Same format as this page.

SAMPLE

ABSTRACT

must be 1st page on ALL papers.

The Illinois Junior Academy of Science

Check against pgs 3 & 4 of manual.

CATEGORY	**Chemistry**	STATE REGION #	**6**
SCHOOL	**Woodlawn Middle School**	IJAS SCHOOL #	**6025**
CITY/ZIP	**Long Grove, 60047**	SCHOOL PHONE #	**(847) 353-8500**
SPONSER	**Mr. Polidoro, Ms. Russell**		

NAME OF SCIENTIST*	**Isaac Newton**	GRADE	**8**
NAME OF SCIENTIST		GRADE	
NAME OF SCIENTIST		GRADE	
NAME OF SCIENTIST		GRADE	

* If this project is awarded a monetary prize, the check will be written in this scientist's name, and it will be his/her responsibility to distribute the prize money equally among all participating scientists.

PROJECT TITLE Effect of Light Intensity on the Rate of a Photochemical Reaction

Purpose: To study how light intensity affects the rate of a photochemical reaction.

Procedure: Test tubes of the same photosensitive solution were prepared using Oxalic acid and tincture of iodine. These test tubes were then covered in aluminum foil so as to not expose the solutions to light until the time of testing. Test tubes of this solution were exposed to light sources of the same color but having different light output intensities at a distance of 3.5cm. Enough test tubes were prepared to perform three trials for each of the different light sources. The intensity of the light source measured in lumens and the amount of time elapsed measured in minutes was recorded after the photochemical reaction reached completion. Data from each set of trials was averaged and also recorded.

Conclusion: The researcher found that the light source with the highest output intensity caused the photochemical reaction to reach completion earlier than the other experimental groups. The photochemical reaction in question reacts faster when a light source of higher intensity (lumens) is used to activate it.

No more than 200 words total

1. Limit Abstract to 3 paragraphs (about 200 words or less), a) Purpose - what you set out to investigate; b) Procedure - how you did it; c) Conclusion - based on your results.
2. Must be typed, single-spaced on the front of this form. DO NOT write on the back of this form.
3. THREE (3) copies of your COMPLETE paper are required at the State Science Project Exposition. FOUR (4) copies of your COMPLETE paper are required for the State Paper Session Competition.

The above form must be duplicated. (Student generated forms must in essentially **the** same **format.)**

This form MUST be displayed on the exhibitor's display board. It may be reduced to half a sheet of paper.

Same format as this page

SAMPLE

SAFETY SHEET

The Illinois Junior Academy of Science

Must be 2nd page on ALL papers

DIRECTIONS: The student is asked to read this introduction carefully, fill out the bottom of this sheet, and sign it. The science teacher and/or advisor must sign in the indicated space.

SAFETY AND THE STUDENT: Experimentation or research may involve an element of risk or injury to the student, test subjects and to others. Recognition of such hazards and provision for adequate control measures are joint responsibilities of the student and the sponsor. Some of the more common risks encountered in research are those of electrical shock, infection from pathogenic organisms, uncontrolled reactions of incompatible chemicals, eye injury from materials or procedures, and fire in apparatus or work area. Countering these hazards and others with suitable controls is an integral part of good scientific research.

In the **box** below, list the principal hazards associated with your project, if any, and what specific precautions you have used as safeguards. Be sure to read the entire section in the *Policy and Procedure Manual of the Illinois Junior Academy of Science* entitled "SAFETY GUIDELINES FOR EXPERIMENTATION" before completing this form.

Typical

- The researcher used gloves when handling the chemicals in order to protect the skin from any harmful elements.
- Safety goggles were worn throughout the experiment in order not to get chemicals in her eyes.
- The electrical apparatus / lamp which held and energized the light sources was connected and operated safely and with parental supervision.

SIGNED I. Sage Newton

Student Exhibitor(s)

SIGNED R. Polidori

Sponsor *

*As a sponsor, I assume all responsibilities related to this project.

This Sheet Must Be Typed

This form MUST be displayed on the exhibitor's display board. It may be reduced to half a sheet of paper.

If it applies, page 3 of paper

HUMANS AS TEST SUBJECTS ENDORSEMENT

The Illinois Junior Academy of Science

THESE RULES WILL BE STRICTLY ENFORCED FOR THE STATE SCIENCE EXPOSITION. NO REGION SHOULD SEND A PROJECT TO THE STATE EXPOSITION THAT DOES NOT MEET THESE REGULATIONS.

Students and sponsors doing a human vertebrate project must complete this form. The signature of the student or students and the sponsor indicates that the project was done within these rules and regulations. Failure to comply with these rules will mean the disqualification of the project at the state level. This form must follow the Safety Sheet in the project paper.

1. Humans must not be subjected to treatments that are considered hazardous and/or that could result in undue stress, injury, or death to the subject.
2. **No** primary or secondary cultures taken directly (mouth, throat, skin, etc.) or indirectly (eating utensils, countertops, doorknobs, toilets, etc.) will be allowed. However, cultures obtained from reputable biological suppliers or research facilities are suitable for student use.
3. Quantities of food and non-alcoholic beverages are limited to normal serving amounts or less and must be consumed in a reasonable amount of time. Normal serving amounts must be substantiated with reliable documentation. This documentation must be attached to the Humans as Test Subjects Endorsement form. No project may use over-the-counter, prescription, illegal drugs, or alcohol in order to measure their effect on a person.
4. The only human blood that may be used is that which is either purchased or obtained from a blood bank, hospital, or laboratory. No blood may be drawn by any person or from any person specifically for a science project. This rule does not preclude a student making use of data collected from blood tests not made exclusively for a science project.
5. Projects that involve exercise and its effect on pulse, respiration rate, blood pressure, and so on are allowed provided the exercise is not carried o the extreme. Electrical stimulation is not permitted. A valid, normal physical examination must be on file for each test subject. Documentation of same must be attached to the Humans as Test Subjects Endorsement form.
6. Projects that involve learning, ESP, motivation, hearing, vision, and surveys require the **Humans as Test Subjects** form.

In this space, briefly describe the use of humans and assess the risk(s) to them in your project. Use the back of this page if necessary.

If a project requires this form, this space should be filled out appropriately.

The signatures of the student or students and sponsor below indicate that the project conforms to the above rules of the Illinois Junior Academy of Science.

R. Feynman
(Sponsor)

1/15/12
(Date)

Isaac Newton
(Student)

(Student)

This Sheet Must Be Typed

This form MUST be displayed on the exhibitor's display board. It may be reduced to half a sheet of paper.

☐ **Check box if exception/approval letter is required and attached**

If it applies, page 3 of paper

SAMPLE

MICROORGANISM ENDORSEMENT

The Illinois Junior Academy of Science

THESE RULES WILL BE STRICTLY ENFORCED FOR THE STATE SCIENCE EXPOSITION. NO REGION SHOULD SEND A PROJECT TO THE STATE EXPOSITION THAT DOES NOT MEET THESE REGULATIONS.

Students and sponsors doing a microorganism project must complete this form. The signature of the student or students and the sponsor indicates that the project was done within these rules and regulations. Failure to comply with these rules will mean the disqualification of the project at the state level. This form must follow the Safety Sheet in the project paper.

1. This area of science may involve many dangers and hazards while experimenting. It is the sole responsibility of all teacher(s)/sponsor(s) to teach students proper safety methods and sterile techniques.
2. The Illinois Junior Academy of Science prohibits the use of primary or secondary cultures taken from humans or other vertebrate animals in any project because of the danger from unknown viruses or other disease-causing agents that may be present. Pure cultures of microorganisms known to inhabit vertebrate animals may be obtained from reputable suppliers and used in proper settings.
3. Microorganism experiments must be conducted in a laboratory such as science classroom or research facility.
4. Projects involving viruses and recombinant DNA should be done with the help of a professional and should comply with the National Institutes of Health (NIH) Guidelines unless the project is limited to a kit obtained from a legitimate supply house.
5. All cultures should be destroyed by methods such as autoclaving or with a suitable NaOCl (bleach) solution before disposal.

In this space, identify and briefly describe the use of microorganisms in your project. Use the back of this page if necessary.

The microorganisms used in this investigation were obtained through the instructor at Woodlawn Middle School and are known to be non-pathogenic Typical bacteria. Agar plates were inoculated and cultured to be used in experimental trials to discover the following:

The signatures of the student or students and sponsor below indicate that the project conforms to the above rules of the Illinois Junior Academy of Science.

R. Poelen
(Sponsor)

1/15/12
(Date)

Isaac Newton
(Student)

(Student)

This Sheet Must Be Typed

This form MUST be displayed on the exhibitor's display board. It may be reduced to half a sheet of paper.

☐ **Check box if exception/approval letter is required and attached**

If it applies, page 4 of paper.

TISSUE CULTURE ENDORSEMENT

SAMPLE

The Illinois Junior Academy of Science

THESE RULES WILL BE STRICTLY ENFORCED FOR THE STATE SCIENCE EXPOSITION. NO REGION SHOULD SEND A PROJECT TO THE STATE EXPOSITION THAT DOES NOT MEET THESE REGULATIONS.

Students and sponsors doing a microorganism project must complete this form. The signature of the student or students and the sponsor indicates that the project was done within these rules and regulations. Failure to comply with these rules will mean the disqualification of the project at the state level. This form must follow the Safety Sheet in the project paper.

1. This area of science may involve many dangers and hazards while experimenting. It is the sole responsibility of all teacher(s)/sponsor(s) to teach students proper safety methods and sterile techniques.
2. The Illinois Junior Academy of Science prohibits the use of primary cell cultures taken from humans or other vertebrate animals in any project because of the danger from unknown viruses or other disease-causing agents that may be present. Established tissue culture cell lines that are characterized as requiring biosafety level 1 (BSL1) procedures and precautions may be obtained from reputable suppliers and used in proper research settings. Cell lines requiring biosafety level 2 (BSL2) procedures and precautions for use must have approval from IJAS prior to use OR be used in an established research facility.
3. Experiments using tissue culture cell lines must be conducted in a laboratory such as science classroom or research facility.
4. Projects involving tissue culture should be done with the help of a professional and should comply with the standards and principles for biological safety.
5. Experiments using tissue culture, including the culture of insect cells, with viruses and/or recombinant DNA must also follow the rules and regulations for these agents; one endorsement sheet detailing use of these agents together is acceptable.
6. All cultures should be destroyed by methods such as autoclaving or with a suitable NaOCl (bleach) solution before disposal.

In this space, identify and briefly describe the use of tissue culture cells in your project. Include the published name, source from which they were obtained, brief experimental procedure uses, safety precautions taken, disposal practices, and so forth. Use the back of this page if necessary.
The signatures of the student or students and sponsor below indicate that the project conforms to the above rules of the Illinois Junior Academy of Science.

The microorganisms used in this investigation were obtained through the science fair sponser at Woodlawn Middle School and are known to be non-pathogenic Typical bacteria. These microorganisms were obtained by the teacher via the science material supplier Flinn Scientific.

The techniques for inoculation, culture and destruction were all performed safely according to the following sources:

- Flinn Aseptic Techniques document number 10940
- "Streaking Microbial Cultures" taken from Science in the Real World document obtained through the department of Biology, University of Missouri.

All procedures were conducted in the science classroom which include receiving, unpacking, agar plate streaking, culturing, photographing and destruction of the microorganisms.

Disposal of the microorganisms followed known safe practices using the recommended sodium hypochlorite solution.

The **signatures** of the student or students and sponsor below indicate that the project conforms to the above rules of the Illinois Junior Academy of Science.

R. Robinson
(Sponsor)

1/15/12
(Date)

Isaac Newton
(Student)

(Student)

This Sheet Must Be Typed

This form MUST be displayed on the exhibitor's display board. It may be reduced to half a sheet of paper.

☐ **Check box if exception/approval letter is required and attached**

SAMPLE

Newton

Last name of scientists upper right corner starting on this page.

Page numbers start

Table of Contents

Confirm accuracy

Double Spacing 12 pt font from here on.

SAMPLE

Acknowledgments

I would like to thank Mr. Polidoro for his aid in this project. Thank you for being my sponsor, providing the majority of the equipment and chemicals needed for the experiment, and for editing the paper. It is much appreciated

Do Independent & Dependent variables clearly stand out?

Newton

Can be elaborated and include a question.

Purpose

To study how light intensity affects the rate of a photochemical reaction.

Ind. V. Dep. V

Depends on

Newbies

Ind V. **Hypothesis** Dep. V.

If the intensity of light applied to a photosensitive solution increases, the rate of the resulting photochemical reaction will also increase.

Doesn't need to be wordy or explain anything - leave that for conclusion.

This sample paper is too short. 4-5 pages would be what is recommended for regional or state.

SAMPLE

Review of Literature

Photochemistry takes place all around us in ways most people wouldn't even think about. Our lives depend on a photochemical reaction in something people often take for granted: plants. Green plants photosynthesize in order to create fuel for all living things (Farabee, 2010). Photosynthesis is an example of photochemistry because once plants combine water and carbon dioxide, they then use the energy from light as the activation energy to react the two chemicals and produce sugar and oxygen, two vital substances all living things need (Photosynthesis, 1998). Photochemistry has many more uses in people's daily lives.

Photochemical reactions occur when photons, small particles of constantly moving light energy, break a chemical bond (Jones, n.d.). Therefore, the light becomes the activation energy (Brown, 2010). One photochemical reaction that is very popular during the summer time is sun tanning. This comes about when skin cells called metanocytes react with the ultraviolet rays from the sun to create brown pigments in the skin known as a tan (Thompson, 2008). Another common use of photochemistry is picture taking. Although now-a-days most people use digital cameras, a few film cameras are still around. The 35mm film is the most commonly used, and the way it works is that when light hits it, a chemical reaction occurs that creates the negative image seen on a film roll (Blackmon, n.d.). Unfortunately, there are not only good photochemical reactions, but photochemistry can also have a negative impact. For example, photochemical smog is when different pollutants react with sunlight to create harmful air pollution (Harris, n.d.). Photochemical smog, which is usually invisible, is different to normal smog, which is the fog created by pollution (Smog, 2003). Both kinds of smog can be extremely damaging to human health and both can be prevented with simple precautions such as limiting the use of gas-emitting cars. If there is no pollution, then no chemicals can react to the light; henceforth, the world will slowly be rid of hurtful pollutants.

Scan for grammar.

Internal Citations are required as shown.

Each Citing should be on Reference List & vice versa.

Photochemistry is also used by people in order to observe other photochemical reactions with their sense of sight. Vision is often considered the most important of all our five senses. People's eyes use light in order to send an image to their brain. First, the light must pass through the first layer of the eye: the cornea; then it travels through several other parts of the eye until it reaches the retina (Bianco, n.d.). Once in the retina, the light causes two cells, called the rod and cone, to react (Bianco, n.d.). This reaction produces electric charges that are sent to the brain through the optic nerve, and from there, the brain is able to interpret an image (Bianco, n.d.). The retina is where the vital photochemical reaction takes place. When there is no light, people obviously are not able to see because no activation energy is provided to create the signals that need to be sent to the brain.

The world has many photochemical reactions occurring in the air, in plants, and even in humans every second. The facts have shown that it is very plausible that lumens will have an effect on photochemical reactions because light is energy and the lumens in a light bulb are the amount of that energy being emitted (Lux, Lumen and Watts, 2006). Therefore, the more energy given out by a light bulb, the more activation energy there will be and the faster a photochemical reaction will occur. Photochemistry is a branch of science that many scientists have studied in the past and will continue to study.

SAMPLE

Newton

Materials and Variables

Materials:

- Test tubes
- Rubber Stopper
- Aluminum foil
- 250mL beaker
- 10mL graduated cylinder
- Pipets
- Plastic spoons
- Oxalic acid
- Ammonia
- Tincture of iodine
- Distilled water

Should include these.

Variables:

- Independent- Intensity of the Light Source (lumens)
- Dependent- Rate of Reaction (minutes)

the variable that is changed.

the variable that is measured. Dependent on independent variable.

Constants / Controlled Variables:

- Brand of the different light sources - Westinghouse Clear Incandescent Light Bulbs
- Photosensitive solution
- Distance and proximity from light source
- Voltage applied to light source
- Ambient light

Do not allow to change. Can / may affect the results.

Understand what was done).

SAMPLE

Newton

Method of Procedure

1) Mix together 50mL of distilled water, 2 small scoops of oxalic acid, 5mL of ammonia, and 6mL of iodine in a 250mL beaker.
2) Distribute 4mL of the new solution into 5 different test tubes.
3) Cover the test tubes completely in aluminum foil and place in test tube rack 3.5cm away from the light bulb.
4) Screw the 230 Lumens light bulb into the light fixture.
5) Turn off all surrounding lights.
6) Unwrap foil from one test tube, insert a rubber stopper in the top, and invert the tube 5 times.
7) Take out the stopper, put the test tube back on the rack, and turn on the light while starting the timer at the same time.
8) Time how long it takes for the solution to produce a clear liquid.
9) Repeat steps 4-8 with the 455 Lumen, 830 Lumen, 1100 Lumen, and 1630 Lumen light bulbs.

Test each light bulb three times and then calculate the average results in order to get the final rate of reaction for each variable.

At least 3-5 trials - the more the better.

SAMPLE

Newton

Data and Results

	230 Lumens	455 Lumens	830 Lumens	1,100 Lumens	1,630 Lumens
Trial 1	8.8 min.	7.15 min.	5.6 min.	5.62 min.	4.73 min.
Trial 2	8.35 min.	7.12 min.	5.55 min.	5.25 min.	4.65 min.
Trial 3	8.7 min.	7.05 min.	5.25 min.	5.12 min.	4.53 min.
Average	**8.62 min.**	**7.12 min.**	**5.47 min.**	**5.33 min.**	**4.64 min.**

Metric measurements required.

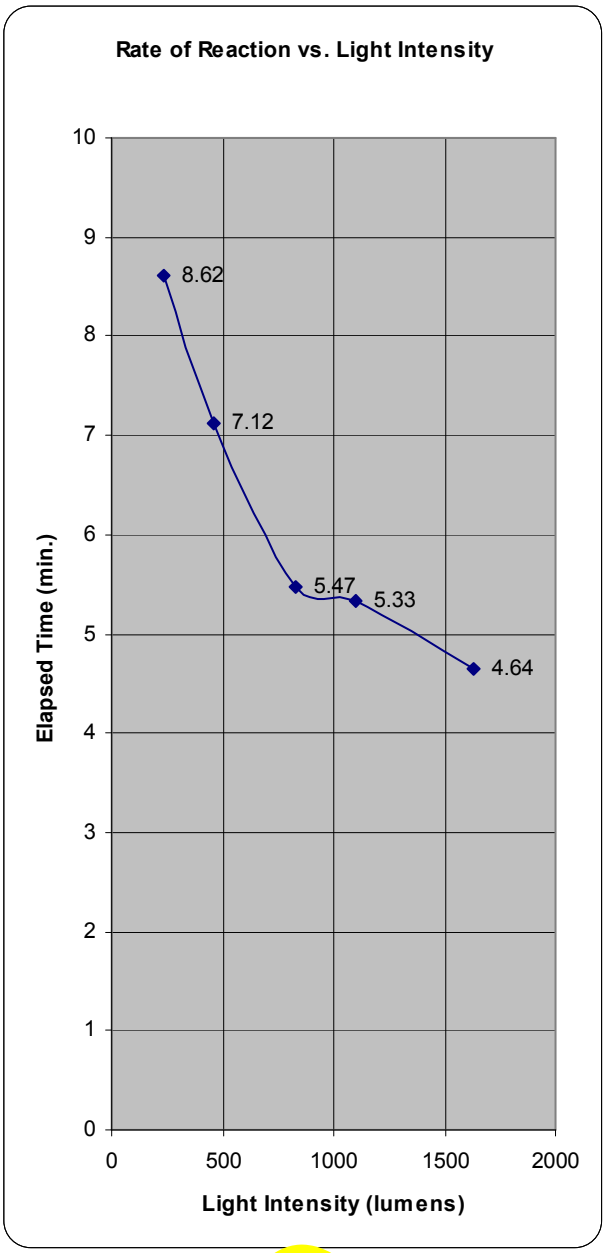

Table and Chart a must!

Titled, labeled and properly scaled.

Clearly SUPPORT conclusion with evidence: DATA

SAMPLE

Newton

3rd person ONLY

Conclusion

From the data, the researcher concluded that the intensity of light which activates a photochemical reaction does indeed affect the rate of that reaction. The data clearly illustrates an inverse relationship between the value of light intensity measured in lumens versus the time elapsed for the reaction. As the intensity increases, the time taken to react decreases. Considering rate as a function of time, the data illustrates a direct or positive relationship between the value of light intensity measured in lumens versus the rate of reaction. As this data does not mathematically calculate and chart "rate", the rate of reaction can be inferred as a measurement of time given the constants present in the experimental groups. One might also infer based on the data that the relationship of light intensity to rate of reaction is certainly not a linear one, but more exponential perhaps or even logarithmic.

Further repeated tests are most likely needed when considering the variance of the data point at 1100 lumens. Interpolation of the data points with exception to the data gathered during the 1100 lumen trials would most likely yield a more mathematically sound relationship between the two data sets.

No compensation for the effects of radiated heat from the light source into the photosensitive solution was made as it was deemed negligible.

Varied references are highly encouraged. NOT ALL WEBSITES!

SAMPLE

Newton

Reference List

mistake here. these should be alphabetical

Farabee, M.J. (2010). Photosynthesis. Retrieved December 26, 2010 from http://emc.maricopa.edu/faculty/farabee/biobk/biobookps.html

(1998). Photosynthesis. Retrieved December 26, 2010 from Think Quest: http://library.thinkquest.org/3715/photo3.html

Jones, A. What is a photon?. Retrieved December 22, 2010 from About.com: http://physics.about.com/od/lightoptics/f/photon.htm

Brown, W.P. (2010). Factors affecting the speed-rates of chemical reactions. Retrieved December 22, 2010 from Doc Brown's Chemistry: http://www.docbrown.info/page03/3_31rates.htm

Thompson, R. (2008). *Illustrated guide to home chemistry experiments*. Sebastopol, CA: Make:Books.

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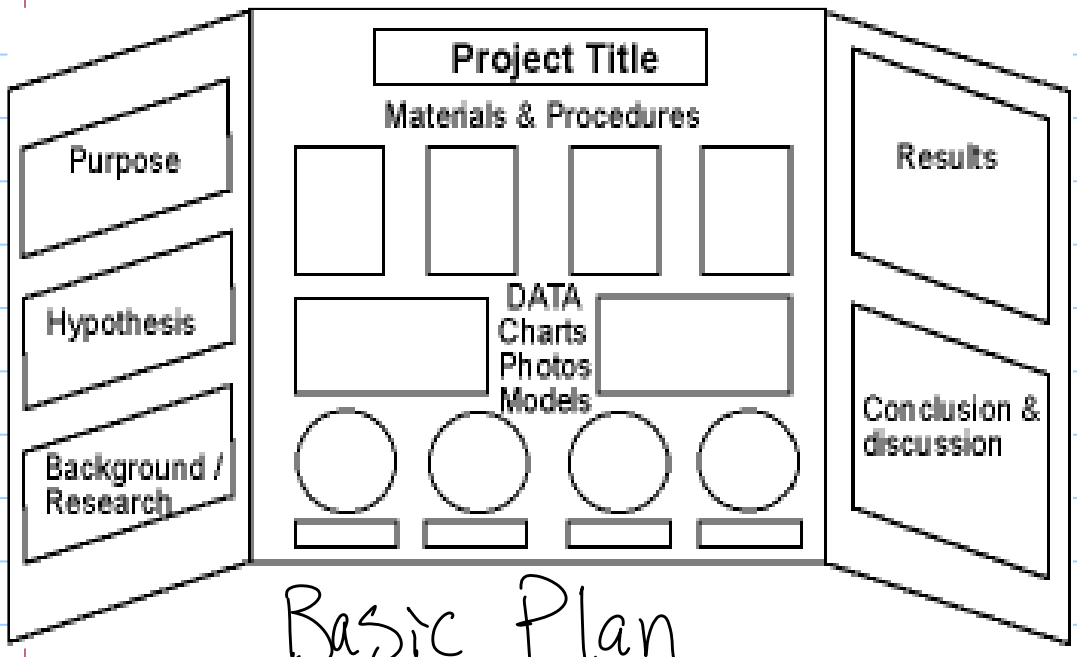
Harris, B. What is photochemical smog?. Retrieved January 9, 2011 from Wise Geek: http://www.wisegeek.com/what-is-photochemical-smog.htm

(2003). Smog. Retrieved January 9, 2011 from Encyclopedia.com: http://www.encyclopedia.com/topic/smog.aspx#1

Bianco, C. How vision works. Retrieved January 9, 2011 from Discovery Health: http://health.howstuffworks.com/human-body/systems/eye/eye2.htm

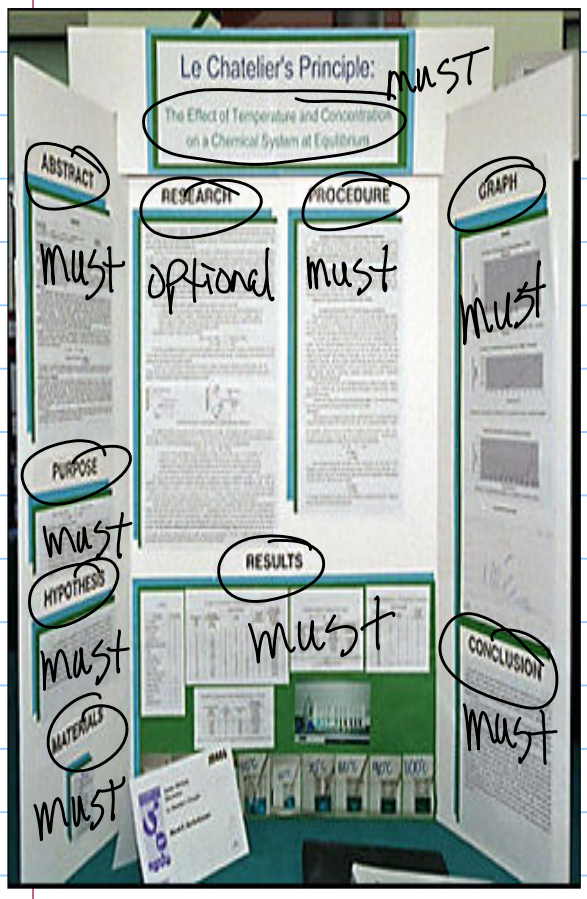
(2006). Lux, lumen and watts, what's the difference?. Retrieved December 22, 2010 from Brillianz: http://brillianz.co.uk/data/documents/Lumen.pdf

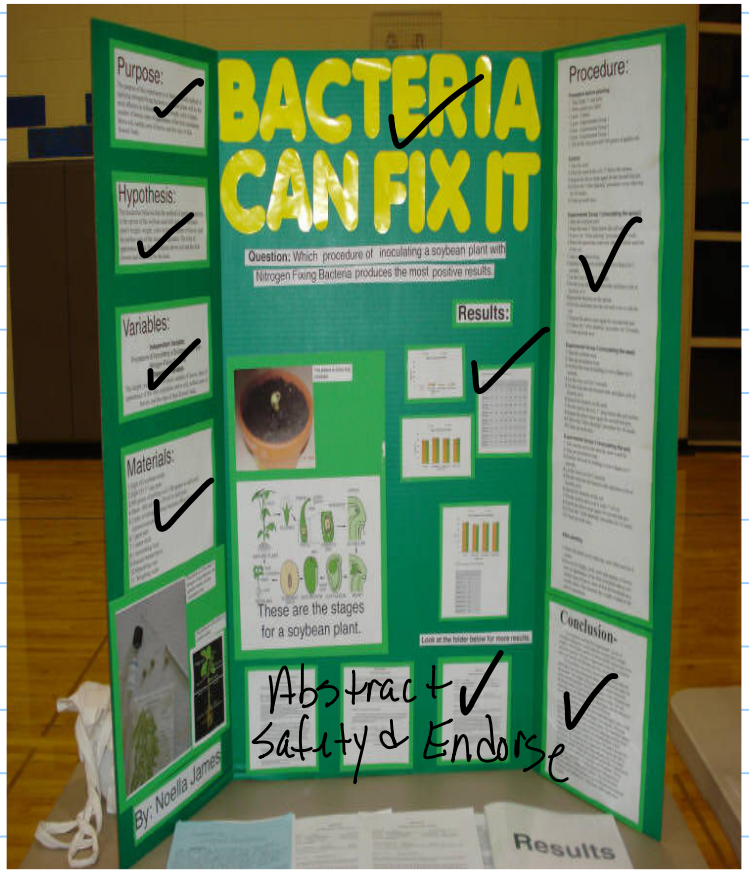
Project Display Board



Basic Plan

Must have Abstract and safety sheet on front. Reduce to half-size is O.K. encouraged.





Oral Presentation

1. Introduction
2. Acknowledgements
3. Purpose and Hypothesis
4. Background Information/Research SUMMARY
5. Procedure (basic, Not wordy)
6. Results (summary)
7. Conclusion (summary)
8. Offer to answer questions

Remember

- Be serious - no giggling
- Speak slow
- Don't assume judge knows what you did. Explain your work where needed
- Be enthusiastic - SELL IT!