

**Science Project
Information 8th Grade
Advanced Science**

IMPORTANT NOTES:

1. All project topics must be approved by the teacher **BEFORE** experimentation begins. *Completion of projects when a topic has not been approved is an automatic loss of 75 points from the final 300 point grade.*

2. No experimentation can be conducted on humans or any other vertebrate (animals with backbones), with the exception of behavioral science projects. These will be approved on an individual basis. (Students with approved topics in this category must complete the Rules Wizard from the International Science and Engineering Fair using the web link below. Projects will have documentation that must be completed and submitted for project approval by the Mobile Regional Science Fair Committee prior to experimentation. This would be submitted by mid-September. <https://apps2.societyforscience.org/wizard/index.asp>) Invertebrate animals may be used as long as no harm is done to the animals.

3. No experimentation can be conducted using bacteria or mold.

4. No experimentation can be conducted using explosives, firearms, or dangerous chemicals.

5. All measurements used in science projects must be in metric units. (centimeters, meters, liters, grams, seconds, Celsius, etc.)

6. Each student should use a small, 3-ring binder to serve as his/her Project Log Book. All information related to the project will be kept in the Project Log book. The Project Log Book will include the project's Problem, Purpose, Research, Hypothesis, Materials, Procedure, Results, Conclusion and Abstract.

7. All text in the Project Log Book and on the Display Board must be written in 3rd person-- no me, my or I.

8. No handwritten text is allowed on the Display Board. All text must be typed.

9. Project Display Boards and labels will be available for sale through the science classes for a cost of \$7.00 for boards only, \$3.00 for labels only and \$10 for both board and labels. An announcement will be made when these go on sale at school. These are pre-ordered. A few extra may be available after all boards are distributed, but please don't count on this.

PHASE ONE: Project Planning

Select a Topic

1. Students are expected to develop their own science project topic to research and upon which to plan and conduct experiments. The teacher will not assign topics, but will assist students in their selections.
2. Students should strive to select a topic that is of interest to them and that is a competitive project. This is a long process, so being interested in the topic being studied helps keep students on task. Example Topic: I am interested in producing more blooms on my rose bushes.

Topic Categories: These are the categories from which students need to select a topic question: **Earth and space, behavioral and social sciences, engineering, chemistry, physics, zoology, environmental science, math and computers, and botany.**

Refine the Problem

1. After a topic has been **APPROVED**, a Problem Statement will be developed.
2. The Problem Statement is always in the form of a question.
3. Initial research is required to define the Problem Statement. (The problem statement should include the independent variable--what the student is changing in the experiment--and the dependent variable--what the student measures as a result of the experiment to determine if changes in the independent variable made any difference.
4. Problem Statement must be specific and include brand names of any product used for the experiment.

5. Example Problem: What amount of fertilizer, a normal amount of fertilizer, half the normal amount of fertilizer, or double the normal amount of fertilizer, will produce the largest mass of blooms on Knockout Rose bushes?

6. The project must have a measurable outcome using metric units.

7. If the problem can be answered without experimentation or through minimally reading information available online, in books, etc. then it is not a project that should be conducted because it is not competitive.

Purpose

All projects must have a meaningful purpose so the results can benefit others and how they benefit from this information.

Example

Purpose:

The purpose of this project is to determine what amount of fertilizer will produce the most mass of blooms on Knockout rose bushes. The results gained from this experiment will benefit flower nurseries, commercial landscapers, and all who are interested in home gardening by determining the correct amount of fertilizer to use in order to maximize the mass of blooms produced.

Conduct Research

1. After the problem statement is developed, more research must be conducted to determine how the Problem Statement can be used to form a Hypothesis.

2. All research must be documented in the Project Log Book. Five (5) different sources of information must be located to support and shape the hypothesis to be tested. Copies, photocopies or computer-generated, must be turned in with the facts supporting/shaping the hypothesis highlighted.

Develop Hypothesis

1. The Hypothesis is based on the research done after the Problem Statement is developed. The Hypothesis must begin with the following phrase and be in the IF...THEN format.

Based on research, If thethen.....

2. The hypothesis is what the researcher believes to be the answer to the Problem Statement.

3. The hypothesis must be specific, measurable with metric units, and include product brand names if any commercial products are used in the experiment.

4. Example: Based on research, If Susie's Righteous Plant Food is used to fertilize plants, then it will produce a greater mass of blooms on Knockout rose bushes than Joe's Good Stuff Plant Food or Bennie's Better Blooms Plant Food.

5. The hypothesis should be supported by five details that have been researched regarding the project.

Design the Experiment

1. Eighth grade students are required to use an experimental design that includes **ONE (1) control group and THREE (3) experimental groups.**

2. The design must contain only ONE independent (Example: change the type of fertilizer, temperature, soil type, light conditions, etc.) and ONE dependent variable (one result: height, mass, temperature change, length, speed, etc.) 3. Each group must be tested on 12 **trials** for a total of **48 trials.**

4. The experimental design must be described in detail in the Project Log Book.

Purchase/acquire materials:

1. Materials should be purchased, borrowed, ordered etc. and be in possession by the time the experimental phase begins. PLAN AHEAD.

2. Materials should not be an excessive expense, so keep this in mind as you select a topic and develop your question.

3. Materials will be in chart form in your logbook. The list of materials needs to be very specific and brands need to be included for any item that is critical to conducting the experiment, such as the type of fertilizer used. The brand of pencil used is not critical if

it is only used for recording data.

4. FOR ALL CRITICAL materials, include the brand, size, color, amount, etc.

Example materials chart:

Brand Name of Material	Size of Material	Quantity of Material Needed for Experiment	Color of Material
Solo cups	8 ml capacity	24	Red
Miracle Gro Potting Soil	10 kg bag	100 grams per cup	Not applicable/not needed

- **Must be converted to appropriate metrics units.**

PHASE TWO: EXPERIMENTATION

Conduct the Experiment

1. Students are required to take printable photographs of each trial/experimental test in each group, for a total of 53 photographs. The photographs provide documentation of the student actually conducting the experiment.

2. A card indicating the test group and test/trial number must be in the picture of each trial while it is being conducted. Example: Control, TEST 1; Variable 1, TEST 1; Variable 2, TEST 1; Variable 3, Test 1; until all 12 trials for each group have been documented. These are action shots not POSES.

3. In addition, **FIVE** photographs of the experimental process **WITHOUT** any body parts showing must be taken. These are the photographs that will be used on the display board, so try to get excellent shots.

4. Pictures should be printed, mounted 2 pictures to a page, and numbered with a caption describing the action taken place in the picture. This should be in a complete sentence and placed underneath the photo. These should be in the logbook shortly after completion of the experiments/tests. (See timeline for due date.)

5. Results (metric measurements, numbers and units) must be collected from each trial for each group, for a total of 48 data entries.

6. The results from each trial must be recorded on a separate Data Table for each group in the Project Log Book and labeled according to the test group, Control: _____, Variable 1: _____, Variable 2: _____, and Variable 3: _____.

7. Example of data table labels: Control: no fertilizer; Variable 1: normal amount of fertilizer; Variable 2: half the normal amount of fertilizer; Variable 3: twice the normal amount of fertilizer 8. Data tables will be checked in class for a class grade. (See timeline for due date.)

Procedures (THIS IS SECTION is 1/2 of the final grade on the project, and counts as a 100 pt class grade when the rough draft is submitted.)

1. These are step-by-step directions of how you conducted the experimental tests/trials. They should be recorded in a numbered list in your logbook as the experimental trials/tests are conducted, NOT after the fact.

2. EACH test group needs a separate set of instructions, one for the control group and for each of the variable groups.

3. You must state in the procedures for each group what the independent variable is that you are manipulating and what the dependent variable is that you are using to check for a measurable result.

4. You must identify each group as control, variable 1: , variable 2:, variable 3:, and what these groups are. You must list the independent variable and dependent variable for each group. **These headings should be before each set of procedures.**

5. YOU MAY NOT say repeat the steps used for one group for the remaining groups.

6. YOU MUST describe in detail how you conducted 1 experimental trial/test for each of the control and variable groups.

7. THEN, you may say repeat steps 2 through whatever number for the remaining trials for this group.

8. Procedures must provide written evidence of conducting the experiments seen in the picture documentation and describe how it was conducted.

9. Describe everything! How did you measure? What did you measure? What tool did you use to measure? Where did you record the measurement? What unit did you measure with? **LEAVE nothing to guess. Every step is important and procedures should allow someone reading them to conduct the experiment just as you did it. If not, there isn't enough detail.**

10. *PROCEDURES are lengthy and very specific.*

11. If you have a set of instructions for building something needed in your project, include a copy of these and document their source. (Pictures included in the directions can be used as a supplement to your procedures.)

12. Procedures should be in a numbered list NOT a paragraph using 3rd person (your understood subject NOT me, my, I.)

13. Describe the control group first, then the variable groups.

14. DESCRIBE each group separately in the heading for each group's directions.

EXAMPLE:

CONTROL: No Plant Food

Independent variable: amount of fertilizer, none for this group

Dependent variable: height of plants measured in centimeters

1. Gather materials needed.

2. Label each cup for the control group trials 1-12 using a permanent marker.

Photographs:

1. It is extremely important that you document your project in photographs. **If your pictures do not show evidence that you tested 12 times for each group, you will lose 70 points on the procedure portion of the project.**

2. Example: If you are testing worms, I should see 48 worms and 48 worms being tested and measured. A picture of one or two worms will not be acceptable.
3. You should have **53** photographs total that document your project. **FIVE photos should not include any humans, you or anyone else.** These 5 will go on your show board. The other 48 photos should show you and the 48 experimental trials you conducted with trial cards in the picture (see above under procedures). Even projects including large groups of trial/test subjects like plants need to have a picture of each plant being measured with you and the trial identified in the photo.
4. **48 PHOTOGRAPHS MUST SHOW YOU and YOUR FACE. PICTURES WITH JUST ARMS AND LEGS WILL NOT COUNT. Pictures not showing your entire face will not be accepted.**
5. **YOUR PICTURES SHOULD SHOW YOU ACTIVELY ENGAGED IN TESTING.**
6. **You should be performing an action required for the experiment. No cute game show host poses. Keep all pictures professional (be appropriately dressed in your photos) and without any evidence in the photo that you attend PPS. Judges will look through your logbook and you being identified as a PPS student could change their thoughts on your project.**
7. **We want to see you doing the experiment.**
8. **ONE and ONLY ONE picture of your materials will be accepted.**
9. **ONE and ONLY ONE picture of you writing in the logbook will be accepted.**
10. **You MUST have actual printed photographs. Pictures on a cell phone, camera, or other device are unacceptable.**
11. **Wal-Mart** can process pictures in an hour. They are about 9 cents each. Upload to www.walmart.com and place your order online. Walgreens has the same service. **You can also print the photos from your printer on copy paper.**
12. **Printer problems are NOT an excuse for Not having your pictures.** Don't wait until the last minute!! You were given 3 months notice about this due date. Your teacher needs photo evidence of your completion of the project, not excuses. Don't

procrastinate.

13. Pictures can also be printed in the library or computer lab for 25 cents a page.

14. ***ALL PICTURES SHOULD BE CAPTIONED USING COMPLETE SENTENCES.***

15. Trial # and Variables should be shown in the photo. The caption should explain what is happening in the photo **USING A COMPLETE SENTENCE!**

PHASE THREE: PREPARING RESULTS Graphs and Explanations

1. After experimentation is completed, data must be analyzed and conclusions developed.
2. Data from the data tables must be presented in graph form. A total of **THREE (3) different types of graphs must be prepared--range of data, average of data, and of individual data points.**
3. All graphs must be properly labeled and keys provided--the type of graph, line, pie, bar, etc. is up to you, but there must be a range, average, and individual data points graph, with each graph being a different type. Example: 1 bar, 1 line, 1 range graph NOT 3 line or 3 bar or 3 range graphs
4. Rough drafts of these graphs should be handwritten with an explanation in your logbook. The explanation needs to be 3-5 sentences in length and should describe what is suggested through the graph. The highs, lows, outliers and averages are detailed and an inference is made from the data presented in the graph.
5. Final graphs will be created in the computer lab using Excel.
6. Final paragraphs describing the graphs in 3-5 sentences must be included underneath the final computer generated graphs on the board.

Conclusion

1. After the results are analyzed, a conclusion will be drawn from the data.
2. The conclusion should include the results of the experiment, any possible things that could have caused false results, a brief statement of how the experiment could be improved, and how the experiment could benefit from additional experimentation to further validate the results.
3. The conclusion must be recorded in the Project Log Book.
4. The conclusion statement **MUST** begin with the following phrase: **Based on the results of this experiment, the researcher concludes.....**

PHASE FOUR: PREPARE AN ABSTRACT

1. The abstract is a summary of the project written in essay form. It must include the following:
1st paragraph: A. Problem Statement B. Purpose/Benefit C. Hypothesis

2nd paragraph: D. Summary of experimental design

3rd paragraph: E. Results of the experiment F. Conclusion
2. A rough draft, handwritten copy of the abstract must be included in the Project Log Book.
3. The abstract cannot exceed 250 words (about 1 full page if you don't write large & no longer than 1 typed page in 12 point font.)


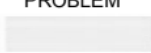




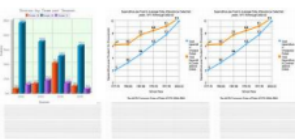
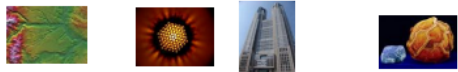




PHASE FIVE: PREPARE DISPLAY BOARD The display board must contain all of the following:

Title	Purpose	Procedures	Pictures (5)
Abstract	Hypothesis	Graphs	Conclusion
Problem	Materials	Results Paragraphs	Abstract
		(3)	

*Acknowledgments

The display board should follow the example that follows. It needs to be put in order just as it is seen in the example with headings for each part.

TITLE

<p>ABSTRACT</p>  <p>PROBLEM</p>  <p>PURPOSE</p>  <p>HYPOTHESIS</p>  	<p>PROCEDURES for all test/trial groups</p>  <p>Range, average, & individual data points graphs here (3 graphs total)</p>  <p>RESULTS paragraphs with each graph</p> <p>5 Pictures with captions underneath</p> 	<p>MATERIALS</p>  <p>DATA TABLE</p>  <p>CONCLUSION</p>  <p>ACKNOWLEDGEMENTS</p> 
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2. A copy of everything that is on the board should be printed and included in order as it is on the board at the back of the logbook, even the graphs with explanation paragraphs

and the 5 pictures on your board without you. Print the information for the board in 18-20 point font and then print it again for your logbook, making sure the second copy of the logbook information is in order in your logbook just as it is on the board.

3. A clear, colored picture of the completed board should be taken, printed, and included with the copies of the information on the board. This documents your completion of the board by the due date. You will turn in your logbook with the 2nd copies and the clear photo of the final board when you come to class on DECEMBER 10th. You will be assigned a presentation day. Do not bring the board until your presentation day, AND it should not be altered/changed in any way from the picture that you included in your logbook. **ALTERATIONS of the board will result in a loss of 75 points.**

4. No student's logbook will be accepted without the second copies AND final picture of the show board. The science project will be considered late and will not be accepted until second copies and the final picture are placed in the logbook.

5. All text used on the Display Board must be typed using an appropriate font and size. Make sure the font is large enough to be read easily from 3 feet away, BLACK INK ONLY, Times New Roman or Arial Font, 18- 20 point size minimum. Keep the board professional.

6. Boards must fold flat--do not place 3D objects on the board. Use glue or rubber cement to attach items on the board. DO NOT use staples, push pins, or thumb tacks to attach items to the board.

Acknowledgements Each student should have an Acknowledgement that credits who the photos were taken by and any help that was received during the experimentation phase of the project.

Ex. All photos were taken by the student. * **If applicable**- A special thanks is given to the University of (_____) for special use of their laboratory and equipment.