PHILADELPHIA ZOO

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Sustainability (6th-8th)

Essential Question: Why is sustainability so important?

Objectives

1. Students will learn what an ecosystem is
2. Students will learn what is means to be sustainable
3. Students will be able to give examples of sustainable practices

Vocabulary

Ecosystem: All the biotic and abiotic factors interacting as a system

Environment: the interaction between physical, chemical, and biotic factors (such as climate, soil, and living things) that act upon and organism or community to determine its survival

Sustainable: utilizing a resource so that the resource is not depleted or permanently damaged

Abiotic: All the non-living things in an environment

Biotic: All the living things in an environment

Recommendations

Read: "The Lorax" – Dr. Seuss

"Not Your Typical Book About the Environment" – Elin Kelsey

Research: -Items that are and are not recyclable in your school or town

-Ecosystems that have been impacted by an unsustainable practice

Discuss:

-What are some examples of sustainable choices that you or your family have made?

-What are some ways that we can help local ecosystems?

Standards

PA: 3.1 A2, 3.1 A8, 3.4 B2, 3.4 E2, 4.1 A, 4.1 C, 4.1 D, 4.1 E, 4.3 B, 4.4 A, 4.4 D, 4.5 A, 4.5 B, 4.5 C, 4.5 D

Next Generation Science: MS-LS2-1, MS-LS2-3, MS-LS2-4, MS-LS2-5, MS-LS4-4, MS-LS2-2, MS-ESS3-3, MS-ESS3-4

New Jersey Core Curriculum: 5.1, 5.3C, 5.4G

Common Core: CCSS.ELA-LITERACY.RST.4, CCSS.ELA-LITERACY.RST.7, CCSS.ELA-LITERACY.W.7, CCSS.ELA-LITERACY.SL.1

Plastic Problem

- Students will work in groups and as individuals
- Time needed: **60 minutes**
- Materials needed: computer and internet access, writing utensil, calculator

Classroom Activity

Use the included worksheets to have students complete the following tasks. An answer key is provided on the last page.

As individuals: Students should work through the problems on the first worksheet. The problems presented use current accurate sustainability data and ask the students to extrapolate that data in reference to their own lives. This will give them a picture of the impact they can have on sustainability. Most of the information is given to them, and they can simply solve the math problems in order to find the answers. Students are also directed to find another piece of information and create their own math problem based on that data. Suggestions on where to find reliable sustainability data are provided.

In groups: Once their worksheets are complete, students should form groups to extrapolate their data even further. They can record their answers on the second worksheet. They should also work together to answer the open-ended questions.

Plastic Problem

You may think that a single person has very little impact on the planet, but that is simply not true. Read the following facts about resource usage in the United States, and answer the questions that follow. Show all your work.

Fact: Americans use 4 million plastic bottles every hour. That includes water, soda, juice, and other beverages.

1. How many plastic bottles are used in the United States every day? How about every year?

2. If the current population of the United States is 319 million people, how many bottles are used on average per person each year? Round to the nearest full bottle.

3. Based on this average number and the number of people in your family, how many bottles can you estimate your family uses each year?

4. Of all the plastic bottles that we use, only 25% of them are recycled. How many bottles in the United States are **not** recycled and end up in a landfill (or the ocean) each year?

Visit the website http://www.recommunity.com/education/ and look at some of the information you can find there (the 'infographics' are particularly helpful!). Choose a material and find a fact about recycling or usage. Write your own word problem using that fact. Be sure to solve it, too!

Fact: _____

5. _____

_____

Answer:
Form a group with other students in your class. Pass your worksheet to another student and have them check your answers. Work together to ensure that everyone has solved the problems correctly. Then, retrieve your worksheet and work as a group to answer the following questions.

6. Based on your answers to Question 3, how many plastic bottles are used each year by everyone in your group, including their families?

7. Assume that all of those families recycle 25% of their plastic bottles. How many bottles are recycled? How many end up in the trash?

8. Do you think everyone in your group and their families could start recycling 100% of the plastic bottles they use? Why or why not? What are some challenges people may face? What are some benefits of increasing recycling efforts?

Answer Key

1. (4 million x 24 hours) = 96 million bottles per day
    (96 million bottles per day x 365 days per year) = 35,040,000,000 bottles per year

2. (35,040,000,000 bottles per year / 319,000,000 people) = 109.8 bottles per person, rounded up to 110 bottles per person

3. (Number of family members x 110 bottles). Answers will vary based on number of family members

4. You can enforce your preferred method of figuring this answer. The desired answer is equal to 75% of 35,040,000,000: 26,280,000,000 bottles thrown away each year

5. Answers will vary based on their chosen fact.

6. Answer can be found by either: adding together all answers to Q. 3 **or** counting the total number of family members and multiplying by 110 bottles.

7. (0.25 x answer to Q. 6)
    (0.75 x answer to Q. 6) **or** (answer to Question 6 – answer to part one of Q. 7)

8. Answers will vary. Challenges may include not having access to recycling programs, not understanding what can and cannot be recycled, or not being near a recycling bin. Benefits may include fewer bottles taking up landfill space, less trash ending up in the ocean, and saving energy or reducing pollution by reducing the need for new materials.