

Chopsticks and the Future of Forests: Using Mathematics to Look at the Future

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Grade Level 8
Duration 1 class period

National Standards

GEOGRAPHY

Element 1: The World in Spatial Terms

1. How to use maps and other geographic representations, geospatial technologies, and spatial thinking to understand and communicate information

3. How to analyze the spatial organization of people, places, and environments on Earth's surface

Element 5: Environment and Society

14. How human actions modify the physical environment.

Element 6: The Uses of Geography

18. How to apply geography to interpret the present and plan for the future

AZ Standards

MATHEMATICS

Geometry

8.G.C.9. Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

Standards for Mathematical Practice

8.MP.4. Model with mathematics.

ELA

Writing

Text Types and Purposes

8.W.1 Write arguments to support claims with clear reasons and relevant evidence. a. Introduce claim(s), acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. b. Support claim(s) with logical reasoning and relevant evidence, using accurate, credible sources and demonstrating an understanding of the topic or text. c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. d. Establish and maintain a formal style. e. Provide a concluding statement or section that follows from and supports the argument presented.

Research to Build and Present

Knowledge

8.W.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

Arizona Social Science Standards

GEOGRAPHY

The use of geographic representations and tools helps individuals understand their world.

8.G1.1 Use geographic tools and representations to analyze historical and modern political and economic issues and events.

Human-environment interactions are essential aspects of human life in all societies.

8.G2.1 Examine impact of and responses to environmental issues such as air, water, and land pollution, deforestation, urban sprawl, and changes to climate.
8G2.2 Evaluate how political, social, and economic decisions throughout time have influenced cultural and environmental characteristics of various places and regions.

Global Interconnections and spatial patterns are a necessary part of geographic reasoning.

8G4.1 Take an active stance on a geographic issue reflecting its scale (local, regional, state, national, or global)

Overview

Looking at the consequences of everyday cultural habits, such as eating, helps to illuminate the environmental implications of culture. Mathematics is

one tool to look at these habits and the way in which they impact world ecosystems.

Purpose

Chopsticks and the Future of Forests

In this lesson students estimate the number of disposable chopsticks that can be obtained from one cubic meter of wood and, from that information, determine the cubic meters of wood that China would use in a year under varying assumptions of reuse.

Materials

- Meter sticks
- Calculators (Optional) (preferably those capable of displaying 9 digits)
- Chopsticks and the Future of Forests Reading
- Chopsticks and the Future of Forests Mathematics and Answer Key

Objectives

Students will be able to:

1. Calculate how many chopsticks can be obtained from a cubic meter of wood.
2. Calculate how many cubic meters of wood would be used annually at 3 different assumptions of reuse.
3. Write an argument using evidence to support their statements or conduct a short research project based on a question they have about a topic.

Procedures

Prerequisite Knowledge: Students have calculated volume before.

1. Review concept of volume and how it is determined. Distribute calculators (teacher decision) and the Chopsticks and the Future of Forests Mathematics worksheet.
2. Option 1: Working in small groups, have students complete the Chopsticks and the Future of Forests Mathematics worksheet following the directions given on the worksheet. Option 2: As a whole group, students will follow the teacher as he/she models how to complete the worksheet.
3. Once the worksheet has been completed, assign students the writing assignment topic: Are the use of wooden chopsticks, a cultural tradition, good for today's and future populations? Or have students conduct a short research project involving the use of chopsticks.

Assessment

Mathematics and Geography

The Chopsticks and the Future of Forests Mathematics worksheet can be graded for accuracy. Mastery will be considered 80% or higher.

ELA and Geography

Students should cite evidence from Chopsticks and the Future of Forests Reading and Chopsticks and the Future of Forests Mathematics worksheet in their argument. Or students should determine a question of their own about chopsticks and conduct a short research project and write up their results. In both writing assignments, the student should identify the scale of the issue and take a stance. Students should score a 4 or higher on the 6 Traits Writing Rubric in the areas of Ideas and Content and Organization.

Extensions

Have students think of other traditional items made from wood and have them calculate the volume of these items and how many trees would be used to produce these items. (pencils, yard/meter sticks, rulers, tablet of paper, newspaper, etc.)