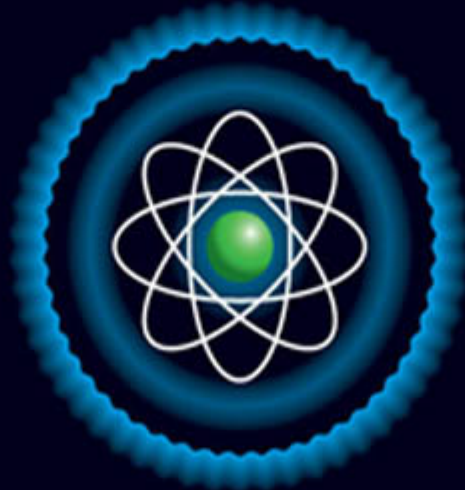
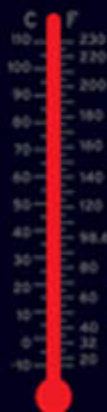


46

SCIENCE FAIR PROJECTS

FOR THE EVIL GENIUS



- Each project contains a suggested entry category, a hypothesis, materials list, conclusion, and list of suggestions for going further

BOB BONNET AND DAN KEEN



46 Science Fair Projects for the Evil Genius



Evil Genius Series

Bike, Scooter, and Chopper Projects for the Evil Genius

Bionics for the Evil Genius: 25 Build-it-Yourself Projects

Electronic Circuits for the Evil Genius: 57 Lessons with Projects

Electronic Gadgets for the Evil Genius: 28 Build-it-Yourself Projects

Electronic Games for the Evil Genius

Electronic Sensors for the Evil Genius: 54 Electrifying Projects

50 Awesome Auto Projects for the Evil Genius

50 Model Rocket Projects for the Evil Genius

51 High Tech Practical Jokes for the Evil Genius

46 Science Fair Projects for the Evil Genius

Fuel Cell Projects for the Evil Genius

Mechatronics for the Evil Genius: 25 Build-It-Yourself Projects

MORE Electronic Gadgets for the Evil Genius: 40 NEW Build-It-Yourself Projects

101 Outer Space Projects for the Evil Genius

101 Spy Gadgets for the Evil Genius

123 PIC[®] Microcontroller Experiments for the Evil Genius

123 Robotics Experiments for the Evil Genius

PC Mods for the Evil Genius: 25 Custom Builds to Turbocharge Your Computer

Programming Video Games for the Evil Genius

Solar Energy Projects for the Evil Genius

22 Radio and Receiver Projects for the Evil Genius

25 Home Automation Projects for the Evil Genius

46 Science Fair
Projects for
the Evil Genius

BOB BONNET
DAN KEEN



New York Chicago San Francisco Lisbon
London Madrid Mexico City Milan New Delhi
San Juan Seoul Singapore Sydney Toronto

Copyright © 2009 by The McGraw-Hill Companies, Inc. All rights reserved. Manufactured in the United States of America. Except as permitted under the United States Copyright Act of 1976, no part of this publication may be reproduced or distributed in any form or by any means, or stored in a database or retrieval system, without the prior written permission of the publisher.

0-07-160028-0

The material in this eBook also appears in the print version of this title: 0-07-160027-2.

All trademarks are trademarks of their respective owners. Rather than put a trademark symbol after every occurrence of a trademarked name, we use names in an editorial fashion only, and to the benefit of the trademark owner, with no intention of infringement of the trademark. Where such designations appear in this book, they have been printed with initial caps.

McGraw-Hill eBooks are available at special quantity discounts to use as premiums and sales promotions, or for use in corporate training programs. For more information, please contact George Hoare, Special Sales, at george_hoare@mcgraw-hill.com or (212) 904-4069.

TERMS OF USE

This is a copyrighted work and The McGraw-Hill Companies, Inc. ("McGraw-Hill") and its licensors reserve all rights in and to the work. Use of this work is subject to these terms. Except as permitted under the Copyright Act of 1976 and the right to store and retrieve one copy of the work, you may not decompile, disassemble, reverse engineer, reproduce, modify, create derivative works based upon, transmit, distribute, disseminate, sell, publish or sublicense the work or any part of it without McGraw-Hill's prior consent. You may use the work for your own noncommercial and personal use; any other use of the work is strictly prohibited. Your right to use the work may be terminated if you fail to comply with these terms.

THE WORK IS PROVIDED "AS IS." MCGRAW-HILL AND ITS LICENSORS MAKE NO GUARANTEES OR WARRANTIES AS TO THE ACCURACY, ADEQUACY OR COMPLETENESS OF OR RESULTS TO BE OBTAINED FROM USING THE WORK, INCLUDING ANY INFORMATION THAT CAN BE ACCESSED THROUGH THE WORK VIA HYPERLINK OR OTHERWISE, AND EXPRESSLY DISCLAIM ANY WARRANTY, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. McGraw-Hill and its licensors do not warrant or guarantee that the functions contained in the work will meet your requirements or that its operation will be uninterrupted or error free. Neither McGraw-Hill nor its licensors shall be liable to you or anyone else for any inaccuracy, error or omission, regardless of cause, in the work or for any damages resulting therefrom. McGraw-Hill has no responsibility for the content of any information accessed through the work. Under no circumstances shall McGraw-Hill and/or its licensors be liable for any indirect, incidental, special, punitive, consequential or similar damages that result from the use of or inability to use the work, even if any of them has been advised of the possibility of such damages. This limitation of liability shall apply to any claim or cause whatsoever whether such claim or cause arises in contract, tort or otherwise.

DOI: 10.1036/0071600272

About the Authors

Bob Bonnet, who holds a master's degree in environmental education, has been teaching science for over 25 years. He was a state naturalist at Belleplain State Forest in New Jersey. Mr. Bonnet has organized and judged many science fairs at both the local and regional levels. He has served as the chairman of the science curriculum committee for the Dennis Township School system, and he is a Science Teaching Fellow at Rowan University in New Jersey.

Mr. Bonnet is listed in "Who's Who Among America's Teachers."

Dan Keen holds an Associate in Science degree, majoring in electronic technology. Mr. Keen is the editor and publisher of a county newspaper in southern New Jersey.

He was employed in the field of electronics for 23 years, and his work included electronic servicing, as well as computer consulting and programming. Mr. Keen has written numerous articles for many computer magazines and trade journals since 1979. He is also the coauthor of several computer programming books. For ten years, he taught computer courses in community education programs in four schools. In 1986 and 1987, Mr. Keen taught computer science at Stockton State College in New Jersey.

Together, Mr. Bonnet and Mr. Keen have had many articles and books published on a variety of science topics for international publishers, including McGraw-Hill.

This page intentionally left blank

Contents

Introduction	xi	PROJECT 7: Got Salt?	25
		<i>Comparisons of back bay salt content to tide cycles</i>	
PROJECT 1: Water, Water, Everywhere	1	PROJECT 8: In the Ear of the Beholder	29
<i>The effect of fresh water and coastal salt water flooding on lawns</i>		<i>The physics and social classification of “noise”</i>	
PROJECT 2: Who’s Home?	5	PROJECT 9: Flying in the Wind	33
<i>Determining whether or not organisms other than birds live in birds’ nests</i>		<i>Wind velocity at ground level may be different at heights above the ground</i>	
PROJECT 3: Go with the Flow	9	PROJECT 10: Lighter Struts	37
<i>Lighthouses are cylindrically shaped, so they can structurally withstand high-velocity winds</i>		<i>Making materials lighter, yet still strong enough for the required need</i>	
PROJECT 4: Kinetic Pendulum	13	PROJECT 11: Stock Up	41
<i>Examining the relationship between the arc distance a pendulum travels and the swing period time</i>		<i>Concepts of stock market investing</i>	
PROJECT 5: Melody Camouflage	17	PROJECT 12: A Better Burger	47
<i>Erroneously perceived sound while masked by noise</i>		<i>Comparing the fat content in different grades of ground beef</i>	
PROJECT 6: “Vlip!”	21	PROJECT 13: Caught in the Spotlight	51
<i>A pet dog responds to sounds rather than understanding the meaning of words</i>		<i>Devising an insect-collection device, and then evaluating the nocturnal insect population in your area for health hazards</i>	

PROJECT 14: Sweet Treat	55	PROJECT 23: Parallelogram Prevention	91
<i>The behavior of ants toward natural and artificial sugars</i>		<i>Simple bracing can greatly increase a structure's capability to maintain its shape under stress</i>	
PROJECT 15: C, a Fantastic Vitamin	59	PROJECT 24: A Taste of Plant Acid	95
<i>The effect of boiling on the vitamin C content of carrots</i>		<i>Determining if a vegetable has a more acrid taste if it has a higher pH</i>	
PROJECT 16: Zenith Is Not a Radio	63	PROJECT 25: Split and Dip	99
<i>Comparing the Sun's daily zenith to the time between sunrise and sunset</i>		<i>Testing a strategy for making money in the stock market</i>	
PROJECT 17: Bold Mold	67	PROJECT 26: Johnny Applesauce	105
<i>Environment affects the rate at which food spoils</i>		<i>Cinnamon: A mold inhibitor</i>	
PROJECT 18: M&M's Ring Around the World	71	PROJECT 27: Backfield in Motion	109
<i>Determining the validity of sample size</i>		<i>The effect of an electromagnetic field on single-celled organisms</i>	
PROJECT 19: Choices	75	PROJECT 28: Green No More	113
<i>Behavior: The position of an item will determine the selection by handedness (left hand/right hand) over color</i>		<i>Concepts in chlorophyll</i>	
PROJECT 20: Plants Exhale	79	PROJECT 29: Not Just Lemonade	117
<i>A plant produces more oxygen when light intensity is increased</i>		<i>Determining if the addition of lemon to cleaning products is strictly for marketing purposes</i>	
PROJECT 21: Melting Mountains	83	PROJECT 30: Less Is More	121
<i>Alluvial runoff from melting mountain ice</i>		<i>Determining if pH increases as standing rainwater evaporates</i>	
PROJECT 22: Sounds Fishy	87	PROJECT 31: Natural Fences	125
<i>Determining if goldfish have water temperature preferences</i>		<i>Finding natural pesticide substances</i>	
		PROJECT 32: The Nose Knows	129
		<i>Olfactory identification differences by age</i>	

PROJECT 33: Germ Jungle	133	PROJECT 42: Flying, Walking, Crawling	169
<i>Checking for the presence of bacteria on public surfaces</i>		<i>Natural bait to keep pests at bay during picnics</i>	
PROJECT 34: Not 'til Christmas	137	PROJECT 43: High-Tech Times	173
<i>Determining adherence to instructions by gender</i>		<i>A study of the willingness of people in different age groups to adapt to new technology</i>	
PROJECT 35: Space Farm	141	PROJECT 44: Commercial TV	177
<i>The effect of artificial gravity on radish-seed germination</i>		<i>A comparison of programming to advertising content</i>	
PROJECT 36: Cooled Off	145	PROJECT 45: Sold on Solar	181
<i>Comparison study between the cooling effect of evaporating water and alcohol</i>		<i>The temperature in a climate as it relates to the amount of possible usable sunlight</i>	
PROJECT 37: Pass the Mold	149	PROJECT 46: Getting to the Root of the Problem	185
<i>A study on the capability of common bread mold to be transferred from one food to another</i>		<i>A study of the effect of low water on radish seedling root systems</i>	
PROJECT 38: Hardwood Café	153	Index	189
<i>Determining if bracket fungi are parasites or saprophytes</i>			
PROJECT 39: Web Crawlers	157		
<i>Determining the effectiveness of various Internet search engines</i>			
PROJECT 40: Night Watch	161		
<i>Circadian rhythms: Training a house plant to be awake at night</i>			
PROJECT 41: Time for the Concert	165		
<i>A study of the effect of temperature on the chirping of crickets</i>			

This page intentionally left blank



Introduction

Welcome to the exciting exploration of the world around us. . . the world of science! Researching a project for entry into a science fair gives us a glimpse into the marvels of this world.

Participating in a science fair is not only enjoyable, but it also encourages logical thinking, involves doing interesting research, develops objective observations, and gives experience in problem solving.

Before you do any project, discuss it in detail with a parent or science instructor. Be sure they understand and are familiar with your project.

Science fair projects must follow a procedure called the scientific method. This procedure is also used by actual scientists. First, a problem or purpose is defined. A hypothesis or prediction of the outcome is then stated. Next, a procedure is developed for determining whether or not the hypothesis was correct. Do not think that your science project is a failure if the hypothesis is proven to be wrong. The idea of the science fair project is either to prove or disprove the hypothesis. Learning takes place even when the results are not what you expected. Thomas Edison tried over a thousand different materials before he found one that would work best in his light bulb. Edison said he failed his way to success!

Generally, school science fairs have 12 standard categories under which students can enter their projects: behavioral and social, biochemistry, botany, chemistry, Earth and space, engineering, environmental, physics, zoology, math and computers, microbiology, and medicine and health.

Some projects may involve more than one science discipline. A project that involves using different colors of light to grow plants could fall under the category of either botany or physics. This crossing over of sciences may allow you to choose between two categories in which to enter your project. It can give you an edge at winning a science fair by entering your project in a category where there are fewer competitors or avoiding a category where other entries are of particularly outstanding quality.

In this book, we present a wide variety of project ideas for all 12 science fair categories. Select a topic you find interesting, one you would like to research. This will make your science fair experience a very enjoyable one. Many projects in this book are merely “starters,” which you can expand on and then create additional hypotheses for.

Know the rules of your school’s science fair before you decide on a project topic. Projects must follow ethical rules. A project cannot be inhumane to animals. Never

interfere with ecological systems. Use common sense.

Safety

When planning your science fair project, safety must be your first consideration. Even seemingly harmless objects can become a hazard under certain circumstances. Know what potential hazards you are faced with before you start a project. Take no unnecessary risks. Have an adult or a science instructor present during all phases of your project. Be prepared to handle a problem even though none is expected (for example, keep heat gloves or oven mitts handy when you work around a hot stove). Wear safety glasses when appropriate.

Be Especially Aware of These Hazards

- Sharp objects: Construction tools (hammer, saw, knife, scissors, drill). Be careful how you pick up sharp tools and glass objects, which can fragment and become sharp objects.
- Fire: Cooking fat can catch on fire; alcohol has a low flash point. To boil alcohol, use a “double boiler.” First, bring a pot of water to a boil. Next, turn off the stove burner. And then, lower a test tube filled with alcohol into the water.
- Chemicals: Keep everything out of the reach of children that specifies “keep out of the reach of children” on the label (alcohol, iodine, and so forth). Know what materials you are working with that have extreme pH levels (acids, bases).
- Allergens: When growing mold in sealable plastic bags, keep the bags closed during and after the project. When the project is over, discard the plastic bags without ever opening them, so mold is contained and does not become airborne.
- Carcinogens, mutagens: Stand away from microwave ovens when in use.
- Water and electricity don’t mix. Use caution whenever both water and electricity are present (as with a fish tank heater that must be plugged into a wall outlet). Use only UL-approved electrical devices.
- Heat: Use heat gloves or oven mitts when you deal with hot objects. When using a heat lamp, keep away from curtains and other flammable objects. Be aware that glass may be hot, but it might not give the appearance of being hot.
- Secure loose clothing, sleeves, and hair.
- Wash your hands. When you return home after touching surfaces at public places, be sure to wash your hands to avoid bringing bacteria into your home.
- Rivers, lakes, oceans: Do not work near or around large bodies of water without an adult present, even if you know how to swim.
- Nothing should be tested by tasting it.
- Be aware of others nearby. A chemical reaction, for example, could cause a glass container to shatter or a caustic material to be ejected from a container. Keep

others in the room at a safe distance or have them wear proper safety protection.

- Thermometers made of glass have the potential to break and cause glass to shatter.
- Be aware of gas products that may be created when certain chemicals react. Such projects must be carried out in a well-ventilated area.
- Never look directly at the Sun. Do not use direct sunlight as a source of light for microscopes.
- Loud sounds can be harmful to your hearing.

Being aware of these possible hazards and working with adult supervision should ensure a safe and enjoyable project experience.

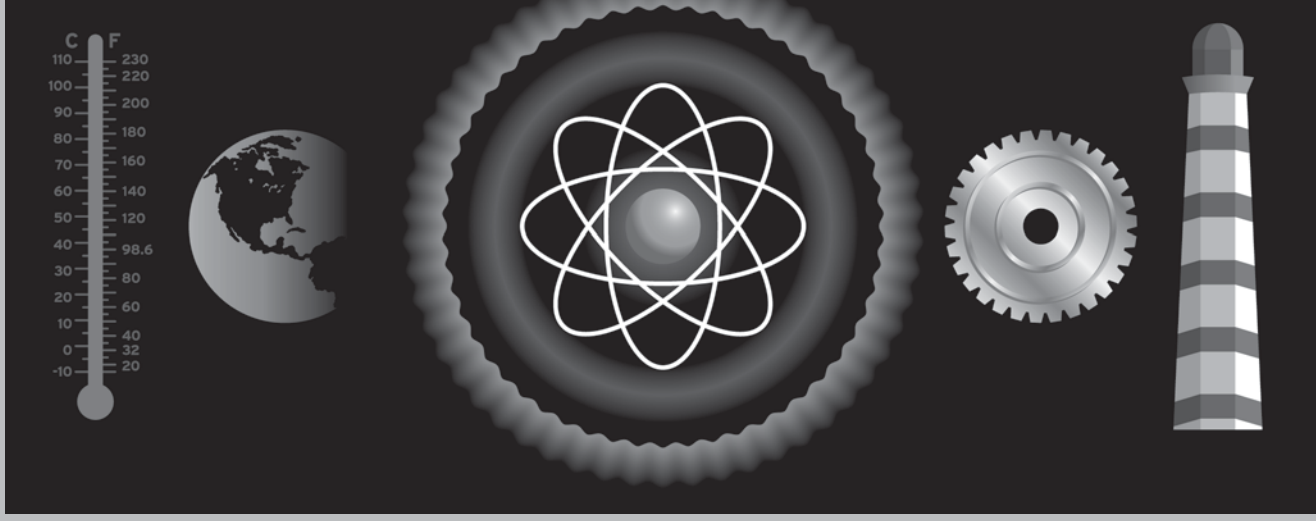
What Makes a Good Science Fair Project?

A good science fair project is either something that is unique or it is something that is already common, but done uniquely. For example, many elementary students construct a small model of a volcano, and then use the reaction of vinegar and baking soda to make it “erupt.” Such a project could have a unique “twist” to it by hypothesizing that some other substance or chemical reaction would effervesce and give a better eruption.

A good project is also one where the student has done a solid background study and fully understands the project. It’s fine to have an adult or even a science professional assist a student in their project, but a judge will expect the student to understand the project and be able to articulate the work to the judges and others attending a science fair. A project will be judged on its completeness. Students should look at their projects as if they are the judges and check for any deficiencies. Presentation is important, but many science fairs weigh more heavily on the science aspect of projects.

Good luck with your project!

This page intentionally left blank



Project 1

Water, Water, Everywhere

The effect of fresh water and coastal salt water flooding on lawns

Suggested Entry Categories

- Biochemistry
- Botany
- Chemistry
- Earth Science
- Environmental Science

Overview

People often pay a high price to purchase land and build a house along the coast, or along a scenic river or stream. The view is always magnificent; the fresh air and walking along the shore are especially healthy. However, not only is the initial cost of real estate expensive, but so is property upkeep. For coastal homes, the salt air and strong winds act as sand blasters to pit the metal on door knobs, window casings, and house paint. Coastal storms are an ever-present threat, too. Another risk for home owners living along rivers or oceans is flooding.

Even a small flood can damage the beautiful and expensive lawns around a home.

Is more damage done to a lawn by fresh water river flooding or coastal salt water flooding?

Hypothesis

Hypothesize that more damage to lawns is caused by coastal salt water flooding than by the flooding of a fresh water stream or river.

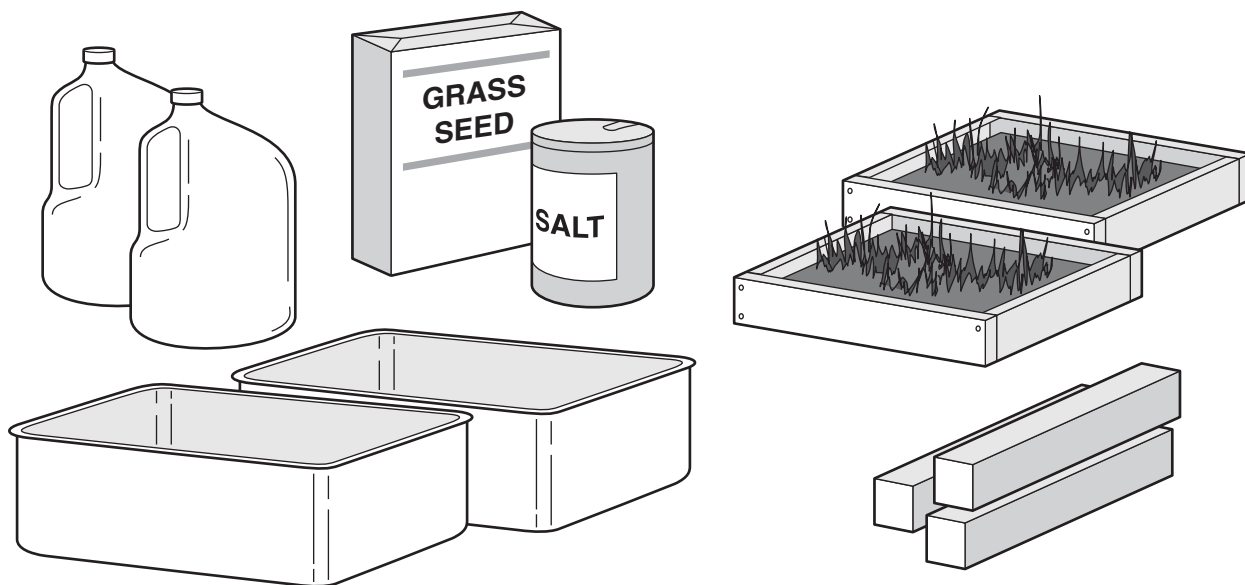
Materials' List

- Two large dishpans
- Several pieces of 1×2 lumber
- Small nails
- Use of a hammer and hand saw
- Several feet of cheesecloth

- Instant synthetic sea salt mix (available inexpensively from school science supply catalogs)
- Water
- Grass seed
- Potting soil
- Staple gun
- Funnel
- Scissors
- Kitchen measuring cup
- Four empty plastic gallon milk or water jugs
- A warm, lighted area indoors, but not in direct sunlight
- Several weeks of time, because we are dealing with germination and growth

Procedure

Grass seed will germinate and grow in two wooden frames of potting soil. Both

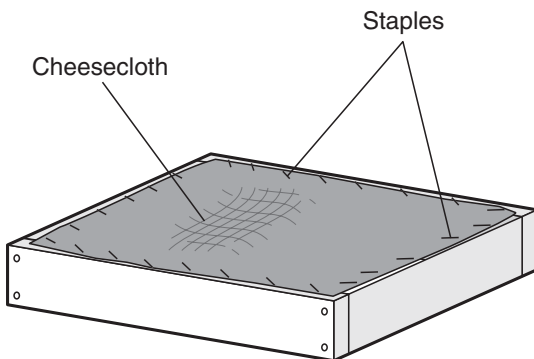


“miniature lawns” will be kept next to each other to maintain the same environment, each receiving an equal amount of light and being kept at the same temperature.

The variable in this project is the exposure of one lawn to severe salt water flooding, and the other to fresh water flooding.

Locate two large rectangular dishpans, used for washing dishes.

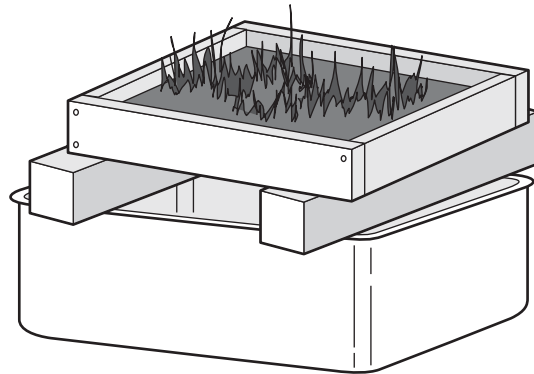
With several pieces of 1×2 wood and small nails (or screws), construct two rectangular frames that fit inside the dishpans. Cut a rectangular piece of cheesecloth to cover a frame. Staple the cheesecloth to the wooden frame, keeping it pulled tight. Repeat for the other frame. Now, turn the frames upside down and fill them with potting soil. The cheesecloth holds the potting soil in the frames, but it allows excess water to pass through.



Place the two dishpans in a warm, well-lit area, but not in direct sunlight. Across the top of each dishpan, lay two pieces of wood, and set a wooden frame over each one. The pieces of wood will support the frames over the dishpans. Pour some grass seed in a kitchen measuring cup, and then spread the seeds out on the soil of one of the frames.

Pour an equal amount of seed into the cup, and spread over the soil in the second frame. Lightly cover the seeds with soil and moisten the soil in the frames.

Make observations daily and keep the soil moist (but not soaked), watching for germination. Equal amounts of water should be given to each lawn frame. Allow the grass to grow until the blades are around one to two inches tall. When that happens, continue to the next step.



Fill four 1-gallon plastic milk or water jugs with tap water. To two of the jugs, add a synthetic sea salt mix, as per the instructions on the package. These mixes are available at science shops and through science catalogs from your school science teacher. They are inexpensive. The mix contains all the essential major and minor elements to create a solution that closely matches ocean water.

Remove the two wooden supports on one flat and lower it into the dishpan. Slowly, so you don't cause erosion of the soil, pour the two gallons of salt water solution into the dishpan. Leave the water in the pan for one hour, and then pour it off. You can save the solution by using a funnel and pouring it back into the bottles. Lift the frame out of the

dishpan and place the wood supports back under it, so the soil can drain.

Similarly, lower the other lawn frame into its dishpan and flood it with two gallons of fresh water. Let it sit for one hour, and then pour off the water and place the supports back under the frame.

Allow the lawn frames to dry for two days. Make observations, looking for any changes in grass (color, turgor, and so forth) Record your observations. If no differences are observed, repeat the flooding procedure on the third day. Then, again allow to dry for three days. Continue to repeat the flooding and drying process until you see an observable difference.

Results

Write down the results of your experiment. Document all observations and data collected.

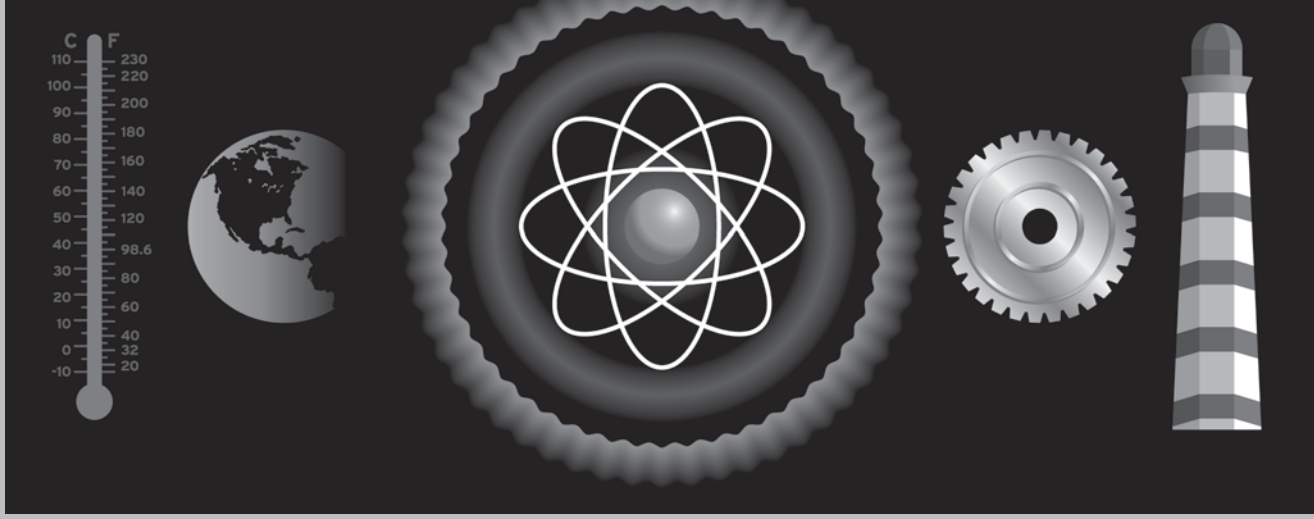
Conclusion

Come to a conclusion as to whether or not your hypothesis was correct.



Something More

1. If a lawn is killed by salt water flooding, can the home owner simply replant grass seed on the lawn once the flooding has passed, or is the soil made unfit for growing new plants? If the soil is unfit, how can it be cleared of salt and made ready to support life again? Should a home owner turn on his lawn sprinklers after a flood to dilute and wash the salts and other materials left by the sea water?
2. Is one type of seed more tolerant of salt water flooding? This would be important to know for landscapers and home owners in seashore communities.
3. Does pouring salt in the cracks in a sidewalk or driveway kill any grass or weeds that grow there? If so, this would be a safe way to kill unwanted weeds, because salt is not a hazard to people or pets.



Project 2

Who's Home?

Determining whether or not organisms other than birds live in birds' nests

Suggested Entry Categories

- Environmental Science
- Microbiology
- Zoology

Purpose or Problem

The purpose is to determine if a bird's nest is home to more organisms than just birds.

Overview

The Earth is teeming with life. Just think how many things are alive within 100 feet of where you are right now: worms in the ground, flowers, trees, grasses, an insect on a window screen, a microscopic mite on your pillow, mold on a piece of bread left uncovered in the kitchen, perhaps even a family member in the next room. You may hear the peaceful singing of a bird building a nest outside your window.

Birds lack the carpentry skills of humans, and they obviously don't have the use of arms or hands. Yet, they are quite capable of

constructing nests that are structurally sufficient for the laying of eggs and raising their young.

Nature provides all the nest-building materials a bird needs: twigs, feathers, animal hair, straw, moss, leaves, pebbles, blades of grass, and even some items provided by humans—a piece of yarn, string, or paper.

Because nest building materials come from nature, and life is abundant all around us, do you think other things are living in birds' nests besides birds?

Hypothesis

Hypothesize that you can find other forms of life besides birds in a bird nest.

Materials' List

- Bird nest containing baby birds
- Desk lamp that uses a standard 60 to 75 watt incandescent bulb
- Large funnel
- Clear jar about the size of a drinking glass
- High-power hand lens (magnifying glass)
- Microscope
- Small plastic bag
- Ten petri dishes with agar

Procedure

Scout around the trees on your property or in your neighborhood and look for a bird's nest with baby birds inside. The nest must be within reach or able to be easily and safely retrieved (you don't want one that is 50 feet in a tree top).

Once you locate a suitable nest, watch it once or twice a day, waiting for the day when the last baby bird leaves the nest. Do not get too close or disturb the nest in any way.

As soon as possible after you see all the birds are gone and the nest is no longer used by the mother bird, carefully remove the nest and place it in a plastic bag.

Take the nest home (or to school), but do not take it inside your house, just in case it contains insects or microscopic life that would not be good to have inside your home. Set the nest on a picnic table, a portable card table, or on a workbench in a garage. To collect tiny insects that may be living in the nest, place a large-mouth funnel in a clear jar. Then, set the nest in the mouth of the funnel. Position a desk lamp over the top of the nest, but keep a space of several inches between the lamp's bulb and the nest to prevent the nest from getting hot. The incandescent bulb in the desk lamp should be about 60 or 75 watts. The heat from the bulb may drive any insects down into the glass, as they try to escape the heat. Leave the bulb on for one hour, and then carefully examine the glass for anything that has been collected. During the time the light is on, do not leave it unattended. Watch that the nest is not becoming too hot (to avoid a fire hazard and

Results

Write down the results of your experiment. Document all observations and data collected.

Conclusion

Come to a conclusion as to whether or not your hypothesis was correct.



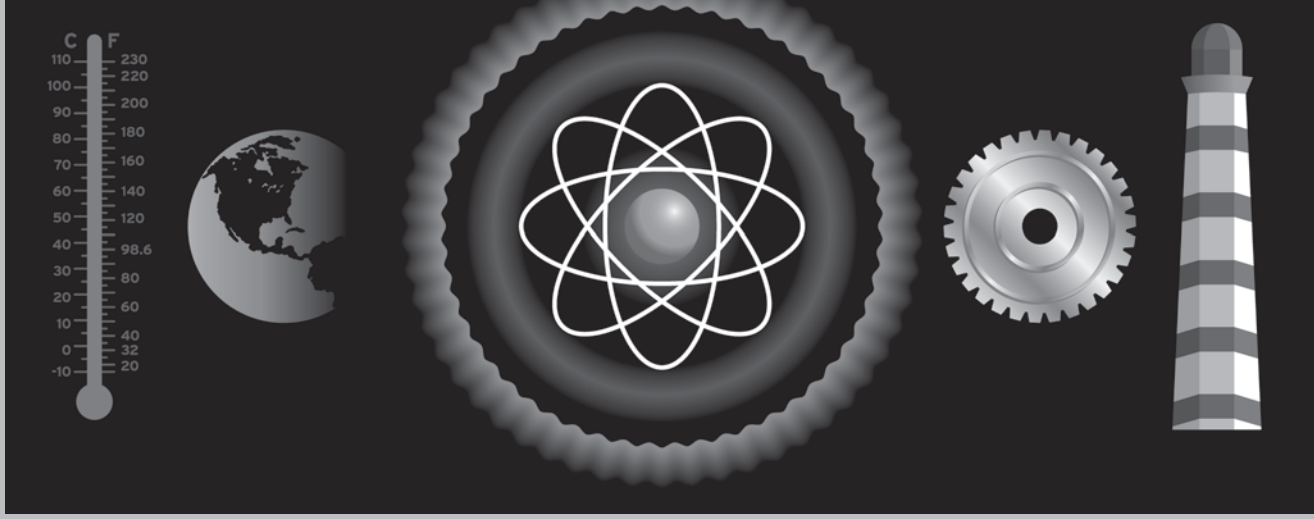
harming anything that may be living in the nest). Use a high-power magnifying glass to examine any material that falls into the jar. Attempt to identify the organisms using field guides and other reference materials.

Next, check for the presence of smaller organisms in the nest. Do this by taking ten pieces from different locations on the nest and wiping them several times on agar in petri dishes. Cover the petri dishes and place them in a warm, dark location. After two weeks, examine each petri dish under a microscope. Never open any of the petri dishes once they have been closed. Eventually, when the project is over, dispose of the petri dishes, continuing to keep them sealed shut.

Something More

1. Can you locate other similar nests in your area that would indicate they were built by the same species of bird? The mother bird, the structure of the nest, and the size and designs on the egg shells will help you identify the species of bird using the nest. A good book on birds will be necessary to help you identify the species. Then, run the same tests as you did previously. Are the same organisms found in these nests?
2. What else did you find in the nest: leftover food, a piece of egg shell?
3. What is the composition of the nest? Can you identify other materials used making the nest?
4. How are nests adapted for rain? How are they adapted to ward off attacks from other animals?

This page intentionally left blank



Project 3

Go with the Flow

Lighthouses are cylindrically shaped, so they can structurally withstand high-velocity winds

Suggested Entry Categories

- Earth Science
- Engineering
- Environmental Science
- Physics

Purpose or Problem

Lighthouses must be built along the coast and they must be tall, but that subjects these structures to fierce winds. Builders have learned to make the shape of lighthouses round, causing air to flow around them with less resistance, and allowing them to withstand strong winds.

sample content of 46 Science Fair Projects for the Evil Genius

- [download online The Vanishing Point pdf](#)
- [Fire in the Hole: Stories online](#)
- [click Alice's Adventures in Wonderland and Through the Looking Glass pdf, azw \(kindle\), epub](#)
- [**download A Wizard of Mars \(Young Wizards, Book 9\) \(International Edition\) pdf, azw \(kindle\)**](#)
- [download The World Turned Upside Down](#)

- <http://flog.co.id/library/Born-Standing-Up--A-Comic-s-Life.pdf>
- <http://cavalldecartro.highlandagency.es/library/Fire-in-the-Hole--Stories.pdf>
- <http://growingsomeroots.com/ebooks/Living-Simply-with-Children--A-Voluntary-Simplicity-Guide-for-Moms--Dads--and-Kids-Who-Want-to-Reclaim-the-Bliss>
- <http://betsy.wesleychapelcomputerrepair.com/library/The-Reality-of-Being--The-Fourth-Way-of-Gurdjieff.pdf>
- <http://junkrobots.com/ebooks/Une-pi--ce-mont--e.pdf>