

DISCOVERING THE CONNECTION: YOUR ENVIRONMENT, YOUR HEALTH

AFTERSCHOOL SCIENCE CLUB CURRICULUM FOR MIDDLE SCHOOL STUDENTS



UNIT 6: THE GREAT DEBATE: BOTTLED WATER VS. TAP WATER IN OUR SCHOOL



DEVELOPED BY K-12 SPECIALIZED INFORMATION SERVICES GROUP,
NATIONAL LIBRARY OF MEDICINE, NATIONAL INSTITUTES OF HEALTH



INTENTIONALLY LEFT BLANK

ABOUT DISCOVERING THE CONNECTION: YOUR ENVIRONMENT, YOUR HEALTH

PURPOSE OF THE CURRICULUM

Discovering the Connection: Your Environment, Your Health uses the Tox Town Web site (toxtown.nlm.nih.gov) developed by the National Library of Medicine (NLM) to introduce middle school students to environmental health issues in everyday life. The curriculum includes information and laboratory research and communication activities, stressing the relevance of science to informed citizenship and integrating science, society, and literacy. The curriculum is for an afterschool club, but can also be used in the science classroom. The curriculum is based on National Science Education Standards.

Teaching and Learning Approaches

The curriculum uses inquiry-based learning and problem-based learning approaches. These are student-centered approaches that promote in-depth understanding and critical thinking by fostering students' active engagement with the subject matter. Students develop content knowledge and scientific reasoning skills through collaborative work on real world problems. They explore ideas, formulate meaningful questions, collect and analyze data, and evaluate and communicate their findings.

Tox Town Web Site

Tox Town (toxtown.nlm.nih.gov) is visually engaging and is an authoritative, reliable educational Web site, dedicated to highlighting the connections among chemicals, the environment, and the public's health.

Curriculum Development Team

This effort was initiated and coordinated by the NLM K-12 Specialized Information Services group. The NLM, one of the institutes of the National Institutes of Health (NIH), has been a center of information innovation since its founding in 1836. The K-12 group develops authoritative resources for a variety of science education areas, coordinates outreach to educators and school health professionals, and conducts research into teaching and learning.

The working group for this curriculum consists of: the NLM K-12 staff; Daniel M. Levin, a professor of science education from the University of Maryland College of Education; and five teachers from Montgomery County, MD, and the District of Columbia. The teachers are Jacquelyn Geer (science), Maura Hinkle (science), Sandra Garner (language arts), Kelley Knox (social studies), and Berneatta Barnes (science).

Curriculum Overview and Suggested Use

The curriculum contains six units. Each unit introduces one environmental health topic and includes three or four 50-60 minute lessons in the following format:






- Topic introduction and information research activity using Tox Town;
- Hands-on experiment or activity reinforcing understanding, conducted with simple materials; and
- Communication and social action activity where students share their understanding of the topic with others and translate their understanding into actions.

The units can be used sequentially or individually to support the existing middle school science curriculum. They can also be used to support the science/society connection in the social science or language arts classroom. The entire curriculum was pilot-tested as an afterschool club at the Cabin John Middle School, Montgomery County, MD.

The Six Units of the Curriculum







1. **Water Quality:** Introduces students to drinking water quality issues and the water treatment process. Includes experiments where students test school drinking water, compare it with water from other sources, and communicate the findings to the school community.
2. **Air Quality:** Introduces students to air quality issues and the impact of air pollution on human health. Students test air quality in several locations in and around the school.
3. **Chemicals in Your Home:** Informs students about potentially toxic chemicals in common products and introduces safer alternatives.
4. **Food Safety:** Introduces students to biological, chemical, and physical contaminants in food. Uses an experiment to teach safe food handling.
5. **Runoff, Impervious Surfaces, and Smart Development:** Introduces students to the relationship among runoff, water pollution, and human health. Also introduces the idea of responsible development.
6. **The Great Debate: Bottled Water vs. Tap Water in Our School:** Students perform research about pros and cons of different sources of drinking water, engage in a debate, and develop persuasive arguments to advocate for bottled or tap water as a primary source of drinking water in the school.

Symbols Used in This Curriculum

-  – information research via Tox Town
-  – lab experiment
-  – hands-on activity
-  – communication and social action activity
-  – excerpt from student handouts in teacher directions

UNIT 6: THE GREAT DEBATE: BOTTLED WATER VS. TAP WATER IN OUR SCHOOL

TABLE OF CONTENTS

Unit Overview	3
Lesson Plans	
L 6.1 How to Build Your Best Argument 	4
L 6.1.1 Objectives, Materials, and Teacher Preparation	4
L 6.1.2 Activator.....	4
L 6.1.3 Activity	5
L 6.2 Building Up Your Argument  	8
L 6.2.1 Objectives, Materials, and Teacher Preparation	8
L 6.2.2 Activator.....	8
L 6.2.3 Activity	9
L 6.3 The Best Argument 	10
L 6.3.1 Objectives, Materials, and Teacher Preparation	10
L 6.3.2 Activity	11
L 6.4 The Great Debate – Day 1 	12
L 6.4.1 Objectives, Materials, and Teacher Preparation	12
L 6.4.1.1 Debate Timeline Calculator	13
L 6.4.1.2 Debate Scoring Rubric	14
L 6.4.2 Activity	15
L 6.5 The Great Debate – Day 2 	16
L 6.5.1 Objectives, Materials, and Teacher Preparation	16
L 6.5.2 Activity	16
Student Handouts	
How to Build Your Best Argument	
H 6.1.1 Build Your Best Argument Scenarios	21
H 6.1.2 Characteristics of a Good Argument	22
Building Up Your Argument	
H 6.2.1 Building Up Your Background Knowledge	23
The Best Argument	
H 6.3.1 Interest Group Descriptions	25
H 6.3.2 Debate Explained	26
H 6.3.3 The Great Debate Worksheet.....	27
H 6.3.4 The Great Debate Format	31



The Great Debate - Day 1	
H 6.4.1 The Great Debate Ground Rules	32
The Great Debate - Day 2	
H 6.5.1 Certificate.....	33
Unit 6 Glossary	37

UNIT 6:

THE GREAT DEBATE: BOTTLED WATER VS. TAP WATER IN OUR SCHOOL

UNIT OVERVIEW

This unit uses the Tox Town Web site (toxtown.nlm.nih.gov) developed by the National Library of Medicine to 1) introduce students to environmental health issues in their everyday life; 2) highlight the connection between science and society; and 3) support the development of argumentation skills. The unit uses a student-centered *problem-based learning* approach where students develop content knowledge, and scientific reasoning and argumentation skills through collaborative work on real world problems. Students will explore ideas, formulate meaningful questions, conduct information research, develop arguments, and participate in a debate. Scientific argumentation activities will allow students to appreciate the distinction among beliefs, reasons for those beliefs, and factual evidence; learn to collect and organize evidence; and communicate and defend their positions.

National Science Education Standards

H.A.1 Science as Inquiry

- d. Formulate and revise scientific explanation using logic and evidence.
- f. Communicate and defend a scientific argument.

M.A.1 Science as Inquiry

- e. Think critically and logically to make the relationship between evidence and explanation.
- f. Recognize and analyze alternative explanations and predictions.

Unit Objectives

At the end of this unit, students will be able to:

- Construct a good argument using information research and scientific reasoning skills
- Understand the use of argumentation in the scientific arena and in everyday life
- Engage in a socio-scientific debate

Essential Questions

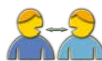
What is the role of argumentation in communicating information with others and engaging in socio-scientific issues that are prominent in society?

What constitutes a good socio-scientific argument?

Technology Education Skills

Students will use computer resources to research, evaluate, and organize information, preparing to participate in a debate on an environmental health topic.

L 6.1 HOW TO BUILD YOUR BEST ARGUMENT



L 6.1.1 Objectives, Materials, and Teacher Preparation

Objectives

Students will be able to:

- Explain the characteristics of a good argument
- Explain the process of building and evaluating a good argument in the socio-scientific domain
- Describe strategies for challenging an argument

Materials Needed for Lesson

- *Build Your Best Argument Scenarios* (H 6.1.1)
- *Characteristics of a Good Argument* (H 6.1.2)

Teacher Preparation

1. Prepare copies of *Build Your Best Argument Scenarios* (H 6.1.1) and *Characteristics of a Good Argument* (H 6.1.2) (one set per student).

L 6.1.2 Activator

Teacher Directions

1. Ask the students: Do people ever argue about topics related to science in their everyday life? Can you name some science topics that you've heard people argue about at home, at school, or in your community? What is the best way to be well prepared for such discussions? Why is being well prepared important?
2. Lead the students to understand that there is a connection between science and society. Breakthroughs in scientific research may prompt societies to change their policies and practices. For example, discovering that lead is harmful to human health may lead to laws that ban the use of lead in certain products, or require that school buildings be tested for lead. Explain that science gets converted into policies and regulations by regular people. They do not conduct the scientific research, but they learn about the findings and influence public policy by joining interest groups, voting, etc.
3. Ask the students: What are the characteristics of a good argument? Write the students' responses on the white/blackboard.
4. Explain that over the next several lessons, the students will learn to make a strong argument and participate in a debate about an environmental health topic: the quality of drinking water in their school.

L 6.1.3 Activity

Teacher Directions

1. Distribute *Build Your Best Argument Scenarios* (H 6.1.1):

1. Scenario 1: Your principal is considering allowing students to carry their cell phones during the school day. Many teachers are not happy about that. The principal schedules a meeting where teachers, parents, students, and school administrators will discuss the issue. You will attend the meeting as a representative of the Student Government. It is your task to make the most convincing case you can for allowing students to carry their cell phones at school. Make your best argument to support student cell phones.
2. Scenario 2: During lunch, you observe that your school does not serve organic fruit and vegetables. You want to talk to your principal about switching to organic fruit and vegetables for staff and students. Make your best argument to support the switch.
3. Scenario 3: Two friends are out to lunch and both want some water, but one asks the waiter for tap water and the other for bottled spring water. The person who asked for tap water laughs and says that it is silly to pay for water, because water is water. The other disagrees. They start arguing about what is a better drink choice: bottled water or tap water. Make your best argument to support each position.



2. Explain to the students that the first two scenarios are provided to practice making a strong argument, but the third will actually be the topic of the debate.

Note: One of the objectives of this lesson is to teach the students about characteristics of a good argument. Rather than simply explain those characteristics to the students, the activity starts by asking students to make their spontaneous “best argument” about cell phones in schools (Scenario 1), without providing the definition of “best argument.” Encouraging the students to create and analyze an argument prior to providing the definition of a good argument helps build the foundation for later understanding of the definition.

3. Read the first scenario and ask the students to make their best, or most convincing, arguments to support student cell phones. Ask five student volunteers to make their statements and write them on the white/blackboard. Refer to characteristics of a good argument that students named in the Activator, and ask students to identify those in their argument.
4. Distribute *Characteristics of a Good Argument* (H 6.1.2) and review it with the students. Spend some time reviewing the definitions of the terms included in the handout: reason, evidence, counter-argument, and rebuttal. Explain that the terms “counter-argument” and “rebuttal” are sometimes used interchangeably. The important thing to remember is that they are both **objections** to an argument. **Note:** Link the characteristics described in the handout to those spontaneously stated by the students, noticing and discussing similarities and differences.
5. Return to students’ arguments in support of cell phones in the school. If some of the arguments include supporting evidence, point to an example of it. If none do, point to one of the reasons for the position and say, “If someone asks you why he/she should believe this, what will you say?” For example, one of the reasons may state that if students are allowed to carry cell phones, there will be fewer situations when parents are late picking them up after their school activities. Ask the students, “How can one show that this is likely to be true?” Explain that a strong argument provides not only good reasons for the opinion, but also evidence as proof of those reasons. For example, one could measure and report the average number of students whose parents are late picking them up at your school and at another neighborhood school, where cell phones are allowed.

6. On the white/blackboard or a flip chart, draw a table that has the following columns:

Reason	Supporting evidence	Any weakness in this reason or evidence that the opponent might identify	How will you respond?

7. Ask the students to organize their initial arguments into this table. Point to the cells that remain blank and encourage the students to complete as many cells as possible. Invite them to come up with hypothetical data for supporting evidence (e.g., “if we could find statistics showing that ...”). Ask the students whether filling in as many cells as possible made the argument stronger and why.
8. On the white/blackboard or a flip chart, draw a table similar to the one below. Tell the students, “We know that some teachers and some parents do not think that allowing students to carry cell phones in school is a good idea.” Ask the students, “What might their reasons be?” List the reasons on the board. Ask the students, “How could we respond to those reasons?” Explain that anticipating the opponent’s argument (or counter-argument) and preparing a response (or rebuttal) is a strategy that makes one’s argument stronger.

Note: Emphasize the definition of rebuttal: A process in which reasons are given as to why something is untrue, using evidence in response to someone’s prior statements.

The other side’s reason	Our response

9. Repeat the process for developing and organizing a best argument using the two tables above with the second scenario. This time, you may start by presenting the first table and asking the students to try to provide evidence for their reasons.
10. Ask the students to consider the third scenario. Ask them which of the two friends described in the drinking water scenario they agree with; count the votes for each side.
11. Divide the white/blackboard or flip chart into two sides: “Pro-bottled” and “Pro-tap.” Ask the students to list the reasons and evidence for supporting each side. In many cases, the students will not have enough knowledge to generate evidence. Ask the students what kind of issues/topics they would explore to generate more reasons and evidence. List those as well. Invite the students to list both scientific and social issues, and ask them to distinguish between the two.
12. Explain that during the next four lessons, the students will prepare and debate the following topic: Should schools sell bottled water to students, teachers, and staff?

Note: Save the flip chart or write down the content on the white/blackboard to be used in the next lesson. Also, *Characteristics of a Good Argument* (H 6.1.2) will be used in **L 6.3 The Best Argument**. Consider collecting or asking the students to save their handouts.

L 6.2 BUILDING UP YOUR ARGUMENT



L 6.2.1 Objectives, Materials, and Teacher Preparation

Objectives

Students will be able to:

- Explain the importance of information research in argumentation
- Research a scientific topic and gather evidence to support a position in a debate

Materials Needed for Lesson

- *Building Up Your Background Knowledge* (H 6.2.1)
- Computers with Internet access

Teacher Preparation

1. Prepare copies of *Building Up Your Background Knowledge* (H 6.2.1) (one per student).
2. Preview the nine-minute-long **Elementary Clip 1** debate video at the following link:

Link: Utah Debate (National Energy Foundation) - utahdebate.org/videos.html

The clip displays a middle school debate about whether the State of Utah should implement a statewide mandated recycling program. Decide whether you want to show the clip as a whole (see **L 6.2.2 Activator**) or select certain parts of it. Become familiar with the video; decide which of the students' statements in the video you will highlight in the Activator.

Note: For a livelier, though non-environmentally-related alternative, consider selecting a segment from this 27-minute-long debate video:

3. **Link:** Middle School Public Debate Program (MSPDP), "Ban Boxing!" - youtube.com/watch?v=SHJzJSQ360A&feature=gv&noredirect=1
4. Ensure that you have technical capabilities to show the videos to the students.
5. Ensure access to computers with Internet connection (for accessing Tox Town, toxtown.nlm.nih.gov).

L 6.2.2 Activator

Teacher Directions

1. Remind the students that they will be preparing to participate in a debate about whether bottled water should be sold in schools.
2. Show a brief debate video (whole or selected segments - see Teacher Preparation) by clicking on **Elementary Clip 1** at the following link: Utah Debate (National Energy Foundation) - utahdebate.org/videos.html; or showing a selection from the following: Middle School Public Debate Program (MSPDP), "Ban Boxing!" - youtube.com/watch?v=SHJzJSQ360A&feature=gv&noredirect=1
3. Explain that because the goal of a debate is to strengthen argumentation skills, participants are assigned which position to argue, and that position does not necessarily correspond with their personal views.

L 6.2.3 Activity

Teacher Directions

1. Divide the students into groups or pairs.
2. Remind the students that they will be preparing to participate in a debate about whether bottled water should be sold in schools.
3. Remind the students about the arguments they came up with during the previous lesson (display the flip chart from the previous lesson or rewrite the arguments on the white/blackboard). Ask if it was easy or difficult to come up with reasons and evidence, and why. Explain that it is easier to build a good argument when one knows a lot about the topic. Remind the students about the reasons and issues pertaining to bottled water vs. tap water that they identified as worth exploring during the previous lesson.
4. Explain that the goal of today's lesson is to learn as much as possible about these relevant issues. Review the relevant issues the students named in the previous lesson. Explain that you are about to distribute *Building Up Your Background Knowledge* (H 6.2.1) with questions and links for research. Tell the students that the handout will most likely address most of the issues that they have identified. They will also be able to research additional issues that are not included.
5. Distribute *Building Up Your Background Knowledge* (H 6.2.1). Instruct the students to conduct computer research for the questions specified on the handout, using the links on the handout, with their groups (or pairs). Each student should complete his/her own handout.

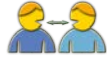
1. Is tap water safe to drink? How is the quality of tap water regulated?
kidsenvirohealth.nlm.nih.gov/TopicSubtopic.php?tid=004&sid=007
cdc.gov/healthyouth/npao/wateraccess.htm
toxtown.nlm.nih.gov/text_version/locations.php?id=18
2. Is bottled water safe to drink? How is the quality of bottled water regulated?
fda.gov/ForConsumers/ConsumerUpdates/ucm203620.htm
fda.gov/Food/ResourcesForYou/Consumers/ucm046894.htm
3. What is fluoride, and why it is important to have it in drinking water?
ada.org/sections/publicResources/pdfs/patient_30.pdf
cdc.gov/fluoridation/benefits/background.htm
4. What is BPA, and how can it affect the quality of drinking water?
toxtown.nlm.nih.gov/text_version/chemicals.php?id=69
5. What are the economic and environmental health effects caused by throwing away plastic water bottles?
cleanair.org/Waste/wasteFacts.html
epa.gov/osw/conserves/materials/plastics.htm
6. If you have additional questions, research them using the links provided by your teacher.



6. In the remaining time, encourage the students to explore any additional issues that may be relevant to the topic.

Note: If in the previous lesson the students mentioned some issues that you would like them to explore, but are not covered in the links above, feel free to suggest additional links.

L 6.3 THE BEST ARGUMENT



L 6.3.1 Objectives, Materials, and Teacher Preparation

Objectives

Students will be able to:

- Use evidence to support a position
- Construct arguments for and against various positions
- Actively engage with peers to communicate ideas and support arguments about drinking water quality, environment, and health

Materials Needed for Lesson

- *Interest Group Descriptions* (H 6.3.1)
- *Debate Explained* (H 6.3.2)
- *Characteristics of a Good Argument* (H 6.1.2) (from the first lesson)
- *The Great Debate Worksheet* (H 6.3.3)
- *The Great Debate Format* (H 6.3.4)
- Computers with Internet access

Teacher Preparation

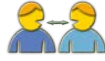
1. Review *Interest Group Descriptions* (H 6.3.1). Decide which of the six groups described in the handout will be represented in your debate. There should be no more than five students in a group.
2. Create a modified version of *Interest Group Descriptions* (H 6.3.1) that contains only the groups represented in your debate (e.g., by making a copy of the handout and blacking out non-represented groups).
3. Prepare copies of *Debate Explained* (H 6.3.2) (one per student), the modified version of *Interest Group Descriptions* (H 6.3.1) (one per student), *Characteristics of a Good Argument* (H 6.1.2) (one per group), *The Great Debate Worksheet* (H 6.3.3) (one per student plus one per group), and *The Great Debate Format* (H 6.3.4) (one per group). **Note:** Each student and group will need multiple copies of the second and third pages of H 6.3.3.
4. From the original *Interest Group Descriptions* (H 6.3.1), cut strips with individual interest group descriptions that can be distributed to the students while assigning them to groups. The number of strips describing each interest group should equal the number of students in that group.
5. Ensure access to computers with Internet connection (for accessing Tox Town, toxtown.nlm.nih.gov)

L 6.3.2 Activity

Teacher Directions

1. Remind the students that they will be participating in the debate, entitled: **The Great Debate: Bottled Water vs. Tap Water in Our School**. The debate question is: **Should our school sell bottled water to students, teachers, and staff?** Explain that a debate is a regulated discussion of a proposition between two sides. A debate usually follows a specified format, and speakers and judges adhere to specific rules. Distribute *Debate Explained* (H 6.3.2) and review the definitions with the students.
2. Explain that in this debate, the students will represent the position of one of the interest groups. Distribute *Interest Group Descriptions* (H 6.3.1). Review participating groups with the students.
3. Assign each student to an interest group by handing out a strip with her/his group's description. **Note:** No two students at the same table should be assigned to the same interest group.
4. Distribute *The Great Debate Worksheet* (H 6.3.3). Explain to the students that they will have 15 minutes to work individually, building the argument for their position. Ask the students to complete the handout while leaving the questions with the names of the speakers blank. (**Note:** To support both individual engagement and collaboration, the students will start to build their argument by working individually, and then proceed to working in interest groups.)
5. Remind the students to think about the characteristics of a good argument while completing their activity. Distribute copies of *Characteristics of a Good Argument* (H 6.1.2) from the first lesson and give students a few moments to review it.
6. After 15 minutes, tell the students to stop working. Explain that they will now meet with the other members of their interest groups, who will also be members of their debate team.
7. Each interest group should have a designated area in your classroom. Have the students go to that area to begin the next step of the activity.
8. Distribute another clean copy of *The Great Debate Worksheet* (H 6.3.3) and *The Great Debate Format* (H 6.3.4) to each group. Explain to the students that they will now combine their arguments to debate with the other interest groups in the class.
9. Review *The Great Debate Format* (H 6.3.4) with the students. Explain that the students should start their initial argument presentations by naming their group and stating their position.
10. Give the students 20 minutes to integrate their arguments and create a combined version of completed *The Great Debate Worksheet* (H 6.3.3). Explain to the students that integrating arguments should include combining ideas and removing redundancies. This should lead to strengthening their interest group's position.
11. Ask the students to select the speakers who will be delivering arguments, rebuttals, and closings, and enter their names on the first page of *The Great Debate Worksheet* (H 6.3.3).
12. At the end of the 20-minute period, collect the students' copies of *The Great Debate Format* (H 6.3.4) and completed *The Great Debate Worksheets* (H 6.3.3), setting them aside for the use during the following lesson.

L 6.4 THE GREAT DEBATE – DAY 1



L 6.4.1 Objectives, Materials, and Teacher Preparation

Objectives

Students will be able to:

- Deliver oral presentations supporting a position
- Analyze arguments and prepare objections
- Actively engage with peers to communicate ideas about drinking water quality, environment, and health

Materials Needed for Lesson

- *The Great Debate Worksheet* (H 6.3.3) (from previous lesson)
- *The Great Debate Format* (H 6.3.4) (from previous lesson)
- *The Great Debate Ground Rules* (H 6.4.1)
- *Debate Scoring Rubric* (L 6.4.1.2) (for judges)
- Paper and pens (for rebuttal notes)
- Stopwatch

Teacher Preparation

1. Locate saved copies of *The Great Debate Format* (H 6.3.4) and the students' completed *The Great Debate Worksheet* (H 6.3.3).
2. Prepare copies of *The Great Debate Ground Rules* (H 6.4.1) and *Debate Scoring Rubric* (L 6.4.1.2).
3. Assemble a panel of judges for the debate (e.g., teachers, parents). Ensure that the judges can participate on both days of the debate. (Optional: Consider inviting people whose occupations are related to either environment/health or debating/legislature.) Help the judges become familiar with *The Great Debate Format* (H 6.3.4) and the *Debate Scoring Rubric* (L 6.4.1.2) by sending or e-mailing copies to them.

Note: Use the *Debate Timeline Calculator* (L 6.4.1.1) below to estimate timing of various debate activities.

L 6.4.1.1 Debate Timeline Calculator

Activity	Minutes per team	# of teams	Total minutes for day
DAY 1			
Introduction			
Argument presentations			
Rebuttal preparation			
Total for Day 1			
DAY 2			
Rebuttal presentations			
Closing remarks preparation			
Closing remarks presentation			
Judges' deliberation			
Awards			
Total for Day 2			

Refer to *The Great Debate Format* (H 6.3.4) for suggested times for selected activities.

L 6.4.1.2 Debate Scoring Rubric

Judge: _____

Category	5	4	3	2	1	Score
<p>Organization of Information and Clarity Main arguments and responses were outlined in a clear and orderly way.</p>	All information presented in this debate was clear, accurate, and thorough.	Most information presented in this debate was clear, accurate, and thorough.	Most information presented in this debate was clear and accurate, but was not always thorough.	Some information was accurate, but there were some minor inaccuracies.	Information had some major inaccuracies or was usually not clear.	
<p>Use of Argument Reasons were given to support the resolution. Evidence was provided.</p>	Very strong and persuasive arguments given throughout.	Strong and persuasive arguments given throughout.	Many good arguments given, with only minor problems.	Some good arguments, but some significant problems.	Few or no real arguments given, or all arguments given had significant problems.	
<p>Organization Arguments were delivered in an orderly, logical fashion.</p>	All arguments were clearly tied to an idea (premise) and organized in a tight, logical fashion.	Most arguments were clearly tied to an idea (premise) and organized in a tight, logical fashion.	All arguments were clearly tied to an idea (premise) but the organization was sometimes not clear or logical.	Arguments were not tied well to an idea.	Arguments were not tied at all to an idea.	
<p>Rebuttal Team identified weakness in opposing team's arguments and demonstrated ability to defend itself against attack.</p>	All counter-arguments were accurate, relevant, and strong.	Most counter-arguments were accurate, relevant, and strong.	Most counter-arguments were accurate and relevant, but several were weak.	Some counter-arguments were weak and irrelevant.	Counter-arguments were not accurate and/or relevant.	
<p>Presentation Style Tone of voice, clarity of expression, precision of arguments all contributed to keeping audience's attention and persuading it of the team's position.</p>	Team consistently used gestures, eye contact, tone of voice, and a level of enthusiasm in a way that kept the attention of the audience.	Team usually used gestures, eye contact, tone of voice, and a level of enthusiasm in a way that kept the attention of the audience.	Team sometimes used gestures, eye contact, tone of voice, and a level of enthusiasm in a way that kept the attention of the audience.	One or more members of the team had a presentation style that did not keep the attention of the audience.	The team's presentation style did not keep the attention of the audience.	

Total: _____

L 6.4.2 Activity

Teacher Directions

1. Distribute *The Great Debate Format* (H 6.3.4) and completed *The Great Debate Worksheets* (H 6.3.3). Remind the students that the debate will take place over two days. On the first day, teams will deliver their arguments and prepare rebuttals. On the second day, they will deliver rebuttals and closing remarks.
2. Introduce the judges. Explain that the judges will vote for the team that made the most convincing case, regardless of the side of the issue it argued, and regardless of the judges' personal agreement or disagreement with that position. Distribute *Debate Scoring Rubric* (L 6.4.1.2) to the judges.
3. Distribute *The Great Debate Ground Rules* (H 6.4.1). Review the rules with the students.
4. Follow the procedure outlined in the Day 1 portion of *The Great Debate Format* (H 6.3.4). **Note:** Students may refer to their completed *The Great Debate Worksheets* (H 6.3.3) during their presentations.

Day 1- Delivering arguments

- Teams draw numbers to determine the order of presentations.
- Each team has **seven minutes** to present its argument. Each presentation is delivered by one or two speakers.
- While a team is delivering the argument, non-presenting teams take notes that will help them to prepare rebuttals.
- Teams spend the rest of the lesson preparing rebuttals for Day 2.



5. Ask the students to put their interest group's name on their rebuttal notes. Collect rebuttal notes, *The Great Debate Format* (H 6.3.4), and *The Great Debate Ground Rules* (H 6.4.1) to be reused on the second day of the debate.
6. Collect *Debate Scoring Rubric* (L 6.4.1.2) from the judges, or ask the judges to bring their rubrics to the second day of the debate.

L 6.5 THE GREAT DEBATE – DAY 2

L 6.5.1 Objectives, Materials, and Teacher Preparation

Objectives

Students will be able to:

- Deliver oral presentations supporting a position
- Analyze arguments and prepare objections
- Actively engage with peers to communicate ideas about drinking water quality, environment, and health

Materials Needed for Lesson

- *The Great Debate Format* (H 6.3.4) (from previous lesson)
- *The Great Debate Ground Rules* (H 6.4.1) (from previous lesson)
- *Debate Scoring Rubric* (L 6.4.1.2) (for judges)
- Rebuttal notes (from previous lesson)
- Paper and pens (for taking notes)
- Stopwatch
- *Certificates* (H 6.5.1)
- Prizes/awards

Teacher Preparation

1. Locate saved copies of *The Great Debate Format* (H 6.3.4), *The Great Debate Ground Rules* (H 6.4.1), and the students' rebuttal notes.
2. Prepare copies of *Debate Scoring Rubric* (L 6.4.1.2) (one for each judge) and *Certificates* (H 6.5.1) (one for each student).
(Optional) Prepare prizes/awards. **Note:** Although only one of the teams will be the winner of the debate, consider preparing prizes/awards for all students.
3. Arrange for space away from the students where judges can deliberate about their decision.

L 6.5.2 Activity

Teacher Directions

1. Distribute *The Great Debate Format* (H 6.3.4), *The Great Debate Ground Rules* (H 6.4.1), and rebuttal notes to the students.
2. Distribute *Debate Scoring Rubric* (L 6.4.1.2) again to the judges.
3. Follow the procedure outlined in the Day 2 portion of *The Great Debate Format* (H 6.3.4).



Day 2

Part 1 - Delivering rebuttals

- Teams deliver rebuttals in the order of the draw opposite to the one used on Day 1. **Note:** *Rebuttal is a process in which reasons are given as to why something is untrue, using evidence in response to someone's prior statements.*
- Each team has **three minutes** to deliver a rebuttal to the teams with the opposing position. Each rebuttal is delivered by one or two speakers who did not speak on Day 1.
- While a team is delivering the rebuttal, non-presenting teams take notes that will help them to prepare closing remarks.

Part 2 - Delivering closing remarks

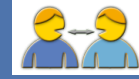
- After rebuttal presentations, teams spend **three minutes** integrating their notes and thoughts for closing remarks.
- Each team has **two minutes** to deliver its closing remarks, or a *summary of why its argument is the strongest*.
- Each presentation will be delivered by a speaker from the team who did not speak on Day 1 or previously on Day 2.

4. Announce that the judges will leave for five minutes for deliberations and then announce the debate winner.
5. While the judges are deliberating, conduct a follow-up discussion, asking the students the following:
 - Which parts of the debate were easy/difficult/interesting/useful?
 - How would the students have changed their researching techniques based on this experience?
 - Did hearing the other side change their opinions? Why or why not?
6. Have the judges return to the room and announce the winner.
7. Distribute *Certificates* (H 6.5.1) and prizes/awards (if there will be any).

INTENTIONALLY LEFT BLANK



STUDENT HANDOUTS



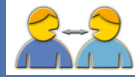
Directions:

Read over the first two scenarios to practice identifying characteristics of a good argument. The third scenario is actually related to the topic of the debate.

Scenario 1: Your principal is considering allowing students to carry their cell phones during the school day. Many teachers are not happy about that. The principal schedules a meeting where teachers, parents, students, and school administrators will discuss the issue. You will attend the meeting as a representative of the Student Government. It is your task to make the most convincing case you can for allowing students to carry their cell phones at school. Make your best argument to support student cell phones.

Scenario 2: During lunch, you observe that your school does not serve organic fruit and vegetables. You want to talk to your principal about switching to organic fruit and vegetables for staff and students. Make your best argument to support the switch.

Scenario 3: Two friends are out to lunch, and both want some water, but one asks the waiter for tap water and the other for bottled spring water. The person who asked for tap water laughs and says that it is silly to pay for water, because water is water. The other disagrees. They start arguing about what is a better drink choice: bottled water or tap water. Make your best argument to support each position.



Engaging in an argument does not always mean being angry at someone. An argument in a debate means you are proving a position based on logical reasoning and evidence.

What makes a good argument?

1. Good Reasons

A **reason** is a statement that explains a position.

Example: “Student lunches should include vegetables, because vegetables are healthy.”

2. Evidence to Support Your Reasons

Evidence is data or facts that provide proof for the reasons supporting your position. Example: “Kids who eat five portions of fruit and vegetables a day are healthier and have better grades than those who rarely eat fruit and vegetables.”

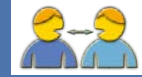
Your evidence should come from current, reputable sources. It is important to cite your sources when providing evidence!

3. Anticipated Responses of the Opposing Side (Counter-Argument)

When making an argument, discussing an idea, or making a suggestion, be aware that your opponent will likely have some objections countering your argument. This is called a **counter-argument**. Your argument is the strongest when you anticipate the opponent’s counter-argument and provide your own objections - reasons and evidence for why the anticipated opponent’s reasons are not good. This is called a **rebuttal**.

4. Completeness of Relevant Information

Your argument is the strongest when your reasons and evidence include all the important information that pertains to the topic. If you leave out important facts, your opponent will point them out in her/his counter-argument, thus weakening your argument.



Directions:

Using the links below, answer the following questions to get relevant background information on issues that involve bottled water and tap water.

1. Is tap water safe to drink? How is the quality of tap water regulated?

kidsenvirohealth.nlm.nih.gov/TopicSubtopic.php?tid=004&sid=007
cdc.gov/healthyyouth/npao/wateraccess.htm
toxtown.nlm.nih.gov/text_version/locations.php?id=18

2. Is bottled water safe to drink? How is the quality of bottled water regulated?

fda.gov/ForConsumers/ConsumerUpdates/ucm203620.htm
fda.gov/Food/ResourcesForYou/Consumers/ucm046894.htm

3. What is fluoride, and why it is important to have it in drinking water?

ada.org/sections/publicResources/pdfs/patient_30.pdf
cdc.gov/fluoridation/benefits/background.htm

4. What is BPA, and how can it affect the quality of drinking water?

toxtown.nlm.nih.gov/text_version/chemicals.php?id=69

5. What are the economic and environmental health effects caused by throwing away plastic water bottles?

cleanair.org/Waste/wasteFacts.html
epa.gov/osw/conserve/materials/plastics.htm

6. If you have additional questions, research them using the links provided by your teacher.



State Bottled Water Association

You represent vendors of bottled water who say that bottled water is a clean, safe alternative to tap water and water from school water fountains. You support the sale of bottled water in schools in order to increase vendor profits.

People Opposed to Packaging! (POP!)

You are radically opposed to widespread commercialization and packaging. You believe that there is too much stuff in packages that can end up in what we eat and drink, and we just don't know enough about the long-term effects to let this commercialization and packaging mania continue. Corporations and politicians won't silence you!

County School Board

You are concerned with recent budget cuts that negatively affect your ability to fund school field trips and afterschool clubs and activities. Sales from bottled water vending machines provide much needed money to support these activities. You think that by selling bottled water at schools, you provide students with safe drinking water while also raising funds for fun educational activities.

Association of Private State Water Treatment Plants

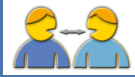
You work to ensure the safety of tap water through extensive water testing and other means. You believe there are all sorts of problems associated with requiring the sale of bottled water. Your interests motivate you to save costs, continue to assure the public that tap water is safe, and maintain and increase your current client base.

Environmental Action Committee

You are a moderate, nonprofit group primarily concerned with environmental issues. You worry about pollution in all its forms, including toxic chemicals in food and beverage containers and packaging. You seek ways to ensure the health of the public and the environment.

Regional Medical Association

You represent the interests of physicians. You argue that people, especially children, drink too little water and too much juice and soda. You support efforts to encourage and enable children to drink plentiful clean, healthy water throughout the school day. You believe that it is best to provide students with different options for accessing drinking water, which includes selling it in bottles.

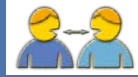


A **debate** is a regulated discussion of a proposition between two sides. It can involve two or more groups. When there are two groups, one group is in favor and the other is against the proposition. When there are more than two groups, some are in favor and some are against the proposition. In addition, the groups on the same side of the issue typically differ in some nuances of their views. A debate usually follows a specified format, and speakers and judges adhere to specific rules.

There are many formats used in debates. These formats differ in the number of opportunities each team gets to speak and in the length of time allowed for preparing and presenting arguments. However, regardless of the format, all debates usually include the following:

- **Initial delivery of the argument** by each team (sometimes also called **position statement**)
- **Rebuttal** of the opposing team's initial arguments. Rebuttal is a process in which reasons are given as to why something is untrue, using evidence in response to someone's prior statements. In a formal debate, rebuttal is usually a team's counter-argument response to the opponent's initial presentation of its position.
- **Closing remarks** by each team. A closing remark is a summary of why a debate argument is the strongest.





Directions:

Using the research you have collected, fill in the following handout with your position and argument that will be delivered during the debate.

Name (s) _____ Date _____

Group Name _____

Your Position: _____

Argument Speaker(s):

1. _____

2. _____

Rebuttal Speaker(s):

1. _____

2. _____

Closing Speaker:

1. _____

Reason # _____ for your position:

Explain your reason in more detail:

Evidence (facts!) that supports your reason (cite your sources):



Directions:

Read each step below for the format and time limits for the debate activities.

Day 1 - Delivering arguments

- Teams draw numbers to determine the order of presentations.
- Each team has **seven minutes** to present its argument. Each presentation is delivered by one or two speakers.
- While a team is delivering the argument, non-presenting teams take notes that will help them to prepare rebuttals.
- Teams spend the rest of the lesson preparing rebuttals for Day 2.

Day 2

Part 1 - Delivering rebuttals

- Teams deliver rebuttals in the order of the draw opposite to the one used on Day 1. **Note:** Rebuttal is a process in which reasons are given as to why something is untrue, using evidence in response to someone's prior statements.
- Each team has **three minutes** to deliver a rebuttal to the teams with the opposing position. Each rebuttal is delivered by one or two speakers who did not speak on Day 1.
- While a team is delivering the rebuttal, non-presenting teams take notes that will help them to prepare closing remarks.

Part 2 - Delivering closing remarks

- After rebuttal presentations, teams spend **three minutes** integrating their notes and thoughts for closing remarks.
- Each team has **two minutes** to deliver its closing remarks, or a *summary of why its argument is the strongest*.
- Each presentation will be delivered by a speaker from the team who did not speak on Day 1 or earlier on Day 2.

Summary

- Seven minutes for delivering argument
- Preparation of rebuttals (time determined by the teacher)
- Three minutes for rebuttal
- Three minutes to gather information and notes
- Two minutes for closing remarks



A good presentation is the result of a well-prepared team. Practice what you will say and how you will say it.

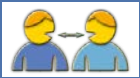
Listen actively.

Respect others when they are talking.

Refrain from personal attacks – focus on ideas.

Participate to the fullest of your ability.

H 6.5.1 CERTIFICATE



Awarded to

For participation in

The Great Debate: Bottled Water vs. Tap Water

Signed by: _____

Date: _____

UNIT 6 GLOSSARY

The following vocabulary is featured in Unit 6 of the Tox Town curriculum.

argument—Presentation of a position based on logical reasoning and evidence.

closing remarks—A summary of why a debate argument is the strongest.

counter-argument—An argument against another argument, idea, or suggestion.

debate—A discussion of a topic where people have different views and positions; a regulated discussion of a proposition between two sides. A debate usually follows a specified format, and speakers and judges adhere to specific rules.

environmental health—Environmental health is the field of science that studies how the environment influences human health and disease. “Environment,” in this context, means things in the natural environment like air, water, and soil and also all the physical, chemical, biological, and social features of our surroundings.

evidence—Data or facts that provide proof for the reasons supporting your position (e.g., “Kids who eat five portions of fruit and vegetables a day are healthier and have better grades than those who rarely eat fruit and vegetables.”) It is important to cite your sources when providing evidence!

objection—A reason or argument presented in opposition to a statement.

position statement—In a debate, initial delivery of the argument by a team.

reason—A statement that explains a position (e.g., “Student lunches should include vegetables, because vegetables are healthy.”).

rebuttal—A process in which reasons are given as to why something is untrue, using evidence in response to someone’s prior statements. In a formal debate, rebuttal is usually a team’s counter-argument response to the opponent’s initial presentation of its position.