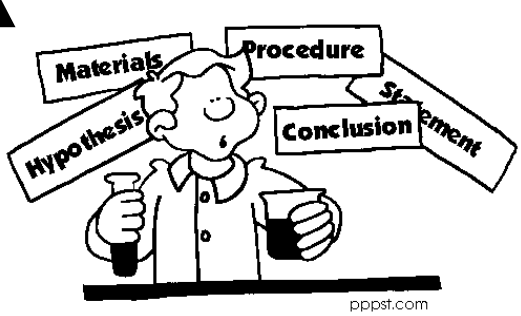
MY SCIENCE FAIR BOOK



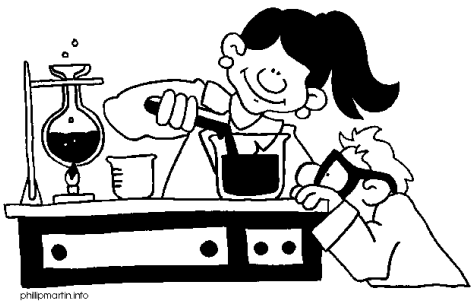
NAME : _____

Dear Parents and Students,

We are proud and excited to announce that you will be participating in the 4th annual McKinley 4th Grade Science Fair on **(4-4-19).** This invaluable experience will help you learn important skills such as problem solving and research that will not only help you succeed on the Science PSSA's, but throughout your life.

You will learn and apply the scientific method to complete the project. The process will begin by teachers introducing the project in class as well as explaining and practicing the scientific method. Next, students will use this booklet to help guide them through the steps necessary to complete the project. Please pay close attention to the due dates for each of the sheets. (See the **due date page** in this booklet) The dates are listed on the following sheet, as well as at the top of each specific record sheet. Then, students will display the sheets and results on a trifold display board. **(Parents can request an electronic copy of the book to type and print pages for neatness and presentation- see next page)** Finally, the students will present their projects in class and during the science fair night. We know that the students will not only gain important knowledge, but have fun in the process! We appreciate your support and efforts!

If you have any questions, please let us know.



Thanks,

The Fourth Grade Teachers

☐ I have received the information about the science fair scheduled for:

April 4, 2019 from 4:30-5:30 p.m.

I will help support my child in turning in the required pages on the due dates. (See next page).

X _____

☐ I would like an electronic copy of the booklet so that I can have my child edit and print the documents.

Please email it to me at:

_____

(Please print neatly)

DUE DATES

Topic Approval & Question Sheet: 1-4-19

Research Sheet: 1-25-19

Hypothesis Sheet: 2-1-19

Experiment (Data): 3-1-19

Results /Conclusion Sheet: 3-15-19

Completed Display Boards* Due: 3-29-19

* Be prepared to present your display board to the class.

The Scientific Method

The Scientific Method is an organized way of figuring something out. There are usually six parts to it:

1. **Purpose/Question** - What do you want to learn?
    - *Ex.* "Does salt water or fresh water freeze faster?"
2. **Research** - Find out as much as you can in order to make a prediction. Look for information in books, on the internet, and by talking with experts to get the most information you can before you start experimenting.
    - *Ex.* Research how solutions like salt water affect the freezing point.
3. **Hypothesis** - After doing your research, try to predict the answer to the problem. Another term for hypothesis is an "educated guess". This is usually stated like " If I...(do something) then...(this will occur)"
    - *Ex.* If I freeze the same amount of salt water and fresh water at the same temperature, then the fresh water will freeze faster.
4. **Experiment** - The fun part! Design a test or procedure to find out if your hypothesis is correct. Record the steps or procedures you use in the proper order, and with specific details.
    - *Ex.* Fill 2 of the same exact containers with the same amount of salt and fresh water. Place both containers in the same location of the freezer and time how long it takes each to completely freeze.

(continued on next page)

A few other terms you may need to know to complete your experiment:

- ✓ **Independent Variable**
  This is the part of your experiment that you will test (vary) to answer your hypothesis. For example, if you were testing to see how different color bulbs affect grass seed growth, the independent variable would be the different colors of the light bulbs.

- ✓ **Dependent Variable**
  This is what occurs in response to the changing independent variable. For example the Dependent Variable in the previous example is how much the grass seeds grow.

- ✓ **Control**
  The control should be the part of the experiment where you do not include the Independent Variable. In the previous example, the grass seed that is growing under the white (uncolored) bulb would be your control. The control lets you compare your results in the experiment.

5. **Analysis** - Record what happened during the experiment. Also known as "data".

   - Ex. The fresh water is beginning to freeze at the 2 hour mark. The salt water is still only beginning to solidify.

6. **Conclusion** - Review the data and check to see if your hypothesis was correct. Remember: It is not "bad" if your hypothesis was wrong, because you still discovered something!

   - Ex. After 4 hours, the fresh water is completely frozen and the salt water is only about 2/3 frozen.

Finally, publish or display your results for all to see. Be proud of your hard work!

Choosing a Research Question

Choose a question to research. Remember the following when considering a question / topic:

- ❑ The topic should interest you.
- ❑ You should **not** know the answer to the question prior to researching it.
- ❑ It should be easy to obtain the necessary supplies and/or materials to complete the project.
- ❑ It should be a safe and age-appropriate project.
- ❑ It should be easy enough to complete on your own or with minimal assistance.

The following page lists examples of research questions. The links below may help you find more topics.

Science Buddies: Browse by science topic or take a quick survey to get project suggestions! http://www.sciencebuddies.org/science-fair-projects/project_ideas.shtml

Discovery Education – Science Fair Central: Choose a topic you're interested in to get suggested research questions. http://school.discoveryeducation.com/sciencefaircentral/Getting-Started/idea-finder.html

Education.com – Science Fair Projects: Specific project ideas. You can narrow your search by grade and subject to help you find an idea you like. http://www.education.com/science-fair/

Here are some project ideas to get you started. If you don't like any of these, they may inspire you to come up with one of your own. Remember, check all project ideas with your teacher and parents, and don't do any project that would hurt or scare people or animals. Good luck!

- Which paper towel brand is the strongest? (Or most absorbent?)
- What is the best way to keep an ice cube from melting?
- Which brand of microwave popcorn leaves the fewest unpopped kernels?
- What is the best way to keep cut flowers fresh the longest?
- Does the color of light used on plants affect how well they grow?
- Which plant fertilizer works best?
- Which brand of battery lasts the longest?
- Does the type of potting soil used in planting affect how fast plants grow?
- What type of foods allow mold to grow the fastest?
- Does having worms in soil help plants grow faster?
- Can plants grow in pots if they are sideways or upside down?
- Does the color of hair affect how much static electricity it can carry?
- How much weight can the surface tension of water hold?
- What light brightness makes plants grow the best?
- Does the color of birdseed affect how much birds will eat?
- How does smell affect taste?
- What brands of bubble gum produce the biggest bubbles?
- Does drinking soda stain your teeth? (Or coffee? Or tea? Or juice?)

Don't see one you like? Look over them again and see if they give you an idea of your own, or use the links on the previous page to search for more projects. Remember: find something fun that interests you!

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QUESTION

Due Date: **1-4-19**

My question that I will research is: _____

_____

_____

_____

I chose this topic / question because: _____

_____

_____

_____

Parent Approval: _____

Teacher Approval: _____

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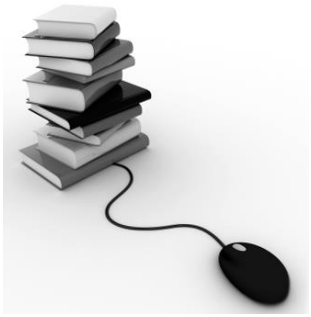
RESEARCH



Due Date: **1-25-19**

A hypothesis is an *educated guess* about what will happen during your experiment. What are some topics or subjects you need to learn more about in order to make your hypothesis?

1. _____
2. _____
3. _____
4. _____

Use books, an encyclopedia, or the Internet to find information about these topics. Record important information on the next page(s). Remember to use the **ABC**s to take good notes!

A = **Abbreviations**. You can shorten words to save time and space!

B = **Bullet Points**. Use one bullet point for each fact to keep your information organized.

C = **Caveman Language**. Think like a caveman! Try to put facts into your own words, and <u>don't</u> use complete sentences.

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RESEARCH

Due Date: **1-18-19**

What information can you find about your topic to help you come up with your hypothesis?

Notes:

More Notes:

Parent Approval: _____

Teacher Approval: _____

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RESEARCH

Due Date: **1-18-19**

BIBLIOGRAPHY: Where did you find your information? What sources did you use to do your research?

BOOK:

_____, _____.

Author's Last Name Author's First Name

_____. _____.

Title of Book © Year

WORLD BOOK ONLINE (ENCYCLOPEDIA):

"_____."

Title of Article.

_____.

Name of Encyclopedia.

WORLD BOOK ONLINE (ENCYCLOPEDIA):

"_____."

Title of Article.

_____.

Name of Encyclopedia.

INTERNET SITE:

"_____."

Title of Web page.

<http://_____>.

Web Address (or URL – first part only)

INTERNET SITE:

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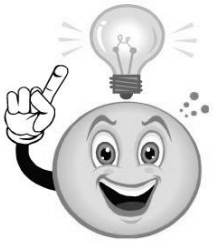
HYPOTHESIS

Due Date: **2-1-19**



Hypothesis Statement: _____

_____

_____

_____

I chose this hypothesis because: _____

_____

_____

_____

Parent Approval: _____

Teacher Approval: _____

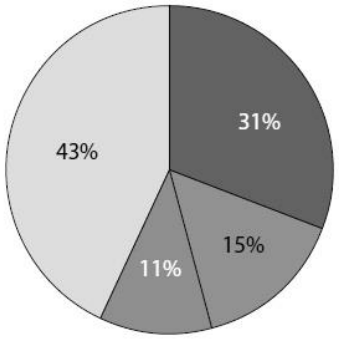
It is now time to test your hypothesis and collect data! A few tips:

1. **Keep a science journal.** In your journal you can record observations, collect research, draw and diagram pictures and jot down any additional questions you might have for later. This is especially useful if your experiment takes place over a long period of time. We suggest you keep a science journal if you experiment will last a week or more.
2. **Have the right tools to do the job.** Make sure you have the items you need to take accurate measurements, such as: rulers, meter tapes, thermometers, graduated cylinders or measuring cups to measure volume. The recommended standard of measurement in science is metric so you should keep your measurements in meters, liters, degrees Celsius, grams, etc.
3. **Use tables, charts and diagrams to keep track of your experiment.** A table is organized in columns and rows and ALWAYS has labels or headings telling what the columns or rows mean. You will probably need a row for every time you did the experiment and a column telling what the independent variable was (what you tested) and the responding variable (the result that happened because of the independent variable).
4. **Be accurate and neat!** When you are making your tables and charts please make sure to write neatly and record your data in the correct column or row. Most of all, be sure to record your data as soon as you collect it **SO YOU DON'T FORGET WHAT HAPPENED!!** Sometimes an experiment might be hard to explain with just a table, so if you have to draw and label a diagram (or picture) to explain what happened, it is recommended that you do.

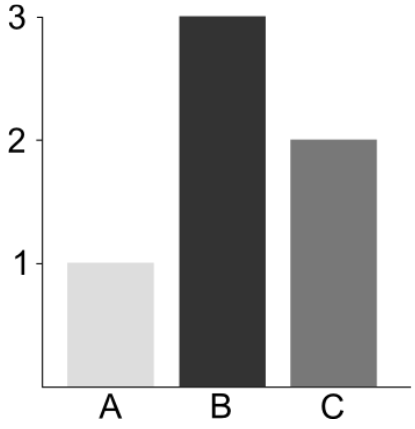
(continued on next page)

5. **Use the right graph for your experiment**. There are all types of graph designs, but these seem to be easy to use for science fair experiments. Make sure you choose the best graph to display your data!

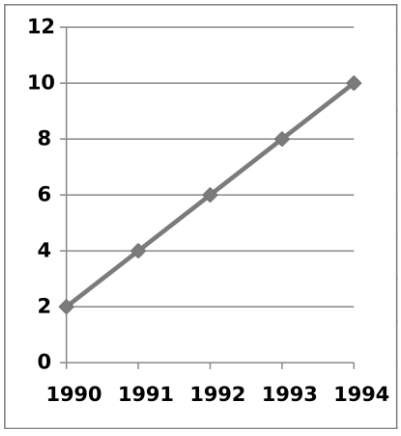
   - **Pie charts** are good to use if you are showing percentages of groups. Remember that you can't have more than 100% and all the pieces need to add up to 100%. This type of graph is great if you are doing surveys.



   - **Bar graphs** are good to use if you are comparing amounts of things because the bars show those amounts in an easy-to-read way. This allows viewers to see your results at a glance. Usually the bars go up and down. The x axis (or horizontal axis) is where you label what is being measured, (like plant A, B, C and D) and the y axis (or vertical axis) is labeled to show the unit being measured (such as how many centimeters the plant grew).



   - **Line graphs** are good to use if you are showing how changes in your experiment occurred over time. For example, you would use the x axis to show measures of time (minutes, hours, days, weeks) and the Y axis to show what you were measuring at that point in time.



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EXPERIMENT

Due Date: **3-1-19**

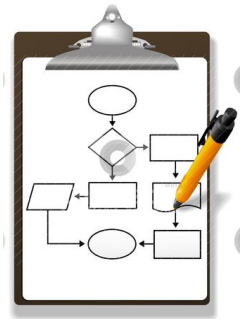
Materials I used for my experiment:

_____

_____

_____

_____



_____

___

Steps I used to test my hypothesis:

1. _____

_____

2. _____

_____

3. _____

_____

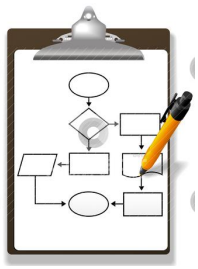
_____

_____

_____

_____

EXPERIMENT



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Due Date: **3-1-19**

Steps (continued)

4. _____

_____

5. _____

_____

6. _____

_____

7. _____

_____

8. _____

_____

Parent Approval: _____

Teacher Approval: _____

EXPERIMENT

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Important DATE!

Due Date: **3-1-19**

On the next several pages, you will find data collection sheets that you can use to record and display your data. You can also

make your own if you would prefer! The links below may help you as well.

Graph/Chart Makers:

http://nces.ed.gov/nceskids/createagraph/default.aspx
http://www.chartgo.com/
http://www.onlinecharttool.com/

Table Maker:

http://truben.no/table/

Flow Chart Maker:

http://www.selectsmart.com/flowchart/

You can also use Microsoft Word, PowerPoint, Excel, or Google Docs to make charts and tables for your data.

EXPERIMENT LOG

DATE	TIME	OBSERVATIONS	COMMENTS

EXPERIMENT LOG

DATE	TIME	OBSERVATIONS	COMMENTS

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CONCLUSION

Due Date: **3-15-19**

My hypothesis was: ☐ CORRECT

(Check one) ☐ INCORRECT

Findings. This is what I found out and/or learned from my experiment:

_____

_____

_____

_____

_____

_____

Parent Approval: _____

Teacher Approval: _____

TIME TO DISPLAY YOUR EXPERIMENT!

Use the diagram below to put your tri-fold board display together.

Please remember that you need to practice presenting it before it is due in class on:

3-29-19

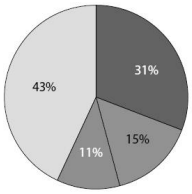
TITLE
(NOT the Question)

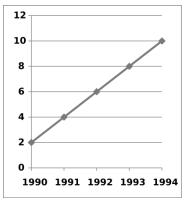
QUESTION
Which will freeze faster, hot or cold water?

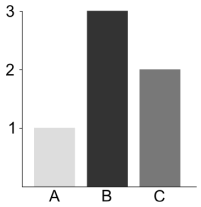
HYPOTHESIS
I think that the colder water will freeze faster because…
*Support your idea with the research you did.

EXPERIMENT
1-2 paragraphs explaining the experiment you did.
First I used 3 ice cube trays and filled them with water…

DATA
Display your data using graphs, logs, charts, and/or photographs.







RESULTS
Share the end result of your experiment.
The water in tray #2, which was 65 degrees, completely froze the fastest.

CONCLUSION
State whether or not your hypothesis was correct.
My hypothesis was incorrect because the coldest water did not freeze the fastest. The water at a medium temperature actually froze faster.