Science Fair Packet
2017-2018

Student Name: _____

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2017-2018 Science Fair Rubric

CATEGORY	3	2	1	0
Visual Display	• Board is neat, attractive, and creative	• Board is neat and attractive	• Board is fair	• The display was incomplete and unorganized
Level of Difficulty/Creativity	• Problem is new, meaningful, and well researched • Requires a creative approach	• Problem is addressed and researched • Requires a less than creative approach	• Problem is addressed with minimal research • Requires a less than creative approach	• Problem is not addressed
***Hypothesis**	• Hypothesis is clearly stated in the "if…then" format	• Hypothesis is stated	• Hypothesis is unclear	• Hypothesis is not stated
***Background Research**	• Research is thorough, specific, and has many examples • All ideas are clearly explained	• Research has some specifics with a couple of examples • Few ideas are explained	• Research has little specifics and one example • Two or less ideas are explained	• Research has no specifics • Ideas are not explained
***Procedures/ Materials**	• Procedures are detailed, appropriate, and thorough • Procedures are listed in sequential order • All materials are listed	• Procedures are appropriate and thorough • Procedures are listed and mostly sequential • Most materials are listed	• Some procedures are listed; procedures may not be appropriate • Few materials are listed	• Procedures are not listed • Materials are not listed

***Variables**	• Variables are properly identified	• Variables are identified with some accuracy	• Some variables are missing	• Variables are not referenced
***Data**	• Adequate number of trials/sample size • Appropriate use of photos/charts/ graphs to display data clearly	• Use of trials/sample size • Fair use of photos/charts/ graphs to display data	• Minimal number of trials/sample size • Use of photos/ charts/graphs to display data is unclear	• Data is not referenced or displayed
***Conclusion**	• Conclusion is supported by the data • Sources of error have been considered • Explanation is made for how and why the hypothesis was supported or rejected • Reflection of what was learned and how it could be made better	• Conclusion is supported by the data • Some sources of error have been considered • Explanation is made for how or why the hypothesis was supported or rejected	• Conclusion is not supported by the data • Little to no sources of error have been considered • Explanation is attempted for how or why the hypothesis was supported or rejected	• Conclusion is not provided
***Presentation**	• Speaks loudly and clearly • Able to present content knowledge in a clear manner without prompting	• Able to present content knowledge in a clear manner with some prompting	• Able to present minimal content knowledge	• Unable to answer any question(s) pertaining to the content

Total Possible Points = 27 points

*Standard-based expectations that may be considered for mastery grades if completed during instructional time.

Science Fair Topics

Animal Sciences: Study of Animals – Development, Ecology, Genetics, Animal Husbandry, Pathology, Physiology, Systematics, Populations Genetics, Other.

Behavioral and Social Sciences: Clinical & Development Psychology, Cognitive Psychology, Physiological Psychology, Sociology, Other.

Biochemistry: General Biochemistry, Metabolism, Structural Biochemistry, Other.

Cellular & Molecular Biology: Cellular Biology, Cellular and Molecular Genetics, Immunology, Molecular Biology, Other.

Chemistry: Analytical Chemistry, Inorganic Chemistry, Organic Chemistry, Physical Chemistry, General Chemistry, Other.

Computer Science: Algorithms, Data Bases, Artificial Intelligence, Networking and Communications, Computational Science, Computer, Graphics, Software Engineering, Programming, Languages, Computer System, Operating System, Other.

Earth Science: Climatology, Weather, Geochemistry, Mineralogy, Paleontology, Geophysics, Planetary Science, Tectonics, Other.

Energy & Transportation: Aerospace & Aeronautical Engineering, Aerodynamics, Fossil Fuel Energy, Vehicle Development, Renewable Energies

Engineering: Bioengineering, Civil, Construction, Chemical, Industrial, Electrical, Computer, Controls Mechanical, Robotics, Thermodynamic, Solar Engineering, Processing Material Science, Other.

Environmental Science: Air Pollution and Air Quality, Soil Contamination and Quality, Water Pollution and Quality, Bioremediation, Ecosystems Management, Environmental Engineering, Land Resource Management, Forestry, Forestry Recycling, Waste Management, Other.

Mathematics: Algebra, Analysis, Applied Math, Geometry, Probability and Statistics, Other.

Medicine and Health: Disease Diagnosis and Treatment, Epidemiology, Genetics, Molecular Biology of Diseases, Physiology and Pathophysiology, Other.

Microbiology: Antibiotics, Antimicrobials, Bacteriology, Microbial Genetics, Virology, Other.

Physics and Astronomy: Astronomy, Atoms, Molecules, Solids, Biological Physics, Instrumentation and Electronics, Magnetics and Electromagnetics, Nuclear and Particle Physics, Optics, Lasers, Masers, Theoretical Physics, Theoretical or Computational Astronomy, Other.

Plant Sciences: Study of Plant life – Agriculture, Agronomy, Horticulture, Forestry, Plant Taxonomy, Plant Physiology, Plant Pathology, Plant Genetics, Hydroponics, Algae, Plant Systematics, Evolution, Other.

Science Fair Project Timeline and Checklist

NAME: _____

Teacher Initials	Due Date	Milestone
		1. **Choose** a project
		○ **Write** a question
		○ **Write** a hypothesis
		2. **Research** your topic and use at least two sources
		○ **Write** an informational paragraph
		3. **Write** a detailed, step by step procedure for a controlled experiment
		○ **Identify** your control group and your variable
		○ **Make** a list of your needed materials
		○ **Create** a data collection form
		4. **Perform** the experiment
		5. **Collect** data
		6. **Analyze** your data
		7. **Create** a chart and graph to display your data
		8. Write your two-step conclusion
		○ **Step 1: Answer** the original question
		○ **Step 2: Tell** whether your hypothesis was supported or rejected and explain why
		9. Create a display of your project
		○ Neat and easy to read
		○ Organized, creative design
		○ Pictures or graphics that relate to the project
		○ Correct spelling and grammar
		10. Class Fair
		11. School Fair
	February 18th	12. **13. Regional Fair**
	March 9th	**14. Network Fair**
Comments:		

Science Fair Project Proposal Form

Student Name: _____

The problem or question I plan to investigate or solve in my experiment: (*please phrase as a question)*

Science Project Question List	
1. Have you met your teacher's requirements?	Yes / No
2. Is your topic interesting enough to read about, and then work on for the next few weeks?	Yes / No
3. Can you find at least 3 sources of written information on your subject? (*At least one written source can not be from the internet*).	Yes / No
4. Can you measure changes to the important factors (variables) using a number that represents quantity such as count, percentage, length, width, weight, voltage, velocity, energy, time etc.? OR, just as good, are you measuring a factory (variable) that is simply present or not present? For example, • Lights **ON** in one trail, then lights **OFF** in another trail.	Yes / No
5. Can you design a "fair test" to answer your question? In other words, will you experiment or invention test only one variable at a time?	Yes / No
6. Is your experiment or invention safe or safe to perform?	Yes / No
7. Do you have all the materials and equipment you need for your project, or will you be able to obtain them quickly and at a very low cost?	Yes / No
8. Do you have enough to time to do your experiment or use your invention more than once before the due date?	Yes / No

I have discussed the project idea and the checklist with my parent(s) or guardian and I am willing to commit to following through on this project.

_____

_____Student Signature **Date**

I have discussed the project idea and the checklist with my student and I believe he or she can follow through with this project. I agree to surprise the safety of the project steps that my student performs at home.

_____

Parent Signature **Date**

Background Research Plan Worksheet

Student Name: _____

1. What is the **question** you are going to try and answer with an experiment?

   _____
   _____

2. List the **keywords** and phrased from your question and the topic in general.

   _____ _____ _____
   _____
   _____ _____ _____
   _____
   _____ _____ _____
   _____

3. Now use your keywords to build some **questions to guide your background research**. Develop at least two or three from each "question word." Do not worry about whether you already know the answer to the question; you'll find the answers when you do your background research. Make sure that you ask for help from knowledgeable adults who can help guide you.

Question Word	**Possible Questions** (*please try and think of others)*	**Substitute your keywords (or variations of your keywords) for the blanks in the "possible questions" column. Write down the relevant questions and use them to guide your background research.**
Why	Why does _____ happen? Why does _____ _____? Why _____?	
How	How does _____ happen? How does _____ work? How does _____ detect? How does one measure _____? How do we use _____? How _____?	

Question Word	Possible Questions (*please try and think of others)*	**Substitute your keywords (or variations of your keywords) for the blanks in the "possible questions" column. Write down the relevant questions and use them to guide your background research.**
Who	Who needs _____? Who discovered _____? Who invented _____? Who _____?	
What	What causes _____ to increase/decrease? What is it made of _____? What are the properties of __? What do we use _____ for? What _____?	
When	When does _____ cause _____? When was _____ discovered? When _____?	
Where	Where does _____ occur? Where does _____ get used? Where _____?	

4. To analyze the results from the experiments, you might need to know some **key formulas** or **equations.** Thinking about your experiment and write down any step or task that requires a formula or equation. Do not worry about whether you already know what the formulas or equation is; you'll find the actual equations when you do your background research.

List steps or tasks that may require a formula or equation:

_____ _____ _____
_____

_____ _____ _____
_____

Research Paper Checklist

Student Name: _____

☐	Have you defined all important terms?
☐	Have you clearly answered all of your research questions?
☐	Does your background research enable you to make a prediction of what will occur in your experiment?
☐	Will you have the knowledge to understand what causes the behavior or action that you observe?
	Does your research include the following:
☐	--Currently accepted theories, facts, and data?
☐	--Relevant mathematics/equations (if applicable)
☐	--Key discoveries and early researchers
☐	Have you referenced all information copied from another source and put any phrases, sentences, or paragraphs you copied in quotation marks?
☐	Is every fact or picture in your research paper followed by a citation telling the reader where you found the information?
	Does your research paper include:
☐	--A title page
☐	--Your report
☐	--Bibliography
☐	Have you used the proper capitalization and punctuation?
☐	Have you checked your grammar and spelling?

Variables and Hypothesis Worksheet

Student Name: _____

Variables (*Fill in the table with the appropriate information from your own experiment*)		
Independent Variable (What will you be changing in the experiment? Note: There should only be one item listed here)	**Dependent Variable** (What will you be measuring or observing)	**Controlled Variable** (What will you be keeping the same during the experiment)

Your Hypothesis

(Fill in the blanks with the appropriate information from your own experiment)

If (I do this)

_____
__

_____
_____

Then this will happen

_____

_____
_____

_____
_____

_____
_____

Final Report Checklist

Student Name: _____

☐	Does your abstract include a short summary of the hypothesis, materials & procedures, results, and conclusions?
☐	Have you used the proper capitalization and punctuation?
☐	Have you checked your grammar and spelling?
	Does your final report include the following key sections:
☐	--A title page
☐	--An abstract
☐	--A table of contents
☐	--Questions, variables, and hypothesis
☐	--Background research (your research paper)
☐	--Materials list
☐	--A title page
☐	--Experimental procedures
☐	--Data analysis and discussion (including data tables and graphs)
☐	--Conclusions
☐	--Acknowledgements
☐	--Bibliography

Display Safety Standards

The following rules that are based on the rules of the International Science and Engineering Fair (ISEF) must be followed.
Note: The following rules only apply to what is included in the actual display. The following items can be used for the project only if they are represented by photographs, drawings, or artificial items in the actual display.

A. Not Allowed in Project Display

Anything potentially dangerous to the public is prohibited in your ACSI Science Fair display, including, but not limited to, the following as determined by the entrant's adult sponsors and the event chair:

1. No living organisms, including plants
2. No taxidermy specimens or parts
3. No preserved vertebrate or invertebrate animals
4. No human or animal food
5. No human/animal parts or body fluids (for example, blood, urine)
6. No plant materials (living, dead, or preserved) that area in their raw, unprocessed, or non-manufactured state (exception: manufactured construction materials used in building the project or display)
7. No laboratory/household chemicals, including water (exceptions: water that is integral to an enclosed apparatus)
8. No poisons, drugs, controlled substances, hazardous substances or devices (for example, firearms, weapons, ammunition, reloading devices)
9. No dry ice or other sublimating solids
10. No sharp items (for example, syringes, needles, pipettes, knives)
11. No flames or highly flammable materials
12. No batteries wit open-top cells
13. No photographs or other visual presentations depicting vertebrate animals in surgical techniques, dissections, necropsies, or other lab procedures
14. No active Internet or email connections as part of displaying or operating the project at the ACSI Science Fair
15. No glass or glass objects unless deemed by the entrant's adult sponsors and event chair to be an integral and necessary part of the project (exception: glass that is an integral part of a commercial product such as a computer screen)
16. No apparatus deemed unsafe by the entrant's adult sponsors and the event chair (for example, large vacuum tubes or dangerous ray-generating devices, empty tanks that previously contained combustible liquids or gases, pressurized tanks)

B. Allowed in Project Display *but* with the Restrictions Indicated

1. Soil or waste samples if permanently encased in a slab of acrylic
2. Postal addresses, World Wide Web and email addresses, telephone numbers, and fax number of the entrant only
3. Photographs and/or visual depictions if
    a. They are not deemed offensive by the entrant's adult sponsors and the even chair
    b. Their origins are credited (such as photographer, a website, magazines, newspapers, journals)
    c. They are photographs or visual depictions of the entrant
    d. They are photographs of human subjects who have signed consent forms

4. Rockets or any apparatus with unshielded belts, pulleys, chains, and moving parts with tension or pinch points if for display only and not operated
5. Class II lasers if
    a. Operated only by the entrant, and only during judging
    b. Labeled with a sign reading “Laser Radiation: Do Not Stare into Beam”
    c. Enclosed in protective housing that prevents physical and visual access to the beam
    d. Disconnected when not being operated
6. Class III and IV lasers if only for display and not operated
7. If adequately insulated, any apparatus producing temperatures that will cause physical burns
8. Behavioral studies for which there are signed consent forms (See ISEF forms listed on Project Approval Form)

C. Electrical Regulations at the ACSI Science Fair

1. Entrants requiring 120 or 220 Volt A.C. electric circuits (maximum allowed and as available at facility) must provide a UL-Listed 3-wire extension cord that is appropriate for the load and equipment.
2. All electrical connectors, wiring, switches, extension cords, fuses, etc., must be UL-listed and must be appropriate for the load and equipment. Connectors must be soldered or made with UL-Listed connectors. Wiring, switches, and metal parts must have adequate insulation and over-current safety devices (such as fuses) and be inaccessible to anyone other than the entrant. Exposed electrical equipment or metal that possibly may be energized must be shielded with a non-conducting material or with a grounded metal box to prevent accidental contact.

   There must be an accessible, clearly visible on/off switch or others means of disconnect from the 120 or 220 Volt power source.

Science Fair Project Display Board Checklist

For a Good Science Fair Project Display Board, You Should Answer "Yes" to Every Question	
Does your display board include: • Title • Student name • Abstract • Question • Variables and hypothesis • Background research • Materials list • Experimental procedure (step-by-step format) • Data analysis and results • Discussion including data chart(s) & graph(s) • Conclusions (including ideas for future research) • Acknowledgements • Bibliography	Yes / No
Are the sections on your display board organized like a newspaper so that they are easy to follow?	Yes / No
Is the text font large enough to be read easily (at least 16 points)?	Yes / No
Does the title catch people's attention, and is the title font large enough to be read from across the room?	Yes / No
Did you use pictures and diagrams to effectively convey information about your science fair project?	Yes / No
Have you constructed your display board as neatly as possible?	Yes / No
Did you proofread your display board?	Yes / No
Did you follow all of the rules pertaining to display boards for your particular science fair?	Yes / No

Science Fair Preparation

Display boards should be purchased early. That way, students will be able to easily visualize the amount of room they'll have for text, photos, charts, graphs, etc. You may want to gather other items they'll need at this time also, so that students are prepared come production time: colored construction paper and heavyweight computer printer paper, various tape, glue stick, and mounting products for various stages of layout and model building (one size does not fit all!); and all the tools they'll need to measure, cut, paste, and create a professional-looking display.

- Tri-fold display board
- Display board header (optional accessory)
- Permanent markers with bold and medium tips
- Colored construction paper
- White computer printer paper (heavier cover stock is best)
- Notebook
- White correction fluid

For the Science Fair:

- Tablecloth to place under display board. (A simple piece of inexpensive fabric in a bright color that complements the colors on your board; stay away from busy patterns).
- Supply kit (Fill a shoe box with any items you might need for emergency repairs: tape, glue, glue sticks, markers, pencils and pens, extra construction paper, scissors, paper cutter, correction fluid, etc.)
- Science reference book (In case anyone asks you a question you can't answer, you can look it up after)

Note: While choosing a topic and testable question, keep required materials, equipment and supplies in mind. Some might be available at school; others may be purchased at online and specialty stores. Based on your family budget, this may factor into your decision-making. Here are some sample items for miscellaneous projects:

Board	Accessories
• 36x48 Corrugate Tri-Fold Display Board White • 36x48 Tri-Fold Foam Display Board White • 36x48 Guide-Line Tri-Fold Foam Display Board White • Mini Corrugate Tri-Fold Display Board • Mini Guide-Line Tri-Fold Foam Display Board	• 10"x36" Single Ply Header Card White • Science Fair Project Titles • Project Popperz – Paper Letters Black • Project Popperz – Jumbo Paper Letters & Numbers Black • Project Popperz – Jumbo Permanent Markers • Project Popperz – Repositionable Borders • Project Popperz – Reusable Plastic Stencils • 3D Paint Pens Classic Colors • Plastic Supply Case

Adhesives	Cutting Tools
• Adhesive Squares – Repositionable • Glue Spots – Pop Up Medium Size • Foam Mounting Tape • Washable Disappearing Purple Glue Stick 2ct. • Washable Jumbo Disappearing Purple Glue Stick 1ct • All Purpose Glue Stick • Repositionable Picture & Poster Glue Stick • Rubber Cement	• #1 Precision Knife • X-Acto Foam Board Cutter
Safety Supplies	**For Making Models**
• Safety goggles • Eyewash • Latex gloves • Apron • Fire extinguisher • First-aid kit	• Modeling clay • Foam board • Recycled cardboard and household items
Science Experiment Supplies	**Where to Buy**
• Petri dishes • Litmus paper • pH test paper • Test tubes and racks • Funnel • Magnifying glass • Balances and scales • Thermometers • Water and soil test kits (test for pH, nitrogen, etc) • Acid rain testing kit	• Target • Jo-Ann's • AC Moore • Michael's • Kroger

Presentation Tips

- ✓ Please refrain from reading directly from your presentation.
- ✓ Stand off to the side of your project so it is visible.
- ✓ Appearance is important. Wear your CSUSA uniforms proudly.
- ✓ Stand up straight and tall. Introduce yourself confidently. Look directly at your judges or into the camera and speak in a clear, friendly tone.
- ✓ Follow the criteria on the *CSUSA Science Fair Rubric* to guide your presentation.
- ✓ Be confident! Be proud of yourself. You have worked hard on this project.

Sample Presentation

- o Introduce your science fair project and provide a brief description about the topic.
- o Explain why you chose your project. For example, "The reason I chose this particular project is because …" Explain why: interesting, fun, challenging, beneficial, applicable, etc.
- o State your hypothesis along with your predicted outcome. "My hypothesis was…"
- o Describe the materials used in your experiment. List materials and state how they were relevant to the experiment, as well as any safety precautions you had to take.
- o Describe the procedure you followed. List the steps IN ORDER and thoroughly explain each.
- o Discuss the variables you included in your experiment.
- o Describe the data collection and how you organized the information. Remember to refer to units of measurement.
- o Describe the results. "After following all of the steps in the procedure, the results I found were…" Explain the outcome. What happened? Do not omit any details in the results that could be useful in the conclusion.
- o Describe the conclusion. "From the results I came to the conclusion…" What did you learn? Was your hypothesis accurate? Your hypothesis may be incorrect; therefore you can discuss what you learned. Did you enjoy the process? Is there anything else you can draw from your conclusion?
- o Describe the resources used to research information regarding your topic.
- o Thank the judges for their time.