

Hydroponics Science Fair Projects

Hydroponics Science Fair Projects: A Guide to Growing Success

Introduction:

Want to wow the judges at your next science fair? Tired of the same old baking soda volcanoes and static electricity experiments? Then look no further! This comprehensive guide dives deep into the fascinating world of hydroponics, offering a wealth of exciting and innovative science fair project ideas. We'll explore the science behind hydroponic gardening, provide step-by-step instructions for several projects suitable for different skill levels, and offer tips for presenting your research effectively. Prepare to cultivate not just plants, but also a winning science fair project!

I. Understanding the Science Behind Hydroponics:

Hydroponics, the art of growing plants without soil, is a fascinating blend of botany, chemistry, and engineering. Instead of soil, plants are grown in a nutrient-rich water solution, allowing for precise control over their environment. This offers unique advantages for scientific exploration. Understanding the fundamental principles is crucial for crafting a successful science fair project.

Nutrient Solutions: The precise balance of essential nutrients (macronutrients like nitrogen, phosphorus, and potassium, and micronutrients like iron and zinc) is critical for plant growth. Different nutrient ratios can impact growth rates, yield, and even plant morphology. A science fair project could investigate the optimal nutrient ratio for a specific plant species.

pH Levels: The acidity or alkalinity of the nutrient solution (measured by pH) significantly affects nutrient uptake. Plants have specific pH ranges where they thrive. Experimenting with different pH levels and observing their impact on plant growth provides excellent project material.

Light Cycles: Light is crucial for photosynthesis, the process by which plants convert light energy into chemical energy for growth. Experimenting with different light intensities, durations, and wavelengths (e.g., using different colored LED grow lights) can reveal fascinating results.

Water Quality: The purity of the water used in hydroponic systems is crucial. Contaminants can inhibit plant growth or even cause diseases. Investigating the effects of different water sources or purification methods on plant health is a worthy project.

Oxygenation: Adequate oxygen is vital for root health. Projects can focus on different aeration techniques (e.g., air pumps, water circulation) and their effects on root development and plant growth.

II. Hydroponic Science Fair Project Ideas:

Here are several project ideas, categorized by complexity level:

A. Beginner-Level Projects:

1. Comparing Growth in Different Hydroponic Systems: This project compares the growth of the same plant species (e.g., lettuce or basil) in different hydroponic systems (e.g., deep water culture, wick system, NFT). The focus is on understanding the strengths and weaknesses of each system.
2. The Effect of Light Intensity on Plant Growth: This project involves growing the same plant under different light intensities (e.g., using different wattage LED grow lights). Measure plant height, leaf area, and biomass to determine the optimal light intensity.
3. The Effect of Nutrient Concentration on Plant Growth: This project investigates the impact of varying nutrient solution concentrations on plant growth parameters. Carefully controlled experiments ensure reliable results.

B. Intermediate-Level Projects:

4. Investigating the Effects of pH on Nutrient Uptake: This project focuses on measuring plant growth at different pH levels within the plant's tolerance range. This requires precise pH control and regular monitoring.
5. Comparing the Growth of Different Plant Species in a Hydroponic System: This project explores the specific nutrient and environmental requirements of different plant species grown under identical hydroponic conditions.
6. The Effect of Different Watering Schedules on Plant Growth: This experiment explores the impact of different watering frequencies (e.g., daily, every other day) on plant growth and water usage efficiency.

C. Advanced-Level Projects:

7. Developing a Closed-Loop Hydroponic System: This project involves designing and building a self-sustaining hydroponic system that recycles water and nutrients. This is a challenging project requiring advanced knowledge of hydroponics and engineering.
8. Investigating the Use of Recycled Water in Hydroponics: This project explores the feasibility and safety of using recycled greywater (e.g., from showers or laundry) in hydroponic systems after proper treatment.
9. The Impact of Different Growing Media on Plant Growth in a Hydroponic System: Explore the use of alternative growing media like coconut coir or rockwool in comparison to traditional methods like clay pebbles.

III. Presenting Your Science Fair Project:

A well-structured presentation is crucial for success. Your project should include:

Abstract: A concise summary of your project's purpose, methods, results, and conclusions.

Introduction: Background information on hydroponics and your specific research question.

Materials and Methods: A detailed description of your experimental setup, materials used, and procedures followed.

Results: Clear presentation of your data, using tables, graphs, and charts.

Discussion: Interpretation of your results, comparison to existing literature, and discussion of limitations.

Conclusion: Summary of your findings and their implications.

Bibliography: A list of all sources cited.

Project Example: "The Effect of Light Intensity on Lettuce Growth in a Deep Water Culture System"

Introduction: Briefly introduces hydroponics and the importance of light for plant growth. States the research question: How does varying light intensity affect the growth of lettuce in a deep water culture system?

Materials and Methods: Details the setup of the deep water culture system, the type of lettuce used, the different light intensities used (e.g., using different wattage LED grow lights), and the parameters measured (e.g., plant height, leaf area, biomass).

Results: Presents data in tables and graphs showing the relationship between light intensity and the measured parameters.

Discussion: Analyzes the results, explaining why higher or lower light intensities might have led to different growth rates. Discusses limitations of the study and suggests areas for future research.

Conclusion: Summarizes the findings and states the conclusion regarding the optimal light intensity for lettuce growth in a deep water culture system.

FAQs:

1. What are the best plants for hydroponic science fair projects? Lettuce, basil, and spinach are excellent choices due to their fast growth and relative ease of cultivation.
2. How much does a hydroponic system cost? Costs vary greatly depending on the complexity of the system. Simple systems can be built for under \$50, while more complex systems can cost several hundred dollars.
3. How long does a hydroponic science fair project take? This depends on the project's complexity and the plant's growth cycle. Allow at least 4-6 weeks for noticeable results.
4. What are the safety precautions for hydroponic projects? Always wash your hands after handling plants or nutrient solutions. Avoid direct skin contact with concentrated nutrient solutions.
5. Where can I buy hydroponic supplies? Hydroponic supplies can be purchased online from retailers specializing in hydroponics or at local garden centers.
6. Can I use tap water in my hydroponic system? Tap water may contain minerals and chemicals that can harm your plants. It's best to use distilled or filtered water.
7. What if my plants don't grow well? Troubleshooting involves checking nutrient levels, pH, light intensity, and oxygenation.
8. How can I make my science fair presentation more engaging? Use visuals, such as photos and

videos, to showcase your project.

9. Are there any online resources to help me with my hydroponic science fair project? Yes, numerous websites and YouTube channels offer tutorials and information on hydroponics.

Related Articles:

1. Beginner's Guide to Hydroponics: A comprehensive introduction to hydroponic gardening.
2. Different Types of Hydroponic Systems: A comparison of various hydroponic systems.
3. DIY Hydroponic Systems: Instructions on building your own hydroponic system.
4. Hydroponic Nutrient Solutions: A Complete Guide: Explaining the importance of nutrient solutions.
5. Troubleshooting Common Hydroponic Problems: Tips for solving common hydroponic issues.
6. Hydroponics for Beginners: A Step-by-Step Guide: A simple guide for beginners.
7. The Science of Hydroponics: A Deep Dive: A more advanced look at the scientific principles.
8. Sustainable Hydroponics: Growing Food Responsibly: Focuses on environmentally friendly practices.
9. Hydroponics vs. Soil Gardening: A Comparison: A detailed comparison of the two methods.

hydroponics science fair projects: The Complete Idiot's Guide to Science Fair Projects

Nancy K. O'Leary, Susan Shelly, 2003 Explains what the scientific method is and gives step-by-step directions for more than 50 projects and experiments using everyday items, for everyone from beginners to advanced students.

hydroponics science fair projects: 100 Amazing First-Prize Science Fair Projects

Glen Vecchione, 2005 This book is a good starting place for finding successful science-fair projects.--School Library Journal Can provide needed direction to parents and students facing looming classroom deadlines.--The Los Angeles Times Offers a real variety to young scientists.--Parent Council(R), Selected as Outstanding Any kid can be a winner, and take top honors at the school science fair, by picking one of these 100 proven first-place projects. Among the cool ideas: demonstrate the action of magnetic fields, make a moon box, build ant architecture, and measure static electricity. Plus, there's plenty of fun in creating homemade perfume and erupting volcanoes; doing a bubble gum plant graft; and building a big green solar machine. Youngsters will find plenty of hints for crafting eye-catching displays, too.

hydroponics science fair projects: The Complete Workbook for Science Fair Projects

Julianne Blair Bochinski, 2004-12-15 Your personal coach and game plan for creating a unique and award-winning science fair project Developing a science fair project from the ground up can be a daunting task--and today's science fairs are more competitive than ever before. The Complete Workbook for Science Fair Projects takes you step by step through the entire process of brainstorming, finding, completing, and submitting an award-winning science fair project of your very own. The special features of this easy-to-use, interactive workbook include: Complete instructions and fun, meaningful exercises to help you develop a science fair project idea from scratch Expert advice on choosing and researching a topic, finding a mentor, conducting an experiment, analyzing your findings, putting together a winning display, and much more Inspiring stories of real projects that show how students solved particular problems This ingenious guide also helps you prepare to deliver a top-notch oral presentation and answer questions from science fair judges. Plus, you'll find sample project journal worksheets, a handy list of scientific supply companies, and lots of space to record your thoughts and ideas as you work on your project. Today's exciting world of science fairs and contests offers many great opportunities. With The Complete Workbook for Science Fair Projects, you'll learn to think like a scientist and create a more effective, impressive science fair

project--opening the door for an amazing science journey!

hydroponics science fair projects: Science Fair Projects For Dummies Maxine Levaren, 2011-05-04 Uh-oh, now you've gone and done it, you volunteered to do a science fair project. Don't sweat it, presenting at a science fair can be a lot of fun. Just remember, the science fair is for your benefit. It's your chance to show that you understand the scientific method and how to apply it. Also, it's an opportunity for you to delve more deeply into a topic you're interested in. Quite a few scientists, including a few Nobel laureates, claim that they had their first major breakthrough while researching a science fair project. And besides, a good science fair project can open a lot of doors academically and professionally—but you already knew that. Stuck on what to do for your science project? This easy-to-follow guide is chock-full of more than 50 fun ideas and experiments in everything from astronomy to zoology. Your ultimate guide to creating crowd-pleasing displays, it shows you everything you need to know to: Choose the best project idea for you Make sure your project idea is safe, affordable, and doable Research, take notes, and organize your facts Write a clear informative research paper Design and execute your projects Ace the presentation and wow the judges Science fair guru Maxine Levaren gives walks you step-by-step through every phase of choosing, designing, assembling and presenting a blue ribbon science fair project. She gives you the inside scoop on what the judges are really looking for and coaches you on all the dos and don'ts of science fairs. And she arms you with in-depth coverage of more than 50 winning projects, including: Projects involving experiments in virtually every scientific disciplines Computer projects that develop programs to solve a particular problem or analyze system performance Engineering projects that design and build new devices or test existing devices to compare and analyze performance Research projects involving data collection and mathematical analysis of results Your complete guide to doing memorable science projects and having fun in the process, *Science Fair Projects For Dummies* is a science fair survival guide for budding scientists at every grade level.

hydroponics science fair projects: Science Fair Projects, Grades 5 - 8 Rushin, 1999-03-01 This instructional book gets the teacher vote for a blue ribbon! Nine units cover all of the steps that students will need to follow when preparing science fair projects. Sections include choosing a prompt question, conducting research, designing a study, drawing result conclusions, and presenting findings. A project time line, standard form letters, and two additional units provide helpful information for teachers and parents. Mark Twain Media Publishing Company specializes in providing captivating, supplemental books and decorative resources to complement middle- and upper-grade classrooms. Designed by leading educators, the product line covers a range of subjects including mathematics, sciences, language arts, social studies, history, government, fine arts, and character. Mark Twain Media also provides innovative classroom solutions for bulletin boards and interactive whiteboards. Since 1977, Mark Twain Media has remained a reliable source for a wide variety of engaging classroom resources.

hydroponics science fair projects: Hydroponics J. Benton Jones, Jr., 1997-06-09 With over 45,000 acres of greenhouse vegetation currently being grown hydroponically throughout the world, hydroponics has become one of the most rapidly expanding new areas of plant research. Although growing plants without soil has been practiced since ancient times, hydroponics—the growing of plants specifically in water or nutrient solutions—has shown itself to be the most cost-effective way of maximizing yield, eliminating plant disease, minimizing labor costs and getting the most out of limited land resources. It's both an economically and ecologically sound approach to field-crop production and soil management. Successfully practicing hydroponics, however, requires a working knowledge of the mechanics of plant growth and a firm grasp of the hydroponics process. *Hydroponics: A Practical Guide for the Soilless Grower* clearly explains the basics of plant growth and development, the different methods of preparing and using hydroponic nutrient solutions, and hydroponic options for various environmental conditions. It gives the reader instructions for simple experiments and a number of helpful charts, tables and illustrations. Completely up-to-date, the book also describes, in detail, all the latest techniques for hydroponic growing. It addresses new challenges in the field such as growing food for astronauts, practicing hydroponics in inhospitable

environments and updating nutrient element supplies for the demands of the next century. It's an ideal guide for anyone interested in plants and how they grow-from casual hobbyists and students to commercial growers and professional plant researchers.

hydroponics science fair projects: Botany Dan Keen, Robert L Bonnet, 1989-09-01 Includes projects to encourage students to explore the plant sciences, from germination and photosynthesis to hydroponics

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hydroponics science fair projects: Last Minute Science Fair Ideas - Due in a Week or More... Experiland, 2010-09-23 Have you ever wondered how a telescope brings objects closer or how cameras take pictures? How boats float or aeroplanes fly? All of these seemingly complicated things can be explained by basic science. With the help of this book, you will construct many weird, wonderful and wacky experiments that you can have hours of fun with! Is the deadline for your science fair project quickly approaching? Not to worry, the 'Last Minute Science Fair Ideas' series is written in an easy to follow format that will guide you to create an exciting science project for the upcoming fair. The science projects in each of the books of this 4-volume series are conveniently sorted according to the approximate time required to complete each experiment. The 50 projects contained in this science experiment e-book cover a wide range of scientific topics; from Chemistry and Electricity to Life Sciences and Physics... there are even experiments on earth science, astronomy and geology all designed for science students from grade 1 to 8! With this book, you are sure to find a project that interests you. When you are interested in a certain science topic, you will have more fun, and learn more, too! Amongst many others, you will make a simple astrolabe to measure the altitude of objects in the night sky, make dirty water pure and drinkable to understand how evaporation & condensation works, make beautiful patterns on a wall to experiment with sound waves, and build a 'Franklin bells' device for detecting high voltage lightning storms and learn about static electricity! Other fun experiments include: growing your own crystals along a piece of string, making your own homemade perfume, measuring the extend of creeping soil on hillsides, making a water barometer to measure the air pressure, checking the wind speed with your own anemometer, building your own rain alarm, building your own foxhole radio, sending Morse code signals with your own telegraph, mummifying an orange, growing plants in your own hydroponic garden, testing the effects of acid rain on ocean life, studying the complete life cycle of a meal worm and many, many more! When making these gadgets, you'll discover that science is a part of every object in our daily lives, and who knows, maybe someday you will become a famous inventor too! Designed with safety in mind, most of the items you will need for the experiments, such as jars, aluminium foil, scissors and sticky tape, you can find around your home. Others, such as magnets, lenses or a compass, you will be able to buy quite cheaply at a hobby shop or hardware store.

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hydroponics science fair projects: **Self-Sufficiency** Abigail Gehring, 2015-07-07 A Complete Guide to Baking, Carpentry, Crafts, Organic Gardening, Preserving Your Harvest, Raising Animals, and More! The inspiring guide to back to basics living, now fully updated! Now, more than ever, people across the country are turning toward simpler, greener, and quieter ways of living—whether they're urbanites or country folk. Following in the footsteps of Back to Basics and Homesteading, this large, fully-illustrated book provides the entire family with the information they need to make the shift toward self-sufficient living. Self-Sufficiency provides tips, advice, and detailed instructions on how to improve everyday life from an environmentally and organic perspective while keeping the focus on the family. Readers will learn how to plant a family garden and harvest the produce; can fruits and vegetables; bake bread and cookies; design interactive and engaging "green" projects; harness natural wind and solar energy to cook food and warm their homes; boil sap to make maple syrup; and build treehouses, furniture, and more. Also included are natural crafts readers can do with their kids, such as scrapbooking, making potato prints, dipping candles, and constructing seasonal decorations. Whether the goal is to live entirely off the grid or just to shrink their carbon footprints, families will find this book a thorough resource and a great inspiration.

hydroponics science fair projects: **Fun & Easy Science Projects: Grade 5** Experiland, 2010-09-23 Science certainly does not need to be complicated formulas, heavy text books and geeky guys in white lab coats with thick glasses. Science can be really simple and is actually only about understanding the world you live in! Science experiments are an awesome part of science that allows you to engage in cool and exciting hands on learning experiences that you are sure to enjoy and remember! By working through the science projects in this book, you will learn about science in the best possible way - getting your hands dirty & doing things yourself! Specially chosen to appeal to kids in grade 5, each experiment answers a particular question about a specific category of science and includes an introduction, list of the materials you need, easy-to-follow steps, an explanation of what the experiment demonstrates as well as a learn more and science glossary section! Each of these easy-to-understand sections helps explain the underlying scientific concepts to kids and will inspire them to create their own related experiments and aid in developing an inquisitive mind. Amongst many others, you will construct your own moon box to understand how the lunar cycles works, make matchsticks move without touching them using the principles of forces & motion, drawing colours from black ink using basic 'chromatography', and remove static charges in clothing by grounding them to learn about the attraction & repulsion forces of static electricity! Other fun experiments include making your own guitar out of an ordinary shoebox, propelling a toy boat with the power of air pressure, calculating the viscosity factor of various liquids, using chemistry to make your own homemade perfume, making your own refrigerator powered by evaporation and many, many more! The 40 projects contained in this science experiment e-book

cover a wide range of scientific topics; from Chemistry and Electricity to Life Sciences and Physics... there are even experiments on earth science, astronomy and geology all designed for young students in grade 5! With this book, you are sure to find a project that interests you. When you are interested in a certain science topic, you will have more fun, and learn more, too! Designed with safety in mind, most of the items you will need for the experiments, such as jars, aluminium foil, scissors and sticky tape, you can find around your home. Others, such as magnets, lenses or a compass, you will be able to buy quite cheaply at a hobby shop or hardware store.

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hydroponics science fair projects: Resources for Teaching Middle School Science Smithsonian Institution, National Academy of Engineering, National Science Resources Center of the National Academy of Sciences, Institute of Medicine, 1998-03-30 With age-appropriate, inquiry-centered curriculum materials and sound teaching practices, middle school science can capture the interest and energy of adolescent students and expand their understanding of the world around them. Resources for Teaching Middle School Science, developed by the National Science Resources Center (NSRC), is a valuable tool for identifying and selecting effective science curriculum materials that will engage students in grades 6 through 8. The volume describes more than 400 curriculum titles that are aligned with the National Science Education Standards. This completely new guide follows on the success of Resources for Teaching Elementary School Science, the first in the NSRC series of annotated guides to hands-on, inquiry-centered curriculum materials and other resources for science teachers. The curriculum materials in the new guide are grouped in five chapters by scientific area—Physical Science, Life Science, Environmental Science, Earth and Space Science, and Multidisciplinary and Applied Science. They are also grouped by type—core materials, supplementary units, and science activity books. Each annotation of curriculum material includes a recommended grade level, a description of the activities involved and of what students can be expected to learn, a list of accompanying materials, a reading level, and ordering information. The curriculum materials included in this book were selected by panels of teachers and scientists using evaluation criteria developed for the guide. The criteria reflect and incorporate goals and principles of the National Science Education Standards. The annotations designate the specific

content standards on which these curriculum pieces focus. In addition to the curriculum chapters, the guide contains six chapters of diverse resources that are directly relevant to middle school science. Among these is a chapter on educational software and multimedia programs, chapters on books about science and teaching, directories and guides to science trade books, and periodicals for teachers and students. Another section features institutional resources. One chapter lists about 600 science centers, museums, and zoos where teachers can take middle school students for interactive science experiences. Another chapter describes nearly 140 professional associations and U.S. government agencies that offer resources and assistance. Authoritative, extensive, and thoroughly indexed—and the only guide of its kind—*Resources for Teaching Middle School Science* will be the most used book on the shelf for science teachers, school administrators, teacher trainers, science curriculum specialists, advocates of hands-on science teaching, and concerned parents.

hydroponics science fair projects: Tried and Tested Primary Science Experiments Kirsty Bertenshaw, 2019-05-20 The modern world needs more scientists and engineers, and good science education is key to filling this gap. Especially in the current climate of rapid curriculum changes, a lack of emphasis on training can result in unconfident teaching and monotonous lessons. To rectify this, this book offers methods to deliver the National Curriculum aims at primary school in an interesting, hands-on and fun fashion. *Tried and Tested Primary Science Experiments* provides a practical step-by-step guide for all year groups, helping teachers to create more engaging and fun science lessons in the classroom. All experiments are simple to follow, fail-safe and are designed to enthuse and inspire students. It includes: tried and tested guides to running successful science experiments; clear instructions that outline the simple equipment required, how to carry out the experiments and what results to expect; suggestions for adapting each activity to the special needs and interests of the students. Aimed at primary school teachers and trainee teachers, this illustrated guide refers directly to the new curriculum and is an essential resource for every primary classroom.

hydroponics science fair projects: Shift Dana Goldstein, 2023-08-28 WILL THEY LISTEN TO A CHILD BEFORE IT'S TOO LATE? Meet Dax Masters, the coolest science whiz you'll ever come across! At just twelve years old, he's got it all—a passion for hanging out with his friends, dominating video games, and rocking the scientific world. Dax's dreams are as big as his brain, and he's determined to win the sixth-grade science fair and score an exclusive invite to the mind-blowing Innovative Science Convention, where the brightest young minds in the world gather. The twist? Dax's project isn't your average volcano eruption—he's out to shake the world. Armed with undeniable evidence, he's on a mission to show that even the world's top scientists have missed a crucial change in the Earth. Who wouldn't be captivated by a young genius challenging the status quo? Join Dax on his epic quest as he not only has to convince his father his science project is worthy but also take on the challenge of a lifetime to convince the world's best scientists they've got it all wrong. Hold onto your lab coats because Dax Masters is about to turn the scientific community upside down!

hydroponics science fair projects: The Only Woman in the Room Eileen Pollack, 2016-09-06 ONE OF WASHINGTON POST'S NOTABLE NONFICTION BOOKS OF THE YEAR A bracingly honest exploration of why there are still so few women in STEM fields—"beautifully written and full of important insights" (Washington Post). In 2005, when Lawrence Summers, then president of Harvard, asked why so few women, even today, achieve tenured positions in the hard sciences, Eileen Pollack set out to find the answer. A successful fiction writer, Pollack had grown up in the 1960s and '70s dreaming of a career as a theoretical astrophysicist. Denied the chance to take advanced courses in science and math, she nonetheless made her way to Yale. There, despite finding herself far behind the men in her classes, she went on to graduate summa cum laude, with honors, as one of the university's first two women to earn a bachelor of science degree in physics. And yet, isolated, lacking in confidence, starved for encouragement, she abandoned her ambition to become a physicist. Years later, spurred by the suggestion that innate differences in scientific and mathematical aptitude might account for the dearth of tenured female faculty at Summer's institution, Pollack thought back on her own experiences and wondered what, if anything, had

changed in the intervening decades. Based on six years interviewing her former teachers and classmates, as well as dozens of other women who had dropped out before completing their degrees in science or found their careers less rewarding than they had hoped, *The Only Woman in the Room* is a bracingly honest, no-holds-barred examination of the social, interpersonal, and institutional barriers confronting women—and minorities—in the STEM fields. This frankly personal and informed book reflects on women's experiences in a way that simple data can't, documenting not only the more blatant bias of another era but all the subtle disincentives women in the sciences still face. *The Only Woman in the Room* shows us the struggles women in the sciences have been hesitant to admit, and provides hope for changing attitudes and behaviors in ways that could bring far more women into fields in which even today they remain seriously underrepresented.

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Science" STEM Fair Rules and Regulations packet, and additional support documents have been incorporated into this revised STEM Fair Student Journal. Additional thanks are given to the ...

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Plant Systems (PS) The study of plant life cycles, classifications, functions, structures, ...

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