Science Exit Project Guide

Please read through this packet carefully. Remember you are responsible for submitting your Science Exit Project as a graduation requirement by the due date.

NOTES

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SCIENCE EXIT PROJECT PACKET

2011-2012

STUDENT'S NAME: _____

HOMEROOM CLASS: _____

DATE: _____

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December 2011

Dear Parents and Students,

The New York State Eighth Grade Science curriculum requires that all 8th grade students complete an Exit Project in order to be promoted. The Grade 8 Science Exit Project is a long term research based project that addresses key ideas and concepts in Earth Science. The project assesses students' knowledge of science concepts by having them complete the process of a scientific investigation.

Students are expected to produce an exit project in two parts:

1. a written piece (which includes a graphic representation of information like: maps, timelines, charts, graphs, detailed labeled diagrams, graphic organizers, etc.)
2. an oral presentation

The Grade 8 Science Exit Project allows students to gain deeper understanding of not only the content but also the nature of scientific investigations. As we strive to help our students reach the next level in their education, students will find that the research and scientific inquiry skills they learn will be useful as they continue their studies in high school and beyond.

There will be various sessions in the classroom that will address all the components of the exit project in depth. Students will receive intensive instruction and support from their science teacher to complete their project. In addition to class trips to the school library and the computer labs, students will need access to the public library, a computer with internet access, a printer, ink, paper and your continual involvement and support.

Attached you will find a checklist of the exit project components, the 8th grade science exit project state rubric, and a copy of the power point presentation. **Remember that completion of the Science Exit Project is a requirement for graduation.** Please feel free to contact your child's science teacher or myself if you have questions.

Sincerely,

Mrs. Allika Thompson-Young
Assistant Principal

NEW YORK CITY DEPARTMENT OF EDUCATION, JOEL I. KLEIN, *CHANCELLOR*

Catherine and Count Basie

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ALL 8th GRADE STUDENTS ARE REQUIRED TO COMPLETE A SCIENCE EXIT PROJECT IN ORDER TO GRADUATE AS PER THE NEW YORK STATE MANDATE.

I, _____, will support my child, _____
(Print Parent/Guardian's Name) (Student's Name)
of class_____ , to successfully complete his/her required Science Exit Project. I have thoroughly read, reviewed, and discussed this packet with my child. I Understand that the following requirement are critical to successful completion of this project, and will ensure my could meet them:

- **Securing approval for the topic/problem from the teacher**
- **Completion of all in-class and homework assignments as it relates to the Exit Project**
- **Strict adherence to the due dates.**
- **Time management skills**
- **Speak/Conference with a teacher if the student is having difficulty or has questions**

Both my child and I are aware of the strict requirements for this project and agree abide by the terms above.

_____ _____
Student's Signature **Date**

_____ _____
Parent/ Guardian's Signature **Date**

PLEASE RETURN THIS FORM TO YOUR SCIENCE TEACHER NO LATER THAN
MONDAY, DECEMBER 20th, 2010

2011-2012 SCIENCE EXIT PROJECT GUIDELINES

The requirements for each of these sections are explained in this packet.

The science exit project is where YOU create an experiment of your own or work with your peers:

- You choose an experimental question you'd like to research.
- You can follow the scientific method to conduct an experiment and answer a question.
- You can do a field study or animal observation.
- You can design and construct a product that meets a need.

The Science Exit Project Has Three Main Parts:

- The written report
- The project board or PowerPoint presentation
- The oral presentation

Project Format:

The exit project MUST be typed. The font should be 12-point, New Times Roman, and double spaced. Please note that no one will be given an extra day because of the excuses "my printer broke," "it is on my USB and I have to print it." If you do not have a printer, you may bring in a USB to print out your work in our school, but you must do so BEFORE the due date, not the day work is due. There are no exceptions.

Choosing a Topic:

Before you can move on to identify a problem to investigate, you must first choose a topic. Before choosing topics ask yourself these questions: What topics interest me? Why do these topics interest me? What specific questions do I have about these topics? Where can you find a topic? A topic for your project can originate from the following sources:

- Middle School Science Curriculum: anything you have studied in 6-8th grade.
- Science Performance Indicators.
- Your teacher
- You: choose a topic that interests you, this way you will invest the time and take ownership of your project.

ALL TOPICS AND QUESTIONS ARE SUBJECTED TO YOUR TEACHER'S APPROVAL.

Which area(s) of Earth and Space Science would you like to research?

- Volcanoes
- Earthquakes
- Glaciers
- Rocks and Minerals
- Oceans
- Plate Tectonics
- Weather
- Earth's Systems
- Seasons
- Water Cycle
- Erosion
- Weathering
- Soil
- Rivers

Which area(s) of Life Science would you like to research?

- Animals
- Plants
- Environment
- Genetics
- Diseases
- Disorders

Which area(s) of Physical Science would you like to research?

- Energy
- Matter
- Machines
- Light
- Sound
- Electricity
- Magnetism

Below is a list of science projects from DiscoverySchool.com. You can use one of these ideas, or come up with your own idea. There are many websites that are very helpful in doing science projects. Two very good ones are school.discovery.com/sciencefaircentral/ & www.urbanadvantagenyc.org/.

REMEMBER TO USE THE INFORMATION WISELY. WE ARE NOT ASKING YOU TO PLAGARIZE THE INFORMATION; WE ARE PROVIDING YOU WITH SOME OF THE TOOLS THAT WILL HELP YOU CHOOSE A TOPIC AND A QUESTION. PLAGARISM WILL RESULT IN A FAILING GRADE.

Behavioral Sciences:

- How teaching styles and color affect learning
- Does learning sign language affect perception?
- Do hand motions affect your memory?
- Fingerprints: the clue to I.Q.

- The effects of teacher and student learning styles on academic performance
- The effects of class structure on learning abilities
- **Auditory and visual memories of males and females**

Biochemistry

- The effect of gibberellic acid on plants with red lights
- Which color Saran Wrap allows plants to grow the tallest?
- Do different wavelengths of light affect plant growth?
- Do fruit and vegetable juices contain the same amount of vitamin C?
- How does the type of water you feed a plant affect its growth?
- Do hydrating shampoos really strengthen hair more than regular shampoos?
- How does vitamin C content of packaged orange juice compare to freshly squeeze?
- The effectiveness of sunscreens
- Does anti-perspirant affect your pH?
- Which bread has the most kilo calories?
- Effects of nitrates on daphnia pulses
- Are you juicy? Do naval and Valencia oranges of the same weight give the same amount of juice?
- Influence of temperature on the digestive activity of pepsin on albumen
- Does temperature affect bacterial growth?
- Does chewed gum lose mass?

Botany

- The effects of varying amounts of water on seed germination
- A comparison of two hydroponic techniques
- Evaluation of fertilizer types: which works best on marigolds?
- The effects of two commonly used window cleaners on plants
- Acid rain: an analysis of germination

Chemistry

- pH of common beverages
- How do household bleaches compare?
- Determination of lead in paint samples
- How much vitamin C is really in our juice?
- Which bandage stays on best when placed in water?
- Does spending more money for your sunscreen give more protection from the sun?
- The biochemical effects of beverages on dental materials
- Does fabric softener affect drying time?
- Electromagnetic earthquake precursors
- Monitoring inland water quality using water analysis kits.
- Percolation in polluted and unpolluted soils.

Engineering

- What is the best insulation?
- Which insulating clothing materials work best?

Science Exit Project Task Descriptions

Students completing the Eighth Grade Science Exit Project requirement may choose one of the following types of projects:

- Controlled Experiment
- Fieldwork
- Secondary Research
- Design Project

Note: Not all research is going to fall so nicely into one of the four categories; therefore a single project may draw on more than one type of investigation.

Initial Development of the Project

Students must initially identify a problem that they are interested in investigating. This can develop from an exploration, various experiences, field trips, exposure to information through newspaper articles, TV, or other media, or just by "messing around". Opportunities must be provided for students to make original observations and to develop authentic questions that are of real value to them. Students need to tap into their prior knowledge regarding the problem they have chosen to investigate and to do background research to develop an informed hypothesis that can be tested. The background research should consist of an initial literature search and must make connections to the curriculum. This initial hypothesis must then be clearly stated and based on this prior knowledge and background research. The student must identify the variables to be examined and then decide on the type of project that best enables the student to address the hypothesis. The student must keep a scientific notebook that includes careful notes and records throughout the investigation and which will enable the student to write the final report of the investigation. The final report will reflect the scientific process the students used to solve the problem or find the answer to the proposed question.

After the student performs the background research, creates a researchable question and develops a testable hypothesis, the student should design strategies to test the hypothesis and determine what type of data needs to be collected to help answer the question. These decisions will then determine what type of investigation the student will engage in, as defined below. In all of the projects, the student must be working with data. This data can be generated by the students themselves (primary data), or could be obtained from other sources (secondary data). The data that students collect must be directly related to the researchable question and the hypothesis that is developed from the research question.

1. Controlled Experiment- students manipulate the environment being studied.

- Students will design the procedure, including identifying what factors are going to be varied and what is going to be controlled. Students should ensure that the precision of the tools they will be using are appropriate, and determine how, when, and where measurements will be taken. Sources of error must be addressed at every step of the project.
- The procedure should be implemented multiple times and data collected.

- Data must be analyzed and represented appropriately using charts and graphs.The data should be compared with existing data sets obtained through background research.
- The hypothesis must be evaluated in terms of the data.
- Conclusions should be drawn, asking new questions based on the results of the investigation.

Examples:

1. How does a substance, such as road salt or compost, affect the growth of a specific plant?
2. How do various coatings affect the corrosion of a metal?
3. How does the pH of water affect the growth of elodea?

2. Fieldwork- a study of a natural or man-made environment to gain practical experience and knowledge through firsthand observation. In this case the student is observing the environment and not manipulating it. The investigation must be able to be completed within the time constraints established by the teacher.

- Design a data collection procedure that includes a number of field observations, frequency of visits, and other appropriate information.
- Test the design for data collection.
- Revise the procedure after an initial trial. Revise hypothesis if necessary based on new observations. Carry out the procedure.
- Record and organize data using tables, graphs, or charts.
- Analyze the data looking for patterns.
- Develop a conclusion based on the available data.

Examples:

1. What is the date that "green down" occurs or budburst happens for different species of trees in the neighborhood or park?
2. What are the behaviors of the mountain gorillas that are most often observed in the Congo Gorilla Forest exhibit?
3. How does the salinity of the Hudson River change as we move south from 138th Street to Battery Park?
4. What is the correlation between day length and the direction of the sun's shadow?

3. Secondary Research- the researchable question must come from data sets (numerical data that has been generated by previous research) that is available to students on a variety of websites. An example of a researchable question is "How is X affecting Y over Z years?" The researchable question is then answered by using additional data sets that the student finds to support the hypothesis.

- Design a research plan that identifies the source of the data to be collected to answer the question/test the hypothesis that has been developed from the secondary data that has been analyzed.
- Obtain the needed data.
- Analyze the data identifying sources of error.
- Form a conclusion based on both the data collected and the background research.
- Identify further questions based on the work.

Examples:

1. How does the latitude or elevation of an area affect the day of the year buds of a particular species of tree open?
2. How does the incidence of asthma depend on the emissions of power plants or industry in different locations?
3. How has there been a change in hurricane frequency or intensity over the last 50 years?
4. How has the Clean Air Act had an effect on acid rain in New York State?

4. Design Project- students need to identify a need and develop a design that meets that need.

- Determine the criteria for success (Testing/ Optimization/Relevant parameters)
- Create a design that satisfies the criteria developed.
- Test design and gather data, or in the case of projects in which it is not possible to test the design due to time constraints, develop a plan on how the design is to be evaluated over time to see if it does meet the identified need.
- Analyze data, revisit the design and revise if necessary.
- Retest design as necessary until meets the established criteria.
- Generate conclusions and develop new questions to explore.

Examples:

1. Design and construct a hydroponic greenhouse for growing vegetable without soil. (Can vegetables be grown without soil?)
2. Design and construct a container that will prevent a frozen object from melting when shipped from one place to another. (Can frozen materials be shipped over long distances?)
3. Design and construct a solar powered racing car that can travel the greatest possible speed over a chosen distance. (How fast can a solar-powered car travel?)
4. Design a zoo exhibit that is both aesthetically pleasing and meets the needs of the animal exhibited. (How can you design a better exhibit for the mountain gorillas?) For all of the projects, the conclusion should refer to the hypothesis, and there should be strong connections between the research question, the analysis of the data, and the conclusion. Does the data support the hypothesis? How does it do this? How are you sure of your results? The discussion should include error analysis and suggestions for further inquiry, as well as future improvements to the investigation procedure or design. If the students are not able to come up with a definitive conclusion, they should discuss why they were not able to do this.

CATHERINE AND COUNT BASIE
MIDDLE SCHOOL 72

SCIENCE EXIT ROJECT

ON

[*Your topic goes here*]

Picture related to your topic goes here

Submitted to: Mr. Reid

Submitted by: [*Your name goes here*]

Group Members' Names: [*Group members' names go here*]

Date: [*Date submitted goes here*]

Background Research

(Minimum of four different sources)

Topic: _____

Please circle one:

Book	Magazine	Website	Documentary	Other

Date information was collected: _____

Title of information: _____

_____

Page Numbers: _____

Author: _____

Copyright date or Year of publication: _____

Publisher: _____

Producer and Production Company: _____

Webpage address: _____

_____

Please write your notes of the information here:

Deciding on a Question for Investigation

You must decide on what you want to investigate; A question you want to answer.
Using your observations and the background information, please list some possible questions for an investigation.

1. _____
   _____
2. _____
   _____
3. _____
   _____

Let's try to narrow down your choices. Your question is very important because it will determine the type of investigation you are doing. Ask yourself the following questions to make sure this is what you want to do:

- Is the question something I want to learn more about?
- Will I be able to answer the question in a reasonable time? (2-3 months)
- Does the question make sense?

Now let's try to narrow down your choices some more. You must decide on a question that is investigable. You must ask yourself, "Does the question allow me to perform an investigation to answer it?" For each question you have written above, please answer the checklist to se if your question will lead you to a meaningful investigation.

Question 1.

_____

- Can the question be answered with a yes or no: ☐Yes ☐No
- Can the question be answered with a definition: ☐Yes ☐No
- Does the possible investigation for the question need resources that I don't have access to: ☐Yes ☐No

If you answered yes to any of the questions in the checklist, then this question is not suitable for your Exit Project investigation.

Writing a Hypothesis

At this point of the Exit Project process, you have decided on a topic, collected background information, and have a question to investigate. You are now ready to formulate a hypothesis on the possible outcome of your investigation.

First, you must understand what a hypothesis is. A hypothesis is "an educated prediction" based on information. It is not a "guess." It is a possible answer for your question. It is what you think will happen based on everything you know at this point.

Second, there is no set format for your hypothesis. If you want to write it in the "If… then …" format, you may do so. However, you are not limited to this.

A good hypothesis depends on how it answers the question. Yet, it doesn't mean that it will be the answer you receive at the end of the investigation. It is ok if your hypothesis does not agree with the results at the end of the investigation. Please don't ever change your hypothesis at the end of the investigation to match your results.

I believe the result that will occur at the end of my investigation is: ___

_____

_____

I believe this because: _____

_____

_____

_____

Therefore, the hypothesis for my Exit Project is: _____

_____

_____

A note on effect and affect:

Effect is a noun. It is defined as a result.
Affect is a verb. It is defined as having an influence on something or cause.
If you need guidance with writing a hypothesis, please see your Science teacher.

WRITTEN REPORT: How to conduct and write about your experiment:

1. Identify a problem/question that can be tested by performing an experiment, doing research, designing a product, or by conducting field work. This will be the title of your exit project.

2. Research your topic question and write a summary of what you find. Use this summary to decide on a hypothesis.

3. Conduct an experiment by following the scientific method:
    a. Purpose: what is the question/problem you wish to test?
    b. Research: what information is available about this topic?
    c. Hypothesis: What do you think will happen and why?
    d. Procedure: Design an experiment; identify the independent variable, the dependent variable, and constants. Set up experimental and control groups. List the materials you will need.
    e. Observations: Keep track of your findings in a data table that includes the independent and dependent variable. Keep careful records about any other information that you think is important to the data you are collecting. Collect pictures of the experiment or pictures pertaining to your specific topic. All information will be recorded in your journals.
    f. Results & Analysis: Analyze the data you have collected. Graph the data and look for patterns. Write about the patterns in sentences.
    g. Conclusion: Answer the question you asked in your purpose. State whether your hypothesis is correct or incorrect based on the experimental data.

4. After writing your conclusion, discuss what sources of error might have affected your experiment. Discuss how the experiment could be improved if another scientist repeated it.

5. Apply your findings: what did you learn? How is this information useful to you and others? How does it apply to everyday living?

6. Include a glossary of terms.

7. Final Reflective Essay: discuss the process of doing the exit project.

8. Bibliography: Include a bibliography, written in correct format, of all the sources you used during the project. If you need help, ask your science teacher.

Science Exit Project Journal

Your Science Exit Project Journal is a very important component of the entire Exit Project process. This is where you will write all your evidence you have collected during your investigation. You will leave the first two pages blank because you will add a table of contents at the end of the process. You will use the journal at the very beginning to write your observations of the natural world around you. From there, you should be able to choose a topic of interest.

The next step is to write all observations that you make during the investigation. You must make daily entries during the entire investigation. The information can include written descriptions, sketches, and numerical data. Please do not include any opinions with your observations. All personal opinions and reflections will be recorded as you analyze the data.

After you complete the investigation and record all the observations, you will write your data analysis, conclusion and results into the journal. This information is what you will use to complete your written report.

You will then write a reflection about the entire Exit Project process as your final entry in your journal. Some topics that you should address are:

- What did you think about the entire process?
- How did you like working in a group? Were any of your group members not cooperative with the rest of the group? Did you disagree with anyone or did someone disagree with you? How did you and/or your group members handle it?
- What did you think of science before you completed your investigation? What do you think of it now? Did you ever consider a career in science? If the answer is yes, what inspired you? If the answer is no, why?
- Please include any other thoughts you about your experience.

Finally, you will include a table of contents at the beginning of your journal. Please number all the pages. You will type your table of contents and then attach it to the first pages of the journal.

Journal Entries

All materials/ information pertaining to your exit project, including your data and observations will be recorded in your science journals. You are required to write weekly journal reflections about your project and its progress. Journal entries will be done during class time and/ or at the discretion of the teacher. Your weekly journal reflections will be used to write your final reflective essay.

Groups

You may work on the project alone or with your peers from your homeroom. Should you decide to work with your classmates, please choose wisely! Select person(s) who you work well with and will be able to get together with after school. Once the decision to work with others is made it cannot be changed. We encourage you to discuss this with your parents/guardians and seek their advice and approval before making a commitment. As a group you may do the research, set up the experiment, collect the data together, but EACH PERSON IS RESPONSIBLE FOR HIS/HER OWN PAPER. Failure of any group member to participate may result in the entire group earning a lowered grade or failing.

Bibliography Requirements

Book:

Author (last name, first name). Title (underlined), publisher, copyright date, page number.

Example:

Williams, Jack. The Weather Book, Vintage Books: A Division of Random House, Inc., 1997, p.17.

Magazine:

Author of article (last name, first name). Title of article (in quotations), Title of Magazine (underlined), page number, date.

Example:

Ackerman, Jennifer. "Dinosaurs Take Wing," National Geographic, pgs 74 – 99, July 1998.

Encyclopedia:

Author of article (last name, first name). Title of article (in quotations), Name of Encyclopedia (underlined), page number, copyright date.

Interview:

Name of Person interviewed (last name, first name). Title, the word interview, date of interview.

Video:

Producer (last name, first name). Year (in parenthesis). Title of video (in quotations), Name of Production Company. Length of Video.

Example:

Thompson, Richard. (1996). "Rocks and Minerals," DK Publishing. 35 minutes.

Internet:

Author (last name, first name). Year of publication (in parenthesis). Title of publication. Type of medium (in parenthesis). Available: Web address. Access date (in parenthesis).

Example:

Perkins, Sid. (2006). Dinosaur Dig. (Internet). Available: http://www.sciencenewsforkids.org/articles/20060906/Feature1.asp

Student Signature Page

I _____ of class _____, certify that all relevant work performed for the Science Exit Project Investigation has been completed by my group and I. I also certify that I have cited any sources that I used and I did not plagiarize any part of the Science Exit Project.

_____
Student Name (Print)

_____
Parent or Guardian Name (Print)

_____
Student Signature

_____
Parent or Guardian Signature

(Must Be Included in Final Exit Project Presentation.)

PowerPoint Presentation

This part of the project should explain your project through visual aides. Include brief statements describing each step in the scientific method you wrote about in your report. It should be neat, attractive, colorful, and informative. You will use this during your oral presentation. IF YOU ARE DOING A POWERPOINT PRESENTATION, it must be handed in on the flash drive *2 days before the due date,* to make sure it is working. Make sure your name and class are written on the flash drive.

The key components of the visual presentation:

1. **Problem Title**: This should be written in the form of a question.
2. **Abstract**: The abstract is a brief overview of the project. It should not be more than one page and should include the project title, a statement of purpose, a hypothesis, a brief description of the procedure, and the results.
3. **Introduction**: The introduction is a statement of your purpose, along with background information that led you to make this study. Make references to information or experiences that led you to choose the project's purpose.
4. **Hypothesis**: This is a personal opinion of what you think the answer to the question will be. It is an educated prediction based on background information.
5. **Materials**: List all materials that you used in your experiment.
6. **Procedure**: Describe in detail the experiment you performed. Give enough information so another person could repeat or redo your project. Give information about the materials you used and what you did with them. Be sure to indicate any and all variables that you controlled in your experiment.
7. **Observations**: Includes all measurements and observations that you took during your experiment. Graphs, tables, and charts should be labeled and, if possible, colorful. You may also include photographs and drawings of your materials, procedure, and/or results.
8. **Data Analysis**: An analysis of the tables, graphs, and/or charts including patterns or trends that is noticeable. Do not include any personal opinion. Only state what is observed.
9. **Conclusion**: The conclusion summarizes, in about one page or less, what you discovered based on your experimental results. The conclusion states the hypothesis and indicates whether or not the data supports it.
10. **Results**: This is the most important part of your report. Your results should be described and discussed thoroughly. Make sure your readers can see the connection between your data and your conclusions clearly. Discuss any possible sources of error. Describe any differences you observed among the repeated trials of your experiment. Discuss what you could have done differently and what you would like to do next time to continue the study. The results section can also include a brief description of plans for exploring ideas for future experiments.
11. **Bibliography**: Please record all sources of information.
12. **Acknowledgement Page:** On this page you have the opportunity to thank or acknowledge anyone

Minimum number of slides for each key component:

1. Problem Title: 1 slide
2. Abstract: 1 – 2 slides
3. Introduction: 1 slide
4. Hypothesis: 1 slide
5. Materials: 1 slide
6. Procedure: 1 – 2 slides
7. Observations: As many slides as needed
8. Graph Analysis: 1 – 2 slides
9. Conclusion: 1 slide
10. Results: 1 – 2 slides
11. Bibliography: 1 slide
12. Acknowledgement: 1 Slide

Some special notes about Power Point:

- Please choose only one background and use it for all slides
- Limit any custom animation that you choose to use
- Make sure that the colors chosen allow the slides to be easily read
- There will be lessons on how to prepare a Power Point presentation during class time

Poster Requirements

Title
The title should state both the independent variable and the dependent variable.
Sample format: "The effect of (the independent variable) on (the dependent variable)."

Question
The question describes the focus of the investigation. The question should ask how the independent variable will affect the dependent variable. The question should be written so that someone else can easily understand it.
Sample format: "How will (the independent variable) affect (the dependent variable)?"

Hypothesis
A hypothesis predicts the effect that changing the independent variable will have on the dependent variable in the investigation. It predicts the effect that the change purposely made in the independent variable will have on the dependent variable. The hypothesis should make a statement about what the student thinks will happen. The hypothesis should state why the student thinks this will happen ("because…").

Sample format: I think (independent variable) will affect (dependent variable) and I expect (predicted result) because (describe the scientific reasons of why you expect this relationship between the variables. Include scientific concepts that relate to this prediction).

Sample format: If (summarize investigation or action being planned, i.e., changing the independent variable) then (predict result, i.e., effect on dependent variable) because (describe the scientific reasons of why you expect this relationship between the variables. Include scientific concepts that relate to this prediction).

Background information (a part of the Hypothesis section)
Describes the student's reasoning behind their hypothesis--why do they expect/predict this relationship between the variables and not a different relationship? The student should use this space to answer the question: "What did I read that makes me predict this outcome?" 2

Investigation Design (the ID diagram used in UA PD may be included as a graphic organizer here)
Using the five components below, describe the design of the investigation:
1. Independent variable: the variable that the student changes on purpose. (In a field study we describe the independent variable as the category(ies) that the student chooses. In a secondary research project, we describe the independent variable as the variable that the student lets change and does not keep constant.)
2. Dependent variable: the variable the student measures that is affected (changes) as a result of changes purposely made in the independent variable.
3. Constants (also called constant variables): the variable(s) in an investigation that are kept the same and not allowed to change or vary.
4. Levels of the independent variable: The different levels of the IV at which the DV is measured, or the groupings of the IV for comparing DV observations.
5. Number of repeated trials: the number of times that a level of the independent variable is tested in an investigation, or the number of objects or organisms tested at each level of the independent variable.

Procedure
List materials and write the procedure so that another student can follow the directions and repeat the investigation (provide a detailed and logical step-by-step description).
Data/Results (Table and Graphs, and Data Analysis)
Got Data? The data reported in this section are the basis on which the student will claim that their hypothesis is, or is not, supported. Exit projects should give priority to evidence in the form of empirical observations. The data should be shown in a table and in charts and graphs, and trends or patterns in the data should be summarized. The student(s) make their own observations for the following types of projects: controlled experiments, field studies and design projects. The student(s) use observations or data reported by other investigators when they do secondary research.

Discussion/Conclusion

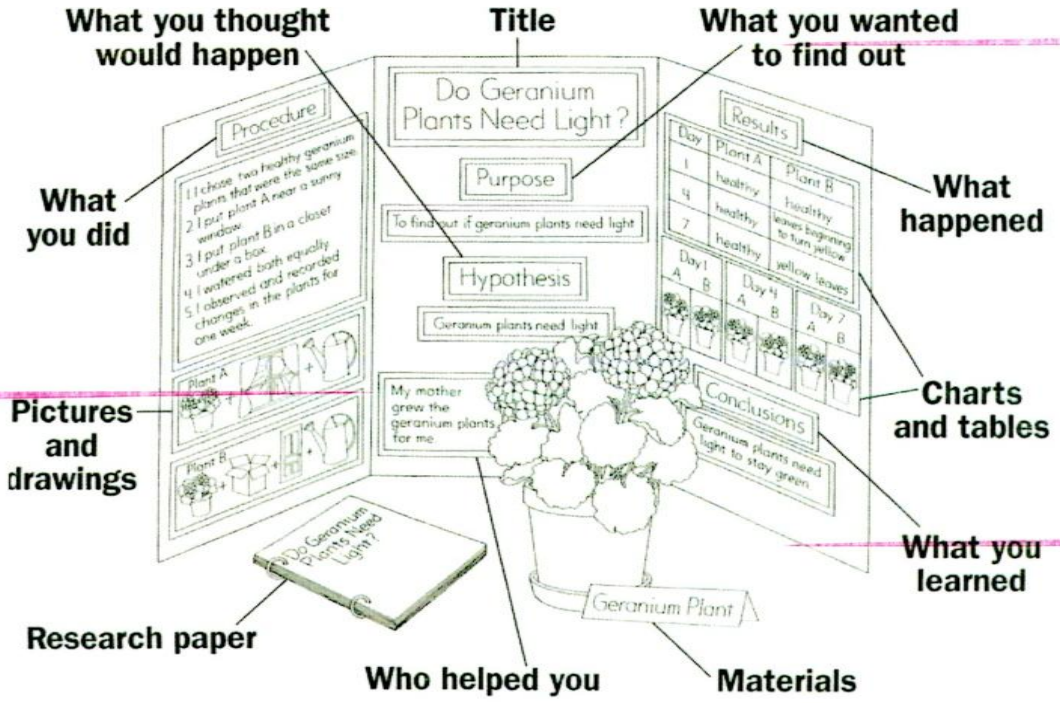
This section(s) should first state whether the hypothesis was--or was not--supported by the data. Further, Urban Advantage also emphasizes the importance of connecting the students' results to the scientific knowledge already available on the topic by having students construct a scientific explanation.

The student's claim about their hypothesis, the data they use to support the claim and the reasoning they use to relate claim and evidence (the connections to scientific knowledge) should all be included in a complete scientific explanation that should form the core of the Discussion/Conclusion. Also important are reflections on possible sources of experimental error; and suggestions for further investigations.

Literature Cited

A list of sources used. Sources should be varied (books, articles, websites…), clearly related to the topic, and at the appropriate level. Citations should include title, author, year, and URL (if website).

Displaying a Science Fair Project



The ORAL PRESENTATION

Using your Project Board/PowerPoint, you will present your project to the class. Your presentation should be about 5 minutes long. You should be knowledgeable about your topic, able to answer questions about your project, and your speech should be clear and loud so that everyone can hear you.

Science Exit Project Evaluation Rubric:

This rubric explicitly outlines each component that is required to adequately complete the exit project.

A. Title
4 -The title correctly states the independent variable and the dependent variable and is worded as a statement.
3 -The title correctly states the independent variable and the dependent variable but is worded as a question.
2 -The title is present but does NOT correctly state the independent variable or the dependent variable.
1 -Not attempted
Comments:
B. Question
4 -The question states the independent variable and the dependent variable, and is testable.
3 -The question does not make the independent variable and the dependent variable clear, but is testable.
2 -The question is present but is NOT testable.
1 -Not attempted
Comments:
C. Hypothesis
4 -The hypothesis predicts the effect that changing the independent variable will have on the dependent variable, and explains the reason for the prediction using scientific reasoning ("because…") that is supported by cited background research as noted in the literature cited section.
3 -The hypothesis predicts the effect that changing the independent variable will have on the dependent variable. The "because…" reasoning is present but incomplete or weak.
2 -The prediction is present but does not frame a relationship between the variables, or the "because…" reasoning is missing from the hypothesis statement.
1 -Not attempted
Comments:
D. Background Research
4 -Background Research is relevant to the topic (and the DV and IV specifically), supports the "…because…"portion of the hypothesis, and supports the "scientific reasoning" portion of the Discussion/Conclusion
3 -Background Research is relevant to the topic and is found to support either the "..because…" portion of the hypothesis, or the "scientific reasoning" portion of the Discussion
2 -Background Research is present, but irrelevant to the topic
1 -Not attempted
Comments:
E. Investigation Design (ID)
4 -All 5 components of the investigation's design (or ID) are stated correctly and explicitly, AND only one independent variable (or IV) is allowed to change at a time, AND there are multiple trials
3 -All 5 components of the ID are stated correctly, BUT more than one IV is changing at a time or there are not multiple trials.
2 -Some of the components of the ID are not reported, and/or two or more components have issues as described above.
1 -Not attempted.
Comments:
F. Procedure
4 -A step-by-step procedure including materials is described in enough detail to repeat the investigation, and details seem consistent with the project overall.
3- Materials are listed, and a step by step procedure is described, but some steps are missing or incomplete or not consistent with the ID.
2 -Materials are listed, and a procedure is described, but many steps are missing, incomplete or not consistent with the ID.
1 -Not attempted
Comments:

Resources - Below are helpful websites to help you create and complete your Science Exit Project.

Science Fair Project Central
A comprehensive guide to creating your science fair project from the award winning Discovery channel site.
Science Buddies
Science Buddies offers detailed guidance and examples for serious students. Their Topic Selection Wizard to help you find a science project idea that can hold your interest.
Dr. Shawn's Super Science Fair Project Support Center
Good Science Fair and Science Project resources, unfortunately not all information is free.
Family Education Guide
Magazine guide includes small list of rated and reviewed projects.
Step by Step Success
Single page guides may be useful as **teacher handouts** as well.
Science Fair Encyclopedia
Thorough guide made by scientists at the University of Florida.
IPL: Science Fair Project Resource Guide
The IPL will guide you to a variety of web site resources, leading you through the necessary steps to successfully complete a science experiment.

Science Project and Research Ideas
Science Fair Idea Exchange
Listed by level of difficulty.
Earth Science Projects
Scientific information from the U.S. Geological Survey.
Math Ideas for Science Fair Projects
From the Math Forum at Drexel.
More Math Ideas for Science Fair Projects
From the Canadian Mathematical Society
Energy related Projects
Energy Quest Science Ideas - Detailed descriptions of projects, science games , biographies.
Real Projects from the 90's.
Many hundreds of text only descriptions of real projects.
Science fair project ideas using mushrooms and fungi
Mushroom growing offers endless possibilities for science projects and experiments.
Science and Agriculture
Ideas from the California Foundation for agriculture in the classroom.
Spikes Science Projects
over 400 science projects for teachers and students to browse, download or just read arranged by categories.
Newfoundland Science Fairs Council
Project ideas from Canada sorted by topic and grade level.
Experimental Projects (Grades 4-12)
Project ideas from Prince Edward Island science fairs.
Crystal Clear Science Fair Projects
Several sample projects with complete details.
Science Fair Projects and Experiments
Sorted by topic with links to further information for each project.
Choosing Your Project
Project ideas from Elmers glue.
Earthquake Project Ideas
U.S. Geological Survey

All Science Fair Projects
Hundreds of ideas with detailed explanations.
Spikes Science Projects
Scores more projects with explanations.
SCIENCE FAIR IDEA EXCHANGE
Dozens of explained ideas arranged by level of difficulty.
Winning Projects from Nebraska
Several winning projects.
Agricultural Ideas for Projects
Useful ideas from the U.S. Dept. of Agriculture.
Kids' Science Projects
For students who like to build things.
Science Project Ideas
Scores of explained ideas arranged by topic with additional reasearch links. Outstanding!
Infoplease Science Project Ideas
A number of science projects and energy activities for students, K-12 from Infoplease. Complete descriptions are included.
Science Topic Ideas
Long one page list of topic titles only with general project
Science Bob Fair Ideas
About 33 topic ideas, tips and links

PART A: WRITTEN REPORT	Due Dates
Problem: This is the question you are investigation	December 20th
Research: An introduction to your project giving background information. Any special words should be defined in this part. You can also include where you got the idea for your project.	January 9th
Hypothesis: The "educated guess" answering the problem.	January 12th
Variables: for controlled experiments only	January 23rd
Materials: List all the items used in the experimental part of your project.	January 23rd
Procedure: List step by step how you set up your experiment.	January 23rd
Observations: During this period of time you would have gathered all the necessary materials, including selecting an animal for observation if you are doing field study of an animal. You would set the experiment and begin collecting data/recording observations. A data table of all observations must be included. Should include both qualitative and quantitative observations.	January 23rd - February 24th
Results & Analysis: Explain what your data means, in words and by graphing the information in the data table.	February 27th
Conclusion &Application: Explain if your hypothesis was supported or not supported. Explain how your findings are useful to others. Discuss sources of error.	March 5th
Glossary: A list of words and definitions pertaining to your topic.	March 9th
Reflective Essay: Here you will write your thoughts about the entire process of the science exit project. You will discuss your feelings and experiences. It can be a summary of your weekly journal reflections.	March 12th
Bibliography: List the names of any books or any publications you used that helped your research or procedure.	March 12th
Abstract: This is a summary of your entire project. This is the portion that will be written last.	March 19th

PART B: PROJECT BOARD / POWERPOINT The visual presentation includes all of the steps of your experiment, and communicates your project work with pictures, captions, and graphs.	March 22nd – 26th

PART C: ORAL PRESENTATION	
The scientific information you presented is accurate.	TBA
You spoke knowledgeably & understood your topic when questioned.	
You fully listened to other presenters.	

FINAL DATE TO TURN IN YOUR EXIT PROJECT : TBA

Science Exit Project Journal Rubric

	4	3	2	1
Table of Contents	Typed, all pages and descriptions correct	Typed, mostly correct	Typed with many errors or not typed	Not typed with many errors
Observations	Observations are clearly written, sketches and diagrams are included	Observations are clearly written, but sketches and diagrams are not included	Some clarity with observations, but sketches and diagrams not included	Lacks observations or not written clearly, lacking sketches and diagrams
Daily Entries During Investigation	Well detailed daily entries with data	All daily entries included but not well detailed	Missing daily entries, lacking in some of the details	Missing daily entries, little or no details
Data Analysis, Conclusion, Results	Clearly written with all information included	Clearly written with most information included	Some clarity with most information included	Not clearly written with little or no information included
Exit Project Reflection	Clearly written with all topics addressed	Clearly written with most topics addressed	Some clarity with most topics addressed	Not clearly written with most topics not addressed
				Total Score:

Science Exit Project Packet Rubric

	4	3	2	1
Questions	All questions in packet fully and clearly answered	Most questions in packet fully and clearly answered	Most questions answered but not fully and clearly answered	Many questions not answered
Background Research	All information about the source used included, four sources used, notes include many details	All information about the source used included, four sources used, notes are lacking in details	All or some information about the source included, only three sources used, notes may be lacking in details	Information missing about the source, only two or less sources included, notes lacking in detail
Signature Page	All signatures included			Missing signatures
				Total Score:

Exit Project Checklist – GROW REPORT

WATCH YOUR SCIENCE EXIT PROJECT "GROW"

Student Exit Project Rubric

Your Name _____ **Class**_____

To see how you are doing, use this sheet as a guide. It is similar to the sheet your teacher will use when evaluating your work and calculating your grade.

How To Use This Guide: When you do one of the things listed, place a **check mark** ☑ in the box next to it, but only if you feel you've completed that task to the best of your ability.

Then, give yourself a **"G", "R", "O"** or **"W"** based on the key at the end of each section.

There are 4 sections that you will be working on

SECTION 1 - "Science Understanding" *(as shown in the written report and the oral presentation).*

☐ I used topics and ideas that we discussed in class or on field trips to come up with a question that I could investigate.

☐ I explained my observations and my results by using science terms and science ideas.

☐ I used more than one way of explaining my ideas: like words, pictures, diagrams, charts or graphs.

☐ I was able to make connections between what I learned from the project and other areas of science.

How did I do in Section 1?

If you have all 4 boxes checked off, you did **G**reat.

If you have 3 boxes checked off, you did **R**eally good, but try to check off the remaining box.

If you have 2 boxes checked off, you're **O**n your way, keep up the good work!

If you only have 1 box checked off, **keep W**orking!

Write a "**G**", an "**R**", an "**O**" **OR** a "**W**" based upon your results for this section here _____

SECTION 2 - "Scientific Process" (as shown in the written report and the oral presentation).

- ☐ I identified a problem and I asked a question that I could investigate (**Not** a *"yes or no"* question.)
- ☐ I did some background research.
- ☐ Using the background research, and before I actually did the project, I made a hypothesis that I could test. I did not already know for sure what the answer to my hypothesis would be. I also know that my hypothesis does not have to be correct, because in science we can learn when we get results we expect or when we get results we did not expect.
- ☐ I designed a way to collect data to test my hypothesis.
- ☐ I conducted my research carefully and with scientific accuracy.
- ☐ I collected, recorded and organized data from my work.
- ☐ I made graphs, charts, tables or artwork that explained my data
- ☐ I made a conclusion that says whether my hypothesis was correct or incorrect (either one is ok) according to my data, explains my observations, and why things came out the way they did
- ☐ I explained what I would do differently next time and I discussed any possible sources of error in my project.
- ☐ I looked back at my work and explained what I might have changed to make the project even better.
  "If I were to do the project all over again, here is what I'd do differently this time....."

How did I do in Section 2?

If you have all 10 boxes checked off, you did **G**reat.

If you have 9 boxes checked off, you did **R**eally good, but try to check off the remaining box.

If you have 8 boxes checked off, you're **O**n your way, keep up the good work!

If you only have less than 8 boxes checked off, **keep W**orking!

Write a "**G**", an "**R**", an "**O**" **OR** a "**W**" based upon your results for this section here _____

SECTION 3 - "The Written Report"

☐ I used at least 3 different sources to collect my background research information, which I have written down in my bibliography.

☐ The report is written in a manner that makes sense. I made sure my report has:

- ✓ an abstract
- ✓ an introduction which includes the purpose and the reason why I chose this topic.
- ✓ a methods and materials section.
- ✓ my actual data and an analysis of it
- ✓ a conclusion that refers back to my hypothesis with a discussion of the results of my results and further questions I would like to investigate.
- ✓ a reflection on the quality of my entire project
- ✓ a glossary of terms
- ✓ a bibliography

☐ I compared concepts and showed the reader that I understood MORE THAN just what I researched about. I compared it to other things not in my research *(...**this** is similar to the idea of **that**).*

☐ I supported my ideas with examples, definitions and references back to other sources of information.

☐ I included footnotes for anything that I did not learn by myself. If I didn't learn it from doing this project, I showed where I got the information.

☐ I used graphics, charts or artwork to enhance my report.

☐ I have checked for grammar, spelling, punctuation and sentence structure. I have not included any "street talk", "slang" or "computer abbreviations" in my report.

☐ I have used a typewriter or a computer to print my report. It is ***NOT*** hand-written.

How did I do in Section 3?

If you have all 8 boxes checked off, you did **G**reat.

If you have 7 boxes checked off, you did **R**eally good, but try to check off the remaining box.

If you have 6 boxes checked off, you're **O**n your way, keep up the good work!

If you only have less than 6 boxes checked off, **keep W**orking!

Write a "**G**", an "**R**", an "**O**" **OR** a "**W**" based upon your results for this section here _____

SECTION 4 - "The Oral Presentation"

- ☐ I organized my presentation in a way that people can understand. I know that not everyone listening to the presentation is as much an expert on my topic as I have become.
- ☐ I used notes, index cards, or PowerPoint to make sure I followed my presentation in the correct manner and that I am giving accurate data. I did **NOT** read directly from my report, and I made eye contact with the audience.
- ☐ I gave examples, definitions and direct references and quotes to support my ideas.
- ☐ I was able to answer questions about my topic: I am the expert!
- ☐ My audience was able to understand my concept.
- ☐ I used proper grammar and sentence structure. I did not use any "street talk" or "slang". I spoke slowly, loudly and clearly, so that I could be understood.
- ☐ I used some visual display such as: powerpoint, trifold board, movie or other multimedia to make my presentation more interesting.

How did I do in Section 4?

If you have all 7 boxes checked off, you did **G**reat.

If you have 6 boxes checked off, you did **R**eally good, but try to check off the remaining box.

If you have 5 boxes checked off, you're **O**n your way, keep up the good work!

If you only have less than 5 boxes checked off, keep **W**orking!

Write a "**G**", an "**R**", an "**O**" **OR** a "**W**" based upon your results for this section here _____

So, how did my project GROW?

If you have 4 G's you did great on your project, give yourself a **BIG "G"** in the box.

If you have 3 G's you did really good on your project, give yourself a **BIG "R"** in the box..

If you have 2 G's on your project, give yourself and **"O"**. You're on your way in the box.

If you have 1 G. on your project, give yourself and **"W"** and keep working in the box.

As of _____ / _____ / _____, my project is rated a ☐ because:

WHEN YOU ARE FINALLY DONE, CONGRATULATE YOURSELF ON COMPLETING YOUR ADVANCED SCIENTIFIC RESEARCH PROJECT AND PRESENTATION !!!