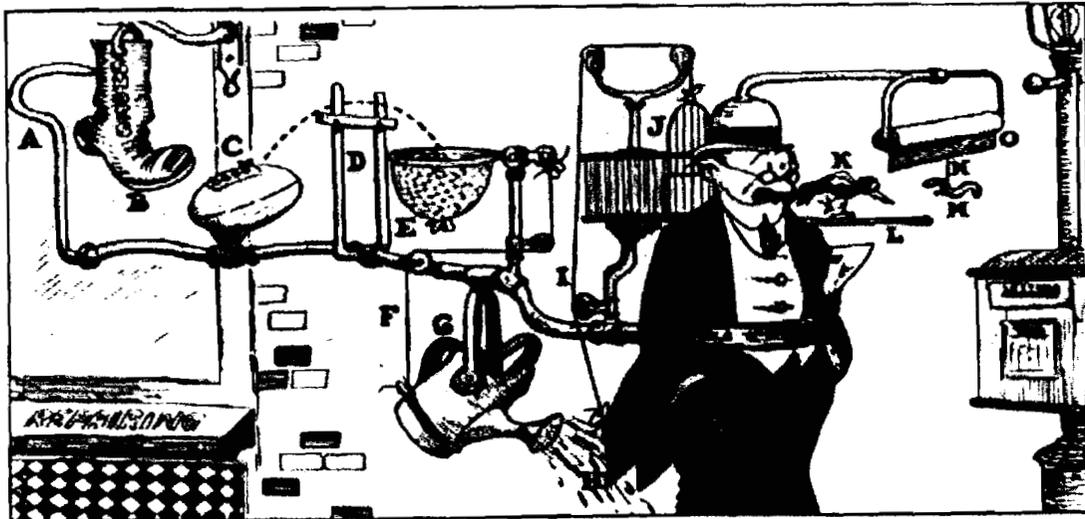
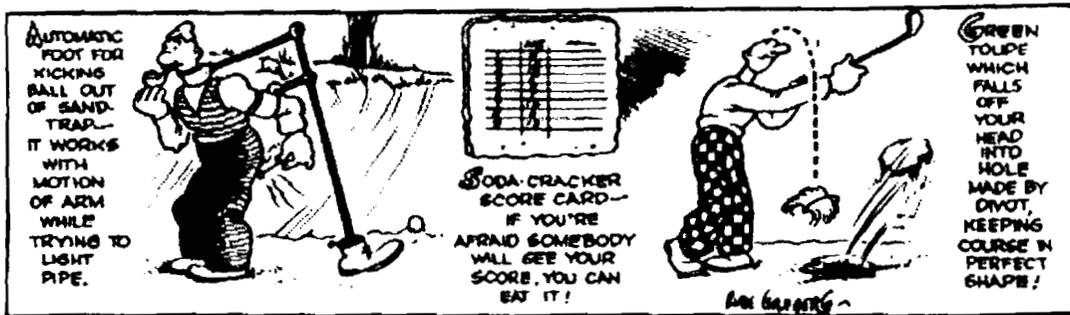


By Rube Goldberg



Keep You From Forgetting To Mail Your Wife's Letter RUBE GOLDBERG (tm) ROI 048



RUBE GOLDBERG (tm) ROI 146

**AUTOMATIC FOOT FOR KICKING BALL OUT OF SAND TRAP— IT WORKS WITH MOTION OF ARM WHILE TRYING TO LIGHT PIPE.**

**SODA CRACKER SCORE CARD— IF YOU'RE AFRAID SOMEBODY WILL SEE YOUR SCORE, YOU CAN EAT IT!**

**GREEN TOLUPE WHICH FALLS OFF YOUR HEAD INTO HOLE MADE BY DIVOT, KEEPING COURSE IN PERFECT SHAPE!**

## INVENTIONS

The following is adapted from the Connecticut Invention Convention Guidelines

### Where do ideas for inventions come from?

Where do you think the inventor got the idea for the invention of Velcro?

*Returning from a day's hunting, an engineer, Georges de Mestral, noticed that thistle blossoms clung to his clothing and his dog's fur. Under a microscope, he discovered that each of these blossoms contained minute hooks that caused it to attach to fabrics. It then occurred to him to fix similar hooks on fabric strips that would then cling together and serve as fasteners.*

*Eight years later the basic product was developed: two nylon strips, one of which contained thousands of tiny hooks, the other even smaller loops. When the two strips were pressed together, they formed a quick and practical fastener. The invention was named Velcro from the French words, velours (velvet) and crochet (hook). It was patented worldwide in 1957.*

For de Mestral, his idea came from his everyday experience. I bet you have experienced the same incident, but did you come up with the idea of Velcro?

### How do you get credit for your invention?

In the United States, the first person to have the idea and to demonstrate a sincere attempt to act upon the idea is awarded the patent, not the person who first applies for the patent.

#### **Don't be a Daniel Drawbaugh!**

*But for the lack of witnessed notebooks describing the device, the man known as the inventor of the telephone would have been a talented mechanic by the name of Daniel Drawbaugh. Similar disputes have raged over who invented the automobile, the electric light, and the laser, and in all of them, records- or lack thereof- played a deciding role.*

*The telephone case is a classic example. Even though Drawbaugh was able to produce hundreds of witnesses to testify that he had talked over a crude telephone long before Alexander Graham Bell filed a patent application in 1875, he had not a scrap of paper dating and describing the invention. The Supreme Court rejected his claims in 1888, by the narrow margin of four votes to three.*

*As the sad case of Daniel Drawbaugh indicates, U.S. patent practice places a premium on witnessed records when two or more parties claimed the same invention. The date the idea occurred (the "conception") and the date it was put into practice ("reduced to practice") are vital.*

*Equally important in the eyes of the Patent Office is the "diligence" shown by contending inventors. They must prove that they regularly pursued work on the invention, documenting their efforts on a day by day basis.*

## **The Invention Process**

### **How do you use creative problem solving to go from problem to invention idea?**

Creative problem solving is a process for finding workable solutions to problems. However, finding the right problem to solve is often the most difficult part of the process.

### **Getting Ideas**

It can be said that need is the mother of invention. Your idea for an invention will come from something that you or someone you know needs. There are several ways to find ideas for inventions. One way is to ask people if there is anything they need.

Another method is called brainstorming. You can brainstorm alone or with others. Here is an example of how brainstorming works. Name an object such as a lunchbox. Take ten minutes to list everything you can that is wrong with lunchboxes. Next, find a way to correct some of the problems. Your ideas for solving the problems can be a big step toward inventing a new or improved product. Keep in mind that your invention does not have to be a product. Instead, it can be a new process for doing something. For example, it may be a better way of memorizing a list of objects or a new card game.

Another way to generate ideas and to modify ideas is the **SCAMPER** technique. Choose a common object, like a paper clip or piece of paper. Use each of the techniques on the common object in order to change it. Then SCAMPER with ideas instead of objects. Example of how to use SCAMPER on a paper lunch bag:

**SUBSTITUTE**- What if you make the bag from a different material?

**COMBINE**- What if you combine it with another common object?

**ADAPT**- How can you adapt the bag to another situation? Is it similar to other objects?

**MMAGNIFY, MINIFY, MODIFY**- What if I make it bigger, smaller, or change it in some way (tear it, change form, texture, shape, color)?

**PUT IT TO OTHER USES**- What else can you use the bag for?

**EELIMINATE**- What could you take away?

**RREARRANGE/ REVERSE**- Can you rearrange the parts? Can you turn it upside down, backwards, inside out?

### ***Find a Problem***

Focus on problems that you may have been noticed during your daily life, i.e., opening a can of dog food, reaching the top shelf in your closet, having a place to sit as you wait in line. Also consider problems that handicap individuals encounter.

### ***Consider the Situation***

What do you already know? Focus on originality. If an inventor has an idea, it is important to know what already exists so that the inventor doesn't waste time "reinventing the wheel." Call around to stores and do research in catalogs to find out if the invention already exists. Your parents may have to help you call stores because they will be taken more seriously. Be sure to record all this information in your log book.

### ***Brainstorm***

Brainstorm a list of possible solutions and record it in your invention log. Review the list and eliminate all of the solutions that are impossible and those that already exist. Reasons for eliminating a solution include lack of knowledge, insufficient technical ability, and lack of necessary materials.

### **Research and Planning**

Before an invention can be successful, you have to make a plan. Your plan should include all the steps you can think of, from beginning to end. When writing your plan, ask yourself questions such as these.

- What can I read about that will help me with my invention?
- Who can I talk to about solving problems and planning properly?
- What materials will I need?
- How can I control the cost of my invention?
- What steps should I follow?
- How much time should I allow for each step?
- How can I test my invention?

Don't be surprised if you have to change your plans along the way. Sometimes a plan will not work as well as you first thought it would. So keep an open mind for change. You may even discover a better way of completing a certain step.

### **Developing and Testing**

Now the work begins. Follow your plan step by step. If you have difficulty with a certain part of your invention, find an expert to talk to. Try different things until you overcome the difficulty. Most of all, don't give up! As Henry Ford, one of the inventors of the automobile, once said, "Failure is only an opportunity to start again more intelligently."

If your invention is a new way to do something, describe your process in a written report. Give all the important details of your process. To show that your idea works, you should test it. The results of your test should be written into your report.

### ***Naming the Invention***

Develop a name for your product using the following guidelines:

- Don't make your brand name too similar to others.
- Don't make your brand name too descriptive. You want your name to be a unique eye-catcher.
- Be creative. Brand names that use rhyming or alliteration will grab people's attention. For example, Kit-Kat® or Cap'n Crunch®.
- Remember when you are brainstorming to go for a bunch of ideas.

### **INVENTION GUIDELINES**

1. Each invention must be the product of a single inventor, this means that students may not work together on an invention.
2. Inventions must fit into the following definition:

- *An invention can be anything that solves a real problem. It is something that no one has ever thought of before. It cannot be purchased in a store or found in a book.*
  - *Sometimes an invention is an improvement to an object that was already invented. An invention must serve a purpose.*
3. Inventors are encouraged to use recycled materials. The cost of the invention must not exceed \$25.
  4. Each invention must be accompanied by a self-standing display board
    - Width: (side to side) 9 cm (3 feet)
    - Depth: (front to back) 76 cm (2 1/2 feet)
    - Height: Table Exhibit 92 cm (3 feet)
  5. The Board needs to include the following information
    - The title of the invention.
    - A description of the problem the invention solves.
    - A description of how the invention works.
    - Inventor's name, grade, and school.
  6. Each inventor must submit a log or report, which includes the following information:
    - A written statement of the purpose of the invention and the problem it solves.
    - A list of materials used.
    - A list of all the steps taken to complete the invention.
    - Describe the problems encountered and include drawings or photographs of attempts that failed.
    - A written statement proving originality. In addition to parent verification, students should also describe what they did to ensure that their invention does not already exist.
  7. Table display space is limited to the area in front of your display board. A working model should represent inventions that are too large.

## Invention Guidelines for Teachers

### Problem for an invention

- The invention should solve a problem.
- The invention should meet a need or have a purpose.

### Winning Examples from *Invent America, 2001*

Invention: "Ear Mutts" (1<sup>st</sup>-place, Kindergarten Invention)

Problem: Since dogs get swimmer's ear, can a special device prevent this problem?

Need: Swimmer's ear can give the dog pain and possibly cause hearing loss.

Invention: "Missing Child Postage Stamp" (1<sup>st</sup>-place Fourth-Grade Invention)

Problem: Many children are missing, can something else be done to help?

Need: Since postage stamps are used by so many people, stamps with pictures of missing children (one per stamp) and a hotline number may assist in finding children quicker.

Invention: "The Tracing Container" (3<sup>rd</sup>-place Third-Grade Invention)

Problem: Sometimes tracing can be difficult. Can a device be made to make it easier to trace even details?

Need: Sometimes students need to trace. A lighted tray and clipboard container can make this easier, including the details to be traced.

### Marketing Slogan or Advertisement (replaces the hypothesis for projects)

- Instead of a hypothesis, an invention should have a marketing slogan or advertisement.
- The marketing slogan or advertisement should creatively promote the sale of the invention.

*Protect your pup's EARS -- use "EAR MUTTS"*



graphic taken from Dale Lewis of *Pet Portraits*

### **Improvements**

This could be improved by having a veterinarian check the dog's ears before the Ear Mutts are inserted. This would show that there was no problem in the dog's ears before or after the Ear Mutts were inserted and removed.

### **Applications**

Dogs can have Ear Mutts inserted every time they go in the water. Thus, they will not develop swimmer's ear. Further research could apply Ear Mutts to other animals that go in the water and have problems with swimmer's ear.

**PROBLEM / NEED**

**MARKETING  
SLOGAN**

**ABSTRACT /  
BIBLIOGRAPHY**

**MATERIALS  
STEPS TO DESIGN**

**DIAGRAM OF THE  
INVENTION**

**RESULTS**

**ABSTRACT**

**BIBLIOGRAPHY**

**HYPOTHESIS**

**PROBLEM  
STATEMENT**

**Problem Statement**

**Which Chocolate Chip Cookies Do Third Graders Like Best?**

**Hypothesis**

**It is hypothesized that third graders will like homemade chocolate chip cookies the best.**

**Variables**

**Manipulated Variables**

Cookies  
Gender of the students

**Responding Variables**

Responses of the students

**Constants**

**All bags are the same, only the letters are different**

**Cookies put in each lettered bag**

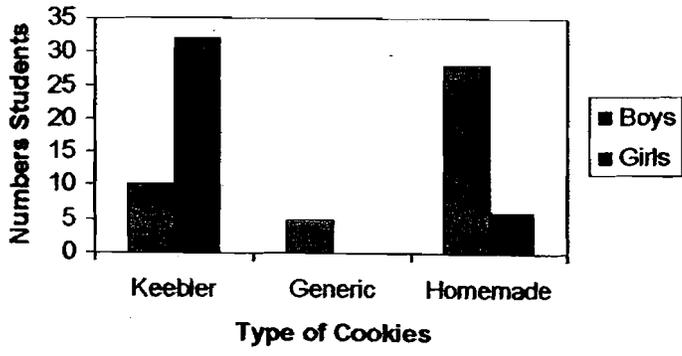
**Bag A - Same type of cookie**

**Bag B - Same type of cookie**

**Bag C - Same type of cookie**

**All subjects were tested at the same time**

### Cookie Choices



# *Elementary Science and Mathematics Fair and Invention Convention*

## *Project Guidelines for Teachers*

### Problem (problem statement)

- states the purpose of the investigation
- should be well-written
- should be "new and / or different" for the student

### Hypothesis

- a statement of expectations from the investigation
- does not have to be confirmed by the results; may be denied

### Experimental Design

- a plan to validate the hypothesis
- not a specific item on the display board but determined by the specificity of the materials list and the procedures

### Experimental Procedures

- a part of the experimental-design plan
- should be written sequentially to connect the hypothesis, data, and results
- should include quantifications (amounts, etc.), qualifications, and any scales developed for judgment

### Variables and Controls

- should identify and control independent (manipulated) variables
- should identify dependent (responding) variables
- should control and apply constants or variables equally to all parts of the experiment for its duration

### Materials/Equipment

- equipment should be utilized appropriately and safely and possibly in new ways
- materials should be listed specifically and quantitatively

### Data Collection

- information should be gathered before and during an investigation (experiment)
- log should include notes taken prior to investigation (experiment), day-by-day notes on the progress of the investigation (experiment), data gathered (any measurement taken or description of what is happening or any drawings to show what is happening)
- metric units should be used for any type of measurement

### Data Presentation

- should use metric units on graphs and/or charts
- should use consistent intervals for labels on graphs
- should specifically label groups, specimens, and/or subjects
- should average where appropriate
- should use photographs to show changes

### Data Analysis

- interpretation of results of the investigation
- should state how the investigation be improved

- Should state any errors and how they could be avoided.

### Outcomes

- identifies and or interprets conclusions
- shows the importance of the findings
- begins with a statement of confirmation or denial of the hypothesis
- discourages stating that the data "proves" anything; uses "agrees" or "disagrees"

### Applications

- should be identified
- should show new relationships: How the investigation is useful. How it contributes to making something better.
- should be specific and show practicality of the application
- should try to determine field of intent if the investigation is purely theoretical

### Visual Display

- well-constructed; self-standing
- good organization
- abstract and bibliography in the lower left corner of the left wing of the display board

### Project Data Log

- a record of the contacts, notes taken, etc., prior to the investigation
- a record of the measurements, etc., taken during the investigation and any changes that had to be made to improve the investigation
- should accompany the project submission

Please note that there will be no students present during judging; therefore, the items on the judging score sheet referring to "oral presentation" and "interview" will not be included in the scoring.

### Websites That May Be Helpful for Inventions and Projects:

<http://www.proteacher.com/110031.shtml>

<http://www.sciedunet.org>

[http://kids.patentcafe.com/books/es-enter\\_win.asp](http://kids.patentcafe.com/books/es-enter_win.asp)

<http://inventors.about.com/cs/campinvention>

<http://www.homeworkspot.com/sciencefair>

<http://sciencepage.org/scifair.htm>

<http://my.integritynet.com.au/purdic/science-fair-projects-ideas.htm>

<http://www.scifair.org>

<http://nuevaschool.org/~debbie/library/cur/sci/sciencefair.html>

[http://www.directoryofgreatdeals.com/school\\_science\\_fair\\_projects\\_for\\_elementary\\_middle\\_and\\_high\\_school\\_students.htm](http://www.directoryofgreatdeals.com/school_science_fair_projects_for_elementary_middle_and_high_school_students.htm)

<http://www.showboard.com>

You may also wish to do a "google" search at <http://www.google.com>.

# Science Project Ideas

1. How much salt does it take to float an egg?
2. What kind of juice cleans pennies best?
3. Which dish soap makes the most bubbles?
4. Do watches keep time the same?
5. On which surface can a snail move faster - dirt or cement?
6. What brand of raisin cereal has the most raisins?
7. How can you measure the strength of a magnet?
8. Do ants like cheese or sugar better?
9. Can the design of a paper airplane make it fly farther?
10. Do roots of a plant always grow downward?
11. Can you tell what something is just by touching it?
12. What kind of things do magnets attract?
13. What foods do mealworms prefer?
14. How long will it take a drop of food dye to color a glass of still water?
15. Does a bath take less water than a shower?
16. Can you tell where sound comes from when you are blindfolded?
17. Can plants grow without soil?
18. Does warm water freeze faster than cool water?
19. In my class who is taller - boys or girls?
20. Do different types of apples have the same number of seeds?

21. Do bigger seeds produce bigger plants?
22. Which materials absorb the most water?
23. Do wheels reduce friction?
24. What materials dissolve in water?
25. What is the soil in my schoolyard made of?
26. Does holding a mirror in front of a fish change
27. What color of birdseed do birds like best?
28. What holds two boards together better - a nail or screw
29. Will bananas brown faster on the counter or in the refrigerator?
30. Does temperature affect the growth of plants?
31. Do mint leaves repel ants?
32. Does a ball roll farther on grass or dirt?
33. Do all objects fall to the ground at the same speed?
34. Does anyone in my class have the same fingerprints?
35. Which travels faster - a snail or a worm?
36. Which paper towel is the strongest?
37. Can plants grow from leaves?
38. Which dissolves better in water-salt or baking soda?
39. Can things be identified by just their smell?
40. With which type of battery do toys run longest?

# Science Project Ideas

41. What type of line carries sound waves 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. Does an earthworm react to light and darkness?
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 its boiling point?
50. Does surrounding color affect an insect's eating habits?
51. Do children's heart rates increase as they get older?
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 different kinds of caterpillars eat different amounts of food?
56. What plant foods contain starch?
57. What keeps things colder - plastic wrap or aluminum foil?
58. Does heart rate increase with increasing 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. Which grows mold faster - moist bread or dry bread?
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. Can you see better if you limit the light that gets to your eye?
70. How much of an apple is water?
71. What common liquids are acid, base, or neutral?
72. Do taller people run faster than shorter people?
73. Does the length of a vibrating object affect sound?
74. Does a plant need some darkness to grow?
75. Who can balance better on the balls of their feet - boys or girls?
76. Does exercise affect heart rate?
77. Which dish soap makes the longest lasting suds?
78. What are the effects of chlorine on plant growth?
79. Which type of oil has the greatest density?
80. How accurately do people judge temperatures?

## Science Project Ideas

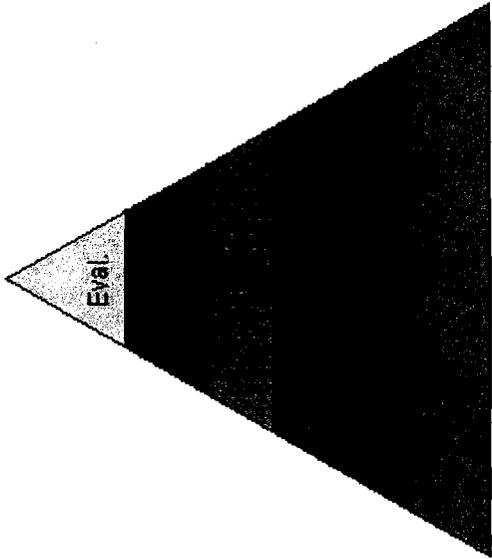
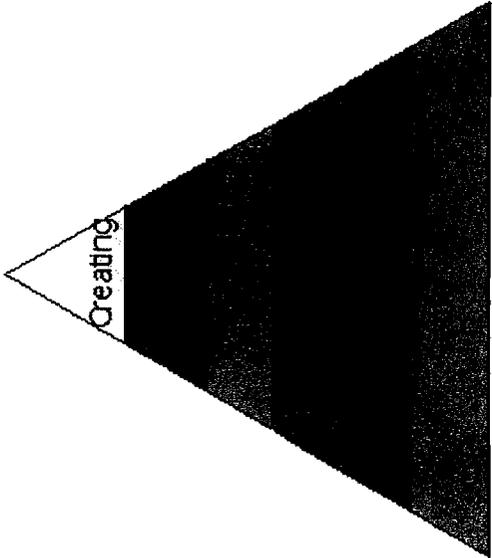
81. How far does a snail travel in one minute?
82. Do different types of soil hold different amounts of water?
83. Will adding bleach to the water of a plant reduce fungus growth?
84. Does water with salt boil faster than plain water?
85. How far can a person lean without falling?
86. Can you tell time without a watch or clock?
87. How far can a water balloon be tossed to someone before it breaks?
88. Does the shape of a kite affect its flight?
89. Does an ice cube melt faster in air or water?
90. Does sugar prolong the life of cut flowers?
91. How much of an orange is water?
92. Which liquid has the highest viscosity?
93. Will more air inside a basketball make it bounce higher?
94. Does the color of light affect plant growth?
95. Does baking soda lower the temperature of water?
96. Which brand of popcorn pops the most kernels?
97. Which brand of popcorn pops the fastest?
98. How much can a caterpillar eat in one day?
99. In my class, who has the biggest feet - boys or girls?
100. Do plants grow bigger in soil or water?

101. Does the color of water affect its evaporation?
102. Can you separate salt from water by freezing?
103. How does omitting an ingredient affect the taste of a cookie?
104. Do suction cups stick equally well to different surfaces?
105. Which student in class has the greatest lung capacity?
106. How much weight can a growing plant lift?
107. Will water with salt evaporate faster than water without salt?
108. Does it matter in which direction seeds are planted?
109. Which cheese grows mold the fastest?
110. Do all colors fade at the same rate?
111. Which brand of diaper holds the most water?
112. In my class, who has the smallest hands - boys or girls?
113. Which kind of cleaner removes ink stains best?
114. Does a plant grow bigger if watered by milk or water?
115. Which brand of soap makes the most suds?
116. Does a baseball go farther when hit by a wood or metal bat?
117. Do living plants give off moisture?
118. Using a lever, can one student lift another student who is bigger?
119. What gets warmer - sand or dirt?
120. Which kind of glue holds two boards together better?

# Science Project Ideas

121 Do pre-wash products get clothes cleaner?	141 Do parking meters give the amount of time we paid for?
122 What waterproofing agents work best?	142 Does a magnetic field affect the growth of beans?
123 How does deodorant effect clothes?	143 Does electricity affect the growth of beans?
124 Which paint protects wood the best?	144 Does temperature affect the growth of plants?
125 Does one brand of shampoo get hair cleaner than another brand of shampoo?	145 How do plants react to different kinds of music?
126 Does one brand of suntan lotion absorb water more quickly than another brand of suntan lotion?	146 Do plants grow better with tap water or distilled water?
127 What is the meat, fat and moisture content of hot dogs?	147 What are the effects of rootbouding on plant growth?
128 Do sausages vary in fat and water content?	148 Do roots always grow down?
129 Which popcorn pops the most?	149 Do mirrors affect the way plants grow?
130 What baseball bat hits the farthest: wood or aluminum?	150 Does location of a plant affect the leaf size?
131 Which test of fishing line can hold the most weight?	151 Do plants grow better with artificial or natural light?
132 What kind of shoe sole has the best traction?	152 Under which color cellophane do plants grow best?
133 What type of skateboard wheels are best?	153 Can you give a plant too much fertilizer?
134 How much does a leaky faucet cost?	154 Which kind of potting soil works best for a particular plant?
135 Which uses more water, a shower or a bath?	155 Does the phase of the moon affect the germination of seeds?
136 Which container (or wrapping) preserves food best?	156 Do seeds sprout better in cold or hot climates?
137 Which diaper is best?	157 How does gravity affect the growth of seeds?
138 Which door lock works best?	158 Does acid rain affect the germination of seeds?
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?	

# Bloom's Taxonomy

 <p style="text-align: center;"><b>Old Version</b></p>	<p>In 1956, Benjamin Bloom headed a group of educational psychologists who developed a classification of levels of intellectual behavior important in learning. During the 1990's a new group of cognitive psychologist, lead by Lorin Anderson (a former student of Bloom's), updated the taxonomy reflecting relevance to 21st century work. The graphic is a representation of the NEW verbage associated with the long familiar Bloom's Taxonomy. Note the change from Nouns to Verbs to describe the different levels of the taxonomy.</p> <p><i>Note that the top two levels are essentially exchanged from the Old to the New version.</i></p>
 <p style="text-align: center;"><b>NEW Version</b></p>	<p>define, duplicate, list, memorize, recall, repeat, reproduce state</p> <p>classify, describe, discuss, explain, identify, locate, recognize, report, select, translate, paraphrase</p> <p>choose, demonstrate, dramatize, employ, illustrate, interpret, operate, schedule, sketch, solve, use, write.</p> <p>appraise, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question, test.</p> <p>appraise, argue, defend, judge, select, support, value, evaluate</p> <p>assemble, construct, create, design, develop, formulate, write.</p>
<p><b>Remembering:</b> can the student recall or remember the information?</p>	<p>define, duplicate, list, memorize, recall, repeat, reproduce state</p>
<p><b>Understanding:</b> can the student explain ideas or concepts?</p>	<p>classify, describe, discuss, explain, identify, locate, recognize, report, select, translate, paraphrase</p>
<p><b>Applying:</b> can the student use the information in a new way?</p>	<p>choose, demonstrate, dramatize, employ, illustrate, interpret, operate, schedule, sketch, solve, use, write.</p>
<p><b>Analysing:</b> can the student distinguish between the different parts?</p>	<p>appraise, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question, test.</p>
<p><b>Evaluating:</b> can the student justify a stand or decision?</p>	<p>appraise, argue, defend, judge, select, support, value, evaluate</p>
<p><b>Creating:</b> can the student create new product or point of view?</p>	<p>assemble, construct, create, design, develop, formulate, write.</p>