

SUSTAINABILITY SCIENCE FAIR

DIRECTIONS, REVIEW, RESEARCH AND RUBRICS

NAME _____ PERIOD _____

What is the Sustainability Science Fair? The Sustainability Science Fair is when **YOU** pick a topic related to your system that you would like to learn more about. The sky is the limit!

You have already chosen a SYSTEM (Energy, Waste, Art, Natural Areas, or Food), researched how to make this system more sustainable, and decided on a community project that will help this system become more sustainable.

During your research, most of you had many QUESTIONS about how to make your system more sustainable. NOW, **YOU** get to test one of those questions!

YOU brainstorm with your friends, classmates, brother, sister, mom, dad, grandpa...about an experiment that **YOU** can run.

YOU run your experiment over a 4-8 week time period.

YOU gather your OWN DATA and place it into a nice data table and graph.

YOU analyze your data and *draw* a conclusion.

YOU present your test, your data, and your conclusion to your classmates, teachers, friends, parents in class and at SCIENCE NIGHT for a grade AND an opportunity to win **FUN PRIZES!**

YOU get to work with your sustainable design group on this project!

Your projects will be displayed at McKnight's Family Science Night on May 4, 2011!

DUE DATES

Science Fair Requirement	Page numbers	Date Due
Scientific Method Review	2-3	
Brainstorming and Research Task	4-5	
Science Fair Proposal	6-9	
Science Fair Procedures	11	
Experiment needs to be finished	-	
Science Fair Conclusion	12	
Display Board	Rubric on pg 9	
Presentation	Rubric on pg 14	

Science Fair Video Questions:

1. Who can you ask for help for science fair ideas?
2. What is wrong with the topic "Plant Growth"?
3. What is wrong with the topic "Life on other planets"?

Scientific Method REVIEW!

These are parts of the scientific method that you will be responsible for knowing. Put a star next to words that you know, a check next to words that you think you know and circle words that you do not know:

- Testable question
- Hypothesis
- Manipulated variable
- Responding variable
- Controlled variable
- Procedure
- Materials
- Data table
- Graph
- Conclusion
- Sources of error

Next, define as many of these words as you can. You may ask your classmates and your teacher for help. Use your textbooks, too!

Now, think back to the “Lava on the Run” investigation:

1. What could a testable question have been for the “lava on the run”? Fill in the blanks: What happens to _____ when I change _____?

2. What would your hypothesis have been? Fill in the blanks: I predict that _____ because _____.

Remember: Your hypothesis must refer directly to the testable question and have a reason.

3. What was the manipulated variable (the variable you changed)?

4. What was the responding variable (the variable you measured)?

5. Name at least three controlled variables (the ones you kept the same):

6. Where could you find the list of procedures?

7. What materials did you need?

8. Was your graph clear and useful? Why or why not?

9. Write a conclusion. In your conclusion, include:

- An answer to your testable question
- High and low data to support your answer to the question
- Explanation about why your data supports your answer

Science Fair Brainstorming and Research Task

You must finish this and get checked off by your instructor before moving onto the proposal.

1. Review- What system are you studying: _____
2. List at least three questions that you have about making your system more sustainable:
 - a) _____
 - b) _____
 - c) _____
3. Are any of these questions testable? If so, please describe how you could test it. If these questions are not testable, describe how you could turn them into testable questions. Please remember that a testable question needs to have a manipulated and a responding variable in it and should be written in this format: What is the effect of _____ on _____?

4. Visit this website: http://www.sciencebuddies.org/mentoring/register_guest.php. (*You can get there from Ms. Jonas' TeacherWeb Page*). This page will take you through a survey to give you ideas about testable questions that other students have done.
5. Click on the button that says "Take Survey to Find Topic." OR, if you're already pretty certain about the area of science you're interested in, click the button that says "Narrow Down My Question." Work through the surveys and answer the

questions honestly. You want to be spending the next month on a topic that **actually** interests you!

6. Based on what you saw on the Science Fair Topic Selection Wizard AND what your group discussed, describe what you think you will do for your science experiment:

7. How will this science experiment help your system become more sustainable?

*****When you finish, let your teacher know so that you can get credit, then move on to the science fair proposal (on the next page). *****

✓ _____ Check-Out

Sustainability Science Fair Proposal 2011

Science Fair Proposal = 20 points!

1. Testable Question: (What is the effect of _____ on _____?)
2. How will this testable question help you learn more about the system you are studying for the sustainability community project?
3. Who will be impacted by the results of your experiment? (People should care about the results or the experiment is probably not worth your time).
4. Materials needed (think of everything). Include amounts needed for each.
5. Where will you get each of the materials listed above?
6. What is the estimated cost of the needed materials?

7. What test will you perform? Describe in detail. List the steps. (This is your set of procedures).
8. What is the one thing you will change in your test? (This is the manipulated variable.)
9. What will you keep the same in your test? (There will be MANY things that you will keep the same; these are the controlled variables)
10. What are all the possible outcomes of your test (What could possibly happen in your experiment)?
11. What is your prediction (hypothesis)? I predict_____ because
_____.
12. What will you measure? (This is the responding variable). How will you measure it?
13. What do you see as your biggest challenge in completing this project?

Parent Only Section

Parents, please read the science fair proposal (when it is finished) and sign below. Please come to McKnight's FAMILY SCIENCE NIGHT on May 4 to see finished projects.

I am aware of my son/daughter's science fair proposal. We have or can get the materials needed. I will support my son/daughter in the completion of this project. I will look at the grading requirements rubrics and science fair project packet when my son/daughter has a question. If I have any questions or concerns, I will call or email the teacher.

X_____

(Parent or Guardian Signature)

We need help with the following:

X_____

(Parent or Guardian Signature)

Our biggest challenges and/or concerns are:

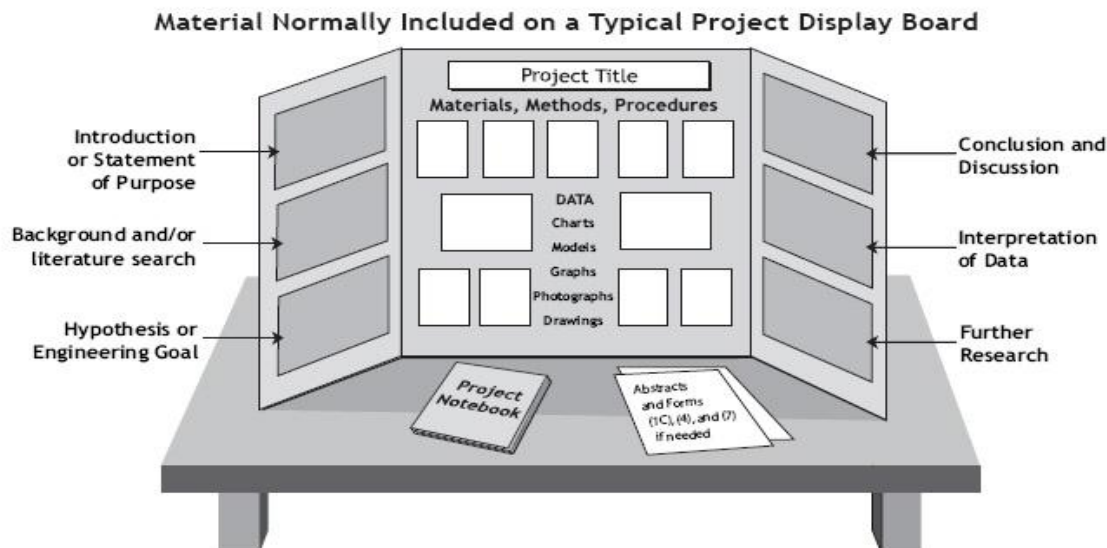
X_____

(Parent or Guardian Signature)

SUSTAINABILITY EXPERIMENT AND COMMUNITY PROJECT DISPLAY BOARD ASSESSMENT

Requirement	Points Possible
1. The title of your project is large and near the top of your board. Your name, teacher and period(s) are under your title.	5
2. There are at least five <u>background facts</u> about how to make your system more sustainable. The background research is interesting and shows effort.	5
3. <u>EXPERIMENT</u> : Your <u>testable question</u> is <u>challenging</u> and <u>creative</u> . It is posted on your board.	5
4. <u>EXPERIMENT</u> : A <u>hypothesis</u> that includes a reason (I predict _____ because _____)	5
5. <u>EXPERIMENT</u> : The set of <u>procedures</u> is clear and complete.	5
6. <u>EXPERIMENT</u> : Three types of <u>variables</u> are listed: -manipulated (changed) -responding variable (measured) -controlled variables (kept the same)	5
7. <u>EXPERIMENT</u> : The <u>data table</u> is clear, neat and labeled	5
8. <u>EXPERIMENT</u> : The <u>graph</u> is clear, neat and labeled	5
9. <u>EXPERIMENT</u> : The <u>conclusion</u> section includes: -The answer to your testable question -High and low data to support the answer -Difference between the high and low data	5
10. <u>COMMUNITY PROJECT</u> : Describe what you did for your community project.	5
11. <u>COMMUNITY PROJECT</u> : Describe three ways that your community project helped your system become more sustainable.	5
12. <u>COMMUNITY PROJECT CONCLUSION</u> : What is the most interesting thing you learned by doing this project? What were the challenges? What are you most proud of?	5
13. The board has some creative <u>PIZZAZZ</u> (a special picture, graphic, exciting fact, sparkles, extra fun)	5
14. It is obvious that the creators of this board were creative when designing it and it shows considerable effort.	5
<u>EXTRA CREDIT</u> - You can get up to 5 points extra credit for re-using an old display board, or using scrap paper (from my scrap paper drawer) for your display board.	
TOTAL	70

Recommendation: Divide up the work so each group member can be responsible for different parts. Peer-edit your work.



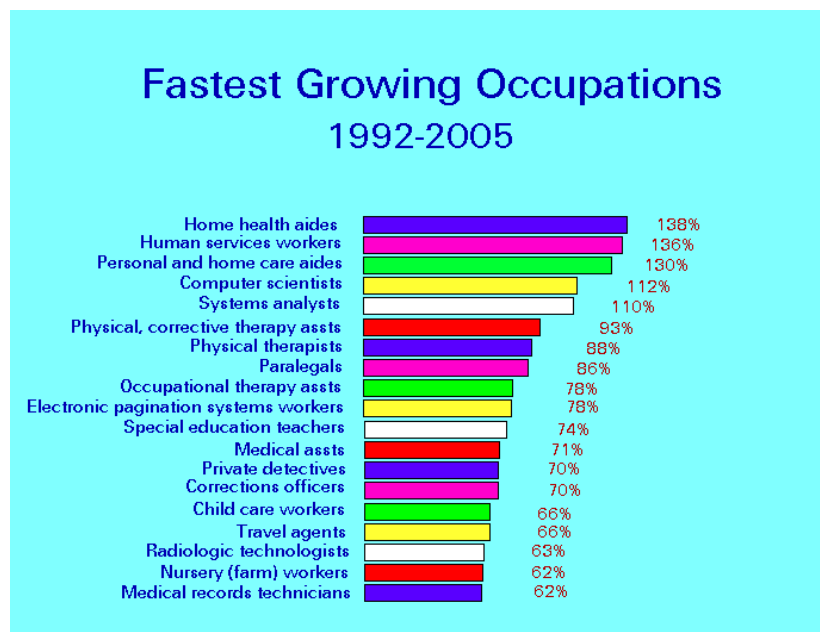
What is the difference between a data table and a graph?

Data tables show all of your numbers in a chart or table. Graphs show the same data in a visual form.

DATA TABLE EXAMPLE:

ACTIVITY	HOURS	PERCENT OF DAY
Sleep	6	25
School	6	25
Job	4	17
Entertainment	4	17
Meals	2	8
Homework	2	8

GRAPH EXAMPLE:



Procedures Peer Edit Form

PART 1: Writing Procedures. List the procedures that you will use to test your testable question using the checklist below. Do not include a materials list.

- ✓ Procedures are logical and complete
- ✓ There is one manipulated variable in the procedure
- ✓ There is one responding variable in the procedure
- ✓ It is stated how often measurements should be taken and recorded.

My testable question: _____

My Procedures:

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

Part 2: PEER EDIT (Will do on Wednesday 2/3)

Edited by _____

Please give advice about the following items and offer suggestions for how your peer can improve:

- ✓ Procedures are logical and complete.
Advice: _____
- ✓ There is one manipulated variable in the procedure.
Advice: _____
- ✓ There is one responding variable in the procedure.
Advice: _____
- ✓ It is stated how often measurements should be taken and recorded.
Advice: _____

Any additional comments?

Conclusion Writing Guide

Example Investigative Question: What is the effect of hours of sunlight on the growth of tomato plant height?

1. Answer the investigative question in one sentence.

(Ex: “The plant that received the most sunlight grew the highest.”)

2. State the high data for responding variable average. It must include actual numbers from the manipulated and responding variables.

(Ex: “The plant that received 16 hours of sunlight a day grew to a height of 20 cm.”)

3. State the low data for responding variable average. It must include actual numbers from the manipulated and responding variables.

(Ex: “The plant that received 4 hours of sunlight a day grew to a height of 7 cm.”)

4. State the difference between the high and low data. Compare the high and low data using a number and a phrase like “more than” or “less than.”

(Ex: The plant that received 16 hours of sunlight grew 13 cm more than the plant that received 4 hours of sunlight.)

Write the conclusion to your science fair experiment here:

Conclusion Writing Peer-Assessment

Name of Person editing your conclusion: _____

Directions: Score your conclusion based on the scoring rubric. You will be graded on your effort on this assessment. Please also answer the questions completely.

	Correct	Did not answer the question correctly	Did not include manipulated and responding variable	Too much information
Answer the investigative question				

	Correct	Did not include responding variable value	Did not include manipulated variable value	Did not use average
Supporting High Data				

	Correct	Did not include responding variable value	Did not include manipulated variable value	Did not use average
Supporting Low Data				

	Correct	Did not include a comparison term like "more than" or "less than"	Did not state the difference between high and low data	Did not state the manipulated variable
State the Difference between high and low data				

What do you think your peer needs the most help with?

What do you think your peer did a great job with?

Sustainable Design Presentation Grading Rubric For the Community Project and the Science Experiment

Note: Although you should start with the introduction and end with the conclusion, you may decide the order of the other requirements.

Requirement	Points Possible
<u>1. INTRO</u> : Your introduction is EXCITING and gets the class interested; tell us why you became interested in your system and topic. Why should the class be interested in your experiment? How does it affect them?	5
<u>2. EXPERIMENT</u> : Tell us your experiment testable question, hypothesis and reason; <u>briefly</u> describe what you did.	5
<u>3. EXPERIMENT</u> : Tell us your conclusion and refer to data table or graph	5
<u>4. EXPERIMENT</u> : Discuss the possible sources of error and new question	5
<u>5. COMMUNITY PROJECT</u> : Describe what you did for your community project.	5
<u>6. COMMUNITY PROJECT</u> : Describe three ways that your community project helped your system become more sustainable.	5
<u>7. COMMUNITY PROJECT CONCLUSION</u> : What is the most interesting thing you learned by doing this project? What were the challenges? What are you most proud of?	5
8. Include PIZZAZZ - (demonstration, video or pictures on board)	5
9. It is obvious you have practiced (note cards are well done and everyone in the group has a role)	5
10. You used good eye contact and a loud voice (you did not read your note cards or board, but you may use note cards)	5
TOTAL	50

****You will need to prepare this presentation by making note cards and practicing with your group****