

# NFHS ENVIRONMENTAL SCIENCE *WATER PROJECT* MENU

## Guidelines:

- You may do as many of the items (tasks) in the menu as you would like during the given time period
- You may choose any combination of the activities.
- Your goal is 100 points (the grade is based on a 100 point scale). You may earn up to 20 points extra credit.
- You may be as creative as you'd like – but must stay within the guidelines.
- Activities may be turned in at any time prior to, or the day of, the due date.
- Keep track of each activity you complete and when you turn it in – a chart is provided.
- Be sure to check with the guidelines included in this document for each activity before starting and again before turning it in. The point value is the maximum you may earn - you must meet all guidelines.

## APPETIZERS

### CREATE A VENN DIAGRAM [10]

Construct a Venn diagram comparing and contrasting tap water and bottled water.

### OIL SPILL MAP [10]

Mark and label the locations of 10-15 of the worlds' largest oil spills on a world map.

### CREATE A DIAGRAM [20]

Draw a diagram illustrating the steps taken in waste water treatment OR drinking water treatment.

### WINDOW PANE [10]

Follow window pane guidelines and directions to illustrate 9 key terms.

## SALADS

### DEBATE THE WETLANDS [20]

Describe the two sides to the debate on preserving the wetlands. Explain your position.

### TIME LINE OF GULF OIL SPILL [20]

Outline a step by step look at what happened during the first 100 days of the gulf oil spill. Must be hand written. Paper provided.

### PAMPHLET WARNING OF CORAL REEF MISUSE [30]

Explain the coral issues by urging tourist (and others) to preserve the coral reefs.

### WATER ISSUES MIND MAP [30]

Connect water terms with a series of links.



## ENTRÉES

### VIRTUAL WATER LAB [40]

Complete one of two water labs. "Assessing Water Quality", or "When is Water Safe to Drink?"

Complete online assignment and turn in corresponding worksheet.

### WRITE A LETTER [40]

Write a political action letter to an elected official regarding your stance on one of the following water issues: conservation of the Great Lakes; ocean pollution; bottled water

### CREATE A PREZI ON A WATER ISSUE OF YOUR CHOICE [60]

Use the website prezi.com to develop an original presentation on a water issue.

### TASTE TESTING [60]

Conduct a scientific experiment to determine if people can tell the difference between bottled water, and tap water. Must use the scientific method and present your work on a poster, or in a paper.

*[Present your taste testing project to the class via PowerPoint for an additional [20]*

### OIL SPILL RESEARCH PAPER [80]

See detailed instructions

### CLEAN WATER ACT RESEARCH PAPER [80]

See detailed instructions

### YOUR CHOICE [VARIES]

Have your own idea? Explain it in writing  
And determine point value with teacher.

## DESSERTS

### BRING IN AN ARTICLE [5]

Simply cut out, or print out, an article that deals with a water issue.

### BRING IN PLASTIC [5]

Bring in a piece of plastic for the garbage patch bulletin board. It must be clean.

### MAKE RECYCLING POSTER [10]

Create a poster encouraging bottle recycling. It will be placed in the hallways of the school.

### CREATE A RAP OR POEM [10]

Develop an original rap or poem that contains information about one or more of the topics covered in our unit on water.

### THREE FACTS AND A FIB [10]

Write four statements, three true and one false. Include a brief paragraph as to why the fib is a false statement.

### CREATE A POSTER ENCOURAGING WATER CONSERVATION [10]

Create a poster encouraging water conservation and provide examples of how students can conserve.

### CONSTRUCT A COLLAGE [10]

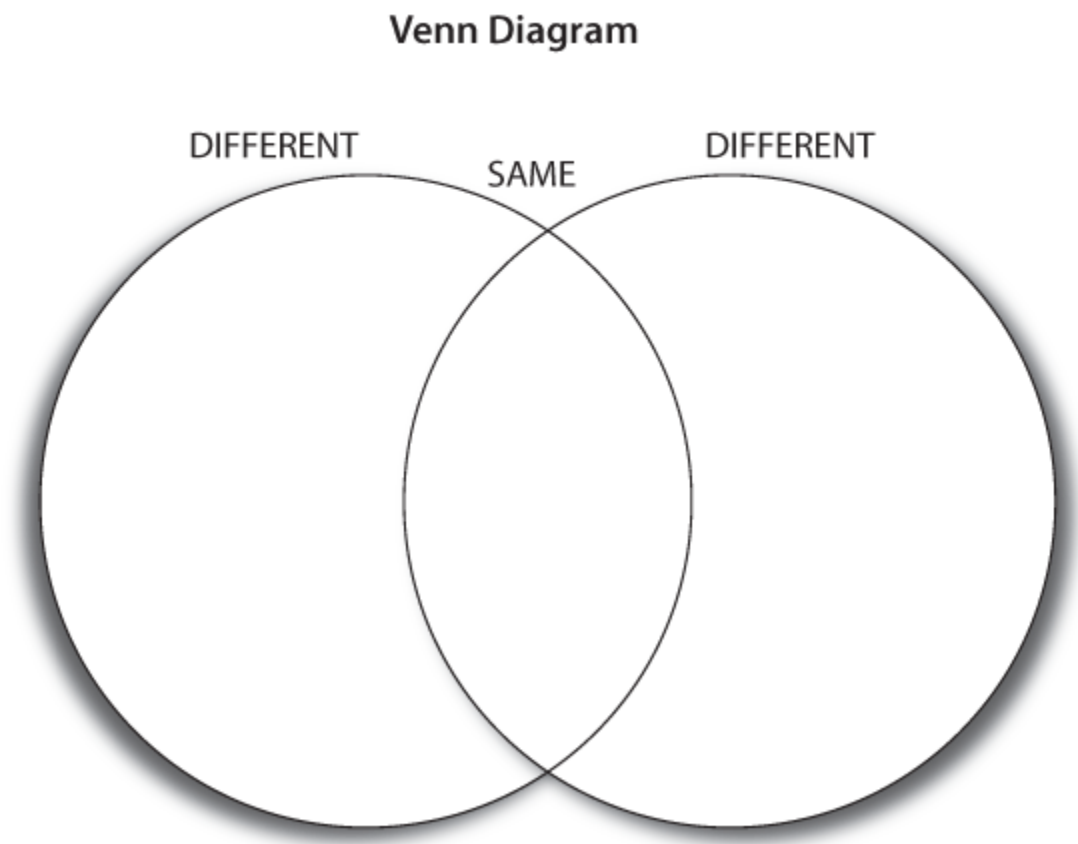
Find images (or other media) to show the impact of water pollution.



## CREATE A VENN DIAGRAM [10]

- A Venn diagram is a graphic way of comparing and contrasting topics. An example is below.
- For this diagram you are comparing and contrasting tap water and bottled water.
- Must have a title for the entire diagram and a title for each section
- Must have at least 6 items in each section of the diagram
- Name must be clearly written on the paper

Example diagram:



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## OIL SPILL MAP [10]

- Do some research to determine the biggest ocean oil spills in history.
- Plot 10-15 of the biggest oil spills on a map. Label them.
- Do not print out a premade map of the oil spills. Labels must be done by hand.

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## CREATE A DIAGRAM [20]

- Research the steps in waste water treatment or drinking water treatment.
- Illustrate the steps of one of these processes.
- Steps must be labeled.

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## WINDOW PANE [10]

- Create 6 boxes on unlined paper
- Choose 6 terms that are important to understanding water issues (example terms, eutrophication, runoff, point source pollution, non point source pollution, turbidity, wetland, coral reef, garbage patch, etc).
- In each box write the term and draw an illustration that helps explain/define the term.

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## DEBATE THE WETLANDS [20]

- Wetland areas are frequently destroyed so that industry or homes can take their place
- There are two sides to the debate – those who think the wetlands should be developed, and those who think they should be preserved.
- Explain the main reasons given each side of the debate. (At LEAST 2 paragraphs).
- Explain your personal stance (One paragraph).

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## TIME LINE OF GULF OIL SPILL [20]

- The oil spill in the gulf of Mexico a few years ago was one of the biggest oil spills ever. The oil continued to flow for days and days before finally being contained.
- Research what happened to cause the spill and what happened in the days after the spill
- Cash register tape will be provided (should you choose to need it) to create a time line summarizing the main events of the oil spill.
- Must be hand written.
- Should include at least 100 days (not every day would have a major event).
- Back of timeline should include sources!

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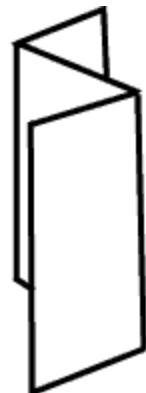


## PAMPHLET WARNING OF CORAL REEF MISUSE

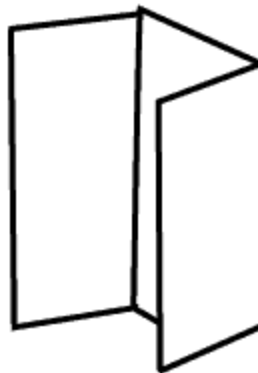
### [30]

- Coral Reefs are under threat for a variety of reasons
- Construct a pamphlet/brochure
  - o Paper in a 3-fold format
  - o Front fold has title and picture
  - o Must include both pictures and written text
  - o Can be created on computer (templates are available)
- Provide information about:
  - o What coral reefs are
  - o What types of species rely on coral reefs
  - o What are the threats to coral reefs
  - o What is the human impact on coral reefs
  - o What should humans do to reduce negative impact on coral reefs
- A bibliography should be included on the back section
- Any photos or illustrations from the internet should be given proper credit

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**z-fold**



**barrel fold**



## WATER ISSUES MIND MAP [30]

- On an unlined piece of paper, create a web connecting ideas about water issues
  - o Topics may include: Water Pollution, Great Lakes, Oil Spills, The Great Garbage Patch, The Clean Water Act, Waste Water Treatment (or another water topic discussed with teacher)
- Connect terms related to the topic
  - o Follow the “no more than 4” rule: no more than four words coming from any one word
  - o Explain connections on lines/arrows that connect the term
- Should be neatly written or developed on the computer (Free trials for “inspiration” are available) Color coding is helpful!
- Here is a website with advice:  
[http://www.teamwork.demon.co.uk/mind\\_maps/mind\\_basic.html](http://www.teamwork.demon.co.uk/mind_maps/mind_basic.html)
- Examples:



Primary School Version of How to Mind Map - Source: BrainTraining4Kids.com

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## VIRTUAL WATER LAB [40]

Pick ONE of the following two water labs. Complete the task online and turn in the corresponding worksheets.

Option 1: Assessing Water Quality

Option 2: When is Water Safe to Drink?

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- ## 2. What are invertebrates?



### Assessing Water Quality Lab Webquest Con't

3. What is the pH scale for acids?
4. What is the pH scale for bases?
5. How does rain become acidic?
6. What are the 2 types of acids in acid rain?
7. What are the sources of acid rain pollution?
8. Describe how acid rain affects ecosystems.
9. What is an indicator species?
10. How are indicator species used to assess pollution levels in the environment?



Assessing Water Quality Webquest Con't.

11. Which species was the most tolerant of increased acidity in the aquarium?
12. Which species were the least tolerant?
13. Suppose you are an ecologist studying the effects of acid precipitation on plant life.  
Describe an experiment you would perform in order to determine which plant species would be a useful indicator species for acid rain pollution.
14. How do the data represented on the population bar graph compare to the data represented in the line graph you created?



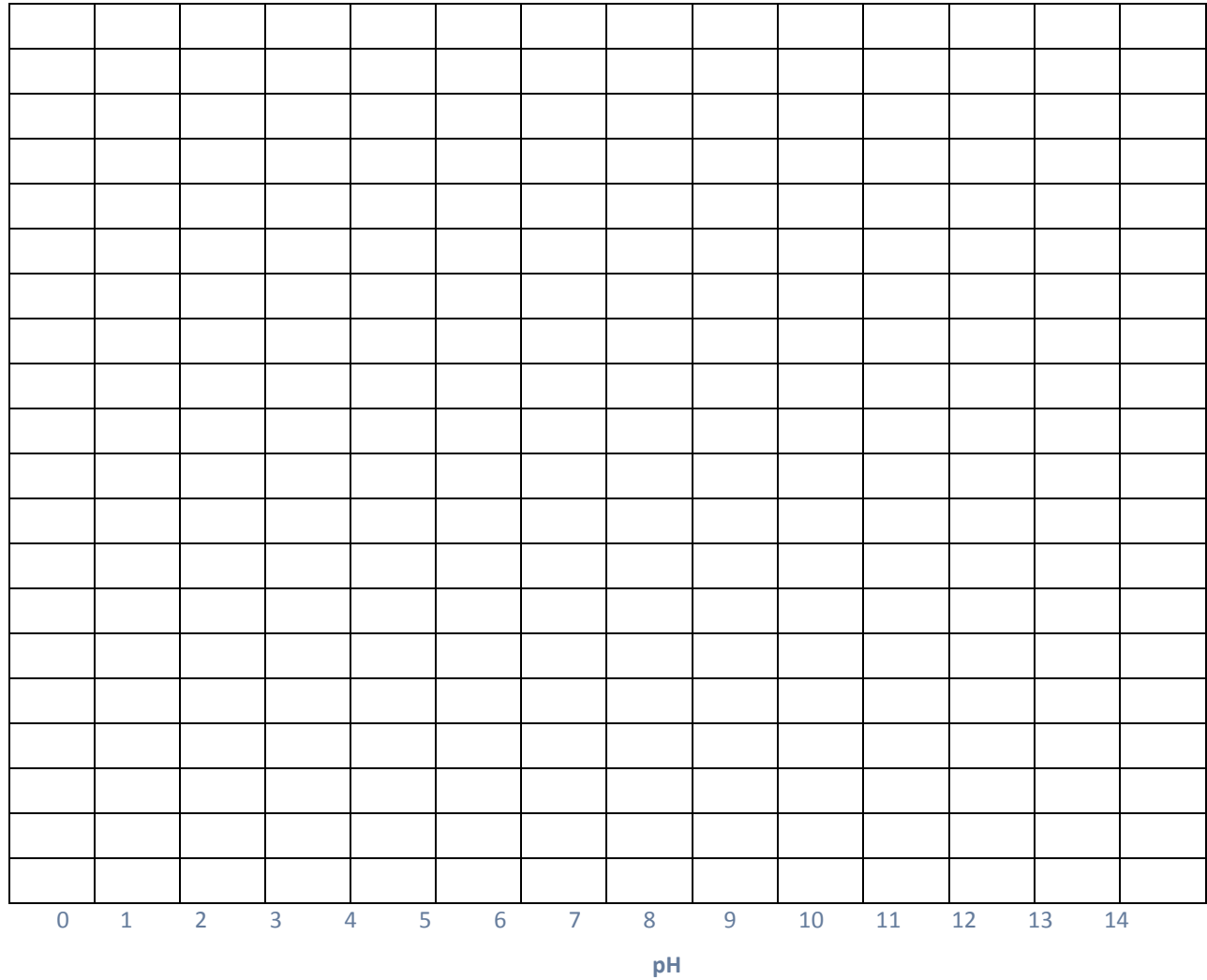
[illegible]



## Assessing Water Quality Lab Con't

### Line Graph

#### Effect of pH on 3 Organisms



Key:

Organisms

Line Type

1.

2.

3.

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Name\_\_\_\_\_Class\_\_\_\_\_Date\_\_\_\_\_

### Virtual Lab: When Is Water Safe To Drink?

Suppose you were hiking along a stream or lake and became very thirsty. Do you think it would be safe to drink the water? In many cases, it wouldn't. Each source of fresh water on or beneath Earth's surface is affected by contaminants. Though the sources of these contaminants are varied, all can make water unfit to drink if they are allowed to increase beyond safe limits.

Go to the website:

[http://www.glencoe.com/sites/common\\_assets/science/virtual\\_labs/CT04/CT04.html](http://www.glencoe.com/sites/common_assets/science/virtual_labs/CT04/CT04.html)

In this Virtual Lab, you will test a variety of water samples. Then you will determine how to treat the water samples to make them safe to drink

Look at the screen to your left, **READ** and find out about the most common types of water contaminants. Describe what they are and how they might affect water quality.

**Acidity:**

.

**Bacteria:**

**Metals:**

.

**Nitrates:**

**Pesticides:**

**Objectives:**

1. Define types of water contaminants.
2. Determine which types of contaminants are common to lake water, city water, well water, rural water and mountain water.



3. Identify treatments that remove contaminants from drinking water.

**Procedure:**

1. Click the right and left arrows to select a body of water to analyze.
2. Click **Test** to test the water sample.
3. Look at the results of the water analysis. Identify the "Safe Range" for each category and record this in the data table.
4. Identify which contaminants exceed the safe range.
5. Click the tabs to find information on how to treat each contaminant.
6. Enter the contaminant and treatment information in your data table.
7. Click **Go To Treatment** to go to the treatment screen.
8. Use the information in the table and click **the wheels** on the valves to add chemicals or additives to the water sample.
9. Click the **Treatment Switch** to start treating the water. The **Safe/Unsafe** Sign will indicate whether the water is safe to drink.
10. If the water is **safe** to drink, use Return to Lab to go to the lab screen and test another water sample.
11. If the water is **unsafe** to drink, check your information and treat the water sample again.
12. When you have tested and treated all the water samples, use your completed table to complete the analysis questions.

**Analysis**

1. What contaminants were found in the surface water samples? What contaminants were found in the groundwater samples?
2. Why might groundwater and surface water have different contaminants?



When is Water Safe To Drink Lab

3. Generally, farmers do not farm on the sides of mountains or in remote areas. Industries also do not build factories in these areas. These areas are usually not highly populated by people. What might explain the high nitrate level in the mountain water in this activity?
  
4. What is pH level, what are its characteristics, and how does it contribute to pollution? What chemicals are used in treating low pH levels?

**Critical Thinking-Please read this carefully!**

Water in an old building tested recently, showed high copper and iron content, and low pH levels. A water reading taken 20 years before, showed low pH levels and only minimal traces of copper and iron. If none of the new buildings on the same street showed signs of metallic contaminants, but all reported lower than normal pH readings, how might these readings be explained?

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Sample	Acidity (pH)	Metals (mg/L)	Coliform Bacteria (ml)	Pesticides/Herbicides (mg/L)	Nitrates	Type of Contamination	Treatment Performed
Safe Range							
City							
Lake							
Mountain							
Rural							
Well							



## WRITE A LETTER [50]

This is your opportunity to let someone in power know how you feel about an issue.

Choose an issue that you have a definitive opinion about.

Do some research to help support your opinions.

Keep these things in mind:

1. Make your letter brief and to the point. Address only one issue in the letter.
2. Be sure that your letter is neatly written, or typed.
3. Be sure that your spelling and grammar is correct – and that you spelled their title and name correctly.
4. Ask the politician to do something specific (like vote for or against something, cosponsor a bill, or tell you their position on the issue).
5. Don't mention that you are a high school student (they like to listen to people that are old enough to vote)
6. Don't threaten or try to impress the politician with your influence.
7. Don't forget that local and state legislation is often just as important as national legislation and that it is usually easier to have more influence on local issues.

To Start:

- Decide what issue you would like to discuss – it should be something that an elected official can have influence over by passing or supporting a bill, voting for or against etc.
- Determine which type of official you would like to contact – local? State? National? The President?
- Find names and addresses for these officials via the internet
- Do some research on the topic

Possible topics to write about:

- Conserving the water of the Great Lakes (do not let it be sent to the west)
- Reducing the pollution of the Great Lakes
- Preventing invasive species from getting into the Great Lakes
- Reducing the amount of plastic that goes into the Great Lakes or Ocean
  - Bottle return legislations?
  - Making companies pay for recycling their plastic??
- New legislation to regulate bottled water?



FORMAT (via businessletterx.net):

# FORMAL LETTER TEMPLATE

**Your name and address.**

Jessica Schachterle  
203 Dale Avenue  
St. Paul, MN 55103

**2 spaces**

**The date.**

January 30, 2003

**2 spaces**

**The name, title, and address of the person to whom you are sending the letter.**

The Honorable Mee Moua  
Minnesota State Senate  
St. Paul, MN 55102

**1 space**

Dear Senator Moua.

Type the body of your letter here. This is where you tell the politician or business manager what you want them to know. It is important to be respectful and to state your ideas in a way that is not too emotional.

**1 space**

Sincerely,

**4 spaces**

Jessica Schachterle

\*\*Ask your teacher for an envelope! You should receive a response!

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## CREATE A PREZI [60]

1. Decide on a water topic that you would like to develop a “prezi” about

Possible Topics:

Oil Spills in the Ocean

Coral Reef Destruction

The Great Garbage Patch

Pollution in the Great Lakes

Tap water v. Bottled Water

The Clean Water Act

Fracking’s impact on water

Any other topic directly related to water...

2. Develop a presentation using the website [prezi.com](http://prezi.com)

3. You will need an email address to sign up (I recommend creating a gmail account if you don’t already have one). Go to [prezi.com](http://prezi.com)

4. After you sign up watch their introductory tutorial.

5. You must include AT LEAST 10 “slides” in your presentation

Select a template that is easy to follow and appropriate for the topic.

Include a general description of the issue/topic

Get more specific and provide facts from credible sources – CITE YOUR SOURCES!!

Include images (there is a search tool within the program)

You may imbed video clips/music

Be sure the FLOW of your Prezi makes sense. Items are easily shifted around.

- 6.

**IMPORTANT:** Under your Prezi there is a “Share Button”. Select that and in the section labeled “Add People” add your teacher! Enter the email address: **[esnfhs@gmail.com](mailto:esnfhs@gmail.com)**

This will allow me to easily see your Prezi and grade it.

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## TASTE TESTING [60]

Use the scientific method to conduct a taste testing experiment comparing bottled water with tap water.

The following steps must be followed:

1. Ask a questions (Is there a difference in taste between bottled water and tap water? OR Do people prefer bottled water or tap water? )
2. Construct a hypothesis (based on prior information what do you think the answer to the question will be?)
3. Test with an experiment
  - a. Devise an appropriate and doable procedure
  - b. Gather materials
  - c. Follow the procedure
  - d. Check the procedure – if it is not working troubleshoot and start over.
4. Collect and record data from your experiment
5. Analyze data and draw a conclusion
  - a. Accept or reject your hypothesis
6. Communicate Results
  - a. Write or type all of the scientific method steps followed, with details included.  
This can be done on paper, a poster presentation, or PowerPoint (OR Prezi!)

20 Extra points for presenting your experimental steps and outcome in front of the class.

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# OIL SPILL RESEARCH PAPER [80]

**Directions:** In this **two-page typed report**, you will investigate one of the major oil spills.

These questions need to be answered in the research report:

**These should be in separate paragraphs (w/out #'s)**

1. What was the cause of the oil spill?
2. What was the reaction to the spill/ how was it dealt with?
3. What were the effect of the oil spill? How did it effect the environment, and humans?
4. What are ways that oil spills could be prevented in the future?

## Requirements:

- ☐ Needs to be a 2 page typed document (no more than 2 pages)
- ☐ 12 point font, Times New Roman
- ☐ Double Spaced
- ☐ Title Page with your title, name, class, period, and date
- ☐ MLA Citation Needed! ([www.citationmachine.net](http://www.citationmachine.net))

## Plagiarism:

Copying website material will not be tolerated. Any plagiarism will receive a zero as well as a referral to the dean. Web browsers enable teachers to easily find plagiarizers. When you find research, please reword into your own words, and include it into the paper.

## Rubric:

Each question above will receive 10 points if answered correctly. If format above is followed, the student will also receive 40 points (8 points per requirement). Two points will be given for turning it in on time. The total for this research paper is **90 points**.



**Sample MLA Works Cited Page (Note: The resources are in alphabetical order with no bullets or numbers):**  
**To be placed at end of paper. Use [www.citationmachine.net](http://www.citationmachine.net) for help.**

#### Works Cited

Danhof, Clarence H. Change in Agriculture: The Northern United States, 1820-1870.  
Cambridge: Harvard UP, 1969. Print.

Demaree, Albert Lowther. The American Agricultural Press 1819-1860. New York:  
Columbia UP, 1941. Print

Hurt, R. Douglas. American Agriculture: A Brief History. Ames: Iowa State UP, 1994.  
Print.

Morrill Land Grant Act of 1862. Prairie View A&M. 2003. Web. 6 Dec. 2008.

#### Sample MLA Citation in the Paper

These objectives were a response to farmers' needs at the time, mainly to the need for experiments, printed distribution of new farming knowledge, and education. Isaac Newton, the first Commissioner of Agriculture, ensured these objectives would be realized by stressing research and education with the ultimate goal of helping farmers improve their operations (Hurt 190).

#### CWA Research Paper Mishaps

1. Must cite within paper too!! Put author's name next to the paragraph you rewrote with the help of the author's information.
2. Use websites that have author's names...unless it is a government web page.
3. Follow the guidelines carefully! Ex...title page!
4. Laws are capitalized!!! Clean Water Act!!
5. No opinion in your paper. Cite where the drawback came from.

Do not use "ask.com," "yahoo answers" or "wiki answers" in your research paper



# CLEAN WATER ACT RESEARCH PAPER [80]



## Clean Water Act of 1977: Amendment to the Federal Water Pollution Control Act of 1972 Research Paper

**Directions:** In this **two-page typed report**, you will investigate the Clean Water Act of 1977.

These questions need to be answered in the research report:

5. Why did the government create this act?
6. What does this act require dischargers to do?
7. After the Clean Water Act passed, other amendments to this law passed. What are some other amendments that passed and what did they require citizens to do?
8. What is 1 drawback/inadequacy of the Clean Water Act? Explain.

### Requirements:

- ☐ Needs to be a 2 page typed document (no more than 2 pages)
- ☐ 12 point font, Times New Roman
- ☐ Double Spaced
- ☐ Title Page with your title, name, class, period, and date
- ☐ MLA Citation Needed! ([www.citationmachine.net](http://www.citationmachine.net))

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9. Laws are capitalized!!! Clean Water Act!!
10. No opinion in your paper. Cite where the drawback came from.

Do not use "ask.com," "yahoo answers" or "wiki answers" in your research paper



## YOUR CHOICE [VARIES]

Have an idea of your own? Put your idea in writing and submit it to your teacher (just a brief note will do). Together with your teacher you will determine how much the project is worth.

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## BRING IN AN ARTICLE [5]

That simple. Find a recent article (internet, from a newspaper, or journal) that discusses a water in some way.

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## BRING IN PLASTIC [5]

There is a beach bulletin board outside of class. Bring in a sample of plastic to add to the “beach”. It must be clean. Show it to your teacher before adding it to the board.

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## MAKE A RECYCLING POSTER [10]

Develop a poster to encourage students and teachers to recycle their bottles.

The poster should be informative and include imagery.

Recycling bins are in the center section of each hallway.

Posters will be displayed in the hallways.

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## CREATE A RAP OR POEM [10]

Develop an original rap or poem that contains information about one or more topics concerning water. (Example topics – pollution, oil spills etc.)

Guidelines:

1. Words must make sense
2. Must be written. You may present it to the class as well.
3. Should be at least 15 lines

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## THREE FACTS AND A FIB [10]

Write three facts about water (do your research to make sure they are factual!)

Develop a “Fib” about water that seems like it would be true but is not. (Mix the fib in with the other 3 statements)

On the back of the paper explain why the fib is a fib.

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## CREATE A POSTER ENCOURAGING WATER CONSERVATION [10]

Develop a poster to encourage students and teachers to conserve their use of water.

The poster should be informative and include imagery.

Posters will be displayed in the hallways.

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## CONSTRUCT A COLLAGE [10]

Collect images (or other items) to create a collection of images that reflect the impact of water pollution.

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