Science Fair 2019-2020

Santan Junior High School

Student Information Packet

Tentative Timeline of Science Fair Completion
Santan Independent Inquiry-Based Science Project: 2019-2020

The following is a sample timeline to guide you in the completion of the project. Understand that some projects (projects requiring 3 weeks of plant growth, for example, will take more time to collect data than one that allows you to complete 3 trials in a day!) and some portions of the process (topic selection and research will take more time than the analysis of data) and writing (appropriate procedures and conclusion will take more time than writing a hypothesis) will take longer periods of time than others. Therefore, please use this timeline for guidance but understand that there is flexibility within your individual project. As always, refer to your teacher with any questions or concerns!

Remember, everything you do with this project should be recorded in a dated log book!

Start by getting a bound journal or notebook…do NOT place your name anywhere on this notebook….

September 9: Scientific Method review and topic-curriculum connections
Project overview requirements (talk to your teacher with any questions)

September 13: Identification of variables
PROBLEM to be investigated
Proposals completed & presented for approval
Curriculum Alignment form signed

September 20: Research topics at home!
Complete a bibliography
Hypothesis completed

September 25: Introductions completed
Experimental designs (Procedures) completed & revised
Data collection tables created (Have procedures and data tables prepared for your teacher to check)

October 28: ***Experimentation should be completed at home.*** *Be sure to record data in your pre-approved data tables. Continue by turning your data into a graph. Use your data table & graph to write an analysis and conclusion paragraph*

December 11: Science Fair Power Point is due.

The Inquiry Process

Students should be completing a project in the following order:

1) Development of a properly stated "PROBLEM" which includes the independent and dependent variables clearly stated. Remember: the topic must be experimental in nature connected to the 7th grade curriculum! (Please refer to the "Curriculum Alignment Grade 7" form on page 7 of this packet.)
2) RESEARCH of the topic that includes details about the variables being investigated from a variety of multiple sources.
3) Creation of a testable HYPOTHESIS that is reflective of the completed research.
4) Development of a step-by-step, detailed EXPERIMENTAL DESIGN that will be followed throughout the project. The design should be reproducible by others, include three trials, and lead to the collection of measurable data that can be graphed.
5) COLLECTION AND ANALYSIS OF DATA to include data tables, graphical representation of the findings, and a paragraph that summarizes the results.
6) CONCLUSION OF RESULTS including an answer to the original problem, a statement of the importance of the research to the scientific community, and potential areas of future research.

Timeline for Project Completion:

Please refer to the timeline provided on page 2…..there is flexibility within those dates. However, the following dates are NOT flexible and have been pre-determined!

*Judging of projects will be held in late January 2020.

*The projects will be displayed during student-led conferences on Tuesday, February 4, 2020. Those earning recognition will receive their awards the evening of conferences.

*All Power Points are due in December.

Science Fair Rules K – 8

Keep this paper for reference throughout the project!

1. The research and display must be entirely the work of the students. However, students may seek the advice & technical assistance of teachers and/or qualified mentors. The focus should be on student involvement in the scientific process.

2. *Before beginning any scientific project students must submit a proposal to their classroom teacher*. Projects must be approved prior to any experiments being started. This should include review of procedures and experimental procedures. Parents will be required to approve project topic and partners, if applicable, prior to students approaching teachers for approval.

3. *No experiments or projects may involve vertebrate (including human!) or invertebrate animals or bacteria of any kind without extensive paperwork and prior approval*.

4. Safety precautions must be observed during any science project. Do not attempt a project in which you cannot keep yourself completely safe at all times.

5. Projects involving harmful, explosive or controlled substances are prohibited.

6. Students will create a Power Point for their project.

Guidance Throughout the Project Portions

Topic Selection

This is one of the most difficult things about doing a science project. Keep in mind as you are picking a topic that you will have to work with it for the duration of the project. Once you choose an idea that you like, spend a few quiet moments thinking about how the whole project would work (remember it needs to be an experiment and it must be measurable). If you can imagine obstacles that will be too difficult, then find a new topic. Don't forget the cost of supplies and time constraints. Also check with your parents that they are ok with your choice of topic. Sometimes the most interesting projects come from things that you like to do in your spare time. Think of your hobbies, sports, clubs, chores at home, etc. Is there some aspect of these that you could measure and test?

Refer to science project books in the library or ideas on the Internet. You will probably have to expand or change an idea in order to make it into a measurable and experimental project.

Problem Statement

The next step is to turn your topic into a problem statement (what are you going to answer/solve?) for the project. The problem statement is a sentence or question that identifies the **independent variable** and the **dependent variable**.

Independent variable: the variable or factor that you decide to change; the cause

Dependent variable: the effect that you measure as a result of the independent variable

Example: How does the amount of water affect the height of plants?

***Independent variable**:* *amount of water* ***Dependent variable**:* *height of plants*

Notice in the example that both the independent and dependent variables are *measurable* in metric units. Think about your topic and imagine a few possible independent and dependent variables that you could use. List them below.

Independent Variables	**Dependent Variables**
_____	_____
_____	_____
_____	_____

Now choose one from each list that will work well together and that you find most interesting. Write a problem statement including these as your independent and dependent variables for the project.

PROBLEM STATEMENT (not hypothesis):

SCIENCE FAIR PROJECT PROPOSAL

TEAM PROJECT (2 people)

Name:_____ Name:_____

Project Description:

PROBLEM: Complete one of the inquiry questions for your project. Remember, the question must be something you can test!

What is the effect of _____ on _____?

~Or~

How does _____ affect _____?

VARIABLES: list the variables that you will need to consider in your project:

Independent Variable:_____

Dependent Variable:_____

Control Variables:_____

_____

_____

PROCEDURES: Briefly describe how you will test your inquiry question. (What are you planning to do for your experiment)?_____

_____

_____

_____

_____

Signature_____Date:_____

By signing this proposal sheet, you are committing to this project topic and choice of having a partner(s) or no partner for the entire duration of the project.

Parent Approval_____Date:_____

By signing this proposal sheet, you are acknowledging the materials and time your child requires for completion of this project. You are also approving the partner(s) your child has chosen.

Research Explanation

When you do research, you want to find articles and books that can teach you something about the independent and dependent variables of your project. Learn about the topic so that you can make a hypothesis in the next step based on intelligent information. Your conclusion will have to be related to what you learn about the variables now and how they turn out in your experiment. Therefore, the research is the foundation of a good hypothesis and a meaningful conclusion. This is what will help you determine what happened in your experiment. Do not just look for basic elementary information (this will hinder your understanding) but information that will help you truly understand the science of what happened.

NO COMPLAINING ABOUT HOW HARD IT IS TO FIND SOURCES FOR YOUR TOPIC. Don't wait until the last minute. Take advantage of the librarians and interlibrary loan. Visit other libraries. This step is not hard, but it requires you to plan and be persistent.

YOU MUST HAVE AT LEAST 4 SOURCES:

Must have 1 BOOK
Must have 1 PERIODICAL (magazine or newspaper)
Must have 1 Internet (only from a .org, .edu, .gov site)
1 OTHER (encyclopedia, Internet, interview with an expert in the field, book, etc.)

Come up with keywords for your research. Use your independent and dependent variables, any words or phrases related to them, or synonyms.

KEYWORDS:

Now, find your sources! When you begin research, use the following pages (9 – 13) to guide you. It is important that you collect information from and about the sources you are using. You will need both types of information for your hypothesis and bibliography portions later in the project!

Source 1 - Book

Title of book:

Author(s):

Publishing company:

City where it was published:

Date of publication:

Page(s) you used:

Rewrite the information above in the correct bibliographic format.
(refer to pgs. 14-15 of this packet)
Bibliography:

Two very specific things learned from this source (use 2 complete sentences for each response):

1.

2.

Source 2 - Periodical

Title of periodical:

Title of article:

Author(s):

Volume number of periodical:

Date of periodical:

Page(s) of article:

Rewrite the information above in the correct bibliographic format.
(refer to pgs. 14-15 of this packet)
Bibliography:

Two very specific things learned from this source (use 2 complete sentences for each response):

1.

2.

Source 3 - Internet

Name of source:

Title of article:

Web address: http://

Date site was last updated:

? Author(s)

? Volume of periodical:

? Date of publication:

Date of Search:

Page(s):

Rewrite the information above in the correct bibliographic format.
(refer to pgs. 14-15 of this packet)
Bibliography:

Two very specific things learned from this source (use 2 complete sentences for each response):

1.

2.

Source 4 - Your choice

If this source is a book or periodical, **see the previous pages for the kind of information necessary**.

Rewrite the information above in the correct bibliographic format.
(refer to pgs. 14-15 of this packet)
Bibliography:

Two very specific things learned from this source (use 2 complete sentences for each response):

1.

2.

Sample Bibliography Form

A book with one author

Ambrose, Stephen. Undaunted Courage. New York:
Simon and Schuster, 1996.

A book with two authors

Moore, Harold and Joseph L. Galloway. We Were Soldiers Once...And
Young. New York: Random House, 1992.

A book with more than two authors (et al means "and others" in Latin)

Ottoman, James, et al. Exploring Architecture. 2nd ed. New York: Bantam,
1997.

A book with one editor, but no author

Wigginton, Elliot, ed. Foxfire 5. New York: Doubleday, 1979.

A book with two or three editors, but no author

Tyson, James and Tom L. Gray, eds. African-American Poetry. New York:
MacMillan, 1995. 345-58.

A book with no author and no editor

Primary Reference Books. 1995 ed. New York: Bowker, 1995.

An encyclopedia article (with no author)

"Fire Fighting." The World Book Encyclopedia. 2002 ed.

An encyclopedia article (with an author)

Bates, William. "Video Games." The World Book Encyclopedia. 2002 ed.

Magazine and Newspaper articles

An article from a print magazine (not on the computer or internet)

Cain, William. "Big Business of the Nineties." Business Week.
16 Aug. 1998. 19-21.

A newspaper article (print version, not Internet)

James, Noah. "The Book Everyone Loves to Hate." New York Times. 22 Jan.
1998, sec C: 12.

Internet/Electronic Resources

Article from Encarta Encyclopedia CD-ROM

"Lewis Carroll." Encarta Encyclopedia. CD-ROM. Microsoft, 1996.

Article from WorldBook Online

McGinnis, Terri. "Dog." *World Book Online Reference Center*. 2005. World Book, Inc. 1 Feb. 2005. <http://www.worldbookonline.com/wb/Article?id=ar162620>.

WEB SITE -- Professional or Personal

Format:

Author(If given). Name of Page. Date of Posting/Revision. Name of institution/organization affiliated with the site. Date of Access <electronic address>.

Examples:

Basic Hula Words. 15 Nov. 1999. Hawaiian Language House. 8 Nov. 2000 <http://www.geocities.com/~olelo/o-h-general.html>.

Li, Rong-Chang. English as a Second Language. 12 Feb. 2001. Society of English Teachers. 6 Nov. 2000 <http://www.rong-chang.com/>.

Resources from a Data Base Online (such as Chandler Public Library)

Author #1- Last Name, First Name/initials, Author #2 and more - First Name/Initials, Last Name, and Final Author - First Name/Initials, and Last Name. "Article Title." Journal/Magazine Title volume number.issue number (publication year): page numbers. Database name. H.W. Wilson. Library name or system, city state. Date accessed http://vnweb.hwwilsonweb.com /

Example:
Kean, Rita, LuAnn Gaskil, Larry Leistritz. "Effects of community characteristics, business environment, and competitive strategies on rural retail business performance." Journal of Small Business Management 36.2 (1998): 45-57. Wilson OmniFile Full Text, Mega Edition. H.W. Wilson. Colgate University Libraries, Hamilton, NY. 10 Jan. 2005 <http://vnweb.hwwilsonweb.com/>.

Hypothesis

After learning about the independent and dependent variables, you must state an opinion about the relationship between the variables. The hypothesis is one sentence that states what you think the answer to the problem statement will be based on what you learned in the research. The sentence should indicate what you expect the dependent variable (effect) to be as a result of changing the independent variable (cause) and why this "effect" will happen (because).

The hypothesis ***should not*** be written in 1st person (I, we, my, etc.).

Your hypothesis should be in the form:

If _____(IV change stated)_____ , then _____(DV change stated)_____ because…

Organizing and Planning Your Project

In order to make sure you know what you're measuring, how you are going to measure it, and how you will set up your experiment, fill in the following worksheet.

1. Independent variable:

   Units of measurement:

   Instrument/tool for measuring:

2. Dependent variable:

   Units of measurement:

   Instrument/tool for measuring:

3. List all factors that must remain constant and explain how you will keep them constant.

4. Describe the control group.

5. If you are using plants, list their scientific names.

Experiment - Materials

List all materials, supplies, equipment, tools, etc. that you will need for this project. Add or delete things from this list later when you perform the experiment so that the list you include in your final project is correct. **Remember you must include brand name used, amounts, quantities, etc.**

Typically, if you are using chemicals or plants, those things should be in a separate list next to the equipment.
You may use a list (remove the bullet points).

Experiment - Procedure

Write a list of all the steps you will need to follow to run the experiment. Another person should be able to follow your procedure without ever having to talk to you, so make it good/very detailed. The procedures must be written in a numbered step format using complete sentences. Also, remember to include a minimum of THREE TRIALS!

Record and Analyze Data - Data Table

You must have a data table drawn before you experiment so that you have a place to record your observations neatly. It is difficult to draw one sample data table as an example, since yours will depend on the type of experiment you choose, but the one below may help you get started.

Guidelines:
1. Label each data table with a number and title.
2. Each column should have a heading with units if appropriate.
3. All 3 trials for each group should be shown.
4. The average for the trials in each group should be calculated.

Table 1: Growth of Marigolds (in cm) with Different Amounts of Water (in mL)

Amount of Water (mL)	**Height of Plants (cm)**			
	Trial 1	**Trial 2**	**Trial 3**	***Average***

Sketch your data table below and use it as a rough draft for your experiment.

Record and Analyze Data - Graph

Guidelines:

1. Decide whether a line graph, a bar graph, or other type of graph is better for your data.
2. Label the top of the graph with a number and title that includes the dependent variable first and the independent variable second along with units of measurement
3. Label the x-axis with the independent variable and its units.
4. Label the y-axis with the dependent variable and its units.
5. Number the axes appropriately. Label the individual bars appropriately.
6. Indicate the relationship between the variables.

The final draft MUST be generated by a computer! Excel works great for this.

Results (Analyzing Data)

The results paragraph will analyze all data collected during the experimental process. Before writing the results paragraph, fill in the answers to the following questions. Use the answers to form a proper paragraph including all of the information below.

1. What does the graph represent (include IV and DV information)?
2. What are some interesting features about the data?
3. What does this graph (data) say? Summarize the data in words.
4. Does the data help support the hypothesis? Why? Be specific.

Conclusion

The conclusion will be another mini-report that summarizes the experiment and relates it to the research and hypothesis. In addition, you need to think about how the experiment might be improved upon. Before writing a rough draft of your conclusion, fill in the information in each area below. These are the things that you will then organize and summarize in the conclusion.

1. Was the hypothesis supported or not supported? Why?
2. List data averages that will defend the answers to #1.
3. List at least 3 errors that might have happened and explain how they affected the results. (Do not include "I might have written down the wrong number," or "I might have calculated wrong," etc.). Think about human, equipment, and environmental issues….
4. What could be done differently if the experiment was repeated (either to minimize errors or help clarify the results)?
5. What is the importance of this experiment? What impact could the results have?
6. What are some areas for future research or experimentation?

Use the answers above to write your conclusion. A good format might be to write one paragraph about questions 1, 2, and 3, a second paragraph about questions 4 and 5, and a third paragraph about question 6.

Use correct grammar, spelling and sentence structure. Write good introductory and concluding sentences. **Do not use the 1st person.**

Abstract

- Do not use I, we, our---remove all pronouns
- Write in the past tense
- Must be between 150-250 words
- Use scientific wording- Checked, observed, monitored, watched, looked, concluded, conducted, etc.

The four areas your abstract must include:

1. **Purpose of the experiment**

- An introductory statement of the reason for investigating the topic of the project
- A statement of the problem or hypothesis being studied

2. **Procedures used**

- A summarization of the key points and an overview of how the investigation was conducted.
- An abstract does not give details about the materials used unless it greatly influenced the procedure or had to be developed to do the investigation.
-

3. **Observation/Data/Results**

- This section should provide key results that lead directly to the conclusions you have drawn.
- It should not give too many details about the results nor include tables or graphs.

4. **Conclusions**

- Conclusions from the investigation should be described briefly.
- The summary paragraph should reflect on the process and possibly state some applications and extensions of the investigation.

Bibliography

Write all of your sources in the correct bibliographic format in alphabetical order by author. Remember indentations and correct punctuation!!! **Include bibliography information for any clipart, photos from the internet, etc. that will be used on the display board. (ex: picture taken by, website for picture, etc).** Refer to the "Sample Bibliography Form" found on pages 14-15 in this packet.