"Wet" Your Appetite!

SF Environment
Our home. Our city. Our planet.

Grades 3-5

Lesson Summary

Students will learn how much water is needed to produce food and will create a menu that helps conserve water.

Overview

In this lesson, students will:

- Students will analyze a typical daily diet.
- Estimate how much water is needed to produce food for a day.
- Design a new menu that will conserve water by half.

Time

45-60 minutes

Background

Water is the most abundant substance on earth, covering three-fourths of its surface. Only a tiny amount of that water however is usable drinking water. Ninety-seven percent (97%) of all water is salt water found in oceans and seas. Two percent (2%) of all water on earth is frozen in the form of ice caps, glaciers and icebergs and isn't usable. About 1% of all water on earth is in the form of fresh water found in lakes, streams, rivers, soil and underground reservoirs or aquifers. Since most of this water isn't readily available for us to use, that leaves less than 1% (about 0.34%) available for animals and humans to drink and use. That's like having $100 dollars in the bank and only being able to use 34¢!

Over half of the water in California and the United States is used to grow crops to feed cattle and other livestock. These cattle become food items like steak, hamburgers, taco meat, hot dogs and other red meat items. Raising cattle for food uses a lot of water, because cattle eat tons of crops that need to be grown (using water) to feed them. It takes 25 gallons of water to grow one serving of rice, 63 gallons of water to produce one egg, and 625 gallons of water to make one quarter-pound hamburger. It takes up to 100 times more water to produce one pound of beef than one pound of wheat.

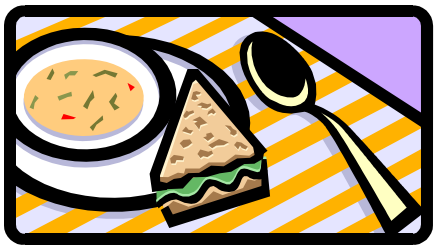
The typical American diet includes a lot of beef. Most doctors agree that plant-based diets full of whole grains, fresh fruits, vegetables, legumes, nuts and seeds are much healthier for our bodies and can help prevent heart attacks, diabetes, cancer and obesity that are often associated with a high intake of beef and other animal products. Many different ethnic cuisines like Chinese, Indian, Thai, Mexican, Middle Eastern and Vietnamese foods offer a variety of healthy dishes that mostly contain plant-based foods. The lower we eat on the food chain (i.e. the more plant-based foods we eat versus animal based foods) the less water, energy and other natural resources we use. Eating less beef is better for the environment and better for our health.

Vocabulary

- plant-based diet
- agriculture
- food chain

Materials

- *Water—The River of Life* Fact Sheet
- *"Wet" Your Appetite* Handout
- Scratch paper and pencils



Menu of a Typical American Diet

Breakfast

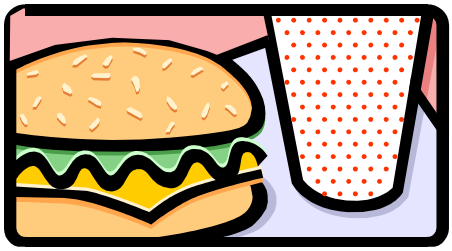
2 eggs-124 gal.
2 slices bacon-100 gal.
2 pc. toast w/butter-110 gal
1 glass orange juice-49 gal.

Lunch

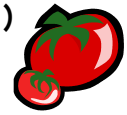
1 burger on a bun–626 gal.
1 order French fries–15 gal.
1 serving carrots–6 gal.
1 cookie–55 gal.
1 glass milk–48 gal.

Dinner

1 beef steak–1200 gal.
1 serving rice–25 gal.
1 tossed salad–15 gal.
1 soda–10 gal.
1 slice apple pie–90 gal.



How much water does it take to produce…? (typical serving)



Lettuce	3 gallons
Tomato	8 gallons
Orange	14 gallons
French fries	15 gallons
Bread–2 slices	20 gallons
Rice	25 gallons
Milk–1 glass	48 gallons
Cheese	56 gallons
One egg	62 gallons
Chicken	330 gallons
Pork	400 gallons
Beef steak	1200 gallons

Preparation

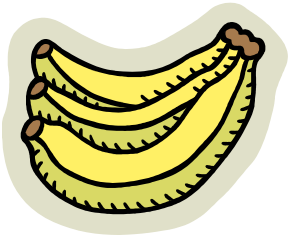
- Read *Background* and *Water—The River of Life* Fact Sheet
- On the chalkboard, write the foods listed above without the gallon amounts. Also write the entire *Menu of a Typical American Diet* at left. Cover up the menu so that students can't see gallon amounts until later.
- Pass out *Water—The River of Life* Fact Sheet and have students read alone or take turns reading aloud. This can also be done earlier as a homework assignment.

Pre-Activity Questions

Ask students:

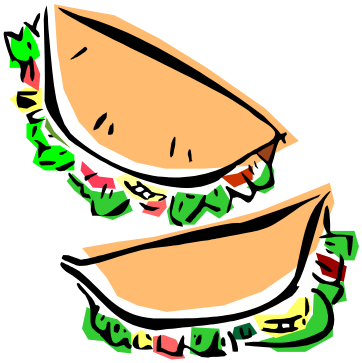
1. What are two things water provides us with that we literally could not live without?. (*drinking water; food)*
2. How much of all water is found on earth as salt water? (97%)
3. How much of all water on earth is found as fresh water? (3%)
4. How much fresh water is available for us to drink? (0.34%)
5. How much water does each student consume every day as drinking water and as water added to other drinks like juice or soda?. (*Answers will vary, but generally it's 4-8 glasses of water a day per person.)*
6. Since much of our water is used by farmers to grow food and other crops, are there some foods that require more water than other foods to be produced? Why? (*Animal products, especially beef, use more water than plant products. To produce food from animals, water is needed to grow crops to feed these animals during their lifetime before they provide us with eggs, dairy or meat products.. It takes up to 100 times more water to grow a pound of beef than it does to grow a pound of wheat.*

Procedure



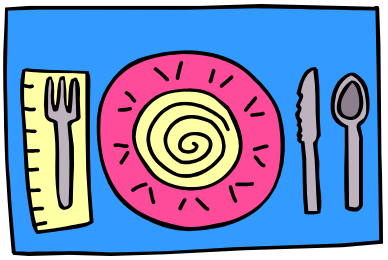
1. Tell students they will play a game to predict how many gallons of water are needed to grow one typical serving of the foods listed on the board. Have students raise their hands and call on two or three students to guess amounts for each food listed. This lets all students participate in game.
2. After the first predictions are made for the first food (i.e. lettuce) write the correct answer on the board and move on to item number two on the list, asking for more predictions. Proceed in this fashion until all the foods have been addressed.
3. Are students surprised by these findings? If so, spend five minutes answering questions and discussing their observations.

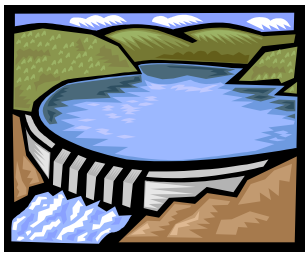
4. Explain to students that most of the water we consume during our lifetime comes from producing the foods we eat every day. Uncover the menu on the board and explain that this resembles a typical American diet. Ask students if they eat any of the foods listed on the board. Since water is always needed to produce foods we eat, ask students to figure out how many gallons of water are needed to produce the food for each meal listed on the board, and then to figure out the total water needed for all three meals. They can do the math on scratch paper. When ready, call on students for their answers. (*Breakfast-383 gal.; Lunch-749 gal.; Dinner-1340 gal.*; *Total for all meals-2472 gal.*)

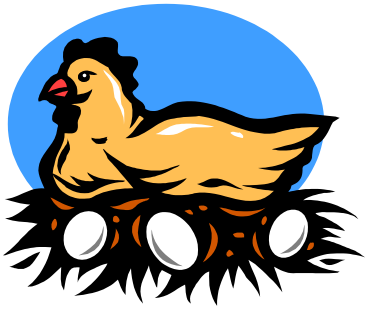


5. Have students identify the foods that consume the most water. Ask them why they require the most water. *(This question helps them reiterate the concept taught earlier in the Pre-Activity Question #3.)*
6. Tell students they will now create a Water-Wise Menu that requires only half the amount of water. Pass out the *"Wet" Your Appetite* handout to each student. Put students into groups of four or five. Tell students to refer to the list of foods and the gallons needed to produce each food. Ask students to come up with a new daily menu that they will share with the class. The goal of this new menu is to reduce water use by approximately half. Since there are many ways to do this, their task is to create a menu that most closely represents what they would eat, and that is balanced and nutritious. In other words, no substituting cookies for sandwiches, and no lettuce-only lunches!

7. When ready, have a student from each group share their groups' menu with the class. Write these new menus on the board including total water needed for the meal.
8. Discuss the findings by investigating the following:
   - Are the meals listed balanced and nutritious?
   - What considerations did students make in creating their new menus?
   - Do meals include animal products or are they plant-based?
   - Is it possible to eat meat and conserve water? (*Note: It is not necessary to be a vegetarian to reduce water use by half when consuming food. While a plant-based diet*







significantly reduces water *consumption, it is important to teach that we can still eat meat and conserve water. This especially makes sense when looking at a weekly diet. If beef is eaten four times a week, it can be halved to twice a week for water conservation benefits*.)

9. Pick one of the students' Water-Wise Menus. Tell students they will now figure out how much water is needed to produce one week's worth of food in the Water-Wise Menu and the *Typical American Diet Menu*. Using the total gallon amounts from each menu on the board, have students figure out the total amounts of water needed for each menu for one week and one month (30 days). Is there a significant change in water use between both menus after a week? A month? (*Typical American Diet Menu: one week=17,304 gal.; one month/30 days=74,160 gal.)*
10. Ask students to discuss their findings. How does food choice affect water consumption and conservation? Will this new information affect their food choices when they are allowed to choose what they eat? (*Note: Some students don't have much choice at home regarding what foods are served to them. If they mention this, explain that they usually have choice when ordering meals at a restaurant and that they will have freedom to choose what they eat when they are older. Whatever foods are served at home, it is important to be thankful to the family for providing that food. The goal is to raise awareness about the impact food choices have on our water supply and to empower students with knowledge they can use throughout their lives.)*

Extensions

- Using the handout, have students create a Water-Wise Menu for a day to follow at home. Share experiences.
- Discuss ethnic cultures that mostly eat a plant-based diet. What foods do the traditional peoples of Mexico, Lebanon, India, Japan and China eat? Is meat the main part of their diet? Have students research the foods of these countries and hold an international potluck where students bring in plant-based food from the country they've studied. Examples of foods include: chips and salsa, bean dip, guacamole, bean burritos, hummus and pita bread, falafel, vegetable curry, samosas, vegetable tempura, sushi rolls, seaweed salad, stir-fried veggies with tofu, vegetarian egg rolls, fried rice, chow mein, etc.

Name_____ Date_____

"Wet" Your Appetite!

Using the list of foods provided, create a balanced and realistic daily menu that uses about half the amount of water needed for the *Typical American Diet*. (*Note: Fish items are not included because it is not known how many gallons of water are needed to process fish items*.)

Menu of a Typical American Diet

Breakfast

2 eggs-124 gal.
2 slices bacon-100 gal.
2 pc. toast w/butter-110 gal
1 glass orange juice-49 gal.

Lunch

1 burger on a bun–626 gal.
1 order French fries–15 gal.
1 serving carrots–6 gal.
1 cookie–55 gal.
1 glass milk–48 gal.

Dinner

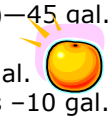
1 beef steak–1200 gal.
1 serving rice–25 gal.
1 tossed salad–15 gal.
1 soda–10 gal.
1 slice apple pie–90 gal.

Daily total: 2472 gallons

Breakfast Foods

Bacon (1 slice)—50 gal.
Bagel—20 gal.
Butter (1 pat)—45 gal.
Cereal (w/out milk)—20 gal.
Cereal with milk – 68 gal.

Cream cheese –56 gal.
Egg (one)—62 gal.
French toast (1 slice)—45 gal.
Fruit salad—25 gal.



Ham (1 slice)—100 gal.
Hash brown potatoes –10 gal.
Muffin— 45 gal.
Pancakes (1 large)—45 gal.
Sausage (1 link)—100 gal.

Toast—(1 slice)—10 gal.
Waffles (1 slice)—45 gal

Lunch Foods

Bologna sandwich—300 gal.
Cheese sandwich—66 gal.
Chicken sandwich—175 gal.
Egg salad sandwich—100 gal.
Ham sandwich—240 gal.
Hamburger—625 gal.
P-nut butter sandwich-100 gal.
Pizza (pepperoni) –285 gal.
Pizza (cheese)—155 gal.

Quesadilla –140 gal.

Dinner Foods

Baked beans (no pork)-65 gal.
Baked beans w/pork-265 gal.
Bean burrito—125 gal.

Beef burrito—425 gal.
Beef hotdog—325 gal.
Beef steak—1200 gal.
Chicken —330 gal.

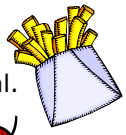
Chicken burger—185 gal.
Hamburger—625 gal.
Lasagna w/cheese—135 gal.
Lasagna w/beef—435 gal.
Macaroni and cheese-110 gal.
Pasta w/tomato sauce-55 gal.
Pasta w/meatballs—670 gal.
Rice—25 gal.
Tamale w/beef—340 gal.
Tamale w/chicken—195 gal.
Tofu burger—80 gal.
Tofu hotdog—80 gal.
Turkey—330 gal.

Veggie stir-fry—45 gal.
Veg. stir-fry w/meat—345 gal.

Fruits and Vegetables

Apple—10 gal.
Broccoli—11 gal.

Cantaloupe—40 gal.
Carrots—6 gal.
Corn—20 gal.
French fries—15 gal.



Fruit salad—25 gal.
Mashed potatoes—15 gal.
Orange—14 gal.

Potato—6 gallons
Tomato—8 gal.
Tossed salad w/dressing 15 gal.
Watermelon—100 gal.

Desserts

Apple pie—90 gal.
Cake—90 gal.
Cookie—55 gal.
Ice Cream—150 gal

Snacks

Almonds—80 gal.
Corn chips— 40 gal
Crackers—20 gal.
Popcorn—20 gal.
Potato chips--.10 gal.

Beverages

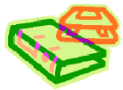
Apple juice—45 gal.
Milk—48 gal .
Milkshake—95 gal.
Orange juice—49 gal.
Soda—10 gal.
Water—8 ounces

Breakfast--------Gallons **Lunch----------Gallons** **Dinner----------Gallons**

Total Gal. Used: **Total Gal. Used:** **Total Gal. Used:**

Daily Total Gallons Used:

"Wet" Your Appetite! CA Standards 3-5



Grade 3

Math **♦NS1.1**	Students count, read, and write whole numbers to 10,000
♦NS2.0	Students calculate and solve problems involving addition, subtraction, multiplication and division:
♦NS2.1	Find the sum or difference of two whole numbers between 0 and 10,000
Language Arts **♦ R2.0**	Students read and understand grade-level appropriate material. They draw upon a variety of comprehension strategies as needed (e.g., generating and responding to essential questions, making predictions, comparing information from several sources)…
♦ R2.2	Ask questions and support answers by connecting prior knowledge with literal information found in, and inferred from, the text.
♦ R2.3	Demonstrate comprehension by identifying answers in the text.

Abbreviations
Language Arts: R=Reading; W=Writing; LC= Language Conventions; LS=Listening/Speaking
Math: N=Number Sense; A=Algebra; MG=Measurement/Geometry; S=Statistics/Data Analysis; MR=Mathematical Reasoning

Grade 4

Math **♦ NS3.0**	Students solve problems involving addition, subtraction, multiplication, and division of whole numbers and understand the relationship among the operations:
♦ NS3.1	Demonstrate an understanding of, and the ability to use, standard algorithms for the addition and subtraction of multidigit numbers.
Language Arts **♦ R1.0**	Students understand the basic features of reading. They select letter patterns and know how to translate them into spoken language by using phonics, syllabication, and word parts. They apply this knowledge to achieve fluent oral and silent reading.
♦ R1.1	Read narrative and expository text aloud with grade-appropriate fluency and accuracy and with appropriate pacing, intonation, and expression.
♦LS1.1	Ask thoughtful questions and respond to relevant questions with appropriate elaboration in oral settings.

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Grade 5

Math ♦ **2.3**	Use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning.
Science ♦ **3**	Water on Earth moves between the oceans and land through the processes of evaporation and condensation. As a basis for understanding this concept:
♦ **3a**	Students know most of Earth's water is present as salt water in the oceans, which covers most of Earth's surface.
♦ **3b**	Students know when liquid water evaporates, it turns into water vapor in the air and can reappear as a liquid when cooled or as a solid if cooled below the freezing point of water.
♦ **3c**	Students know water vapor in the air moves from one place to another and can form fog or clouds, which are tiny droplets of water or ice, and can fall to Earth as rain, hail, sleet, or snow.
♦ **3d**	Students know that the amount of fresh water located in rivers, lakes, under-ground sources, and glaciers is limited and that it's availability can be extended by recycling and decreasing the use of water.
Language Arts ♦ **R1.1**	Read aloud narrative and expository text fluently and accurately and with appropriate pacing, intonation, and expression.
♦ **R2.3**	Discern main ideas and concepts presented in texts, identifying and assessing evidence that supports those ideas.
♦ **R2.3**	Demonstrate comprehension by identifying answers in the text.

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