It’s Getting Crowded: Determining Population Growth Patterns

Students will learn the impact of different growth rates on society, the economy, and the environment through the manipulation of poker chips and maps.

Adapted from a lesson by Facing the Future: People and the Planet

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### National Geography Standards

**ELEMENT SIX: THE USES OF GEOGRAPHY**

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

### Arizona Geography Standards

**Strand 4**

**CONCEPT 5 Environment and Society**

GRADE 7

PO 6 Describe the ways human population growth can affect environments and the capacity of environments to support populations.

**CONCEPT 6 Geographic Applications**

GRADE 6

PO 2 Use geographic knowledge and skills when discussing current events.

GRADE 7-8

PO 3 Use geographic knowledge and skills when discussing current events.

### Arizona Math Standard

**STRAND 3: Patterns, Algebra, and Functions**

**CONCEPT 2 Function and Relationships**

GRADE 6

PO 1 Recognize and describe a relationship between two quantities, given by a chart, table, or graph, using words and expressions.

**CONCEPT 1 Patterns**

GRADE 7

PO 1 Recognize, describe, create, and analyze numerical and geometric sequences using tables or graphs; make conjectures about these sequences.

**CONCEPT 1 Patterns**

GRADE 8

PO 1 Recognize, describe, create, and analyze numerical and geometric sequences using tables, graphs, words, or symbols; make conjectures about these sequences.

### Overview

World population reached 6 billion people in 1999. At the current growth rate on earth, the population will double within 40 years. Students need to know the key issues confronting the world today as a result of this growth in population.

### Purpose

This activity will give students the opportunity to experience the impact that population growth has on the world. Students will become aware that they have a personal responsibility for the decisions they make as they encounter local, national and global issues.
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Materials
- Article-Who Cares About Population Anyway?
- Article-Hamburger, Fries, and a Cola (optional)
- Article-Does the U.S. Have a Population Problem (optional)
- ECOLOGICAL FOOTPRINT handout/overhead
- Pretest-Population Issues handout
- Pretest-Answer Key handout
- When the Chips are Down handout
- When the Chips are Down answer key
- Many poker chips (1000 in various colors).
- Poster board or large sheets of butcher paper.
- Set of colored markers for each group.

Objectives
The student will be able to:

1. Demonstrate an understanding of vocabulary and ideas pertaining to population. Main concepts should include: “Carrying Capacity”, “Environmental Footprints”, “Resource Scarcity”, and “Push-Pull Migration Factors”. (See Article)

2. Apply the understanding of key concepts such as “ecological footprints” and “carrying capacity” to solutions relating to global population issues. Key issues to resolve include: food, health, housing, jobs, education, water, energy, pollution, government, conflict (war), and recreation.

3. Interpret past and present population growth rate patterns and predict future patterns.

Procedures
This lesson provides numerous materials, suggestions and ideas. The teacher should read the background articles to become familiar with the main concepts. Understanding of an “Ecological Footprint” is critical for the activity. *If the teacher chooses to read the article with the class the lesson may require another session due to the article’s length and detail. **However, this lesson can be done without reading the entire article. If the level is too high or time is limited, focus on the Population Mobile and the American Footprint found in the articles.

SESSION ONE
1. Distribute and complete “Pretest-Population Issues.” Save for later (assessment)

2. Ask the students, “What is the population of the world?” (6.14 Billion in 2001) Discuss its implications for the Earth. Then ask, “What is an ecological footprint?” Every person has an ecological “footprint.” At the most basic level, we all need enough productive land to produce food and fiber, raise crops, graze animals, and enough clean water to drink, wash, and irrigate. We also need enough land to supply energy for heat and cooking, and to dispose of our wastes. As people’s lifestyles expand, so do their footprints. In the industrialized world, we need more land to support our higher protein diet, and to supply resources to build our homes, schools, factories, shopping centers and offices, and to produce our consumer goods.

3. Read the article, Who Cares About Population Anyway?, discussing each section as students read. If time or reading level is an issue be sure to highlight the Population Mobile and Ecological Footprint.

4. If time permits, also read the extension article, Hamburger, Fries and a Cola. This is an excellent follow-up/supplement to this activity, as well. This article could also be a reading homework assignment.

SESSION TWO
1. Divide the class into three separate groups. If the class is large use six groups. Distribute poster board or butcher paper and colored markers. Standard poster board size of 20 X 28 is best, and if groups are large then tape two
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poster boards together. Direct each group to create a fictitious country, complete with all necessary resources such as farmland, water sources, housing, energy, transportation, etc. Don’t forget to include mountains, lakes, rivers and forests. Be sure to include open spaces such as parks and recreation areas. Instruct them to draw as if they were looking down from an airplane, so items should be small (in scale) in perspective. (Establishing a scale might be beneficial at this point – perhaps one inch could equal ten miles.)

2. Explain to the groups that they will receive chips at regular intervals. (Consider each interval to be a generation and should last 2-3 minutes.) Each chip represents an “Ecological Footprint”. a) They are to place the chips on their country in appropriate locations. b) Some groups will receive more chips than others, depending on growth rate and average rate of consumption.

3. Explain the following two rules: 1) chips cannot be stacked, and 2) chips must be within the boundaries of a country. If the chip is not within a specified boundary, this means those people no longer exist due to war, famine, or disease. (Note: It is not forbidden to be within the borders of a neighboring country by either friendly or hostile means, but do not tell them about this option – they must consider it independently.)

4. Distribute chips using the procedures as follows. A) One group will begin with 2 chips, and then they will receive 2 more after a minute or so. Their rate of growth and consumption will double each generation, so they will go from 2 to 4 to 8 to 16 to 32. B) The next group also begins with 2 chips, but their society has a higher rate of growth and consumption so they will triple their “footprints” each interval. (Again emphasize that an interval represents one generation in this activity.) Therefore, their sequence should be 2 to 6 to 18 to 54 to 162. C) The final group is the most affluent. They begin with 2 chips, but due to double growth/double consumption their “footprints” will quadruple each generation. Their sequence should be 2 to 8 to 32 to 128 to 512. These affluent groups will probably need the most time but they must place their chips in the allotted time (2-3 minutes).

5. At the conclusion of 4 intervals or generations, stop the scenario and discuss. Have the different groups describe what happened in their countries each generation. Next, discuss what events they described could have occurred in real life. Finally, each group must interpret their own pattern of growth (and consumption). Have the students write down the pattern that they saw in the distribution of the chips. Then have them write the formula for several more generations in two more cycles in the future. (Group A = 2x, would be 64 and 128. Group B = 3x, would be 324 and 648. Group C = 4x, would be 1024 and 2048.)

SESSION THREE

1. Have the students complete the When the Chips are Down handout individually and then with their group. Talk about various responses with an emphasis on key issues (see objective #2) and realistic solutions to the problems being addressed. Individual responses could be entered in a notebook or journal.

2. Review the Pretest at this time or have students retake the test as a posttest. Discuss results as a wrap-up to the lesson.

Assessment

- Finding “The Pattern” and predicting the future numbers can be assessed for math knowledge.
- The journal or individual responses can be assessed for geography content.
- The handout When the Chips are Down can be graded for sound thinking. All assessments should have 80% correct or higher as mastery.
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Extensions
The following articles are included and could be used. Hamburger, Fries and a Cola and Does the U.S. Have a Population Problem? as extension activities.

Sources
The lesson presented here is credited to the educational non-profit organization, Facing the Future: People and the Planet at www.facingthefuture.org. The ideas and materials come from the resource book entitled, Population: Issues, Impacts, and Solutions. Regularly updated versions are available for downloading at www.popinfo.org. Copying these materials for educational use is encouraged.

Other Sources
World Bank, Development Education Program at www.worldbank.org/depweb

Museum of Man at www.popexpo.net/english.html

National Center for health Statistics at www.cdc.gov/nchswww

Population Reference Bureau at www.prb.org

Population Connection at www.populationconnection.org/education

Population Action International at www.populationaction.org

Zero Population Growth at www.zpg.org/education

US Census Bureau at www.census.org


United Nations Population Fund at www.unfpa.org

World Resources Institute at www.wri.org

Worldwatch Institute at www.worldwatch.org

United Nations Food and Agriculture at www.fao.org

Recommended Videos include:
World Population by Zero Population Growth
Connections by National Geographic Society
The Island by National Geographic Society
Six Billion and Beyond by PBS