**Chapter 1**

**Timetable for Science Fair Projects**

|  |  |
| --- | --- |
| *Parts* | *Due* |
| **Topic/Research** | **November 4** |
| **Problem/Question/Hypothesis** | **November 11** |
| **Procedure (all parts)** | **December 2** |
| **Abstract and Paperwork** | **December 19** |
| **Poster boards** | **January 20** |
| **Oral presentations** | **January 22** |

**Chapter 2**

**Important Science Fair Dates**

* **School Science Fair**
	+ **Set Up** – January 21, 2013 (Tuesday)
	+ **Judging** – January 22, 2013 (Wednesday)
	+ **Awards**– January 23, 2013 (Thursday)
* **State Science Fair**-- UNR – 3rd quarter (date to be announced)

**Chapter 3**

**Information for Students About Science Fair Projects**

**A successful science project:**

1. Represents your work -- not the work of an expert or your parent.
2. Indicates an understanding of the science area chosen.
3. Shows careful planning that would eliminate a "rush" project.
4. Has a notebook showing a complete record of all your work.
5. Has a simple, well-stated title and neat lettering.
6. Includes pictures, charts, graphs, etc. that might be necessary to explain your work.
7. Has accurate, valid, and correct observations.
8. Tells a complete story -- problem and solution.
9. Is original in approach and presentation.
10. Is self-explanatory.
11. Is attractive and organized.
12. Does not have to cost much money.
13. Is best if it is an experiment, but it doesn't have to be.
14. Is one that gives credit to those who gave help.

**A science fair project is NOT:**

1. Only a report.
2. Necessarily a new discovery or an original piece of research.
3. Constructing a plastic model from a hobby kit.
4. An enlarged model or drawing.
5. A weekend chore.
6. One, two, or even three posters.
7. Something done by your parents or teachers.

**Steps in Making a Science Project:**

1. Choose a topic and discuss it with your teacher. Ask your teacher for help and suggestions.
2. Once you have chosen your topic problem, find out as much about the topic as possible.
3. Keep a project notebook and record all of your thought, preparation, and ideas. Keep a record of your readings.
4. Set up a work area somewhere around your house where you can work on your project. Make sure the area is off limits to your pets or younger brothers or sisters.
5. Work on your project a little each day, don't wait until the last minute.
6. Collect the materials needed for the project.
7. Check with your teacher for suggestions and materials, he or she can save you time, excess work, and money.
8. Construct your exhibit and make letters for your signs.
9. Mount your pictures, graphs, charts, etc.
10. Present your science project at the fair.

**Chapter 4**

**Display and Safety Rules**

1. **If there are pictures of people other than the exhibitor, there MUST be a signed release form (Form 4B) in their notebook.**
2. NO plants or soil on backboard or display.
3. NO food is allowed on backboards or display.
4. NO hair or teeth is allowed on backboard or display.
5. ***NO push pins or staples can be used on the backboard.***
6. NO pointers of any kind will be permitted at the fair.
7. If the student is doing a multi-year project, NO previous year materials can be displayed on the backboard. It must be in their notebooks. Graphs can be displayed for comparison purposes.
8. NO pictures of animals in unnatural positions can be displayed on the backboard. They can be in their notebook.
9. If the student is working with any kind of chemical, make sure they are following the proper safety procedures (using goggles, gloves, or aprons where appropriate) and these safety procedures are included in their research plan (FORM 1A).
***Material Safety Data Sheets MUST be included in their paperwork for the chemicals used.***
10. Make sure all procedures are complete in their research plan (FORM 1A). They should be clear enough so that anyone can read the procedure and be able to duplicate the experiment.
11. NO glass or sharp objects can be displayed at the fair.
12. Stay away from tall table model backboards made of foam. Any backboard above 36" should have 3 hinges, with pins in place, if the board is made of anything other than cardboard or foam. No velcro can be used to hold the backboard together.
13. Models that do not work or explain the projects should not be displayed. Take good pictures for the display on the backboard or put them in the notebook.
14. Backboards must be no more than 30" deep, 48" wide and 108" high, including table.

**Chapter 5**

**The Project Notebook**

(This should be a spiral notebook and it needs to be in your own handwriting.)

Each page should have a title stating what the page is about. An outline form, using Roman numerals and capital letters is suggested for good organization. You must write on the front of the pages only.

|  |  |  |
| --- | --- | --- |
| **Title Page** | **Page 2** | **Page 5** |
| **Title** **Name** **Date**  | **III. Materials:** **A. What kind?** **B. What size?** **C. How many?** | **VI. Results:** **What happened?** |
| **Contents Page** | **Page 3** | **Page 6** |
| **Table of Contents** **I. Question** **II. Hypothesis** **III. Materials** **IV. Procedure** **V. Observation** **VI. Results** **VII. Data tables/Graphs****VIII. Conclusion** |  **IV. Procedure** **A. 1st,**  **B. 2nd,** **C. 3rd,**  **D. 4th,**  |  **VII. Data Tables/Graphs** |
| **Page 1** | **Page 4** | **Page 7** |
|  **I. Question** **II. Hypothesis** | **V. Observations** **What do you see happening?** | **VIII. Conclusion** |

***Write neatly and spell correctly. The notebook needs to be in your handwriting.***

**Chapter 6**

**Science Fair "How To"**

**Topic:**

1. Select a topic that can be answered only by experimenting.
2. Write your topic as a question to be investigated.

**Purpose:**

* One sentence explaining why you are doing this investigation. Try to relate your purpose to the real world. The purpose can be stated like this: **"The purpose of this project is...."**

**Hypothesis:**

A hypothesis states what you think is going to happen when you investigate a question.

Here is an example:

**Question: Does light affect the way plants grow?**

Hypothesis: Plants will grow toward the light.
Hypothesis: Plants will grow away from light.
Hypothesis: Light will make no difference in the way plants grow.

**Procedure:**

**1. Materials** -- list all materials used in your investigation. Include what, how much, and what kinds of materials you used. Keep in mind quantities are important. Be sure to ONLY use METRIC units.

|  |  |
| --- | --- |
| **GOOD LISTING** | **POOR LISTING** |
| 3- 15x15 cm square each of:Brawny, Gala, Scott,Generic Paper Towels | Paper Towels |
| 250 ml beaker | Measuring Cup |
| 750 ml water at 20 oC(temperature of the water) | Water |
| 1 - 20x20 cm square cake pan | Container |
| Celsius Thermometer | Thermometer |
| Clock with a second hand | Clock |

**2. Variables** -- There are 3 types of variables.

1. **manipulated variable (mv)** - What you change on purpose in your experiment.
2. **responding variable (rv)** - What changes by itself because you manipulated (changed) something in your experiment. What you are measuring.
3. **variables held constant (c)** - Everything else in your experiment must stay the same (constant).

Here are some examples:

**Question:** Do all brands of paper towels absorb the same amount of water?

* + - mv - Brands of paper towels
		- rv - Amount of water absorbed by each towel
		- c - size of paper towel, amount of water poured on each brand of towel, temperature of the water being used, container towels are placed on, method of pouring the water

**3. Step-by-Step Directions** -- These are like a recipe. Anyone who reads them will be able to duplicate (copy) your experiment and get the same results.

Example:

**Question:** Do all Brands of Paper Towels Absorb the Same Amount of Water?

**Step-by-Step Directions:**

* + - * Cut 3 - 15x15 cm square pieces of each brand of paper towel.
			* Label each cut piece with the brand name.
			* Pour 50 ml of 20 C water into a 20x20 cm square pan
			* Place 1 square of the generic brand paper towel into the water .
			* Leave in the water for 30 seconds.
			* Remove paper towel.
			* Squeeze the paper towel back into the empty measuring cup.
			* Record the amount of water in the data table.
			* Dry the pan.
			* Repeat steps 4-8 for each brand of paper towel.
			* Repeat the entire process 2 more times for each brand of paper towel.

**Data Log**-- See the guideline paper for how to set up your data log book.

**Collecting Data:**
The data collected during the experiment needs to be quantifiable (measurable). All measurements in your investigation must be made in METRICS.

For example:

|  |  |  |
| --- | --- | --- |
| Volume: | milliliter (ml)liter (L) | 1000 ml = 1 L |
| Length: | millimeter (mm)centimeter (cm)meter (m)kilometer (km) | 10 mm = 1 cm100 cm = 1 m 1000 m = 1 km |
| Mass: | milligram (mg)gram (g) kiligram (kg) | 10 mg = 1 g1000g = 1 kg |
| Temperature: | Celsius (oC) |  |

**Tables:**

**Five Steps to a Table:**

1. Make as many rows and columns as you need.
2. Label the rows and columns.
3. Fill in data in the appropriate spaces in the form of tallies or numbers.
4. Find totals or subtotals as necessary.
5. Write a title above the table.

|  |
| --- |
| **Sneezes on Tuesday (title)** |
| **Person** | **Tallies** |
| **Meg** | | | | | | | |
| **Tim** | | | | |
| **Fred** | | | | | |
| **Ann-Marie** | | | | | | | | | | |
| **Jewel** | | | | | | | | |
| **Labels for Columns** | Data shown with tally marks |

|  |
| --- |
| **Sneezes on Tuesday (title)** |
| **Person** | **Tallies** |
| **Meg** | 6 |
| **Tim** | 3 |
| **Fred** | 4 |
| **Ann-Marie** | 9 |
| **Jewel** | 7 |
| **Labels for Columns** | Data shown with numbers |

**Graphs:**

* **Line Graphs**

**Five Steps to a Line Graph:**

* + 1. Draw and label the vertical and horizontal sides (axes)
		2. Choose a scale that suits the data.
		3. Place the dots on the graph to represent the data.
		4. Connect the dots in order
		5. Write a title above the graph.
* **Bar Graphs**

**Five Steps to a Bar Graph:**

* + 1. Decide whether to make the bars vertical or horizontal.
		2. Draw and label the sides (axes).
		3. Choose a scale; calibrate it to fit the data.
		4. Draw the bars to represent your data.
		5. Write a title above the graph.

**Conclusions:**

* **Your conclusion should include:**
	1. Statement of support or non-support of the original hypothesis.
	2. Description of any problems or unusual events that occurred during your investigation.
	3. What you would do differently next time.
	4. Revised hypothesis (if data did not support your original hypothesis).
* **How to Write a Conclusion:**
Before you write your conclusion, carefully examine all of your data (tables & graphs). Ask yourself these questions:
	1. Did I get the results I expected to get? If not, how were the results different?
	2. Were there any unexpected problems or occurrences that may have affected the results of my experiment?
	3. Do I think I collected enough data to form a conclusion? (Did I do enough trials?)
	4. Do I need to revise my original hypothesis? (If you do need to write a revised hypothesis, DO NOT use it to replace your original hypothesis for¾ your project!)

**Abstract:**

* **ALL projects must have an abstract.**

The abstract must include:

* 1. purpose of the experiment,
	2. procedures used,
	3. data, and
	4. conclusions.

**Research Papers:**

All students **must complete**a scientific research paper.

**Chapter 7**

**Sample Abstract**

**Project Title
Student Name
Honors Academy of Literature
Type the category that your project falls into (see teacher)**

|  |
| --- |
| **Text -- Maximum of 250 words**  |

**\* NO bibliography on abstract -- detailed bibliography must be on research plan form 1A.**

**Chapter 8**

**Science Fair Research Paper**

**\*Using your notes, you can make a first-class science fair project by writing a good paper explaining what you did.**

**Title Page**

Your project's name (it can be in the form of a question), your name, school, teacher, and grade.

**Table of Contents**

List the parts of your report (introduction, hypothesis and research, procedure/experiment, results, conclusion, credits/references) and the page numbers where they begin.

**Abstract**

One paragraph that tells the whole story. One way to do this is to write a sentence for each idea in the scientific method. One for the purpose, one telling what experiment or test you did, etc.

**Hypothesis & Background Research**

State your PURPOSE in more detail. What made you think of this project (NOT my teacher told me to.) Tell what you found out from books or other sources you used to learn about your topic and be sure those sources are listed in your bibliography.

**Procedure/Experiment**

List the materials you used and tell what you did. If drawings will make it clearer, draw on separate pages and put in this section. Explain in detail the things you made.

**Results**

Describe what happened, what you observed. Show your data.

**Conclusion**

Describe your interpretation of your results. Look over your notes, charts/tables, and log book and write what you think your data shows. You can put your opinions here. Was your hypothesis (what you expected to happen) correct? Don't be afraid to say that you might have made a mistake somewhere. Great discoveries can come from what we learn from mistakes.

Be sure to state the limitations of your project. (For example, if your project was to find out something about dogs and you used your dog, you can say, "my dog did this". This might not be the same for "other dogs." You can't say that all dogs would behave in the same way as yours because you didn't check all dogs.

**Credits/References**

List of all books, articles, pamphlets, people you talked to and any other sources you used for researching your idea and writing your paper.

**Sources**

They are written or typed in this form:

Last name of author (or person you talked to), First name, "Title of article or chapter." Title of Source (book title, magazine title or "Conversation"), Place where published:¾ Publisher Name, Date, Volume: pages.

Examples:
Jones, Thomas A., "The Development of the Chick" Animal Development Magazine, June 1976, Vol 16:27-34.
Peraccchio, Laura, Telephone Conversation, February 15, 1993.

**Chapter 9**

**Science Fair Display Board**

|  |  |  |
| --- | --- | --- |
| **Hypothesis**(must be in the form of a question) | **Title/Problem** | **Graphs** |
| **Procedure**(materials(variables(step-by-step directions | **Purpose** |  |
| **Abstract** | **Data**(tables, charts, pictures) | **Conclusion** |

|  |
| --- |
| **On Back of Board:NameSchoolGradeScience Teacher** |

**Chapter 10**

**Science Project Evaluation**

Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Period\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_ Topic/Problem stated in the form of a question (5)

\_\_\_\_\_\_\_\_\_\_ Purpose explaining why you are doing this experiment (5)

\_\_\_\_\_\_\_\_\_\_ Hypothesis (5)

**Procedure**

* \_\_\_\_\_\_Materials List (10) **METRIC** system must be used
* \_\_\_\_\_\_Manipulated Variable (5)
* \_\_\_\_\_\_Responding Variable (5)
* \_\_\_\_\_\_Constants (5)
* \_\_\_\_\_\_Step-by-Step Directions (10)
* \_\_\_\_\_\_Data Table(s) (10)
* \_\_\_\_\_\_Graph (10)
* \_\_\_\_\_\_Experiment conducted a minimum of 3 times (5)
* \_\_\_\_\_\_Conclusion (5)
* \_\_\_\_\_\_Abstract (10)
* \_\_\_\_\_\_Neatness (handwriting, spelling) (5)
* \_\_\_\_\_\_Log Book (10)
* \_\_\_\_\_\_Research Paper (20)
* \_\_\_\_\_\_Oral Presentation (20)

**TOTAL (145 points possible)**

**Student Signature\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Parent Signature\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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