Discover Scientific Method Research Poster Contest

Introduction

This program is based on science and the scientific method using the 4-H Science, Engineering, and Technology (S.E.T.) model. The 4-H Science experience is a program that is framed in science, engineering, and technology concepts. The objective is to implement science, engineering, and technology in the forefront of all 4-H project work. The Discover Scientific Method Research Poster Contest will allow youth to apply the scientific method to the subject matter they have learned through their 4-H projects. The scientific method is a process for experimentation that is used to explore observations and answer questions. Scientists use the scientific method to explore relationships in nature.

The research poster contest will allow youth an opportunity to display and explain through the scientific method their project, research and observations.

Scientific Method Steps

- Name the problem or question
- Form an educated guess (hypothesis) of the cause of the problem and make predictions based upon the hypothesis
- Test the hypothesis by doing an experiment or study (with proper controls)
- Check and interpret the results
- Report the results to the scientific community

Objectives

- To initiate a program based on science and the scientific method
- To increase the awareness of science, engineering and technology among 4-H members
- To implement science, engineering and technology in the forefront of 4-H project work through the use of 4-H S.E.T. Abilities:

Science abilities encompass the entirety of the cause and effect on the world

Engineering is recognized as a problem-solving and design process within science and technology

Technology is human innovation

- To allow youth to apply subject matter they have learned through various projects and programs

Discover Scientific Method Research Poster Contest Changes to 2013 Contest

Team has been changed to include up to six 4-H members. This is a change from a team of two as in the previous years.

Texas 4-H Roundup Discover Scientific Method Research Poster Contest Senior Competition Awards and Placing: Highest scoring poster from each of the seven categories will be called back for final evaluation and interview to determine the final 1, 2, 3 placing and associated awards. The remaining four high scoring category posters will receive first place ribbons for category, but not be recognized as final winners. Scholarships are still pending based on donor support, but will only be awarded to final 1, 2, and 3 placing in Senior Division.

Texas 4-H Roundup Discover Scientific Method Research Poster Contest Intermediate Competition Awards and Placing: Highest scoring poster from each of the seven categories will be called back for final evaluation and interview to determine the final 1, 2, 3 placing and associated awards. The remaining four high scoring category posters will receive first place ribbons for category, but not be recognized as final winners.

Discover Scientific Method Research Poster Contest Overview

The Discover Scientific Method Research Poster Contest is designed to help youth identify a question or problem, then focus learning and solving the problem using the scientific method in the following project areas: Biology; Chemistry and Earth; Computer Science and Math; Consumer Products Testing; Energy and Transportation; Environmental Science; and Physics, Engineering, and Astronomy. Topics can cover any field as long as it is research oriented, and may include humanities or social sciences that meet the research criteria. **The County Extension Agent or their designee will document and certify all projects.**

Category Descriptions:

Biology: Animal Sciences, Plant Sciences, Microbiology, Cellular and Molecular Biology

Chemistry and Earth: Study of nature and composition of matter and laws governing it – physical chemistry, organic chemistry, inorganic chemistry, plastics, metallurgy, soil chemistry, etc.; Geology, mineralogy, climatology, oceanography, meteorology, seismology, geography, tectonics, planetary science, etc.

Computer Science and Math: Study of development of computer software and hardware and associated logical devices. Development of formal logical systems or various numerical and algebraic computations, and the application of these principles – calculus, geometry, abstract algebra, number theory, statistics, complex analysis, probability

Consumer Products Testing: Comparison of product quality, effectiveness, usefulness, economy, cost, smell, environmental friendliness etc.

Energy and Transportation: Aerospace and aeronautical engineering, aerodynamics, alternative fuels, fossil fuel energy, vehicle development, renewable energies, engines

Environmental Science: Study of pollution (air, water, and land) sources and their control; environmental engineering, ecology

Physics, Engineering, and Astronomy: Theories, principles, and laws governing energy and the effect of energy on matter – solid state, optics, acoustics, particle, nuclear, atomic, plasma, superconductivity, fluid and gas dynamics, semiconductors, magnetism, quantum mechanics, biophysics; Technology; projects that directly apply scientific principles to manufacturing and practical uses – civil, mechanical, chemical, electrical, material, thermodynamics, robotics, etc.; Astronomy, study of celestial objects and phenomena originating outside the Earth's atmosphere

The research poster contest will afford youth the opportunity to showcase their accomplishments. Judging will be based on the interest and understanding of the research layout which should include a good combination of text, graphics, and photos. The Judging Scorecards explains further the criteria for each age division. Scorecards used are from Science Buddies partnership with Texas 4-H.

- Judging Scorecard Elementary (Juniors)
- Judging Scorecard Basic (Intermediates)
- Judging Scorecard (Senior)

The contestant(s) will give a two-minute overview, have an interview with questions, and develop a project notebook, which will relate the work conducted on the research topic. Youth may work individually or in groups of two. The poster contest will use the same age divisions as outlined in the Texas 4-H Rules and Guidelines and the topics should be age appropriate. Please see complete handbook for contest rules, guidelines, and specifics.

Certification by County Extension Agent

< The County Extension Agent, with special emphasis on research projects that involved animal subjects, must approve research. Research involving animals must adhere to standard experimental standards.
< Research certification must be complete and certified by County Extension Agent before the project begins.
< Periodic and documented updates to County Extension Agent must be shown in research notes and included in the project Notebook.

Age Divisions

< The Texas 4-H Research Poster contest will follow the same age divisions as outlined in the Texas 4-H Rules and Guidelines.
< Topics for the Texas 4-H Research Poster Contest should be age appropriate.
< Research should be of a nature that the 4-H member can develop, research, process, and write a meaningful paper on the age appropriate topic.

Team or Individual

Research projects may be an individual effort, or be comprised of a team of up to six 4-H members. If a tea, all 4-H members must keep separate notebooks, with individual notes and then combine the notes for final project notebook.

Poster Guidelines

< Poster dimensions: No larger than 36" high by 72" wide (unfolded).
< Posters must stand upright on a table once unfolded.
< The poster should include an abstract, introduction, background, methodology, results and/or conclusions.
< Items not adhered to poster must fit on the tabletop within the dimension of the unfolded poster. Nothing may be hung from the top of the poster (lights, banner, shelf, etc.) that will be outside of the above mentioned poster dimensions.

Hints for a good poster:
Good title – Your title is a very important attention getter. A good title should simply and accurately present your project and depict the nature of it. The title should be no longer than 10 words.
Nice visuals – Photographs, drawings, charts and graphs that explain your project and results should be clear, well done, and easy to understand.
Be organized – Make sure your display follows a sequence, logical and easy to read. A glance should permit anyone (especially the judges) to quickly locate the title, summary, experiments, results and conclusions.
Clearly presented – Be aware that the font size needs to be large enough to read from 3 feet away. Make sure the poster has all the information the judges will need.

Junior and Intermediate Research Notebook
Notebook should chronicle the 4-H member's work on the chosen research topic. Suggested entries could be - reason for choice of topic, initial question, basic knowledge of topic, major resources for determining question refinement (literature search), hypothesis, scientific methodology of research (experiment design), initial results and testing results, and conclusion. Use of notes during research is highly desirable and should be included in the notebook.

Senior Research Notebook
Notebook should chronicle the 4-H member's work on the chosen research topic. Notebooks must include accurate, timely, and original notes of implemented project. They should also contain the following headings:

<Title Page	<Introduction	<Discussion and conclusions
<Table of Contents	<Materials and methods	<Acknowledgments
<Abstract	<Results	<Literature cited

Safety
Safety should be a primary concern for every science experiment. Almost any tool or technique, no matter how safe, can be used in an unsafe manner. At the same time, many potentially dangerous tools are perfectly safe if they are used in the proper way. So how do you know if your project is within reasonable safety guidelines? Science Buddies (www.sciencebuddies.org) recommends you ask three simple questions to test your project's level of safety.

Is it safe for other people or animals that are involved? All projects involving humans as subjects must involve minimal risk. Unacceptable risks include ingestion of any substance or physical contact with any potentially hazardous materials, as well as unnecessary physical, psychological, or emotional stress, including invasion of privacy. Even if you are simply surveying other students, you should review your questions in advance and decide if the questions meet this test, and determine if a parent/guardian's consent is needed for any students that are participating. If you are not sure, do not hesitate to ask your County Extension Agent, parent, or mentor to help you decide.

Live animals (in particular vertebrate animals-those with a backbone) should be housed, cared for, and observed in a safe and humane manner.

If you are participating in another science fair at your classroom or school fair, does your project meet the safety rules for that higher-level fair? If you will be participating in a city or county-wide fair, make sure that the projects meet the rules of that fair. Science fairs affiliated with the Intel International Science and Engineering Fair (ISEF) must follow very strict and detailed safety rules, often including pre-approval before experimentation begins. The Science Buddies website has an overview of these rules on the Scientific Review Committee (SRC) page.

Finally, have you addressed safety concerns to your parents' and County Extension Agent's satisfaction? Make sure you address all safety issues in your project proposal so your adult supervisors are aware of any issues ahead of time. Your County Extension Agent will then evaluate your project based on the following questions:

1. Where will the experiment be performed?
2. What safety gear will be used?
3. Who will be supervising the experiment?
4. Are you knowledgeable about or do you have training in the procedures being used?

If in doubt about the safety of the experiment, ask your County Extension Agent, parent, or mentor for advice. Be prepared to choose another project if your County Extension Agent decides that yours does not meet age appropriateness or the safety guidelines. Hopefully good common sense and the questions above will help you put together a fun, informative, and safe research project.

Science Projects for 4-H from Science Buddies
http://www.sciencebuddies.org/science-fair-projects/parents_4h.shtml

Teaching the Scientific Method - Science Buddies Web Resources
http://www.sciencebuddies.org/science-fair-projects/project_question.shtml
http://www.sciencebuddies.org/science-fair-projects/parent_resources.shtml#tc-scientificmethod
http://www.sciencebuddies.org/science-fair-projects/project_experimental_procedure.shtml
http://www.sciencebuddies.org/science-fair- projects/project_data_analysis.shtml
http://www.sciencebuddies.org/science-fair-projects/project_final_report.shtml

Teaching the Scientific Method Intel ISEF Resources
http://www.intel.com/education/isef/ - printable thirteen-week Guide for After-school
http://www.intel.com/education/isef/middleschool.htm - middle right of page for materials

The Scientific Method (page excerpt from Science Buddies presentations for teachers)

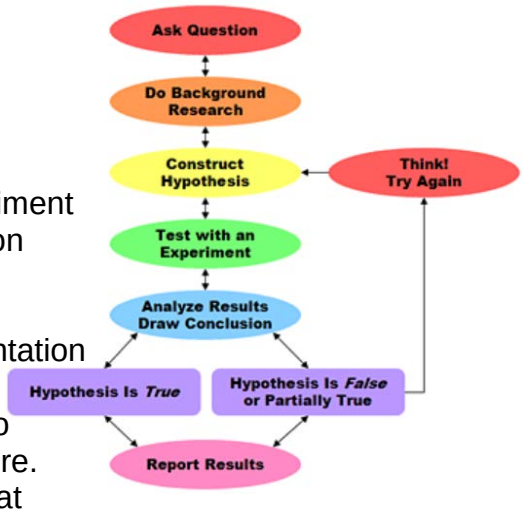
Scientific method refers to techniques for investigating phenomena, acquiring new knowledge, or correcting and integrating previous knowledge. To be termed scientific, a method of inquiry must be based on gathering observable, empirical and measurable evidence subject to specific principles of reasoning. A scientific method consists of the collection of data through observation and experimentation, and the formulation and testing of hypotheses.

Reasoning is the cognitive process of looking for reasons for beliefs, conclusions, actions or feelings. Although reasoning was once thought to be a uniquely human capability, other animals also engage in reasoning.

A hypothesis consists either of a suggested explanation for an observable phenomenon or of a reasoned proposal predicting a possible causal correlation among multiple phenomena. The term derives from the Greek, *"hypotithenai*" meaning "to put under" or "to suppose." The scientific method requires that one can test a scientific hypothesis.

The steps of the scientific method are to:

- Ask a Question
- Do Background Research
- Construct a Hypothesis
- Test Your Hypothesis by Doing an Experiment
- Analyze Your Data and Draw a Conclusion
- Communicate Your Results



The scientific method is a process for experimentation that is used to explore observations and answer questions. Scientists use the scientific method to search for cause and effect relationships in nature. In other words, they design an experiment so that changes to one item cause something else to vary in a predictable way.

Just as it does for a professional scientist, the scientific method will help you to focus your research Poster project question, construct a hypothesis, design, execute, and evaluate your experiment.

Steps of the Scientific Method

Ask a Question: The scientific method starts when you ask a question about something that you observe: How, What, When, Who, Which, Why, or Where?
And, in order for the scientific method to answer the question it must be about something that you can measure, preferably with a number.

Do Background Research: Rather than starting from scratch in putting together a plan for answering your question, you want to be a savvy scientist using library and Internet research to help you find the best way to do things and insure that you don't repeat mistakes from the past.

Construct a Hypothesis: A hypothesis is an educated guess about how things work: "If _____[I do this] _____, then _____[this]_____ will happen."
You must state your hypothesis in a way that you can easily measure, and of course, your hypothesis should be constructed in a way to help you answer your original question.

Test Your Hypothesis by Doing an Experiment: Your experiment tests whether your hypothesis is true or false. It is important for your experiment to be a fair test. You conduct a fair test by making sure that you change only one factor at a time while keeping all other conditions the same.
You should also repeat your experiments several times to make sure that the first results weren't just an accident.

Analyze Your Data and Draw a Conclusion: Once your experiment is complete, you collect your measurements and analyze them to see if your hypothesis is true or false.
Scientists often find that their hypothesis was false, and in such cases they will construct a new hypothesis starting the entire process of the scientific method over again. Even if they find that their hypothesis was true, they may want to test it again in a new way.

Communicate Your Results: To complete your science fair project you will communicate your results to others in a final report and/or a display board. Professional scientists do almost exactly the same thing by publishing their final report in a scientific journal or by presenting their results on a poster at a scientific meeting.

Even though we show the scientific method as a series of steps, keep in mind that new information or thinking might cause a scientist to back up and repeat steps at any point during the process. A process like the scientific method that involves such backing up and repeating is called an iterative process.

Throughout the process of doing your research poster project, you should keep a journal containing all of your important ideas and information. This journal is called a laboratory notebook.

Possible Timeline of Activities for Discover: Scientific Method Research Poster Contest

1. Set meeting with County Extension Agent
   1.1. Take information with you to outline your research project
      1.1.1. Topic
      1.1.2. Information of your experiences, or why you are interested, in the research topic
      1.1.3. Review Safety Guidelines with County Extension Agent and parents
   1.2. Articles, or books on topic that interest you
   1.3. Calendar
   1.4. Spiral notebook to begin taking notes on meeting and put the date on it (You and your County Extension Agent need to sign and date)

(**Generate Question**)

2. Write your Inquiry Question
   2.1. Begin with what you know
   2.2. Write why you want to conduct an experiment on the subject
   2.3. Evaluate the question to determine if you have resources available to experiment and find the answer (Use Operational Definitions to clarify the question)
3. Set meeting with County Extension Agent to discuss your question

(**Designs and Investigations**)

4. Write your hypothesis (What you think will happen)
5. Research what variables (what they are, and what type of variables) will have to be identified and what controls will be needed for experiment
6. Write the materials and methods you will use and the experimental procedures you will follow
7. Set meeting with County Extension Agent to discuss your experiment

(**Gathers and Transforms Data**)

8. Gather all the materials you will need to begin your experiment
   8.1. Notebook entries should be as complete as possible
   8.2. Notes are the way to put your observations down so later you can find answers
   8.3. Dates, times, and thoughts you have about the experiment should be written
   8.4. Plan data records that need to be collected
9. Set regular meetings with your County Extension Agent to report the progress of your research

   9.1. Take notebook each time so each of you sign and date the meeting notes page
   9.2. Bring out any unique things you are recording in your notebook
   9.3. Write down ideas for other research projects that interest you from your work
10. Begin thinking of how to organize information to put on Poster Display

(**Prepare Analysis**)

11. Identify patterns in results
12. Explicitly use results to answer the question
13. Point out sources of errors or limitations
14. Follow guide of notebook layout
15. Develop your presentation and sketch your poster display layout
16. Set meeting with County Extension Agent to review notebook and poster sketch
17. Make your poster
18. Submit entry materials for Contest
19. Share results with others in your community
20. Conclude current research project and set future goals

Safety Rules

1. If an exhibit becomes unsafe or unsuitable for display, it will be removed and deemed ineligible for any awards.
2. Projects which involve vertebrate animal subjects must conform with the following statement: **Experiments on live animals involving surgery, the removal of parts, injection of harmful chemicals, and/or exposure to harmful environments, are not acceptable at the Discover Scientific Method Research Poster Contest.** Live vertebrates are not permitted at the Discover Scientific Method Research Poster Contest.
3. Toxic and hazardous chemicals are prohibited.
4. All necessary chemical glassware must be displayed in a stable manner. The items must be back from the edge of the table and may not be operational at any time.
5. 4-H Member should substitute colored water, photographs or drawings for chemicals.
6. Crystals, other than sucrose (sugar) and sodium chloride (salt), may not be displayed. Projects involving crystals can be represented by pictures or other three-dimensional models.
7. Hypodermic needles and syringes may not be displayed in any exhibit at the Discover Scientific Method Research Poster Contest.
8. It is critically important that no person be exposed to any bacteria that are considered pathogenic. Therefore, the following two rules are very important: **No wild cultures incubated above room temperature; no cultures taken from humans or other warm blooded animals may be used.** This includes, but is not limited to skin, throat and mouth.
9. Plastic petri dishes must be sealed.
10. Lasers may not be used in any exhibit.
11. Dangerous and combustible materials are prohibited.
12. No exhibit shall have open flames. Any part of an exhibit that can get hotter than 100 degrees Celsius (boiling water temperature) must be adequately protected from its surroundings.
13. If an exhibit includes electrical wiring or devices, they must be safe. For voltages above 20 volts, special precautions must be taken. All connections must be secure and provide suitable protection against short circuits, etc.
14. All wiring carrying more than 20 volts must be well- insulated. Also, the connections must either be soldered or secured by UL approved fasteners. The wire used must be insulated adequately for the maximum voltage that will be present and the wire must be of sufficient size to carry the maximum current you anticipate. Open knife switches or doorbell-type push buttons in circuits using more than 20 volts may not be used.
15. If the exhibit will be connected to 120 volt AC power (plugged into a wall outlet) fuses or circuit breakers must be provided to protect not only the exhibit but also any others that may share the same sources of power. The power cord used must be UL approved for the voltage and current it will be carrying, and it must be at least 1.8 meters (6 feet) long. Discover Scientific Method Research Poster Contest staff must be notified of the need for power at the time of certification so power can be ordered in advance.
16. Exhibits requiring voltage in excess of 120 volts AC are not allowed.

County Extension Agent Approval Form

Member(s) Name(s) _____ **County/Club** _____

1. Adult Sponsor Approval: I have read the Research Plan prior to experimentation and reviewed the Checklist for County Extension Agent with the 4-H Member. I agree to sponsor the member(s) and assume reasonable responsibility for compliance with all rules.

CEA Printed Name _____ **Signature** _____ **Date** _____

2. 4-H Member Acknowledgement: I understand the risks and possible dangers to me in the Research Plan. I will adhere to all rules when conducting this research.

4-H Member Printed Name _____ **Signature** _____ **Date** _____

4-H Member Printed Name _____ **Signature** _____ **Date** _____

3. Parent/Guardian Approval: I have read and understand the risks and possible dangers involved in the Research Plan. I give my consent to my child prior to participating in this research.

Parent/Guardian Printed Name _____ **Signature** _____ **Date** _____

FORM REQUIRED FOR COMPETITION

Scan and mail to mtarpley@ag.tamu.edu

Human Vertebrate Endorsement

Recognizing that human beings are vertebrate animals and yet need different criteria than nonhuman vertebrates, the following policies will govern the use of human beings.

1. No projects involving human cultures of any type (mouth, throat, skin or otherwise) are allowed. However, tissue cultures purchased from reputable biological supply houses or research facilities are suitable for student use.
2. Projects that involve taste, color, texture or any other choice are allowed, but are limited to preference only. Quantities of normal food and non-alcoholic beverages are limited to normal serving amounts or less. No project may use drugs, food or beverages in order to measure their effect on a person.
3. The only human blood that may be used is that which is either obtained through a blood bank, hospital or laboratory. No blood may be drawn by any person or from any person specifically for a science project. This rule does not preclude a student making use of the data collected from blood tests not made exclusively for a science project.
4. Projects that involve exercise and its effect on pulse, respiration rate and blood pressure are approved, if valid, normal physical examination is on file and the exercise is not carried to extreme.
5. Projects that involve learning, ESP, motivation, hearing, vision and surveys are allowed. No project will be allowed that is in violation of these rules.
6. No person may perform any experiment for the student that violates any of the rules.

In this space, briefly describe the use of humans in your project. Use the back of this page if necessary.

The signatures of the student(s) and the CEA indicate this project conforms to the above rules.

CEA Printed Name	Signature	Date
4-H Member Printed Name	Signature	Date
4-H Member Printed Name	Signature	Date

FORM REQUIRED FOR

Scan and mail to mtarpley@ag.tamu.edu

Non-Human Vertebrate Endorsement

These rules are strictly enforced. Students and advisors using non-human vertebrates in their project must complete this form. The signature of the student and the advisor indicate the project was done within the rules and regulations of

1. Intrusive techniques used cannot exceed momentary pain and must comply with commonly accepted livestock management procedures.

2. Changing an organism's normal environment by using either aversive stimuli or predatory/prey conditions to study behavior/operant conditioning is prohibited.

3. Food and water cannot be used or withheld for more than 24 hours for maze running and other learning or conditioning activities.

4. The student and advisor have the responsibility to see that animals are properly cared for in a well-ventilated, lighted and warm location with adequate food, water and sanitary conditions. Care must be taken to see that organisms are properly cared for during weekends and vacation periods.

5. Chicken or other bird embryo projects must be terminated at or before ninety-six hours.

6. Projects that involve behavioral studies or newly hatched chickens or other birds will be allowed, provided no change has been made in the normal incubation and hatching of the organism and all vertebrate rules are followed.

In this space, briefly describe the use of vertebrate animals in your project. Use the back of this page if necessary.

The signatures of the student(s) and the CEA indicate this project conforms to the above rules.

CEA Printed Name	Signature	Date
4-H Member Printed Name	Signature	Date
4-H Member Printed Name	Signature	Date

FORM REQUIRED FOR COMPETITION

Scan and mail to mtarpley@ag.tamu.edu

Figure 1: Elementary for use in 4-H Junior age Division

Science Fair Project Judging Scorecard – Elementary*

Student's Name:	**Grade:**
Project Category:	**Date:**
Project Title:	**Project #:**
Judge's Name:	**Final Score:**

	Superior	Above Avg.	Average	Below Avg.	No Evidence
Scientific Method:					
1. Presented a question that could be answered through experimentation	4	3	2	1	0
2. Accurately followed steps to perform an experiment	4	3	2	1	0
3. Recorded observations in writing or a data table (advanced students will take measurements)	4	3	2	1	0
4. Used the observations to answer the question (advanced students will be able to provide a simple graph)	4	3	2	1	0
Scientific Knowledge, Presentation, Creativity					
5. Accessed age-appropriate sources for background research	4	3	2	1	0
6. Presentation is neat, well organized, and visually appealing	4	3	2	1	0
7. Included age-appropriate components to provide a thorough description of the project	4	3	2	1	0
8. Displayed creativity in the question, approach, or technique	4	3	2	1	0

Opportunities for Improvement, General Comments:

Total Score: _____ / 32

* This scorecard makes few assumptions about student knowledge. They should be able to follow the basic steps of an experiment and make observations to answer a question. Advanced students will be able to make measurements.

Figure 2: Basic for use in 4-H Intermediate age Division

Science Fair Project Judging Scorecard – Basic*

Student's Name:	**Grade:**
Project Category:	**Date:**
Project Title:	**Project #:**
Judge's Name:	**Final Score:**

	Superior	Above Avg.	Average	Below Avg.	No Evidence
Scientific Method:					
1. Presented a question that could be answered through experimentation	4	3	2	1	0
2. Developed a hypothesis	4	3	2	1	0
3. Developed a fair test to validate the hypothesis, changing only one factor at a time	4	3	2	1	0
4. Clear and thorough process for data observation and collection	4	3	2	1	0
5. Ran sufficient trials (at least 3)	4	3	2	1	0
6. Accurate experimental technique	4	3	2	1	0
7. Derived conclusions from appropriately organized data	4	3	2	1	0
8. Related conclusions back to the hypothesis	4	3	2	1	0

Opportunities for Improvement:

* This scorecard assumes students understand the concept of a fair test, but do NOT have knowledge of dependent, independent, and controlled variables.

Continued on next page...

Figure 3: Page 2 of Basic

Scientific Knowledge					
9. Accessed a minimum of three, age-appropriate sources for background research	**4**	**3**	**2**	**1**	**0**
10. Clearly identified and explained key scientific concepts relating to the experiment	**4**	**3**	**2**	**1**	**0**
11. Used scientific principles and / or mathematical formulas correctly in the experiment	**4**	**3**	**2**	**1**	**0**
Opportunities for Improvement:					
Presentation					
12. Neat, well organized, and visually appealing	**4**	**3**	**2**	**1**	**0**
13. Included key components to provide a thorough picture of the project (purpose / question, hypothesis, summary of research findings, materials and procedures, data charts or graphs, results, conclusions)	**4**	**3**	**2**	**1**	**0**
14. Included a lab notebook	**4**	**3**	**2**	**1**	**0**
Opportunities for Improvement:					
Creativity					
15. Investigated an original question or used an original approach or technique	**4**	**3**	**2**	**1**	**0**
Opportunities for Improvement:					
Total Score:	_____ / 60				
General Comments/ Notes:					

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Figure 4: Judging Scorecard for use in 4-H Senior age Division

Science Fair Project Judging Scorecard*					
Student's Name:	**Grade:**				
Project Category:	**Date:**				
Project Title:	**Project #:**				
Judge's Name:	**Final Score:**				
	Superior	**Above Avg.**	**Average**	**Below Avg.**	**No Evidence**
Scientific Method:					
1. Presented a question that could be answered through experimentation	4	3	2	1	0
2. Developed a hypothesis identifying independent and dependent variables	4	3	2	1	0
3. Developed good procedure for testing the hypothesis, including use of control variables	4	3	2	1	0
4. Clear and thorough process for data observation and collection	4	3	2	1	0
5. Ran sufficient trials (at least 3)	4	3	2	1	0
6. Accurate experimental technique	4	3	2	1	0
7. Derived conclusions from appropriately organized and summarized data	4	3	2	1	0
8. Related conclusions back to the hypothesis	4	3	2	1	0
Opportunities for Improvement:					

* This scorecard assumes students understand dependent, independent, and controlled variables.

Continued on next page...

Figure 5: Page 2 of Senior

Scientific Knowledge					
9. Accessed a minimum of three, age-appropriate sources for background research	**4**	**3**	**2**	**1**	**0**
10. Clearly identified and explained key scientific concepts relating to the experiment	**4**	**3**	**2**	**1**	**0**
11. Used scientific principles and / or mathematical formulas correctly in the experiment	**4**	**3**	**2**	**1**	**0**
Opportunities for Improvement:					

Presentation					
12. Neat, well organized, and visually appealing	**4**	**3**	**2**	**1**	**0**
13. Included key components to provide a thorough picture of the project (purpose / question, variables and hypothesis, summary of research findings, materials and procedures, data charts and graphs, results, conclusions)	**4**	**3**	**2**	**1**	**0**
14. Included a lab notebook	**4**	**3**	**2**	**1**	**0**
Opportunities for Improvement:					

Creativity					
15. Investigated an original question or used an original approach or technique	**4**	**3**	**2**	**1**	**0**
Opportunities for Improvement:					

Total Score:	_____ / 60
General Comments/ Notes:	

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Texas 4-H Discover Scientific Method Research Poster Contest Entry Form

Due Date: **Scan and mail to mtarpley@ag.tamu.edu**

Contest Name and Location:

4-H Member(s) Name:	
Project Title:	
Category:	
Age Division:	CEA Name:
County:	4-H Club Name:

Project Abstract: Write neatly below, or attach a typed copy with your name and problem on it.

4-H Member(s) Signature(s): Date:	County Extension Agent Signature: Date:
Parent/Guardian Signature: Date:	Date Entry Received: