This Packet Belongs To:

____

Teacher: ____________________________________

Room #: ____________________

Franklin Elementary Science Fair
Thursday, March 2, 2017

This Packet Contains:

1. Cover Sheet
2. General Information/Signature Sheet
3. Rules & Regulations
4. Science Fair Guide
5. Experiment Ideas
6. Scoring Criteria

This packet can also be found on our website @
www.blogs.egusd.net/franklin
Click on Academic & Social Programs

Completed project is due in regular classroom on:

Wednesday, March 1, 2017

The Science Fair will be held on Thursday, March 2, 2017, in the Multi-Purpose Room at Franklin Elementary. Public viewing of all projects is scheduled for:
Thursday, March 2, 2017
From 6:00 to 7:00 PM

If you have any questions call or email your teacher or Mr. Bradley (mbradley@egusd.net)

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(cut out and return to your teacher)

I have reviewed the Science Fair Packet with ______________________________________
(Student's Name)

and he/she understands that the project ***needs to be completed by Tuesday, 2/28/2017, and brought to school the next day.***

Parent/Guardian Signature ____

Elk Grove Unified School District

Science Fair
&
Invention Convention
Rules and Regulations 2017

1. All K-12 exhibits can be class, group, or individual projects that demonstrate student work. A "group" is defined as involving two or more students in the same grade level.

2. The exhibition of human or vertebrate animal parts is prohibited except: hair, nails, histological (tissue) sections, and hermetically sealed liquid tissue slides that are properly acquired.

3. Any display element that could be hazardous to the public is strictly prohibited (i.e. drugs, caustic or flammable chemicals, microbial or fungal cultures, live insects, sharp objects, exposed hardware, exposed or frayed wiring which carries current, etc.). This includes displays or descriptions of the use of any type of weapon or explosive device.

4. In order to ensure the health and safety of all involved, any project utilizing human or animal subjects must be free from any potential physical and/or psychological risk. Entrant must be able to furnish a statement to that effect, endorsed by site authorities.

5. Exhibit must not be larger than 76cm deep (2 ½ feet front-to-back) by 122cm wide (4 feet side-to-side) by 274cm high (9 feet top-to-bottom).

6. Gas or running water will not be provided for exhibits at the fair. Limited electricity is available.

7. Entries in the Science Fair and the Invention Convention will be judged using separate criteria. Please create displays and projects that meet all criteria requirements.

8. A student may create two different projects and attempt to enter the Science Fair competition and the Invention Convention.

9. Have fun with the project!

Selecting a Topic

The most important part of any science fair project is determining what the project will be about. When you select a topic, start with an observation.

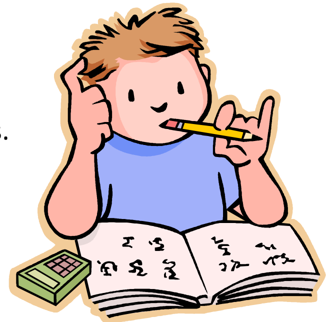
Look Around You….

What interests you?
What do you want to know more about?

A Good Topic Is….

1. Realistic
2. Can be accomplished with available resources
3. Asks a specific question that can be solved in a reasonable amount of time

Take Some Time….



Take several days to think about your topics.
Go to a library and look through some science books. Look online.
Talk to people around you.
Look around your house.

Write down each topic that you are interested in. Think of what you want to know about the topics. Write the questions down.

Example Topic: Using Recycled Materials to Grow Seeds
Example Question: Will bean seeds grow in recycled materials?

The Purpose of Your Project

Now that you have chosen a topic, think about the purpose of your project. What is it you want to accomplish?

State the purpose clearly. You can start this way:

"The purpose of this project is…."

Example of a Purpose: The purpose of this project is to determine whether bean seeds can germinate in recycled materials.

Write the purpose of your project here:

____

____

____

____

____

Library/Internet Research

No matter what the topic or purpose of your science fair project, the next step should be library or internet research. Find out what you can about the topic that you have chosen. Look for information that will help you to design your investigation.

Keep a record of the information you read.

Use a separate piece of paper or note card for each different book, magazine, or internet site that you research. Each place you find information is called a **source**. For books, write down the name of the source, its author, its publisher, and when it was published. For internet sites, write down the name of the site.

When you put your final project together you will list the sources that you used. This list of sources is called a **bibliography**.

The correct forms for listing sources in a bibliography are:

Book:
Author's last name, first name. *Book title*. Additional information. City of publication: Publishing company, publication date.

Internet Site:
Author's last name, first name (if available). "Title of work within a project or database." *Title of site, project, or database*. Editor (if available). Electronic publication information (Date of publication or of the latest update, and name of any sponsoring institution or organization). Date of access and <full URL>.

For more sources visit: http://www.mla.org/style_faq.

Hypothesis

Now that you have completed your background research, you are ready to write a hypothesis. A **hypothesis** is a scientific word for "an educated guess."

Your hypothesis is what you think the answer to your question will be. It usually includes your prediction about what will happen during your investigation.

A good hypothesis is…

- Based on the information you gathered in research
- Clear and brief
- Testable

Example Hypothesis: Bean seeds will sprout in recycled materials that provide a moist environment.

Write your hypothesis here:

____

____

____

____

Your hypothesis should be written in the form of a statement. The statement should not start with the words, "I think" or "I hope."

Designing the Investigation

After you have written your hypothesis, the next step is to plan an investigation or experiment that will test the hypothesis.

Scientists use the terms: subjects, variables, and controls.

The subject of the experiment is what is being tested.
Example Subject: The subject is the bean seed.

The variable is the condition that is changed.
Example Variable: The recycled materials are the variables.

The controls are the conditions that are not changed. All the factors other than the variable need to be the same for each subject. If factors in your experiment change, it will be impossible to determine whether your variable or some other factor caused the results.
Example Controls: Only the growing material is changed.

What is the subject of your investigation?

____

What is the variable that you are testing?

____

What factors are controls?

____

____

Procedure

The procedure should be a step-by-step list that anyone could follow to duplicate your experiment. Descriptions of the steps should be concise and complete.

You are writing a recipe for your science experiment. Don't leave any steps out or the experiment might not be complete.

Here are three important considerations:

Sample Size

You cannot do an experiment once on only one subject and prove a hypothesis. When dealing with live specimens, a larger sample size is important. (For example: if you're dealing with seeds, start with at least 50 since some will not germinate)

Number of Trials

Perform a sufficient number of trials, or tests, to make your results more certain. No conclusive evidence can be inferred based on too few trials.

Control Group

If you are changing one variable to test its effect on your subject, you will need to have a control group. A group that is identical to your experimental group except for the variable. The differences between the control group and the experimental group will show the effect of the variable.

Example Control: The control group will be beans planted in potting soil with no recycled materials.

Materials

Now that you have a precise procedure, you will need to prepare a complete materials inventory. This list must include everything that you will use. Tell the size, quantity, kind, and/or temperature of all items.

If there is anything that you are using that you cannot describe verbally, illustrate it by including diagrams or photographs.

If you build your own equipment, include instructions.

Sample of Poor Materials List:

1. **Bean seeds**
2. **Milk cartons, tops cut off**
3. **Gravel**
4. **Soil**
5. **Plastic Wrap**
6. **Cardboard**
7. **Newspaper**
8. **Styrofoam**
9. **Water**

Sample of a Good Materials List:

1. **40 half pint milk cartons (with folded tops cut off)**
2. **Gravel**
3. **Potting soil**
4. **A cardboard box cut into Small pieces**
5. **Styrofoam pellets**
6. **Black and white newspaper Shredded into strips**
7. **80 bean seeds of the same variety**
8. **Surface near a sunny window**
9. **Water supply**
10. **Plastic wrap**
11. **Measuring cups and spoons**
12. **Nail for poking holes in milk cartons**

Sample Procedure

1. Prepare 40 milk cartons for planting:
   Cut off the tops of all cartons
   Rinse them thoroughly
   Punch seven holes in the bottom for drainage
   Put in one scoop of gravel

2. Fill ten milk cartons by layering ½ cup of shredded newspaper with ½ cup of potting soil in each one.

3. Fill ten milk cartons by layering ½ cups of Styrofoam pellets with ½ cup of potting soil in each one.

4. Fill ten milk cartons by layering ½ cup of cut-up cardboard with ½ cup of potting soil in each one.

5. Fill ten milk cartons with 1 cup of potting soil in each one.

6. Plant two bean seeds ½ inch deep in each milk carton. (The bean seeds should be the same variety.)

7. Place milk cartons in a tray near a window.

8. For a greenhouse effect, make a tent over all the cartons using clear plastic.

9. Water each carton daily. Use one tablespoon of water for each.

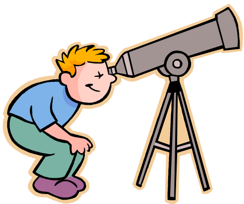
10. Observe and write a daily report on observations for ten days.

Create a Log Sheet

Precise record keeping is essential for accurate results. Before you begin your investigation, create a log sheet for each test you will perform. If you have a control, create a log sheet for it also.

Your form should include a place for:

- Date and time of entries
- Measurements and observations
- Notes and comments



Here are some sample log pages:

(Log sheet to record liquid absorbed)

Date	Time	Liquid Absorbed Group A	Liquid Absorbed Group B	Comments
1/27	5:30 pm	5 inches	5 ½ inches	Noticed a hole in container
1/28	5:30 pm	5 ¼ inches	5 ¾ inches	None

(Log sheet to record temperature over a 10 minute period)

Sample #1 Change in Temperature (in ˚F)									
1min 90˚	2min 91˚	3min 93˚	4min 94˚	5min 95˚	6min 95˚	7min 96˚	8min 97˚	9min 97˚	10min 98˚

Doing Your Experiment

Gathering Data:

1. Follow the procedure that you have written
2. Be accurate in your measurements and careful in recording the results. At the time you make each observation, record your data in writing on your log sheet. Photographs can be helpful.
3. If you find it necessary to change your procedure, note the changes and tell why they were made.
4. Sometimes the measurements will remain the same and your comment may be "Nothing Happened." That is still a result.

(Sample Log Sheet from a Bean Seed Project)

Sample #3 Newspaper/Soil			
Day	Seed A	Seed B	Comments
1	_	_	Seed still under ground
2	_	_	_
3	Sprout 1cm	_	Tiny sprout pops out of seed A
4	3cm	Sprout 1cm	Tiny sprout pops out of seed B

Organizing Your Data

When your experiment is completed, you are left with your written observations. This is your raw data. You need to organize this data so that you can figure out what it means. An organized summary of your data tells others what happened during the course of your experiment. Scientists call these summaries, **results**.

An effective way to present your raw data is to create bar or line graphs which show the differences between your variable and control groups. You will want to average the trials on a specific test before you begin graphing.

At the bottom of each data table or graph, write a brief explanation of what the facts and numbers show. Title each graph or chart and label it clearly.

When you have completed your graphs, write a summary of your observations and measurements. This short statement should clearly and simply explain what you observed.

Example Results:

The growing records show:

- 17 bean seeds planted in the shredded newspaper/soil mixture sprouted and grew. On Day 10 the average height of these seedlings was 10 cm.
- 15 bean seeds planted in the Styrofoam pellet/soil mixture sprouted and grew. On Day 10 the average height of theses seedlings was 12 cm.
- 16 bean seeds planted in the cardboard/soil mixture sprouted and grew. On Day 10 the average height of these seedlings was 9 cm.
- 14 bean seeds planted in the soil mixtures sprouted and grew. On Day 10 the average height of these seedlings was 12 cm.

The Conclusion

You have done your experiment and organized your results. Your results reported what happened in your investigation. The **conclusion** is your analysis of these results.

Tell what you learned from the trials and the testing. Compare the results with your original hypothesis. The result may establish your theory to be true or false. It is also possible that the results will be inconclusive. The data may not be strong enough to prove or disprove your hypothesis.

Look for patterns. Closely look at your graphs and tables to see if a trend clearly emerges. Then write about any trends that you see.

End your conclusion with a discussion of any practical value that your experiment might have.

Example Conclusion:

The bean seeds planted grew! Out of 80 seeds, 62 sprouted. It is clear that bean seeds can grow in mixtures of soil and newspaper, soil and styrofoam, and soil and cardboard. In fact, each of the experimental groups produced more bean sprouts than the control group where just potting soil was used!

In all but 2 milk cartons, at least one bean seed sprouted. Seedlings sprouted in the styrofoam/soil and in the potting soil had the largest average height. However, the height difference from largest to smallest is just 3cm. All seedlings have long stems. The depth of the growing material may not be deep enough.

If growers can mix shredded paper and styrofoam with soil for planting, there will be less paper and styrofoam to put in landfills. This investigation should be continued to include testing of more recycled materials and on extended growing period to see if the beans mature normally in the soil mixtures.

Display Boards

- For almost every science fair project, you need to prepare a **display board** to communicate your work to others. In most cases you will use a standard, three-panel display board that unfolds to be 36" tall by 48" wide.

- **Organize your information like a newspaper** so that your audience can quickly follow the thread of your experiment by reading from top to bottom, then left to right. Include each step of your science fair project: Abstract, question, hypothesis, variables, background research, and so on.

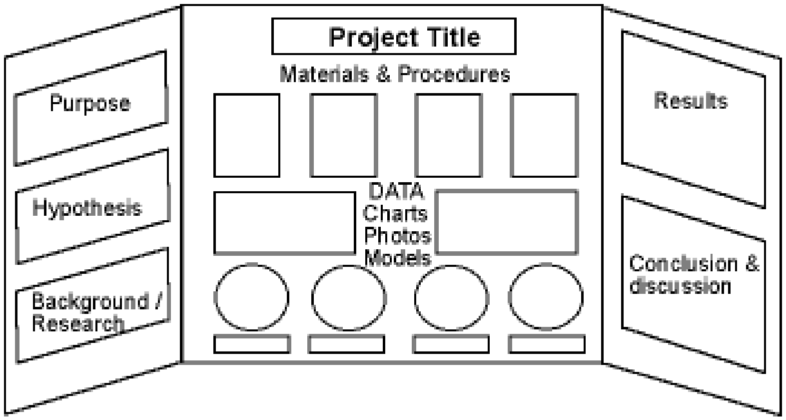
- **Use a font size of at least 16 points** for the text on your display board, so that it is easy to read from a few feet away. It's OK to use slightly smaller fonts for captions on picture and tables.

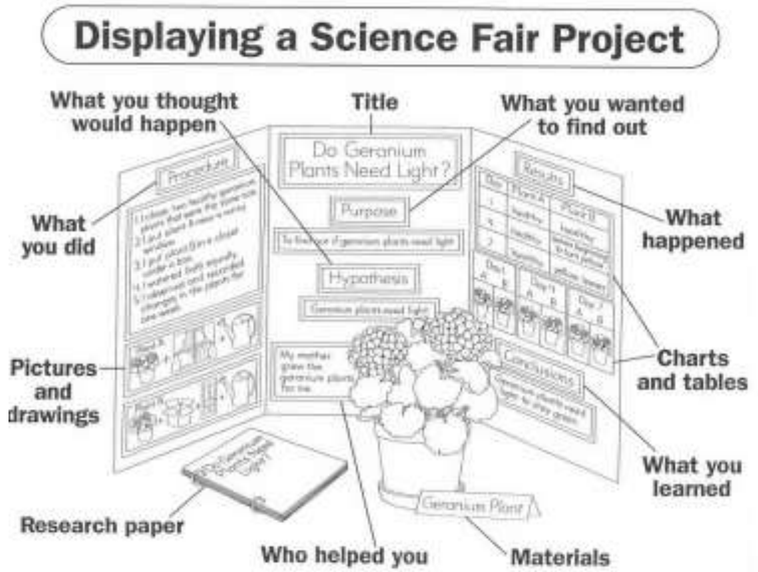
- **The title should be big and easily read from across the room**. Choose one that accurately describes your work, but also grabs peoples' attention.

- **A picture speaks a thousand words!** Use photos or draw diagrams to present non-numerical data, to propose models that explain your results, or just to show your experimental setup. But, don't put text on top of photographs or images. It can be very difficult to read.

- **Check the rules for your science fair.** Here is a list of items that some science fairs allow (or even require) and some science fairs don't require (or even prohibit):
    - Your name on the display board
    - Pictures of yourself
    - Captions that include the source for every picture or image
    - Acknowledgements of people who helped you
    - Equipment such as your laboratory apparatus or your invention

Examples





Review

Ask a Question: The scientific method starts when you ask a question about something that you observe: How, What, When, Who, Which, Why, or Where? And, in order for the scientific method to answer the question it must be about something that you can measure, preferably with a number.

Do Background Research: Rather than starting from scratch in putting together a plan for answering your question, you want to be a savvy scientist using library and Internet research to help you find the best way to do things and insure that you don't repeat mistakes from the past.

Construct a Hypothesis: A hypothesis is an educated guess about how things work:
"If ______*[I do this]*______, then ______*[this]*______ will happen."
You must state your hypothesis in a way that you can easily measure, and of course, your hypothesis should be constructed in a way to help you answer your original question.

Test Your Hypothesis by Doing an Experiment: Your experiment tests whether your hypothesis is true or false. It is important for your experiment to be a fair test. You conduct a fair test by making sure that you change only one factor at a time while keeping all other conditions the same.
You should also repeat your experiments several times to make sure that the first results weren't just an accident.

Analyze Your Data and Draw a Conclusion: Once your experiment is complete, you collect your measurements and analyze them to see if your hypothesis is true or false.
Scientists often find that their hypothesis was false, and in such cases they will construct a new hypothesis starting the entire process of the scientific method over again. Even if they find that their hypothesis was true, they may want to test it again in a new way.

Communicate Your Results: To complete your science fair project you will communicate your results to others in a final report and/or a display board. Professional scientists do almost exactly the same thing by publishing their final report in a scientific journal or by presenting their results on a poster at a scientific meeting.

Project Ideas

1. Do different types of apples have the same number of seeds?
2. Do different types of soil hold different amounts of water?
3. Will adding bleach to the water of a plant reduce growth?
4. Does water with salt boil faster than plain water?
5. How far can a person lean without falling?
6. Can you tell time without a watch or clock?
7. How far can a water balloon be tossed to someone before it breaks?
8. Does the shape of a kite affect its flight?
9. How long will it take a drop of food dye to color a glass of still water?
10. Does sugar prolong the life of cut flowers?
11. How much of an orange is water?
12. Which liquid has the highest viscosity?
13. Will more air inside a basketball make it bounce higher?
14. Does the color of light affect plant growth?
15. Does baking soda lower the temperature of water?
16. Which brand of popcorn pops the most kernels?
17. Which brand of popcorn pops the fastest?
18. What kind of juice cleans pennies best?
19. Do roots of a plant always grow downward?
20. Do plants grow bigger in soil or water?
21. Does the color of water affect its evaporation?
22. Can you separate salt from water by freezing?
23. How does omitting an ingredient affect the taste of a cookie?
24. Do suction cups stick equally well to different surfaces?
25. Which student in class has the greatest lung capacity?
26. How much weight can a growing plant lift?
27. Will water with salt evaporate faster than water without?
28. Does it matter in which direction seeds are planted?
29. Can the design of a paper airplane make it fly farther?
30. Do all colors fade at the same rate?

31. Which brand of diaper holds the most water?
32. In my class, who has the smallest hands – boys or girls?
33. Which kind of cleaner removes ink stains best?
34. Does a plant grow bigger if watered by milk or water?
35. Which brand of soap makes the most suds?
36. Does a baseball go farther when hit by a wood or metal bat?
37. Do living plants give off moisture?
38. Using a lever, can one student tilt another student who is bigger?
39. What gets warmer – sand or dirt?
40. Which kind of glue holds two boards together better?
41. What type of line carries sound the best?
42. Can the sun's energy be used to clean water?
43. Does a green plant add oxygen to its environment?
44. Which metal conducts heat best?
45. What percentage of corn seeds in a package will germinate?
46. Which materials absorb the most water?
47. Does the human tongue have definite areas for certain tastes?
48. Can same type balloons withstand the same amount of pressure?
49. Does the viscosity of a liquid affect the boiling point?
50. What color of birdseed do birds like best?
51. Does temperature affect the growth of plants?
52. Can you use a strand of human hair to measure air moisture?
53. What materials provide the best insulation?
54. Is using two eyes to judge distance more accurate than using one eye?
55. Do all objects fall to the ground at the same speed?
56. What plant foods contain starch?
57. What keeps things colder – plastic wrap or aluminum foil?
58. Does heart rate increase with increased sound volume?
59. Do boys or girls have a higher resting heart rate?
60. Do liquids cool as they evaporate?
61. Which way does the wind blow most frequently?
62. Does the size of a light bulb affect its energy use?
63. For how long a distance can speech be transmitted through a tube?
64. Do bigger seeds produce bigger plants?
65. What type of soil filters water best?
66. Does the color of a material affect its absorption of heat?
67. Does sound travel best through solids, liquids, or gases?
68. Do sugar crystals grow faster in tap water or distilled water?
69. How much of an apple is water?
70. What common liquids are acid, base, or neutral?
71. Do taller people run faster than shorter people?
72. Does the length of a vibrating object affect sound?
73. Who can balance better on the balls of their feet – boys or girls?
74. Does exercise affect heart rate?
75. Which dish soap makes the longest lasting suds?
76. What are the effects of chlorine on plant growth?
77. Which type of oil has the greatest density?
78. How accurately do people judge temperature?

You can find more ideas on the internet:

http://www.sciencebuddies.org/

http://www.all-science-fair-projects.com/

http://school.discoveryeducation.com/sciencefaircentral/index.html

http://www.sciencefairadventure.com/