SCIENCE FAIR PACKET

PARENT INFORMATION:

The Science Fair Packet is a Time Management Assignment (TMA). The student is to complete the TMA over a three to four month period. This is NOT meant to be a project that the student will or can complete over a weekend or a couple of weeks. All TMAs have deadlines and corresponding "mini-deadlines." There are NO late projects accepted on a TMA. Students must make arrangements to have the project brought to the school if they are absent or the student can always turn the TMA in early if it is a prearranged absence. Students will have adequate notice of all mini-deadlines along the way. Each mini-deadline assignment will be scored and is counted as part of the overall grade for the science fair TMA.

Topics that students select are required to be reflective of a Columbus High School student. There should be no product comparisons or projects that requires a qualitative evaluation. All Science Fair TMAs require quantitative measurements. The topics are actual experiments that will be completed, NOT demonstrations, which means no topics like: How does a Volcano Work? Or Which Tastes Better: Apples or Oranges? The complexity of the project will directly affect the overall final grade for the Science Fair TMA.

There are many benefits to the Science Fair TMA. It helps the student organize and plan time, materials, activities, and other subject's requirements. The Science TMA is practice in time management for senior projects. It can be a résumé builder and lead to science awards. It can lead to an academic letter, and help the student apply and be considered for Governor's Honors Program (GHP).

If the student has problems doing their topic, be sure they have spoken to the teacher before the parent contacts the teacher. We want and encourage our students to develop the skills of being independent learners and be able to address their teachers and administrators. Teachers cannot answer or address thirty students' questions or concerns during class time. If you or your student have a question about the science fair, please feel free to e-mail the teacher directly. Teachers are available at various times. Please refer to the Biology Teacher's Syllabus for available hours before or after school. Please allow the student to do their own project with minimal help from the parent. This will contribute to the development of independent learners.

The Science Fair TMA must follow the Scientific Method. Within each step of the scientific method are additional requirements. For example, when identifying the problem, there are specific forms that must be completed by students, parents and teacher. When completing the research, a review of literature must be submitted along with a works cited.

The Science Fair Project will be done in the order of the scientific method.

A. Problem
   1. Choose a topic: pose a question. If internet resources are used for ideas, the project should be modified by the student. The student should design a new project and not copy a project already completed.
   2. Have the topic approved by teacher- Remember that topics should be reflective of a Columbus High Student.

B. Research
   Find books, journals, magazines, resource people, videos, and any other source that contains information pertaining to your chosen topic. These sources will be used to write a literature review that will be turned into turnitin.com to check for plagiarism. All sources and information MUST be cited in the MLA works cited page.
C. Form a Hypothesis
   Hypothesis: an If, then statement of the prediction of the outcome of the experiment (based on available information). This is an educated guess.
D. Methods and Materials (Procedures)
   1. Written plan of how to carry out the experiment. Complete an experimental design to include: an independent variable, dependent variable, control group, and constants.
   2. State sequential steps in detail of how the experiment/project will be conducted.
   3. Obtain materials needed for carrying out your project.
E. Test the Hypothesis
   1. Carry out the experiment/ project following the method devised. Must have 30 trials for the experiment.
   2. Make frequent observations and record all results in the project log.
F. Results and analysis
   1. Data (recorded observations) Must be quantitative not qualitative data and must be put into the appropriate graph.
   2. Verbal description/summary of data (what happened in the project and why it happened)
G. Conclusion
   1. Did the data support or fail to support the hypothesis? Why or why not? How do the results compare to other research? How does this project benefit society? Any recommendations to expand the project? The conclusion should answer these questions and be summarized.

<u>Below are sections that will be completed for grade which are due on mini deadlines throughout the Science Fair Project.</u>

I. LOG BOOK SETUP AND CONTENT:
This should be started immediately since all science fair work needs to be documented in the logbook.

DIRECTIONS: OBTAIN A LOG BOOK – This is an unused composition notebook- DO NOT WRITE IN THE LOG BOOK – WE WILL SET THE BOOKS UP TOGETHER IN CLASS - YOU WILL NEED A BLUE OR BLACK INK PEN FOR THIS.

1. The log book should have your name and the Topic/Title on the front cover. This should be the original log book set up in class.
2. The Table of Contents should be up to date to and include all sections outlined in the logbook grading rubric.
3. The Method/Materials must be in completed form.
4. Pages should be pre-numbered to at least 50.
5. A Date, Time and Location should appear before every new entry.
6. The log book should detail how you are completing your project on a daily basis. INACCEPTABLE: Today I watered my plants. ACCEPTABLE: Today each plant received 20mL distilled water. Remember the logbook is a detailed description of your project similar to a daily diary.

*BY THE FIRST LOG BOOK CHECK, YOU ARE EXPECTED TO BEGIN PROGRESS OF EXPERIMENT. THIS MEANS YOU MUST OBTAIN SUPPLIES AND BEGIN EXPERIMENTATION. PLAN ACCORDINGLY.

*BY THE SECOND LOG BOOK CHECK, IT IS EXPECTED THAT EXPERIMENTATION IS COMPLETED AND ALL DATA AS WELL AS DISCUSSION AND CONCLUSION ARE IN THE LOG BOOK.

SEE LOG BOOK RUBRIC FOR SPECIFIC DETAILS.

II. TOPIC:
You do not have to have the exact title of your project at this time; however, a general topic is needed. Write the topic on a sheet of paper with a paragraph explaining what you hope to find out through experimentation. You also need to briefly explain how you will carry out experimentation. For ideas, the internet may be used but topics must be changed in some way in order to not be copying someone else's project. **Topics that are the same as previous projects or internet projects will not be accepted.** Science fair ideas can be found at www.secondaryinstruction.com under the science fair tab.

NOTE: When the topic is approved, write it in your log book

III. WORKS CITED PAGE:
This is your background research. You may consult newspapers, books, public television, internet sources, magazines, professional individuals, etc. YOU MAY NOT USE A DICTIONARY AS A MAIN SOURCE OF INFORMATION. ANOTHER STUDENT IS NOT AN AUTHORITY. IF YOU LOOK AT ANOTHER STUDENT'S PROJECT (I.E. ON LINE) YOU MAY NOT USE THEM AS A SOURCE OF INFORMATION – THEY CAN BE USED TO GET AN IDEA FOR YOUR PROJECT ONLY.

DIRECTIONS:

1. You will need to have **AT LEAST 5** sources of information related to your topic. This information will be used to produce a 4-6 paragraph introduction to your research in the future (Literature Review). Remember, you are doing a works cited page (MLA writing style) not a bibliography.
2. It is suggested that you print a hard copy of the information if you are using an internet source since some of these will be removed at times. NOTE: If you list it as a source to be used; I will expect you to use it somewhere in your paper. In other words be sure the information is something useful to you. Points will be deducted if you change your mind about a source after they are turned in. You will be able to add to your Works Cited list; however, you cannot remove any of the original 5 that were turned in for points.
3. You may use any media source as many times as you like. In other words, if you would like to use all internet sources or all book sources that is acceptable. IF YOU USE INTERNET SOURCES, BE SURE THE SOURCE IS A PUBLISHED WORK FROM A CREDIBLE SOURCE. FOR EXAMPLE, GALILEO, NEWSPAPER ARTICLES, PUBLISHED MAGIZINES. You may not use Wikipedia, Science Buddies, e-how, YouTube how- to videos, etc.

NOTE: When your sources have been checked and returned be sure to write them in your log book.

Student must submit several forms on this due date as well.

1. Form 1: Checklist for Adult Sponsor
2. Form 1A: Student Checklist (Including Research Plan- this may be modified as the project progresses, but should be an outline of the project)
3. Form 1B: Approval Form
4. Completed Abstract Form

5. Form 3: Risk Assessment Form
6. Other forms may be required depending on topic. (For example, students working with human subjects need a human participant form and students working with potentially hazardous materials need a qualified scientist form)

IV. LITERATURE REVIEW:

The literature review for a laboratory report can vary from a few sentences to several pages. For our purposes, the literature review will be a few paragraphs (meaning more than one) that you write from information that you collect from the five sources that you have in your log book. A literature review provides background information about the topic so that the reader knows that the topic but does not know the details about the project. Some reminders:

1. You are to use MLA writing style (to conform to the rest of the school). That means all information is double spaced. Use Times New Roman size 12 font. Margins should be no more than 1 inch which means it must be typed. Heading on the first page only. Headers on all pages to include last name and page number.
2. Give your paper a title. DO NOT CALL IT Literature Review. Capitalize all important words in a title.
3. DO NOT begin a sentence with "so", "but" or "well". This is too casual for this type of writing.
4. DO NOT begin paragraphs with "this article says this". You are providing background info not summaries of articles.
3. DO NOT end a sentence with a preposition. EX. Where are you going to?
4. DO NOT use 1st or 2nd person pronouns in the report (which includes the literature review) anywhere!
5. DO NOT use contractions or slang terms such as kids, guys and gals, etc.
6. You may add more sources to use in writing your lab report but you cannot take away any.
7. USE TRANSITION between paragraphs. Your writing should flow easily from one thought to another.
8. Spelling and grammar are ALWAYS important.
9. Parenthetical documentation is a MUST. Paraphrase pertinent information from your sources and then give credit to the individual(s) from whom you borrowed information using within the text documentation. The proper way to do this is outlined in your MLA book or you can see your WW or English teacher. Failure to document constitutes plagiarism. Your paper will not be read and you will receive a zero. Your paper will be submitted to turnitin.com.
10. You SHOULD NOT quote your entire paper. As a rule, an introduction this short should not have more than one or two quotes at the most. YOU REALLY DO NOT NEED ANY; HOWEVER, ONE OR TWO AT MOST WILL BE FINE.
11. All grammar rules apply for the laboratory report. If you are not sure, consult your MLA book and/or an English grammar book. DO NOT GUESS.

V. VARIABLES/CONTROLS:

A typed, double spaced hard copy will need to be turned in along with the Method/Materials. Do not write this information in your log book until it has been checked.

1. State the problem and purpose of your study. Example: The purpose of this study is to ------
2. State the hypothesis for your study. NOTE: This may be written as a null hypothesis. Example: The hypothesis for this study is ----- OR It is hypothesized that -------- MUST be "if, then" format
3. What is the independent variable? Not sure what that is? If you were plotting a graph this information would appear on the X axis.

4. What is the dependent variable? Not sure what that is? If you were plotting a graph this information would appear on the Y axis. It is what you are looking for or measuring in your experiment.
5. What are the constant procedures that will be implemented? How will you keep conditions the same for all groups?
6. What will be the control group (if applicable)? ALL EXPERIMENTS HAVE CONSTANT PROCEDURES; MANY WILL ALSO HAVE A CONTROL GROUP BUT NOT ALL.

VI. METHODS/MATERIALS:
A typed, double spaced hard copy must be turned in so that the procedure can be checked for accuracy. Do not write the Method/Materials in your logbook until it has been checked.
THE METHOD/MATERIALS (PROCEDURE) MAY BE WRITTEN AS A STEP-BY-STEP PROCESS IN YOUR LOG BOOK BUT MUST BE WRITTEN IN PARAGRAPH FORM FOR YOUR LAB REPORT PAPER.

1. Make a list of all equipment, reagents, etc. that you will need for your project. BE SURE TO INCLUDE THE SIZE, SHAPE, QUANTITY, etc. that is needed. GIVE ALL SIZES IN **METRIC** UNITS. If you are using people be sure to include the gender and age range. If you are using plants or animals (other than humans) YOU MUST USE THE SCIENTIFIC NAME AT LEAST ONCE and then you may use the common name. This information may be obtained from a dictionary. Pay close attention to how the name is presented. These are foreign terms and must be written in italics. The genus name is capitalized and the species name is written in lower case letters.

2. Write how the procedure will be carried out. Do not use the terms "the researcher or the experimenter" does this or that. This section must be written in paragraph format and very detailed. It should include all steps and be able to be followed by another person. It should be detailed like a recipe or set of instructions.

VII. Formal/ Final Report:
The report must include the following in order: Title, table of contents, abstract, corrected review of literature, corrected methods and materials, corrected hypothesis/variables, results, discussion/conclusion, and corrected works cited. *Remember everything but results and discussion/conclusion have already been written and graded. You must correct errors and resubmit with entire final report in the order stated above.

A. Results: Think of the most logical way to present your data. The student MUST include tables, appropriate graphs, and possibly figures or a combination of all. In addition, students must rewrite their data placing it in paragraph format using complete sentences and refer the reader to the graphs. (Hint: think how a textbook says "see figure 1")

B Discussion/Conclusion: These sections may be separate or combined and must include the following:

1. Specific and detailed statements concerning whether or not the analysis of data supported or failed to support the hypothesis.

2. Separate and detailed statements regarding the acceptance or rejection based on the data collected. State specific reasons.

3. Tell how the conclusion in your experiment compares with other research and remember to use in text citations for the references. Explain similarities and differences. For example, if your literature research states that fertilizers impact plant growth and your project's data supported this, you should state that your

results compare to that specific research. It does not mean you have to find a similar project to compare to your project.

4. Give recommendations for improving or expanding the research. Think of ways that you could make your project better if you were to repeat the project.

5. State the importance of your findings to society and scientists. Every project will have an importance!

6. If there was something unforeseen that affected your data (ex. Heavy rain damaged plants), explain these and how they may have affected your data.

7. A summary of the entire TMA.

****This discussion and conclusion section must be three (3) to four (4) pages in length****

VIII. Digital Presentation:
You will complete a digital presentation that will be submitted to Edmodo or some type of digital dropbox specified by the teacher. No flash drives or emails will be accepted.
**If your project is selected to compete in the regional science fair, you must construct a tri-board display. See attached example for layout.

Important Notes:

1. **Abstract**: A properly written abstract consists of the title of the project and a brief summary of the entire project. Think of it as a summary of your project giving the highlights of your project, methods, and results. Remember to use past tense in describing completed research and present tense when stating existing facts and what is in the paper. It should be limited to 200-250 words limited to one page.
2. **Introduction:** This will be completed with your literature review and should be why you chose the project. It can be based on personal preference or interests. This should be the only assignment
3. **Forms:** All forms can be found on the school's website, www.secondaryinstruction.com, or www. societyforscience.org/isef
4. **Scoring rubrics:** All scoring rubrics are included in this packet. Be sure to look over and follow the rubrics. This is how your assignment will be scored.
5. **MLA Structure and Style:** All assignments must be in MLA format. It should also be written in 3rd person. Third person does not include I, me, we, us, our, you, and your. Some examples of third person include he, she, it, they, and one. The only exception to this rule is the introduction.
6. **Scientist Requirements:** It is your responsibility to find a qualified scientist for your project. If you choose to do a project with human participants, you MUST have a qualified science help you with the project. This could be a counselor, psychiatrist, or doctor. If you choose to do a project with mold, bacteria, fungi, or any potentially hazardous material, you MUST do the experiment in an approved lab with a qualified scientist. All of these places and people require additional forms to be completed and signed. Forms can be found on links above in note number three. Any projects completed without this documentation will not be accepted.
7. **General Projects:** Projects completed on guns, ammunition, bows and arrows and other weapons will not be able to compete in any science fair completions.

Works Cited

Area	Points Possible	Points Earned
Number of Sources	10	
Alphabetical by Author/Title	5	
MLA Format	10	
Total Points	25	

Literature Review

Area	Points Possible	Points Earned
Heading/Header	5	
Title	5	
Documentation	15	
Content/Pertinent Info	15	
Grammar/Spelling	10	
Total	50	

Methods/Materials

Area	Points Possible	Points Earned
Accurate/Detailed	20	
Paragraph Format	5	
Grammar/Spelling	10	
Total	35	

Hypothesis/ Variables

Area	Points Possible	Points Earned
Problem/Purpose	5	
Hypothesis Testable	10	
Correctly Written	10	
Control Group	2	
Constants	2	
Dependent Variable	2	
Independent Variable	2	
Total	33	

LOGBOOK GRADING RUBRIC

MECHANICS	POINTS VALUE	POINTS EARNED
Name & Topic on Font	2pts	
Pages Pre-Numbered	2pts	
Black/Blue Ink	2pts	
Legible	2pts	
Book Intact	2pts	
Dates on all entries	2pts	
Times on all entries	2pts	
Locations on all entries	2pts	
No erasures/white out	2pts	
	TOTAL	
CONTENT	POINTS VALUE	POINTS EARNED
Table of Contents 1st pg	2pts	
Brainstorming Topics	3pts	
Library Research	5pts	
Problem/Purpose	5pts	
Hypothesis	5pts	
Method/Materials	5pts	
Progress of Experiment	10pts	
Data: Qual/Quant	10pts	
Conclusions	5pts	
	TOTAL	
	OVERALL TOTAL	

DIGITAL PRESENTATION

	POINTS VALUE	POINTS EARNED
Title (with problem statement if title is different)	5 pts	
Purpose	10 pts	
Hypothesis/Null Hypothesis	10 pts	
Materials/Methods	10 pts	
Results (paragraph format)	10 pts	
Graphs	10 pts	
Discussion/Conclusion	10 pts	
Visuals/Colors/Font/Overall Aesthetics	10 pts	
Layout Well Organized	10 pts	
Spelling/Grammar/Function	5 pts	
Neatness	10 pts	
Digital Submission	5 pts	
Total	105pts	

FORMAL/FINAL REPORT RUBRIC- REMEMBER TO CHECK PAPER LAYOUT DESCRIBED IN SECTION VII.

AREA	DESCRIPTION	POINTS POSSIBLE	POINTS EARNED
INTRODUCTION	Title/or Problem Statement	4	
	Table of Contents	5	
	Abstract (In form)	10	
EXPERIMENTAL DESIGN	Independent Variable	4	
	Dependent Variable	4	
	Constants	2	
	Control	3	
	Hypothesis/Null Hypothesis	4	
RESULTS	Graph(s)	20	
	Verbal Summarization	10	
Discussion/Conclusion	Accept/Reject Hypothesis	4	
	Explanation: Accept/Reject	5	
	Recommendations to Expand	5	
	Compares Data (Parenthetical Citations Required)	4	
	Benefit to Society	5	
	Summarizes Project	5	
Grammar/Spelling	Sentence structure/Variety	4	
	Mechanics- spelling, capitalization, etc.	4	
	Standard Usage (tense, agreement, etc.)	4	
	Margin size, font size, spacing, titles	4	
Corrections Made	Review of Literature	5	
	Materials	5	
	Methods	5	
	Works Cited	5	
Signed Papers Enclosed		20	
TOTAL		150	