

**Mass of a Tortoise Diet (Lesson Plan)
(Level 3 Inquiry- Guided Inquiry)**

Grade Level

4. Students in grade 3, 4 should have at least a rudimentary understanding of how living organisms depend on one another and their environment for survival. This lesson plan reemphasizes prior information – and builds upon prior knowledge – by giving students an opportunity to make observations, create hypotheses, calculate formulas and organize their ideas in a meaningful way.

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Science Concept

This lesson is aimed at helping students understand that animals can adapt their diets to their environment in order to survive. This lesson provides opportunities for students to practice making observations and formulating and testing hypotheses.

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Relationship to California Science Content Standards

6. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:

- a. Differentiate observation from inference (interpretation) and know scientists' explanations come partly from what they observe and partly from how they interpret their observations.
- b. Measure and estimate the weight, length, or volume of objects.

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Objective

Students will learn the mass of water in a tortoise diet can vary depending on the type of food it eats.

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Conceptual Background

Living in the desert terrains can pose a problem for animals that need water to survive. Tortoises can easily consume 40% of their body weight in water daily, if plenty of water is available. However living in the desert, tortoises do not always have water available to them and they must obtain it from different sources such as food in order to survive. This lesson can be adapted for diets of Turtles and Tortoises that live in captivity as well. One basic concept a teacher needs to understand in order to teach this lesson well is subtraction and finding the percentages.

Weight: is a measure of the pull or force of gravity on an object

Mass: is the amount of matter in an object and a measure of the force needed to accelerate it. On the moon, where gravity is much less than on earth, an object has a smaller weight but the identical mass as earth. For practical purposes, on earth, the measures of mass and weight will be about the same. In this lesson, the terms *weight* and *mass* will be used interchangeably.

The tortoise diet in the wild generally consists of grasses, succulent plants, cacti, wild flowers and herbs, and prickly pear fruits. For the sake of this lesson the variations of following items can be used to demonstrate a tortoise diet: Alfalfa hay, romaine lettuce, apples (sans seeds), prickly pears, dandelions, carrots, squash, zucchini, melon, eggplant, bananas/ plantains, etc.

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Materials

1. Triple beam balance
2. 5 plants from a tortoise diet
3. Shoe box or similar box for storing plants
4. Pencils and crayons

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Engage:

Bring the Desert or Texas Tortoise in for display. Give students at a few minutes to get a close-up look at the tortoise in the morning to watch it eat. Have students fill out a KWL sheet regarding the eating and dietary habits of tortoises. Watch the video “The Heat is On” from the USGS about tortoises (This is in your Multimedia Resource Section in your SERC binder.

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Explore:

Show the class pictures of plants that tortoises eat in their natural habitat. Lead a class discussion on where and how tortoises get food and water in the vapid desert. Have the students add information and questions to their KWL chart.

Each group (3-4 students) will have a chance to learn the mass of water in a tortoise diet. Students will copy the information from the lab directions “Mass of a Tortoise Diet” and input the information in their Lab Report sheet. Students will also complete a Data Table worksheet with the weight of each food item. On day one, have students fill out the KWL sheet and go over the lab and data sheets including a demonstration of one example of measuring a food item. Have the students measure the “wet” weight of the food items. Remember that measurements will vary as the size of whole or cut up food are of not equal weight. Once the students are working, circulate the room asking questions and guiding inquiry.

Ask leading questions such as:

Which food item do you think contains more water?

How much do you think a tortoise would have to eat of each item to get enough water in its diet?

What do you think will happen if we leave the plants out all night? Why?

Why is it important for tortoises to have water?

On day two, have the students take out their KWL chart and fill in their observations about the food items that were left out overnight at room temperature. Then have them complete their Data Table handout.

Ask leading questions such as:

What differences/ changes have you noticed today verses yesterday?

What does this mean for the tortoise diet?

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Explain: After the class finishes their measurements, have the students tell you some of their results. *Ask* them to ponder the differences in results.

Ask students some leading questions, if necessary:

Why did some students have different results? What are some reasons why this happened?

Is your outcome different than your guess (Hypothesis)?

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Extend: Review the food that tortoises eat in the wild and talk about similar food that are eaten in captivity. Based on the findings they collected in their Data Table and choosing random data material, as a class determine the amount of food the tortoise would have to eat of the wet food items combined in order to equal 40% of its weight each day.

(Formula:

$40\% \text{ of weight} = 0.4$

Weight of tortoise

Jeremiah= 4,790g or 4.79kg

Governor= 1,930g or 1.93kg

$0.4 \times \text{mass of tortoise} = \text{amount of grams of water needed per day}$

Find the amount of food needed to eat to equal 40% of weight.

Use the combined total of grams of wet food weight and divide by amount of grams of water needed per day.

Evaluation Ideas:

Summative – Correct students’ worksheets for thoroughness and accuracy. Use a point scale based on level of achievement. For example, on the Lab Report offer each student 2 full points for each box that is correctly and completely filled out, 1 point for each material draw, listed and colored (15 pts) for a total of 25 points. The data table sheet is worth one point for the data entered in each box (total 25pts) and 5 points for the hypothesis. If grammar or punctuation is incorrect half a point for each error is subtracted. The total value of the Data Table is 30 points. KWL chart is extra credit for students that filled it out.

Formative – Note students’ level of participation throughout the lesson. For example, students who intently observe the tortoise, engage in lesson-related conversations with peers, work well with group members, jot down notes in their KWL Charts and make contributions to answer the leading questions can receive full credit for this part of the evaluation. For a more formal evaluation, read each student’s Analyze and Conclude section in their Lab Reports after class and award points based on thoroughness and lesson-relevant notations.

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Differentiation Plans:

Behavioral for Student A – Simply having a live animal in the classroom may be one way to engage a student who is unmotivated or has trouble staying on task. Prepare further by considering the problem behavior when planning out your lesson and creating a back-up plan. For example, ask the student to be the facilitator of his or her group and that everyone has to have each section finished in order to move on to the net task. They may also be in charge of making sure each group has their materials.

Cognitive for Student B – Offer extra scaffolding for a student with a learning disability. For example, give the student more time with the tortoise and ask more leading questions as the student observes the animal and conducts the lab. During lab time, place the student in a group with peers of mixed abilities to encourage collaboration while helping prevent the student from feeling like the underdog.

Cognitive for Student C – Encourage a gifted student to help you learn more about tortoise diets and the environmental impacts hindering food sources as you go through the lesson. For example: During the **Explain** portion of the lesson, a student raises his hand and asks a questions, “Why can’t they eat other plants?” or “Where do they keep all that water?” but you don’t know the answer. Ask a gifted student to use the Internet on a class computer to look up the answer for you. Prepare in advance by opening tabs on a computer for at least three different valuable wildlife websites.

http://www.blueplanetbiomes.org/desert_tortoise.htm
<http://www.tortoise-tracks.org/gopherus/tortques.html>
<http://www.tortoisetrust.org/articles/webdiet.htm>

Affective for Student D - For a shy student who fears raising his hands in class, offer an alternative formative assessment by listening in on his contribution to group discussions. Also, approach his table during journaling/class discussion time to ask him some one-on-one open-ended questions about his observations. If needed, place extra weight on summative evaluation scores.

Language Demands for Students E, F, G – Give ELLs a front-and-center view of the tortoise and materials used in the lab. Use clear body language, such as pointing directly to the feature of the animal, food items and materials being discussed. Teacher demonstration of the lab can help to clarify order of instructions. Drawing the materials and labeling them on the lab sheet will also help in identifying objects and relating the names to the in order to draw a connection between each item. Evaluate ELLs who are somewhat proficient in oral English but struggle with written English by having a verbal discussion. If bilingual students who speak the language of your ELLs are in your classroom, place ELLs at a table with them and encourage a group discussion.

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Directions or Special Instructions; Safety Concerns, etc.

- While students are permitted to closely observe the Tortoise, only the teacher is permitted to touch the animal.