

Unit 1: Aqua Bodies

Lesson 2 - How Much Water Do We Eat?

Setting:

- Middle school biology class
- Public or private school classroom

Learners:

- 25-30 middle school biology students
- Ages range from 14-17 years old
- Majority are English language learners
 - various L1s and home countries
 - many demonstrate high proficiency English speaking skills

Class duration:

- 2 class periods of 50 minutes, 100 minutes total.

Materials: Aqua Bodies Packet (which includes “Following Directions: A Diagnostic Exam,” “Reflection,” “ Worksheet for SA and SB,” “Worksheet for SC and SD,” and “Calculating Food Water Content”), ALA Flipchart; For experiment: enough oranges, cucumbers, carrots, individual potato chips, tortillas, kitchen knives, carrot shavers, permanent markers for each group to have one; 5 individual pieces of paper towel, 5 individual pieces of aluminum foil for each group; 1 food scale for the whole class to use (and an optional desk lamp for drying area)

Task	Teacher (T) Behavior	Student (S) Behavior	Outcomes	Time
1 - Brainstorm - Desert Island Diet	<p>-Before Ss enter, write the following on the board: SA is recorder, SB is reporter, SC is explainer, SD is task-master; Have all supplies ready for Ss to collect before starting experiment; Designate a dry, bright “drying area.” NOTE: if classroom is particularly humid, a desk lamp can be placed over samples to speed drying.</p> <p>-As students enter, direct them to sit with their groups of 4 and show them their assigned roles on the board.</p> <p>-Ask Ss to make a list of food items to bring to a desert island for 1 week, tell them to be ready to say why they chose those foods!</p> <p>-Remind Ss to consult ALA flipchart of keywords and</p>	<p>-Sit in assigned groups of 4, Ss must note their assigned role.</p> <p>-Consult ALA flipchart of keywords and questions for appropriate language.</p> <p>-Recorder (SA) uses their own paper and pencil to write down foods.</p> <p>-Task-master (SD) makes sure every S participates and that everyone is heard.</p> <p>-Reporter (SB) writes thoughts on the board</p>	<p>-Ss will give, evaluate, defend, and negotiate opinions in order to come to a consensus using their ALA flipchart keywords and questions.</p> <p>-Ss schematic knowledge related to food and survival (hydration) will be activated; Ss should be curious as to why the T chose a certain group to survive over another.</p>	12 mins

	<p>questions for appropriate language.</p> <p>-Monitor S progress; direct Ss to board to write their list when ready.</p> <p>-Bring class back together and call on groups to share reasoning.</p> <p>-At the end, based on water content of foods Ss thought of, T chooses a team that will survive!</p> <p>-T should not tell Ss <i>why</i> one group survives over another. (The answer is that the group who listed foods with more water = better chance of survival), as this will be revealed at the end of the following experiment.</p>	<p>before sharing as a class.</p> <p>-Explainer (SC) shares reasons for choosing foods with whole class.</p>		
2 - Grammar Awareness - Imperatives; Grammar Use - Imperatives	<p>-Tell Ss to check HW in pairs (SA with SB, SC with SD); they must come to a consensus as to whose verb is the best choice.</p> <p>-When finished, direct Ss to original groups of 4; SA and SB read their answers allowed to SC and SD, then switch; Ss should fill out p. 3 and p. 4 based on what they hear.</p> <p>-Bring class back together; check HW by having students read one direction each out loud; if verb or verb form is incorrect, correct it. If it is correct, elicit other possibilities from other groups (more than one answer is possible!).</p> <p>-If time runs short, can just check answers as a class, though this removes the information gap aspect of activity.</p>	<p>-SA and SB share answers on p. 3 and SC and SD share answers on p. 4 by reading aloud. If there is a disagreement, S defends their choice; Ss must come to a consensus.</p>	<p>-Ss awareness of verb polysemy will be triggered.</p> <p>-Ss must listen for correct verb form; Ss will negotiate meaning and form of verbs with other Ss.</p> <p>-Ss will confirm or correct their own answers.</p>	12 mins
3 - Experiment - Directions into Actions	<p>-Direct Ss to use their newly corrected directions to perform experiment.</p> <p>-Circulate room as Ss work, guiding and aiding as needed; stop after direction #9.</p>	<p>-Ss work through experiment using newly corrected directions (p. 3 and 4), stop after direction #9.</p>	<p>-Ss will put verbs into action by performing experiment.</p> <p>-Ss will practice scientific process of making a hypothesis and testing it.</p>	26 mins

(48/72 hours later)

Day 3, Lesson 2.1 - How much water do we *eat*?

Materials: Aqua Bodies Packet

4 - Calculating Food Water Content (Percentages)	-As students enter, direct them to collect their food and bring it to their group work area -Direct Ss to proceed with directions #10-15 on p. 4	-Ss get into lab groups from food laboratory experiment -Ss collect their food scraps from the drying area	-Ss will understand nutritional value of foods in terms of hydration; Ss will practice calculating percentages. -Ss will discuss how percentages of water affect their body and what foods they should eat to stay hydrated.	30
5 - Reflecting on Language - imperatives vs modals.	-Direct Ss back to Part 2 of Pages 3 and 4. Ss work in partners first, then share answers with whole group, and finally as a class. Remind them to write down what their partner shares.	-Move on to Part 2 of Pages 3 and 4. Ss work in partners first, then share answers with whole group.	-Ss will note the differences between written directions and spoken directions as well range in politness	

1. **Do not** turn this paper over
2. This is a test to see if you can follow directions. First, read everything on this page before doing anything so that you will know exactly what to do.
3. Write your name in the upper-right corner of this paper (under “Page 1”).
4. Circle the word “**name**” in the direction #3.
5. Write the date in the upper-left corner of this page (above “Following directions”).
6. Draw five small squares under your name.
7. Write an X in each square.
8. Draw a circle around the date.
9. Quietly tap your pen three times on the bottom-right corner of the paper.
10. Draw an arrow from the bottom right corner of the page to the word “directions” in direction #13.
11. In the space below, write three healthy foods you like to eat:
12. In the space below, draw a picture of one of the foods above:
13. Ignore everything but direction #1, #2, and #3. Sit quietly and observe your classmates. Write your observations below as you wait for the teacher to give you further directions.

Reflection – Part 1

Directions: Read questions #1 and #2 below. Answer them in complete sentences.

- 1) What did you learn from this activity?

 - 2) Why is it important to carefully read all directions before you begin an activity or experiment? Why might this be especially important in science?
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Grammar Awareness

Now that you've learned a very important lesson, please follow the directions below:

Directions

1. Turn to Page 1
2. Circle all of the **VERBS** you can find.
3. Answer the following questions:

Think about the use of verbs in a novel, newspaper, and recipe. What makes the use of verbs in these texts similar and/or different than the verbs in the directions for your experiment?

Why do you think the writer of these directions chose to use verbs in this way?

Students A and B (SA and SB)

SA and SB go to the front of the class

Part 1

1. _____ 1 orange, 1 cucumber, 1 carrot, 1 potato chip, 1 tortilla, a kitchen knife, shaver, food scale, paper plate, 1 permanent marker, 5 pieces of paper towel, and 5 pieces of aluminum foil.
2. _____ to your group with all of your supplies.
3. With the permanent marker, _____ the name of each food on one piece of tin foil.
4. _____ each piece of tinfoil on the food scale; _____ how much each piece weighs in column A on p. 5.
5. Using the carrot shaver, _____ as much of the carrot and cucumber as possible onto their **separate** tinfoil/paper towel. _____ the rest of the carrot and cucumber away.
6. Carefully _____ the orange into thin slices with the kitchen knife
7. _____ the potato chip and tortilla on their separate tinfoil/paper towel

Part 2

Consider how these directions would be different if they were spoken rather than written. (Hint: how do people give drivers help when they ask for directions?) You may want to consider the way your group spoke while performing the experiment. With your partner, think about these differences and practice giving each other spoken, rather than written, directions.

Example: “You *need* to pick up 1 orange, 1 cucumber...” or “You *should* carefully cut the orange into thin slices with a kitchen knife.”

Write down three sentences your partner says.

Students C and D (SC and SD)

SA and SD go to the front of the class

8. _____ each food on their tinfoil/paper towel; _____ how much each food item + tinfoil/paper towel weighs in column B on p. 5.
9. _____ all five food items on the tinfoil/paper towel to a warm, dry part of the room.
10. _____ the food dry for 48 hours.
11. _____ the weight in A from the weight in Column B; _____ the new weight in Column C.
12. After waiting 48 hours (or as long as it takes for the food to dry out completely), _____ your food. Be sure to _____ it on the tinfoil/paper towel; _____ this weight in column D on p. 5.
13. _____ the weight in Column A from the weight in Column D; _____ this weight in Column E
14. Finally, _____ weight in Column E from the weight in Column C; _____ this weight in Column F.
15. _____ weight in Column F by weight in Column C. _____ this number to a percentage.

Part 2

Consider how these directions would be different if they were spoken rather than written. (Hint: how do people give drivers help when they ask for directions?) With your partner think about these differences and practice giving each other spoken, rather than written, directions.
Example: “You *need* to wait for the food to dry.” and “You *must* keep the food on the tinfoil/paper towel.”

Calculating Food Water Content

	Before Drying			After Drying			
	Hypothesis (Which food has the most water?):			Accept or refute hypothesis? Why?			
	A	B	C	D	E	F	G
	Weight of Tinfoil/Paper towel (TPT) without food	Weight of TPT with food	Weight of food (only) before drying	Weight of TPT + Food after drying	Weight of food (only) after drying	Amount of water contained in food ITEM	Percentage of food that was water
Example:	100 g	400 g	300 g	150 g	50 g	250 g	83%
Carrot							
Cucumber							
Orange							
Tortilla							
Potato Chip							