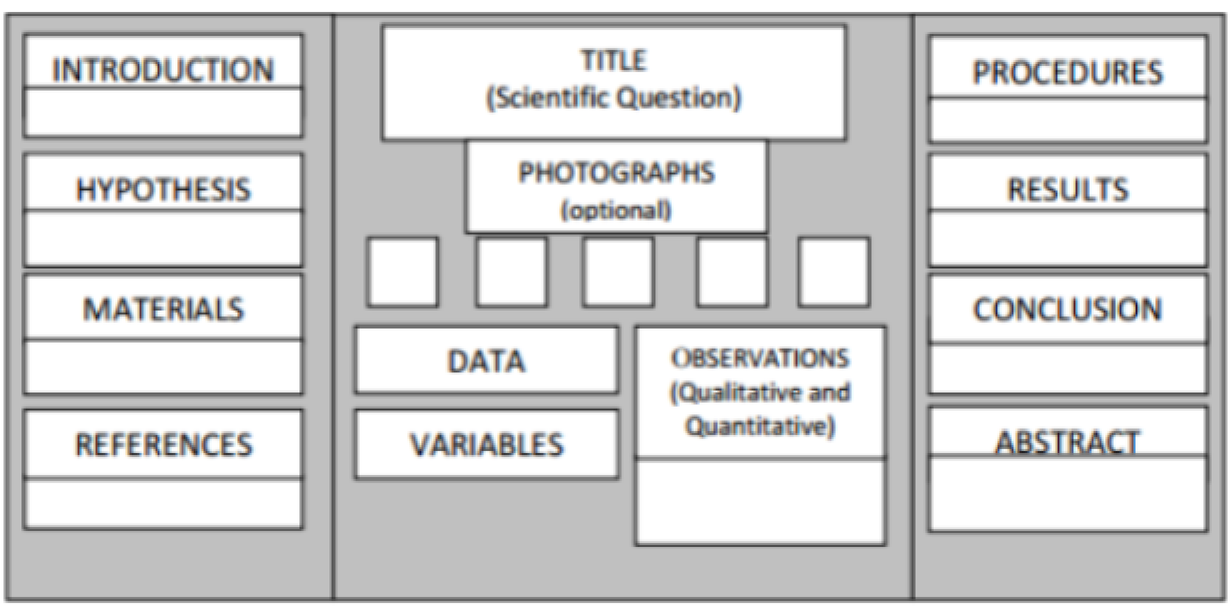
Science Fair Project Handbook

February 7th-8th, 2019

At Ukiah Valley Conference Center

A Guide for Entries to the Ukiah Unified School District Science Fair



Dear Parent/Guardian,

The Ukiah Unified School District Science Fair will be held on **Thursday, February 7th and Friday, February 8th, 2019 at Ukiah Valley Conference Center** located at 200 South School St. Ukiah, CA

The top winners at each grade level (3rd-12th), of our local science fair will also be eligible to display their projects and compete for ribbons/medals at the **Mendocino County Science Fair on March 9th, 2019.** K-2 students may enter the district science fair under Class C projects, but will not be eligible to move onto the county science fair.

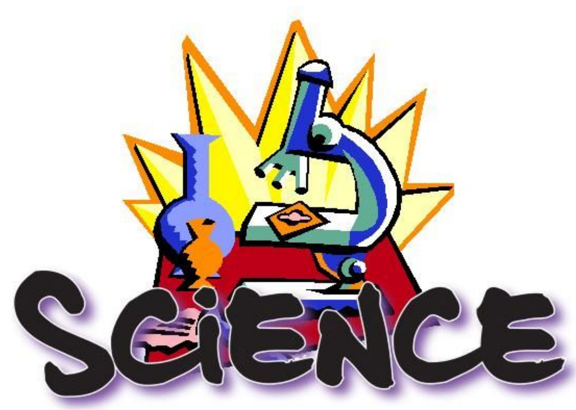
Your child is invited to participate in the science fair. I urge you to support and encourage this endeavor. It is acceptable for you to assist your child with his or her project, but keep in mind that it must be primarily his or her own work. Judges will be looking at the amount of student involvement and effort in a project. Please review the attached student Science Project Handbook for specific information on the project. Ukiah Unified School District will be using the standards presented in this handbook.

Researching and displaying a science fair project gives students the opportunity to engage in scientific inquiry, maintain accurate records, and apply the skills and processes of a scientist. We also hope that this project will stimulate an interest in science and encourage students to apply creative and critical thought to the solution of science problems. Additionally, we believe it is important to give public recognition to talented students for the work they have done.

Please do not hesitate to contact me if you have any questions.

Sincerely,

Terry d'Selkie
Ukiah Unified School District
Ukiah Adult School Room 3
1056 North Bush St.
Ukiah, CA 95482
(707) 621-5611
tdselkie@uusd.net



Who May Enter?

Any student enrolled in grades TK-12th may enter the science fair. Please review the specific classes and divisions below for specific information on entering. Please review the attached "Mendocino County Student Science Project Handbook" for specific category information.

Classes, Divisions, and Categories:

Class A Projects—Standard Entries/Experimental Projects

Entries in this division cannot have more than **three** students to a project. A group project will be entered into the grade level of the oldest student on the team, if students are from different grade levels. Class A experiments are projects that go through the scientific method.

Elementary Division (Grades 3, 4, & 5)
- Life Science
- Physical Science/Math
- Earth/Space Science/Technology

Junior Division (Grades 6, 7, & 8)
- Life Science A (Zoology, Botany, Biology, Microbiology)
- Life Science B (Environmental/Ecology, Medicine, Health, Behavioral/Social Sciences)
- Physics/Chemistry/Biochemistry/Math/Computer
- Earth Sciences/Space Sciences/Engineering/Electronics

Senior Division (Grades 9, 10, 11, & 12)
- Life Science A (Zoology, Botany, Biology, Microbiology)
- Life Science B (Environmental/Ecology, Medicine, Health, Behavioral/Social Sciences)
- Physics/Chemistry/Biochemistry/Math/Computer
- Earth Sciences/Space Sciences/Engineering/Electronics

Class B Projects—Displays/Demonstrations

- Entries in this division cannot have more than **three** students to a project. Class B projects demonstrate how something works and does not involve the scientific method.

Class C Projects—Classroom or School Projects

- Grade levels TK-12 which are completed by an individual's classroom or group of classes or a school.

What is a Science Fair Project?

A science project is an attempt to answer a question by designing and conducting an experiment or a series of experiments. This handbook will teach you how to do projects that require *hands-on* experimentation and use of the process known as the scientific method.

While a science project may include any or all of the elements listed below, you should keep in mind that it is more than just descriptive projects, models, or collections. For instance, a display of plants is not considered a science project but asking a question such as, *What is the effect of light on the germination of radish seeds,* can be a science project.

Selecting Your Project Topic

For many students, one of the most difficult parts of a science project is selecting a topic. A sample list of ideas is provided in this handbook. You are encouraged to research additional ideas, as well. Before deciding on a specific topic or project title, keep in mind that your project should be one that:

✓ You are really interested in researching;

✓ You are motivated to do;

✓ You have information available;

✓ You can get the materials and equipment needed;

✓ You can actually perform the experiment;

✓ You have enough time to work on and complete;

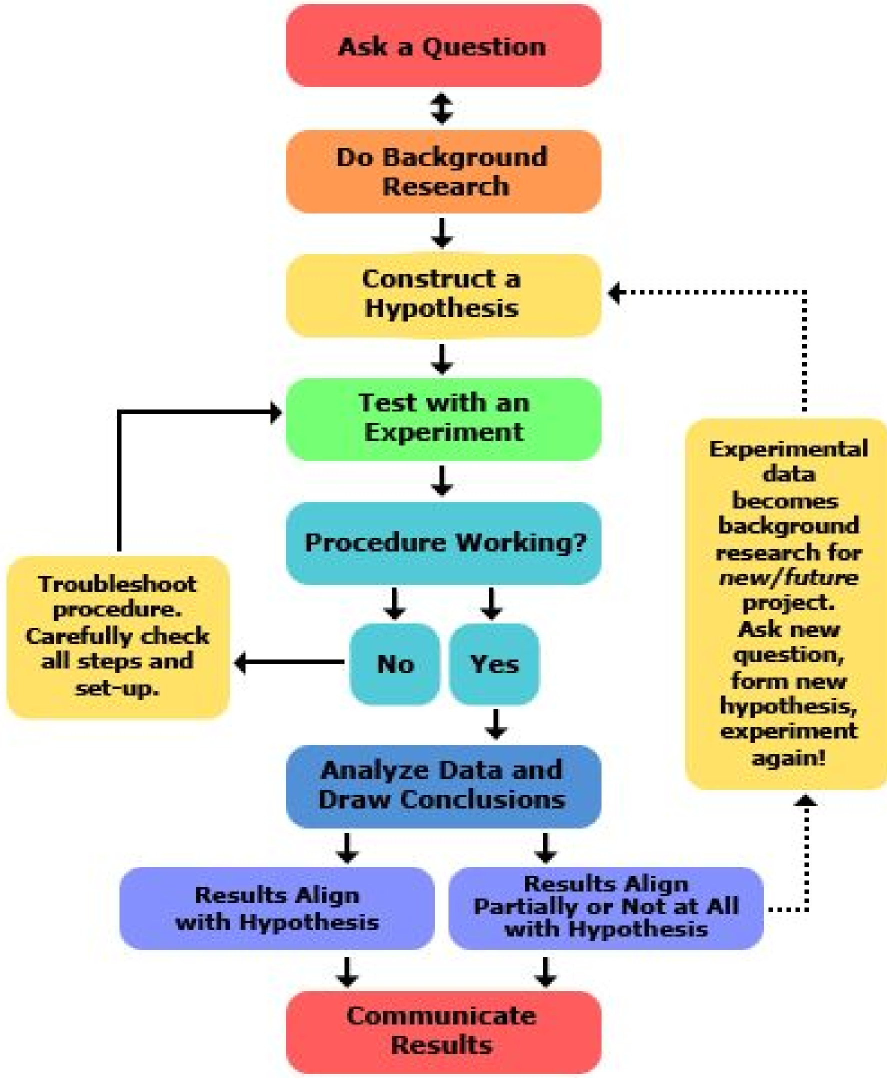
✓ And you can do by yourself or with very little help from others except for possible teammates (maximum 3 per team).

What is the Scientific Method?

The scientific method is a way to ask and answer scientific questions by making observations and doing experiments.

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



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? 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 supported or not. 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 they support your hypothesis or not. Scientists often find that their hypothesis was not supported, and in such cases they will construct a new hypothesis based on the information they learned during their experiment. This starts the entire process of the scientific method over again. Even if they find that their hypothesis was supported, 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. In a science fair, judges are interested in your findings regardless of whether or not they support your original hypothesis.

Science Fair Project Question?

Once you have chosen a topic of interest, you will need to create a related scientific question. Without a good question, your whole science fair project will be much harder, if not impossible! It is important to select a question that is going to be interesting to work on for at least a few weeks and that is specific enough to allow you to find the answer with a simple experiment. A scientific question usually starts with: How, What, When, Who, Which, Why, or Where. Here are some characteristics of a good science fair project question:

- The question should be interesting enough to read about, then work on for the next few weeks.

- There should be at least three sources of written information on the subject. You want to be able to build on the experience of others!

- The question should contain one factor (variable) that you can change in your experiment and at least one factor (variable) that you can measure.

Now, for something like a science fair project, it is important to think ahead. This will save you a lot of stress and unhappiness later. Visualize the experiment you might perform to answer your question.

- The experiment should measure changes to the important factors (variables) using a number that represents a quantity such as a count, percentage, length, width, weight, voltage, velocity, energy, time, etcetera. Or, just as good might be an experiment that measures a factor (variable) that is simply present or not present. For example, lights *on* in one trial, then lights *off* in another trial, or *use* fertilizer in one trial, then *do not use* fertilizer in another trial. If you cannot observe or measure the results of your experiment, you are not doing science!

- You must be able to control other factors that might influence your experiment, so that you can do a fair test. A "fair test" occurs when you change only one factor (variable) and keep all other conditions the same.

• Is your experiment safe to perform?

• Do you have all the materials and equipment you need for your science fair project, or will you be able to obtain them in a reasonable amount of time at a cost that is okay for your family?

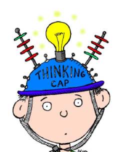
• Do you have enough time to do your experiment before the science fair? For example, most plants take weeks to grow. If you want to do a project on plants, you need to start very early! For most experiments you will want to allow enough time to do a practice run in order to work out any problems in your procedures.

Research:

Background research is necessary so that you know how to design and understand your experiment. To make a **background research plan** — a roadmap of the research questions you need to answer and follow these steps:

1. Identify the keywords in the question for your science fair project. Brainstorm additional keywords and concepts.
2. Use a table with the "question words" (why, how, who, what, when, where) to generate research questions from your keywords. For example:
   What is the difference between a series and parallel circuit?
   When does a plant grow the most, during the day or night?
Where is the focal point of a lens
   How does a java applet work?
Does a truss make a bridge stronger?
   Why are moths attracted to light?
   Which cleaning products kill the most bacteria?
1. Throw out irrelevant questions.
2. Add to your background research plan a list of mathematical formulas or equations (if any) that you will need to describe the results of your experiment.
3. You should also plan to do background research on the history of similar experiments or inventions.
4. Network with other people with more experience than yourself: your mentors, parents, and teachers. Ask them: "What science concepts should I study to better understand my science fair project?" and "What area of science covers my project?" Better yet, ask even more specific questions.

Hypothesis:



A hypothesis is an educated guess about how things work. Most of the time a hypothesis is written like this: "If _____[I do this] _____, then _____[this]_____ will happen." (Fill in the blanks with the appropriate information from your own experiment.) Your hypothesis should be something that you can actually test, what's called a **testable** hypothesis. In other words, you need to be able to measure both "what you do" and "what will happen."

Hypothesis

After having thoroughly researched your question, you should have some educated guess about how things work. This educated guess about the answer to your question is called the hypothesis. The hypothesis must be worded so that it can be tested in your experiment. Do this by expressing the hypothesis using your independent variable (the variable you change during your experiment) and your dependent variable (the variable you observe-changes in the dependent variable depend on changes in the independent variable). In fact, many hypotheses are stated exactly like this: "If a particular independent variable is changed, then there is also a change in a certain dependent variable."

Example Hypotheses

"If I open the faucet [faucet opening size is the independent variable], then it will increase the flow of water [flow of water is the dependent variable].

"Raising the temperature of a cup of water [temperature is the independent variable] will increase the amount of sugar that dissolves [the amount of sugar is the dependent variable]."

"If a plant receives fertilizer [having fertilizer is the independent variable], then it will grow to be bigger than a plant that does not receive fertilizer [plant size is the dependent variable]."

"If I put fenders on a bicycle [having fenders is the independent variable], then they will keep the rider dry when riding through puddles [the dependent variable is how much water splashes on the rider]."

Note: When you write your own hypothesis you can leave out the part in the above examples that is in brackets [ ].

Notice that in each of the examples it will be easy to measure the independent variables. This is another important characteristic of a good hypothesis. If we can readily measure the variables in the hypothesis, then we say that the hypothesis is **testable**.

Not every question can be answered by the scientific method. The hypothesis is the key. If you can state your question as a testable hypothesis, then you can use the scientific method to obtain an answer.

Project Experimentation:

Project experimentation is the process of testing a hypothesis. The things that have an effect on the experiment are called variables. There are three kinds of variables that you need to identify in your experiments: independent, dependent, and controlled.

The **independent variable** is the *one* that is changed by the scientist. Why just one? Well, if you changed more than one variable it would be hard to figure out which change is causing what you observe. For example, what if our scientific question was: "How does the size of a dog affect how much food it eats?"; then, during your feeding experiments you changed both the size of the dog and the time of day the dogs were fed. The data might get a bit confusing— did the larger dog eat less food than the smaller dog because of his size or because it was the middle of the day and dogs prefer to eat more in the morning? If you are new to doing science projects and want to know the effect of changing multiple variables, do multiple tests where you focus on one independent variable at a time.

The **dependent variables** are the things that the scientist focuses his or her observations on to see how they respond to the change made to the independent variable. In our dog example, the dependent variable is how much the dogs eat. This is what we are observing and measuring. It is called the "dependent" variable because we are trying to figure out whether its value depends on the value of the independent variable. If there is a direct link between the two types of variables (independent and dependent) then you may be uncovering a cause and effect relationship. The number of dependent variables in an experiment varies, but there can be more than one.

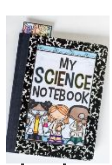
Experiments also have **controlled variables**. Controlled variables are quantities that a scientist wants to remain constant, and she must observe them as carefully as the dependent variables. For example, in the dog experiment example, you would need to control how hungry the dogs are at the start of the experiment, the type of food you are feeding them, and whether the food was a type that they liked. Why? If you did not, then other explanations could be given for differences you observe in how much they eat. For instance, maybe the little dog eats more because it is hungrier that day, maybe the big dog does not like the dog food offered, or maybe all dogs will eat more wet dog food than dry dog food. So, you should keep all the other variables the same (you control them) so that you can see only the effect of the one variable (the independent variable) that you are trying to test. Similar to our example, most experiments have more than one controlled variable. Some people refer to controlled variables as "constant variables."

Procedure:

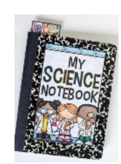
Write the **experimental procedure** like a step-by-step recipe for your science experiment. A good procedure is so detailed and complete that it lets someone else duplicate your experiment exactly!

Repeating a science experiment is an important step to verify that your results are consistent and not just an accident.

- For a typical experiment, you should plan to repeat it at least three times (more is better).
- If you are doing something like growing plants, then you should do the experiment on at least three plants in separate pots (that's the same as doing the experiment three times).
- If you are doing an experiment that involves testing or surveying different groups, you won't need to repeat the experiment three times, but you will need to test or survey a sufficient number of participants to insure that your results are reliable. You will almost always need many more than three participants!



Log Book:



The log book is the single most valued piece of work in your project, and must be brought with your project to the Science Fair. Keep your log book with your whenever you work on your project. It is your personal record of your science project and includes:

- Reading notes, articles, and data
    - Example: “I’ve researched my topic in…”
- Decisions
    - Example: “I’ve decided to experiment with plants” or state the reason why you decided to experiment on your subject.

- Actions
  - Example: “I’ve gone to the library to find books on my topic. I found a lot of books on…”
- Observations
  - Example: “I’ve noticed that plans are starting to wilt, so I need to water them more.”
- Thoughts and reflections
  - Example: “I’ve noticed that many of the seedlings are dying. I wish I had used more seeds. I’m worried that all my plants will be dead before the experiment is finished. I wonder why they are dying?”

Conclusion:

Your **conclusions** summarize how your results support or contradict your original hypothesis:

- Summarize your science fair project results in a few sentences and use this summary to support your conclusion. Include key facts from your background research to help explain your results as needed.
- State whether your results support or contradict your hypothesis. (Engineering & programming projects should state whether they met their design criteria.)
- If appropriate, state the relationship between the independent and dependent variable.
- Summarize and evaluate your experimental procedure, making comments about its success and effectiveness.
- Suggest changes in the experimental procedure (or design) and/or possibilities for further study.

Abstract:

Your science fair project abstract is an abbreviated version of your project. It's like an advertisement for what you've done. If you want judges and the public to be excited about your science fair project, then write an exciting, engaging abstract!

Since an abstract is so short, each section is usually only one or two sentences long. Consequently, every word is important to conveying your message. If a word is boring or vague, refer to a thesaurus and find a better one! If a word is not adding something important, cut it! But, even with the abstract's brief length, don't be afraid to reinforce a key point by stating it in more than one way or referring to it in more than one section.

Class A (Experimental Projects Abstract):

Objective or Goal:

State the objective, goal, or hypothesis upon which the project is based.

Materials and Methods:

Indicate the materials, methods, and experimental design used in your project. Briefly describe your experiment or engineering method. What materials did you use? How did you test your hypothesis?

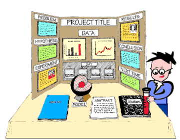
Results:
Summarize the results of your experiment and indicate how they pertain to your objective. What did you find out?

Conclusion/Discussion:
Indicate if your results support your hypothesis or enable you to attain your objective. Discuss briefly how information from this project expands our knowledge about the category. Did your results support your hypothesis? How did your results help society? What can people do with the information from your project?

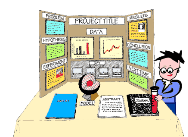
Class B (Display/Demonstration) and Class C (classroom/school) Projects

Purpose and Rational:
State the objective or goal upon which the project is based. Briefly explain your reasoning for selecting your topic and doing this project.

Materials and Methods:
Indicate the materials used in your project. Briefly describe what you did for this project.



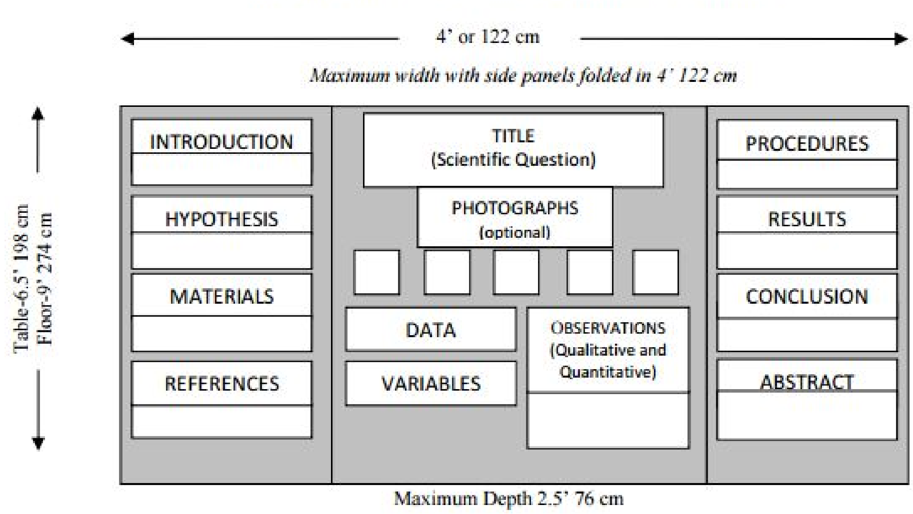
Display Board:



All projects must be free standing and must have a self-supporting display board. The student's name, school, and grade level should be displayed on the front of the board. Any indication of prizes or awards the project may have won at a local school science fair must be removed for display in the county fair. Listed below is a sample display board format (**DON'T FORGET YOUR LOG BOOK).**

Exhibit size:
· Maximum Width: 4 feet or 122 cm
· Maximum Depth: 2.5 feet or 76 cm
· Maximum Height: 6.5 feet or 198 cm on table OR 9 feet or 274 cm on floor.

California State Science Fair Standards for Displays



Important Dates:

- **January 31, 2019: FINAL DAY-** Science Fair Project Registration Due to Terry d'Selkie at the Ukiah Adult School or send to tdselkie@uusd.net
- **February 6, 2019:** Science Fair project drop-off at Ukiah Valley Conference Center – 4:00p.m.-6:30p.m.
- **February 7th, 2019:** Science Fair project judging – All Day

  February 7th, 2019: Science Fair open to public – 6:00p.m.-7:00p.m.
- **February 8th, 2019:** Classrooms field trips – 8:30a.m.-3:00p.m.
- **February 8th, 2019:** Project pick-up – 4:00p.m.-6:00p.m.
- **March 10th, 2018:** Mendocino County Science Fair

FEBRUARY 7th and 8th, 2019

Ukiah Valley Conference Center

SCHEDULE OF ACTIVITIES	TIME
February 6th, 2019: Science Fair Project Set-Up at Ukiah Valley Conference Center All projects must me in place by 6:30 p.m.	4:30p.m. – 6:30 p.m.
February 7th, 2019: Volunteer Judges' Orientation	10:00 a.m. 12:00 p.m. 2:00 p.m.
February 7th, 2019: Science Fair Project Judging Only judges and helpers are allowed in the project area during judging	All Day
February 8th, 2019: Science Fair Open to Public Students are welcome to visit the Science Fair with their families at this time.	6:00 p.m.-7:00 p.m.
February 8th, 2019: Science Fair Field Trips Classes can come view science fair projects	8:30 a.m.- 3:00 p.m.
February 8th, 2019: Project Pick-Up All projects must be removed by 6:30 p.m.	4:00 p.m.—6:00 p.m.
February 8th, 2019: Clean-Up The district coordinator will collect all remaining projects and return them to schools the following week	6:00 p.m. – 7:00 p.m.

Categories/Ideas for Science Fair Projects:

Behavior/Health/Social Sciences (Life Science B: Environmental/Ecology, Medicine, Health, Behavioral/Social Sciences)

- Does color have an effect on a person's food choice? How?
- How do sound waves affect your mood?
- Do TV commercials control buying habits?
- Which orange drinks have the highest concentration of Vitamin C?
- How do students communicate non-verbally to their teachers?

Biological Sciences (Life Science A: Zoology, Botany, Biology, Microbiology)

- What is the highest temperature at which milk may be stored and not spoil?
- Does gravity affect the direction that a seed grows?
- Does magnetism affect plant growth? How?
- Which fruits contain a large quantity of acid?
- How much salt will a plant tolerate and still grow?

Earth Science (Earth/Space Sciences: Earth, Space, Engineering)

- What is the rate of absorption of water in different soil types?
- Pick a constellation. Track its movement each night and use that to prove the earth's orbit around the sun.
- At what time during the day does the sun give the most energy?
- Conduct cloud chamber investigations of particles and cloud formation.
- Conduct an analysis of the Mount St. Helen's eruption as compared to the Hawaiian eruptions.

Ecology/Environmental Science (Life Science B: Environmental/Ecology, Medicine, Health, Behavioral/Social Sciences)

- Does the time of day affect your body's temperature?
- What are the effects of various carbon dioxide levels on plants? How does this relate to the greenhouse effect?
- Conduct a comparison of cotton growth in sandy loam and alkali soils.
- How does heat affect the heart rate of fresh water population?

Engineering/Technology (Earth/Space Sciences: Earth, Space, Engineering)

- Create an original machine that will perform a function. Make modifications and test each model.
- Test the wind resistance of automobile models in a wind tunnel.
- Conduct an analysis of exhaust emissions of cars as related to the size of cars and tune-up conditions.
- Design, construct, and test a mechanical method of separating solid waste for recycling.
- Construct and test a model solar desalination system.

Mathematics (Physical Sciences: Physics, Chemistry, Biochemistry, Mathematics, Computer)

- How are Fibonacci numbers and ratios found in nature?
- Providing geometric theorems by using concrete objects.
- Programming computers to perform equations to test mathematical results (i.e., prime factorization, statistics).
- Using probability methods in predicting the future.
- Design a new mathematical system for analyzing solutions.

Physical Sciences (Physical Science: Physics, Chemistry, Biochemistry, Mathematics, Computer)

- Do metals rust at different rates?
- Does the temperature of the air affect the air pressure?
- Do the different colors in the spectrum have different temperatures?
- What surfaces reflect light best?
- What stain remover will remove the largest percentage of the stain?

Resources:

Below was gathered from the Anne Arundel County Public Schools Science Fair Resource Guide, 2014.

Science Buddies

- www.sciencebuddies.org (choose the Project Ideas tab) Science Buddies offers detailed guidance and examples for serious students who want to do the best possible project.
  - "How-to" information

What Makes A Good Science Fair Project

- www.usc.edu/CSSF/Resources/Good_Project.html A website from USC that gives a lot of good tips and ideas to think about regarding what makes a good science fair project. Advice for students as well as teachers and parents is included.

Science Project Ideas

- www.scienceproject.com World's largest web site for Science Project ideas, information and support.
  - Middle School project ideas (Intermediate projects)
  - High School project ideas (Senior projects)

Science Fair Adventure

- http://www.sciencefairadventure.com/
  - Science Fair projects ideas by topic.

Parent Resources to Science Fair Projects

- http://school.discoveryeducation.com/sciencefaircentral/Parent- Resources.html
  - What is the parent's role?
  - How do I help my student come up with a project idea?
  - How much time will we need?
  - How do I help with the project?
  - What are the main sticking points for students?

- What should the final project look like?
- What else can I do to help?
- Where do I get supplies?

Math Ideas for Science Fair Projects

- http://mathforum.org/teachers/mathproject.html
- http://mathforum.org/library/drmath/sets/high_projects.html

Science Fair Resource Guide

- www.ipl.org/div/projectguide Resources for science fair projects. Includes tips, explanation of the scientific method, and help choosing a topic.

Successful Science Fair Projects

- http://faculty.washington.edu/chudler/fair.html Includes an overview of how to do a science fair project and additional science fair websites.

Science Fairs

- https://www.apa.org/education/k12/science-fair.aspx Information about research methods and statistics that is particularly useful for high school students.

Students discuss various aspects of a science fair project.
http://www.archimedesinitiative.org/themes.html
Student interviews on an array of insightful projects providing excellent advice from conquering fears to working through unforeseen results

Agricultural Ideas for Science Projects
www.ars.usda.gov/is/kids/fair/ideasframe.htm
This website offers suggestions for a wide variety of science fair projects with an agricultural theme.
· Botany
· Chemistry
· Environmental Science
· Medicine and Health
· Microbiology
· Zoology

Virtual Library—Science Fairs
http://physics.usc.edu/%7Egould/ScienceFairs/
A comprehensive list of every science fair accessible through the Web.

Super Science Fair Projects
www.super-science-fair-projects.com/
Complete Guide to Science Fair Projects, Topics and Experiments
· Steps for Doing a Science Fair Project
· Science Fair Idea: Winning Strategies
· Science Fair: How Judges Think
· School Science Fair Projects: How to keep a Timeline
· Science Project Ideas: Science Category Outline
· Science Fair Project Ideas: Science Topic Outline
· High School Science Fair Projects: How to do Project Research
· Kids Science Fair Projects: How to Write a Project Report
· Middle School Science Fair Projects: How to Do a Presentation
· Cool Science Fair Projects: Day of the Science Fair
· Best Science Fair Projects

The Dupont Challenge Science Essay Competition
http://thechallenge.dupont.com/

Google Science Fair

http://www.google.com/events/sciencefair/

· Science Project Resources

· Partner Resources- especially Scientific American

Science Fair Resource Center

http://homeworkspot.com/sciencefair/

Project ideas, information, books and kits

· General Science Fair Project Ideas

· Ideas by Subject

· Help

· Middle School Science Resources

· High School Science Resources

Junior Science & Humanities Symposia (JSHS) Program

http://www.jshs.org/

JSHS is sponsored by the research arm of the Department of Defense and administered in cooperation with nationwide colleges and universities. JSHS aims to prepare and support students to contribute as future scientists and engineers -- conducting STEM research on behalf of or directly for the Department of Defense, the Federal research laboratories, or for the greater good in advancing the nation's scientific and technological progress.

Contains a variety of excellent resources including preparation and presentation tips. A list of awards and scholarships is also included.

Maryland BioGENEius Challenge

http://www.biotechinstitute.org/go.cfm?do=Page.View&pid=71

The premier competition for high school students that recognizes outstanding research in biotechnology.

Toshiba ExploraVision

http://www.exploravision.org/

ExploraVision is a science competition that goes beyond the typical student science competition and into what it takes to bring ideas to reality. A teacher will sponsor and lead his/her students as they work in groups of 2 – 4 to simulate real research and development. A teacher will guide his or her students as they pick a current technology, research it, envision what it might look like in 20 years, and describe the development steps, pros & cons, and obstacles.

Safety Rules (from Mendocino County Office of Education):

Anything which could be hazardous to public display is prohibited.

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This includes:

· Live insects, or live disease-causing organisms which are pathogenic to vertebrates.

· Microbial cultures of fungi, alive or dead including unknown specimens.

· Chemicals or substances included on the federal list restricted to experimentation at college level or above.

· Flames, open or concealed, or flammable display materials.

· Caustics, acids, or dangerous chemicals.

· Combustible solids, fluids or gases (inert substitutes may be used for display).
· Tanks which have contained combustible gases, including butane and propane.
· Syringes, pipettes, or similar devices.
· Batteries with open top cells.
· No glass or liquids with display—we suggest drawings or photos.

Electrical (from Mendocino County Office of Education):

1. Bare wires and exposed knife switches may be used only on circuits of 12 volts or less; otherwise standard enclosed switches are required.
2. Electrical connections in 110 volt circuits must be soldered or fixed under approved connectors and connecting wires insulated.
3. Safety precautions for substances in the American Chemical Society booklet, *Safety in academic Chemistry Laboratories,* must be followed.
4. Circuits with 110 volts must have a main disconnect switch of a type approved by the National Board of Underwriters. Where high voltage is used (110 or above) must be plainly labeled with a conspicuous sign stating high voltage.
5. Electric heating elements must be mounted on non-combustible supports in such a manner that a fire cannot possibly start in the exhibit, and enclosures must be thoroughly ventilated.
6. Exhibits producing temperatures exceeding 100°C (212° F) must be adequately insulated.

Suggested List of Invertebrates/Plants

(from Mendocino County Office of Education):

ANIMALS Most of these specimens may be obtained at a pet store, in your own backyard, or may be ordered from a science materials catalog.		**PLANTS/SEEDS** Most of these seeds/plants are fast growing and may be obtained at a nursery, seed store or a health food store.	
Daphnia (transparent water flea)	Fruit Flies	Corn	Radishes
Brine Shrimp	Mealworms	Beans	Peas
Snails	Crickets	Lima Beans	Tomatoes
Protozoan	Sow bugs	Soy Beans	Duck Weed (aquarium

			plant)
Earthworms	Lady Bird (bugs), etc.	Alfalfa	Other young plants from a nursery, etc.

GUIDELINE FOR THE USE OF ANIMALS & HUMANS IN STUDENT SCIENCE PROJECTS (from Mendocino County Office of Education):

BEFORE the project begins, the student must complete an *Animal Proposal Certificate (FORM 1)*. This form is located on the website at: https://goo.gl/95Wcep

AFTER the project is complete, the adult supervisor will sign a *Completion Certificate For All Projects Involving Animals (FORM 2).* This certificate **MUST** accompany each application for participation. Obtain this form from the MCOE website at: https://goo.gl/95Wcep

Any project not conducted in conformity with both Rules and Requirements and the humane laws of California will be eliminated from competition and display. There will be no exceptions to this rule.

RULES

1. To assure the humane treatment of animals, a qualified supervisor MUST assume responsibility for the condition of all living animals used. For all projects, this supervisor must be trained on the college or professional level in the proper care and handling of laboratory animals. For projects involving vertebrate animals, the supervisor MUST also have an earned doctoral degree in science or medicine, and MUST also be current in the techniques to be used. For projects involving invertebrates only, the sponsoring teacher may act as the supervisor.

2. The comfort of all animals used in any project shall be a prime concern. Animals must be obtained from a reliable source and the following basic needs MUST be assured: appropriate and comfortable quarters; adequate food and water; cleanliness and humane treatment: exercise when required for the species of animals used. Students MUST make arrangements to provide these basic needs at all times, including weekends, vacations, and holiday periods.

3. No vertebrate animal will be subjected to any procedure or condition, including nutritional deficiency experiments, which results, EITHER BY INTENTION OR NEGLIGENCE, in pain, distinct discomfort, abnormal behavior, injury or death (except terminal, non-experimental, humane euthanasia). The term "vertebrate animal" includes vertebrate embryos and fetuses, and fowl embryos within three days of hatching.

4. No surgery, including biopsy, will be performed on any living animal.

5. When planning the project, the student MUST arrange for the humane disposition of all animals involved after the project is completed. This may be done by placing them in an environment where they are assured of continued humane care, by releasing undomesticated species into a suitable wildlife

environment. Students MUST NOT perform euthanasia of vertebrate animals under any circumstances. A complete account of the final disposition of all animals used MUST be included in the final report of all projects involving animals.

REQUIREMENTS

1. The basic aim of any project involving living animals should be to increase the knowledge or understanding of life processes. It should not include the demonstration or development of surgical techniques. All projects involving animals must, therefore, have a clearly defined objective, which requires the use of animals to demonstrate a biological principle or to answer a specific question.

2. A lower form of life should be selected for the project, rather than a higher form, whenever possible. Students are strongly urged to select invertebrate animals, plants, or tissue cultures. Invertebrate animals are especially suitable because of their wide variety and availability in large numbers.

3. Federal and California humane treatment laws specifically forbid the mistreatment or neglect of animals, including animals used in schools and school sponsored activities. Students, teachers, and supervisors must know and obey these laws. Any student research involving animals **must comply** with the requirements of the California Education Code and Code of Federal Regulations.

For All Projects Using Any Live Vertebrate Animal, Excluding Humans:

State of California Education Code §51540:

In the public elementary and high schools or in public elementary and high school school- sponsored activities and classes held elsewhere than on school premises, live vertebrate animals shall not, as part of a scientific experiment or any purpose whatever: (a) Be experimentally medicated or drugged in a manner to cause painful reactions or induce painful or lethal pathological conditions. (b) Be injured through any other treatments, including, but not limited to, anesthetization or electric shock. Live animals on the premises of a public elementary or high school shall be housed and cared for in a humane and safe manner. The provisions of this section are not intended to prohibit or constrain vocational instruction in the normal practices of animal husbandry.

For All Projects Involving Humans as the Subject of Research:

The Code of Federal Regulations 45 CFR 46 §46.102 defines

"***Human Subject"*** *means a living individual about whom an investigator (whether professional or student) conducting research obtains (1) data through intervention or interaction with the individual, or (2) identifiable private information. In order for obtaining of private information to constitute research involving human subjects, the identity of the subject must be readily associated with the information.*

"Minimal Risk" *means that the risks of harm anticipated in the research are not greater, considering probability and magnitude, than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests.*

Examples of unacceptable risks include: (1) ingestion or physical contact with any potentially hazardous materials including toxic chemicals, known or suspected pathogens or carcinogens, or exposure to ionizing radiation; (2) intentionally inducing emotional stress through questioning or invasion of privacy; (3) physical stress to pregnant women or anyone suffering debilitating physical illness; and (4) psychological stress to the mentally handicapped or those suffering psychiatric disorders. This list is intended to be illustrative, not exhaustive.

The regulations of the Fair are intended to protect human subjects, both physically and psychologically. The regulations supplement, and do not supplant, relevant State and Federal regulations dealing with such protection.

For All Projects Involving Tissue Samples:

Live tissue samples must be taken from either a continuously maintained tissue culture line already available to institutional researchers, or from animals already being used in an on-going institutional research project.

Students may not be involved in the direct acquisition of these samples from living human or vertebrate animals.

UUSD SCIENCE FAIR

Student Project Registration Form
Due: January 31, 2019

School Name: ____

Class Project: _____ Yes _____ No **Teacher:** ________________________

Student Full Name #1: ____

Student #1 Grade: ____

Student #1 Teacher: ____

Student Full Name #2: ____

Student #2 Grade: ____

Student #2 Teacher: ____

(If no additional student, please put N/A)

Student Full Name #3: ____

Student #3 Grade: ____

Student #3 Teacher: ____

(If no additional student, please put N/A. LIMIT 3 STUDENTS PER PROJECT).

Project Title: ____

Project Classification (please check one)**:**

_____ Class A Project (experimental projects) _____ Class B Project (display/demonstration)

_____ Class C Project (class or school projects)

Category:____

(please refer to the student handbook for specific category)

Is Electricity Needed? _____ Yes _____ No

Were animals or humans used in this project? _____ Yes _____ No

**** Please return this form to Terry d'Selkie at the Ukiah Adult School, 1056 North Bush Street. Room 3 or email to tdselkie@uusd.net**