Science Fair Project Journal

Topic _____

Name _____

Teacher _____

Grade ___

_____

(Name of School)

Steps to the Scientific Method:

1. Research
2. Topic Selection
3. Question/ Purpose/ Hypothesis
4. Prediction/ Hypothesis
5. Experiment
   - Variables
   - Procedures
   - Materials
6. Data Collection/Results
7. Conclusion

Timeline for Science Fair Project

Date Due _____ Question

Date Due _____ Prediction

Date Due _____ Variables

Date Due _____ Materials

Date Due _____ Procedures

Date Due _____ Data Collection Tool

Date Due _____ Results

Date Due _____ Conclusion

Date Due _____ Research Paper

Date Due _____ Science Fair Display Checklist

Date Due _____ Display board due at school

BE A WINNER

- ✓ Meet your due dates so you can finish on time!
- ✓ If you complete something early, start on the next

The **Question** is also referred to as the **PROBLEM** or the **PURPOSE**. A good question is the key to a good science fair project. Scientists ask questions and then conduct experiments to find out the answer. Therefore, the question asked, should only be able to be answered by performing and experiment, not by looking in a book.

Be specific when writing a question. For example:

Instead of asking—How do plants grow?

Ask:
1. Does the amount of water effect how tall a plant will grow?
2. Does soaking a bean seed before it is planted effect how fast it will grow?
3. Do bean plants grow best in acid soil or alkaline soil?

Use the space below to write a rough draft of your question.

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The **HYPOTHESIS** is another name for **PREDICTION**. When you are writing the hypothesis you are trying to predict the answer to your question. Make sure your hypothesis is worded in an "if . . . then" sentence.

For Example:

Question: Does soaking a bean seed before planting it affect how fast it will grow?

Possible Hypotheses:

1. If a bean seed is soaked before planting, then it will grow faster than a seed that is not soaked.

2. If a bean seed is soaked before planting, then it will not grow faster than a seed that has not been soaked.

Write final revision of question

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Hypothesis/Prediction

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VARIABLES

Take time to identify your variables before you begin your experiment. It will help you write your procedures. A variable is something that can change or be changed. There are three kinds of variables: Independent, Dependent, and Controlled. In a well-designed experiment there should only be one thing changed on purpose, called the independent or manipulated variable.

Remember the example question: Does soaking the bean seed before planting effect how fast it will grow?

In this example, the thing I am changing on purpose is soaking the seed before planting it. Therefore, soaking the seed is the independent variable.

What I think or hope will change during the experiment is called the dependent variable.

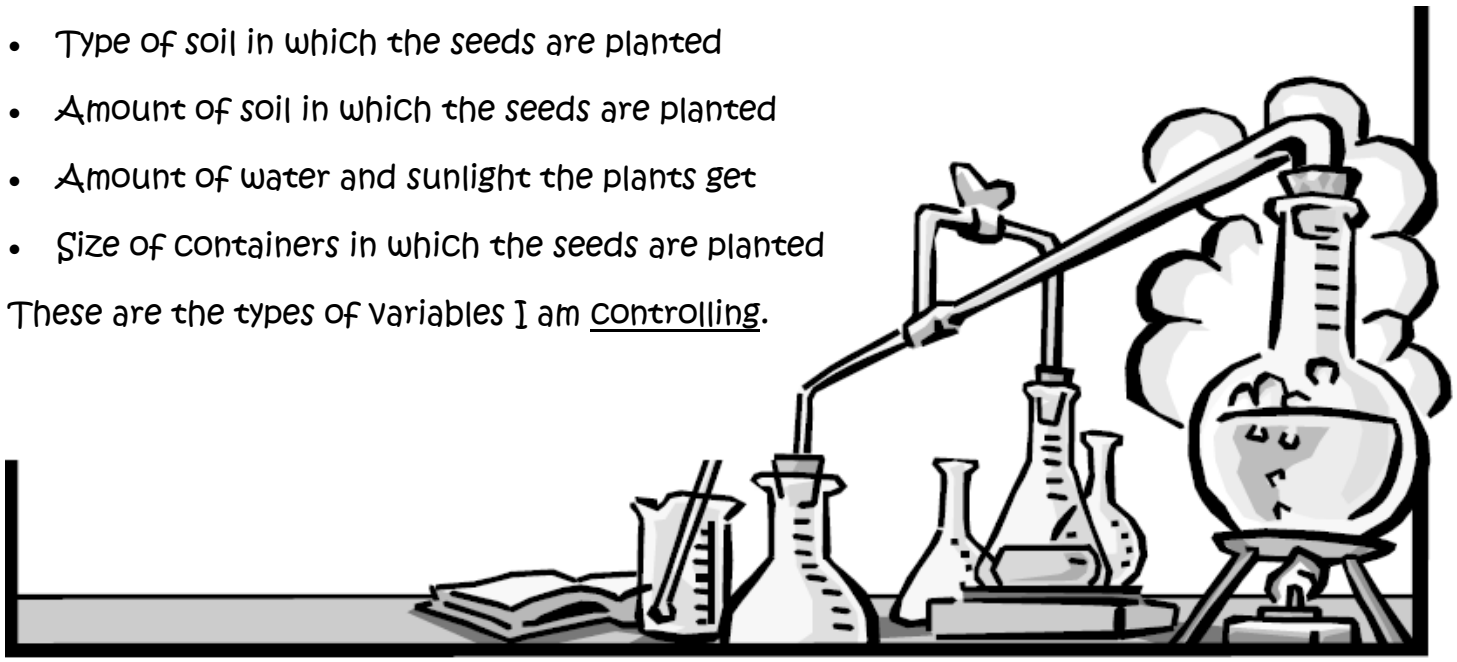
In this example, the thing I am thinking or hoping will change is how fast the plant grows. Therefore, how fast the plant grows is the dependent variable.

I must try to keep other things that might be changed the same throughout the experiment. These things that I keep the same are called controlled variables.

In this example, the things I would keep the same are:

- Type of bean
- Amount of water used to soak the beans
- Type of soil in which the seeds are planted
- Amount of soil in which the seeds are planted
- Amount of water and sunlight the plants get
- Size of containers in which the seeds are planted

These are the types of variables I am controlling.



Independent Variable - what I have changed on purpose

Dependent Variable - what I think/hope will change during my experiment

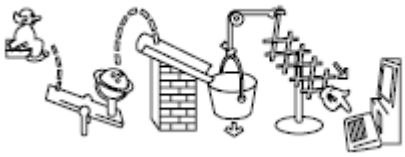
Controlled Variables - what I have kept the same

Your **MATERIALS** is a list of all the items you will need in order to conduct your experiment. As you develop your procedure, you may need to add items to your list.

Remember to:

- Be specific
- Give amounts and sizes
- Use METRIC measurements

MATERIALS



PROCEDURES are detailed step-by-step set of directions of how to conduct the experiment. Details are very important here. Be sure to tell exact amounts of things such as materials, time it will take, etc. It is important that anyone be able to follow your steps and repeat your experiment exactly how you did it. You MUST have at least **3 repeated trials** and clearly identify what you are keeping the same and what you are changing (**variables**) to ensure a **well-designed experiment.**

PROCEDURES

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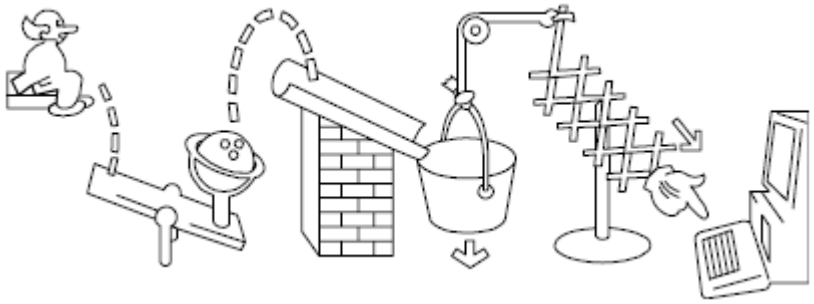


PROCEDURES CONTINUED

Use this space to make any drawings needed to help understand the procedures. Remember to label all parts and provide a title.

Data Collection

Before you start conducting your experiment, it is important that you have thought about your data collection.

- To begin you should design a **chart, table, or journal entry system** to record your information. Whenever possible you must collect NUMERICAL DATA in a chart or table because you are expected both a graph and written results for your project.
- Your chart or table should have room for **repeated trials** (no less than **three**-the more trials you complete, the more reliable your data and conclusion) and a place to find the **average** (mean) of your data.
- The data should be collected using **METRIC units** whenever possible because metric is the international measurement for scientists. Metric units include centimeters, meters (linear), grams (weight/mass), and liters (liquid volume).
- Use a **ruler to draw straight lines** when designing your chart or table. Neatness will help you keep accurate data.
- **Label** the different rows and columns of your chart or table. Include a **title**.

Use this space to make your chart or table.

Use this space for journal entries while conducting the experiment. Notes may be brief, but should be very descriptive. Always include a date for each entry.

Use this space for journal entries while conducting the experiment. Notes may be brief, but should be very descriptive. Always include a date for each entry.

You are now ready to conduct your

EXPERIMENT

To conduct the experiment you will need to

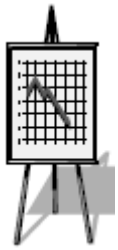
- Follow the procedures just as you wrote them
- Keep accurate records by filling out your data chart and making journal entries as you go
- Have all the materials gathered together before you begin

All RESULTS should include three parts. First it should include a data chart. An appropriate graph (line, pie, or bar) of the data collected in the chart should also be included finally a written explanation of the data is required.

Graphs

When choosing a graph be sure to use the most appropriate one.

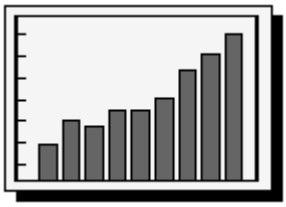
Line graphs should be used to display continuous data. Experiments that have dependent variables that involve temperature, time, mass, height, or distance will *usually* result in data that can be graphed on a line graph. On a line graph, the horizontal axis (x) is always in independent variable and the vertical axis (y) is always the dependent variable. It should also have:



- □ Numbers scale in even intervals (1's, 2's, 5's, 10's, 100's, etc.)
- □ Labels for the horizontal and vertical axes.
- □ A title that reflects the information that is being graphed.

Bar Graphs should be used to display data that is separate or distinct from other pieces of data. The data in a bar graph can be displayed either vertically or horizontally. A bar graph should include:

- □ Numbers scale in even intervals (1's, 2's, 5's, 10's, 100's, etc.)
- □ Labels for the horizontal and vertical axes.
- □ A title that reflects the information that is being graphed.

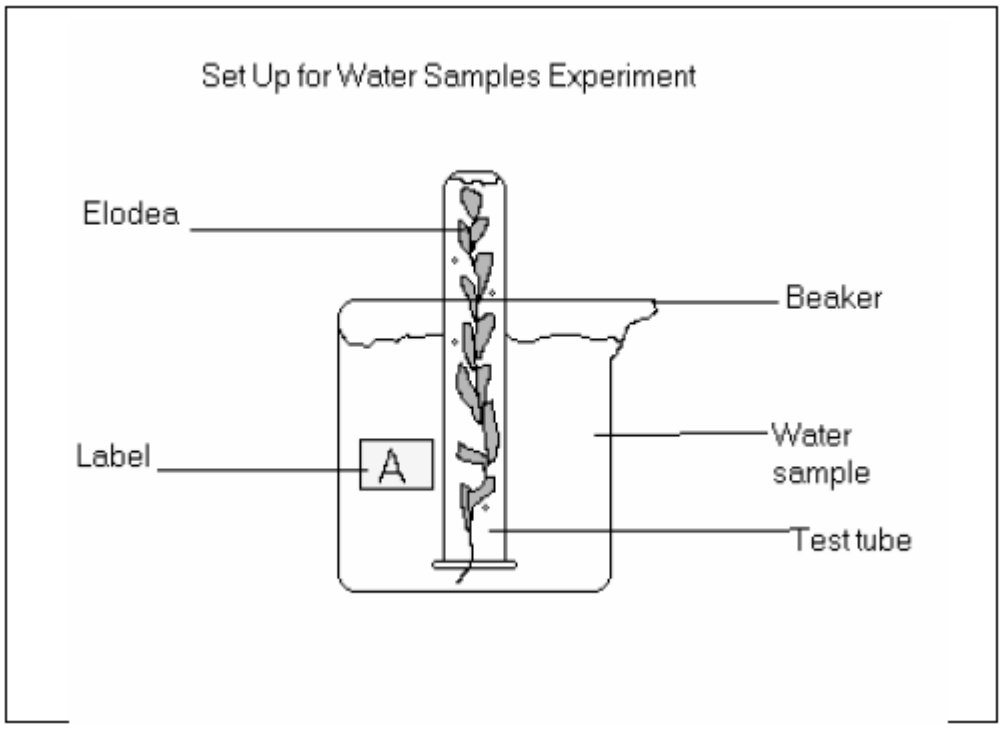


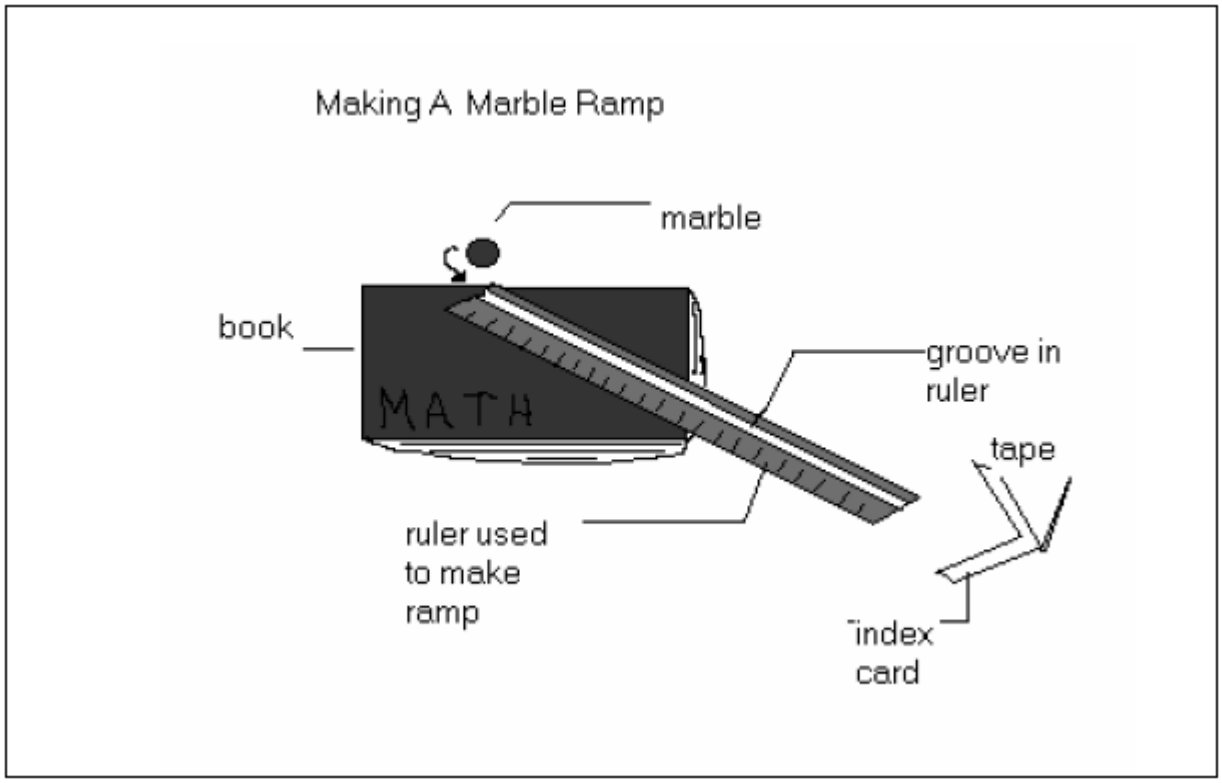
Remember to find the AVERAGE or MEAN of your DATA before graphing.

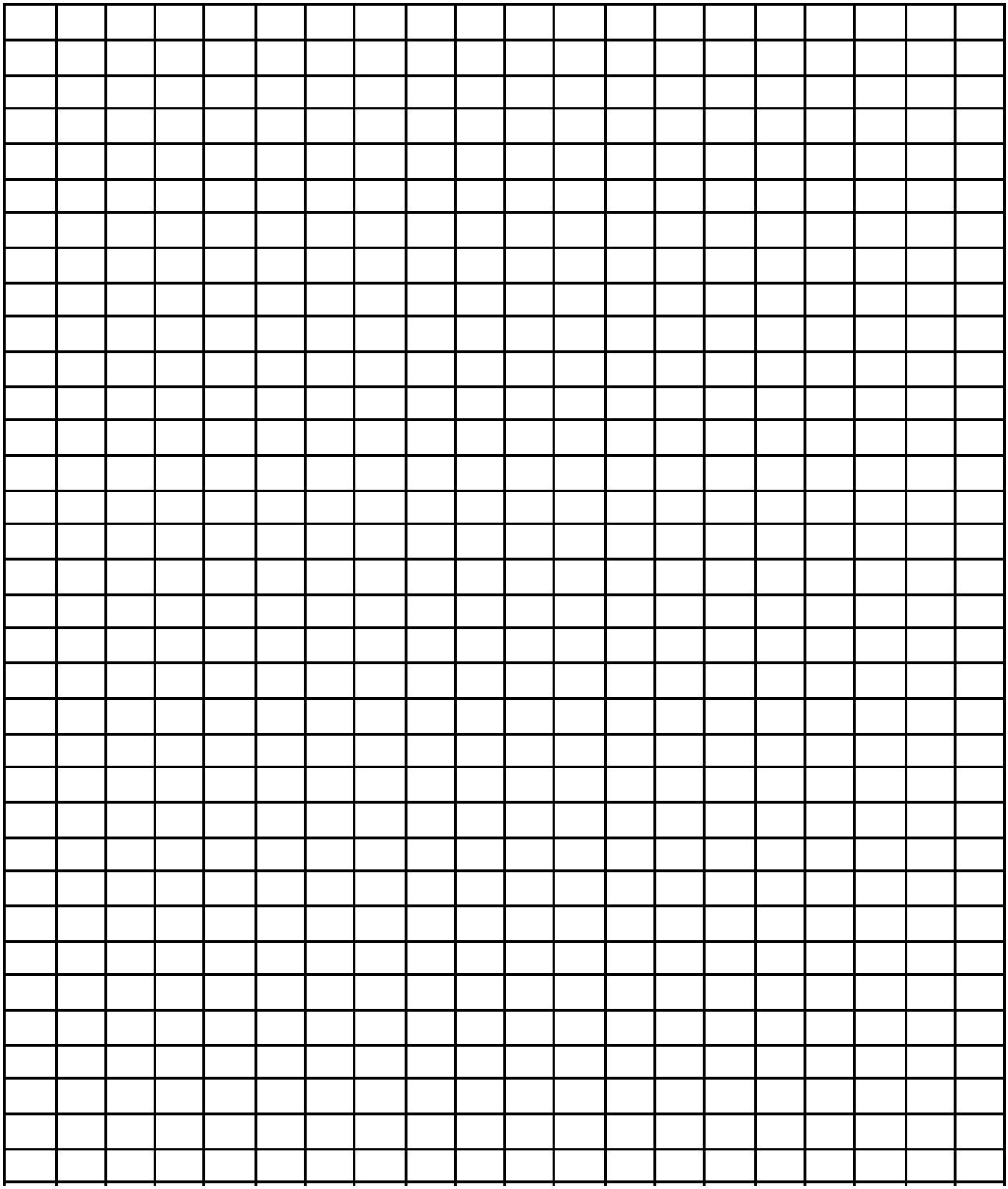
Pie Graphs should only be used when the results of the data are best shown as a percentage of a whole. The data of a pie graph should include:

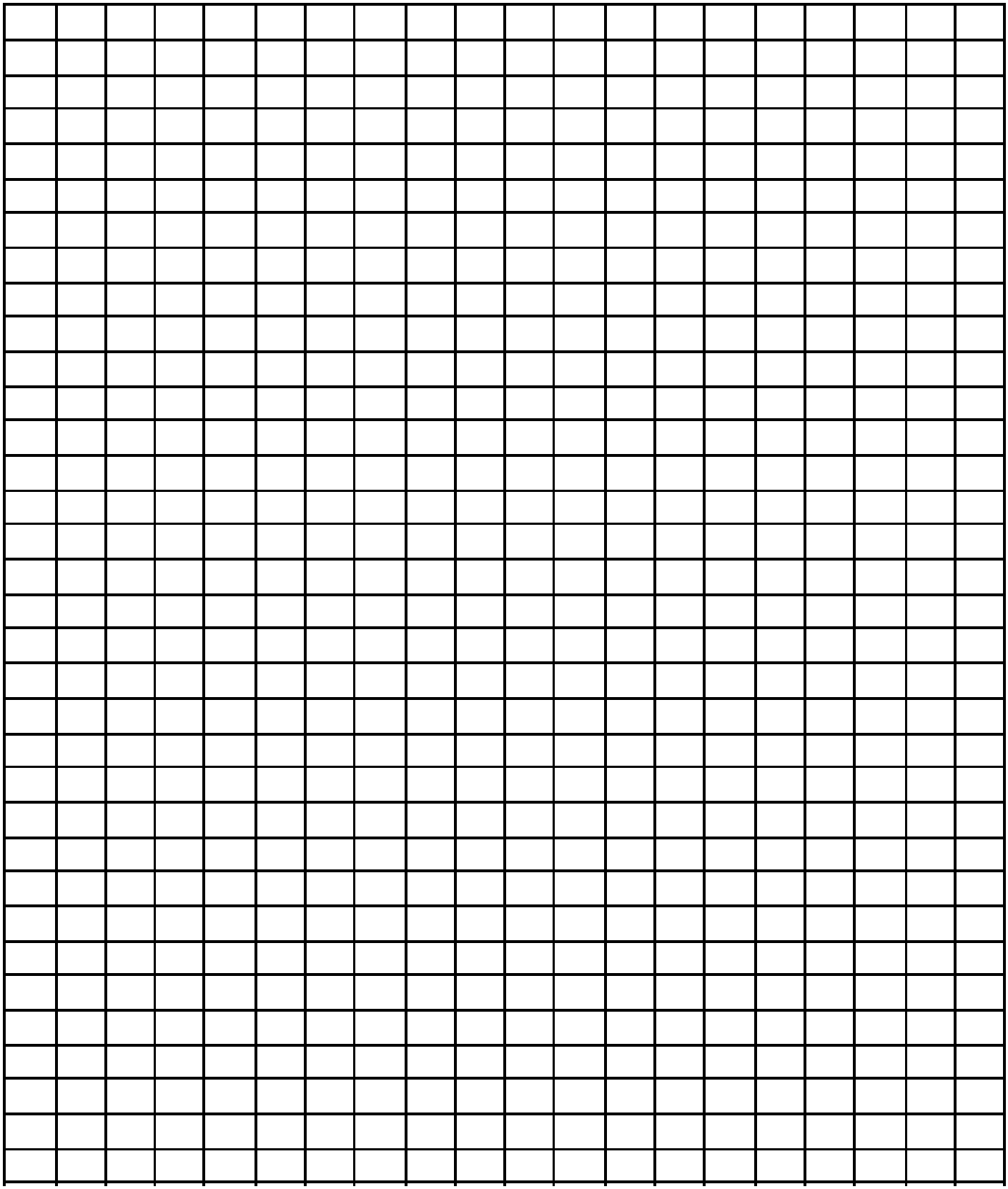
- □ A circle that is divided into the necessary number of parts
- □ Sections of the pie should be sized accurately according to the data.
- □ Each section of the pie should be color coded or labeled with a key.
- □ A title that reflects the information being graphed.

RESULTS may also include photographs and diagrams that help to display and understand the data.









A **Written Explanation** is also required and should be at least a paragraph long. The purpose of the written explanation is to explain the data displayed in the chart and graph. It can include any trends that may occur in the data.

The CONCLUSION tells what you learned about the topic by conducting the experiments. It contains many parts. Answer each of the questions below. Then join them together in paragraph form to write your conclusion.

Was my hypothesis/prediction correct or incorrect? _____

_____

_____

What is the answer to my question? Support the answer with data collected.

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Were there any problems with the investigation or things I would do different?

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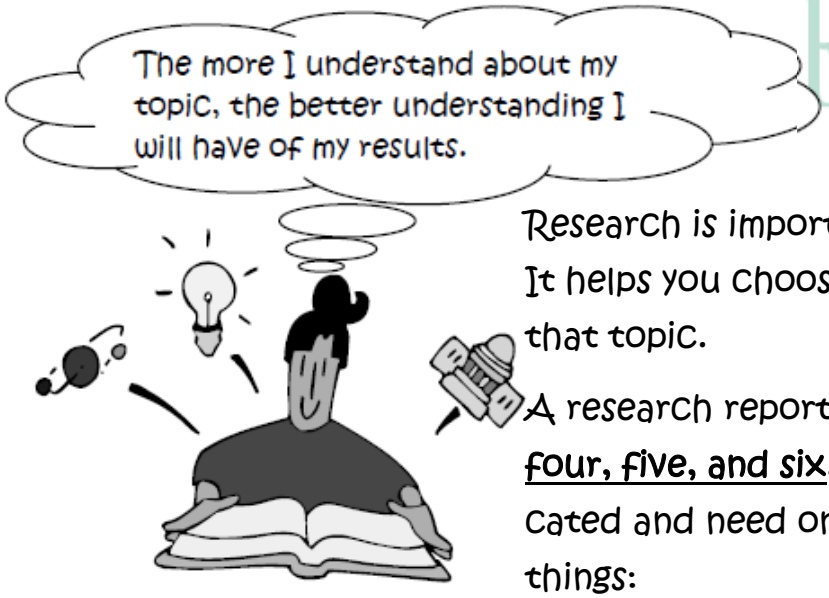
What other things would I like to investigate about my topic?_____

How does what I learned apply to the real world? _____

Now, rewrite your answers together to form a complete conclusion.

RESEARCH



Research is important to a good science fair project. It helps you choose a topic then learn more about that topic.

A research report is **mandatory** for anyone in grades **four, five, and six**. The research report is not complicated and need only include the following five things:

1. **Title page** -
The title page includes the title of your project, your name, school, grade, teacher, and date the project is being turned in.

2. **Acknowledgements** - a personal thank you to anyone who helped you with your project (teacher, parent, sibling, scientists, librarian, etc.)

3. **Question -** The specific question you asked for you experiment.

4. **Background Research**

- Use books in the library and the Internet to find out interesting and relevant information about your topic.
- Rewrite the information you find in your own words. Do not just copy from the book or print out pages from the Internet. This is considered PLAGARISM and it is illegal.
- Keep track of what books or websites you used to get your information so you can list sources in a bibliography.

5. **Sources/Bibliography** - an alphabetical listing of books, articles, or other sources including websites that you used when researching your topic.

RESEARCH NOTES

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BIBLIOGRAPHY

Writing a Bibliography

When you are writing a bibliography, you are listing in alphabetical order all the sources of information you used to write your paper. For the different types of sources follow the examples below.

BOOKS

Author (last name, fist name). "Title of the article." Title of Magazine Date (day month year): page numbers of article.

Smith, Sarah J. "Why Don't We Fall from Rollercoasters?" Science News 8 July 2000: 77-79.

MAGAZINES

Author (last name, fist name). Title of the book. City where book is published: Publisher, Copyright date.

Tillerman, Jon. The Way the Earth Moves. Chicago: McMillian, 1998.

ENCYCLOPEDIA

"Article Title." Title of Reference book. Edition (if available). Year published.

"Microscopes". Encyclopedia Britanica. 1996.

FILMS, SLIDES, or VIDEOTAPE

Title. Medium (state if it is a film, slide, video tape, laser disc etc). Production company, date. Time length

Under the Microscope- Amoebas. Videocassette. Science and Kids Productions, 1994. 15 minutes.

ONLINE SOURCES (Websites)

Author (last name, first name – if there is one) "Title of Article". Title of Website or Publication. Date of Publication (or last update). On-line. Date of access (when you went to website). Available website address.

"Deserts". BrainPop. 2002. Online. 13 May 2002. Available:
http://www.brainpop.com/science/ecology/desert/index.weml