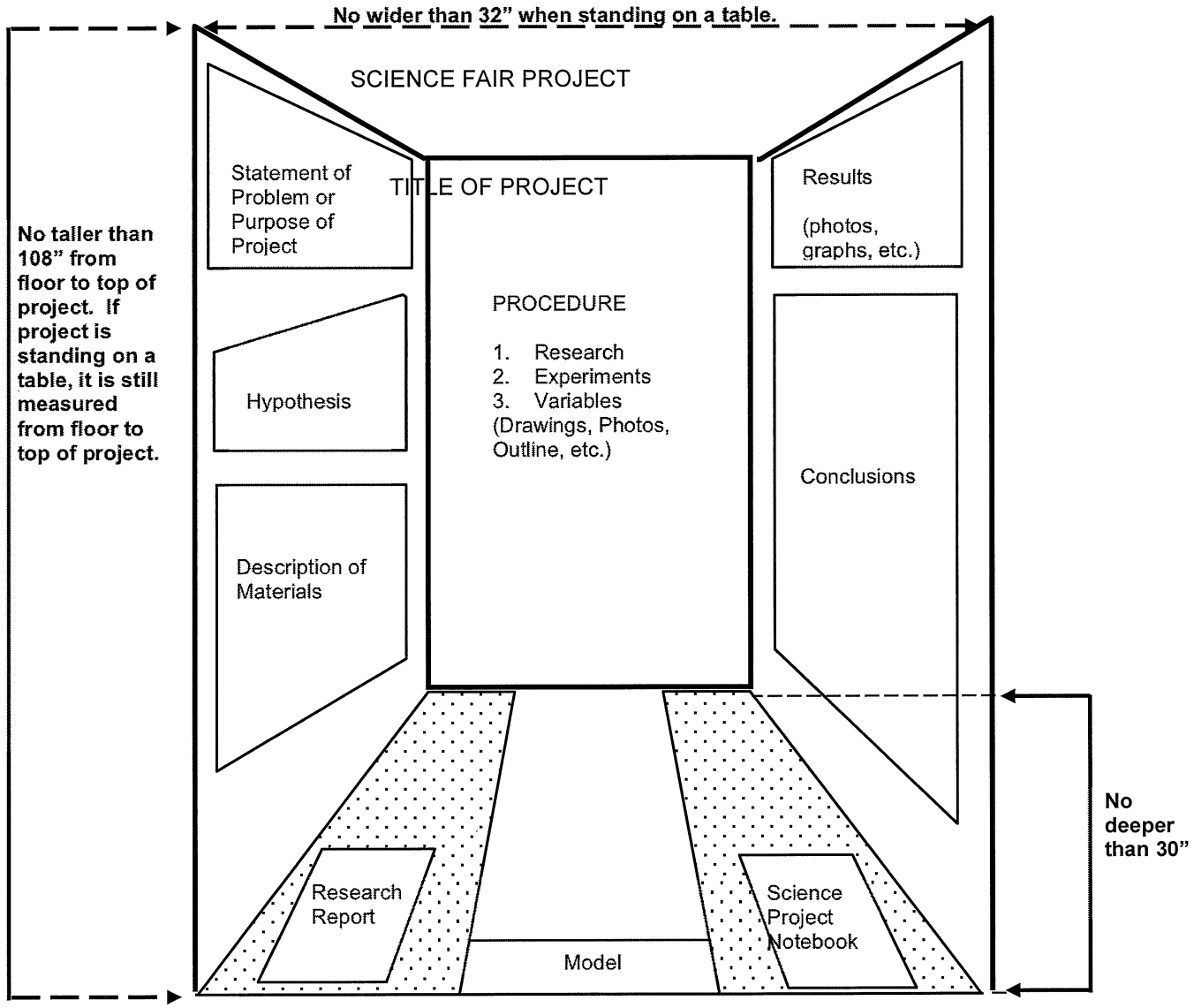
Rules and Certifications for Biological Projects

Required Form for Biological Projects

Sample Science Fair Project Display

Project displays should include these components:

1. **Title** of project
2. Statement of **problem** and **purpose** of project
3. **Hypothesis**
4. **Variables** (manipulating variable, responding variable, variables held constant)
5. **Procedure/Method**
6. **Results/Observations/Data**
7. **Conclusions**
8. **Research Report**
9. **Science Project Notebook**
10. **Display** of material or a model



Display Rules for 2016-17

It is essential for teachers to inform students and parents of these display rules.

The Elementary Regional Science Fair DOES NOT ALLOW the display of organic or potentially dangerous materials and the display of non-essential objects is discouraged. Anything that could be considered hazardous to the public is prohibited. Final d*eterminations of allowable components on displays are made by the Regional Science Fair Committee.*

Display Requirements:

1. The display board must be self-supporting, single-sided and must NOT exceed the size requirements: 30 inches deep, 32 inches wide, and 108 inches high. (from floor to top of exhibit)
2. Personal information including names, addresses, or phone numbers (student, teacher, parents, test or survey subjects), information identifying the student/school/district, accomplishments (previous awards), and acknowledgements may NOT be included on the display or in reports/journals.
3. When possible photographs/drawings should be used instead of actual objects or apparatus.
4. Electronic exhibits are prohibited. The site does not accommodate the use of electricity for project displays.
5. Display materials are NOT encouraged. Any model/apparatus included with display must fit within the dimensions of the display space provided.

Project displays may NOT include the following items:

1. Liquids, including water
2. Food "stuffs" or wrappers (candy, gum, popcorn, etc.)
3. Food or liquid containers
4. Living plants or plant materials, which are in their raw, unprocessed, unmanufactured or natural state such as leaves, seeds/nuts, bark, stems, or roots
5. Live animals (vertebrate or invertebrate) or animal tissues including eggs or egg shells
6. Preserved animals or their parts including teeth and hair
7. Soil (sand, clay, rock, etc.) or waste products
8. Laboratory / household chemicals (including detergents)
9. Dry ice or other sublimating solids
10. Syringes, needles, pipettes or similar devices
11. Flames, open or concealed, or flammable display materials (including candles)
12. Lasers
13. Inflated balloons
14. Photographs showing the face of the student or subjects
15. Photographs showing dissections, animal parts, trauma or injuries

Safety Rules for 2016-17

It is essential for teachers to inform students and parents of these safety rules.

For safety reasons the Elementary Regional Science Fair DOES NOT ALLOW experimentation using dangerous equipment or substances that may be harmful to students or others. If you are uncertain about any safety rules, contact your district science personnel. *Determinations of safety are made by the Regional Science Fair Committee and are final.*

Students MUST:

1. Obtain approval of the District Science Coordinator **BEFORE** beginning any project involving vertebrate animals, human subjects, or any potentially dangerous substance, material or equipment.
2. Have adult supervision when using equipment, sharp objects or chemicals (including household chemicals).
3. Although discouraged, any experiment involving fire and/or burning objects must follow local city ordinances and be supervised by an adult.
4. Observe proper safety protocol at all times.

Students MAY NOT conduct experiments that:

1 involve poisons, hazardous substances, controlled substances or devices or the ingestion or application of any over-the-counter medications to animals or humans.

2 involve any microbial cultures, mold, or disease causing fungi, including rotting or spoiled foods, or any other possibly pathogenic substances. (Exception: Experiment with baker's yeast so long as rDNA studies are NOT involved.)

3 involve microbial presence/growth. (Exception: Experiments using manure with composting to test variables.)

4 involve human parts, blood or other body fluids. (Exception: Experiments may include sterilized teeth that were naturally extracted by a dentist, primary teeth that were naturally removed, or hair clippings.)

5 cause or may cause harm or injury to animals or human subjects.

6 involve explosives including guns, ammunition and rocket propellants

7 involve highly caustic or toxic substances. Experiments involving mildly caustic or toxic substances, including household chemicals, must be approved by district science personnel.

McKinney ISD K-5 Campus Science Fair
Rules and Certifications for Biological Projects

It is the responsibility of elementary teachers to approve projects that involve vertebrate animals, human subjects, teeth, hair clippings, and composting prior to the research of the student. All such projects that are entered in the campus science fair require a district coordinator's certification. The "Required Form for Biological Projects" must be completed for all biological projects.

Research must be conducted with a respect for life and an appreciation of humane considerations, which must be afforded all animals.

1. The Federal regulations for the protection of human subjects in behavioral and biomedical research are becoming increasingly more rigid. Teachers and students should discuss proper methodology and humane concerns. Students may not start any such research unless adult supervision determines, in advance, that it will be in full compliance with safety guidelines. This includes research in which students are the subject of his/her own research. All projects using human subjects must have signed consent forms from each subject agreeing to their participation in the study and appearance in any photographs, which may be displayed. Remember, photographs may not show faces. These are turned in with a project.

2. To provide for humane treatment of animals, an animal supervisor, who is knowledgeable in the proper care and handling of laboratory animals, must assume primary responsibility for the condition under which animals are maintained. If the school faculty includes no one who is knowledgeable in the proper care and handling of laboratory animals, the services of such a person, on a consulting basis, must be obtained. The comfort of the animals used in any research will be a prime concern.

3. Experimental procedures that cause pain or discomfort are prohibited. No research using live animals shall be attempted unless the animals have been obtained from a reliable source and the following conditions can be assured: appropriate, comfortable quarters; adequate food and water; humane treatment; and gentle handling. Proper quarters and care must be provided at all times, including weekends and vacation periods. Pet store animals are inappropriate for experimentation. The genetic background, age, and past nutritional status are difficult to determine. Under no circumstances should the students be allowed to perform sacrifice.

4. Experimentation with composting may not include the use of manure. Microorganisms are a byproduct of composting and composting material should be handled using personal protective equipment. Investigation of the microorganisms found in composting is prohibited.

McKinney ISD Campus Science Fair for Grades K-5
Required Form for Biological Projects

THIS FORM MUST BE COMPLETED for all research involving vertebrate animals, human subjects, (including surveys of human subjects), teeth, hair clippings, and composting PRIOR TO THE RESEARCH. Refer to Safety Rules for clarification on prohibited experiments.

Type or print
Student's name_____

School_____ Grade_____

Description of the project: Be specific about what materials will be tested and how they will be tested.

_____

_____

_____

_____

_____

_____

_____

I agree to sponsor the student named above and assume responsibility for compliance with existing Science Fair rules.

Teacher's signature _____ Date _____

Teacher's name _____

Teacher's position_____

Teacher's address_____

City/State/Zip_____

Teacher's office phone_(_____)_____ Teacher's conference hour_____

District Coordinator's signature _____ Date: _____

THIS FORM MUST BE COMPLETELY FILLED OUT AND PLACED IN THE ENVELOPE ON THE BACK OF THE PROJECT PRIOR TO THE DISPLAY OF THE PROJECT AND JUDGING.

Appendix B

Project Judging Form

Elementary Regional Science Fair

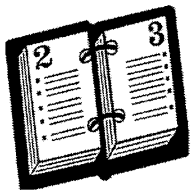
Science Fair Project Judging Form

Project Title:_____ **Project #:**_____

Important Elements of a Project	Range of Points			Points Earned
	Poor	Average	Excellent	
Question/Problem (original - not copied from a book or the Internet)	0-4	5	6-8	
Investigation/Experiment (active investigation/experiment – not a model, kit, demonstration, or collection	0-5	6-9	10-12	
Purpose (understands and explains problem)	0-5	6-8	9-10	
Problem (posed as a testable question - not Yes or No)	0-2	3	4	
Hypothesis (posed scientifically – If ..... then statement)	0-2	3	4	
Experimental Plan (develops a fair test using adequate number of trials and/or uses a large enough sample)	0-2	3	4	
Variables (defined & documented)	0-1	2-3	4	
Procedure (step-by-step procedure carefully followed)	0-1	2-3	4	
Results/Conclusion (conclusion supported by results, accurate data presented in graphs, tables, pictures, etc.)	0-1	2-3	4	
Research (student's explanation in their own words of current research & a plan for further study)	0	1	2	
Practicality (real world application – valid generalizations, notes limitations)	0-2	3	4	
Difficulty Level (appropriate – not too easy or too difficult for age)	0-5	6-7	8-9	
Appearance (logical flow and neatly executed)	0-3	4-5	6	
Thoroughness (adequate number of repeated trials; testing and data; evidence of student work)	0-1	2	3	
Solved Problem Stated (clearly stated as valid or invalid)	0-1	2	3	
Lab Notebook (notebook/journal: a daily written record of project)	0-1	2	3	
Conclusion (supported by data and connected to hypothesis)	0-2	3-4	6	
Display (descriptions & labels guide you through the project)	0-2	3	4	
Written Responses (clear & well organized)	0-3	4-5	6	
			TOTAL POINTS	

Appendix C

Regional Science Fair Information



ELEMENTARY REGIONAL SCIENCE FAIR

IMPORTANT INFORMATION AND DATES

The Elementary Regional Science Fair is a collaborative effort of Allen, Carrollton-Farmers Branch, Garland, McKinney, Mesquite, Plano and Richardson school districts. The regional fair is an opportunity for students in grades 1 through 6 to compete against students from nearby areas.

In order for students to participate, the campus science fair must occur at least three weeks before the regional fair. Projects in the elementary regional science fair are scored in the categories of life, earth, and physical sciences. Each participating school may submit the following projects in the Elementary Regional Science Fair. Projects may only compete in the division of the grade level of the students.

- One lower division winner from grades 1-3
- One upper division winner from grades 4-5

Group projects are acceptable. Groups are limited to no more than 3 members. Siblings may work together on a project. Group projects are assigned to the division of the oldest student.

The regional fair is a two night event held in February of each year. During the first evening, students and parents check in, set up their project, and have it reviewed for compliance with all Elementary Regional Science Fair rules, including safety, participation, and display expectations. Students and parents are welcome to browse through the other projects during this time. Projects are judged the following morning and the awards ceremony occurs on the second evening.

Save these dates!

January 30, 31, 2016 Elementary Regional Science Fair
Curtis Culwell Center, Garland, TX