Chief Little Pine School Science Fair Guidelines

Grade 7 - 12

Coming Up With an Idea

The following are some websites where you can find ideas for the science fair.

- http://www.scienceproject.com/
- http://www.all-science-fair-projects.com
- http://www.sciencebuddies.org/science-fair-projects/project_ideas.shtml

Visual Displays

- Visual displays typically have several important components to them:

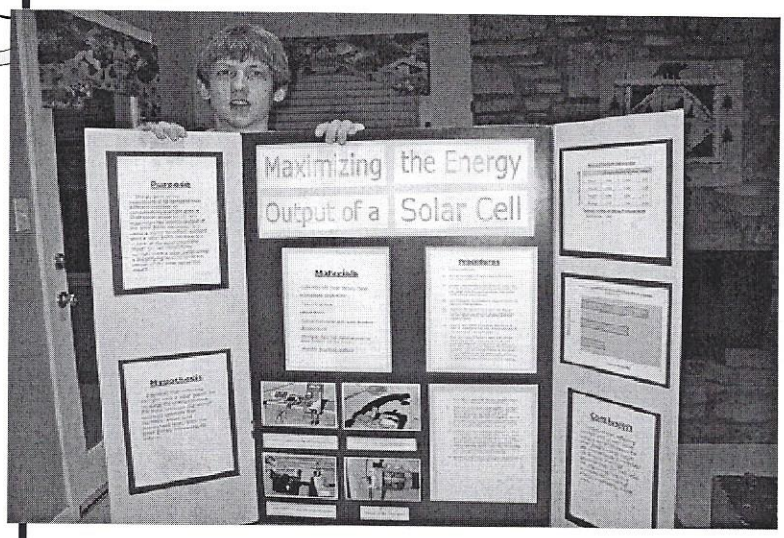
1. **Big Question** - What it the big idea or question that you wish to study
2. **Hypothesis** - an educated guess about what you think the results of your experiment will be.
3. **Methods / Procedures / Materials** - Identify how you did your study, experiment or innovation. What did you use? How did you test your hypothesis?

Visual Displays

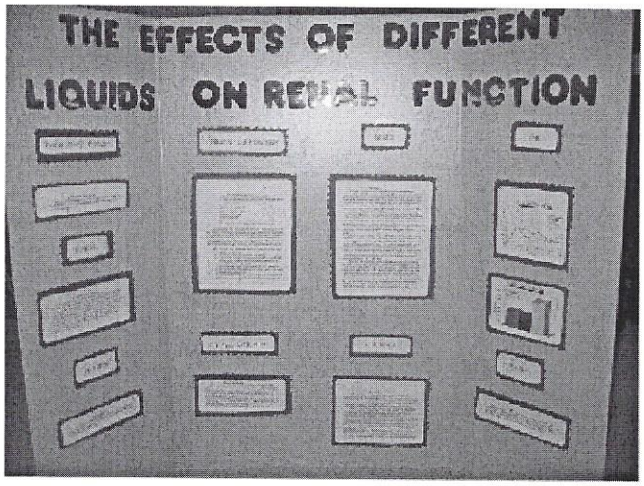
4. **Data, including graphs and visual representations** - make sure that your results and data are available on your visual display. The nicer and neater the graphs and data, the better the display.

5. **Conclusions** - what did you determine as a result of your experiment? How did everything go? This should be included in the conclusion.

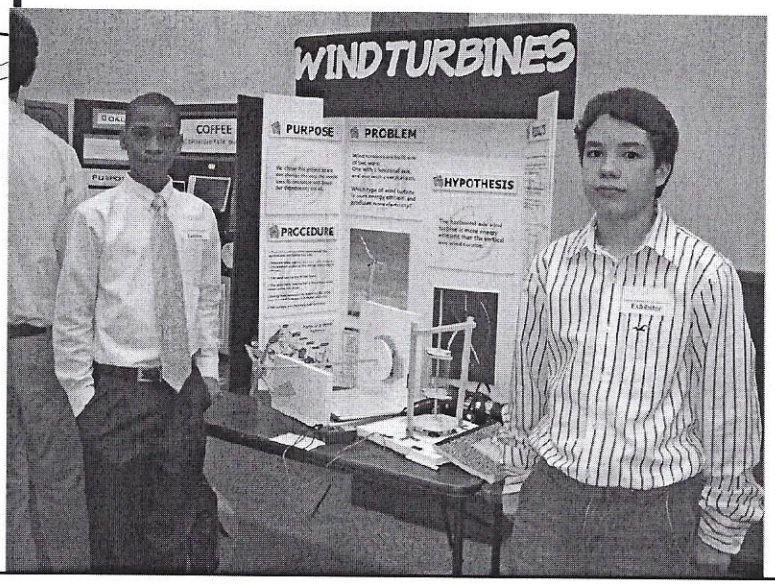
Visual Display Examples



Visual Display Examples



Visual Display Examples



PARTS OF A SCIENCE PROJECT

Proposal

- You need to choose whether you are going to complete an innovation, study, or experiment.
- In half a page, your proposal should explain what you intend to do, why you are interested in it, and a general explanation of what is going to happen for your science project.
- The proposal will be submitted and then returned as either accepted or rejected, based on grade-appropriateness

Design / Research

- The next portion of the project is to determine how you are going to perform your experiment, design your innovation, or do your research.
- In about a page, you need to provide a step-by-step explanation of your procedure for your project.
- This should include the list of materials you are going to use for your experiment as well.
- If you are doing a study, you should explain the sources you intend to use to complete it; i.e. Internet sites, books, interviews with professionals, surveys, etc.

Results / Conclusions

- In approximately one to two pages, you need to explain what you learned in your study, experiment, or the results of your innovation.
- This should include graphs, data tables, and other visual representations of your data. Pictures of your experiment could be great, as well.
- Depending on what type of project you did, this section could vary drastically.

Cultural Integration

- Although projects with a direct cultural / traditional connection are encouraged, it may not be possible with the chosen topic.
- As part of the project you are expected to include a segment on cultural connections. Make your topic relevant to your community, your people or First Nations in general.
- It is your responsibility to speak with knowledge keepers (eg. Elders) and do some research to learn how your project is culturally relevant in some way.
- These section should be 2 or 3 good paragraphs long, explaining how it is it relevant or how it can be used to benefit First Nations people

SCIENCE PROJECT IDEAS

PLANTS-

1. Will vitamins affect the growth of a plant?
2. Do weed killers affect house plants?
3. How do the moon phases affect plant germination?
4. How fast do roots grow?
5. Does the amount of light on plants affect their growth?
6. Does the amount of water given plants affect their growth?
7. What is the effect of detergent on bean seeds?
8. Under what color light do plants grow best?
9. In what kind of material (sand, clay, etc.) do seeds grow best?
10. What is the effect of chlorinated water on plant growth?
11. How does the number of seeds produced by different plants compare?
12. Will frozen seed sprout?
13. Will plants grow better in soil or water/
14. What can be done to increase the decomposing rate of plants?
15. Do loving plants give off moisture?
16. Do living plants give off oxygen?
17. What is the effect of fats and cholesterol on plants/

ANIMALS-

1. What kind of life can be found in 1 square meter of backyard soil?
2. How does a bird embryo grow in an egg?
3. Can mice distinguish color?
4. How do mealworms respond to light?
5. How does an earthworm react to light and darkness?
6. Do different kinds of caterpillars eat different amounts of food?
7. Do mint plants repel insects?
8. What color of flowers attract hummingbirds best?
9. What colors attract moths and other insects at night?
10. Does temperature affect the flash rate of fireflies?
11. At what rate do pets drink water?
12. What is the effect of temperature on the activity of (mealworms, crickets, etc.)?

EARTH SCIENCE-

1. Does the moon rise every night at the same time and in the same location?
2. How accurate are long-range weather forecasts?
3. Is rainwater absorbed at the same rate in different kinds of soil?
4. From which direction does the wind blow most frequently?
5. How warm is it under the snow?

HUMAN BODY-

1. Which grows faster, body hair or scalp hair?
2. How do fingerprints differ?
3. Do all people have the same normal body temperature?
4. Are certain dominant traits exhibited in the same family?
5. Who has bigger hands, boys or girls?
6. How accurately can you tell the temperature of an object by touch?
7. Who are generally taller, boys or girls?
8. How fast do muscles get tired?

PHYSICAL SCIENCE -

1. What is the effect of heat when dissolving sugar? Salt?
2. Why is salt put on icy sidewalks?
3. What is the acidity of various household products?
4. How fast do fabrics burn?
5. What kind of materials can put out a fire?
6. DO CRYSTALS HAVE THE SAME SHAPE?
7. How much of the air is oxygen?
8. Can seawater be "desalted" by freezing?
9. How is the strength of a magnet affected by glass, cardboard and plastic?
10. What is the best shape for a kite?
11. How does a pulley help you work?
12. How does the use of paint prevent the formation of rust?
13. Which holds two materials together better, a screw or a nail?
14. Do all objects fall at the same speed?
15. How does the weight of a pendulum affect the swing?
16. How is the distance a cart rolls affected by the mass in the cart?
17. On what kind of surface will a ball roll fastest?
18. Which kind of metal conducts heat best?
19. Does sound travel best through solid, liquid or gas?
20. What materials provide the best insulation?
21. What is the effect of temperature on the volume of air?
22. How does the length of a vibrating body affect sound?
23. How does the design of a paper airplane affect its flight?

CONSUMER SCIENCE -

1. Which chewing gum holds its flavor the best?
2. Which detergent breaks up oil best?
3. How does the absorption rate of various paper towels differ?
4. Which detergent makes the most bubbles?
5. How does the wattage of a light bulb affect energy use?
6. Which brand of glue holds two boards together best?
7. Which brand of popcorn pops fastest?
8. Which type of battery makes toys run longest?
9. Which type of diaper holds the most water?

SAMPLE SCIENCE FAIR BACKBOARD LAYOUT

Big Question

State the big question or idea you wish to study

Hypothesis

State what you THINK the results will be. Remember you may not be right, which is okay.

Materials

List the all the materials you used and how much of each if necessary. Eg. 100 g Table salt

PROJECT TITLE

Student Name(s)

Research

In several short paragraphs summarize your research.

Results

Pictures

Include pictures of **your** project in action . No pictures from the internet.

Results

Data / Findings

Summarize your findings and include data sheets, tables or charts. Detailed data is included in a binder

Procedure

Outline your procedure (steps) in detailed point form

Conclusions

State your overall conclusions, based on your findings

Cultural Integration

Explain the cultural relevance of your project

References

May be attached separately using forms

Backboard Presentation

- Suggest Fonts:
  - Times New Roman
  - Calibri (Default font)
  - Comic Sans Serif
    (May be used by K - 6 only)
- Have font size approved by teacher prior to posting on board to ensure text is legible and not too large
- All sections must be neat, organized and consistent in font sizes for heading and text.
- Pictures MUST be from your own project
- Graphs and charts can be done by hand, but is recommended to be done in Excel or Word. Speak with Mr. O for assistance.

Science Project References Sheet

Include the necessary reference information for any websites or books that you used throughout your science project. You do not need to use all 6 reference forms.

Reference # 1

Name of book or website: _____

Web address or Page numbers: _____

Author (if available): _____

Date accessed (websites only): _____

Reference # 2

Name of book or website: _____

Web address or Page numbers: _____

Author (if available): _____

Date accessed (websites only): _____

Reference # 3

Name of book or website: _____

Web address or Page numbers: _____

Author (if available): _____

Date accessed (websites only): _____

Reference # 4

Name of book or website: _____

Web address or Page numbers: _____

Author (if available): _____

Date accessed (websites only): _____

Reference # 5

Name of book or website: _____

Web address or Page numbers: _____

Author (if available): _____

Date accessed (websites only): _____

Reference # 6

Name of book or website: _____

Web address or Page numbers: _____

Author (if available): _____

Date accessed (websites only): _____

Teacher's Detailed Rule Book for Science Fair

1. **Use common sense when it comes to general safety and use precautions with your project to prevent personal injury or property damage.**

Specific general safety guidelines:

- Exhibits must be of a safe design with adequate stability to keep from tipping.
- Dangerous moving parts such as belts, gears, pulleys and propeller blades must be suitably guarded.
- Substances giving off odors that may cause discomfort are kept in sealed and unbreakable containers.
- Highly perishable products of vegetable or animal origin are kept in sealed and unbreakable containers.
- Any apparatus producing temperatures that may cause physical burns may not be used at the science fair
- No open flames will be allowed at the science fair.
- Compressed gas cylinders are not permitted.
- Sharp items such as needles, syringes and knives are not allowed.
- The taking of blood samples and the administration of injections are not permitted.
- Use of firearms or air-pressure weapons is not permitted.
- Use of wave generating devices is not permitted (lasers, x-rays, microwaves, radiation or infrared lights).
- Use of explosives is not permitted.
- No offensive or inappropriate visual materials permitted.
- Any noise generated by a project must be of a reasonable level, such that it does not disturb other exhibitors.

2. **Check with your teacher if you plan to use a chemical substance to make sure that the chemical substance is allowed.**

Specific chemical substances guidelines:

- Toxic, corrosive poisonous, volatile, reactive, explosive, flammable, odorous, pharmaceutical, over the counter medication or illegal substances are prohibited. (See Appendix A).
- Commercial vinegar is acceptable.
- Liquid nitrogen and dry ice are not permitted.
- Mercury thermometers are not permitted.
- Acids and bases must be less than 0.5 mole/liter and team members must be aware of the risks associated with the use of acids and bases.

3. **All products on display must be clearly labeled and the team must be able to identify all products displayed on their table.**

Specific guidelines for labels and identification:

- In the event that a student decides to substitute a prohibited substance with a harmless one, the team must clearly indicate on the container the exact nature of the substance. Example: "Simulated sodium nitrate (table salt)"

- Team members must be able to identify all products displayed on their tables and be aware of safe handling practices.

4. All electrical devices must be safe

Specific guidelines for electrical devices:

- All electrical devices must be in good condition, grounded and CSA-approved, with a clearly visible and marked on/off switch.
- Light bulb maximum 40 watt.
- No exposed wiring may be over 36 volts.
- As low a voltage as possible must be used and current (amperage) must be low so as to not to cause any discomfort or danger.
- Cell or battery fed circuits should be both safe in design and operation. Wet cells that contain acid such as automobile batteries are not permitted
- Three-pronged electricity cords should be in good condition and will be supplied at the Science Fair upon request.

5. Plants or plant tissues and soils may be exhibited at the Science Fair with a few restrictions, check with your teacher if you plan to use plants, plant tissues or soils.

Specific guidelines for plants, plant tissues or soils:

- Plants or plant tissues and soils may be exhibited.
- Plant tissues infected with plant viruses, bacteria, fungus or other pathogens, must be in sealed containers or plastic bags.
- Known allergenic plants must be clearly sealed in an container and labeled.
- Soils must be dealt with in such a way as to not make a mess around the exhibit (use of plastic bags or containers) and may not be disposed of at the science fair.

5. Animals and animal parts have some restrictions, check with your teacher if you plan to use live animals or animal parts.

Specific guidelines for animals and animal parts:

- No live vertebrate animals permitted.
- No experiments involving vertebrate animals.
- Parts of vertebrates that have been lost through natural causes (shells, porcupine quills, cast-off skin, feathers, hair or antlers) may be safely displayed in sealed containers.
- No Eagle feathers are allowed to be used in any display.
- Mounted insects in sealed containers are accepted in the display.
- Observations of wild animals, farm animals or animals in zoological parks are permitted.
- Treated skins, skeletons and parts or skeletons that have been properly cleaned and preserved are permitted.
- Lower orders of life (protozoa, insects and invertebrate animals) can be used in experimentation.
- Studies of embryos or animal development are restricted to observation.
- Animal parts (including bones, organs, tissues, preserves, dissections, blood, feces or other body fluids) are not permitted on display.
- Sealed tissue samples on microscope slides are permitted.

6. Biological and Micro-organisms have some restrictions, check with your teacher if you plan to use biological specimens or micro-organisms.

Specific guidelines for biological and micro-organisms:

- Bacterial or fungal cultures must be on media contained in petri-dishes and sealed with paraffin wax or other sealed, non-breakable container.
- Viral cultures are not permitted.
- Bacterial toxins are not permitted.
- Projects involving the manipulation of recombinant DNA are not permitted.

7. **All materials must be taken home. Display materials may NOT be thrown away at the Science Fair.**

8. **Projects can be expanded from year to year.**
- Only the new part will be judged in any given year. Projects may not be entered more than once if they have not had any further work done on it.

Appendix A - Hazardous Substances NOT Permitted at the Science Fair
Including, but NOT limited to:

Carcinogenic, mutagenic or teratogenic Substances:
- Benzenes
- PCB's
- Dioxins

Highly Toxic Substances:
- Arsenic or its derivatives
- Cyanides
- Mercury

Explosive Substances:
- Acetylenes ; perchlorates
- ethers
- peroxides
- polynitrates
- or any other chemical compound that pose a risk of spontaneous or exothermic reactions or produce gases.

Highly Inflammable Substances:
- acetone
- methanol
- ethanol
- ethers
- reactive metals
- alkanes; propane

Cryogenic Substances:
liquid nitrogen or dry ice

Chemical Substances producing a strong odour:
- volatile sulphur derivatives such as hydrogen sulphide
- thiols

Suggested substitutes for toxic or corrosive chemicals:
- Common salt can be used to simulate chemicals such as ammonium nitrate
- Water can be used instead of alcohol, ether and other highly flammable liquids. Rubbing alcohol in place of alcohols.
- Molasses or cooking oils can be used to represent petroleum products.
- Vinegar or baking soda solutions in place of strong acids or bases.
- Food coloring (blue/red) in water representing cold/hot.
- When chemicals are substituted they need to be clearly labeled as 'simulated' and the names of the substance they represent as well.

TEACHERS: If you have any questions please call: Garry Sibley 306-956-1045.

Chief Little Pine School
Science Fair 2015

Grade 6 – 12 Judging Form

Project Name: _____ **Project Number:** _____

Directions: Place the score in the total box at the end each row. Add the totals in the last column for overall points.

CRITERIA	*Beginning Level*	*Fair*	*Good*	*Excellent*	*Scores*
Creativity of Design • Originality of all elements: the question(s), approach and use of equipment	1	2	3	4	
Creativity of interpretation: • Originality of data analysis	1	2	3	4	
Scientific Method: • Clarity of question(s) • Clarity of hypothesis • Clarity of materials used • Clarity of procedures	1	2	3	4	
Interpretation of Data: • Conclusions based on collected data • Correlation of data to answering the question(s)	1	2	3	4	
Completeness: • Question(s) answered • Thorough description • Results from related research	1	2	3	4	
Display and Oral Presentation: • Clear and concise oral interview • Effective visual display • Knowledgeable on subject matter without reading notes	1	2	3	4	
Cultural Integration: • Evidence of consultation with an Elder or knowledge keeper • Show connection of research to cultural values or First Nations people.	1	2	3	4	
Additional Comments:				**TOTAL**	
Judge Signature:					

Judging Form Scoring Explanation Rubric

Criteria	Beginning Level (1)	Fair (2)	Good (3)	Excellent (4)
Creativity of Design • Originality of all elements: the question(s), approach and use of equipment	Project is not innovative and is very conventional in all elements; needs improvement in originality	Project is somewhat innovative and unconventional in some project elements	Project is mostly innovative and unconventional in most project elements.	Project is very innovative and unconventional in all project elements
Creativity of interpretation: • Originality of data analysis	None of the data analysis is original and innovative.	Some of the data analysis is original and innovative.	Most of the data analysis is innovative and original.	Almost all data analysis is innovated and very original
Scientific Method: • Clarity of question(s) • Clarity of hypothesis • Clarity of materials used • Clarity of procedures	Question(s), hypothesis, materials and procedure are not explicitly stated and are unclear.	Some of the elements: Question(s), hypothesis, materials and procedure are explicitly stated and are somewhat clear.	Most, but not all of the elements: Question(s), hypothesis, materials and procedure are explicitly stated and clear.	All Question(s), hypothesis, materials and procedure are explicitly stated and are clear.
Interpretation of Data: • Conclusions based on collected data • Correlation of data to answering the question(s)	Conclusions are not explicitly stated; a better connection between data and question(s) is needed.	Some of the conclusions are explicitly stated; somewhat connected to the question(s).	Most of the conclusions are explicitly stated and connected to the question(s).	All conclusions are explicitly stated and directly connected answering the question(s)
Completeness: • Question(s) answered • Thorough description • Results from related research	Limitations of answer not addressed; no clear description or connection to research data	Question not fully answered; somewhat thorough but very limited documentation	Answer is restricted to some conditions; most supported and connected to some collected data.	Answer covers a range of connections that are thoroughly described and connected to collected data
Display and Oral Presentation: • Clear and concise oral interview • Effective visual display • Knowledgeable on subject matter without reading notes	Presentation confusing or unclear. Graphics ineffective and from internet. Unprepared with a little knowledge of subject matter and reading entirely from notes or backboard	Presentation marginally clear when prompted. Graphics are very general and lack details. Some knowledge of subject, with some reading from notes	Presentation mostly clear; student mostly answers judges questions but could improve. Graphics are somewhat limited. Mostly presented without notes.	Presentation very clear; student effectively answers judge questions; graphics are detailed and comprehensive. Presented without aid from notes.
Cultural Integration: • Evidence of research • Show connection of research to cultural values or First Nations people	Not present or very limited information about connecting research findings to cultural values, with little attempt to make information relevant.	Information is limited to findings from the internet. Some connection is made to try connecting research to traditional values to make it relevant.	Place-based research from speaking with Elders at LPFN. Some research to show importance to people and Cultural values	Place-based and clear evidence of research and consultation with Elders. Clearly states connections to LPFN and or First Nations people and culture.

Chief Little Pine School
Student Grade Rubric

Project Title: _____ Student Name(s): _____

Part A: Scientific Procedure / Experiment **(36 Points)**

Category	4 Excellent	3 Good	2 Fair	1 Beginning Level	0 Missing Component	TOTAL SCORE
Research Question	Stated the problem in question form. How does __ affect __? How will __ affect __? No misspelled words. Easy to understand	Stated the problem. No misspelled words. Legible, variables present, but is incorrect or incomplete	Stated the problem or question using incorrect form. No independent or control variables listed when applicable. Misspelled words, messy / illegible.	Not titled, incomplete question or does not use the correct format. Purpose of scientific inquiry is not clearly stated.	Not titled. Question missing. Purpose not stated.	_____ x 1 _____
Background Research	Minimum 3 paragraphs research focusing on the topic of research. References with at least 3 sources (Not including Wikipedia).	Two good paragraphs on the research topic. Only 1 or 2 reference sources.	One paragraph and / or loosely based on research topic. No references present.	Less than one paragraph that is mostly unrelated to the research topic. No references	No research or plagiarized from the internet. No references present.	_____ x 2 _____
Hypothesis	Answers the question in a complete sentence. Has put thought into statement, with clear evidence of research. Is an educated guess. No misspelled words.	Answers the question in a complete sentence. Applies directly to the problem.	Answers the question in a complete sentence. Does not apply to question. Evidence of research is not present. Messy / illegible.	Does not answer in complete sentence. And / or does not apply to problem. Messy / illegible	Not titled. Hypothesis missing.	_____ x 1 _____
Materials and Procedure	Materials list is complete. Procedure is detailed and written in complete sentences. May be step-wise or in paragraphs. All variables are present. No misspelled words.	Materials list is complete. Procedure lacks details. All variables are present, but steps may not be in complete sentences. Some words are misspelled.	Materials list is incomplete or messy. Procedure is missing variables, and lacks structure in the steps of progress. Contains misspelled words and sentence fragments.	Materials list is incomplete and messy. Procedure is present but lacks detail of each step. Difficult to follow the experiment. No variables present.	One of both of the procedure and materials are missing. Unable to to know what materials were used and how the experiment was conducted.	_____ x 2 _____

Category	4 Excellent	3 Good	2 Fair	1 Beginning Level	0 Missing Component	TOTAL SCORE
Results / Data	Explained results in at least 3 paragraphs and used data charts, graphs or both to support findings. Written in complete paragraphs. Neat and organized. Easy to read graphics made in colour.	Results are explained in 1 or 2 paragraphs. Data charts or graphs are used, but are not well explained. May be misspelled words. Graphs / charts may not be neatly done and not in colour.	A written 1-paragraph explanation is provided without use of graph or data. OR Graphs or data are provided with no explanation of findings.	Explanation is fragmented and / or does not make sense. Graphs / charts are present, but do not properly represent the data.	Written explanation is missing or limited only to a few sentences. No graphs or data charts present.	_____ x 2 _____
Conclusion	Conclusion directly relates to hypothesis, and is written in complete sentences with correct wording to support or reject the hypothesis.	Conclusion relates to hypothesis only as an answer to the problem question. Is answered in complete sentences.	Conclusion is present, but does not clearly relate to the problem or hypothesis. Sentence fragments and spelling errors present.	Conclusion present, but may be an incorrect interpretation of the data. Neither supports nor rejects the hypothesis.	Conclusion is not present in any form.	_____ x 1 _____
COMMENTS:						

Part B: Quality and Cultural Integration (12 points)

Category	4 Excellent	3 Good	2 Fair	1 Beginning Level	0 Missing Component	TOTAL SCORE
Overall Appearance	Items on board are well spaced, straight edges, font large enough to read. All titles and subtitles present. Use of colour and creativity apparent. 4 or more photos included.	Items are board are spaced well, and font is large enough. Titles present, some subtitles are missing. 3 or 4 photos included.	Little attention to detail. Fonts are too small, subtitles missing. Poor spacing of items on board. 1 or 2 photos included.	Items are presented on board, but some elements missing. Items are. Board is not visually appealing. Fonts too small and no photos included.	Board not completed. Entire sections of the project are missing from the board. Disorganized work on board.	_____ x 1 _____
Cultural Integration	Clear evidence of consultation with a knowledge keeper (eg. Elder). Shows importance to community/ land and traditional values.	Place-based information from community members. Shows importance to lands / community.	Information from internet only and not place-based. Possible importance to land / community evident. Little attempt to convey traditional values.	Information from internet or is hearsay. Little importance to land / community. Some reference to traditional values.	No attempt to include any cultural references or attempt to convey the importance of the research to First Nations traditions.	_____ x 2 _____

COMMENTS:

Part C: Student Presentation **(4 Points)**

Category	4 Excellent	3 Good	2 Fair	1 Beginning Level	0 Missing Component	TOTAL SCORE
Subject Knowledge	Demonstrates full knowledge of the subject matter. Does not read from notes or backboard. Is able to answer questions asked by judges with explanations.	Demonstrates understanding of the material. Reads from notes at times. Is able to answer questions with ease, but little explanation.	Demonstrates some understanding of the research. Reads primarily from notes or backboard. Is only able to answer basic questions with ease and some explanation.	Does not have a grasp on the research. Reads from notes or backboard and is unable to answer questions.	Did not present information. Judges had to read backboard and project materials. Unable to answer questions.	_____ x 1 _____

COMMENTS:

Final Overall Score:

PART A: Scientific Procedure/ Experiment _____ / 36

PART B: Quality and Cultural Integration _____ / 12

PART C: Student Presentation _____ / 4

TOTAL SCORE: _____ / 52

Outcomes and Indicators

Life Science – Interactions within Ecosystems (IE)
IE7.1 Relate key aspects of Indigenous knowledge to their understanding of ecosystems.
IE7.2 Observe, illustrate, and analyze living organisms within local ecosystems as part of interconnected food webs, populations, and communities.
IE7.3 Evaluate biogeochemical cycles (water, carbon, and nitrogen) as representations of energy flow and the cycling of matter through ecosystems.
IE7.4 Analyze how ecosystems change in response to natural and human influences, and propose actions to reduce the impact of human behaviour on a specific ecosystem.

Physical Science – Mixtures and Solutions (MS)
MS7.1 Distinguish between pure substances and mixtures (mechanical mixtures and solutions) using the particle model of matter.
MS7.2 Investigate methods of separating the components of mechanical mixtures and solutions, and analyze the impact of industrial and agricultural applications of those methods.
MS7.3 Investigate the properties and applications of solutions, including solubility and concentration.

Physical Science – Heat and Temperature (HT)
HT7.1 Assess the impact of past and current heating and cooling technologies related to food, clothing, and shelter on self, society, and the environment.
HT7.2 Explain how understanding differences between states of matter and the effect of heat on changes in state provide evidence for the particle theory.
HT7.3 Investigate principles and applications of heat transfer via the processes of conduction, convection, and radiation.

Earth and Space Science – Earth's Crust and Resources (EC)
EC7.1 Analyze societal and environmental impacts of historical and current catastrophic geological events, and scientific understanding of movements and forces within Earth's crust.
EC7.2 Identify locations and processes used to extract Earth's geological resources and examine the impacts of those locations and processes on society and the environment.
EC7.3 Investigate the characteristics and formation of the surface geology of Saskatchewan, including soil, and identify correlations between the surface geology and past, present, and possible future land uses.

Outcomes and Indicators

Life Science – Cells, Tissues, Organs, and Systems (CS)
CS8.1 Analyze the characteristics of cells, and compare structural and functional characteristics of plant and animal cells.
CS8.2 Demonstrate proficiency in the use of a compound light microscope to observe plant and animal cells.
CS8.3 Distinguish structural and functional relationships among cells, tissues, organs, and organ systems in humans and how this knowledge is important to various careers.
CS8.4 Analyze how the interdependence of organ systems contributes to the healthy functioning of the human body.

Physical Science – Optics and Vision (OP)
OP8.1 Identify and describe, through experimentation, sources and properties of visible light including: • rectilinear propagation • reflection • refraction.
OP8.2 Explore properties and applications of optics-related technologies, including concave and convex mirrors and lenses.
OP8.3 Compare the nature and properties of human vision with optical devices and vision in other living organisms.
OP8.4 Evaluate the impact of electromagnetic radiation-based technologies on self and community.

Physical Science – Forces, Fluids, and Density (FD)
FD8.1 Investigate and represent the density of solids, liquids, and gases based on the particle theory of matter.
FD8.2 Examine the effects of forces in and on objects in fluids, including the buoyant force.
FD8.3 Investigate and describe physical properties of fluids (liquids and gases), including viscosity and compressibility.
FD8.4 Identify and interpret the scientific principles underlying the functioning of natural and constructed fluid systems.

Earth and Space Science – Water Systems on Earth (WS)
WS8.1 Analyze the impact of natural and human-induced changes to the characteristics and distribution of water in local, regional, and national ecosystems.
WS8.2 Examine how wind, water, and ice have shaped and continue to shape the Canadian landscape.
WS8.3 Analyze natural factors and human practices that affect productivity and species distribution in marine and fresh water environments.

Outcomes and Indicators

Life Science – Reproduction and Human Development (RE)
RE9.1 Examine the process of and influences on the transfer of genetic information and the impact of that understanding on society past and present.
RE9.2 Observe and describe the significance of cellular reproductive processes, including mitosis and meiosis.
RE9.3 Describe the processes and implications of sexual and asexual reproduction in plants and animals.
RE9.4 Analyze the process of human reproduction, including the influence of reproductive and contraceptive technologies.

Physical Science – Atoms and Elements (AE)
AE9.1 Distinguish between physical and chemical properties of common substances, including those found in household, commercial, industrial, and agricultural applications.
AE9.2 Analyze historical explanations of the structure of matter up to and including: • Dalton model • Thomson model • Rutherford model • Bohr model of the atom.
AE9.3 Demonstrate an understanding of the classification of pure substances (elements and compounds), including the development and nature of the Periodic Table.

Physical Science – Characteristics of Electricity (CE)
CE9.1 Demonstrate and analyze characteristics of static electric charge and current electricity, including historical and cultural understanding.
CE9.2 Analyze the relationships that exist among voltage, current, and resistance in series and parallel circuits.
CE9.3 Assess operating principles, costs, and efficiencies of devices that produce or use electrical energy.
CE9.4 Critique impacts of past, current, and possible future methods of small and large scale electrical energy production and distribution in Saskatchewan.

Earth and Space Science – Exploring our Universe (EU)
EU9.1 Inquire into the motion and characteristics of astronomical bodies in our solar system and the universe.
EU9.2 Analyze scientific explanations of the formation and evolution of our solar system and the universe.
EU9.3 Examine how various cultures, past and present, including First Nations and Métis, understand and represent astronomical phenomenon.
EU9.4 Analyze human capabilities for exploring and understanding the universe, including technologies and programs that support such exploration.

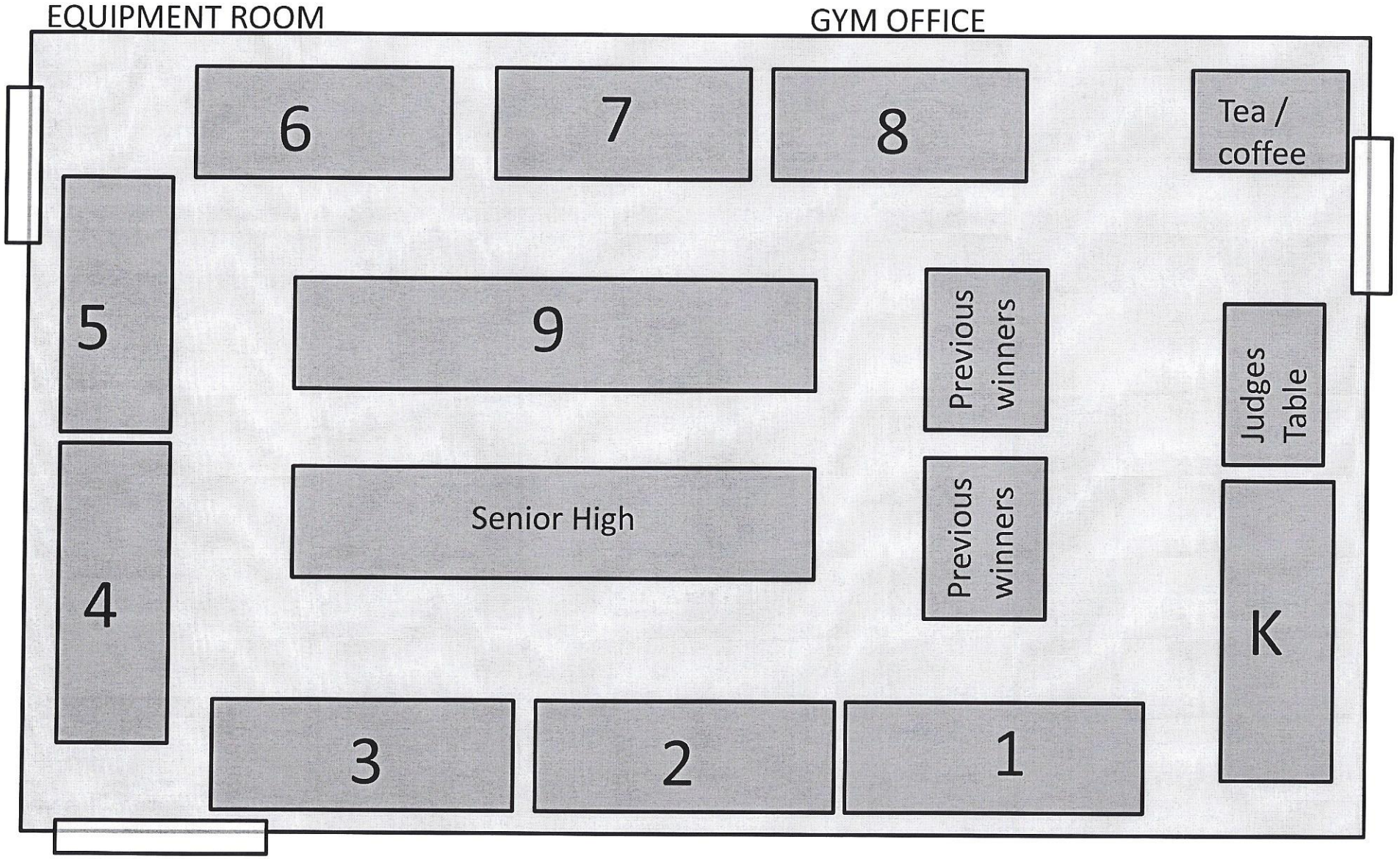
Science 10 Outcomes

Career Education
SCI10-CE1 Explore the range of science topics addressed in senior science courses.

Student-directed Study
SCI10-SDS1 Create and carry out a plan to explore in-depth one or more topics of personal interest relevant to Science 10.

Climate and Ecosystem Dynamics
SCI10-CD1 Assess the consequences of human actions on the local, regional, and global climate and the sustainability of ecosystems.
SCI10-CD2 Investigate the mechanisms that influence Earth's climate system, including the role of the natural greenhouse effect.
SCI10-CD3 Examine biodiversity through the analysis of interactions among populations within communities.
SCI10-CD4 Investigate the role of feedback mechanisms in biogeochemical cycles and in maintaining stability in ecosystems.

Chemical Reactions
SCI10-CR1 Experience a variety of chemical reactions, including the role of energy changes.
SCI10-CR2 Name and write formulas for common ionic and molecular chemical compounds, including acids and bases.
SCI10-CR3 Represent chemical reactions and the conservation of mass symbolically using models, word and skeleton equations, and balanced chemical equations.
SCI10-CR4 Investigate the rates of chemical reactions, including factors that affect the rate.

Force and Motion in Our World
SCI10-FM1 Investigate and represent the motion of objects that travel at a constant speed in a straight line.
SCI10-FM2 Investigate and represent the motion of objects that experience constant acceleration.
SCI10-FM3 Explore the relationship between force and motion for objects moving in one and two dimensions.

Approximate Gym Layout