Petroleum Use Puzzle Activity.

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Individual students get one of three problem sets to work on as a homework assignment. The page each student takes home has the questions in duplicate, and the student fills in the answers in duplicate. They hand in the top half of the page as they arrive at class; this gives them credit for doing the homework.

Class Exercise 1: Students with the same problem set get together at the beginning of the activity to compare answers and make sure they are taking the best possible information to the group activity.

Class Exercise 2: Students break into groups with at least one student having a different piece of the puzzle, and all three problem sets or "jigsaw pieces" represented in the group. They use the duplicate part of their homework sheet to answer the group questions.   They turn in a collective answer sheet for the group questions at the end of the exercise.

Problem Set 1

Answer the following questions using the U.S. Energy Information Administration website:
http://www.eia.doe.gov/basics/quickoil.html

 NAME _____

1. How much petroleum (i.e., oil and natural gas) does the U.S. *consume* daily? _____
2. How much crude oil does the U.S. *produce* daily?   _____
3. How much crude oil plus petroleum products does the U.S. *import* daily? _____
4. At this rate (#1), how much petroleum does the U.S. consume per year? _____
5. One way to think about increasing demand is to consider "doubling time" (D), the number of years it will take for demand to double. This can be estimated from the growth rate (G), expressed as percent per year, using the relationship $D = 70/G$. Using this equation, what is the doubling time for U.S. demand with:
        a growth rate of 1.1% per year? _____
        a growth rate of 2.4% per year? _____
        a growth rate of 7% per year (the average from 1900 - 1973)? _____

Problem Set 2

Answer the following questions using the U.S. Energy Information Administration website:
http://www.eia.doe.gov/neic/infosheets/petroleumreserves.html

NAME _____

1. What is meant by "proved reserves" of crude oil?

2. Which two states in the U.S. have the biggest reserves, and how much do they have?
a) _____
       What percentage of the total US proved reserves is this? _____
b) _____
       What percentage of the total US proved reserves is this? _____
3. What are the *onshore* reserves in California? _____
       What percentage of the total US proved reserves is this? _____
4. What are the *offshore* reserves in California? _____
       What percentage of the total US proved reserves is this? _____

_____

_____

Problem Set 3

Answer the following questions using the 2008 EIA Report "**Analysis of Crude Oil Production in the Arctic National Wildlife Refuge**".

http://www.eia.doe.gov/oiaf/servicerpt/anwr/pdf/sroiaf(2008)03.pdf

NAME _____

1. If the Alaska National Wildlife Refuge (ANWR) were opened to oil development now, when would oil from ANWR be available for use? (see p. 3) _____

For EACH of the *__mean, low, and high__* **ANWR resource case: answer the following:**
2. What would its peak oil production be?
3. When would this occur?
4. What would cumulative production be through 2030? (see p. 8)
5. How much would be produced by ANWR in 2010? 2020? 2030?
(estimate from the thickness of the mean resource part of the graph - Fig. 2, pg 9)

	MEAN	LOW	HIGH
Peak	_____	_____	_____
When	_____	_____	_____
Cumulative/2030	_____	_____	_____
2010/2020/2030	_____	_____	_____

_____

Group Questions, Petroleum "Jigsaw"

NAMES _____

Your group should include one person who has finished each of the three homework "jigsaw pieces". Use the answers from each of these to answer the following questions. You may turn in one answer page for your group; include each members' name on your answer page. Show your work for full credit.

1. At the current consumption rate, how many <u>days</u> of US petroleum consumption would be supplied by the cumulative production of ANWR in the mean resource case?

2. At the current consumption rate, how many <u>days</u> of US petroleum consumption would be supplied by offshore California?

3. Determine projections of US daily consumption in   <u>2010,</u>   <u>2020,</u>   <u>2030</u>

    For an increase of 200,000 b/d each year   _____   _____   _____

    For an increase of 7% annually,   _____   _____   _____
    using your previous answer for 2010
    as a starting point

For *one* of the projections above, what percentage of US daily demand could be met by oil from ANWR in 2010? _____   ...in 2020?_____   ... in 2030? _____