

Science Fair Project: A Handbook for Teachers & Parents



Aventura Waterways K-8 Center
Miami-Dade County Public Schools

21101 NE 26th Avenue
Miami, FL 33180

Principal: Mrs. Yesenia Aponte
Assistant Principal: Ms. Diane Cardona
Assistant Principal: Dr. Sylvia Lane
Assistant Principal: Ms. Natalie Mack

Schedule of Assignments
 Grades 4-5 individual student projects
 Grade K-3 One whole class project

Date Due	Assignment Due
August 19-30	Introduce Science Fair Projects
August 30- September 6	Problem Statement and Title
September 6-16	Background Information, Bibliography & Hypothesis
September 16- October 1	Materials, Procedures and Variables
October 1-14	Data: Tables, Graphs and Pictures
October 14- November 1	Results and Conclusion
November 1-12	Application and Abstract
November 12-15	Completed project on display board or PowerPoint turned in to classroom teacher Classroom presentations to vote for one winner Teachers turn in winning class project to Media Center.
November 16-17	Judging in the Media Center

*K-3 Teachers must display their projects on a bulletin board or tri-fold board outside of their rooms **November 16-17** in order to be judged.

Science Fair Project Guidelines

All Science Fair projects must include the following:

- **Title**
- **Problem statement**
- **Background information**
- **Hypothesis**
- **Materials**
- **Procedures**
- **Variable (manipulated, responding, held constant) control if applicable**
- **Data - 3 types minimum (include charts, graphs, pictures, qualitative/quantitative observations, surveys, diagrams, etc.)**
- **Results**
- **Conclusions**
- **Application - real world extensions; further investigations**
- **Bibliography (minimum of 3-5 resources; all resources can not be from the Internet)**
- **Abstract - including the summary or purpose, brief and summarized procedures, results, and conclusions**
- **Data log - a dated log of what was done on a daily basis towards finding the results of the project**
- **Creativity - projects should be original, innovative, and creative!**

The following pages contain descriptions of each of the above mentioned components with examples that will help students develop their projects.

Title

A project needs a title. It lets people know what you have worked on. The title should be in the form of a statement. If you use the problem statement as your title, it should be in the form of a question. Consider the following:

Poor title: Soap Powder (does not say enough information)

Better general title: Cleaning Power of Soap Powder

Problem statement as title: Which Soap Powder is the Best Cleaner of Ketchup Stains?

These are some tips to help you select a title.

- Read in science books, magazines, newspapers for title ideas
- Talk to your teacher, family, and friends
- Select a topic that interests you
- Follow your curiosity; select a topic that you do not know anything about
- Select a topic that you know a little about but you want to investigate further to see what will happen if...
- See a list of possible project ideas included

Problem Statement

The problem statement is always written in the form of a question, even if it is used as the title. The question tells people what you are trying to find out.

Poor problem statement: How does Soap Work?

Better problem statement: Which Soap Powder Works Best in Removing Ketchup Stains?

Hypothesis

A hypothesis states what you think is going to happen when you investigate a question. Remember to include the words If and Then to describe the manipulated, and the responding variables. Be sure to make a numerical prediction of the expected result (ex: 2 out of 3, 67%). Use third person when you write your hypothesis. (No pronouns) Here is an example:

Question: *Which brand of paper towels is the most absorbent?*

Hypothesis: *If Viva, Bounty, and Suave paper towels are tested for their absorbency, then Viva paper towels will be 20 % more absorbent because Viva paper towels are thicker.*

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 measure all your materials using metric units. Do not forget to write your numbers in words.

Example of a “good listing”:

- 3, 15x15 cm sq. each of Brawney, Gala, Scott, generic paper towels
- 250 ml graduated beaker
- 750 ml water 20° C
- 1, 20x20 cm sq. cake pan
- Celsius thermometer
- clock with a second hand

Procedures

Your step-by-step directions are like a recipe. Anyone who reads them will be able to duplicate your investigation and get the same results. Remember the first word of each step must be written as a verb.

Example:

Step-by-Step Directions:

- 1. Cut 3, 15x15 cm sq. from each brand of paper towel*
- 2. Label each cut piece with brand name*
- 3. Pour 50 ml of 20° C water into 20x20 cm sq pan*
- 4. Place 1 square of generic brand paper towel into water and pan*
- 5. Leave for 30 seconds*
- 6. Remove paper towel*
- 7. Measure water remaining in pan and record*
- 8. Dry the cake pan*
- 9. Repeat steps 4-8 for each brand of paper towel*
- 10. Repeat entire process twice more for each brand of paper towel*

Variables

There are three types of variables.

- 1. Manipulated Variable or Independent Variable**
What you change on purpose in an investigation.
- 2. Responding Variable or Dependent Variable**
The responding variable is what changes by itself.
- 3. Variables held constant or Control Variable**
Everything else in your investigation must be held constant (kept the same)

Example of variables:

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

Manipulated variable: brand of paper towel (what you changed on purpose)

Responding variable: amount of water that is adsorbed by each towel

Kept constant size of towel, temp. of water, amount of water etc.

Background Information

Once you have chosen your science problem it is important to research the written materials available on your subject. By finding out as much background information as you can about the subject, you will gain better understanding of your problem. This will be valuable to you as you plan your project.

The following are guidelines for conducting a research:

1. Read books and articles on your subject. Make sure this information is upto-date (usually not older than five to ten years, depending on the subject.)
2. Interview and talk with people who are knowledgeable about your subject.
3. After reading books or interviewing people about your topic, write a paragraph that includes all the information that you gathered.

** The background information is for the report only. It does not go on the project board.*

Bibliography

Make a list of all the books, magazines, interviews, or other sources that were used.

General Form and Examples:

BOOK : Author's last name, first name, and initial. Title of book, city of publication: publisher, year, pages used

Cured, Mary B., Medicinal Plants, New York: Moorehouse and Moorehouse Publications, 199, pp. 84-86

MAGAZINE: Title of article, title of magazine, volume and number, city of publication: publisher, month, year, pages or article used.

"Problem-Solving Processes," The Science Teacher, Volume 6, Number 4, Alexandria: National Science Teachers Association, April 1999, pp 16-19

INTERVIEW: Interviewed person's last name, first name, initial, title, type of interview, month date, year of interview, department of one interviewed, institution where the interviewed works, phone number.

Brown, Joseph T. Ph.D., telephone interview, September 17, 2008, Department of Botany, Somewhere University, (555) 444-3210

ENCYCLOPEDIA: Title of article, title of encyclopedia, place of publication, the publisher, date of publication, volume number, pages used.

"Seeds", World Book, New York: World Publishers, 1999, Volume S, pages 1120-1121.

WORLD WIDE WEB: Classical Muty: "The Ancient Sources." Dept. of Greek and Roman Studies, U of Victoria. 28 Mar. 1998

<<http://www.wesleyan.edu/cbays/homepage/ttlm>>

Data/Log

Data refers to information gathered during your investigation. Writing in a spiral notebook is the most convenient way to keep a log.

Your log should include:

- 1. A list of all the materials you use*
- 2. Notes on all the preparation you made prior to starting your investigation*
- 3. Information about the resources you use (books, people, libraries, museums, universities, etc.)*
- 4. Detailed day-by day notes on the progress of your project*
 - a. What you are actually doing*
 - b. Problems you have with your investigation*
 - c. Things you would change if you were doing this investigation again.*
- 5. Any drawings that you feel might help explain your work*
- 6. Data that you gather from your investigation (notes, tables charts, graphs)*

Quantification of Data

The data collected during the course of your investigation needs to be quantifiable (measurable). All measurements in your investigation must be made in metrics.

Volume: milliliter (mL) $1000 \text{ mL} = 1 \text{ L}$ liter (L)

Length: millimeter (mm) $10 \text{ mm} = 1 \text{ cm}$
Centimeter (cm) $100 \text{ cm} = 1 \text{ m}$
meter (m) $1000 \text{ m} = 1 \text{ km}$
kilometer (km)

Mass: milligram (mg) $10 \text{ mg} = 1 \text{ cg}$
centigram (cg) $100 \text{ cg} = 1 \text{ g}$
gram (g) $1000 \text{ g} = 1 \text{ kg}$
kilogram (kg)

Results

Write the results of the experiment based on the information you have observed.

Example:

A sheet of Viva paper towel absorbed an average of 50 mL of water. A sheet of Suave paper towel absorbed an average of 36 mL of water.

Conclusions

Before you write your conclusions, carefully examine all your data (graphs, charts, tables).

Ask yourself these questions:

- Did I get the results I expected to get? If not, how were the results different?
- Were there any unexpected problems or occurrences that may have affected the results of my investigation?
- Did I collect sufficient data? (Were there enough trials/samples?)
- Do I need to revise my original hypothesis for this project?

Your conclusions 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 different next time.*
4. *Revised hypothesis (if data did not support your original hypothesis).*

Applications

Importance of how the results of the experiment may be useful to others or how the knowledge gained may be used in everyday life.

Example: Farmers and nursery personnel can use fertilizer to increase the rate of growth of bean plants.

Abstract

The abstract is a summary of the entire project written in past tense. The first paragraph includes the purpose of the experiment and the hypothesis. The second paragraph includes the procedures. The third paragraph includes the results and the conclusions. The following template might be helpful in guiding your students to write a good abstract.

The problem was

It was hypothesized that if

then

The procedure followed was (written in paragraph form):

It was concluded that

The results of the experiment (did or did not) support the hypothesis, because of

Science Fair Project

Student Name: _____ Teacher: _____

Assignment #1

Due Date:

Please complete the following information and return to your teacher for approval.

Project Title:

Problem Statement (needs to be in the form of a question)

Approved

Not approved

Parent Signature

Date

Bibliography

Write which books, magazines, or other resource(s) you have used for your experiment and your background information. You must include the title of the book, the author, the publisher, the city where it was published, the year it was published and the page numbers you used. Minimum three (3) resources.

- Approved
- Not approved

Parent Signature

Date

Science Fair Project

Student Name: _____ Teacher: _____

Assignment #2

Due Date:

Please complete the following information and return to your teacher for approval.

Project Title:

Problem Statement (needs to be in the form of a question)

Hypothesis

Approved

Not approved

Parent Signature

Date

Science Fair Project

Student Name: _____ Teacher: _____

Assignment #3

Due Date:

Please complete the following information and return to your teacher for approval.

Project Title:

Materials (list)

Procedures (numbered step by step)

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

Science Fair Project

Student Name: _____ Teacher: _____

Assignment #4

Due Date:

Please complete the following information and return to your teacher for approval.

Project Title:

Data (include tables, graphs and pictures attached to this worksheet if needed)

Approved

Not approved

Parent Signature

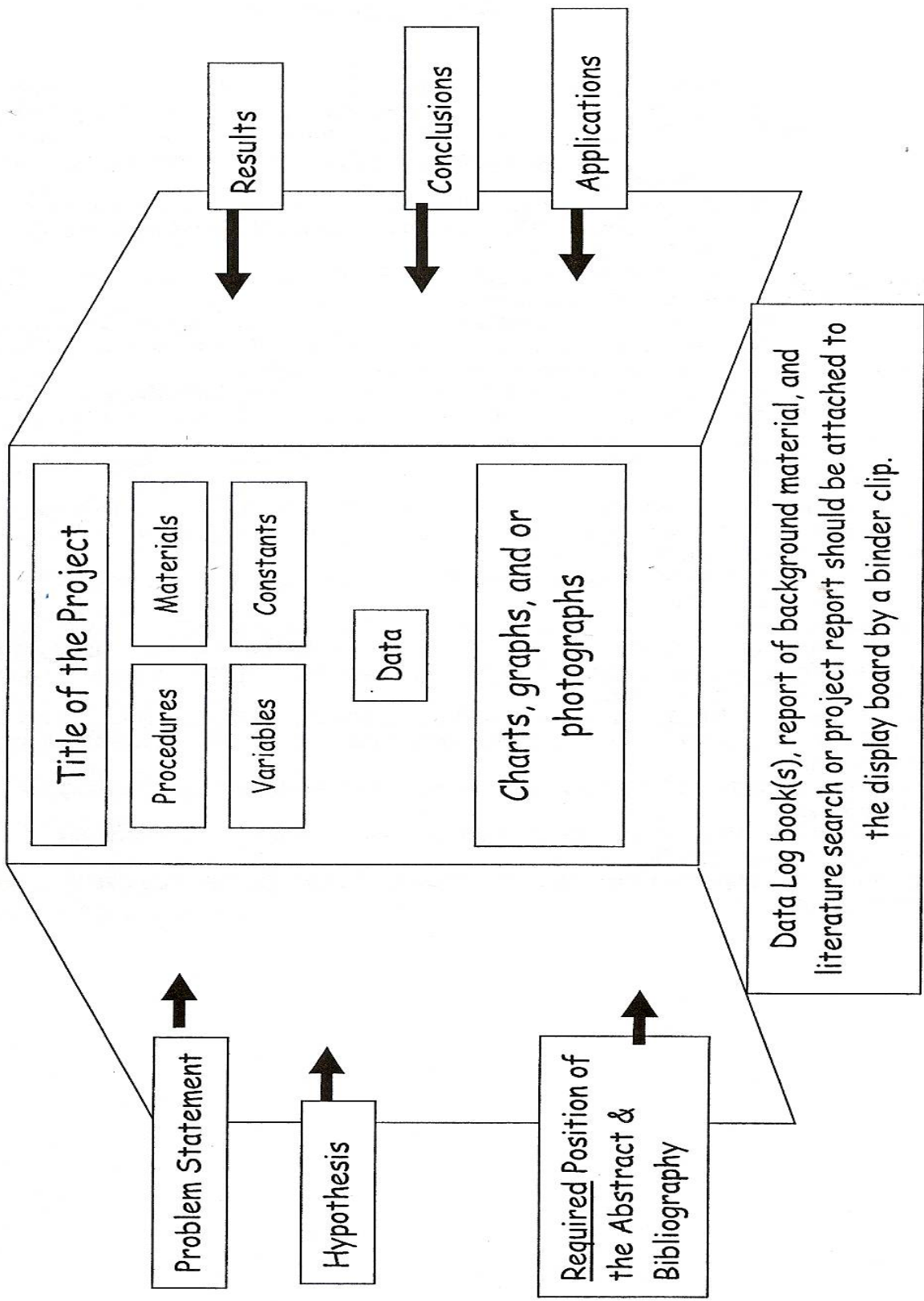
Date

Conclusion

- Approved
- Not approved

Parent Signature

Date



Name: _____

Science Fair Project Judging Sheet

Section 1: 20 points total

Scientific Title (3)

Problem Statement (3): What is the effect of ____ on ____?

Hypothesis (4): Followed format; it is hypothesized that if ____ then ____.

Abstract (10): Followed format given; 1st paragraph includes purpose of project and hypothesis; 2nd paragraph includes summary of procedures; 3rd paragraph includes results and conclusions.

Section 2: 15 points total

Materials (3): Specific with measurements

Procedures (3): Specific steps for trials

Independent Variable (3): What changes in the experiment?

Dependent Variable (3): What is being observed in the experiment?

Control Variable/Constants (3): What stays the same in the experiment?

Section 3: 27 points total

Table/Chart (9): Title, units, trials, mean

Graphs (9): Title, axis labeled, units

Pictures (9): Relevant to project, labeled

Section 4: 38 points total

Results (10): Discuss findings, discuss numbers obtained

Conclusion (10): Discuss findings and agree or disagree with hypothesis

Application (3): What use does this project have in real life?

Neatness (15): Creative, clean, nice effort shown on set up.

Total Points (out of 100) _____

Comments:

Science Project Ideas

1. How much salt does it take to float an egg?	21. Do bigger seeds produce bigger plants?
2. What kind of juice cleans pennies best?	22. Which materials absorb the most water?
3. Which dish soap makes the most bubbles?	23. Do wheels reduce friction?
4. Do watches keep time the same?	24. What materials dissolve in water?
5. On which surface can a snail move faster - dirt or cement?	25. What is the soil in my schoolyard made of?
6. What brand of raisin cereal has the most raisins?	26. Does holding a mirror in front of a fish change
7. How can you measure the strength of a magnet?	27. What color of birdseed do birds like best?
8. Do ants like cheese or sugar better?	28. What holds two boards together better - a nail or screw
9. Can the design of a paper airplane make it fly farther?	29. Will bananas brown faster on the counter or in the refrigerator?
10. Do roots of a plant always grow downward?	30. Does temperature affect the growth of plants?
11. Can you tell what something is just by touching it?	31. Do mint leaves repel ants?
12. What kind of things do magnets attract?	32. Does a ball roll farther on grass or dirt?
13. What foods do mealworms prefer?	33. Do all objects fall to the ground at the same speed?
14. How long will it take a drop of food dye to color a glass of still water?	34. Does anyone in my class have the same fingerprints?
15. Does a bath take less water than a shower?	35. Which travels faster - a snail or a worm?
16. Can you tell where sound comes from when you are blindfolded?	36. Which paper towel is the strongest?
17. Can plants grow without soil?	37. Can plants grow from leaves?
18. Does warm water freeze faster than cool water?	38. Which dissolves better in water-salt or baking soda?
19. In my class who is taller - boys or girls?	39. Can things be identified by just their smell?
20. Do different types of apples have the same number of seeds?	40. With which type of battery do toys run longest?

Science Project Ideas

41. What type of line carries sound waves best?	61. Which way does the wind blow most frequently?
42. Can the sun's energy be used to clean water?	62. Does the size of a light bulb affect its energy use?
43. Does a green plant add oxygen to its environment?	63. For how long a distance can speech be transmitted through a tube?
44. Which metal conducts heat best?	64. Which grows mold faster - moist bread or dry bread?
45. What percentage of corn seeds in a package will germinate?	65. What type of soil filters water best?
46. Does an earthworm react to light and darkness?	66. Does the color of a material affect its absorption of heat?
47. Does the human tongue have definite areas for certain tastes?	67. Does sound travel best through solids, liquids, or gases?
48. Can same-type balloons withstand the same amount of pressure?	68. Do sugar crystals grow faster in tap water or distilled water?
49. Does the viscosity of a liquid affect its boiling point?	69. Can you see better if you limit the light that gets to your eye?
50. Does surrounding color affect an insect's eating habits?	70. How much of an apple is water?
51. Do children's heart rates increase as they get older?	71. What common liquids are acid, base, or neutral?
52. Can you use a strand of human hair to measure air moisture?	72. Do taller people run faster than shorter people?
53. What materials provide the best insulation?	73. Does the length of a vibrating object affect sound?
54. Is using two eyes to judge distance more accurate than using one eye?	74. Does a plant need some darkness to grow?
55. Do different kinds of caterpillars eat different amounts of food?	75. Who can balance better on the balls of their feet - boys or girls?
56. What plant foods contain starch?	76. Does exercise affect heart rate?
57. What keeps things colder - plastic wrap or aluminum foil?	77. Which dish soap makes the longest lasting suds?
58. Does heart rate increase with increasing sound volume?	78. What are the effects of chlorine on plant growth?
59. Do boys or girls have a higher resting heart rate?	79. Which type of oil has the greatest density?
60. Do liquids cool as they evaporate?	80. How accurately do people judge temperatures?

Science Project Ideas

81. How far does a snail travel in one minute?	101 Does the color of water affect its evaporation?
82. Do different types of soil hold different amounts of water?	102 Can you separate salt from water by freezing?
83. Will adding bleach to the water of a plant reduce fungus growth?	103 How does omitting an ingredient affect the taste of a cookie?
84. Does water with salt boil faster than plain water?	104 Do suction cups stick equally well to different surfaces?
85. How far can a person lean without falling?	105 Which student in class has the greatest lung capacity?
86. Can you tell time without a watch or clock?	106 How much weight can a growing plant lift?
87. How far can a water balloon be tossed to someone before it breaks?	107 Will water with salt evaporate faster than water without salt?
88. Does the shape of a kite affect its flight?	108 Does it matter in which direction seeds are planted?
89. Does an ice cube melt faster in air or water?	109 Which cheese grows mold the fastest?
90. Does sugar prolong the life of cut flowers?	110 Do all colors fade at the same rate?
91. How much of an orange is water?	111 Which brand of diaper holds the most water?
92. Which liquid has the highest viscosity?	112 In my class, who has the smallest hands - boys or girls?
93. Will more air inside a basketball make it bounce higher?	113 Which kind of cleaner removes ink stains best?
94. Does the color of light affect plant growth?	114 Does a plant grow bigger if watered by milk or water?
95. Does baking soda lower the temperature of water?	115 Which brand of soap makes the most suds?
96. Which brand of popcorn pops the most kernels?	116 Does a baseball go farther when hit by a wood or metal bat?
97. Which brand of popcorn pops the fastest?	117 Do living plants give off moisture?
98. How much can a caterpillar eat in one day?	118 Using a lever, can one student lift another student who is bigger?
99. In my class, who has the biggest feet - boys or girls?	119 What gets warmer - sand or dirt?
100 Do plants grow bigger in soil or water?	120 Which kind of glue holds two boards together better?

Science Project Ideas

121	Do pre-wash products get clothes cleaner?
122	What waterproofing agents work best?
123	How does deodorant effect clothes?
124	Which paint protects wood the best?
125	Does one brand of shampoo get hair cleaner than another brand of shampoo?
126	Does one brand of suntan lotion absorb water more quickly than another brand of suntan lotion?
127	What is the meat, fat and moisture content of hot dogs?
128	Do sausages vary in fat and water content?
129	Which popcorn pops the most?
130	What baseball bat hits the farthest: wood or aluminum?
131	Which test of fishing line can hold the most weight?
132	What kind of shoe sole has the best traction?
133	What type of skateboard wheels are best?
134	How much does a leaky faucet cost?
135	Which uses more water, a shower or a bath?
136	Which container (or wrapping) preserves food best?
137	Which diaper is best?
138	Which door lock works best?
139	What is the best air pressure for tires on an A.T.V., three-wheeler?
140	How long are yellow lights at various intersections?

141	Do parking meters give the amount of time we paid for?
142	Does a magnetic field affect the growth of beans?
143	Does electricity affect the growth of beans?
144	Does temperature affect the growth of plants?
145	How do plants react to different kinds of music?
146	Do plants grow better with tap water or distilled water?
147	What are the effects of rootbounding on plant growth?
148	Do roots always grow down?
149	Do mirrors affect the way plants grow?
150	Does location of a plant affect the leaf size?
151	Do plants grow better with artificial or natural light?
152	Under which color cellophane do plants grow best?
153	Can you give a plant too much fertilizer?
154	Which kind of potting soil works best for a particular plant?
155	Does the phase of the moon affect the germination of seeds?
156	Do seeds sprout better in cold or hot climates?
157	How does gravity affect the growth of seeds?
158	Does acid rain affect the germination of seeds?