PROJECT GRADE SHEET

##### Student Name: Period:

Project Title:

Project Category:

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| --- | --- | --- | --- |
| **ASSIGNMENT** | **Due Date** | **Grade** | **Teacher****Comments/Initials** |
| Problem Title, Topic,and Questions**(Daily Grade)** | Sept. 14, 2015 |  |  |
| Science Fair Journalswill be checked**(Daily Grade)** | Oct. 14, 2015 |  |  |
| Complete ScienceFair Project DUE**(Test)** | Nov. 4, 2015 |  |  |
| Science FairPresentations**(Test)** | Nov. 5-9, 2015 |  |  |

SCIENCE FAIR RUBRIC

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| CATEGORY | **15** | **12** | **8** | **4** |
| **Idea** | Independently identified a question which was interesting to the student and which could be investigated. | Identified, with adult help, a question which was interesting to the student and which could be investigated. | Identified, with adult help, a question which could be investigated. | Identified a question that could not be tested/investigated or one that did not merit investigation. |
| **Hypothesis Development** | Independently developed an hypothesis well­ substantiated by a literature review and observation of similar phenomena. | Independently developed an hypothesis somewhat substantiated by a literature review and observation of similar phenomena. | Independently developed an hypothesis somewhat substantiated by a literature review or observation of similar phenomena. | Needed adult assistance to develop an hypothesis or to do a basic literature review. |
| **Variables** | Independently identified and clearly defined which variables were going to be changed (independent variables) and which were going to be measured (dependent variables). | Independently identified which variables were going to be changed (independent variables) and which were going to be measured (dependent variables). Some feedback was needed to clearly define the variables. | With adult help, identified and clearly defined which variables were going to be changed (independent variables) and which were going to be measured (dependent variables). | Adult help needed to identify and define almost all the variables. |
| **Description****OF** **Procedure** | Procedures were outlined in a step­ by­step fashion that could be followed by anyone without additional explanations. No adult help was needed to accomplish this | Procedures were outlined in a step­ by­step fashion that could be followed by anyone without additional explanations. Some adult help was needed to accomplish this. | Procedures were outlined in a step­ by­step fashion, but had 1 or 2 gaps that require explanation even after adult feedback had been given. | Procedures that were outlined were seriously incomplete or not sequential,even after adult feedback had been given. |
| **Data Collection** | Data was collected several times. It was summarized, independently, in a way that clearly describes what was discovered | Data was collected more than one time. It was summarized, independently, in a way that clearly describes what was discovered. | Data was collected more than one time. Adult assistance was needed to clearly summarize what was discovered | Data was collected only once and adult assistance was needed to clearly summarize what was discovered |
| **Diagrams** | Provided an accurate, easy­to­ follow diagram with labels to illustrate the procedure or the process being studied. | Provided an accurate diagram with labels to illustrate the procedure or the process being studied. | Provided an easy­ to­follow diagram with labels to illustrate the procedure or process, but one key step was left out. | Did not provide a diagram OR the diagram was quite incomplete. |
| **Conclusion/****Summary** | Student provided a detailed conclusion clearly based on the data and related to previous research findings and the hypothesis statement(s). | Student provided a somewhat detailed conclusion clearly based on the data and related to the hypothesis statement(s). | Student provided a conclusion with some reference to the data and the hypothesis statement(s). | No conclusion was apparent OR important details were overlooked. |
| **Display** | Each element in the display had a function and clearly served to illustrate some aspect of the experiment. All items, 6, graphs etc. were neatly and correctly labeled. | Each element had a function and clearly served to illustrate some aspect of the experiment. Most items, 6, graphs etc. were neatly and correctly labeled. | Each element had a function and clearly served to illustrate some aspect of the experiment. Most items, 6, graphs etc. were correctly labeled. | The display seemed incomplete or chaotic with no clear plan. Many labels were missing or incorrect. |

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

SCIENCE FAIR PACKET

Scientific Method

The scientific method is the backbone of every science experiment, and understanding it is critical to the success of your science fair experiment. It involves identifying a problem, learning what is already known about that problem, thinking of a solution or answer (called a hypothesis), doing an experiment to test your hypothesis, and reaching a conclusion based on what you learned. Here is a detailed description of the scientific method.

### Problem/Question

Develop a question or problem that can be solved through experimentation.

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### Observation/Research

Perform research on your topic. It is not a good idea to begin from a scratch to answer the question. Rather the library and Internet must be used to gather information and confirm that the past errors would not get repeated. How are you planning to research for your project? What observations are you planning on doing?

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### Formulate a Hypothesis

Based on the research you have done, you will be writing an answer or solution (formed as a statement) – your best ***educated guess*** – to your question. Two things must be kept in mind while stating a hypothesis. It must be possible to measure the terms in the hypothesis and the hypothesis must answer the original question.

Example: If soil temperatures rise, then plant growth will increase.

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### Variables/Controls

Establish the variables important to your experiment. Variables are the things that have an effect on the experiment.

The *manipulated/independent variable* is the one condition that you change in the experiment. It is the factor that you are comparing or testing. Ask yourself: What are the things that may affect the results of my experiment? Choose one variable to change and keep the others the same.

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*The dependent/responding variable*: The measure of change observed because of the independent variable. It is important to decide how you are going to measure the change.

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The *controlled variables* are the conditions that need to remain the same during the experiment so that they do not affect the results.

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### Materials

Develop a list of materials that you will need to complete your experiment. Materials are a detailed list of items you need to complete your experiment. Be specific about the amounts used.

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### Procedures

Develop and follow a procedure. Procedures are a step-by-step description of how you will conduct your experiment. Remember to number your steps. The experiment must be repeated for the same and different set of values to ensure that the initial results were not a fluke.

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### Data/Observations

As you observe your experiment, you will need to record the progress of your experiment. This is your data. The *data* are the values written down as the experiment progresses. Data can be whatever you observe about your experiment that may or may not change during the time of the experimentation. Data can be in form of graphs and charts. *Qualitative observation* involves using sights, hearing, smell, and sometimes taste to gather information. *Quantitative observation* involves numbers. This type can be in the form of charts, graphs, and tables.

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### Results

The results are usually in the form of a statement that explains or interprets the data. You do not go into any detail or explanations here. You simply say in words what your data is telling you.

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### Conclusion

The conclusion is a summary of the research and the results of the experiment. This is where you answer your research question. You make a statement of whether your data supported your hypothesis or not.

You may have data that supported part of your hypothesis and not another part. You may also have data that did not support your hypothesis at all. In this case, you may explain why the results were different.

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### Abstract

A project abstract is a brief paragraph or two (limited to 250 words) highlighting and/summarizing the major points or most important ideas about your project. The abstract should include purpose of experiment, procedure, data, and conclusion.

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Possible Topic Ideas:

* Does the pH of juice change over time?
* Insects can sense light and dark. Can they still see light if it's only red or blue, etc?
* How does the concentration of chlorine in water affect the rate or percentage of seed germination?
* What is the effect of watering schedules on the germination (or growth rate) of seeds from a certain plant?
* Does the bounciness of a golf ball relate to its ability to be hit a long distance?
* Does the species of wood affect the rate at which it burns? Its heat output?
* Does the mass of a baseball bat relate to the distance the baseball travels?
* Is the paper towel that absorbs the most water the same as the paper towel brand that absorbs the most oil?
* What types of fruits or vegetables are suitable for making a battery?
* What exactly does a vacuum cleaner pick up? Use a magnifying glass or microscope to look at the contents of a bag or canister.
* Does coloring carbonated water change how its taste is perceived?
* How long does it take for milk to go "bad" refrigerated and unrefrigerated?
* Do all crayons have the same melting points? Why or why not?
* Do different types of carbonated sodas have different pH?
* Can you tell different brands of soda pop apart based on taste?
* Do some plants grow better inside than outside?
* Which type of water contains the lowest amount of chlorine?
* What type of insulation holds in heat the best?
* Do different types of knots affect the breaking strength of a rope?
* Does wiping a doorknob with an antibacterial wipe really reduce the numbers of bacteria?
* Does using hand sanitizer really reduce the amount of bacteria on your hands?
* Does temperature affect the maximum size you can inflate a balloon?
* Do the color of a crayon affect how long of a line it will write?
* Does changing the temperature affect how long a pen will last?
* Do all types of bread mold at the same rate?
* What paper airplane design flies the farthest? Stays aloft the longest?
* What effect does soap in water have on plants? Is the effect the same at very low soap concentrations as compared with high concentrations?
* How much plant food is too much?
* What soils best support structures, such as buildings?
* What types of words do babies learn to speak first?
* Does air temperature affect how long soap bubbles last? Does relative humidity?
* Can you graft a tomato plant onto a potato plant?
* Do plants react to the presence of other plants? Music? Different colored light?
* What materials glow under black light? Can you use the UV light to find invisible, possibly smelly, stains in your carpet or elsewhere in your house?
* Will chilling an onion before cutting it keep you from crying?
* What type of plastic wrap prevents evaporation the best?
* What plastic wrap prevents oxidation the best?
* What percentage of an orange is water?
* Do white candles burn at a different rate than colored candles?
* Does the presence of detergent in water affect plant growth?
* Does magnetism affect the growth of plants?
* How does the shape of an ice cube affect how quickly it melts?
* Do different brands of popcorn leave different amounts of unpopped kernels?
* How accurately do egg producers measure eggs?
* How do differences in surfaces affect the adhesion of tape?
* If you shake up different kinds or brands of soft drinks (e.g., carbonated), will they all spew the same amount?
* Are all potato chips equally greasy?
* Does light effect the rate at which foods spoil?
* Can you use a household water filter to remove flavor or color from other liquids?
* Does the power of a microwave affect how well it makes popcorn?
* Do all brands of diapers absorb the same amount of liquid? Does it matter what the liquid is (water as opposed to juice or... um.. urine)?
* Do all dishwashing detergents produce the same amount of bubbles? Clean the same number of dishes?
* Is the nutritional content of different brands of a vegetable (e.g., canned peas) the same?
* How permanent are permanent markers? What solvents (e.g., water, alcohol, vinegar, and detergent solution) will remove the ink? Do different brands/types of markers produce the same results?
* Is laundry detergent as effective if you use less than the recommended amount? More?
* Do all hairsprays hold equally well? Equally long? Does type of hair affect the results?
* What effect do additives have on the crystals? You could add food coloring, flavorings, or other 'impurities'.
* What steps can you take to maximize crystal size? You can affect vibration, humidity, temperature, rate of evaporation, purity of your growth medium, and time allowed for crystal growth.
* How do different factors affect seed germination? Factors that you could test include the intensity, duration, or type of light, the temperature, the amount of water, the presence/absence of certain chemicals, or the presence/absence of soil. You can look at the percentage of seeds that germinate or the rate at which seeds germinate.
* Is a seed affected by its size? Do different size seeds have different germination rates or percentages? Does seed size affect the growth rate or final size of a plant?
* How does cold storage affect the germination of seeds? Factors you can control include the type of seeds, length of storage, temperature of storage, and other variables, such as light and humidity.
* What conditions affect the ripening of fruit? Look at ethylene and enclosing a fruit in a sealed bag, temperature, light, or nearness to other pieces or fruit.
* How are different soils affected by erosion? You can make your own wind or water and evaluate the effects on soil. If you have access to a very cold freezer, you can look at the effects of freeze and thaw cycles.
* How does the pH of soil relate to the pH of the water around the soil? You can make your own pH paper, test the pH of the soil, and add water, then test the pH of the water. Are the two values the same? If not, is there a relationship between them?
* How close does a plant have to be to a pesticide for it to work? What factors influence the effectiveness of a pesticide (rain? light? wind?)? How much can you dilute a pesticide while retaining its effectiveness? How effective are natural pest deterrents?
* What is the best way to store bread to keep it fresh the longest time?
* What things can you do to improve the efficiency or effectiveness of your clothes dryer or water heater or any device? For example, can you take actions or make changes that will decrease the length of time it takes your dryer to get a load of towels dry?
* Does listening to music while you study affect your ability to memorize facts?
* Does the presence of smoke in the air affect plant transpiration?
* Does eye color affect peripheral vision? Supposedly people with darker eyes tend to have wider pupils for a given amount of light than people with light-colored irises. If you have a more-open pupil, does it give you measurably better peripheral vision? Another idea to test would be to see if you have the same peripheral vision in bright light as compared with dim light.
* Acid snow? - You know about acid rain, but do you know the pH range of snow? If you live in an area with snow, test its pH. How does the pH of snow compare with the pH of rain from the same region?
* What methods of preventing soil erosion work best? For example, what is effective at preventing erosion in your yard?
* What can you do to reduce noise pollution in a room? What factors contribute to noise pollution inside a residence?
* Seed viability - Is there a test you can perform to predict whether or not a seed will germinate? What factors can you measure that might be used to construct a test?
* Is the brightness of glow-in-the-dark (phosphorescent) materials affected by the light source (spectrum) used to make them glow or only by the intensity (brightness) of the light? Does the light source affect the length of time a phosphorescent material will glow?
* What is the best thickness of insulation for preventing heat loss?
* Is light bulb lifespan affected by whether the bulb is run at full power? In other words, do dim bulbs last longer/shorter than bulbs run at their power rating?
* What type of box material gives you the best sound for your speaker?

### DISPLAY BOARD



\*Variables and controls should also be displayed on board