Diocese of Oakland Middle School Science Fair Judging Rubric
Grades 7 and 8

Project Title: _____

Project #: _____

<u>Question/Title/Hypothesis:</u> *Evaluate the degree to which the project shows a clear and focused purpose, identifies contribution to the field of study and is testable using scientific methods* **0**- No question or title **1**-Topic unclear in title/question **2**-Question and/or hypothesis clear but not well defined **3**-Question and/or hypothesis is clear and shows a focused purpose **4**-Question and hypothesis is clear and highlights many of the above points **5**-Excellent question and hypothesis that highlights all of the above points and demonstrates a deep understanding	**<u>Conclusion:</u>** *Evaluate the degree to which the conclusion describes what results were obtained and how these results related to the question/hypothesis* **0**- none **1**- does not relate to the question/hypothesis or is not supported by the data **2**-shows some understanding of the question/hypothesis but little data is provided **3**-addresses the question/hypothesis but is not easily supported by the data **4**- addresses the question/hypothesis and data is shown that supports most of the findings **5**- addresses the question/hypothesis; data is excellent and easily supports all of the findings
<u>Procedure:</u> *Evaluate the degree to which the procedure is clearly displayed, easy to follow, and would be able to be replicated by the scientific community* **0**- no procedure shown or demonstration* only **1**- incomplete procedure **2**- procedure is limited and does not account for variables	**<u>Presentation/Neatness/Appeal of Display:</u>** *Evaluate the degree to which the project board demonstrates organization, correct spelling and grammar, is neat and easy to read, and is appealing to the eye* **0**-Board is very poorly organized and difficult to read **1**- Board is somewhat organized but not there was not much attention to detail

3- procedure is detailed and accounts for some variables **4**- procedure is detailed and accounts for most variables **5**-procedure is very detailed and accounts for all variables	**2**- Board is organized with some attention to detail **3**- Board in organized and demonstrates satisfactory neatness and attention to detail **4**-Board is very well done and demonstrates neatness and attention to detail **5**-Board is excellent and one the best boards presented today.
<u>Observations:</u> *Evaluate the degree to which the observations are clearly displayed, show a control group, and multiple trials are carried out* **0**- no observation shown **1**-Observations are limited and no control group is identified **2**- Observations are limited but a control group or multiple trials is evident **3**-Good observations and multiple trials were performed **4**-Good observations and multiple trials were performed and controls were identified **5**- Excellent observations with a minimum of 3 trials and controls identified.	**<u>Originality/Creativity:</u>** *Evaluate the degree to which the project demonstrates creativity in the research question, hypothesis, design, methodology, and/or execution* **4**- typical project, typical way **5**- typical project but approaches it from a different angle **6**-typical project but uses a very unique approach **7**- Creative and demonstrates originality in ***at least two*** of the areas listed above **8**- Creative and demonstrates originality in ***at least three*** of the areas listed above **9**- Creative and demonstrates originality in ***at least four*** of the areas listed above **10**- Extremely creative and demonstrates originality ***in all*** areas listed above
<u>Data:(pictures, graphs, charts):</u> *Evaluate the degree to which data is provided that supports the question/hypothesis and is clearly displayed with descriptive titles, correct units, and is scaled appropriately.* **0**- no data shown **1**- limited data is displayed; insufficient for valid conclusion **2**-data is recorded and displayed but hard to understand **3**-data is recorded and displayed with some attention to detail **4**-data is recorded and displayed and highlights many of the points above **5**-data is excellent and demonstrates a deep understanding of the question/hypothesis and highlights all of the above points	**<u>Total Points:</u> _____/ 40** ***Please turn document into Room 30 by 10am** ***Accounts for 75% of overall student score.**

Interview Question Rubric

Diocese of Oakland Science Fair

Project Title: _____Project #: _____

Question 1: Why did you choose your topic?	1- No real reason evident 2- Shows some interest in their topic 3- Project excites them but it is difficult for them to explain their choice 4- Project excites them and they can explain relatively well why they chose this project. 5- Project excites them and they can explain in detail why they chose this project.	_____ (out of 5)
Question 2: Tell me about your project.	1- Student is unable to explain the project. 2- Student knows little about their project and offers no detail in their explanation. 3- Student is able to talk about the project but with limited detail. 4- Student is able to talk about the project and provides an adequate amount of detail. 5- Student is able to talk about the project in detail and shows a deep understanding of the working of their project on a scientific level.	_____ (out of 5)
Question 3: What was your hypothesis? Did you accept or refute it by the end?	1- No hypothesis evident in discussion with student. 2- Very basic hypothesis with the student only being able to discuss limited results that may/or may not relate to the hypothesis. 3- Hypothesis evident and student shows a general understanding of how it relates to their results. 4- Well stated hypothesis and student demonstrates adequately how it relates to their results. 5- Clearly stated hypothesis and student is able to discuss in detail the validity of the hypothesis.	_____ (out of 5)
Overall Interview	Evaluate the degree to which the student interviewed: • Clear, concise, thoughtful responses to questions. • Showed understanding of basic science relevant to the project. • Demonstrated understanding of interpretation and limitations of results and conclusions. • Showed their degree of independence in conducting the project. • Showed recognition of potential impact in science, society, and/or economics. • Discussed ideas of further research.	_____ (out of 10)

***Accounts for 25% of student overall score.** **Total Points: _____ (out of a possible 25)**

Diocese of Oakland Science Fair
Abstract Template

An abstract is created after the experiment/study is complete. It is a summary of the purpose, procedures, results, and conclusion that gives judges a quick overview of the projects. Prepare to write it as four separate 'paragraphs'. Once this handout is completed, combine all the sentences so that it appears as one paragraph. A complete abstract should be about 150 words in length and should not exceed 250 words.

Write one or two sentences about what you studied and you wanted to find out (example:

Write three or four sentences about your procedure briefly highlighting what you did (example: procedure/method).

Write three or four sentences about important observations and the general trends of your results (example: observations and results).

Write one or two sentences about your conclusion. This will include the answer to your question, extensions, and applications to your project.

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Sample Abstracts

Example One:

Advertisers are always touting more powerful and longer lasting batteries, but which batteries really do last longer, and is battery life impacted by the speed of the current drain? This projects looks at which AA battery maintains its voltage for the longest period of time in low, medium, and high current drain devices. The batteries were tested in a CD player (low drain device), a flashlight (medium drain device), and a camera flash (high drain device) by measuring the battery voltage (dependent variable) at different time intervals (independent variable) for each of the battery types in each of the devices. My hypothesis was that Energizer would last the longest in all of the devices tested. The experimental results supported my hypothesis by showing that the Energizer performs with increasing superiority, the higher the current drain of the device. The experiment also showed that the heavy-duty non-alkaline batteries do not maintain their voltage as long as either alkaline battery at any level of current drain.

Example Two:

The purpose of this project was to determine if Vitamin A tablets have any effect on tomato plants. A total of twelve Rutgers tomato plants each two inches tall were planted in identical individual plastic pots using two cups of potting soil. Each plant received the same amount of water and sunlight during the three week experiment. The twelve plants were divided into four groups of three plants each. One vitamin A tablet was added to each of the three plants in the first group by burying the tablet one inch from the stem and one inch deep. Two vitamin A tablets were added to the second group of three plants in a similar manner. The third group of three plants had three tablets planted in the soil. The fourth group of three plants had no vitamin A tablets added to the soil and served as the control group. The height of each plant was measured and recorded at the start of the experiment and every 7 days thereafter. At the end of the experiment (21 days) the stems were cut across at a height of 3 inches. Experimental groups showed less development and slower growth rates than plants in the control group. The data was analyzed and the conclusion was drawn that giving vitamin A tablets to tomato plants did not improve growth as each of the three experimental groups failed to produce plants that were taller or had thicker stems than those in the control group.

DIOCESE OF OAKLAND
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Project Proposal Form

This document must be completed by any student whose project involves (even if only observing) human subjects, invertebrate or non-human vertebrate animals, recombinant DNA, tissues, pathogenic agents, or controlled substances. Students only need to complete this form if they have not applied to the Alameda or Contra Costa Science and Engineering Fairs.

If you have any questions, please contact Kristina Taylor, at ktaylor@sjnd.org

When completed, mail this form to:

SJND High School Science Fair, 1011 Chestnut Street, Alameda, CA 94501

Student Name: _____ Grade: _____

Name of School: _____

Address of School: _____

Home Phone #: _____ School Phone # _____

Where will you conduct your experimentation?

At school: _____ At home: _____ In the Field: _____

At a research institution (university lab, medical center, industrial setting): _____
(If you plan to perform your work at a research institution, you must complete section 3)

Check here _____ if you are working with humans and complete sections 1, 4 and 5.

Check here _____ if you are working with non-human animals, bacteria, or tissues and complete sections 1, 4 and 5. Read section 2 before completing section 1.

Section 1: To be completed by all students filing this proposal form

a. What is the question and purpose of your study?

b. Describe your experimental procedure with as much detail as possible. Use and attach additional page(s) if necessary. If your study involves survey of humans, please attach a copy of the survey questions and a copy of the informed consent/waiver form.

Section 2: To be completed by all students whose projects involve non-human vertebrate or invertebrate animals. In your description for Section 1 question b, please include responses to the following:

a. Are there any alternatives to the use of live animals in your project? If not, why did you find such alternatives unacceptable for your study? Explain.
b. Describe in detail how the animals will be used. Identify (where appropriate) the species, strain, sex, age, weight, source, and number of animals proposed for use. Remember to use the MINIMUM number of animals you deem necessary for your study.
c. Explain the potential impact or contribution this research may have on the broad fields of biology or medicine.
d. Provide detailed information on the animals' housing and environment. Also, provide information on the veterinary medical/nursing care in the case of illness or emergency.
e. Explain what will happen to the animal(s) after the project is finished.

Section 3: To be completed by all students whose experimentation is carried out in a research facility. In your description for Section 1 question b, please include responses to the following:

a. Where do you plan to do your experimentation?
b. How did you get the idea for your project?
c. Will you work on the project as part of a team or a group?
d. How independently will you work on the project?

"I certify that I have reviewed and approved the research proposal prior to the start of study, that if the student is not trained in the necessary procedures I will ensure his/her training, and that I will provide advice and supervision during the research."

Name of supervising scientist: _____

Signature: _____ Date: _____

Section 4: To be completed by the sponsoring teacher of the student filing this form.

"I have read all the rules and regulations regarding projects involving humans, animals, recombinant DNA, tissues, pathogenic agents, and controlled substances and I have discussed these with the student I am sponsoring. The student has read and understands the guidelines, requirements and rules for student science projects and I will be

responsible for this student's compliance with the guidelines. I have collected and kept the signed consent/waiver forms for this student's project (if it involves a survey of humans)."

Name of sponsoring teacher: _____

Signature: _____ Date: _____

Section 5: To be completed by all students filing this proposal form.

_____ Yes _____ No Did you read all guidelines regarding the use of humans, animals, Recombinant DNA, tissue, pathogenic agents, or controlled substances In a science fair project?

_____ Yes _____ No Did your sponsoring teacher go over the guidelines regarding your Science project with you?

_____ Yes _____ No If your project involved a survey of human subjects, did you give your Signed informed consent/waiver forms to your sponsoring teacher?

Student's Signature _____ Date: _____

Parent/Guardian Approval

"I have read and understand the risks and possible dangers in the sponsoring teacher-approved research plan. I consent to my child participating in this research project."

Parent/Guardian Signature: _____ Date: _____

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Informed Consent Form

Required of all human subjects involved in a student science project. These forms do not need to be turned in to the Diocese of Oakland Science Fair. They should be kept by the student researcher unless they are requested.

TO BE COMPLETED BY STUDENT RESEARCHER:

Complete this section ***before*** making copies for your human subjects. Your subjects may not sign a blank consent form.

Student researcher's name:_____

Title of project:_____

1. What are the research procedures in which the subject will be involved?

2. What are the possible discomforts or risks that may reasonably be expected by participating in this research?

3. What procedures will be used to minimize the risks described in #2 above?

4. If this is a survey project, has the supervising teacher reviewed your survey questions with you?

TO BE COMPLETED BY HUMAN SUBJECT PRIOR TO EXPERIMENTATION

"I have read and understand the conditions stated above, and I consent to participate in this research procedure. I realize that I am free to withdraw my consent and to withdraw from this activity at any time without prejudice toward me."

Participant's signature: _____ Date:

Parent/Guardian signature: _____ Date:

DIOCESE OF OAKLAND SCIENCE FAIR
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GUIDELINES FOR THE USE OF ANIMALS IN SCIENCE PROJECTS

INTRODUCTION

A strong allegiance to the principles of bioethics is vital to any discussion of responsible research practices. In accordance with the actions of several governing bodies (the State Humans Association of California, the Belmont Report, 1979; the Animal Welfare Act; the U.S. Government Principles for the Utilization and Care of Vertebrate Animals Used in Testing, Research, and Training, 1985; the Council for International Organizations of Medical Sciences, 1985; the Public Health Service Act; the NASA Guide for the Care and Use of Laboratory Animals, 1996; the National Institute of Health), the following principles are offered to guide careful consideration of the ethical challenges that arise in the course of animal research, a process that must balance risks, burdens, and benefits. It is recognized that awareness of these principles will not prevent conflicts. Rather, these principles are meant to provide a framework within which challenges and conflicts can be rationally addressed.

BASIC PRINCIPLES

The use of animals in research involves responsibility – not only for the stewardship of the animals, but to the scientific community and society as well. Stewardship is a universal responsibility that goes beyond the immediate research needs to include acquisition, care, and disposition of the animals, while responsibility to the scientific community and society requires an appropriate understanding of and sensitivity to scientific needs and community attitudes towards the use of animals.

Among the basic principles generally accepted in our culture, three are particularly relevant to the ethics of research using animals: respect for life, societal benefit, and nonmaleficence.

1. RESPECT FOR LIFE Living creatures deserve respect. This principle requires that animals used in research should be of an appropriate species and health status and should involve the minimum number required to obtain valid scientific results. It also recognizes that the use of different species may raise different ethical concerns. Selection of appropriate species should consider cognitive capacity and other morally relevant factors. Additionally, methods such as mathematical models, computer simulation, and in vitro systems should be considered and used whenever possible.
2. SOCIETAL BENEFIT The advancement of biological knowledge and improvements in the protections of the health and well being of both humans and other animals provide strong justification for biomedical and behavioral research. This principle entails that where animals are used, the assessment of the overall ethical value of such use should

include consideration of the full range of potential societal goods, the population affected, and the burdens that are expected to be borne by the subjects of the research.

3. NONMALEFICENCE Vertebrate animals are sentient (conscious and sensitive organisms, aware of their environment). This principle entails that the minimization of distress, pain, and suffering is a moral imperative. Unless the contrary is established, investigators should consider that procedures that cause pain or distress in humans may cause pain or distress in other sentient animals.

REQUIREMENTS AND RULES REGARDING VERTEBRATE ANIMALS

All projects involving vertebrate animals must conform to the following:

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 principal 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.
3. California humane laws (enclosed) 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.
4. All projects involving living animals must be preplanned and conducted with respect for life and for the humane needs and rights of the animals involved. This consideration must extend to the disposition of the animals after the conclusion of the project.

RULES

1. 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, comfortable quarters, adequate food and water, cleanliness and humane treatment, exercise when required for the species of animal used. Students MUST make arrangements to provide these basic needs at all times, including weekends, vacations, and holiday periods.
2. 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. The

term "vertebrate animal" includes vertebrate embryos and fetuses, and fowl embryos within three days of hatching.

3. No surgery, including biopsy, will be performed on any living animal.
4. To assure the humane treatment of animals, a qualified supervisor other than the student's sponsoring teacher or parent 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 on animals.
5. When planning the project, the student MUSST 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, or by arranging for their humane euthanasia by a qualified adult. 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 living animals.

FOR **HUMAN SUBJECTS:**

1. All human research projects, including surveys and questionnaires, are subject to SRC review before experimentation begins.
2. Student researchers must assess the risks to their human subjects when developing research plans. The following are examples of activities that may contain risks a student researcher might overlook: exercise, emotional stress resulting from invasion of privacy, ingestion of any substances or physical contact with any potentially hazardous materials.
3. Subjects 18 years and under require consent from a parent or guardian except in observational research where subjects cannot be identified and in situations in which no interaction takes place between the subject (s) and the researcher.
4. A student may observe and collect data for analysis of new procedures and medications only under direct supervision of a licensed professional. Students are prohibited from administering medications to human subjects.
5. It is illegal to publish information in a report that identifies the human subjects directly or through identifies linked to the subjects, including photographs. Names or photographs of human subjects may not be displayed with a project without informed consent of the subjects.

FOR **NON-HUMAN VERTEBRATE ANIMALS:**

1. Alternatives to vertebrate animals for research must be explored.
2. Students performing animal research must follow local, state, and federal regulations,
3. All common laboratory animals must be legally obtained from licensed animal breeders.

4. Animals must be treated kindly and cared for properly.
5. Experimental procedures that cause pain/discomfort may not be attempted on any vertebrate animals.
6. Experiments designed to kill vertebrate animals or where there is a chance of death are not permitted.
7. Acid rain, insecticide, and herbicide toxicity studies on live vertebrates are prohibited.
8. Only the qualified scientist* or licensed animal care supervisor may perform euthanasia.

FOR **HUMAN AND ANIMAL TISSUE:**

1. Human blood and blood products must be documented free of Human Immunodeficiency Virus (HIV) and hepatitis B and C virus before the student receives them.
2. Students using their own blood do not need the HIV or hepatitis certifications described in #1 above.
3. Types of tissue that are exempted, and hence do not require the Tissue Provider signature or prior SRC approval include: plant tissue and meat or meat-by-product obtained from food stores or restaurants

FOR **RECOMBINANT DNA (rDNA):**

1. The Diocese of Oakland Science Fair adheres to NIH Guidelines and accepts the following definitions of rDNA molecules:
a. Molecules that are constructed outside living cells by joining natural or synthetic DNA segments to DNA molecules that can replicate in a living cell.
b. Molecules that result from the replication of those described above.
2. Student researchers working with any microorganism, whether or not they involve DNA, must always follow standard microbiological practices.
3. Students may conduct studies on both exempt and non-exempt rDNA and host organisms.
a. Non-exempt rDNA studies must be conducted in a federally registered research institution under direct supervision of a qualified scientist*.
b. Exempt rDNA studies may be conducted in non-federally registered laboratories, but must follow federal regulations. Exempt host organisms include the following: bacterium Escherichia, bacterium Bacillus subtilus, yeast Saccharomyces cerevesiae.
c. Exempt DNA insert molecules include the following: DNA molecules that are not in the DNA of organisms or viruses; DNA from single non-chromosomal or viral sources; DNA that is entirely from a prokaryotic host, including its indigenous plasmids or viruses when propagated only in the host.

FOR **PATHOGENIC AGENTS:**

1. Pathogenic agents are disease-causing or potentially disease-causing agents such as bacteria, viruses, rickettsia, fungi and parasites.
2. Student research with pathogenic agents may be performed only under the direct supervision of an experienced and qualified scientist* in an institutional laboratory.

FOR **CONTROLLED SUBSTANCES:**

1. Student researchers must adhere to all federal regulations governing controlled substances.
2. Production of alcohol is federally regulated; contact the Bureau of Alcohol, Tobacco, and Firearms (BATF) at (202) 927-8210.
3. Only under the direct supervision of a qualified scientist* may a student use any federally controlled or experimental substance for therapy or experimentation, including over-the-counter drugs and potential new therapeutic substances.

***QUALIFIED SCIENTIST:

A qualified scientist should possess an earned doctoral degree in science or medicine. However, a master's degree with equivalent experience and/or expertise is acceptable when approved by the SRC. The qualified scientist must be thoroughly familiar with the local, state, and federal