

# **EASTERN MUNICIPAL WATER DISTRICT**

## **SCIENCE FAIR HANDBOOK**

### **FOR WATER-RELATED SCIENCE PROJECTS**



Third Edition 2005

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**\*USE THE GREY BOXES THROUGHOUT THE CD TO FILL IN YOUR ANSWERS AND THEN PRINT UP THE PAGE**

## Introduction

EMWD is proud to bring you this handbook on CD designed to assist you in water-related science fair projects. EMWD consists of the people that make sure you get safe, clean drinkable water and to also make sure that your wastewater is removed and treated in a responsible manner. EMWD employees not only take care of water and wastewater but also promote water education. That is why this handbook is available to be used as a reference guide for your water-related science fair project. EMWD wants to help teachers, parents, and students within our service area to learn about water. School districts within our service area include:

- C Hemet Unified School District
- C Menifee Union School District
- C Moreno Valley Unified School District
- C Murrieta Valley Unified School District
- C Nuvview Union School District
- C Perris School District
- C Perris Union High School District
- C Romoland School District
- C San Jacinto Unified School District
- C Val Verde Unified School District
- C ALL Private Schools within EMWD-s service area

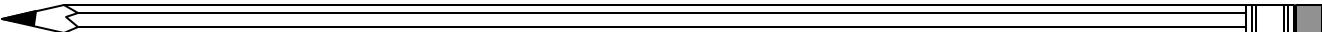


If you are beginning a science fair project for the first time, you are about to embark on a journey. The result of this journey is up to you, as with anything; what you put into it is what you will get out. If you take the time to research, plan, and create your science fair project, it can become a journey in which you have will fun and learn. Do not be intimidated by this project; it is manageable and it can be FUN.

We hope that you will use this handbook as a supplement to instructions given to you by your teacher. It is not meant to take away from any instructions given to you by your teacher. It is only meant to give you an extra bit of help on your science fair project.

The world of water is amazing, and we at EMWD, are excited for you and your project. GOOD LUCK.

## Quick Note to Parents



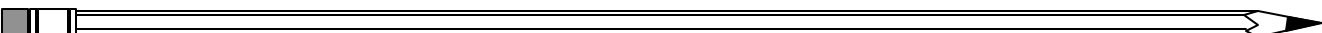
Science fair projects can be rewarding not only for your child but also for yourself. A science fair project can increase your child's confidence and ability to accomplish a great task.

A science fair project should be an enjoyable learning experience. This guide is intended to help simplify your student's project. Included within this guide you will find:

- C ideas for topics
- C ways of obtaining research material
- C order forms for water test kits
- C sample judging forms
- C project planning time-line
- C mock-up display model

As a reminder, **BE SAFE**. Do not allow your child to conduct an experiment that may jeopardize his/her health and or safety. Watch your child closely, direct his/her actions when dealing with any potentially hazardous chemicals or objects. Most of all, have fun and encourage your child to have fun as well.

Good luck to you, the parent. May you learn as much as your child, and may your experience be memorable. Also, thank you for supporting your child's interest in science and specifically water.



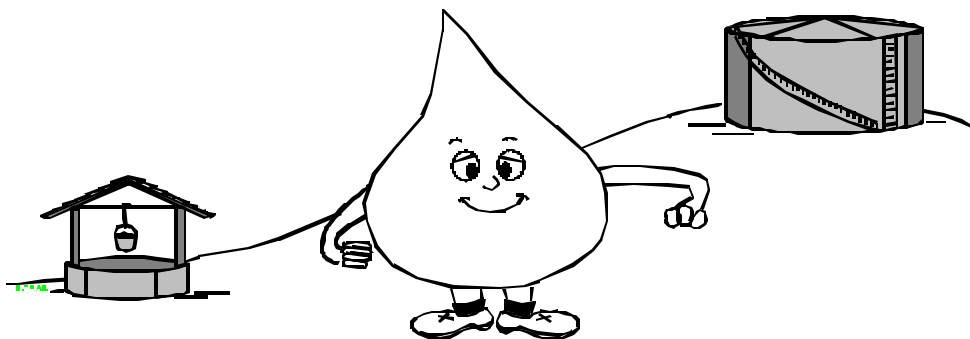
## WHY WATER IS SPECIAL

There are many reasons why you should pick a water-related topic for your science fair project. Water is all around us, and is easily available for observation and testing. Water is non-toxic, non-explosive and non-corrosive, in other words it is a safe substance to work with.

Although we tend to take water for granted, it is actually a very unusual substance with unique and fascinating properties. The more you learn about water the more amazed you will be. For example, water is the only substance which occurs in all three states of matter (solid, liquid and gas) at naturally occurring temperatures. It is unique in that the solid form of water (ice) floats in the liquid form (water). Ice also takes up more room than the same amount of water in liquid form. Water is known as the universal solvent--given enough time, (which might be millions of years), everything will dissolve in water. The reason for this is the unique chemical structure of the water molecule. Water is involved in a huge variety of chemical, physical, and biological interactions because everything will dissolve within it, therefore making it essential to life. Although there are life forms that can live without air, there are none that can survive without water! Water makes the chemical interactions and exchanges needed by all living organisms possible.

Two-thirds of our planet is covered in water. With its presence or its absence water shapes and determines every ecosystem and landform on Earth.

For these reasons and many others, learning about water is useful for everyday life. Anything you learn about water has real and immediate applications. Water is like a doorway that can take you from the world of observation and experience deep into the heart of science.





**“Hands-on, live experiences are empowering, they allow the students to feel connected to their community and source of water.”**

-Malea Ortloff  
Education Specialist  
EMWD

## Picking A WATER-Related Science Fair Topic

In picking a topic that interests you, you may find it easier to work your way down from a general to a very specific topic. We often find that when students choose to do a science fair project on water, they think of testing water for pollutants. We want to encourage you to think about other possibilities as well. There are many different aspects pertaining to water including the physics and chemistry of water, and the ways in which water works with living organisms.

Below are some general topics relating to the classifications of water. We have only listed general topics because we want YOU to decide upon a problem/question for your science fair project. Pick an idea that interests you, do some research, and narrow your topic down to a problem/question that is testable.

### GENERAL TOPICS:

- ◆ WATER IN THE ENVIRONMENT
  - ◆ THE PHYSICS OF WATER
- ◆ WATER PURITY AND QUALITY
  - ◆ WATER AND LIFE

\*\*\*\*\*

### WATER IN THE ENVIRONMENT

oceans  
rivers  
streams  
lakes  
ponds  
wetlands  
erosion

#### CLIMATE AND WEATHER:

rain  
snow

ice  
frost  
dew  
vapor  
mist/fog

CYCLES OF THE BIOSPHERE:

water cycle  
carbon cycle  
oxygen cycle  
nitrogen cycle

## THE PHYSICS OF WATER

GENERAL FORCES OF FLUIDS:

rate of flow  
pressure  
density  
hydraulics  
floating and sinking  
water and light  
reflections from above water  
passage of light through water (refraction)  
rainbows

WATER AND SOUND:

travel faster  
travel farther

SPECIAL PROPERTIES OF WATER:

ice expands  
surface tension  
hydrogen bonding  
tendency for things to dissolve  
capillary action  
viscosity

## WATER PURITY AND WATER QUALITY

### THINGS THAT DISSOLVE IN WATER:

- oxygen
- nitrogen
- copper and iron
- organic matter
- chlorine

Hardness

pH

### WATER POLLUTION:

- acid rain
- rivers
- oceans

## WATER AND LIFE

micro-organisms

plants

animals

humans

### THE WATER INDUSTRY AND MAN-MADE WATER SYSTEMS:

drinking water filtration

wastewater treatment

Metropolitan Water District of Southern California

Eastern Municipal Water District

the water distribution system (provides your tap water)

Eastside Reservoir Project

aqueducts

reservoirs

wells

bottling plants for bottled water

aquariums

bottling plants for distilled water

swimming pools  
backyard ponds  
fish tanks

WATER CONSERVATION:

shorter showers/half-filled tubs  
buckets in the shower  
turning off the faucet while brushing teeth  
use low flow faucet and toilets  
sweep driveway instead of watering  
full load of laundry and dishes  
xeriscape (water-saving gardening)

# Planning Your Project



## The Scientific Method

The scientific method is a systematic way of finding the answers to a question or problem. Scientists use the scientific method when they want to find a solution. All scientists use the same five steps that make up the scientific method.

**The steps of the scientific method are:**

- 1. PROBLEM**
- 2. RESEARCH**
- 3. HYPOTHESIS**
- 4. EXPERIMENT**
- 5. CONCLUSION**

Notice that the actual experiment is only a portion of the scientific method. Just because you do an experiment does not mean that you have completed the scientific method. The main objective of doing a science fair project is to learn and understand the steps of the scientific method and to determine why each step is crucial.

The first step of the scientific method is the **PROBLEM**. You need to define your **PROBLEM**, specify what you are trying to find out, and phrase the **PROBLEM** into a question. When you put your **PROBLEM** into a question, format it so that everyone who sees your project knows what you are trying to find out. State the **PROBLEM** clearly at the beginning of the project and from then on everybody will understand what you are trying to find out.

The second step is **RESEARCH**. In the **RESEARCH** phase of the scientific method you will investigate what is already known about your topic. This is not normal studying like you do when you read a chapter in your history book. The research for a science fair project can include many sources. Of course this includes reading books, but not

just schoolbooks. You can also read newspapers, journals, booklets, and brochures. In addition you can look up your topic on the Internet, (if you have access and your parents= permission.) Or you can do interviews with people who have studied your topic. There are all sorts of ways to do your RESEARCH and it will be a lot more fun if you use different types of resources to complete your RESEARCH.

The third step is forming your **HYPOTHESIS**. A HYPOTHESIS is an educated guess about the outcome of your experiment. Based on your research you are to speculate about the answer to your problem. Forming a strong HYPOTHESIS is a key step in the scientific method because it helps you to set up and plan your EXPERIMENT.

The fourth step of the scientific method is the **EXPERIMENT**. Your EXPERIMENT should be set up to test whether or not your hypothesis is correct. You will not know for sure if your hypothesis is true until you complete your EXPERIMENT. You may find out that your hypothesis was not correct. That is alright, just be sure to carefully plan your experiment from the beginning. Careful planning makes it more likely that your EXPERIMENT will really test for the answer to your problem, whether your hypothesis turns out to be correct or not.

Keeping a journal or log is a very important and required part of your project. Be sure to write down all of the results of your experiment. But just writing down the results is not enough. You need to write down EVERYTHING that you observe or notice about your project. For example, if you are using plants as part of your experiment and you notice that the leaves are turning brown around the edges, write your observations down. You want record to anything that develops within your project and the time and date it occurred, especially during the experiment phase. This documentation will make your conclusion credible.

The last step to the scientific method is your **CONCLUSION**. Did your hypothesis prove to be correct or not? If your hypothesis did turn out to be correct that is GREAT. Why did it turn out correct? Is there another variable that you think could have changed your results? If your hypothesis was incorrect, why do you think it did not turn out the way that you thought it would? (Remember if your hypothesis was not correct that does not disqualify the validity of your experiment. The main objective is to learn and understand the scientific method.) Were there any major surprises that occurred while conducting your experiment? How might you have reduced your probability of error? What did you learn from this experiment? Be sure to clearly explain your answer. If there are other answers that you want to include in your CONCLUSION that is fine also. Your conclusion ties up all of the loose ends and answers questions anybody might have regarding your project. Other questions might arise from your experiment in which you may want to further study your topic, and if so, this is good.

## Types of Science Fair Projects

As you plan your project, you may find it useful to consider the TYPE of science fair project you are doing. Science Projects fall into different categories from the simplest to the most complex.

The simplest type of project involves **observing the environment**. If you are doing this type of project you will be studying your surroundings in order to classify and organize what is there. You will not be CHANGING your environment in any way, you will simply be observing it.

For example: What types of plants can be found in a wetlands?

A more complicated science project involves not just observing what is there but also **collecting and analyzing data**. For example: How many of each type of plant lives in a particular wetlands?

The most complex and interesting type of science project involves **controlled experimentation**. In addition to observing the environment and collecting data about what you observe, you will be CHANGING ONE ASPECT OF THE ENVIRONMENT in order to see what happens. The one thing that you change is called the *manipulated variable*.

Your manipulated variable could be temperature, amount of light, size or shape of a container, the number of plants per pot, the amount of water, etc. It is important to have just one manipulated variable. If you are changing the amount of light your plants get, be careful to use a light source that does not also change the temperature of the water. In controlled experimentation you KEEP EVERYTHING THE SAME EXCEPT FOR THE MANIPULATED VARIABLE. All other variables are kept the same and are called the *controlled variables*.

To continue our example: Let's say you have observed more Duckweed than Water Lilies growing in particular wetlands. You want to know why this is so. You state your problem as a question: **Why is there more Duckweed than Water Lilies in the XYZ Wetlands?** After doing your research, you come up with a hypothesis: **I think there is more Duckweed because the amount of nitrogen in the water is just right for growing Duckweed but not as good for growing Water Lilies.** Now you have to set up your experiment to test this hypothesis. Your manipulated variable will be the amount of nitrogen in the water. Your controlled variables will be everything else: amount of water, water temperature, size and shape of the containers, the number of each type of plants you start with in each container, the amount of light the plants get, and so on. You will have to have several containers each with a different amount of nitrogen in the water. And you will have to measure the growth of the duckweed and water lilies (these are the *responding variables*)

over time. The data you collect will tell you what is the best amount of nitrogen in the water for growing each type of plant. You can then compare that to the amount of nitrogen in the XYZ wetlands and see if your hypothesis was correct.

You will learn the most if you plan your science fair project as a controlled experiment.

In planning your project, you need to consider the following things:

- What am I trying to find out? This is the PROBLEM.
- What do I think the answer to my problem will be? This is the HYPOTHESIS.
- What is the one variable that I plan to change during the experiment?  
(MANIPULATED VARIABLE)
- What are the other variables that I need to keep the same during the experiment?  
(CONTROLLED VARIABLES)
- What is the variable that I think will, or will not, change in response to the manipulated variable?  
(RESPONDING VARIABLE)

<b>Science Fair Project Planning Grid</b>			
Project	Problem:	Hypothesis:	Procedure:
Observation of the Environment			
Collecting and Analyzing Data			
Controlled Experimentation			manipulated variable:
			controlled variables:
			responding variables:

## Science Fair Project Pre-Planning Sheet

So, you need to come up with a topic for a science fair project. Is there anything in your house or in your yard that you are curious about? Have you ever wondered why something works the way it does or how it originated? Choose a topic that YOU like, and are curious about.

List some things that you think you could do a project on. Remember to keep it simple.

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Once you have decided on a topic for your project look in your Science Book to see what information it has on your topic. Other sources you can go to for information include: your teachers, the library, or the Internet (if you have access.) You may also be able to use the Internet at your local library. Be sure to write down everything you find and where you found it. (The author, the title of the book, the year it was written, and the publisher.)

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Have you thought about how you are going to conduct your experiment? Remember to keep in mind how long it is going to take you to set-up your experiment, how long the process of your experiment will take in order for you to get accurate results, and how long it will take for clean-up. For example, if you are going to be growing plants you need to think about the time that it is going to take to plant seeds. Be sure to keep in mind that plants don't grow over night, therefore you need to allow several days or even weeks for your experimental process to be completed. Other experiments might need time to set or to dry. How long do you expect your experiment to take?

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Writing down the procedure that you plan to use is VERY important. This will help you save time and energy by carefully planning your

experiment. It may also help you to come up with simpler steps and help you think about ways to make your experiment safer for yourself, your parents, and your teacher. Keep your procedure in mind now; you will write it down in a little while. When planning your experiment try to think of whose help you're going to need ahead of time. Do you need your parents' help? Yes Do you need your teacher's help or supplies? Yes Do you need help from other people? Yes

BE SURE TO TELL YOUR PARENTS ALL OF YOUR PLANS AND MAKE SURE THAT THEY SAY OKAY. ALSO KEEP YOUR BUDGET IN MIND; YOU DO NOT WANT YOUR EXPERIMENT TO COST BIG BUCKS.

Decide on the title of your project. Remember to keep it simple.

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Don't forget to keep a journal of everything that you do about your science fair project, from start to finish. (It is required) You will be thankful later. (It is required.)

## Science Fair Project Plan

1. I am trying to find out \_\_\_\_\_
2. In question form (also the title) \_\_\_\_\_
3. My hypothesis is \_\_\_\_\_
4. I plan to prove this by (procedure) \_\_\_\_\_
5. Materials I will need \_\_\_\_\_
6. Resources I will use to research this topic and help me to understand my results \_\_\_\_\_

# SCIENCE FAIR TIMELINE

## Science Fair Project Due Date:

Order	Task	Check When Complete
<b>START HERE</b>		
Log everything that you complete in your JOURNAL		
<b>1</b>	Choose a Topic	<input type="checkbox"/>
<b>2</b>	Get Proper Permission (Parents' and Teachers')	<input type="checkbox"/>
<b>3</b>	Do Research	<input type="checkbox"/>
<b>4</b>	More Research	<input type="checkbox"/>
<b>5</b>	Write Down Hypothesis	<input type="checkbox"/>
<b>6</b>	Plan out Experiment Write it Down!	<input type="checkbox"/>
<b>7</b>	Get Materials for experiment (and display)	<input type="checkbox"/>
<b>8</b>	Conduct Experiment	<input type="checkbox"/>
<b>9</b>	Repeat Experiment (optional, but recommended)	<input type="checkbox"/>
<b>10</b>	Make Charts or Graphs (Report Results)	<input type="checkbox"/>
<b>11</b>	Write Conclusion	<input type="checkbox"/>
<b>12</b>	Write Bibliography	<input type="checkbox"/>
<b>13</b>	Make Acknowledgements	<input type="checkbox"/>
<b>14</b>	Put Notebook Together (include introduction, topic, hypothesis, materials, procedure, results, conclusion, and acknowledgments.)	<input type="checkbox"/>
<b>15</b>	Put Display Together	<input type="checkbox"/>

## How EMWD Can Help YOU

Eastern Municipal Water District is dedicated to promoting water conservation and water education. That is why we have put together this guide. There are several levels of assistance available to you from EMWD:

### **For assistance with:**

- ! ideas for topics
- ! research about a topic
- ! help in structuring a project

Contact Malea Ortloff, Education Specialist at (951) 928-3777, Ext. 4405.

### **For assistance with:**

It is to your advantage to contact Malea as early as possible in the course of doing your project. Due to the busy nature of EMWD's Education Program, the assistance you need may not be available at the last minute.

- ◆ Controlled-Variable Experiments (see pages 15-16).

The scientists at EMWD's Water Quality Laboratory are able to assist a limited number of students each school year with the actual experimental portion of a controlled variable science fair project.

Some examples of the types of testing the lab can help with include:

- C bacteria testing
- C plants= response to chemicals
- C testing for substances dissolved in water
- C other

Contact Malea Ortloff, Education Specialist at (951) 928-3777, Ext. 4405.

Contact Malea at least 6 weeks prior to your project due date.

There are a few requirements that a student must complete in order to be considered for assistance by the EMWD Water Quality Lab:



- C The student must COMPLETE the EMWD Lab Application (Page 23).
- C The student must send in the COMPLETED lab application at least **30** days prior to the science fair project due date.
- C The student must be able to show knowledge and prior research on the topic of the science fair project.
- C If a student is selected he/she must comply with the following:
  - C Be prompt to the appointment.
  - C Bring all of the research materials.
  - C Bring a complete procedure plan. (Such as the Science Fair Project Plan included in this guide, Page 19)

Agree to send Malea Ortloff a copy of the Summary of Results and Conclusion after the project has been completed.

(Parents= and Teachers= assistance are required in order to see that this step is completed.)

## EMWD Lab Application

(Does NOT Guarantee Assistance)

You may also request assistance online at: [www.emwd.org](http://www.emwd.org)

Student=s Name: \_\_\_\_\_

Student=s Home Telephone Number: \_\_\_\_\_

Address: \_\_\_\_\_

School: \_\_\_\_\_ School District: \_\_\_\_\_

Teacher=s Name: \_\_\_\_\_ Grade Level: \_\_\_\_\_

Title of Science Project: \_\_\_\_\_

Project Due Date: \_\_\_\_\_

Problem:

\_\_\_\_\_

Research: (list at least 5 sources you have used:)

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

Based on my research, my hypothesis is:

\_\_\_\_\_

### **Experimental Design:**

Materials:

\_\_\_\_\_

Procedure:

\_\_\_\_\_

Manipulated Variable: \_\_\_\_\_

Controlled Variables: \_\_\_\_\_

Responding Variable: \_\_\_\_\_

Application must be received by EMWD AT LEAST 30 days before project due date. A completed application does not guarantee lab assistance. There are a limited number of students that the lab can assist per school year, therefore send your application in early.

Summary of Results and Conclusion **must** be turned in to Lab along with copy of student=s completed report (Teacher=s and Parent=s signature are required).

**If selected in being assisted by the EMWD Water Quality Laboratory, I agree to have my student send EMWD a copy of the Summary of Results and Conclusion.**

Student=s Signature: \_\_\_\_\_

Parent=s Name and Signature: \_\_\_\_\_

\_\_\_\_\_

Teacher=s Name and Signature: \_\_\_\_\_

\_\_\_\_\_

**\*\*\*\*\*EMWD USE ONLY\*\*\*\*\***

Date Received:

Summary of Results:

Results:

Conclusion

## EMWD Pamphlets Available

**California Water Facts:** This pamphlet contains information about rain, snow, water use and water delivery, California water projects, and environmental protection, alternative water sources, and water conservation.

**EMWD Annual Report on Water Quality:** This report on water served during 1997 illustrates how EMWD's water meets the strict standards set by the U.S. Environmental Protection Agency and the California Department of Health Services. Information is provided on the sources of all tap water served by EMWD. The Annual Report includes information on Primary Standards (mandatory health-related standards for drinking water established by the State of California) and Secondary Standards (aesthetic standards for drinking water established by the State of California).

**Henry J. Mills Filtration Plant:** The Mills Filtration Plant treats water imported from Northern California. After treatment at Mills, the water flows through EMWD's distribution system of pipes, pumps, and tanks to homes and businesses in the communities of Moreno Valley, Menifee, Perris, Sun City, Good Hope, Mead Valley, Lakeview, Nuevo, Juniper Flats, Homeland, Green Acres, Romoland, North Canyon Lake, and Quail Valley. This brochure tells the location of the Mills Plant, the source of the water that flows through it, and how the water ends up in your home.

**Water Treatment: Following Nature's Lead:** Examines drinking water treatment processes including aeration and oxidation, flocculation, filtration, and disinfection. Includes a simple graph mapping the steps in water treatment. Provides an overview of water characteristics including hardness, total dissolved solids (TDS), turbidity, pH, taste, and odor. Discusses Metropolitan Water District's five treatment plants located throughout Southern California.

**A Matter of Taste, Perspectives on Water Purity:** Provides an overview of the safety and health issues of drinking tap water. Discusses the benefits and drawbacks of using a home water filtration system.

**How safe is safe? Perspectives on Water Purity:** This is a commentary generated by Dr. Bruce N. Ames, Ph.D., who at the time of writing was chairman of the Biochemistry Department at UC Berkeley. Dr. Ames emphasizes the safety of drinking water compared to other substances we regularly consume.

**A Taste of Quality:** Discusses the safety of drinking water, with an emphasis on the two major disinfection methods used by Metropolitan Water District of Southern California: chlorine and chloramines. Gives the history of and details about, the use of each of these two methods of treating drinking water.



# Eastern Municipal Water District

## Science Fair Pamphlets Order Form

You can also order these on the Internet: [www.emwd.org](http://www.emwd.org)

Student-s Name \_\_\_\_\_

Address \_\_\_\_\_

Home Phone \_\_\_\_\_

Grade Level \_\_\_\_\_

Teacher-s Name \_\_\_\_\_

School Name \_\_\_\_\_

Science Fair Project Topic \_\_\_\_\_

Date \_\_\_\_\_

- California Water Facts
- EMWD Annual Report on Water Quality
- Henry J. Mills Filtration Plant
- Water Treatment: Following Nature-s Lead
- A Matter of Taste, Perspectives on Water Purity
- How Safe is Safe? Perspectives on Water Purity
- A Taste of Quality

Mail to:

**Malea Ortloff** ([ortloffm@emwd.org](mailto:ortloffm@emwd.org))

**Education Specialist**

**Eastern Municipal Water District** ([www.emwd.org](http://www.emwd.org))

**P.O. Box 8300**

**Perris, CA 92572-8300**

**Telephone: (951) 928-3777 extension 4405**

**FAX: (951) 928-6177**

All resources within this form are offered for free. Limited to one of each brochure per student per school year.

## Bibliography

The following is a partial list of books available in the Riverside County Libraries. It is only a general overview of the water-related books that are available, and should be used as a starting point of reference.



Some of the Riverside County Libraries located in EMWD's Service Area are as follows:

**Moreno Valley Library**

(951) 413-3880

**Murrieta Library**

(951) 600-2665

**Paloma Valley Library**

(951) 301-3682

**Perris Library**

(951) 657-2358

**San Jacinto Library**

(951) 654-8635

**Sun City Library**

(951) 679-3534

**Temecula Library**

(951) 600-6263

**Valley Vista Library**

(951) 927-2611

For more information go to the Riverside County Libraries Website:

<http://www.riverside.lib.ca.us/default/>

## **WATER, GENERAL**

**A Drop of Water: A Book of Science and Wonder**, Wick, Walter. New York: Scholastic, 1997.

**Bodies of Water: Fun, Facts, and Activities**, Arnold, Caroline. New York: F. Watts, 1985.

**Children Need Water**, Davis, Wendy M. New York: M. Cavendish, 1988.

**Follow the Water from Brook to Ocean**, Dorros, Arthur. New York: Harper Collins, 1991.

**Junior Science Book of Water**, Peterson, Ottis. Champaign, Illinois: Garrard Publishing Co., 1966.

**The New Water Book**, Berger, Melvin. New York: Crowell, 1973.

**Our Endangered Planet, Rivers, and Lakes**, Hoff, Mary King. Minneapolis: Lerner Publications Co., 1991.

**Rain to Dams**, Twist, Clint. New York: Gloucester Press, 1990.

**The Trip of a Drip**, Cobb, Vicki. Boston: Little. Brown, 1986.

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# Science Fair Display Guidelines

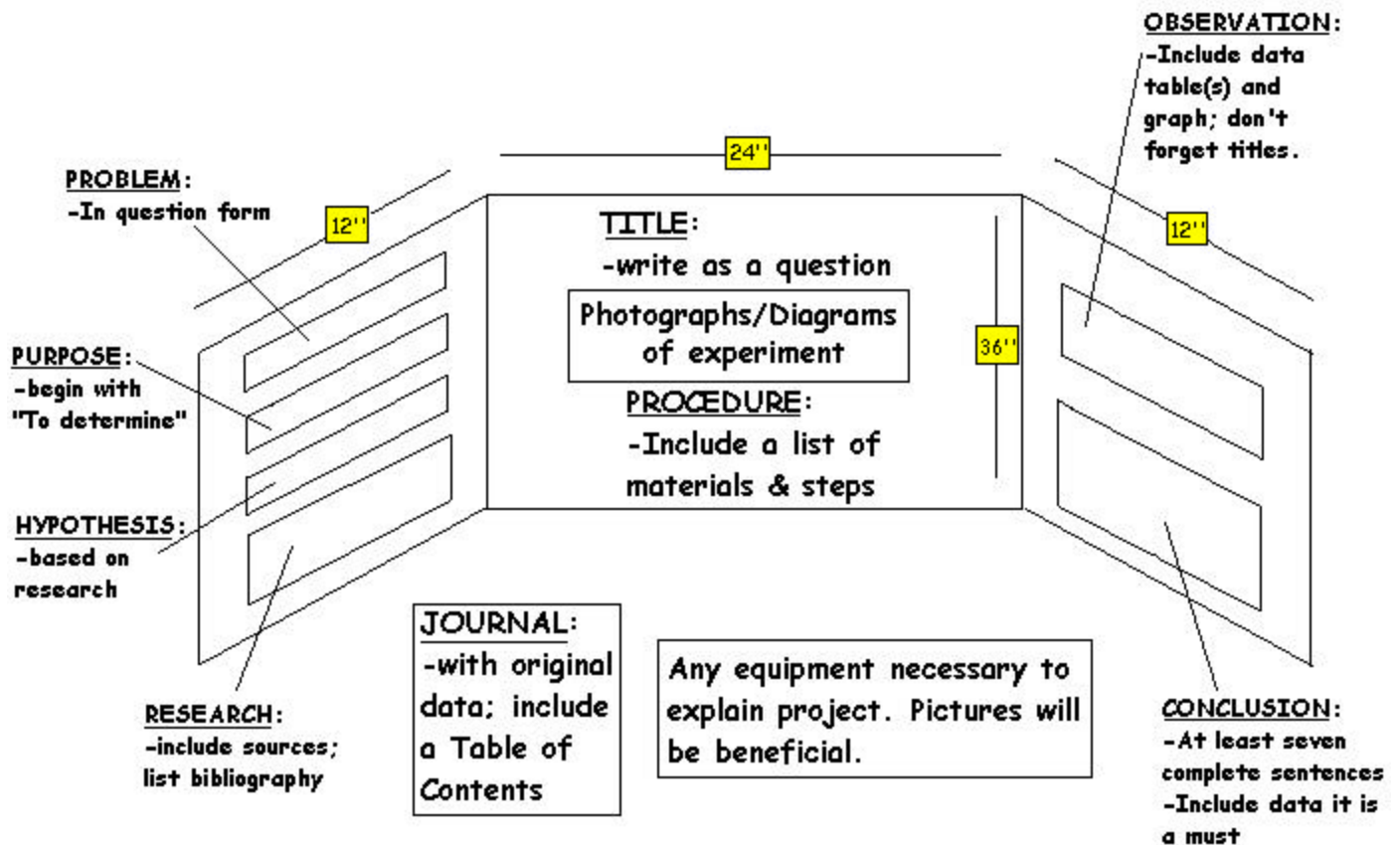
## Recommended Sized of Display:

**48" WIDE and 36" HIGH**

There are precut boards located at many office/school supply stores.

Below is an example board

The highlighted numbers below are the dimensions of the board.  
(the height of the board is 36 inches and the width is 48 inches)



**\* this example display is not to scale**

## The Relationship between Metropolitan Water District of Southern California and Eastern Municipal Water District

The Metropolitan Water District of Southern California (MWD) was founded in 1928 for the purpose of importing Colorado River water into Southern California. MWD provides approximately 60% of the drinking water used by the 18 million people living on the coastal plain between Ventura and the Mexican border. MWD's water supplies come from the Colorado River via the Colorado River Aqueduct and from Northern California via the State Water Project's California Aqueduct.

Metropolitan Water District has 27 customers. These 27 customers are MWD's member agencies--14 cities, 12 municipal water districts, and one county water authority.

You might think of Metropolitan Water District as a water "wholesaler". In addition to bringing water into Southern California, Metropolitan operates five filtration plants to treat the water and make it suitable for drinking, as well as several reservoirs. MWD built and filled Diamond Valley Lake in Hemet for the purpose of storing a six-month's supply of drinking water for Southern California. The Eastside Reservoir will be used in the event that either or both aqueducts' service is interrupted due to an earthquake or other natural disaster, or as a supplemental supply in case of drought.



Eastern Municipal Water District (EMWD) is one of the 27 customers or member agencies of MWD. You might think of EMWD as your local water "retailer". EMWD was formed in 1950 for the purpose of providing water for a (then) lightly populated area of western Riverside county. EMWD was annexed to become a member agency of MWD in 1951. EMWD buys roughly 80% of its water from MWD and sends it through its own distribution system of pumps, pipes, and tanks to homes, businesses and industries within its service area. EMWD also has its own wells for pumping local groundwater, especially in the Hemet and San Jacinto areas.



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## Sample Science Fair Judging Form

NOTICE: The following judging form has been used throughout Southern California. It should be used as a GUIDE for you to evaluate your own project. **Check with your school for the official judging format.**

Student Topic \_\_\_\_\_ Project # \_\_\_\_\_ TOTALS \_\_\_\_\_

### 1A. SCIENTIFIC THOUGHT (45 points - use 1A or 1B but not both)

- |   |   |   |
|---|---|---|
| 1. Both problem and hypothesis are identified and clearly stated.   | 0 | 2 |
| 2. The problem is manageable and capable of being investigated.   | 0 | 2 |
| 3. The hypothesis is derived from the literature search conducted prior the experiment.   | 0 | 4 |
| 4. The procedure for gathering data and making observations is detailed to allow for repetition by others.  | 0 | 5 |
| 5. The experiment is designed so that it yields valid, reliable and accurate data in testing the hypothesis. Variables are identified and controlled. | 0 | 7 |
| 6. The student had used a sufficient size and/or has repeated the experiment to provide sufficient data for analysis.                                 | 0 | 7 |
| 7. Data/observations are organized an summarized using charts, tables, or graphs.   | 0 | 5 |
| 9. Any inconsistencies in the data/observations are discussed.  | 0 | 4 |
| 10. Conclusions formulated are logical, based on the data or observations collected, and relevant to the problem/ hypothesis.                         | 0 | 5 |
| 11. Student demonstrates an understanding of remaining unanswered questions.  | 0 | 2 |

### 1B. ENGINEERING GOALS (45 points)

- |   |   |   |
|---|---|---|
| 9.1. The project has a clear, well-defined objective (problem).   | 0 | 2 |
| 2. The objective reflects knowledge of existing solutions and their limitations.  | 0 | 2 |
| 3.The project reflects knowledge of existing solutions and their limitations.   | 0 | 4 |
| 4. The project addresses an existing or newly created need.   | 0 | 4 |
| 5. The materials/procedure is clearly stated with adequate detail to allow for repetition by others.  | 0 | 2 |
| 6. Accurate and detail data have been collected throughout the development of the solution/device/product.  | 0 | 5 |
| 7. Data/observations are organized and presented in the journal section of the notebook as original entries.  | 0 | 5 |
| 8. A functional, environmentally safe solution/device/product was created. Data/ observations are organized and summarized using charts, tables, or graphs. | 0 | 7 |
|   | 0 | 4 |

10. The solution/device/product has been tested to determine its feasibility and/or effectiveness. 0 5
11. Student show an understanding of remaining unanswered questions and/or suggests future modifications required. 0 2

**Sub total for Page I (Max 45) \_\_\_\_\_**

**Sub total Page 1 (Max 45) \_\_\_\_\_**

CLARITY AND THOROUGHNESS (30 points)

1. Student has prepared an in-depth annotated bibliography which cites sources of information other than encyclopedia and textbooks. 0 1 3 5
2. The complete project is documented in a notebook which is organized, neat, and accurate. 0 1 3 5
3. The project demonstrates a depth and/or breadth of study. 0 1 3 5
4. Through the use of an abstract/ interview, the student demonstrates a clear understanding of the project in summarizing the project goal, procedure, and findings. 0 1 3 5
5. The display reflects the logical progression of the project, in addition to being neat and organized. 0 1 3 5
6. It is evident the student committed considerable time and effort in developing the project. 0 1 3 5

Sub total (Max=30) \_\_\_\_\_

SKILLS (10 points)

1. The student demonstrates the acquisition and use of new skills (laboratory, computational, observation, design.) 0 1 3 5
2. The project was accomplished by the student. 0 1 3 5

Sub total (Max=10) \_\_\_\_\_

CREATIVITY (15 points)

1. The student's project is original, stemming from ideas conceived by the student as opposed to those found in a laboratory text or provided by others. 0 1 3 5
2. The student has used equipment and/or material creatively to obtain data/observations. 0 1 3 5
3. The student shows creative ability or originality in the analysis, interpretation, and application of the data/observations. 0 1 3 5

Sub total (Max=15) \_\_\_\_\_

TOTAL MERIT (5 points)

1. Total merit of the project based on the level of achieving the overall goals of a science fair project. 0 1 3 5

Sub total (Max=5) \_\_\_\_\_

**GRAND TOTAL (MAX 105) \_\_\_\_\_**

## Sample Elementary Level Judging Form

Title of Project \_\_\_\_\_ Total Score \_\_\_\_\_

### I. PROJECT CONTENT / PROCESS SKILLS

- |  |                         |       |
|--|-------------------------|-------|
| A. Clearly states scientific question  | (Problem)               | _____ |
| B. Clearly states an educated hypothesis   | (Hypothesis)            | _____ |
| C. Complete materials list   | (Materials)             | _____ |
| D. Clearly states a complete procedure   | (Procedure)             | _____ |
| E. Evidence of data collection/ observations<br>(tables, graphs, charts, photos, drawings) | (Data/<br>Observations) | _____ |
| F. Clearly states results  | (Analysis of Data)      | _____ |
| G. Interpretation of results/ data explained   | (Conclusion)            | _____ |

### II. CREATIVITY

- A. Exhibits original thought \_\_\_\_\_

### III. DISPLAY

- A. Exhibits clarity, order, good workmanship,  
correct spelling and mechanics \_\_\_\_\_
- B. Reflects neatness and attractiveness \_\_\_\_\_

### IV. RESEARCH

- A. A handwritten journal documenting all of  
the steps in the Scientific Process is included. \_\_\_\_\_

**TOTAL POINTS EARNED** \_\_\_\_\_

## EMWD Comments/ Suggestions Form

We need to know what YOU think. The 1998-1999 school year will be the first year that the EMWD Science Fair Handbook is published. In order to best help our students we are asking for comments and suggestions about our science fair handbook. So please, take a few moments to answer the questions below and send this form back to us.

Please rate how useful the following sections were to YOU in your science fair project planning and experiment.

	Most Useful						Least Useful
WHY WATER IS SPECIAL	5	4	3	2	1	0	
Picking a Water-Related Topic	5	4	3	2	1	0	
Scientific Method	5	4	3	2	1	0	
Science Fair Pre-Planning Sheet	5	4	3	2	1	0	
Science Fair Planning Sheet	5	4	3	2	1	0	
Post-up Timeline	5	4	3	2	1	0	
How EMWD can help you	5	4	3	2	1	0	
Where Your Drinking Water Comes From	5	4	3	2	1	0	
Pamphlets	5	4	3	2	1	0	
Bibliography	5	4	3	2	1	0	
Sample Science Fair Judging Forms	5	4	3	2	1	0	
Vendor/ Test Kit Information	5	4	3	2	1	0	

Additional Comments/ Suggestions:

Optional:

Name \_\_\_\_\_

School \_\_\_\_\_ GradeLevel \_\_\_\_\_

Name of Project \_\_\_\_\_

Thank you for taking the time to fill this form out. Please fold and return this form to Malea Ortloff, Education Specialist at EMWD. Thank you.

## Test Kits/ Materials and Order Forms

The following pages display test kits and experiment materials that can be ordered through various companies. Please contact a specific vendor if you have any questions regarding their products. EMWD is not promoting any specific vendor or product.

Acorn Naturalists: Phone: (800) 422-8886  
(714) 838-4888  
FAX: (800) 452-2802  
(714) 838-5869  
[www.acornnaturalists.com](http://www.acornnaturalists.com)  
[EMailAcorn@aol.com](mailto:EMailAcorn@aol.com).

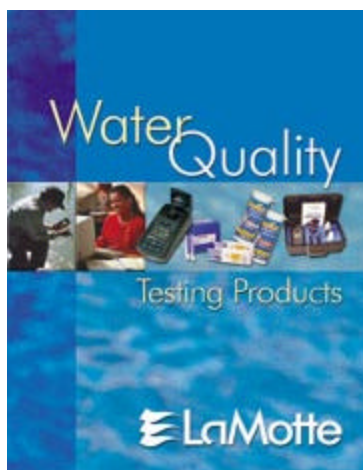
Hach Company: Phone: (970)-669-3050  
FAX: (970)-461-3939  
[www.hach.com](http://www.hach.com)  
[orders@hach.com](mailto:orders@hach.com)

Hanna Instruments: Phone: (888) 426-6222  
FAX: (951) 693-5213  
[www.hannainst.com](http://www.hannainst.com)  
[water@hannainst.com](mailto:water@hannainst.com)  
**Water Analysis & Control Division**  
Hanna Instruments, Inc.  
43180 Business Park Drive, Suite A-201  
Temecula, CA 92590

LaMotte Company: Phone: (800) 344-3100  
FAX: (410) 778-6394  
[www.lamotte.com](http://www.lamotte.com)  
[mkt@lamotte.com](mailto:mkt@lamotte.com)  
Address: P.O. Box 329  
Chestertown, MD 21620

Wards Biology: Phone: (800) 962-2660  
FAX: (800) 635-8439  
[www.wardsci.com](http://www.wardsci.com)  
Address: P.O. Box 92912  
Rochester, NY 14692-9012

Here are some examples of Water Testing Kits...



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This Handbook is dedicated to the teachers, students, and parents in the Eastern Municipal Water District's service area. We hope you will use it, find it helpful, and will share your feedback with us, so we can make future editions even better.

Malea Ortloff  
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Perris, California  
September 16, 2005