BLACK GOLD

A Technology-Filled Simulation in Which Students Study Petroleum and Our Reliance on This Vanishing Fossil Fuel

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The nationwide movement for high standards not only determines what students should learn, but also mandates that students demonstrate what they know. BLACK GOLD is a standards-based program addressing National Geography, Social Studies, Science, and English Language Arts Standards. BLACK GOLD offers many opportunities for performance assessment as students demonstrate their understanding of all aspects of oil including how it is formed, how it is refined, the key producers, the role of the OPEC cartel, and the pollutants caused by using petroleum products. Students complete a world map project, oral presentations, and research activities to accumulate their trading dollars for the Buy and Sell oil trading simulation. The cooperation and group decision-making required in BLACK GOLD address Applied Learning standards.

National Geography Standards

The World in Spatial Terms

Standard 1: How to use maps and other geographic representations, tools, and technologies to acquire, process, and report information from a spatial perspective. The student is able to:

- Describe the essential characteristics and functions of maps and geographic representations, tools, and technologies.
- Develop and use different kinds of maps, globes, graphs, charts, databases, and models.
- Use geographic tools and technologies to pose and answer question about spatial distributions and patterns on Earth.

Standard 2: How to use mental maps to organize information about people, places, and environments in a spatial context. The student is able to:

- Identify the locations of certain physical and human features and events on maps and globes and answer related geographic questions.

Standard 3: How to analyze the spatial organization of people, places, and environments on Earth's surface. The student is able to:

- Analyze and explain distributions of physical and human phenomena with respect to spatial patterns, arrangements, and associations.
- Analyze and explain patterns of land use in urban, suburban, and rural areas using terms such as distance, accessibility, and connections.
- Explain the different ways in which places are connected and how these connections demonstrate interdependence and accessibility.

Places and Regions

Standard 5: People create regions to interpret Earth's complexity. The student is able to:

- Identify types of regions
  A. Explain how regions are connected.

STANDARDS

Physical Systems

Standard 7: The physical processes that shape the patterns of Earth's surface. The student is able to:

- Describe the processes that produce renewable and nonrenewable resources.

Standard 8: The characteristics and spatial distribution of ecosystems on earth's surface. The student is able to:

- Explain how human processes contribute to changes in ecosystems.

Human Systems

Standard 11: The pattern and networks of economic interdependence on Earth's surface. The student is able to:

- List and define the major terms used to describe economic activity in a geographic context.
- Explain the spatial aspects of systems designed to deliver goods and services.
  A. Identify and explain the primary geographic causes for world trade.
  B. Compare and evaluate the roles of historical and contemporary systems of transportation and communication in the development of economic activities.

Environment and Society

Standard 16: The changes that occur in the meaning, use, distribution, and importance of resources. The student is able to:

- Describe and analyze world patterns of resource distribution and utilization.
- Describe the consequences of the use of resources in the contemporary world.
  A. Identify the role of technology in resource acquisition and use.
  B. Explain the critical importance of energy resources to the development of human societies.

The Uses of Geography

Standard 18: How to apply geography to interpret the present and plan for the future. The student is able to:

- Demonstrate an understanding of the spatial organization of human activities and physical systems and be able to make informed decisions.

NCTE Standards for the English Language Arts

Standard 3: Students apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics.)

Standard 4: Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate with different audiences for a variety of purposes.

Standard 5: Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes.

Standard 7: Students conduct research on issues and interest by generating ideas and questions, and by posing problems. They gather, evaluate, and synthesize data from a variety of sources (e.g., print and non-print texts, artifacts, people) to communicate their discoveries in ways that suit their purposes and audience.

Standard 8: Students use a variety of technological and informational resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge.

Standard 11: Students participate as knowledgeable, reflective, creative, and critical members of a variety of literacy communities.

AASL Informational Literacy Standards

Standard 1: The student who is information literate accesses information efficiently and effectively.

Standard 2: The student who is information literate evaluates information critically and competently.

Standard 3: The student who is information literate uses information accurately and creatively.

National Science Education Standards

Content Standard A: Science as Inquiry

- Develop descriptions, explanations, predictions, and models using evidence
- Think critically and logically to make the relationships between evidence and explanations. Content Standard B: Physical Science

Content Standard B: Transfer of Energy

- Energy is a property of many substances and is associated with heat, light, electricity, mechanical motion, sound, nuclei, and the nature of a chemical. Energy is transferred in many ways.

Content Standard F: Science in Personal and Social Perspectives

- Populations, Resources, and Environments: When an area becomes overpopulated, the environment will become degraded due to the increased use of resources.

STANDARDS

National Council for the Social Studies

Standard 7: Production, Distribution, & Consumption

The learner can:

- Give and explain examples of ways that economic systems structure choices about how goods and services are to be produced and distributed.
- Describe the role that supply and demand, prices, incentives, and profits play in determining what is produced and distributed in a competitive market system.
- Describe a range of examples of the various institutions that make up economic systems such as households, business firms, banks, government agencies, labor unions, and corporations (and cartels)

Standard 9: Global Connections

The learner can:

- Analyze examples of conflict, cooperation, and interdependence among groups, societies, and nations.
- Explore the causes, consequences, and possible solutions to persistent, contemporary, and emerging global issues, such as health, security, resource allocation, economic development, and environmental quality.
- Describe and explain the relationships and tensions between national sovereignty and global issues, such as health, security, resource allocation, economic development, and environmental quality.

National Standards for School Mathematics

Number and Operations Standard

- Understand numbers, ways of representing numbers, relationships among numbers, and number systems.

Representation Standard

- Create and use representations to organize, record, and communicate mathematical ideas.
- Select, apply, and translate among mathematical representations to solve problems.
- Use representations to model and interpret physical, social, and mathematical phenomena

California Applied Learning Standards

- **Standard 6:** Students will understand how to apply communication skills and techniques. Students will demonstrate ability to communicate orally and in writing.
- **Standard 8:** Students will understand the importance of teamwork. Students will work on teams to achieve project objectives.

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Reproducibles (in order of use)

BLACK GOLD combines research, geography, mathematics, cooperative/collaborative learning skills, listening and speaking skills, and map creation into a fun, challenging, integrated science unit. This unit addresses many middle level content standards in geography, energy, mathematics, and research skills. Your students will learn how petroleum was formed, its location, details about extraction and processing, how it is transported, which nations use the most oil, and will learn about problems arising from transportation. Specifically your students will:

Knowledge

- Identify and locate known petroleum reserves
- Understand the scientific explanation of how petroleum reserves were created
- Gain a basic understanding of distillation and the various products of refined oil
- Understand how petroleum is extracted and transported globally
- Trace the dynamic connection between petroleum extraction and consumption, and world economics
- Explore the role of specific density in helping clean oil spills
- Review world geography

Skills

- Exhibit quality work when completing a map project
- Research and locate specific information
- Practice proper bibliography skills
- Use technology to research and organize information
- Keep accurate records
- Cooperatively solve problems in a simulated crisis situation
- Accurately calculate costs and profits
- Develop e-mail and Internet research skills

Attitudes

- Gain a realization of the dependence on oil in the United States and throughout the world
- Understand the roles of producer/consumer—exporter/importer
- Experience the dynamics of supply and demand in a market setting
- Appreciate some of the complexities of global trade
- Analyze the position of the United States within global petroleum economics

PURPOSE

OVERVIEW

Connecting to the Energy Curriculum
BLACK GOLD focuses on the conversion of radiant, kinetic energy (light), to potential, chemical energy (concentrated and stored for millions of years in fossil fuels such as petroleum, coal, and natural gas). After studying the importance of the petroleum industry, students begin research that enables them to draw conclusions about major producer and consumer nations. Students **Scour** the world looking for petroleum reserves. They study world petroleum consumption in **Running on Empty**, and trace major transportation methods in **Route**.

World Map Project
This individual project begins with each student tracing an outline map of the earth's continents. Students begin by adding country names, key geographic features, a title, and a key. As students complete research, oral reports, and class discussion, they transfer information about oil reserves, oil consumption, and transportation routes to their individual maps. A detailed WORLD MAP RUBRIC and regular self-check days reinforce for students the processes and steps involved in producing high quality work for a long-term project.

Research Based Challenges
Each symbolic graphic representation that students add to their individual maps grows from cooperative group research.

- **Scour!:** Students scour research sources of all varieties for verification that a nation produces large quantities of crude oil. Students practice proper bibliographic notation, rank those nations with the largest petroleum reserves and mark their choices by placing oil derricks on a group map, prepare an oral report of their findings, and chart the accuracy of their own decisions and the decisions of others. Students transfer information from this group map to their individual maps.
- **Running on Empty:** Students locate nations that are major consumers of energy and examine the reasons why some nations consume so much. Again, students practice proper bibliographic notation, rank those nations with the largest appetite for petroleum, mark their choices by placing smokestacks on a group map, prepare an oral report of their findings, and chart the accuracy of their own decisions and the decisions of others. Students transfer information from this group map to their individual maps.
- **Route:** Students plot and plan how crude oil may be transported from the exporting nations to the importing nations. Students participate in a class discussion of major transportation techniques and global 'chokepoints' before groups plot six viable passages. The passages may be presented to the class or just to the instructor prior to individuals marking them on their maps.

Oil and the Environment
Students study the environmental hazards posed by countless ships of many nations continually transporting large quantities of petroleum around the world using a variety of technologies. Student groups face an **Oil Spill!** and work to avert a major ecological disaster. Emphasis is on creative recovery techniques and on accurately measuring the amount of oil recovered. This kinesthetic challenge provides an excellent opportunity to include percent calculations. Many graphing extensions and class discussions can grow from this activity.

Culminating Activities
BLACK GOLD concludes with a high stakes **Buy and Sell** trading venture in which student pairs represent a country in pursuit of either importing or exporting oil to meet energy needs or economic goals. To generate class discussion and reflection on our modern lifestyle, **Cheeseburger!** enables students to deduce our reliance on petroleum for a wide variety of products and services. **Environmental Impacts** demonstrates and quantifies for students by-product emissions from automobiles.

OVERVIEW

SETUP DIRECTIONS

1. **Before You Begin**
   Read through the entire Teacher Guide and Student Guide to understand the breadth, scope, and objectives of BLACK GOLD. Study the Unit Time Chart. Decide whether you will incorporate any or all of the seven Extra Days into your instructional schedule. The Extra Days allow you to reinforce concepts for your students, or allow students additional in-class time to work on their *World Map Projects*.

2. **Preparing Your Classroom**
   Consider posting various QUOTES OF NOTE around the classroom as the unit progresses. If you do not have a large classroom world map, prepare a bulletin-board size map from the WORLD MAP master. Students will locate specific nations on this map throughout the unit.

3. **Resources**
   Prior to beginning BLACK GOLD, obtain adequate copies of research resources about world geography, the Middle East, and petroleum production and consumption for your students.
   a. Map resources (atlases and world maps, print and electronic)
   b. Resource materials (atlases, encyclopedias, and almanacs—electronic or print, geography texts, pre-bookmarked Internet sites)
   c. Gather examples or photos of fossil fuels (charcoal, kerosene, gas cans, oil drums, etc.) to share with students. When you bring in materials, be careful not to violate any school policies or fire safety standards. . . . . Day 2
   d. Try to obtain background music to enrich the classroom atmosphere and set a tone for certain lessons:
      —*Running on Empty* by Jackson Browne . . . . . Day 8
      —*Consider me Gone* by Sting . . . . . Day 12
      —*Cheeseburger in Paradise* by Jimmy Buffet
      —or *Coast to Coast* by Ken Lounquist . . . . . Day 15

4. **Grouping Students**
   Throughout BLACK GOLD students work in *Powerpods*, cooperative-learning groups of four. Decide how to group students, whether by assignment or by choice.
   a. Research-based assignments such as **Scour** and **Running on Empty** work well when students are placed in heterogeneous groups.
      - Stronger students provide research and reading leadership on these more challenging projects.
      - Utilize parent volunteers on research days if possible.
      - Some students will find the research and application of what they learn difficult.
   b. The *World Map Project* is an individual assignment. Partnership exceptions may be made for students who present special needs. Examples of this would be students who lack good motor control, students with significant attention problems, those who are frequently absent, those who struggle with English, etc. Use your discretion in establishing such partnerships.

Independently-Partners-Cooperative-Groups

5. **Student Incentives**
   BLACK GOLD offers several group and individual incentives to spark student interest and enthusiasm.
   a. As individuals, student earn points for the quality of their *World Map Projects*, for their GRAPHIC ORGANIZERS, ORAL REPORT GRAPHS, and scores on the unit quizzes.
   b. In their Powerpods students earn points for the quality of their research, the accuracy of their conclusions, for their oral presentations, and for their success in cleaning up the oil spill.
   c. As students complete activities and reach checkpoints on their *World Map Projects*, the Powerpods advance from PetroPretenders (after Day 3) to PetroPlebes (after Day 7), to PetroPorters (after Day 9), and eventually to PetroPooBahs (after Day 11). However, point values earned by individual students and Powerpods will vary within these levels of accomplishment.
   d. Use both Powerpod and individual point totals to award bonuses of dollars to students for use during **Buy and Sell**.
   e. The individual and/or the Powerpod with the highest profits after one or more rounds of **Buy and Sell** are crowned the PetroPlutocrat(s).

Determine point values for students to progress that are appropriate to your class.

6. **Oral Presentations**
   After completing research on major producing and consuming nations, Powerpods will give oral reports of their conclusions as to the identities of the top producers and consumers. If time is a consideration, require that only half the Powerpods report on the major producer nations, and the other half of the Powerpods report on the major consumer nations. To ensure that the class pays attention to the reports, have students chart the conclusions of their own Powerpod on the ORAL REPORT GRAPHS, then chart and compare the research results of the reporting Powerpods.

7. **Time Considerations and the World Map Project**
   One important facet of BLACK GOLD is the student-created world map (with an accurate key) that graphically indicates the location of substantial oil reserves, the location of large consuming nations, and possible routes for the transporting of petroleum from producer to consumer nation.

   Map work is scheduled throughout the unit. If possible, have students complete most map work during class time. By breaking the project down, and emphasizing quality work and attention to detail on each step, the students work to a higher standard of accomplishment.

   We strongly recommend providing the extra time for in-class map work because of what it teaches the students. The step-by-step progression provides a valuable experience, especially for struggling students. Many students are in wonder about how "Bobby" or "Emily" always does such nice work. Using the rubric and class time for this project insures that *all students experience that level of success*. It takes the "mystery" out of quality work.

When map work is assigned as homework, many students, without adequate support, produce lower quality work than they would have if the support were available in class.

8. **Extensions of Learning**
   a. **Extra Days**
      Supplemental instructional days are suggested following Days 3, 6, 9, 11, 13, 14, and 15. If your schedule is flexible include some or all of these extra days. The reinforcement of learning, time for in-class map work, or math or related extension activities will enrich your students' learning.
   b. **Tech Trek**
      Certain lessons include optional technology experiences for the technologically well-equipped classroom, or for those students with the interest, ability, and equipment to extend their learning using the Internet, computer graphing and database programs, and intranet communication.

9. **Using the Internet**
   If you have access to the Internet, your students will benefit from the magnitude of information available. Before using the Internet, become familiar with your school's Acceptable Use Policy. Always preview any web site you make available to your students. Following are suggestions for making web sites available for your class:
   a. **Interact's Resource List:** Several recommended web site addresses are listed on a Resource page available through the Interact web site. To find the BLACK GOLD Resource Page, complete the following steps:
      —Connect to the Internet
      —Go to Interact's site at: www.teachinteract.com
      —Search for "**Black Gold**"
      —Click the "**related Web sites**" link
      —Click any links of interest
      —Click the "**Back**" button to return to Interact's home page
   b. **Bookmarks/Favorites:** You can use any browser to mark specific web site addresses for your students to use. Depending on your browser, these saved web addresses will be called "Bookmarks" or "Favorites." To create a Bookmark/Favorite follow these steps:
      —Go to the web site
      —Click on the Bookmark's "pull down menu" and choose different terminologies and/or processes for marking or saving web addresses.
      —The name of the web site will automatically enter on your menu as a bookmark or favorite
      —Search out several appropriate web sites and place the sites in a folder entitled "**Black Gold**" on your browser. When you have completed your search, save the entire folder on the desktop or to a disk. You can then insert the folder into the browser on each available computer in the classroom or computer lab.
   c. **Off-line browsing:** If Internet access is limited for your students, you may want to save selected web sites to your hard drive in your classroom or in the computer lab. Downloading web sites requires significant hard drive space; you may want to put only a few downloaded files on each computer and have students rotate time at the computers.

If your students do not have access to the internet, you should access the internet and build a notebook of information printed off the various web sites you locate.

10. **Duplication**
The following duplication masters are in order of use. Duplicate in the quantities indicated in *Italics*:

- WORLD MAP — *transparency + two per Powerpod (11" x 17")*
- QUOTES OF NOTE — *transparency or to post*
- WORLD MAP PROJECT RUBRIC/WORLD MAP CHECKLIST — *class set (copy back-to-back) + transparency (both sides)*
- GRAPHIC ORGANIZER — *class set + transparency*
- OPEC NATIONS — *transparency*
- SCOUR — *one per Powerpod + transparency*
- SAMPLE BIBLIOGRAPHIC FORM — *transparency*
- ORAL PRESENTATION RUBRIC — *one per Powerpod + transparency*
- ORAL REPORT GRAPH — *two class sets*
- OIL DERRICKS — *one or two, cut apart*
- PROVEN OIL RESERVES/ANOTHER LOOK AT OIL RESERVES — *class set (copy back-to-back) + transparency (both sides)*
- PROVEN OIL RESERVES GRAPH — *transparency (optional)*
- ANOTHER LOOK AT OIL RESERVES GRAPH — *transparency (optional)*
- MIDDLE EAST MAP — *class set + transparency*
- SAMPLE MAP KEY — *transparency*
- OIL QUIZ #1 STUDY GUIDE — *class set + transparency (optional)*
- OPEC FLAGS — *one set (cut apart)*
- OIL QUIZ # 1 — *class set + extras (if needed)*
- HISTORY OF OIL EXTRACTION — *transparency*
- WORLD POPULATION GROWTH — *transparency*
- RUNNING ON EMPTY — *class set + transparency*
- RUNNING ON EMPTY GRAPH — *transparency (optional)*
- SMOKESTACKS — *one or two (cut apart)*
- SYNONYM SLIM — *one*
- IMPORTERS AND EXPORTERS — *three (cut apart)*
- ROUTE — *three per Powerpod + extras + transparency*
- OIL QUIZ #2 STUDY GUIDE — *class set + transparency (optional)*
- OIL QUIZ #2 — *class set + extras (if needed)*
- OIL SPILL NEWSFLASH — *teacher resource*
- OIL SPILL DATA (1993-2000) — *class set*
- OIL SPILL DATA KEY — *teacher reference*
- COUNTRY CARDS — *one set*
- COUNTRY CARDS BACKS — *eight (optional)*
- BUY AND SELL LEDGER — *one per student pair + transparency*
- OIL BARONS* — *one per student pair + transparency (poster optional)*
- BURGER MAP CENTER — *one per Powerpod*
- CHEESEBURGER! — *one per Powerpod*

*Select the OIL BARONS version appropriate to your class, either with or without a space for e-mail addresses.

11. **Materials**

Accumulate the following materials before beginning the unit:

- Art or construction paper (18" x 18") — *one per Powerpod*
- Art or construction paper (18" x 24") — *class set + extras*
- Art supplies (drawing and finelining) — *enough for students*
- Baskets or hats — *two*
- Beaker or graduated cylinder (250 ml capacity) — *one per Powerpod*
- Bell — *one*
- Baron country nametags — *one set (optional)*
- Calculators — *class set*
- Chart paper or bulletin board — *one*
- Cheeseburgers or hamburgers — *class set*
- Corn oil — *one to three gallons (100 ml per Powerpod)*
- Computer network — *Internet with e-mail or school Intranet (preferable) (optional)*
- Computer work stations — *one per student pair (optional)*
- Feathers (real or plastic) — *at least two per Powerpod*
- Fossil fuel samples or photos (charcoal, kerosene, gas cans, oil drums, etc.) — *several*
- Friction toys — *one per Powerpod + one for teacher*
- Glue sticks — *one per Powerpod*
- Graduated cylinder (100-ml capacity) — *one (optional)*
- Index cards — *44*
- Map resources (atlases and world maps, print and electronic) — *enough for students*
- Markers (at least three colors) — *one set per Powerpod*
- Mop, pail, rags and detergent — *one per Powerpod*
- Mystery bag (opaque paper or cloth bag) — *one*
- Overhead projector — *one*
- Overhead transparencies (blank) — *two per Powerpod + a few extras*
- Pencils — *class set*
- Phillips screwdrivers (small) — *one + one per Powerpod (optional)*
- Plastic dishpan or bucket (3- to 5-gallon) — *one per Powerpod*
- Resource materials (atlases, encyclopedias, and almanacs—electronic or print, geography texts, pre-bookmarked Internet sites) — *enough for students*
- Scissors — *one per Powerpod*
- Staplers — *one or two (optional)*
- Star stickers (multi-colored sets) — *two sheets per student*
- Stencils — *enough for students (optional)*

Three sheets of 55 star labels are sufficient with lots of leftovers. You may be able to conserve here.

- Stickers, red and blue (1/4" diameter)* — *three boxes of each*
- Stopwatch or timer — *one (one per Powerpod optional)*
- Straight pins, pushpins or tacks — *11*
- Styrofoam ball (4" diameter) — *one*
- Tape or CD player — *one (optional)*
- Television — *one*
- Thumbtacks — *class set (optional)*
- Transparency markers — *at least one per Powerpod*
- Transparent tape — *one or two rolls*
- VCR — *one*
- Writing paper — *class set*

*The scale of the student maps works best with colored dots approximately ¼" diameter. If such gummed stickers are unavailable, students can create their own by using a ¼" hole punch and larger square or rectangular stickers.

Coloring with markers actually is far easier and quicker.

Students must have their maps traced and be ready to begin labeling countries prior to instruction on Day 1.

12. **Preparing Materials for Activities**
Prior to beginning the unit, prepare all materials for the unit.

a. **Mystery Bag Contents** . . . . . **Throughout unit**
To heighten student interest, periodically introduce the daily lesson with objects hidden within an opaque mystery bag.
Materials
- Friction Toy. . . . . Day 1
- Scouring Pad. . . . . Day 4
- Toy Car . . . . . Day 9
- Cork (or toy boat, train, and a straw*) . . . . . Day 10

*To represent tankers, ground transportation, and pipelines

b. **World Map Projects** . . . . . **Day 1**
Each student prepares and uses an 18" x 24" world map outline.
Materials
- WORLD MAP PROJECT RUBRIC — *class set*
- WORLD MAP CHECKLIST — *class set*
- WORLD MAP — *transparency*
- Art paper (18" x 24") — *class set + extras*
- Overhead projector — *one*
- Pencils — *class set*
- Copy the rubric and the checklist back-to-back on one sheet of paper enabling students to keep track of one paper for self-checking their map progress.

Procedure

- Project the transparency of the WORLD MAP for students to trace.
  —Each student may complete his or her map individually.
  —A group of students may complete maps for the entire class.
  —Parent volunteer(s) may trace the maps.

Provide art materials to enable students to neatly and accurately illustrate the information that they learn.

Art Materials

- Art supplies (drawing and finelining) — *enough for students to label nations and other features and mark transportation routes*
- Star stickers (multi-colored sets) — *two sheets per student to mark petroleum consumption*
- Stencils — *enough for students (optional)*
- Stickers, red and blue (1/4" diameter)* — *three boxes of each to mark petroleum reserves (Students may make colored dots with markers if necessary.)*

c. **OPEC Flags** for Extra Day . . . . . **After Day 6**

Materials

- OPEC FLAGS — *one set*
- Straight pins, pushpins or tacks — *11*
- Styrofoam ball (4" diameter) — *one*
- Prepare OPEC Flags for each class.
  —Copy and cut apart one set of OPEC flags.
  —Students may color the flags; you may then laminate them for durability.
  —Tape each flag to a straight pin.
  —Stick the flag pins into the foam ball for students to pick up.

d. **Current Events Chart**. . . . . **Day 7**

Prepare a Current Events Chart using chart paper or space on the bulletin board.

Materials

- Chart paper or bulletin board
- Thumbtacks or tape — *enough for students*
- Write the names of the 11 OPEC nations on the chart, leaving room for students to attach their current events information.

e. **Country Cards** for **Buy and Sell** **Day14**
Materials
- COUNTRY CARDS — *one set*
- COUNTRY CARDS BACKS — *eight (optional)*
- Index cards — *44*
- Prepare a set of 44 Country Cards by cutting apart and gluing each country on a separate index card.
  —Copy enough COUNTRY CARDS BACKS to glue one to the back of each index card (optional).
  —You may laminate the cards for durability.

f. **Burger Maps** for **Cheeseburger!** . . . . . **Day 15**
Materials
- BURGER MAP CENTER — *one per Powerpod (Students may color these, then you laminate them and attach to the paper.)*
- Art or construction paper (18" x 18") — *one per Powerpod*
- Glue stick — *one*
- Prepare a Burger Map for each Powerpod of students by attaching the BURGER MAP CENTER in the center of the art or construction paper.

13. **Preparing for Classroom Activities**

a. **Oil Spill!** . . . . . **Day 13**
- Arrange to do the spill in a "moppable" room with tables (perhaps the lunchroom or a science lab) or outside. The ideal room has sinks with hot water where the oil can be rinsed off.
- Students must bring from home materials that they think may help in the cleanup. Discourage the use of school materials for the cleanup; if you let students use school paper towels or cups for example, it minimizes the need for them to search at home for supplies.
- When cleaning up after the oil spill recovery, if possible have the students take their materials to the kitchen and have them run through the dishwasher.
- If this is not an option, decide how you want to clean up the materials and the room. It can be quite messy.

Note: There is a danger of slipping on slippery floors if students spill corn oil on the floor. Caution students to be very careful.

b. **Buy and Sell**. . . . . **Day 14**
Introduce **Buy and Sell** as a partnered activity. Split Powerpods into two pairs, making adjustments for and pairing up extra students in Powerpods with three or five members.
- One student will be the "bean-counter" (the mathematician). Accurate record keeping is a must.
- The other student will be the "wheeler-dealer'"(the one who travels around making offers to buy and/or sell oil).
- Allow trading partners as much latitude as possible in setting up individual responsibilities. The trading partners can switch responsibilities at any time.
- To facilitate student negotiations, post the countries and the names of the student representatives in a prominent place.
- If you have a school Intranet students can negotiate, buy, and sell electronically. If your students are sophisticated with Intranet communication, they will probably be able to succeed with individual rather than partnered buying and selling. See the Daily Directions for Day 14 for detailed teaching instructions.

c. **Cheeseburger!** . . . . . **Day 15**
- Call local fast food restaurants to see who will donate cheeseburgers or provide at a low cost. Many of these establishments will deliver for this type of activity if asked.
- If no fast food is available, you can bring in two burgers and draw a girl and boy at random to eat these for the sake of the activity.
- An additional option is to cook frozen pizza(s), enough to provide for one small piece for each student – this works well on a busy schedule or a tight budget.
- If possible, move the class to a large room with group tables for Cheeseburger!
- Try to obtain a copy of *Cheeseburger in Paradise* (a song by Jimmy Buffet) to play as you introduce the activity.

This trading activity is the culmination of BLACK GOLD.

TEACHING TIP

An accurate spring scale, balance scale, or digital scale is crucial.

d. **Environment Impacts** for *Extra Day* **. . . . . After Day 15**

Materials

- Automobile — *one*
- Duct tape — *12" length*
- Flat edge screwdriver — *one (optional)*
- Flexible tubing (2" diameter) — *four to five foot length (can be length of vacuum cleaner hose)*
- Heavy rubber band (3") — *one*
- Pictures and/or video clips of traffic jams and/or a variety of interesting vehicles
- Ring clamp — *one (optional)*
- Spring scale, balance, or digital scale — *one*
- Stop watch — *one*
- Trash bag (28-gallon) — *one*

Procedure

- Park an automobile in an open area with ample room for students to assemble. Keep the students a safe distance away from the vehicle at all times.
- If you are going to tape the trash bag directly to the tailpipe, practice beforehand to be sure this will work.
  —Weigh the trash bag, rubber band and tape in class.
  —Attach the trash bag to the end of the exhaust pipe of the automobile with the rubber band and secure with tape.

TEACHING TIP

This entire operation makes it easier to attach the trash bag to the tailpipe.

- If necessary, prepare the ring clamp and flexible tubing assembly prior to class.
  —Slip the ring clamp over the outside of the flexible tubing.
  —Slip the flexible tubing over the outside of the exhaust pipe of the automobile.
  —Slide the ring clamp up so that it can be tightened, using the screwdriver, securing the hose over the tailpipe.
  —Weigh the trash bag, rubber band and tape in class.
  —Attach the trash bag to the end of the flexible tubing with the rubber band and secure with tape.

14. **Assessment**
    a. **World Map Projects**
        - The MAP PROJECT RUBRIC/WORLD MAP CHECKLIST clearly spells out for students the requirements for their maps. Students trace the map outlines, label at least 44 nations and 15 additional geographic features, use colored dots to indicate the magnitude of oil reserves, colored stars to indicate the magnitude of oil consumption, and draw several crude oil transportation routes.
        - On Days 6, 8, 10, and 14 students self-check their progress for the separate sections of the maps. At the end of Day 13 the maps are complete and students submit them for formal evaluation. Do your own spot checks of student work throughout this process.
        - Evaluate the thoroughness, accuracy, neatness, and overall quality of the completed maps.
    b. **Powerpod Research and Oral Presentations**
        - Powerpods earn points by completing assigned work. The **Sample Bibliographic Form** in the Student Guide clearly defines expectations for the quality of their research and documentation.
        - The **Oral Presentation Rubric** in the Student Guide clearly defines expectations for the quality of their Powerpod presentations.
        - The ORAL REPORT GRAPHS ensure that students will pay attention to the oral reports of other students and that they will critically evaluate the quality of their own research and conclusions.
    c. **Minute Talks**
        - Select one student to speak to the class for 60 seconds. The goal is to explain what the class learned this hour.
        - The Student Guide includes a rubric for Minute Talk Expectations. Following the "minute talk," the class will assign the reporter a rating by a show of hands.
        - Encourage students to be responsible in their Minute Talk efforts and assessments. Take time to supplement and support a student who does poorly.
        - Use these brief summaries of daily lessons to informally assess how well students understand unit content.
        - Particularly creative students may attempt to "hoax" the class by spinning tales of things that the students didn't learn about. This can be fun too!

TEACHING TIP

Colored dots represent oil barrels, reserves/production valued in billions of barrels. These provide a graphic representation of a nation's production of crude oil. Colored stars represent how much energy (in quadrillions of BTU's) certain nations consume.

Decide how you will spot check the student maps. After students self-check, circulate among students while they work, checking progress, or collect the maps and rubrics after class. If you collect student maps, return by the next class period.

Demand high levels of achievement from your students.

TEACHING TIP

Minute talks are excellent tools to reinforce learning and increase student interest and involvement. Make this fun and not overly judgmental!

Minute Talk Expectations

Mighty Minute Accurately restates all main ideas of the day … Everyone in the class can hear

Minute Maker Accurately restates most main ideas of the day … Most people in the class can hear

Minute Mini Accurately restates some main ideas of the day … Some people in the class cannot hear

Minute Minus Accurately restates few main ideas of the day … Most people in the class cannot hear

d. **Oil Spill**
- Evaluate students' effort and resourcefulness in bringing tools from home to clean up the oil spill.
- Evaluate the total amount of oil recovered.
- Evaluate students' effort to succeed.

e. **Buy and Sell**
- Evaluate the success of students in meeting the energy needs or maximizing the income of the nation they represent.
- Assess the success of students in meeting goals and keeping accurate records.

15. **Special Needs Students**

Like all Interact units, BLACK GOLD provides differentiated instruction through its various learning opportunities. Students learn and experience the knowledge, skills, and attitudes through all domains of language (reading, writing, speaking, and listening). Adjust the level of difficulty as best fits your students. Assist special needs students in selecting activities that utilize their strengths and allow them to succeed. Work together with the Resource Specialist teacher, Gifted and Talented teacher, or other specialist to coordinate instruction.

UNIT TIME CHART

BLACK GOLD

Building Background Knowledge

DAY 1

Building Background Knowledge

- SG:**Oil…Petroleum… Texas Tea… Black Gold**
- MAP PROJECT RUBRIC/WORLD MAP CHECKLIST
- Friction Toy Activity
- Introduce *World Map Project*: **The Map**
- Minute Talk
- Tech Trek

DAY 2

Building Background Knowledge

- SG: **Refine and Consume**
- GRAPHIC ORGANIZER
- OPEC NATIONS
- Map Project: **The Map**

DAY 3

Reinforce Knowledge

- Review SG Background Knowledge
- Review GRAPHIC ORGANIZER
- Map Project: **The Map**
- Minute Talk

Reinforce Knowledge Extra Day

Scour

DAY 4

Scour

- SG: **Sample Bibliographic Form**
- WORLD MAP
- SCOUR
- SAMPLE BIBLIOGRAPHIC FORM
- ORAL PRESENTATION RUBRIC
- Tech Trek

DAY 5

Scour

- SG: **Sample Bibliographic Form**
- WORLD MAP
- SCOUR
- SAMPLE BIBLIOGRAPHIC FORM
- ORAL PRESENTATION RUBRIC
- Tech Trek

DAY 6

Scour

- Self-Check Map Project: **The Map**
- SAMPLE MAP KEY
- SG: **Oil Quiz #1 Review**
- Map Project: **Map Key**
- Map Project: **Oil Reserves**
- Tech Trek

Scour Extra Day

Running on Empty

DAY 7

Oil Quiz #1

- Share Current Events
- OIL QUIZ #1
- Map Project: **Oil Reserves**

DAY 8

Running on Empty

- Self-Check Map Project: **Oil Reserves**
- HISTORY OF OIL EXTRACTION
- WORLD POPULATION GROWTH
- ORAL PRESENTATION RUBRIC
- Map Project: **Oil Consumption**
- Tech Trek

DAY 9

Running on Empty

- **Running on Empty** Oral Presentations
- ORAL REPORT GRAPH
- RUNNING ON EMPTY
- SMOKESTACKS
- Map Project: **Oil Consumption**
- Minute Talk

Running on Empty Extra Day

UNIT TIME CHART

BLACK GOLD

Route

DAY 10

Oil Transportation

- Self-Check Map Project: **Oil Consumption**
- SG: **How Do We Get There?**
- SYNONYM SLIM
- SG: **Oil Quiz #2 Review**
- Tech Trek

DAY 11

Oil Transportation

- SG: **Oil Quiz #2 Review**
- ROUTE
- IMPORTERS AND EXPORTERS
- WORLD MAPS
- Map Project: **Transportation Routes**
- Tech Trek

Oil Transportation
Extra Day

DAY 12

Oil Quiz #2

- Map Project: **Transportation Routes**
- SG: **Oil Spills**
- PROVEN OIL RESERVES
- RUNNING ON EMPTY
- OIL SPILL NEWS FLASH
- Minute Talk

Oil Spill!

DAY 13

Oil Spill Cleanup

- Self-Check Map Project: **Transportation Routes**
- Cooperative Oil Spill Cleanup Activity
- Tech Trek

Oil Spill Cleanup
Extra Day

Buy and Sell

DAY 14

Buy and Sell

- BUY AND SELL LEDGER
- COUNTRY CARDS
- OIL BROKERS
- Tech Trek

Buy and Sell
Extra Day

Culmination

DAY 15

Fast Food

- CHEESEBURGER!
- Minute Talk

Environmental Impacts
Optional Extra Day

Building Background Knowledge

Overview

- Students will define, compare, and contrast potential and kinetic energy as they analyze and hypothesize about a friction-powered toy with wheels.
- Students will learn about the formation and location of petroleum.
- Students will understand the goals of the *World Map Project* and begin this long-term project.

One to Two Days

The activities on Day 1 may take more than one 45 or 50 minute class period. Adjust your time accordingly.

Materials

- Student Guides — *class set*
- WORLD MAP PROJECT RUBRIC/WORLD MAP CHECKLIST — *class set (copy back-to-back) + transparency (both sides)*
- Art supplies (drawing and finelining) — *enough for students*
- Friction toys — *one per Powerpod + one for teacher (available at toy stores)*
- Map resources (atlases and world maps, print and electronic) — *enough for students*
- Mystery Bag (with friction toy) — *one*
- Overhead projector — *one*
- Pencils — *class set*
- Phillips screwdriver (small) — *one (one per Powerpod optional)*
- Stencils — *enough for students (optional)*
- Traced student maps (at least 18" x 24")* — *class set*
- Writing paper — *class set*

*See Setup Directions #12 **Preparing Materials for Activities** for more information about these maps.

Procedure

1. Place students in their Powerpods. Explain that today they begin to learn about energy. Discuss briefly the objectives for today:
   a. Learn about potential and kinetic energy.
   b. Learn about the history of petroleum.
   c. Begin to fill in their *World Map Project* maps.

See Setup Directions #4, Grouping Students for more specific instructions.

2. Present the Mystery Bag with a friction toy inside. Invite a representative from each Powerpod to come up and get a friction toy. Within their Powerpods students spend three or four minutes of play/examination time. This fun exploratory time is vital to the success of the activity!

3. Reconvene the class and explain that you need the students' help to figure out how these toys work. Within their Powerpods students discuss how these toys do what they do. (Allow three to four minutes.)

If your students are not familiar with the scientific method introduce the concept of hypothesis*. Since a hypothesis is an educated guess, there are no "wrong" answers.*

4. When the Powerpod discussion has reached its peak, have each student take out some paper with the goal being to write a hypothesis explaining how he or she believe the toy works. Stress clarity in these statements. (Allow three to four minutes.)

5. To conclude the writing activity, ask students to create a labeled diagram of what they believe to be the internal workings of the toy. (Allow five to 10 minutes.) This is independent work, but allowing students to sit at a table with their Powerpod—centered on the toy—allows for some sharing and provides help to students who are without a clear idea.

6. After the five to 10 minutes, invite three or four volunteers to come to the board or overhead to share and explain their .sketches.

If time allows, provide screwdrivers to each Powerpod and allow students to dissect their friction toys to prove their hypotheses.

7. Following the sharing period, have the students come up and sit on the floor or another convenient area where all can see. Carefully "dissect" one of the toys as a demonstration, allowing questions to flow.

8. Have students take two minutes to write a conclusion on the bottom of their hypothesis/sketch sheet. Was their hypothesis correct or incorrect?

9. Conclude this portion of the lesson by focusing on the *potential energy* stored in the spring being converted to the *kinetic energy* of the turning wheel. *These are key concepts.*

10. Bridge to a discussion of fuels as potential energy that provide kinetic energy. Ask students to name "Fuels We Know." List these on the board or overhead.

11. Ask the students to group these fuels as a class and lead the discussion to focus on the fuels known as *Fossil Fuels*. Single out oil as the primary fossil fuel in use today.

12. Distribute the Student Guides and read **Oil…Petroleum… Texas Tea…Black Gold** (page 1). Discuss briefly.

13. Have students reconvene in their Powerpods and read **Powerpod Orientation** in their Student Guides (page 2). Encourage students to work to the best of their abilities as they progress through the different levels of BLACK GOLD. Inform students that their good work will translate into higher points, and that based on total individual and Powerpod points, students will receive dollar bonuses for the **Buy and Sell** activity at the end of the unit.

14. Distribute the WORLD MAP PROJECT RUBRICS. Challenge students to read the rubric independently while you display an overhead copy. Allow one to two minutes.

15. Discuss the concept of "chunking" a large project into pieces and that the first "piece" of their *World Map Project* is to complete the section from the rubric called **The Map**.

16. Allow time for student questions. Display the transparency of the WORLD MAP CHECKLIST and direct students to the WORLD MAP CHECKLIST on the back of their rubrics.

17. Have both hard copy and electronic atlases available for students at this point. Suggest that students concentrate on countries not in the Middle East for this initial work time.

18. Inform students that they have five days to complete **The Map** portion of the *World Map Project*. Clearly post the assignment due date. Tell them that they will self-check and that you will collect their maps and rubrics on Day 6.

19. Allow time for students to begin work on their maps.

20. With about five minutes remainingexplain the concept of the **Minute Talk**. Call students' attention to the **Minute Talk Rubric** in the Student Guides on page 5. Ask for a volunteer or call on one student to give a Minute Talk about the expectations for **The Map** portion of their *World Map Project* (how to do a good job and earn an "A").

Tech Trek

1. Students investigate the web site of the manufacturer of the friction toy.

2. Students complete sketches of the internal workings of the friction toy using available computer drawing programs.

3. Follow the sketching with a five minute "writing on demand" paragraph on the friction toy experiences. This works well in the laptop environment.

As you instruct your students on the map labeling, be sensitive to the needs of students with poor motor coordination, dysgraphia, or other problems. Allow these students the opportunity to type names on computer, print, cut, and paste on the map.

Suggest that students locate, label, and check off items as they go.

Select a student comfortable with speaking before the class, who will excel with the subject material for this first talk. Minute Talks provide excellent opportunities to informally evaluate how much information students are absorbing from day to day.

Building Background Knowledge

Overview

- Students will learn about the processing and uses of petroleum.
- Students will organize information and notes using a graphic organizer.
- Students will receive a current events assignment about OPEC nations for **Day 7**.

Materials

- Student Guides — *class set*
- GRAPHIC ORGANIZER — *class set + transparency*
- OPEC NATIONS — *transparency*
- Art supplies (drawing and finelining) — *enough for students*
- Charcoal, other examples or photos of fossil fuels — *several*
- Map resources (atlases and world maps, print and electronic) — *enough for students*
- Overhead projector — *one*
- Stencils — *enough for students (optional)*
- Traced student maps (at least 18" x 24") — *class set*
- TELEVISION and VCR — *one of each*

Procedure

1. Have students read **Refine and Consume**, in their Student Guides on page 3. Discuss briefly.

2. Distribute the GRAPHIC ORGANIZER and introduce it as a good way to organize the information learned so far.

3. Using the GRAPHIC ORGANIZER transparency, fill in the definition of **Natural Resources** and **Fossil Fuels** together. Include the three main types of fossil fuels we use: coal, oil, and natural gas.

4. You may bring in various fossil fuel containers or samples on this day. Be careful with flammable substances. Some suggestions are an empty, unused gas can, an empty propane tank, charcoal, peat, an oil barrel (55-gallon drum?), kerosene container, something that says "diesel" on it…etc.

5. Allow two to three minutes for students to fill in any things on the organizer they are certain they already know.

TEACHING TIP

Spend some time discussing natural gas, emphasizing its difference from "gas" (gasoline). Confusing the two fuels is a common misconception for some students.

This is a good way to preview the organizer itself and to prepare for the videotape.

6. Go through the GRAPHIC ORGANIZER together as a class. You or a student can write on the transparency as the class completes their notes.

7. Collect the GRAPHIC ORGANIZERS and check student notes for accuracy.

8. Display the transparency of OPEC NATIONS. Have students copy this list onto their WORLD MAP CHECKLIST. Their assignment is to locate a current event (newspaper, printed from Internet, current magazine, etc.) concerning one of those 11 nations and to bring it in for Day 7. No further explanation is needed at this time.

9. Discuss briefly with students how much information they have covered in the last two days.

10. Allow students time to work on **The Map** portion of their *World Map Projects.*

You may write these nations on the board instead of using the transparency.

Use this as an opportunity to informally evaluate how much content your students are absorbing so far.

Reinforce Background Knowledge

Overview

- Students will review information covered during Days 1 and 2 and their GRAPHIC ORGANIZERS.
- Students will concentrate on **The Map** portion of their *World Map Project*.

Materials

- Student Guides — *class set*
- GRAPHIC ORGANIZER — *class set + transparency (from previous day)*
- Art supplies (drawing and finelining) — *enough for students*
- Map resources (atlases and world maps, print and electronic) — *enough for students*
- Stencils — *enough for students (optional)*
- Traced student maps (at least 18" x 24") — *class set*

Procedure

1. Begin with a game of *Hangman*, using the words _.

2. Once students have unveiled the term in the game, define *Natural Resources* as the land, water supplies, forests, mineral deposits, etc. that occur in nature and that have economic and/or aesthetic value for the nation that possess them.

3. Return student GRAPHIC ORGANIZERS and discuss briefly with students how much information has been covered in the past three days.

4. Allow most of the day for work on the *World Map Projects*.

5. Call on a student to give a Minute Talk for a conclusion if there is time.

TEACHING TIP

It is crucial that students understand the importance of careful, neat, and precise map preparation. Allowing ample time for students to produce their best work will reinforce the steps that result in work that brings them personal pride and satisfaction (and a high grade).

Reinforce Background Knowledge

Overview

- Students review Days 1 to 3 and their GRAPHIC ORGANIZERS.
- Students concentrate on **The Map** portion of their *World Map Project*.

Materials

- Student Guides — *class set*
- GRAPHIC ORGANIZER — *class set + transparency (from previous day)*
- Art supplies (drawing and finelining) — *enough for students*
- Map resources (atlases and world maps, print and electronic) — *enough for students*
- Stencils — *enough for students (optional)*
- Traced student maps (at least 18" x 24") — *class set*

Procedure

1. If your schedule will allow, or if students are having trouble understanding all of the material covered thus far, add a day to reinforce the learning about petroleum and to establish the importance of the *World Map Project* preparation skills.

2. Use this day for students to reinforce the information on the GRAPHIC ORGANIZERS.

3. To ensure that your students do good, careful work on their *World Map Projects*, allow additional time for students to research nations' names and locations and complete their lettering.

Scour

Overview

- In their Powerpods, students conduct research to locate and chart the world's major oil reserves, then prepare a Powerpod oral presentation of their conclusions.
- Students use proper bibliographic form to identify sources.

Materials

- Student Guides — *class set*
- SCOUR — *one per Powerpod + transparency*
- SAMPLE BIBLIOGRAPHIC FORM — *transparency*
- ORAL PRESENTATION RUBRIC — *transparency*
- WORLD MAP — *transparency*
- WORLD MAP (11" x 17") — *one per Powerpod*
- Blank overhead transparencies — *one per Powerpod + extras*
- Glue sticks — *one per Powerpod*
- Mystery Bag (with scouring pad) — *one*
- Resource materials (atlases, encyclopedias, and almanacs—electronic or print, geography texts, pre-bookmarked Internet sites) — *enough for students*
- Scissors — *one per Powerpod*
- Transparency markers — *at least one per Powerpod*

Procedure

1. If necessary, place students with their Powerpods. Refresh the definition of *fossil fuel* and *natural resources*. Petroleum is considered to be both of these. Many nations have petroleum and most need it.

2. Use the Mystery Bag with a scouring pad to lead to a brief discussion of what it means to *scour* something. Alternatively bring in shovels and asking students for suggestions on where we could go to "dig" for oil.

TEACHING TIP

Define Fossil Fuel *as a fuel from decayed plant and animal remains subjected to tremendous heat and pressure over extremely long periods of time.*

3. Bridge to the goals of **Scour**. Display the overhead of SCOUR and explain the Powerpod **Scour** challenge. Students will prepare a list of the top 12 energy-producing nations in the world, "drill" oil wells, and make oral presentations explaining their research and conclusions. Each Powerpod will:
   a. Identify and rank the top 12 energy-producing nations
   b. Mark each producer nation by placing 12 separate oil well derricks on their group map
   c. Document their reasoning by providing bibliographical information
   d. Write one or two sentences explaining why they chose each nation and ranked it where they did
   e. Create an overhead that lists their top 12 nations
   f. Prepare a one- to two-minute talk in which they explain/ defend their choices

4. Present the word *bibliography* and gauge the students' understanding of this term. Discuss the importance of providing bibliographies as proof or evidence of where they gather information. Call students' attention to the Student Guides, page 4. Show the SAMPLE BIBLIOGRAPHIC FORM transparency and review with students.

5. Identify for students the resources available. To encourage research efforts and reinforce bibliographic skills, students may only record two countries from each source they use. This means that each Powerpod must use a minimum of six different sources of information.

6. Distribute SCOUR and an 11" x 17" WORLD MAP to each Powerpod. Display the WORLD MAP transparency and discuss how the students will glue *oil derrick #1* on or near the country that is #1 on their copy of SCOUR, etc. Model the USA on the transparency of the map.

Follow up to this activity comes on the World Map Project when students display each country's oil reserves.

If necessary, adjust this goal based on your resources and the skills of the students. Successful students must coordinate division of labor with good communication skills to arrive at a list of 12 nations.

7. Display the ORAL PRESENTATION RUBRIC and call students' attention to the **Oral Presentation Rubric** in their Student Guides, page 4. Clearly identify student objectives and your expectations.

8. Distribute one blank transparency sheet and at least one marker to each Powerpod.

When a Powerpod successfully completes a country by filling in all of the information and gluing the oil well down, they may feel free to yell, "Oil!"

9. Allow the rest of the day for students to work. Inform them that they must give their presentations tomorrow.

10. Remind students about the current event they must bring in for Day 7.

Tech Trek

1. Use of online and CD resources provide a tech experience during this activity.

2. Students may record results of their **Scour** research directly on a spreadsheet or computer file.

Scour Oral Presentations — OPEC

Overview

- Students will analyze and orally present the information they discovered through **Scour**.
- Students will graph the results of their own and other students' research and draw conclusions about the location of the world's major oil reserves.
- Students will identify the nations comprising OPEC and have a general understanding of what a 'cartel' is and how OPEC functions in this capacity.
- Students will begin to prepare for OIL QUIZ #1.
- Checkpoint on Day 6 for *World Map Project* (**The Map**)

Materials

- Student Guides — *class set*
- SCOUR — *one per Powerpod (from previous day)*
- ORAL REPORT GRAPH — *class set*
- ORAL PRESENTATION RUBRIC — *one per Powerpod presenting*
- WORLD MAP (bulletin board-size)* — *one*
- OIL DERRICKS** — *one or two, cut apart*
- PROVEN OIL RESERVES/ANOTHER LOOK AT OIL RESERVES — *class set (copy back-to-back) + transparency (both sides)*
- PROVEN OIL RESERVES GRAPH – *transparency (optional*)
- ANOTHER LOOK AT OIL RESERVES GRAPH – *transparency (optional*)
- MIDDLE EAST MAP — *class set + transparency*
- OPEC NATIONS — *transparency*
- OIL QUIZ #1 STUDY GUIDE — *class set*
- Art supplies (drawing and finelining) — *enough for students*
- Map resources (atlases and world maps, print and electronic) — *enough for students*
- Resource materials (atlases, encyclopedias, and almanacs— electronic or print, geography texts, pre-bookmarked Internet sites) — *enough for students*
- Stencils — *enough for students (optional)*
- Stopwatch or timer — *one*
- Traced student maps (at least 18" x 24") — *class set*
- Transparent tape — *enough for students*

*See Setup Directions #2 **Preparing Your Classroom** for more information about this map.

**Prior to class, cut apart the oil derricks and have tape available for students to use.

Procedure

1. Depending on time available, decide if all or only half of the Powerpods will give oral presentations today.

2. Allow Powerpods to meet for five minutes to plan their **Scour** oral presentations. Remind Powerpods they will have between one and two minutes to share and defend their lists.

3. If time is limited, explain that only half the Powerpods in the class will make a presentation today.

4. Distribute the ORAL REPORT GRAPHS and review how students will graph and score them. All students will begin by graphing the top 12 producing countries (in descending order) based on the research completed by his or her Powerpod. During the Powerpod presentations, any student not presenting will chart the results reported by others and compare with his or her own Powerpod's results.

5. Ask for volunteers or randomly choose a Powerpod to begin the **Scour** presentations. If a Powerpod presents a less-than-satisfactory oral presentation, allow the students to redo the presentation at a higher level after school. Reward more points for improved reports, but not as much as you would have had they done well the first time.

TEACHING TIP

As the presentations take place and students graph the various conclusions, they will begin to see a pattern emerging on their charts.

6. Monitor the time for each Powerpod's presentation and allow time for other students to ask questions. Grade presentations using a separate copy of the ORAL PRESENTATION RUBRIC for each Powerpod. You may evaluate presentations as they take place or videotape the presentations and score later.

7. Following all presentations, create a class list of what the class agrees are the top 12 energy-producing nations in the world. Don't allow for over-arguing about specific order or ranking during this time.

The two graphs offer another way of comparing oil reserves that may be more understandable to some of the students.

8. Distribute the two-sided handout tables PROVEN OIL RESERVES and ANOTHER LOOK AT OIL RESERVES. Using the transparency, study PROVEN OIL RESERVES. Point out the oil reserves of some of the countries the students identified during the **Scour** presentations.

The enormous quantities of oil represented on these graphs are difficult to grasp. Data is presented in quantities of *billions of barrels*. Production by nations is presented in thousands of these *billions of barrels*. A "2" by a nation indicates that that nation produces **two** *billions of barrels* of oil. A "1000" by a nation indicates that that nation produces **one thousand** *billions of barrels* of oil (one trillion barrels of oil). Nations producing great amounts of petroleum actually produce millions of *billions of barrels* (quadrillions of barrels) of oil. Go through these numbers and quantities in detail to help students understand these vast quantities of petroleum without having to write all of the zeroes on the chart.

TEACHING TIP

*Keep in mind that these are **estimated reserves**, not actual yearly production numbers.*

9. Display ANOTHER LOOK AT OIL RESERVES to focus on the supplies located in the Middle East alone! Reinforce the conclusion that the Middle East must contain some of the world's largest oil deposits.

10. Distribute MIDDLE EAST MAP and the resource materials. Using the MIDDLE EAST MAP transparency, invite students to use their maps and atlases to help identify and label the countries on the overhead. Advise students to leave sufficient room around each country name to place stickers to mark oil reserves during the next phase of the World Map Project.

11. Call for volunteers to come up to label each of the countries as students fill in the names on their own MIDDLE EAST MAP. Be sure to focus on neatness and spacing the country names out so they remain legible. Extend the discussion to Middle East politics if appropriate.

TEACHING TIP

Students love to write with the special overhead markers!

12. Focus on writing the names in one direction only and "arrowing" them to the country's location. This avoids confusion in locating some of these small countries.

Be sensitive to the needs of students with poor motor coordination, dysgraphia, or other problems. Allow these students time to type names on computer, print, cut, and paste on the map.

13. Invite one person from each Powerpod that made a **Scour** presentation to mark the Powerpod's first, second, and third choice producer nations by taping an *oil derrick* on the appropriate country on the bulletin board WORLD MAP.

14. Display the OPEC NATIONS transparency or write the names of the OPEC countries on the board and call students' attention to the list written on their WORLD MAP CHECKLIST.

15. Introduce these countries as a "cartel" of nations known as "OPEC" (Organization of Petroleum Exporting Countries).

Cartel *— An international syndicate, combine, or trust formed especially to regulate prices and output in some field of business.*

16. Have a brief class discussion of *cartels* and *supply and demand*. Make sure the students understand how agreements made by this particular organization can influence global oil prices very quickly. Stress that such agreements affect how gas and fuel prices affect your students and their families.

17. Students bridge this class activity to their own maps by copying the Middle East countries to their individual 18" x 24" world maps. This helps them towards tomorrow's goal of completing **The Map** portion of the *World Map Project*.

This "soft deadline" is an important skill for middle level students to meet as they work toward completing a major project one part at a time. Emphasize the step-by-step process of a long-term project.

18. Remind students that they will self-evaluate and hand in their *World Map Projects* and Rubrics on Day 6. Students may not proceed with **Oil Reserves** until part one (**The Map**) is complete.

19. Several minutes before the end of class distribute the OIL QUIZ #1 STUDY GUIDE. Inform them that their first quiz will be on Day 7 (in two days). Suggest that students begin to complete the STUDY GUIDE as homework.

20. Remind students about the current event they must bring in for Day 7 (two days from now).

21. Minute Talk!

Tech Trek

1. Students may use an Internet atlas or CD atlas rather than a paper atlas during this activity.

2. Students research OPEC on the Internet and construct a database or a spreadsheet to organize information about the OPEC nations.

3. Students use the Internet and spreadsheet software to research the current price of crude oil and chart price fluctuations for several days.

Oil Reserves Map Work

Overview

- Using the WORLD MAP PROJECT RUBRIC/WORLD MAP CHECKLIST (**The Map**) students self-evaluate. Follow with a teacher spot evaluation.
- Students will begin to create a graphic representation of the **Oil Reserves** of 44 nations for their *World Map Projects*. They will create a map key.

Materials

- Student Guides — *class set*
- PROVEN OIL RESERVES/ANOTHER LOOK AT OIL RESERVES — *class set (from previous day)*
- SAMPLE MAP KEY — *transparency*
- OIL QUIZ #1 STUDY GUIDE — *transparency (optional)*
- Stickers, red and blue (1/4" diameter)* — *three boxes of each (to mark petroleum reserves) Students may make colored dots with markers if necessary.*
- Traced student maps (at least 18" x 24") — *class set*

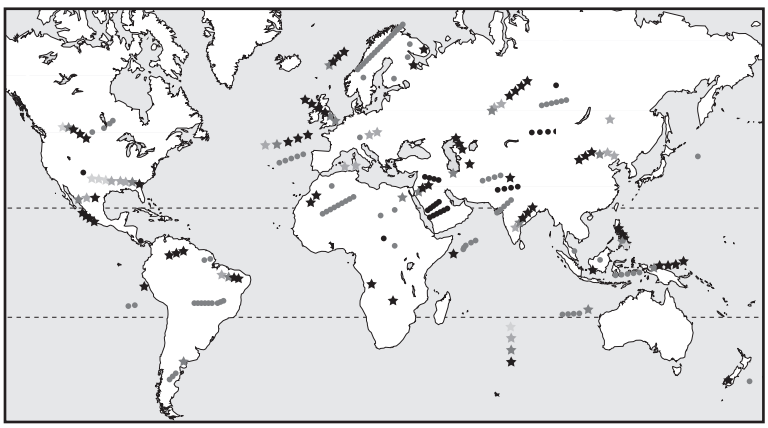
Procedure

1. Call students' attention to **The Map** portion of the WORLD MAP PROJECT RUBRIC.

2. Have the students self-evaluate their progress on the project thus far. (Allow four to five minutes.) After students determine the points they deserve, have them mark their score on their rubric, using pencil. (Students will mark 10, 20, or 30 points). Discuss quality at this point.

3. Have students bring out PROVEN OIL RESERVES data from yesterday.

4. Share with students that the first thing they will note on their maps is where oil reserves are located. Students will mark oil reserves with the color-coded gummed labels indicating how many billions of barrels remained to be used as of the late 1990s.



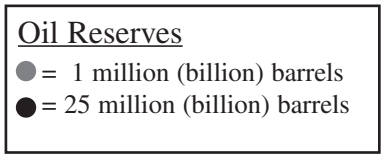
TEACHING TIP

This checkpoint is important for middle level students to meet as they work toward completing a major project over several weeks' time. Emphasize the step-by-step process. Students may not proceed with part two () until part one () is complete.

TEACHING TIP

This excellent example of a student-created map was completed by Amanda Helt, one of the author's students. One color sticker may be used to represent one billion barrels and another to represent 25 billion barrels. See Setup Directions #7 for more information about the World Map Projects and the map key.

5. Introduce and explain section one of the Map Key. Place colored stickers (or make colored marks) on the SAMPLE MAP KEY transparency and share with students as an example of how you'd like this key to present.



6. Allow time for students to construct their own keys. Establish an area where students can 'drill' for oil (where they can pick up the stickers they need) and have them begin working.

7. Inform students that they must complete marking **Oil Reserves** and that portion of the key on their *World Map Project* by Day 8, when they self-check **Oil Reserves**.

8. Allow the rest of the day for students to work on their *World Map Projects*, using the color-coded stickers to mark oil reserves.

9. Depending on the abilities of your students, you may review the OIL QUIZ #1 STUDY GUIDE with them, using the transparency. Remind students of OIL QUIZ #1 scheduled for Day 7 (tomorrow).

10. Remind students that their current events stories are due on Day 7 (tomorrow).

Tech Trek

1. The data on oil reserves is laid out well for a computer graphing activity using a spreadsheet program. This is a highly recommended extension. It will add a day to the unit.

Oil Reserves Map Work

Overview

- Students will continue their graphic representation of the **Oil Reserves** of 44 nations for their *World Map Projects*.

Materials

- Student Guides — *class set*
- OPEC FLAGS — *one set*
- PROVEN OIL RESERVES/ANOTHER LOOK AT OIL RESERVES — *class set (from previous day)*
- Basket or hat— *one*
- Stickers, red and blue (1/4" diameter)* — *three boxes of each*
- Straight pins, pushpins or tacks — *11*
- Styrofoam ball (4") — *one*
- Traced student maps (at least 18" x 24") — *class set*

*The scale of the student maps works best with colored dots approximately 1/4" diameter. If such gummed stickers are unavailable, students can create their own by using a 1/4" hole punch and larger square or rectangular stickers.

Procedure

1. If your schedule will allow, or if students are having trouble understanding all of the material covered thus far, add a day to reinforce information about the Middle East, OPEC, and the map work skills.

2. Prior to class, prepare a means of having students select an OPEC country flag to research and place on the bulletin board map. (See Setup Directions #12 **Preparing Materials for Activities** for more information about these flags.)
   a. Make available a foam ball with the 11 OPEC Flags on their pins.
   b. Write the names of the OPEC nations on slips of paper and place them in a basket or hat.

3. Call a representative of each Powerpod to the front of the room to select an OPEC flag. You may ask for volunteers or use classroom management incentives to reward students with selection opportunities.

Stress that PROVEN OIL RESERVES defines units of oil reserves as billions of barrels. *The total quantity of these billions of barrels of oil reserves is listed in the* millions. *Thus,* one million *for production means* one million billion. *One* million billion *equals a* quadrillion. *PROVEN OIL RESERVES lists quadrillions of barrels of oil. Such immense quantities are difficult to comprehend.*

4. After selecting a flag, each representative returns to his or her Powerpod and together students complete the following tasks:
   a. Using student atlases and/or background knowledge, the students locate their selected country on the bulletin board world map.
   b. Powerpods take turns placing their OPEC FLAG pin in or near the country on the class map.

Math Extension

5. A good math extension is to have the students round each of the numbers to the nearest million. Using the ANOTHER LOOK AT OIL RESERVES transparency, model a few countries. If your schedule allows, have students complete this step before attaching stickers to their maps.

6. For the remaining class time, allow students to work on their *World Map Projects*.

Current Events — Oil Quiz #1 — Map Work

Overview

- Students bring in OPEC current events assignments.
- OIL QUIZ #1
- Students complete **Oil Reserves** on the *World Map Projects*.

Materials

- Student Guides — *class set*
- OIL QUIZ #1 — *class set + extras (if needed)*
- WORLD MAP (bulletin board size) — *one*
- Stickers, red and blue (1/4" diameter)* — *three boxes of each*
- Traced student maps (at least 18" x 24") — *class set*

Procedure

1. Decide in advance how detailed your class discussion of the current events stories will be, taking into consideration your time constraints and the interests/abilities of your students.

2. Have students come up and individually tape their current event under the country name posted on bulletin board or Current Events Chart.
   a. Give students credit for bringing in the item.
   b. There are bound to be more articles about some nations than others. Speculate as to reasons for this.
   c. Once the articles are in class, you can help students understand Middle East politics or petroleum-related news items better through discussion.

3. Distribute OIL QUIZ #1 and allow 20 - 25 minutes for students to complete.

4. In any time remaining allow students to continue work on marking **Oil Reserves** and completing their **Map Keys** on their *World Map Projects*.

5. Remind students that they will self-evaluate and hand in their *World Map Projects* and Rubrics on Day 8.

6. **Answer Key for Oil Quiz #1:**

1. d.	6. a.
2. b.	7. d.
3. b.	8. b.
4. e.	9. c.
5. c.	10. Any three of 11

Students must have their current events for today.

Some news articles can be rather complex. Decide how much pre-understanding of the event the students must have to receive credit.

TEACHING TIP

This checkpoint is important for middle level students to meet as they work toward completing a major project over several weeks' time. Emphasize the step-by-step process. Students may not proceed with part three () until part two () is complete.

*Working in the library or having access to research books is of value for the **Running on Empty** research. If such resources are not available, Powerpods can use discussion and deductive reasoning to put together their list.*

TEACHING TIP

Running on Empty *by Jackson Browne or* Coast to Coast *by Ken Lounquist are excellent selections.*

Running on Empty

Overview

- Using the WORLD MAP PROJECT RUBRIC/WORLD MAP CHECKLIST (**Oil Reserves**) students self-evaluate their work. Follow with a teacher spot evaluation.
- In their Powerpods students conduct research to locate and chart the world's 10 major oil consuming nations, then prepare a Powerpod oral presentation of their conclusions.
- As they research and attempt to support their hypotheses, students draw conclusions and make generalizations about industrialized versus non-industrialized nations.

Materials

- Student Guides — *class set*
- Traced student maps — *class set*
- HISTORY OF OIL EXTRACTION — *transparency*
- WORLD POPULATION GROWTH — *transparency*
- ORAL PRESENTATION RUBRIC — *one per Powerpod presenting*
- Blank overhead transparencies — *one per Powerpod + extras*
- Resource materials (atlases, encyclopedias, and almanacs—electronic or print, geography texts, pre-bookmarked Internet sites) — *enough for students*
- Tape or CD player — *one (optional)*
- Transparency markers — *one per Powerpod*

Procedure

1. Call students' attention to **Oil Reserves** portion of the WORLD MAP PROJECT RUBRIC.

2. Have the students self-evaluate their progress on the project thus far. (Allow four to five minutes.) After students determine the points they deserve, have them mark their score on their rubric, using pencil. (Students will mark 10, 25, or 30 points).

3. As students finish their self-evaluations, begin to play *Running on Empty* as background music. Use this to lead into a quick discussion to relate for students the map work they are completing and the cumulative nature of what they are learning. Bridge from the first two sections of the World Map Project, **The Map** and **Oil Reserves** to the study of **Oil Consumption**.

4. Display the HISTORY OF OIL EXTRACTION transparency and discuss.

5. Introduce the transparency of WORLD POPULATION GROWTH and discuss.

6. Overlay the two graphs and allow the students to generate a discussion of what this may mean for our nation in the next decades!

7. Explain that the third part of the *World Map Project* is to chart countries' energy consumption. Ask students which countries they believe consume the most oil? Discuss briefly as a class without telling students whether they are right or wrong.

8. Explain the Powerpod **Running on Empty** challenge. Students will prepare a list of the top 10 energy-consuming nations in the world. They will:
   a. Identify and rank the top ten energy-consuming nations
   b. Document their reasoning with one or two sentences explaining why they chose the nation and ranked it where they did (Remind students that a source to back up their thinking is highly valued.)
   c. Create an overhead that lists their top ten nations
   d. Prepare a one- to two-minute talk in which they explain/defend their choices

9. Have students take out their ORAL PRESENTATION RUBRICS or distribute new copies if necessary. Remind students of their presentation objectives and your expectations. Refer students to the **Sample Bibliographic Form** in their Student Guides. Answer any questions.

10. Distribute one blank transparency sheet and at least one overhead marker to each Powerpod.

11. Allow the rest of the day for students to work. Inform them that they must give their presentations on Day 9 (tomorrow).

Tech Trek

1. Students may prepare a computer-generated write-up or slide presentation to share their top 10 list.

2. Use on-line or CD resources to help students make and justify their decisions about petroleum-consuming nations.

Explain that for this activity energy consumption and petroleum consumption mean the same thing.

Running on Empty Oral Presentations

Overview

- Students present and defend their choices for the top 10 petroleum-consuming nations.
- Students will compare their decisions with those of classmates and with a data table and draw further conclusions.
- Students will begin to create a graphic representation of the **Oil Consumption** of 44 nations for their *World Map Projects*. They will create a map key.

Materials

- Student Guides — *class set*
- ORAL REPORT GRAPH — *class set*
- ORAL PRESENTATION RUBRIC — *one per Powerpod presenting*
- RUNNING ON EMPTY — *class set + transparency*
- RUNNING ON EMPTY GRAPH — *transparency*
- SAMPLE MAP KEY — *transparency*
- SMOKESTACKS* — *one or two (cut apart)*
- WORLD MAP (bulletin board-size)* — *one*
- Mystery Bag (with a toy car) — *one*
- Resource materials (atlases, encyclopedias, and almanacs—electronic or print, geography texts, pre-bookmarked Internet sites) — *enough for students*
- Star stickers (multi-colored sets) — *two sheets per student (to mark petroleum consumption)*
- Stopwatch or timer — *one*
- Tape or CD player — *one (optional)*
- Traced student maps (at least 18" x 24") — *class set*
- Transparent tape — *one roll*

*Prior to class, cut apart the smokestacks and have tape available for students to use.

Procedure

1. Begin the hour with music playing: *Running on Empty* by Jackson Browne is a good choice.

2. Depending on time available, decide if all or only half of the Powerpods will give oral presentations today.

3. Powerpods meet for five minutes to plan their presentations. Remind students they will have between one and two minutes to share and defend their lists.

4. Distribute the ORAL REPORT GRAPHS and review how students will graph and score them. All students will begin by graphing the top 10 petroleum-consuming countries (in descending order) based on the research completed by his or her Powerpod. Any student not presenting will chart the results reported by others and compare with his or her own Powerpod's results.

5. Ask for volunteers or randomly choose a Powerpod to begin the oral presentations. Today Powerpods who did **not** make oral presentations for **Scour** will make oral presentations for **Running on Empty**.

6. Monitor the time for each Powerpod's presentation and allow time for other students to ask questions. Grade presentations using a separate copy of the ORAL PRESENTATION RUBRIC for each Powerpod. You may evaluate presentations as they take place or videotape the presentations and score later.

7. Following all presentations, create a class list of what the class agrees are the top 10 energy-consuming nations in the world. Don't allow for over-arguing about specific order or ranking during this time.

8. Distribute RUNNING ON EMPTY. Discuss the information contained on the data sheet and compare to the class results.

Math Extension

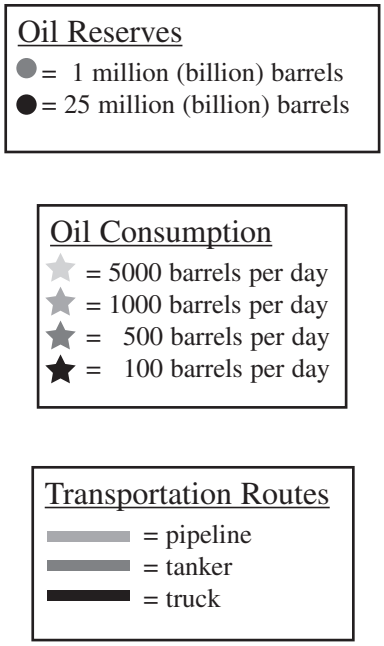
9. Before students begin marking **Oil Consumption** on the map, have them round the data to the nearest 100.
   a. Using the RUNNING ON EMPTY transparency, model the first couple on the overhead. Make note of the exception to normal rounding rules:
      - Any number that would usually round to zero will be rounded to 100 for this project.
   b. Give students a few minutes to do the rounding, offering help as needed.

10. Invite one person from each Powerpod that made a **Running on Empty** presentation to mark the Powerpod's first, second, and third choice producer nations by taping a *smokestack* on the appropriate country on the bulletin board WORLD MAP.

11. Try to lead students to identify what factors contribute to or are associated with high levels of energy/oil consumption.

As the presentations take place and students graph the various conclusions, they will begin to see a pattern emerging on their charts.

12. Introduce and explain section two of the Map Key. Use the SAMPLE MAP KEY to create an example of how you'd like this key to present.



TEACHING TIP

Some students have a difficult time with both locating the countries on their maps and completing the computations to decide which star combinations to place on each country. Be aware of this potential problem and watch for struggles.

Decide if you need to add an extra day for students to work on their maps.

13. Make the star stickers available to students and provide time for students to work.

14. The **Oil Consumption** section of the *World Map Project* is due at the end of class on Day 10 (tomorrow).

15. Minute Talk to end the hour!

Oil Consumption Map Work

Overview

- Students will continue their graphic representation of the **Oil Consumption** of 44 nations for their *World Map Projects*.

Materials

- Resource materials (atlases, encyclopedias, and almanacs—electronic or print, geography texts, pre-bookmarked Internet sites) — *enough for students*
- Star stickers (multi-colored sets) — *two sheets per student*
- Traced student maps (at least 18" x 24") — *class set*

Procedure

1. If your schedule allows an extra day, or if students have difficulty with the process of locating consumer nations and/or deciding which colored star combinations to place on their maps, allow additional class time for student work.

2. The quality of the finished maps will reward both you and your students for this extra work time.

TEACHING TIP

This checkpoint is important for middle level students to meet as they work toward completing a major project over several weeks' time. Emphasize the step-by-step process. Students may not proceed with part four () until part three () is complete.

You may choose to place a toy boat, a toy train, and a straw in the Mystery Bag (to represent oil tankers, ground transportation, and pipelines).

Oil Transportation

Overview

- Using the WORLD MAP PROJECT RUBRIC/WORLD MAP CHECKLIST (**Oil Consumption**) students self-evaluate. Follow with a teacher spot evaluation.
- Students learn about the transport of petroleum and discuss examples of *chokepoints*.

Materials

- Student Guides — *class set*
- SYNONYM SLIM — *one*
- OIL QUIZ #2 STUDY GUIDE — *class set*
- Glue sticks — *one per Powerpod*
- Mystery bag (with a cork) — *one*
- Resource materials (atlases, encyclopedias, and almanacs—electronic or print, geography texts, pre-bookmarked Internet sites) — *enough for students*
- Star stickers (multi-colored sets) — *two sheets per student*
- Traced student maps (at least 18" x 24") — *class set*

Procedure

1. Call students' attention to the **Oil Consumption** portion of the WORLD MAP PROJECT RUBRIC.

2. Have the students self-evaluate their progress on the project thus far. (Allow four to five minutes.) After students determine the points they deserve, have them mark their score on their rubric, using pencil. (Students will mark 5 or 10 points). Spot-check student evaluations.

3. Introduce the mystery bag with the cork inside. Have students describe and discuss all the possible things a cork could be used for.

4. Bridge to a discussion of floating and then to transportation techniques for oil.

5. Direct students' attention to **How Do We Get There?** on page 6 in the Student Guide. Read either individually or as a class. Discuss three methods of oil transportation: tankers, pipelines, and trucks. Note several pros and cons identified for each in the Student Guide.

6. Introduce SYNONYM SLIM. Use this cartoon of a very slender creature to inspire the students to generate a list of synonyms for *slim*. Bridge this to a discussion and definition of *chokepoints* — narrow areas around the world where the transport of oil supplies can easily be stopped or choked.

7. On the bulletin board world map point out and discuss the following areas:
   - Suez Canal + Su-Med pipeline
   - Panama Canal + Trans-Panama pipeline
   - Strait of Hormuz — entrance to the Persian Gulf
   - Bosporus / Turkish Straits — connects the Black Sea to the Mediterranean Sea
   - Bab el-Mandab — connects the Red Sea to the Gulf of Aden/ Arabian Sea
   - Strait of Malacaa — connects Northern Indian Ocean with South China Sea/Pacific Ocean
   - Russian oil and gas pipelines and ports — suppliers to most of Europe

8. Before the end of class distribute the OIL QUIZ #2 STUDY GUIDE. Inform them that their second quiz will be on Day 12 (in two days). Suggest that students begin to complete the STUDY GUIDE as homework.

Tech Trek

1. Log on to the Interact web site for links to sites related to *chokepoints*. Students will apply research skills and work cooperatively to select appropriate search terms and then refine an Internet search.

Chokepoint — A narrow, easily cut off area of a transit route used by petroleum transporters.

*If the Internet sites listed in **Tech Trek** are available, incorporate into the class discussion. The chokepoint locations come directly from that data.*

Route

Overview

- Students will apply knowledge of nations that produce or import petroleum and locate feasible transportation routes for crude oil.
- Students will begin to prepare for OIL QUIZ #2.

Materials

- Student Guides — *class set*
- IMPORTERS AND EXPORTERS — *three sets (cut apart)*
- ROUTE — *three per Powerpod + extras + transparency*
- WORLD MAPS (11" x 17") — *one per Powerpod*
- OIL QUIZ #2 STUDY GUIDE — *transparency (optional)*
- Art supplies (drawing and finelining) — *enough for students*
- Baskets or hats — *two*
- Glue sticks — *one per Powerpod*
- Map resources (atlases and world maps, print and electronic) — *enough for students*
- Resource materials (atlases, encyclopedias and almanacs— electronic or print, geography texts, pre-bookmarked Internet sites) — *enough for students*
- Star stickers (multi-colored sets) — *two sheets per student*

TEACHING TIP

Prior to class, cut apart the IMPORTERS AND EXPORTERS countries and separate into two baskets or hats, one for importing countries and one for exporting countries.

1. Introduce and discuss the goal of **Route**. Powerpods will design hypothetical transportation routes for oil to travel from an exporter to an importer.

2. Display and discuss the transparency of ROUTE and model an example or two.
   a. Be sure to emphasize that students may not invent pipelines; if they have any questions they need to ask you if one exists — Alaskan Pipeline and the Su-Med pipeline are two easy ones they can use.
   b. Also, emphasize the poor economics of trucking oil long distances.
   c. Recommend that students use tankers whenever possible.

3. Have a representative of each Powerpod come forward to select one importing country and exporting country from each hat or basket.

4. Distribute ROUTE and the WORLD MAPS to the Powerpods.

TEACHING TIP

Inform students that they will be able to use the material they prepare for their World Map Projects.

5. Powerpods gather resource materials and art supplies and create one or more transportation routes on the 11" x 17" world maps. They should complete as many routes as time allows.

6. If time allows, have Powerpods share a route or two. Have students staple completed ROUTE sheets to their map and turn in for evaluation.

7. Depending on the abilities of your students, you may review theOIL QUIZ #2 STUDY GUIDE with them using the transparency. Remind students of OIL QUIZ #2 scheduled for Day 12 (tomorrow).

Tech Trek

1. Powerpods or individuals use computer resources to complete the following challenges for **Route**:
   a. Find proof and properly list bibliographic information in support of a route. This can be very specific. Begin at an oilfield. Give locations, directions of travel, street names…you name it. This is a research challenge of the highest order!
   b. Find as many different routes as possible and discuss within the Powerpods or with the class. Students can pick up additional "route" handouts.
   c. Write a fictional newspaper account of a "chokepoint" incident involving real countries and real locations. Paragraphs can and should be word-processed if computers are available.
   d. Complete a videotape for challenge "c" above.

Route Map Work

Overview

- Students will continue to locate feasible transportation routes for crude oil.

Materials

- Art supplies (drawing and finelining) — *enough for students*
- Map resources (atlases and world maps, print and electronic) — *enough for students*
- Resource materials (atlases, encyclopedias, and almanacs— electronic or print, geography texts, pre-bookmarked Internet sites) — *enough for students*
- Star stickers (multi-colored sets) — *two sheets per student*
- Traced student maps (at least 18" x 24") — *class set*

Procedure

1. If your schedule allows an extra day, allow additional class time for student map work.

2. The quality of the finished maps will reward both you and your students for this extra work time.

Oil Quiz #2 — Map Work

Overview

- On their *World Map Project* maps students design and complete six feasible routes for oil transportation from exporter to importer.
- OIL QUIZ #2
- Students receive an oil spill cleanup challenge.

Materials

- Student Guides — *class set*
- PROVEN OIL RESERVES — *from earlier lesson*
- RUNNING ON EMPTY — *from earlier lesson + transparency*
- OIL SPILL NEWSFLASH — *teacher resource*
- OIL QUIZ #2 — *class set + extras (if needed)*
- Art supplies (drawing and finelining) — *enough for students*
- Map resources (atlases and world maps, print and electronic) — *enough for students*
- Tape or CD player — *one (optional)*
- Traced student maps (at least 18" x 24") — *class set*

Procedure

1. Begin with an appropriate song playing as students enter. *Consider me Gone* by Sting sets the proper tone.

2. Return the ROUTE sheets and maps to Powerpods. Discuss what students did well or may have improved upon.

3. Distribute OIL QUIZ #2 and allow 20 - 25 minutes for students to complete.

4. Have students take out their maps and their WORLD MAP PROJECT RUBRICS. Explain that the class will begin the final section of the *World Map Project* today. Remind them that they may use some of the information generated on Day 11.

5. The goal is for each student to design six hypothetical transportation routes for petroleum from exporter to importer. Brainstorm a quick list of countries that may export oil.

6. Display the PROVEN OIL RESERVES transparency. Students may want to use the top 10 list here for their exporters.

7. Display the RUNNING ON EMPTY transparency. Students may want to prioritize importers from this list.

8. Share with students that for purposes of charting these transportation routes, oil fields are located on or near a coast. If slightly inland, a short pipeline will take oil from oil fields to the coast where it can be pumped into tankers.

9. Make resource materials available. Students begin working, with the goal of completing their routes and turning their maps in on Day 14 (two days from today).

Students really enjoy hearing the names of the principal, yourself or another popular teacher, or a local celebrity inserted into the text. The author uses his own name for the last fill-in-the-blank; his students really like that!

10. With approximately 10 minutes remaining in the hour, stop the class and read the OIL SPILL NEWSFLASH in a very dramatic fashion, personalizing the text by inserting familiar names and locations.

11. Students set their *World Map Projects* aside. Remind students that their World Map Projects are due on Day 14 (two days from today).

12. Have students open their Student Guides to **Oil Spills**. Allow two to three minutes to scan this article.

13. If they are not already seated together, place students in their Powerpods. Inform the students that:
    a. The oil spill consists of 100 ml of corn oil dumped into a container of water.
    b. Their Powerpod grade will be based on how many ml of oil they are able to successfully retrieve.

f students need some samples to spark their creativity, refer them to the Student Guide, and suggest sponges, scoops, shallow spoons, etc.

14. Allow students five minutes to discuss ways and techniques to salvage as much oil (corn oil) as they can from the "oil spill."
    a. They may use any materials or tools they can dream up.
    b. Encourage students to make lists and write down materials they offer or think they can bring in for Day 13.
    c. Stress that students must bring from home any materials that they think will work to clean up the oil spill, and that you will not have any cleanup supplies to give to them.

15. Minute Talk to end the class.

16. **Oil Quiz #2 Answer Key:**
    1. To summarize the contents of the paragraph and to reconnect with the topic sentence.
    2. b.
    3. e.
    4. a.
    5. e.
    6. e.
    7. Answers will vary.
    8. Suez is located in the Middle East where political tensions make it vulnerable to terrorism.
    9. Answers will vary.
    10. Any four of 11 OPEC nations
        Any four of the major producers from IMPORTERS AND EXPORTERS list

Oil Spill!

Overview

- Powerpods attempt to clean up 100 ml of corn oil from a container of water.
- Students analyze class results.

Materials

- OIL SPILL NEWSFLASH — *teacher resource*
- Plastic bucket or dishpan (3-5 gallon) — *one per Powerpod*
- Corn oil (100 ml) — *one container per Powerpod*
- Beaker or graduated cylinder (250 ml capacity) — *one per Powerpod*
- Graduated cylinder (100 ml capacity) — *one (optional)*
- Mop, pail, rags and detergent — *one per Powerpod (ideally)*
- Feathers (real or plastic) — *at least two per Powerpod*
- Materials brought in by the students for clean up

Procedure

TEACHING TIP

See Setup Directions #13 for more specific information about the preparations.

1. Before class, prepare the **Oil Spill!** work stations. Each Powerpod needs the following supplies:
   a. A spill container filled one/half to two/thirds full of water
   b. A container with 100 ml of corn oil
   c. A container for a recovery vessel
   d. One or two feathers

2. Have students assemble with their Powerpods. Reread the OIL SPILL NEWSFLASH. Allow students in their Powerpods to analyze the materials brought in to help clean up. Allow five to 10 minutes for students to formulate their plan.

3. Restate the goals of **Oil Spill!**:
   a. Recover as much good oil as possible into the beaker or graduated cylinder (the recovery vessel).
   b. Attempt to clean the "animals" so they are able to survive.

4. Powerpods move to their workstation in the classroom or in another suitable room.

5. At the count of three, have all of the Powerpods spill the oil into the water and mix it with a tool or one of the supplies they brought.

6. The recovery process begins! Allow approximately 10 minutes for students to get as much oil as possible into the recovery vessel (beaker or graduated cylinder).

7. When the time period has expired, have each Powerpod present its recovery vessel for analysis. Take a score right from the student container, if possible. If you have a graduated cylinder, you can transfer the oil to this for examination.
   Suggested grading scale:
   100 – 90 ml = Gold Star Environmentalists
   89 – 80 ml = Silver Star Environmentalists
   79 – 70 ml = Bronze Star Environmentalists
   Below 69 = Tin Star Environmentalists (factor in how hard the group worked)

8. Have each Powerpod clean up its workstation.

9. Back in class, begin discussion of student experiences. Encourage students to share what techniques worked and what did not.

Tech Trek

1. Students may graph the class **Oil Spill!** cleanup results.

2. Log on to the Interact web site for links to sites related to oil spills.

Oil Spill!

Overview

- As an extension to **Oil Spill!** students will process data regarding historical oil spills and convert the raw data to a common form of measurement.

Materials

- OIL SPILL DATA (1993-2000) — *class set*
- OIL SPILL DATA KEY — *teacher reference*
- Calculators — *class set*
- Internet access if available

Procedure

1. Distribute OIL SPILL DATA (1993-2000). As a class, quickly scan the data. Discuss briefly.

2. Call students' attention to the conversions listed beneath the data chart. Allow time for students to convert each spill to US gallons for comparison.

3. Check the accuracy of student work using the OIL SPILL DATA KEY.

Tech Trek

1. Scan the OIL SPILL DATA (1993-2000). You or students set up a spreadsheet to work with as they do the volume conversions.

2. Students may sort the spread sheet data on spills from largest to smallest or vice-versa.

Buy and Sell

Overview

- Students will integrate an understanding of real world importers and exporters in regard to oil resources.
- Students will understand the goals of **Buy and Sell**: to satisfy their country's energy requirements as well as earn as much money as possible.
- Student pairs will devise and implement strategies, then cooperate while striving to meet stated goals.
- Students will accurately calculate profit and deficit and keep accurate records as they strive to meet stated goals.

E-mail or Intranet Buy and Sell Option

- Students will communicate using computers as they "buy and sell" oil.

Materials

- Student Guides — *class set*
- Country Cards* — *one set*
- BUY AND SELL LEDGER — *one per student pair + transparency*
- OIL BARONS** — *one per student pair + transparency (poster optional)*
- Basket or hat — *one*
- Bell — *one*
- Baron country nametags — *one set (optional)*
- Calculators — *class set*
- Staplers — *one or two (optional)*

E-mail or Intranet Buy and Sell Option

- Computer network — *Internet with e-mail or school Intranet (preferable)*
- Computer work stations — *one per student pair*

*See Setup Directions #12, **Preparing Materials for Activities** for more information about assembling these Country Cards.

**Select the OIL BARONS version appropriate to your class, either with or without a space for e-mail addresses.

Prior to class prepare the Country Cards and place in a basket or hat.

*Students need to be reasonably well versed in the use of the e-mail tool they will use. If they are not, set aside instructional time prior to **Buy and Sell** and teach them how to use it. If the students are struggling with e-mail, the challenge is too difficult—unless you significantly extend the **Buy and Sell** time frame.*

TEACHING TIP

If you are using points earned throughout the unit as incentives to reward students with bonuses, add these up and distribute to the students at the beginning of class. Students will add these bonuses to the pre-determined dollars allotted on the Country Cards.

Procedure

1. Call students' attention to the **Transportation Routes** portion of the WORLD MAP PROJECT RUBRIC.

2. Allow time for students to complete a final self-evaluation in pencil. Then collect the *World Map Project* maps with the rubric resting on top. (Students may staple the rubrics to the maps. Remind students to clearly identify both their rubrics and their maps.)

3. Review the results of Scour and Running on Empty and discuss **importers vs. exporters** of petroleum.

4. Remind students of the discussions the class has had about OPEC and then introduce the **Buy and Sell** activity and its goals:
   a. Accumulate enough energy for a country's needs
   b. Amass as much wealth as possible in the process
   c. Strategize!

5. Divide the Powerpods into groups of two for this activity and have them sit with their partners.

6. Inform students that within their Powerpods they will work with one other student (a trading partner) during the **Buy and Sell** trading session(s).
   a. One student will be the "bean-counter" (the mathematician).
   b. The other student will be the "wheeler-dealer" (the one who travels around making offers to buy and/or sell oil).
   c. Allow trading partners as much latitude as possible in setting up individual responsibilities.
   d. Stress that accurate record keeping is a must.
   e. The trading partners can switch responsibilities at any time.

TEACHING TIP

To be of any use to the teams, OIL BARONS must be accurately completed.

7. Distribute the OIL BARONS handouts and explain to the students that this will be their "address book" for **Buy and Sell**.

8. Distribute the BUY AND SELL LEDGERS and go over these with the students. Explain the significance of the **Oil Production** and **Oil Requirement** numbers and the **Cash Balance** and **Barrels of Oil Calculation Areas**.

9. Select a sample country from the hat and complete a BUY AND SELL LEDGER for this country using the transparency. Fill in the following:
   a. Starting balance (dollars)
   b. Oil production number
   c. Oil requirement number
   d. Circle either *Importer* or *Exporter* based on comparison of production capacity and consumption requirements

10. Stress that students will use the information on their own Country Card to fill in the same information.

11. Begin a discussion of strategies that may be useful in buying and selling a commodity such as oil.

12. Strategies for **Buy and Sell**:
    a. Buy low and sell high! This is always a good technique.
    b. Brainstorm a quick list of countries that may have a lot of oil to export and a similar list of those who may need to import.
    c. The gist of the **Buy and Sell** activity is that students must buy enough oil to satisfy their country's energy needs. When this is done, the amount of money in their balance sheet becomes your score. Stress that students can not win the game unless they have first met their energy needs.
    d. Discuss the strategy of spending money to buy oil and then reselling it at a profit to those whom may need it!
    e. Importers as well as exporters may contact people to make deals. A true 'wheeler dealer' would not be content to just meet his or her goal for energy. Such dealers may take a chance by going into the red to buy some oil and then turn around and export this oil in order to make more profit

13. Answer any questions about the procedures. Allow a few minutes for trading partners to organize their individual responsibilities and strategies and make out nametags. Have each pair of students set up a 'trading post' where they will be headquartered.

14. With great fanfare invite a representative of each trading partnership to draw a Country Card. As students do so, begin to compile a list of trading partners/country names to post, so everyone knows who is representing every country. Remind students to record on their OIL BARONS roster the names of the trading partners representing each nation.

Reserve this last strategic ploy for discussion after the first round of trading. Students who really think like business people discover this on their own. It comes out in the sharing session following the first round. Others then will try to employ the strategy in round two

15. To ensure that all students have accurate OIL BARONS rosters, conduct a class roll call and record who has each country on the OIL BARON transparency. Students need to accurately complete their OIL BARON sheets while you fill in the overhead.

16. Each team fills in their BUY AND SELL LEDGER, including whether their country will be an importer or an exporter.

17. Allow teams a few minutes to strategize and then, with a ding of the bell, let the trading begin! A good limit for the first trading day is 15 minutes.

18. As students make their trades, circulate around the classroom, emphasizing accurate record keeping of both dollar totals and oil amounts.

19. Upon completion of the 15-minute trading period, ding the bell again. Trading partners get together and complete final calculations.

TEACHING TIP

Allow five-10 minutes for students to finish off their number calculations and get ready to share.

20. Teams first compute whether or not they met their energy requirements. This is the 'qualifier' for the rewards of **Buy and Sell**. Once that has been tabulated, have students determine the following:
    a. What is their final dollar amount?
    b. What is their final oil amount?
    c. Did they earn a profit or lose money?
    d. How much?

21. When a winning pair is identified, they may be rewarded an amazing candy prize or something else you deem suitable. Reward all trading partners who achieved their energy goals with a small prize.

22. You may collect the BUY AND SELL LEDGERS for checking/evaluation.

TEACHING TIP

If time allows, the author recommends that you follow up with a second round of after the students have assessed their successes/ failures and had a chance to hear from others.

23. Have a class sharing session (either at this time or at the beginning of the next class) focused on which strategies may have worked and or not worked the best.

Extension

24. Have each trading pair average what they paid for oil per barrel and then compare this to the going rate on the world market.

25. Discuss what may have led to some prices being above average while others may have been below. Depending on class discussion, you may be able to bridge to a discussion of OPEC nations and how they impact our lives on a daily basis. This discussion has the possibility to extend even further.

Tech Trek

1. Students make an on-line check of today's petroleum market.

2. Conduct **Buy and Sell** using school e-mail or Intranet.

E-mail or Intranet Buy and Sell Option

1. Decide if students will work in Powerpod pairs or as individuals.

2. Prepare and transmit an e-mail version of the OIL BARON roster to each individual/pair.

3. The BUY AND SELL LEDGER could also be e-mailed and completed by the students on computer, though paper and pencil work is easier for students as they complete their computations.

4. Conduct a class roll call and record who has each country on the OIL BARON transparency. Students need to accurately complete their OIL BARON sheets while you fill in the overhead.

5. During the active trading time, circulate through the classroom, emphasizing accurate record keeping of both dollar totals and oil amounts.

6. It is advisable to make sure that no deals are being carried out 'under the table' —non-electronically in this case! You may have the trading sessions closed to speaking, except to one's partner.

If possible, transmit a completed OIL BARON roster copy to each team/student.

Buy and Sell (Round 2)

Objectives

- Offer a second round of **Buy and Sell** if time allows.

Materials

- Student Guides — *class set*
- COUNTRY CARDS — *one set (from previous day)*
- BUY AND SELL LEDGER — *one per student pair + transparency*
- OIL BARONS* — *one per student pair + transparency (poster optional)*
- Bell — *one*
- Broker nametags — *one set (optional)*
- Calculators — *class set*

E-mail or Intranet Buy and Sell Option

- Computer network — *Internet with e-mail or school Intranet (preferable)*
- Computer work stations — *one per student pair*

*Select the OIL BARONS version appropriate to your class, either with or without a space for e-mail addresses.

Procedure

1. Incorporate additional class discussion of the **Buy and Sell** activity, helping students relate their experience to the real world oil market.

2. Set up **Buy and Sell** round 2. Remind students of the **Buy and Sell** objectives:
   a. To creatively meet the energy requirements of a country they will choose randomly
   b. To amass more money than anyone else in the class!

3. Student trading partners may remain the same, or partners may change. Have each pair of students set up a "trading post" where they will be headquartered.

4. Distribute a new set of OIL BARONS rosters and BUY AND SELL LEDGERS.

5. Invite a representative of each trading partnership to draw a Country Card. As students do so, begin to compile a list of trading partners/country names to post, so everyone knows who is representing every country. Remind students to record on their OIL BARONS roster the names of the trading partners representing each nation.

6. To ensure that all students have accurate OIL BARONS rosters, have a class roll call and record who has each country on the OIL BARON transparency. Students need to accurately complete their OIL BARON sheets while you fill in the overhead.

7. Each team fills in their BUY AND SELL LEDGER, including whether their country will be an importer or an exporter.

8. Allow teams a few minutes to strategize and then, with a ding of the bell, let the trading begin! A good limit for the first trading day is 15 minutes.

9. As students make their trades, circulate around the classroom, emphasizing accurate record keeping of both dollar totals and oil amounts.

10. Upon completion of the 15-minute trading period, ding the bell again. Trading partners get together and complete final calculations.

11. Teams first compute whether or not they met their energy requirements. This is the 'qualifier' for the rewards of **Buy and Sell**. Once that has been tabulated, have students determine the following:
    a. What is their final dollar amount?
    b. What is their final oil amount?
    c. Did they earn a profit or lose money?
    d. How much?

12. Have a class sharing session focused on similarities and differences noticed between the two **Buy and Sell** days. Reward all Powerpods who achieved their energy goals with a small prize.

Extension

13. Have each Powerpod average what they paid for oil per barrel and then compare this to the going rate on the world market.

14. Discuss what may have led to some prices being above average while others may have been below. Depending on class discussion, you may be able to bridge to a discussion of OPEC nations and how they impact our lives on a daily basis. This discussion has the possibility to extend even further.

Allow five-10 minutes for students to finish off their number calculations and get ready to share.

TEACHING TIP

Begin the day with some background music: Cheeseburger in Paradise *by Jimmy Buffet works well here.*

TEACHING TIP

Review the handout with the students. Suggest that students devise a rubric to guide them as they work. Setting group goals and standards is excellent practice for self-evaluation.

Cheeseburger!

Overview

- Students will deduce, draw conclusions, and summarize about different ways we use energy in the creation and consumption of fast food.

Materials

- CHEESEBURGER! — *one per Powerpod*
- Burger Maps* — *one per Powerpod*
- Cheeseburgers or hamburgers — *class set*
- Markers (at least three colors) — *one set per Powerpod*
- Stopwatch — *one per Powerpod (optional)*
- Tape or CD player — *one (optional)*

*See Setup Directions #12 **Preparing Materials for Activities** for more information about these maps.

Procedure

1. Have students sit with their regular Powerpods. Distribute one CHEESEBURGER! handout to each Powerpod.

2. Pose the initial question:
   "What provides most of the energy for a cheeseburger?"

3. Each Powerpod sends a volunteer to pick up four piping hot (?) hamburgers / cheeseburgers.

4. Students dine and record the number of seconds taken for each Powerpod member to eat his or her burger. The maximum time will be four minutes, the time used for anyone who doesn't finish or doesn't want his or her burger.

5. Each Powerpod calculates the group average time and records on the CHEESEBURGER! handout.

6. A representative of each Powerpod picks up a large Burger Map," (large white paper with a laminated "burger" in the center. Powerpods select a writer at this time.

7. Discuss the concept of divergent thinking and how it may apply today! Inform students that they will create a web diagram of the **items that make up** their cheeseburgers.

8. If necessary, model brainstorming and semantic mapping for students. At this point, students should list things like *meat*, *cheese*, *bun*, (but not the flour included in the bun), etc. Students write their ideas using only one color marker. Advise students to leave plenty of room around each item that they list.

9. Following the partial model, allow time for the Powerpods to list all of the items that each burger included.

10. Using a different color marker, students web the **raw materials** that make up each item included in the burger. Model *mustard*. Mustard raw materials include mustard seeds, water, spices, a squirt container and a can or jar.

11. Selecting a third color marker, students create a list of the **processes** needed to prepare each raw material. Model with *mustard* on the class diagram. Include planting the seed, harvesting the seed, squashing and mixing the mustard, etc. Give the cue that processes are verbs. Students will look for words ending in *–ing*!

12. Re-pose the initial question:
    "What provides most of the energy for a cheeseburger?"

13. Summarize by discussion. Try to include in the discussion the following concepts:
    a. Many people involved in such a common, simple food
    b. Many steps involved in:
       —farming —transportation
       —cooking —refrigeration
       —travel to and from the store or restaurant
    c. Tremendous amount of energy used in:
       —Production of raw materials
       —Processing of raw materials
       —Transportation of raw materials
       —Petroleum is the primary fuel used in most of these processes

Be prepared to help Powerpods to think divergently during this step.

Stress students' success at learning this important step-by-step strategy for tackling and subduing large tasks.

14. Return the *World Map Projects*.

15. Discuss the project briefly and the steps the students followed in producing their final maps.

16. Minute Talk to end the hour.

Extensions

17. Depending on the time available, decide how to introduce the following extension activities:
    a. Map a meal at home and report back to class.
    b. Interview school kitchen staff and map a hot lunch meal.

18. Depending on the time available, begin a class discussion about petroleum reserves and the rate of consumption in our modern industrial/technological society.
    a. Compute the amount of fuel consumed to transport a busload of students to school compared with the amount of fuel consumed by individuals or pairs or students traveling together.
    b. Generate a list of somewhat frivolous or entertainment activities that consume fuel, then compute how much fuel might be conserved by participating in alternative activities.

Environmental Impacts

Overview

- Students gain a graphic representation of the pollution caused by burning fossil fuels as an energy source.
- Students will synthesize their learning and project the environmental problems caused by widespread use of fossil fuels.

Materials

- Automobile — *one*
- Duct tape — *12" length*
- Flat edge screwdriver — *one*
- Flexible tubing (2" diameter) — *four to five foot length*
- Heavy rubber band (3") — *one*
- Pictures and/or video clips of traffic jams and/or a variety of interesting vehicles
- Ring clamp — *one (optional)*
- Spring scale, balance, or digital scale — *one*
- Stop watch — *one*
- Trash bag (28-gallon) — *one*

Procedure

1. Begin by having one student use a balance scale to measure the mass of a large trash bag, a large rubber band and 12 inches of duct tape. You or another student records the value on the board.

2. Take the students outside to the test automobile. Keep the students a safe distance away from the vehicle at all times.

3. With the vehicle off, the transmission set in *Park*, and the keys safely in your pocket, use the duct tape to attach the trash bag securely to the exhaust pipe of the automobile.

4. Have a student running a stop watch give you the start signal. Start the car and run it for two to five minutes or until the bag is nearly full.

5. Round the time to the nearest minute and record. Turn off the car. Tightly seal the trash bag with the rubber band. Carefully remove the trash bag from the exhaust pipe, leaving the duct tape attached to the bag.

6. Return to the classroom. Have one student use the balance scale to weigh the sealed trash bag.

Assemble the tubing assembly before class—except for the trash bag. See Setup Directions #13, ***Preparing for Classroom Activities****.*

The author strongly recommends a second adult for supervision during the activity.

TEACHING TIP

The bag is filled with by-products of the burning of gasoline in an internal combustion engine—water vapor condensation, carbon dioxide, nitrogen oxide, carbon monoxide, etc.

7. Begin the discussion of the experiment and observed results. Ask what is in the bag? (This is the only question you need to ask here.)

8. Lead students in a follow-up discussion. Be sure to include the following observations in the discussion:
   a. Plants convert solar energy from the sun to chemical energy.
   b. The chemical energy of plants changes and is stored as fossil fuels (potential energy).
   c. The potential energy of fossil fuels is burned by humans releasing heat and light (kinetic energy).
   d. Along with this kinetic energy come other by-products (pollutants) including soot, ash, and carbon dioxide.
   e. These pollutants cause many problems for Earth's ecosystems.

9. Show video footage or some still pictures of traffic jams and/or cool-looking vehicles from around the world.

10. Conclude by asking students if they believe humans are immune from, or not affected by, our activities as a group. Introduce the global warming phenomena and leave them with more questions than answers on this day.

Tech Trek

1. Students may conduct Internet research on the *greenhouse effect*. The goal may be to develop arguments for and against the use of fossil fuels in power plants.

2. Students may expand on the information learned during today's experiment.
   a. They calculate the difference in mass of the trash bag before and after capturing the automobile exhaust.
   b. They assign this value to the pollutants in the bag.
   c. They set up a spreadsheet that will calculate the amount of pollutants for various numbers of vehicles running for set amounts of time.
   d. This application allows a lot of room for creativity.

QUOTES OF NOTE

"Our ships sailed on water, but they moved on oil, and the demand never ceased."
Rear Admiral W.R. Carter, United States Navy

"No matter how well fed, equipped, or officered, without oil and gasoline the modern army is a hopeless monster, mired and marked for destruction."
T. H. Vail Motter, Army Historian

"It takes nine million gallons of fuel to keep a battleship at sea."

"An hour's flight of a navy Hellcat fighter consumes enough gasoline to take your car from Chicago to Los Angeles."

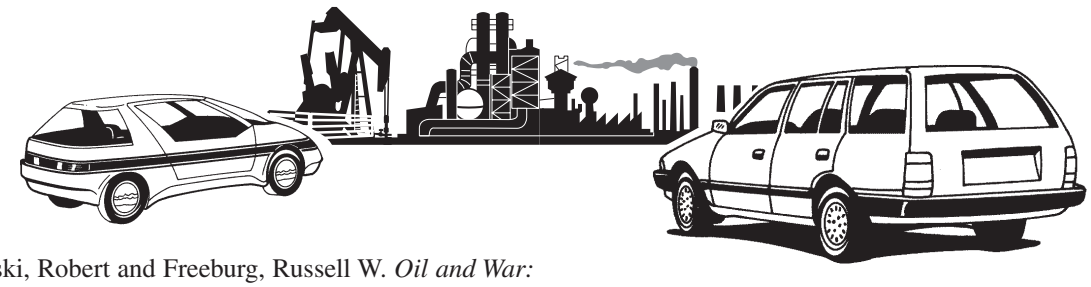
"It takes 60,000 gallons of gasoline a day to keep a single armored division fighting."
Department of War information (World War II)
(to convince Americans on the home front to conserve gasoline.)

"He who owns the oil will own the world, for he will rule the sea by means of the heavy oils, the air by the means of the ultra-refined oils and the land by means of gasoline and illuminating oils."
Henri Berenger, French Diplomat (1921)

"I think we wouldn't have won the Battle of Britain without 100-octane, but we did have 100-octane." (a type of aviation fuel)
Geoffrey Lloyd, British Secretary of Petroleum (WWII)

"To fight, we must have oil for our machine."
Adolph Hitler

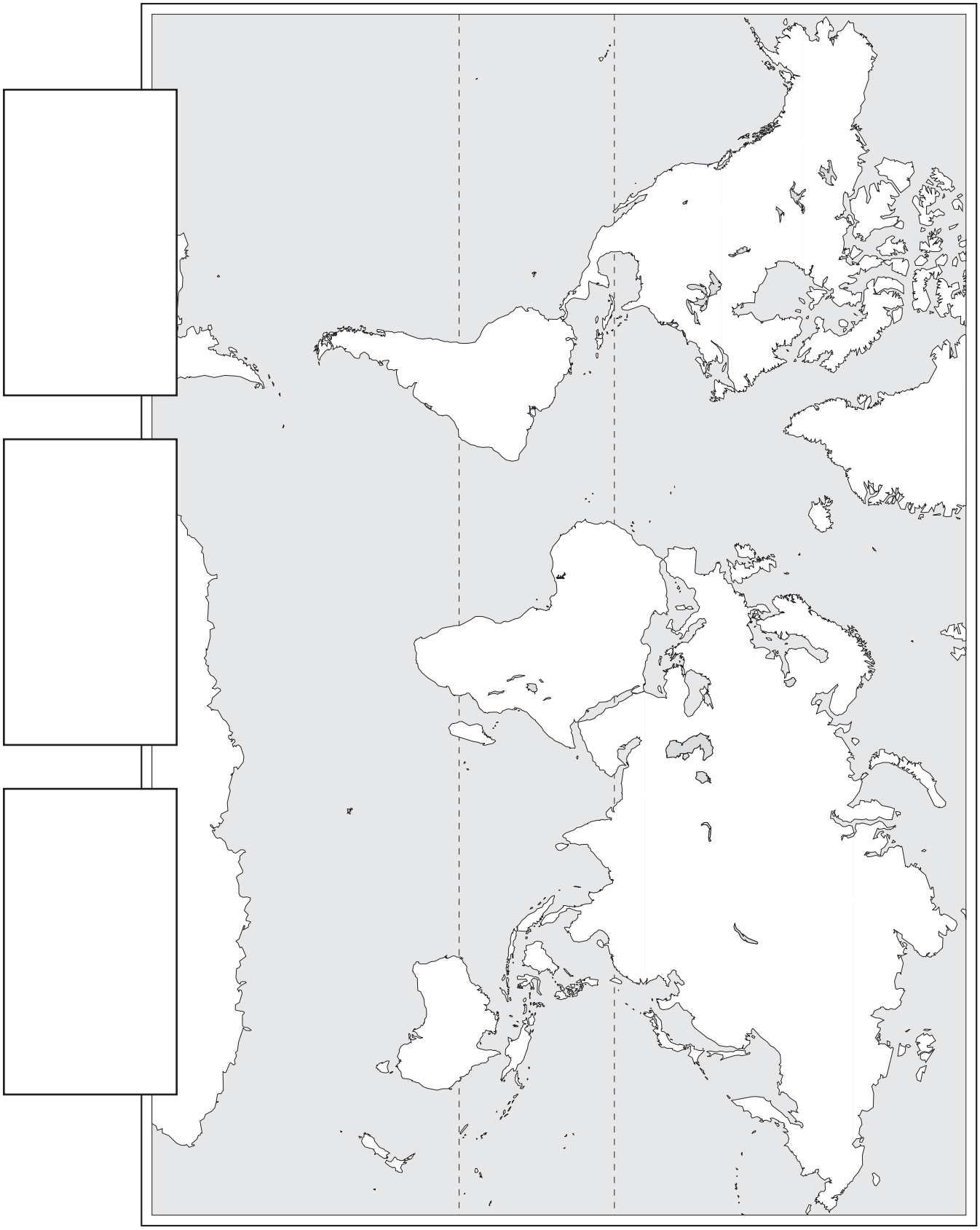
"Can anyone tell me what good tanks, trucks and airplanes are if the enemy doesn't have the fuel for them?"
Admiral Karl Donitz, Commander German U-Boat force (1942)



Goralski, Robert and Freeburg, Russell W. *Oil and War: How the Deadly Struggle for Fuel in WWII Meant Victory or Defeat.* William and Morrow, 1987

WORLD MAP

WORLD MAP



WORLD MAP PROJECT RUBRIC

BLACK GOLD

Name _____

30 points possible Date due _____

Level	The Map	# Points
Level 3	• Finelined • Stenciled Title • Completely Colored • 41 to 44 countries correctly placed (countries, oceans, rivers, mountain ranges) • 15 or more additional items listed on World Map Checklist	30
Level 2	• Finelined • Stenciled Title • Completely Colored • 36 to 40 countries correctly placed • 0 to 14 additional items labeled (countries, oceans, rivers, mountain ranges) • 0 to 14 additional items listed on World Map Checklist	20
Level 1	• Finelined • Titled (no stencil) • 0 to 35 countries correctly placed	10

Map Points Earned _____

30 points possible Date due _____

Level	Oil Reserves	# Points
Level 3	• Oil reserves correctly indicated for 41 - 44 countries	30
Level 2	• Oil reserves correctly indicated for 36 - 40 countries	25
Level 1	• Oil reserves correctly indicated for 0 - 35 countries	10

Oil Reserves Total _____

The Map Total	
Oil Reserves Total	
Oil Consumption Total	
Transportation Routes Total	
Map Key Total	
GRAND TOTAL	

15 points possible Date due _____

Level	Oil Consumption	# Points
Level 2	• 35 - 45 of the countries from the data table are marked with the correct color and number of stars indicating oil consumption	15
Level 1	• 0 - 34 of the countries from the data table are marked with the correct color and number of stars indicating oil consumption.	5

Oil Consumption Total _____

10 points possible Date due _____

Level	Transportation Routes	# Points
Level 2	• 6 or more reasonable transportation routes shown	10
Level 1	• 0 - 5 reasonable transportation routes shown	5

Transportation Routes Total _____

15 points possible Date due _____

Map Keys	# Points
Oil Reserves (stickers) • Complete • Accurate • Finelined • No spelling errors	5
Oil Consumption (stars) • Complete • Accurate • Finelined • No spelling errors	5
Transportation Routes (your choice of materials) • Complete • Accurate • Finelined • No spelling errors	5

Map Keys Total _____

← **Total** (100 points possible)

WORLD MAP CHECKLIST

Countries (44)

Algeria	Brunei	Egypt	Italy	Netherlands	Russia	United Kingdom
Angola	Cameroon	France	Japan	New Zealand	Saudi Arabia	United States
Argentina	Canada	Germany	Kazakhstan	Nigeria	Thailand	Venezuela
Azerbaijan	China	India	Kuwait	Norway	Tunisia	Yemen
Belarus	Colombia	Indonesia	Libya	Oman	United Arab Emirates	
Bolivia	Denmark	Iran	Malaysia	Pakistan		
Brazil	Ecuador	Iraq	Mexico	Qatar		

Fifteen Geographic Items

1 =_____ 9 =_____

2 =_____ 10 =_____

3 =_____ 11 =_____

4 =_____ 12 =_____

5 =_____ 13 =_____

6 =_____ 14 =_____

7 =_____ 15 =_____

8 =_____

Extra Items:

OPEC Countries

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____

Sample Map Key

<u>Oil Reserves</u>
- = 1 million (billion) barrels
- = 25 million (billion) barrels

<u>Oil Consumption</u>
- = 5000 barrels per day
- = 1000 barrels per day
- = 500 barrels per day
- = 100 barrels per day

<u>Transportation Routes</u>
- = pipeline
- = tanker
- = truck

GRAPHIC ORGANIZER

BLACK GOLD

Prehistoric Facts:

Three processes involved:

1.
2.
3.

Fuels before Oil:

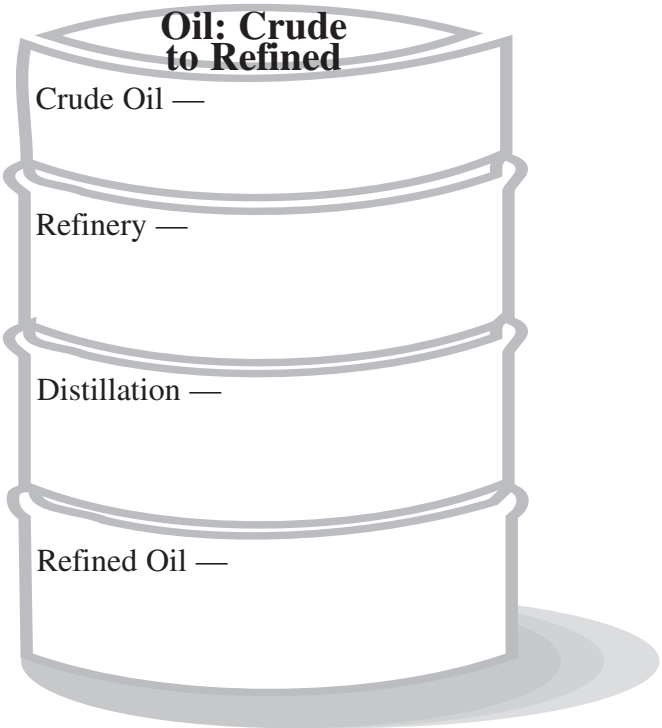
1.
2.
3.

Natural Resources:

Fossil Fuels (list):

Problems with Fossil Fuels:

1.
2.



Products:

Fuels:

1.
2.
3.
4.
5.

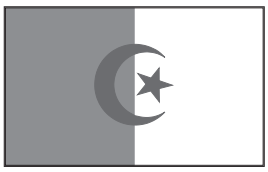
Others:

1.
2.
3.
4.
5.

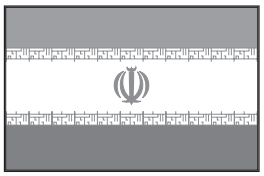
OPEC NATIONS

Nation	Member Since	Location
Algeria	1969	Africa
Indonesia	1962	Asia
Iran	1960*	Middle East
Iraq	1960*	Middle East
Kuwait	1960*	Middle East
Libya	1962	Africa
Nigeria	1971	Africa
Qatar	1961	Middle East
Saudi Arabia	1960*	Middle East
United Arab Emirates	1967	Middle East
Venezuela	1960*	South America

* Founding Members of OPEC


Algeria


Indonesia


Iran


Iraq


Kuwait


Libya


Nigeria


Qatar


Saudi Arabia


United Arab Emirates


Venezuela

Source: http://www.opec.org/welcome.htm [OPEC homepage]

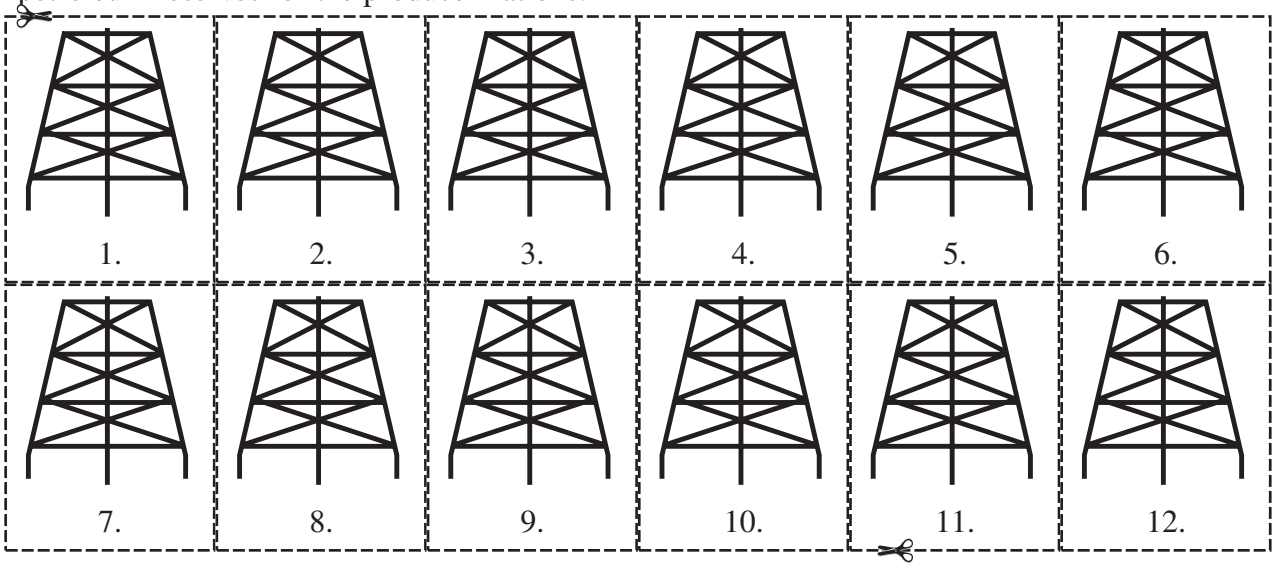
…the Globe in Search of Oil

Powerpod members: _____

After you identify12 nations that hold large oil reserves, rank them in order beginning with the largest oil producer. Write the name of the country and your research resource.

	Country	Bibliographic Information
1.	_____	_____
2.	_____	_____
3.	_____	_____
4.	_____	_____
5.	_____	_____
6.	_____	_____
7.	_____	_____
8.	_____	_____
9.	_____	_____
10.	_____	_____
11.	_____	_____
12.	_____	_____

Cut out these 12 oil derricks and place them on your map showing your decisions about the petroleum reserves for the producer nations:



SAMPLE BIBLIOGRAPHIC FORM

(Always list author's last name first)

Book: (with one author)
Author. Title. Place: Publisher, Year of publication: pages.

Example: Boas, Jacob. We Are Witnesses. New York: Henry Holt and Co., 1995: 13-38.

Book: (with two or more authors)

Example: Barbree, Jay and Martin Caidin. A Journey through Time. New York: Penguin Books USA Inc., 1995.

Encyclopedia:
Author of article. "Title of Article." Title of Encyclopedia. Year of publication.

Example: Klocke, Robert A. "Trachea." The World Book Encyclopedia. 1996 ed.

Encyclopedia CD-ROM:
Author if given. "Title of Article." Name of CD. CD-ROM. Date.

Example: "Acid Rain." Encarta Multimedia Encyclopedia. CD-ROM. 1995.

Magazine:
Author of article if given. "Title of Article." Name of Magazine. Month Day, Year: pages.

Example: Lewis, Michael. "The Ultimate Gold Rush. Soccer. October, 1996: 36-39.

CD:
Author if given. "Title of Article." Name of CD. CD-ROM. Publisher, Date.

Example: Francis, Arthur. "Oxygen." The World of Nature. CD-ROM. Queue, Inc., 1996.

World Wide Web:
Author if given. "Title of Home Page. " [Online] http://www.waunakee.k12.wi.us, Date of document or viewing date.

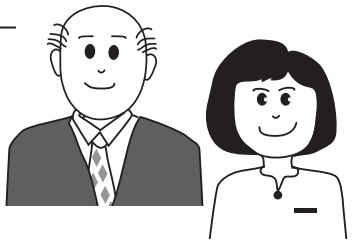
Example: Relick, Michael. "Color blindness." [Online] http://www.ctw.org, January 9, 1997

Resource Compiled by: Judy Morgan – Media Director Waunakee Intermediate School

ORAL PRESENTATION RUBRIC

BLACK GOLD

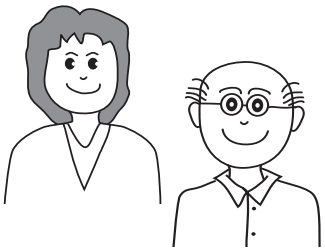
Tycoon



- Additional visual presentation
- Overhead prepared
- No spelling mistakes
- Neatly presented
- Logical explanations given for choices
- Includes more than two source materials during discussion of choices
- Powerpod members evenly share the discussion responsibility

---

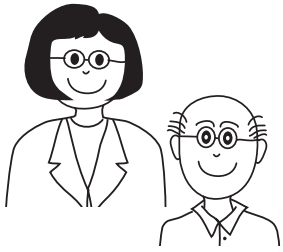
Master Producer



- Overhead prepared
- No spelling mistakes
- Neatly written
- Logical explanations given for choices
- Includes at least two source materials during discussion of choices
- Powerpod members evenly share the discussion responsibility

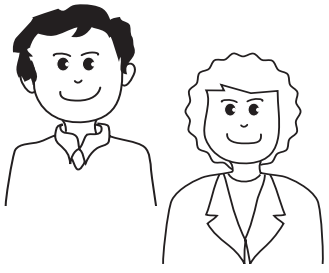
---

Producer

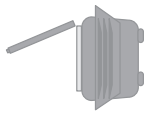


- Overhead prepared
- One or two spelling mistakes
- Fairly neatly written
- Some explanations given for choices
- Includes at least one source material during discussion of choices
- Powerpod members share the discussion responsibility

Minor Producer



- Overhead prepared
- Several spelling mistakes
- Not neatly written
- Inadequate explanations given for choices
- Includes no source material during discussion of choices
- Powerpod members do not share the discussion responsibility



SAMPLE ORAL REPORT GRAPH

BLACK GOLD

Actual Ranking of Countries	Ranking of Countries	Our PowerPod rank / score		Report #1 rank / score		Report #2 rank / score		Report #3 rank / score		Report #4 rank / score		Report #5 rank / score	
Saudi Arabia	1	Saudi Arabia		1	10	1		1		1		1	
Iraq	2	Iran		3	8	5		2		3		2	
UAE	3	Iraq		2	10	2		3		2		5	
Kuwait	4	Kuwait		5	9	4		4		4		4	
Iran	5	UAE		4	9	3		5		5		3	
Venezuela	6	Venezuela		6	10	6		6		7		7	
Russia	7	Libya		8	9	7		7		6		6	
Libya	8	Russia		7	9	8		8		8		8	
Mexico	9	Mexico		9	0	10		9					
China	10	China		10	9	9		9		10			
Totals					83								

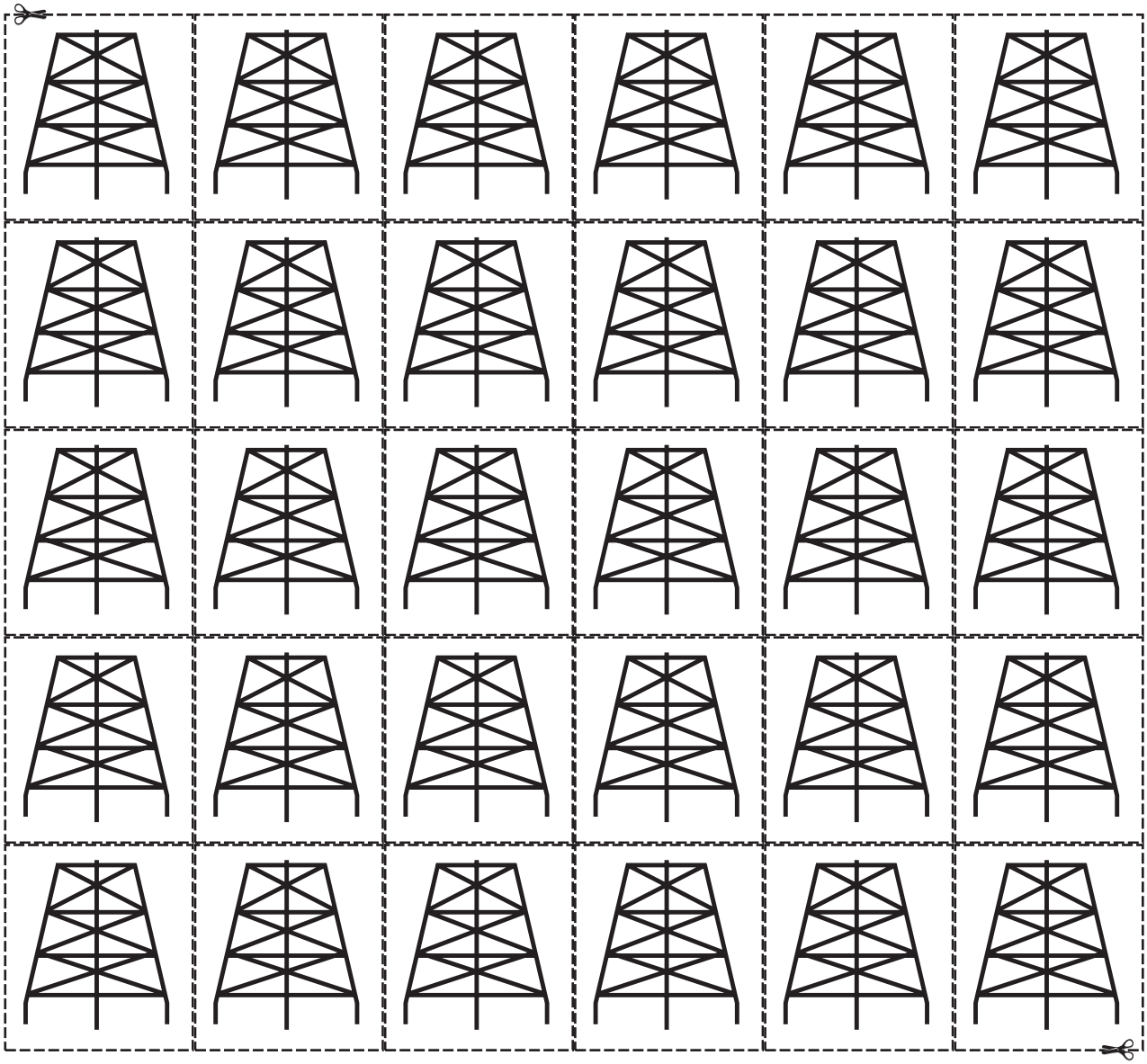
100 Points Possible
Score 10 Points For Every Country Ranked Correctly
Subtract Points For Every County Ranked Incorrectly
Find the Difference Between the Real Ranking and the Incorrect Ranking and write as a minus number.
Students will see patterns emerging as they listen to the reports.
Afterwards, individually or as a class, they fill in the Actual Ranking of Countries in blanks on the left, and then self score.
Exta Credit - individually or as a class students score other teams and graph class results. Teacher can collect and grade.

ORAL REPORT GRAPH

Actual Ranking of Countries	Ranking of Countries	Our PowerPod rank / score		Report #1 rank / score		Report #2 rank / score		Report #3 rank / score		Report #4 rank / score		Report #5 rank / score	
	1												
	2												
	3												
	4												
	5												
	6												
	7												
	8												
	9												
	10												
Totals													

100 Points Possible
Score 10 Points For Every Country Ranked Correctly
Subtract Points For Every County Ranked Incorrectly
Find the Difference Between the Real Ranking and the Incorrect Ranking and write as a minus number.

OIL DERRICKS



PROVEN OIL RESERVES

Country	Barrels—2009	Country	Barrels—2009
Algeria	12,200,000,000	Iraq	115,000,000,000
Angola	9,035,000,000	Italy	407,000,000
Argentina	2,587,000,000	Japan	44,000,000
Australia	1,500,000,000	Kazakhstan	30,000,000,000
Azerbaijan	7,000,000,000	Kuwait	104,000,000,000
Belarus	198,000,000	Libya	41,464,000,000
Brazil	12,182,000,000	Malaysia	4,000,000,000
Brunei	1,100,000,000	Mexico	12,352,000,000
Cameroon	200,000,000	Nigeria	36,220,000,000
Canada	178,592,000,000	Norway	6,865,000,000
China	16,000,000,000	Oman	5,500,000,000
Colombia	1,506,000,000	Pakistan	289,000,000
Denmark	1,118,000,000	Qatar	15,207,000,000
Ecuador	4,517,000,000	Russia	60,000,000,000
Egypt	3,700,000,000	Saudi Arabia	266,751,000,000
France	120,000,000	Sudan	5,000,000,000
Germany	367,000,000	U.A.E	97,800,000,000
India	5,625,000,000	United Kingdom	3,600,000,000
Indonesia	4,370,000,000	United States	20,972,000,000
Iran	138,400,000,000	Venezuela	87,035,000,000

Source: "World Crude Oil and Natural Gas Reserves," January 18, 2009. [Online]. http://www.eia.doe.gov/emeu/iea/table81.html. 2.09.04
http://www.eia.doe.gov/emeu/international/reserves.xls 2009 updates

Proven Oil Reserves Graph

Billions of Barrels—2009

Source: "World Crude Oil and Natural Gas Reserves," January 18, 2009. [Online]. http://www.eia.doe.gov/emeu/iea/table81.html. 2.09.04
http://www.eia.doe.gov/emeu/international/reserves.xls 2009 updates

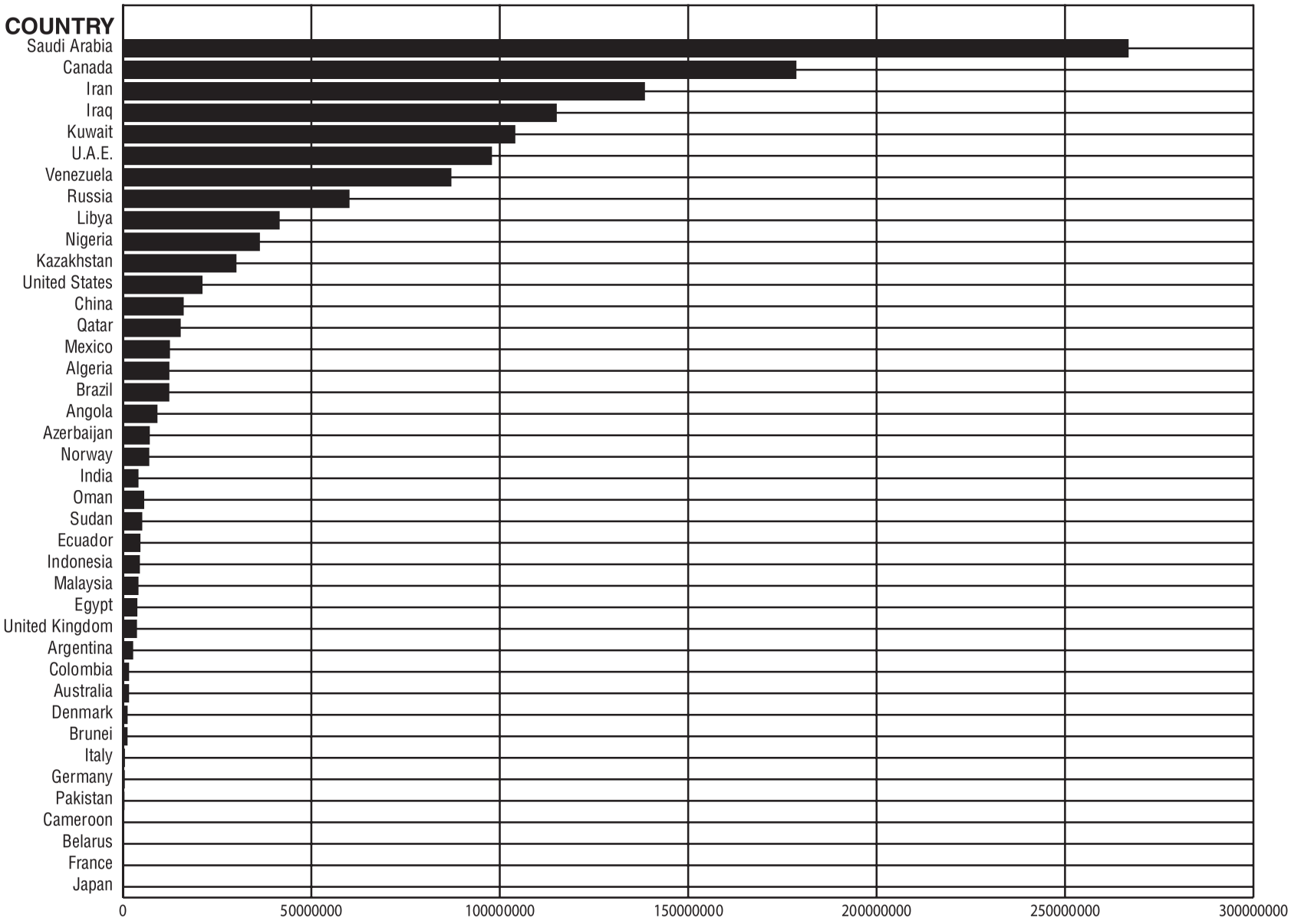
ANOTHER LOOK AT OIL RESERVES

BLACK GOLD

Country	Barrels—2009	Round to the nearest billion:	Country	Barrels—2009	Round to the nearest billion:
Saudi Arabia	266,751,000,000		India	5,625,000,000	
Canada	178,592,000,000		Oman	5,500,000,000	
Iran	138,400,000,000		Sudan	5,000,000,000	
Iraq	115,000,000,000		Ecuador	4,517,000,000	
Kuwait	104,000,000,000		Indonesia	4,370,000,000	
U.A.E	97,800,000,000		Malaysia	4,000,000,000	
Venezuela	87,035,000,000		Egypt	3,700,000,000	
Russia	60,000,000,000		United Kingdom	3,600,000,000	
Libya	41,464,000,000		Argentina	2,587,000,000	
Nigeria	36,220,000,000		Colombia	1,506,000,000	
Kazakhstan	30,000,000,000		Australia	1,500,000,000	
United States	20,972,000,000		Denmark	1,118,000,000	
China	16,000,000,000		Brunei	1,100,000,000	
Qatar	15,207,000,000		Italy	407,000,000	
Mexico	12,352,000,000		Germany	367,000,000	
Algeria	12,200,000,000		Pakistan	289,000,000	
Brazil	12,182,000,000		Cameroon	200,000,000	
Angola	9,035,000,000		Belarus	198,000,000	
Azerbaijan	7,000,000,000		France	120,000,000	
Norway	6,865,000,000		Japan	44,000,000	

Source: “International Oil Reserves.” [Online]. http://www.eia.doe.gov/emeu/international/reserves.html 1.18.09

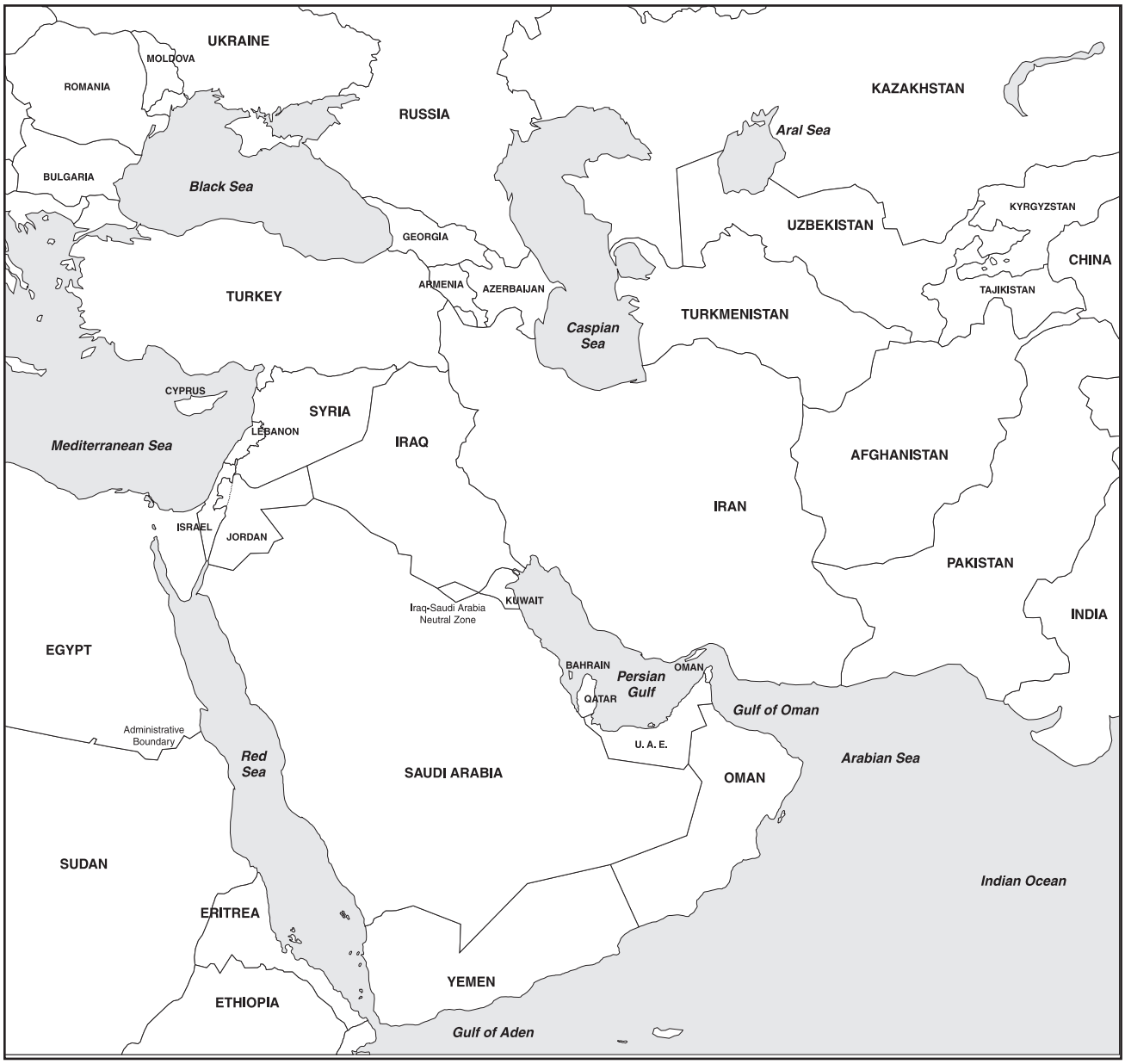
Another Look At Oil Reserves Graph



Billions of Barrels—2009

Source: "International Oil Reserves." [Online]. http://www.eia.doe.gov/emeu/international/reserves.html 1.18.09

MIDDLE EAST MAP



SAMPLE MAP KEY

Oil Reserves

= 1 million (billion) barrels

= 25 million (billion) barrels

Oil Consumption

= 5000 barrels per day

= 1000 barrels per day

= 500 barrels per day

= 100 barrels per day

Transportation Routes

= pipeline

= tanker

= truck

OIL QUIZ #1 STUDY GUIDE

BLACK GOLD

This paragraph is on the quiz:

Petroleum, commonly called oil, has a very interesting past. Scientists believe oil was created millions of years ago by decaying plant and animal material at the bottom of prehistoric swamps. Over this long time period, changes occurred to these particles; what we end up with is a very versatile fuel, one with many uses. This ancient fuel is very useful to us today.

Think About: History of petroleum
Processes involved:

• _____

• _____

• _____

Trace the energy that is stored in oil:

Sun Tiny prehistoric plants/Tiny prehistoric animals Petroleum

Key Vocabulary: Write definitions below

Kinetic Energy: _____

_____

Potential Energy:_____

_____

Fossil Fuels: _____

_____

Petroleum: _____

_____

Crude Oil: _____

_____

Distillation: _____

_____

Refined Oil:_____

_____

OIL QUIZ #1 STUDY GUIDE (CONT.)

Where is oil refined?_____

Concepts:

What is OPEC?_____

_____

How can this oil cartel affect your life?

_____

_____

_____

Location of Oil Reserves: Major Producing Countries - spelling must be accurate on quiz!

_____ _____

_____ _____

_____ _____

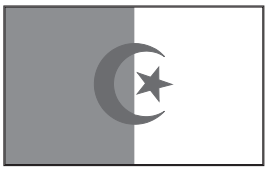
_____ _____

_____ _____

_____

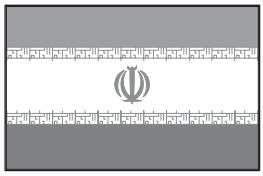
Major Producing Region: _____

OPEC FLAGS



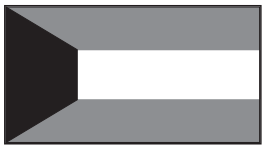
Algeria

Indonesia



Iran

Iraq

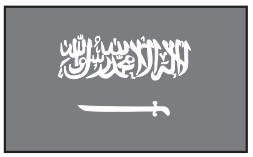


Kuwait

Libya

Nigeria

Qatar



Saudi Arabia

United Arab Emirates

Venezuela

OIL QUIZ #1

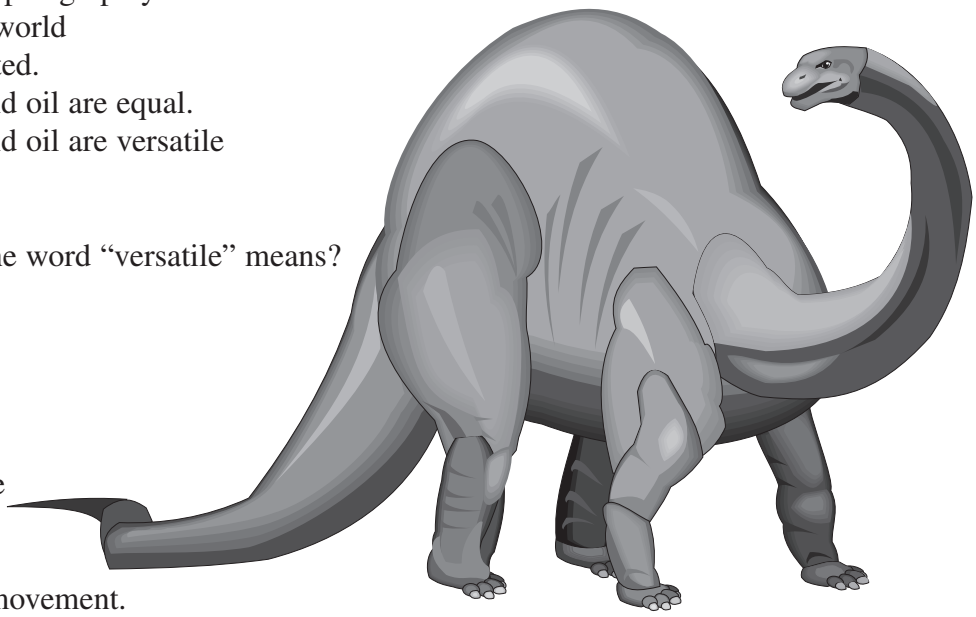
Name: _____

Read the paragraph then answer the questions.

Petroleum, commonly called oil, has a very interesting past. Scientists believe oil was created millions of years ago by decaying plant and animal material at the bottom of prehistoric swamps. Over this long time period, changes have occurred to these particles and what we end up with is a very versatile fuel — one with many uses. This ancient fuel is very useful to us today.

1. This paragraph is missing:
   a. a topic sentence
   b. a body.
   c. a closing sentence.
   d. none of the above

2. The main idea of the paragraph you read was
   a. fuels around the world
   b. how oil was created.
   c. that petroleum and oil are equal.
   d. that petroleum and oil are versatile
   e. all of the above



3. What do you think the word "versatile" means?
   a. fossil fuel
   b. many uses
   c. not usable
   d. petroleum
   e. all of the above
   f. none of the above

4. Kinetic energy
   a. is the energy of movement.
   b. can be stored as potential energy.
   c. was stored in the spring of the friction toy.
   d. is very useful to us.
   e. all of the above

5. The process in which petroleum is heated and separated is called
   a. bending.
   b. destroying.
   c. distillation.
   d. blending.
   e. all of the above
   f. none of the above

OIL QUIZ #1 (PAGE 2)

Name: _____

6. The majority of the world's known petroleum reserves are located in
   a. the Middle East.
   b. areas yet to be explored.
   c. Russia.
   d. the United States.
   e. all of the above
   f. none of the above

7. The energy stored in petroleum originally comes from
   a. cheeseburgers.
   b. tiny plants and animals.
   c. heat.
   d. the sun.
   e. all of the above

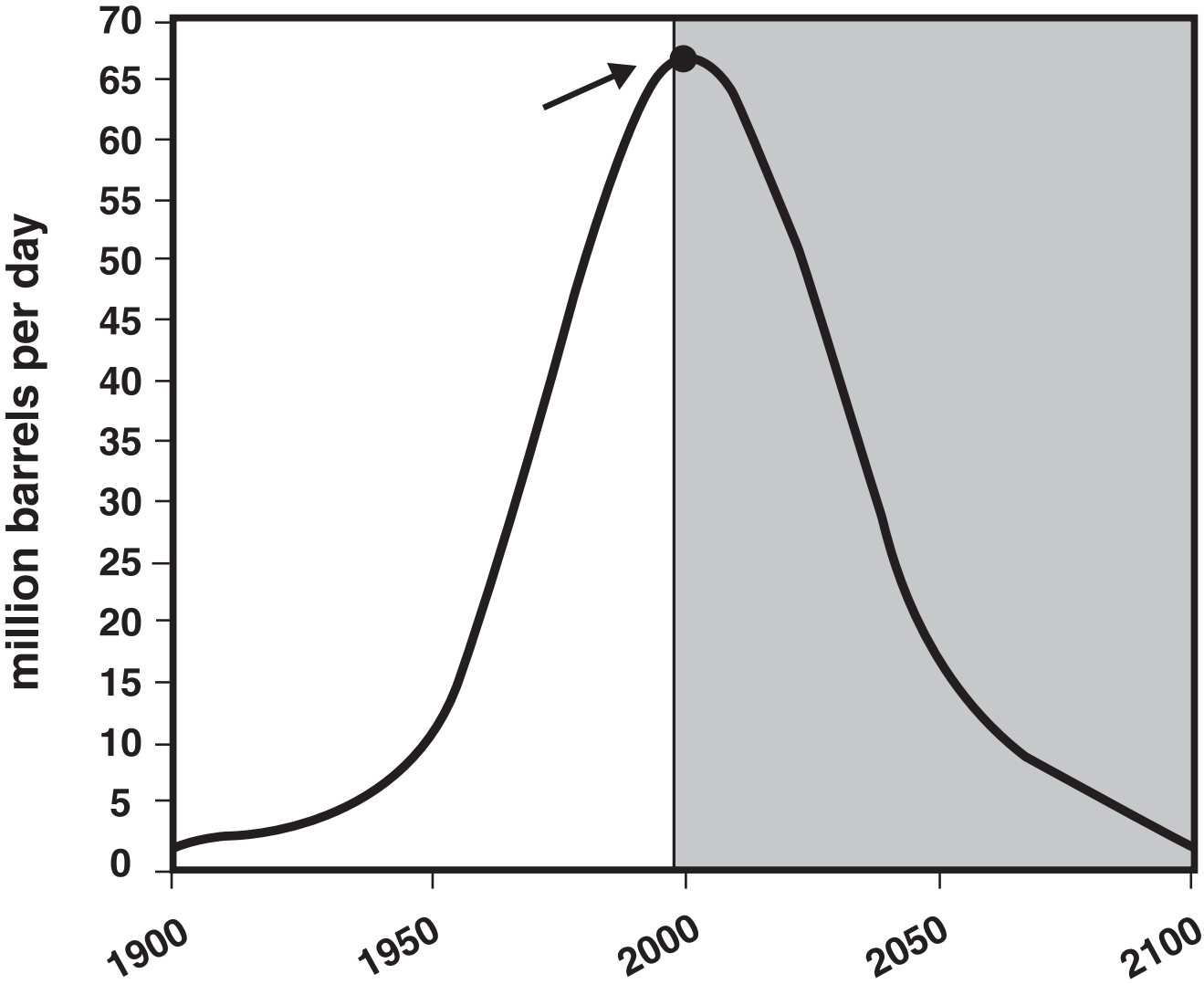
8. OPEC is
   a. a group of nations that makes oil tankers.
   b. a group of nations that all export crude oil.
   c. a group of muscles in the human arm.
   d. a group of people from Norway known for cleaning up oil spills.

9. Oil is distilled at a factory called a
   a. refrigerator.
   b. refraction.
   c. refinery.
   d. reflex.
   e. all of the above
   f. none of the above

10. Name three countries that are found in the Middle East:

    1. _____ 3. _____

    2. _____ (Must be spelled correctly. No abbreviations.)

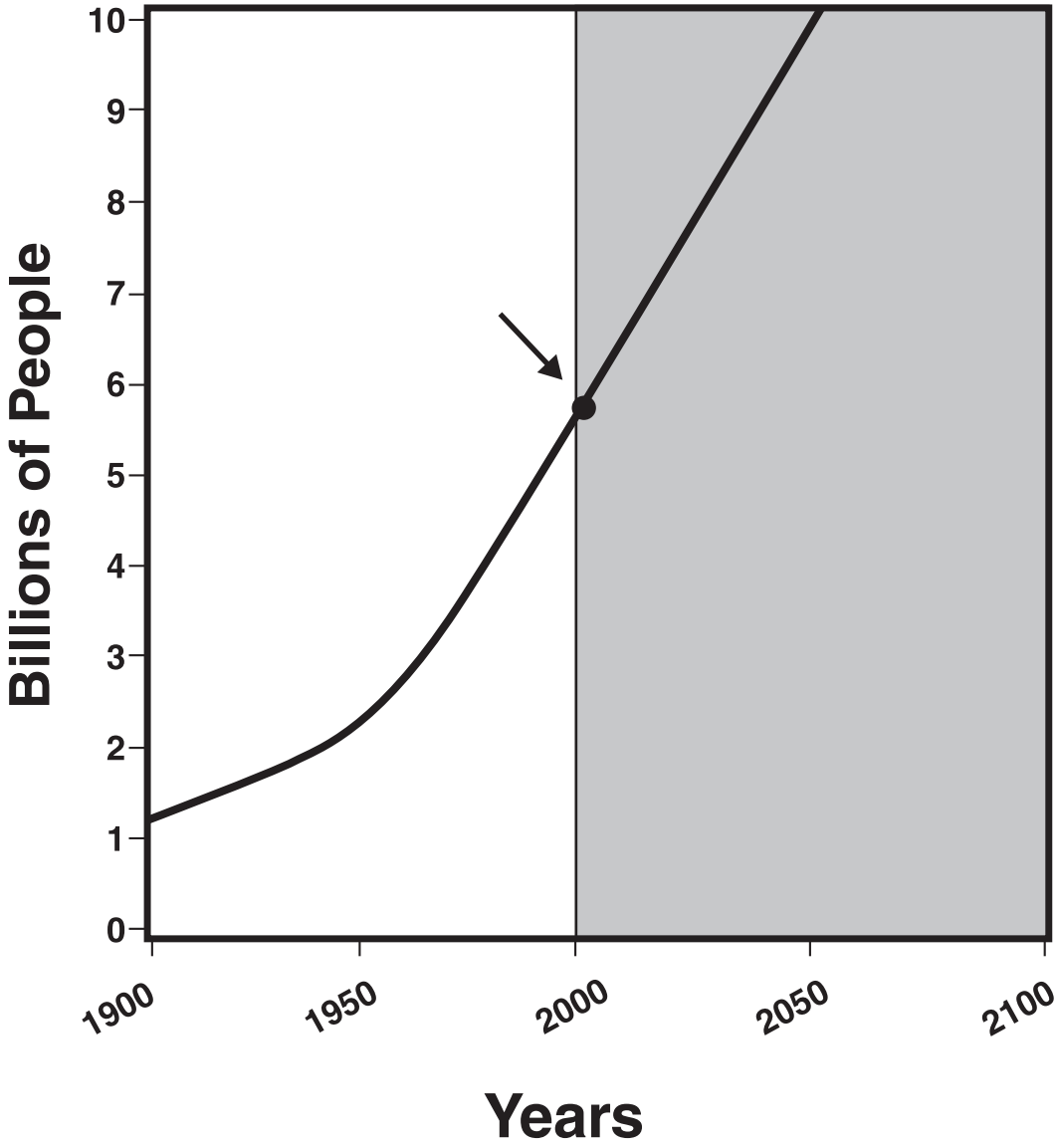


World Oil Extraction

The Past, Present and Future

1900 - 2100

Source: Cambell C.J., The Coming Oil Crisis, Multi-Science Publishing & Petroconsultants. SA.



World Population Growth

The Past, Present and Future

1900 - 2100

Source: U.S. Bureau of the Census, Current Population Projections

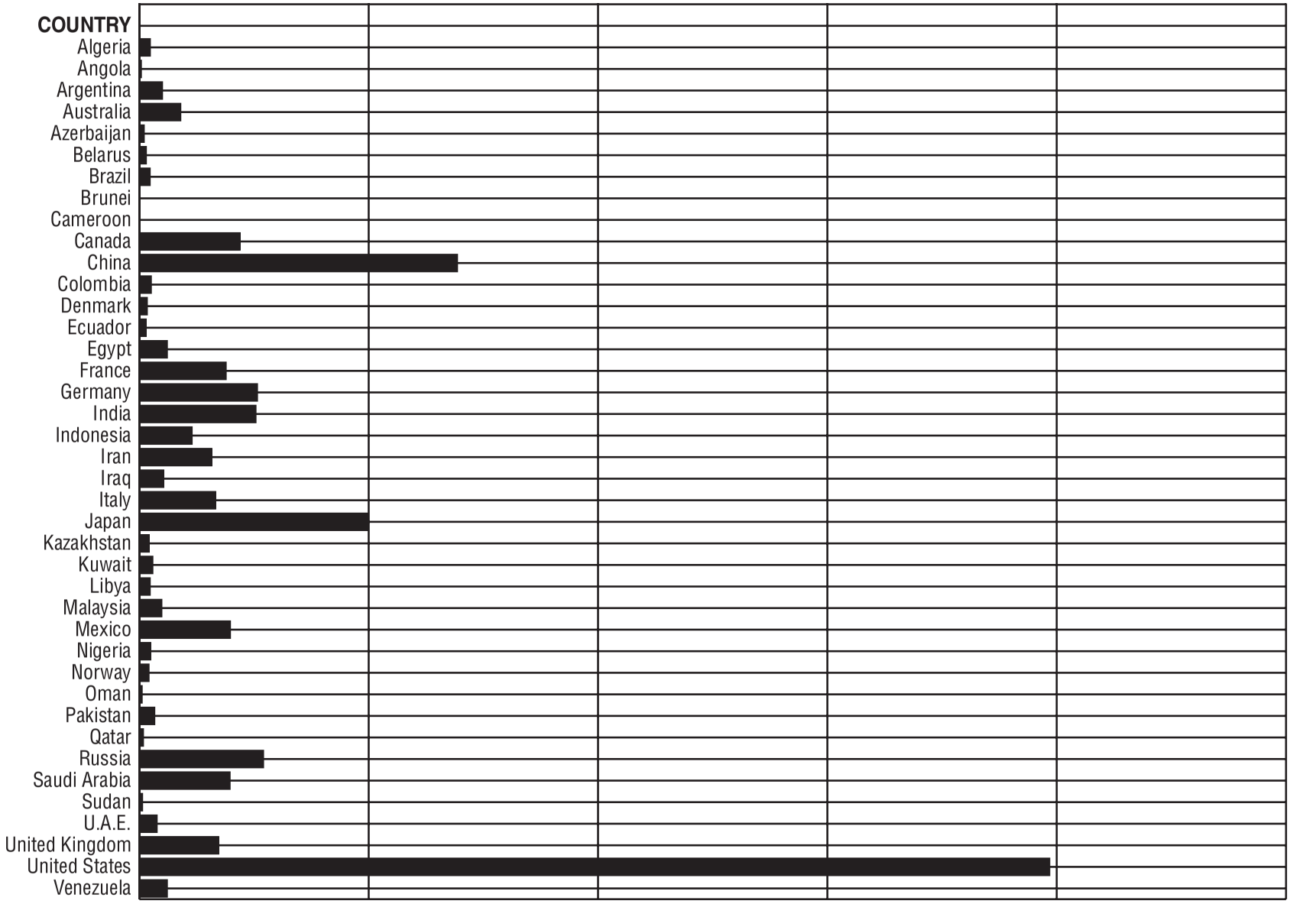
RUNNING ON EMPTY

Countries	Petroleum Consumption*	Round to nearest 100**	Countries	Petroleum Consumption*	Round to nearest 100**
Algeria	259		Iraq	564	
Angola	55		Italy	1743	
Argentina	535		Japan	5198	
Australia	950		Kazakhstan	234	
Azerbaijan	120		Kuwait	316	
Belarus	168		Libya	256	
Brazil	255		Malaysia	520	
Brunei	15		Mexico	2078	
Cameroon	25		Nigeria	268	
Canada	2297		Norway	229	
China	7235		Oman	73	
Colombia	281		Pakistan	359	
Denmark	190		Qatar	102	
Ecuador	165		Russia	2830	
Egypt	645		Saudi Arabia	2070	
France	1981		Sudan	82	
Germany	2692		U.A.E	413	
India	2658		United Kingdom	1812	
Indonesia	1208		United States	20687	
Iran	1655		Venezuela	645	

* in thousands of barrels per day 2006 source: http://www.eia.doe.gov/pub/international/iealf/table12.xlsl

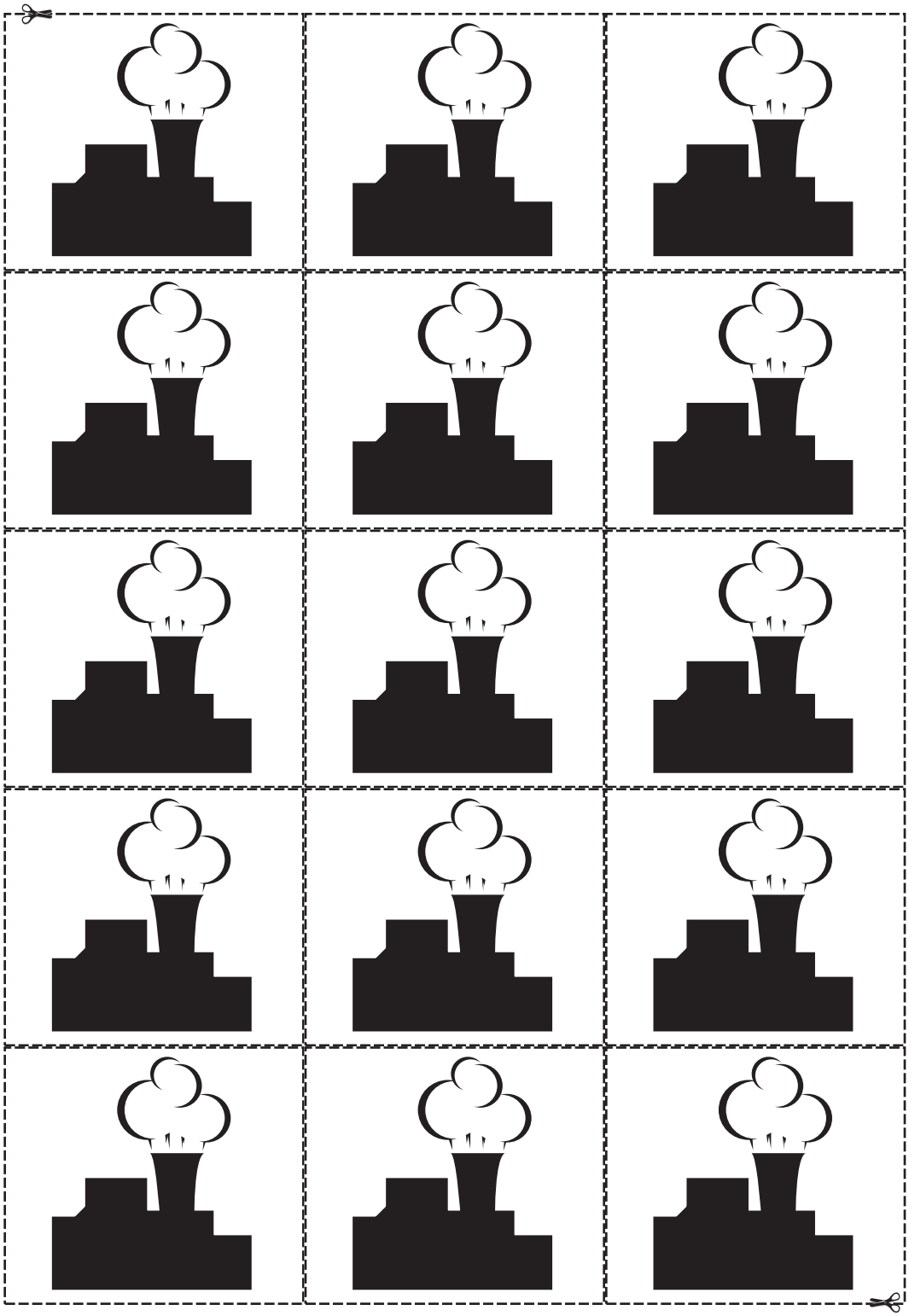
** lowest value is 100

Running on Empty Graph



Petroleum Consumption (in thousands of barrels per day 2006) source: http://www.eia.doe.gov/pub/international/iealf/table12.xls

SMOKESTACKS



Importer	Exporter
United States	Venezuela
China	Iraq
Japan	Kazakhstan
Germany	Iran
Russia	Kuwait
Germany	Oman
Canada	Qatar
United Kingdom	Nigeria
France	Libya
India	Algeria
Brazil	United Arab Emirates
Indonesia	Saudi Arabia
Italy	Egypt

ROUTE

Powerpod members:

_____ _____

_____ _____

- 1. Identify your exporting country and your importing country in the boxes. Map a route oil could travel from your exporting nation to the capital city of the importing country.

Your exporting country: Your importing country:

2. Locate your two countries on the world map. Write "EXPORT" on your exporter and "IMPORT" on your importer in bright colors.
3. Using pencil, trace a possible path that oil could travel to get from the exporter to the importer.
4. Make a list below in order of the specific places your oil will travel and also take a guess at what sort of "container" it will be in at each spot.

Location:	"Container" (transportation technique)
1. _____	1._____
2. _____	2._____
3. _____	3._____
4. _____	4._____
5. _____	5._____
6. _____	6._____
7. _____	7._____
8. _____	8._____

5. As a group, compose a paragraph that explains exactly how the oil will travel from the exporting nation to the importing nation.

_____

_____

_____

_____

_____

_____

_____

OIL QUIZ #2 STUDY GUIDE

Read and think about the following paragraph:

Petroleum is a vital natural resource. It is in so many everyday products that we in the United States really cannot live without it. We must import large quantities of this fossil fuel from the Middle East and other countries. Can you imagine how our lives would be different without this important substance?

Concepts

Natural Resources: These are materials that come from the earth and can be used, imported, or exported. List four different natural resources:

1. _____ 3. _____

2. _____ 4. _____

Production of Oil

Define *distillation* _____

_____

Why do some countries not produce as much oil as they could?

_____

List five countries known for producing petroleum:

1. _____ 4. _____

2. _____ 5. _____

3. _____ (Spelling and capitalization will count!)

Consumption of Oil: List five fuels distilled from crude oil:

1. _____ 4. _____

2. _____ 5. _____

3. _____

List three additional materials or substances created from oil:

1. _____ 3. _____

2. _____

OIL QUIZ #2 STUDY GUIDE (CONT.)

BLACK GOLD

List five countries known for high levels of oil consumption:

1. _____ 4. _____

2. _____ 5. _____

3. _____

List four factors highly connected to a country's level of oil consumption:

1. _____ 3. _____

2. _____ 4. _____

Trade and Transportation

Define *importing* _____

_____

Define *exporting* _____

_____

Define *chokepoint* _____

_____

List three possible 'chokepoints' connected to oil transportation:

1. _____ 3. _____

2. _____ Be able to find the Suez Canal on a map.

List a pro and a con for each transportation technique:

Tanker:

Pro _____ Con _____

Pipeline:

Pro _____ Con _____

Truck/Train:

Pro _____ Con _____

Which transportation technique do you think is best? Why? _____

_____

_____

OIL QUIZ #2

Name: _____

Read the paragraph then answer the questions.

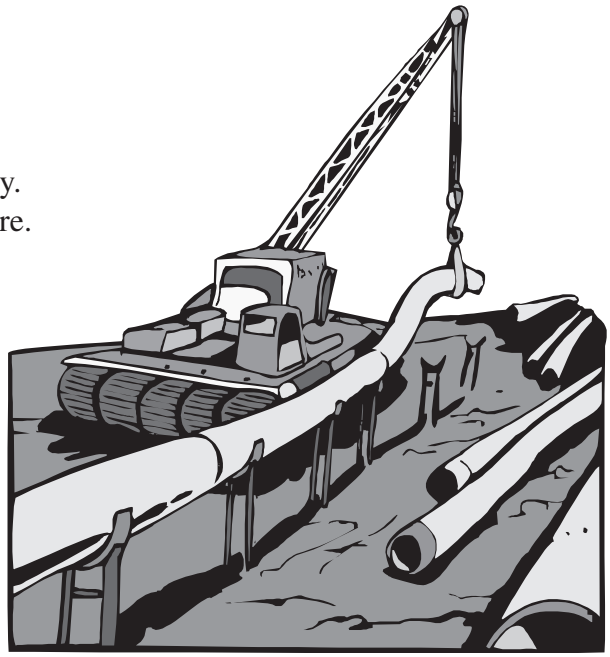
Petroleum is a vital natural resource. We use it for so many things in the United States that we really can't live without it. We need to import large quantities of this fossil fuel from the Middle East and other areas around the world. Can you imagine how our lives would be different without this important substance?

1. What is the purpose of the closing sentence(s) in a good paragraph?

   _____

   _____

2. The main idea of the paragraph you read was
   a. exporting oil.
   b. oil is important to the United States.
   c. distillation.
   d. all of the above
   e. none of the above



3. Natural resources
   a. come from the earth in some way.
   b. include oil, wood, water and more.
   c. can be imported to a country.
   d. can be exported from a country.
   e. all of the above

4. The United States must
   a. import oil.
   b. export oil.
   c. expel oil.
   d. repel oil.
   e. all of the above
   f. none of the above

5. Consumption of oil is closely tied to
   a. population.
   b. technology.
   c. amount of industry.
   d. number of automobiles.
   e. all of the above

OIL QUIZ #2 (PAGE 2)

Name: _____

6. Why do some countries produce less oil than they could?
   a. They don't want to produce more.
   b. They don't really like oil.
   c. They use wind power instead.
   d. They use uranium instead.
   e. They want to control supply and keep prices high.

7. List four materials distilled from or created from oil.

   1. _____ 3. _____

   2. _____ 4. _____

8. Why is the Suez Canal considered to be a dangerous 'chokepoint'? Include information in your answer showing you know where it's located.

   _____

   _____

   _____

9. Which oil transportation technique is the best in your opinion? Why?

   _____

   _____

   _____

OIL QUIZ #2 (PAGE 3)

Name: _____

10. List 4 countries that <u>produce</u> large amounts of oil. Spelling and capitalization will count!

    1. _____ 3. _____

    2. _____ 4. _____

11. List 4 countries that <u>consume</u> large amounts of oil. Spelling and capitalization will count!

    1. _____ 3. _____

    2. _____ 4. _____

OIL SPILL NEWSFLASH

Newsflash!

During treacherous, stormy, windswept seas, the SS _____ (insert the name of a beloved principal, teacher etc. for the name of the ship!) has run aground just off the coast of _____ (insert the name of your town:)! She has ruptured seven of twelve holds and oil is spewing forth at the rate of over 250,000 gallons per hour. She was said to be carrying over 10 millions gallons of crude!! Our survey team tells us that from their chopper, they can see the oily slick approaching the very sensitive and delicate _____ (insert the name of your town) Wildlife Sanctuary. This is the last known habitat of the black banded, red striped, buffalo eared, puny brained _____ (insert the beloved individual of your choice's name here) bird. Your emergency crew has been summoned to the area to assist with the emergency clean up. Stay Tuned for Further Information!!

OIL SPILL DATA (1993-2000)

Amount Spilled	Spill size in U.S. Gallons	Date	Spill Location
140,000,000 gallons of crude oil	140,000,00	Jun., 1979	Ixtoc Oil Field - Mexico
11,000,000 gallons of crude oil	11,000,000	Mar., 1989	Exxon Valdez - Alaska
240,000,000 gallons of crude oil	240,000,000	1991	Persian Gulf -Kuwaiti, Saudi coastline
84,500 tons of crude oil		Jan. 5, 1993	Scotland's Shetland Islands
2 million barrels of oil		Jan. 21, 1993	Andamen Sea; enroute from Oman to Japan
80 tons of heavy fuel		Mar. 9, 1993	Baltic Sea off coast of Germany / Poland
24,000 tons of petroleum		Jun. 3, 1993	North Sea; UK / Belgium
750,000 gallons of fuel oil	750,000	Jan. 7, 1994	Puerto Rico coastline
105,670 gallons of diesel fuel	105,670	Mar. 6, 1994	Thailand coastline
15,900 tons of crude oil		Mar. 31, 1994	Arabian Sea / United Arab Emirates
200 tons of fuel oil		May., 8, 1994	Long Tau River - Vietnam
700 tons of fuel oil		Jun. 14, 1994	Indian coastline
2,000 tons of crude oil		Oct. 2, 1994	Oporto, Portugal
100 tons of fuel oil		Jun. 5, 1995	Singapore
500 tons of fuel oil		Jul. 11, 1995	Southern Australia
700 tons of fuel oil		Jul. 25, 1995	South Korea
40,000 tons of crude oil		Feb. 15, 1996	United Kingdom
36,400 barrels of fuel oil		Jan. 7, 1997	Japanese coast
1500 tons of crude oil		Jul. 2, 1997	Japanese coast
25,000 tons of fuel oil		Oct. 15, 1997	Singapore
40,000 barrels of crude oil		Jan. 12, 1998	Nigeria
15, 000 tons of crude oil		Dec. 12, 1999	France's Atlantic shoreline
45, 753 tons of crude oil		Dec. 27, 1999	Bosporous Strait - Turkey
900 tons of fuel oil		Jan. 4, 2000	Bosporous Strait - Turkey

approximate conversions:
1 ton = 7 barrels 1 barrel = 42 gallons

Sources:
www.nwn.noaa.gov
"Office of Response and Restoration, National Ocean Service, National Oceanic and Atmospheric Administration"
webmaster@hazmat.noaa.gov

OIL SPILL DATA KEY

Amount Spilled	Spill size in U.S. Gallons	Date	Spill Location
140,000,000 gallons of crude oil	140,000,00	Jun., 1979	Ixtoc Oil Field - Mexico
11,000,000 gallons of crude oil	11,000,000	Mar., 1989	Exxon Valdez - Alaska
240,000,000 gallons of crude oil	240,000,000	1991	Persian Gulf -Kuwaiti, Saudi coastline
84,500 tons of crude oil	24,843,000	Jan. 5, 1993	Scotland's Shetland Islands
2 million barrels of oil	84,000,000	Jan. 21, 1993	Andamen Sea; enroute from Oman to Japan
80 tons of heavy fuel	23,520	Mar. 9, 1993	Baltic Sea off coast of Germany / Poland
24,000 tons of petroleum	7,056,000	Jun. 3, 1993	North Sea; UK / Belgium
750,000 gallons of fuel oil	750,000	Jan. 7, 1994	Puerto Rico coastline
105,670 gallons of diesel fuel	105,670	Mar. 6, 1994	Thailand coastline
15,900 tons of crude oil	4,674,600	Mar. 31, 1994	Arabian Sea / United Arab Emirates
200 tons of fuel oil	58,800	May., 8, 1994	Long Tau River - Vietnam
700 tons of fuel oil	205,800	Jun. 14, 1994	Indian coastline
2,000 tons of crude oil	588,000	Oct. 2, 1994	Oporto, Portugal
100 tons of fuel oil	29,400	Jun. 5, 1995	Singapore
500 tons of fuel oil	147,000	Jul. 11, 1995	Southern Australia
700 tons of fuel oil	205,800	Jul. 25, 1995	South Korea
40,000 tons of crude oil	11,760,000	Feb. 15, 1996	United Kingdom
36,400 barrels of fuel oil	1,528,800	Jan. 7, 1997	Japanese coast
1500 tons of crude oil	441,000	Jul. 2, 1997	Japanese coast
25,000 tons of fuel oil	7,350,000	Oct. 15, 1997	Singapore
40,000 barrels of crude oil	1,680,000	Jan. 12, 1998	Nigeria
15, 000 tons of crude oil	4,410,000	Dec. 12, 1999	France's Atlantic shoreline
45, 753 tons of crude oil	13,451,382	Dec. 27, 1999	Bosporous Strait - Turkey
900 tons of fuel oil	264,600	Jan. 4, 2000	Bosporous Strait - Turkey

approximate conversions:
1 ton = 7 barrels 1 barrel = 42 gallons

Sources:
www.nwn.noaa.gov
"Office of Response and Restoration, National Ocean Service, National Oceanic and Atmospheric Administration"
webmaster@hazmat.noaa.gov

COUNTRY CARDS

Cut out and glue on 3" x 5" cards.

Canada Oil production: 6 Money available: $494 Oil requirement: 50	**United Arab Emirates** Oil production: 170 Money available: $330 Oil requirement: 20	**Russia** Oil production: 187 Money available: $313 Oil requirement: 150
Mexico Oil production: 51 Money available: $449 Oil requirement: 42	**Venezuela** Oil production: 80 Money available: $420 Oil requirement: 50	**Bahrain** Oil production: 10 Money available: $490 Oil requirement: 2
United States Oil production: 24 Money available: $476 Oil requirement: 125	**Denmark** Oil production: 5 Money available: $495 Oil requirement: 25	**Iran** Oil production: 90 Money available: $410 Oil requirement: 20
Argentina Oil production: 2 Money available: $498 Oil requirement: 20	**Germany** Oil production: 4 Money available: $496 Oil requirement: 70	**Kuwait** Oil production: 95 Money available: $405 Oil requirement: 10
Bolivia Oil production:1 Money available: $499 Oil requirement: 15	**Italy** Oil production: 5 Money available: $495 Oil requirement: 30	**Oman** Oil production: 10 Money available: $490 Oil requirement: 1
Brazil Oil production: 20 Money available: $420 Oil requirement: 50	**Netherlands** Oil production: 3 Money available: $497 Oil requirement: 20	**Qatar** Oil production: 10 Money available: $496 Oil requirement: 1
Colombia Oil production: 4 Money available: $496 Oil requirement: 20	**Norway** Oil production: 32 Money available: $468 Oil requirement: 16	**Saudi Arabia** Oil production: 261 Money available: $239 Oil requirement: 15
Ecuador Oil production: 2 Money available: $498 Oil requirement: 20	**United Kingdom** Oil production: 5 Money available: $495 Oil requirement: 35	**Algeria** Oil production: 25 Money available: $475 Oil requirement: 2

COUNTRY CARDS

Cut out and glue on 3" x 5" cards.

Cameroon Oil production: 1 Money available: $499 Oil requirement: 2	**India** Oil production: 20 Money available: $480 Oil requirement: 30	**Azerbaijan** Oil production: 50 Money available: $450 Oil requirement: 14
Egypt Oil production: 6 Money available: $496 Oil requirement: 1	**Japan** Oil production: 1 Money available: $499 Oil requirement: 52	**Angola** Oil production: 30 Money available: $470 Oil requirement: 14
Libya Oil production: 60 Money available: $440 Oil requirement: 20	**Indonesia** Oil production: 30 Money available: $470 Oil requirement: 20	**Kazakhstan** Oil production: 70 Money available: $430 Oil requirement: 33
Nigeria Oil production: 40 Money available: $460 Oil requirement: 15	**Malaysia** Oil production: 14 Money available: $486 Oil requirement: 10	**France** Oil production: 3 Money available: $497 Oil requirement: 23
Tunisia Oil production: 1 Money available: $499 Oil requirement: 2	**New Zealand** Oil production: 1 Money available: $499 Oil requirement: 5	**Belarus** Oil production: 3 Money available: $497 Oil requirement: 20
Brunei Oil production: 1 Money available: $499 Oil requirement: 2	**Pakistan** Oil production: 1 Money available: $499 Oil requirement: 3	**Iraq** Oil production: 100 Money available: $400 Oil requirement: 15 **Special Circumstances:** ***AT WAR***—Oil production may be limited by sanctions or war activities
China Oil production: 45 Money available: $470 Oil requirement: 75	**Thailand** Oil production: 1 Money available: $499 Oil requirement: 5	

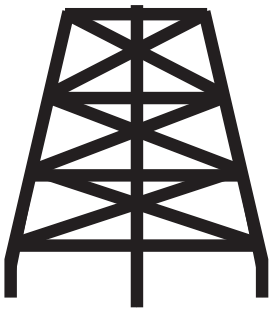
COUNTRY CARDS BACKS

Cut out and glue on 3" x 5" cards.

Buy and Sell

Country Card

Buy and Sell

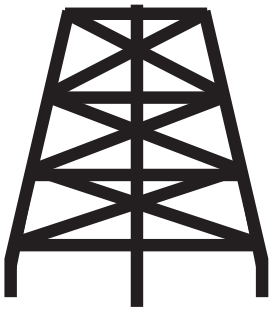


Country Card

Buy and Sell

Country Card

Buy and Sell

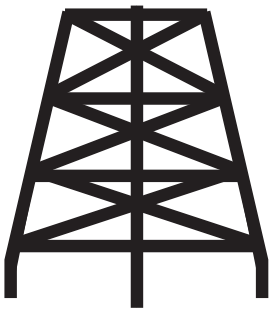


Country Card

Buy and Sell

Country Card

Buy and Sell



Country Card

BUY AND SELL LEDGER

BLACK GOLD

BUY AND SELL: Operating on the World Market

Country:		Oil Needed		Name(s):
Oil Production:		Importer	Exporter	
Oil Running Total:				
Oil Requirement:				
Money Available:				
Running Cash Total:				

Purchased from:	Barrels	$ / barrel	Total:	Sold to:	Barrels:	$ / barrel	Total:
Totals:							

OIL BARONS

Names: _____

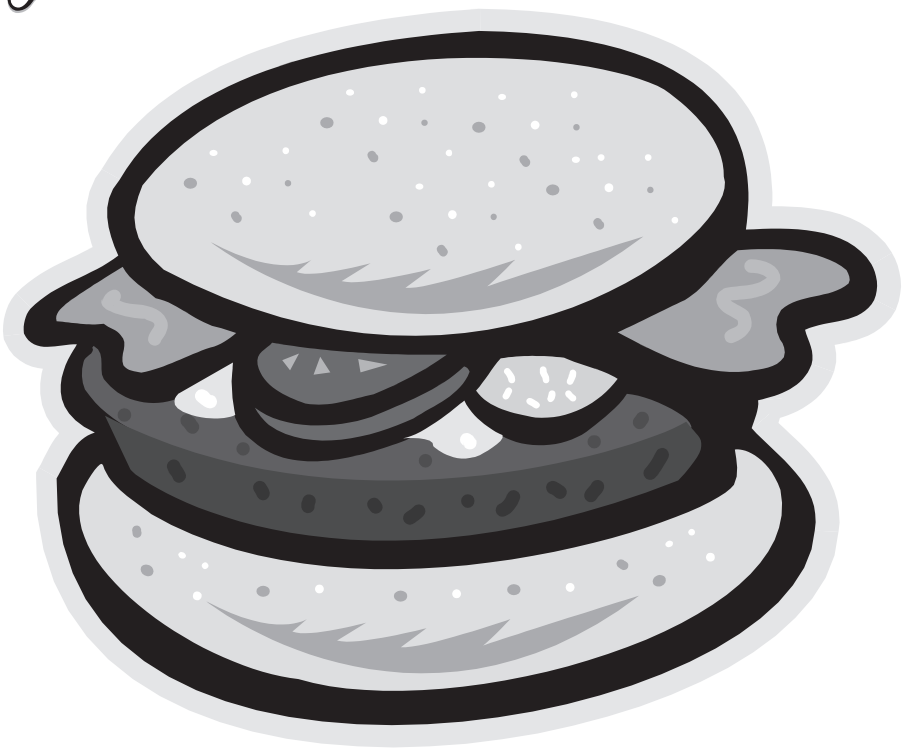
Country	Student	Computer/email address	Country	Student	Computer/email address
Algeria			Japan		
Angola			Kazakhstan		
Argentina			Kuwait		
Azerbaijan			Libya		
Belarus			Malaysia		
Bolivia			Mexico		
Brazil			Netherlands		
Brunei			New Zealand		
Cameroon			Nigeria		
Canada			Norway		
China			Oman		
Colombia			Pakistan		
Denmark			Qatar		
Ecuador			Russia		
Egypt			Saudi Arabia		
France			Thailand		
Germany			Tunisia		
India			United Arab Emirates		
Indonesia			United Kingdom		
Iran			United States		
Iraq			Venezuela		
Italy			Yemen		

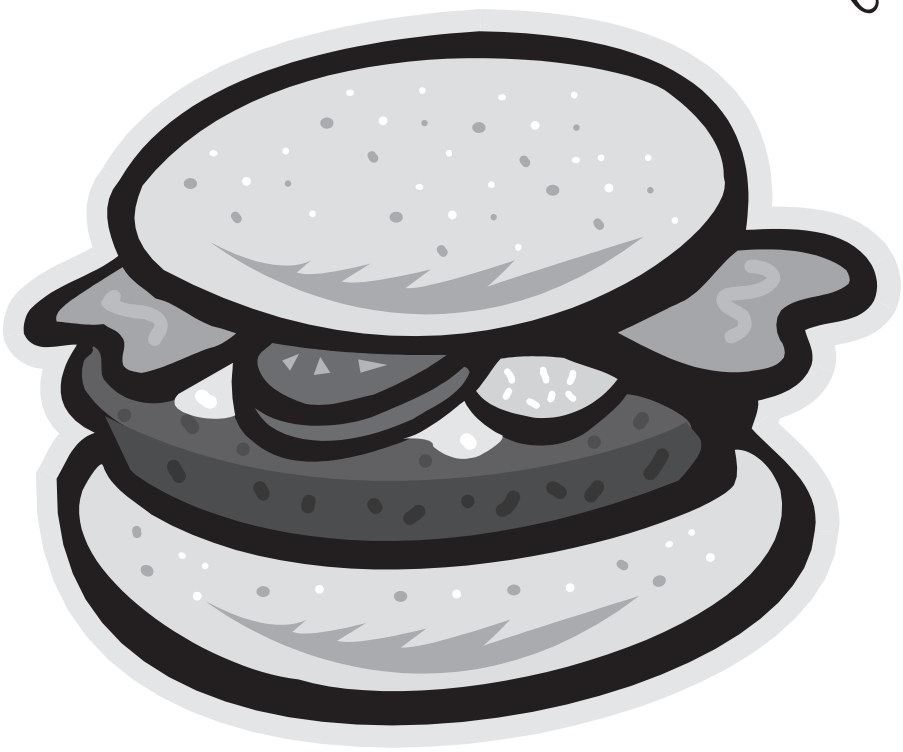
OIL BARONS

Names: _____

Country	Student	Country	Student
Algeria		Japan	
Angola		Kazakhstan	
Argentina		Kuwait	
Azerbaijan		Libya	
Belarus		Malaysia	
Bolivia		Mexico	
Brazil		Netherlands	
Brunei		New Zealand	
Cameroon		Nigeria	
Canada		Norway	
China		Oman	
Colombia		Pakistan	
Denmark		Qatar	
Ecuador		Russia	
Egypt		Saudi Arabia	
France		Thailand	
Germany		Tunisia	
India		United Arab Emirates	
Indonesia		United Kingdom	
Iran		United States	
Iraq		Venezuela	
Italy		Yemen	

BURGER MAP CENTER





CHEESEBURGER!

Eat your cheeseburger and record approximately how long in seconds it takes each person in your Powerpod to finish. The maximum is four minutes (240 seconds). Use this value for any people who don't finish or don't want their burger.

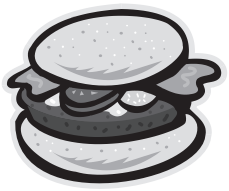
1. _____ name _____ seconds

2. _____ name _____ seconds

3. _____ name _____ seconds

4. _____ name _____ seconds

Average for our Powerpod: _____ seconds



Draw a group web that contains the following items:

- Burger in center
- Parts of the cheeseburger listed in web – **color #1**
- Raw materials listed under each part of the cheeseburger – **color #2**
- Processes involved in production, transportation, storage and disposal of each part of the burger – **color #3**

Group grade you believe your Powerpod should earn: _____

Teacher Feedback Form

At Interact, we constantly strive to make our units the best they can be. We always appreciate feedback from you—our customer—to facilitate this process. With your input, we can continue to provide high-quality, interactive, and meaningful instructional materials to enhance your curriculum and engage your students. Please take a few moments to complete this feedback form and drop it in the mail. Address it to:

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We enjoy receiving photos or videotapes of our units in action!
Please use the release form on the following page.

Your Name: _____

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E-mail: _____

Interact Unit: _____

Comments: _____

_____

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Release Form for Photographic Images

To Teachers:

To help illustrate to others the experiential activities involved and to promote the use of simulations, we like to get photographs and videos of classes participating in the simulation. Please send photos of students actively engaged so we can publish them in our promotional material. Be aware that we can only use images of students for whom a release form has been submitted.

To Parents:

I give permission for photographs or videos of my child to appear in catalogs of educational materials published by Interact.

Name of Student: _____ (print)

Age of Student: _____ (print)

Parent or Guardian: _____ (print)

Signature: _____ Date: _____

Address:

_____

_____

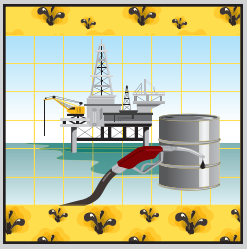
_____

_____

Phone: _____

Interact
10200 Jefferson Blvd.
Culver City, CA 90232-0802
310-839-2436

Student Name: _____



BLACK GOLD

STUDENT GUIDE

Oil… Petroleum… Texas Tea… Black Gold…

Take yourself back in time…to a time before cars and engines…before written history… before people talked or even walked the land…Go deep…deeper…back millions of years to a time before even the greatest dinosaurs roamed the land. The only creatures in the warm swamps around you are microscopic plants and animals. Countless lifecycles of these microscopic plants and animals live and die. Their bodies sink into the muck at the bottom of the swamps. Generation after generation, plants and animals die. Their remains settle at the bottom of the swamps. Subjected to tremendous amounts of heat and pressure over an almost unimaginable span of time, these remains gradually changed into petroleum, a vital *natural resource*. *Petroleum* comes from two Latin words. *Petra* means rock. *Oleum* means oil. Petroleum as it comes out of the ground is called crude oil.

Humans have known about and used petroleum for centuries. Ancient Egyptians used *pitch*, a thick form of crude oil, to coat and preserve their mummies and their fantastic pyramids. Ancient Babylonians, Assyrians, and Persians used pitch to coat streets, heat homes, and hold walls together. Native Americans used crude oil for paint, fuel, and medicines. Crude oil was very scarce. It was only used where it happened to bubble to the surface or when people discovered it while drilling for water or salt. Water well diggers considered crude oil a nuisance.

For centuries, people used animal fats or whale oil for lamps and lubrication. They used wood, peat, or coal for heating. That began to change in 1859. Edwin L. Drake drilled the first successful oil well at Titusville, Pennsylvania. It produced just 35 barrels of crude oil per day that sold for $20 per barrel, a large sum at the time. The search for "Black Gold" was on. The oil industry was born.

Despite its many uses, crude oil alone was not what people came to desire. The chemicals that make up crude oil resembled a feast for inventors. By the 1860s, oil producers began the practice of *distillation*. Distillation is the heating and separating of crude oil into its components such as gasoline, kerosene, and heating oil.

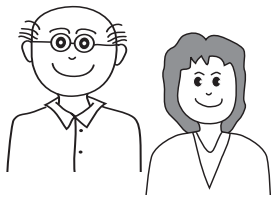
Distillation led to the rapid growth in the demand for such products. This demand led to commercial petroleum production all around the world. There was more petroleum and more distilled products available. Whale oil was more difficult to find. Thus humans entered the petroleum age. Petroleum was more than the source for many fuels. It was also the source for other products like dyes, paints, solvents, drugs, and plastics. These many uses have deepened our dependence on this finite and rapidly dwindling natural resource.

POWERPOD ORIENTATION

During **BLACK GOLD** you will learn about the history, extraction, consumption, and transportation of petroleum. Working with other students in **Powerpods** you will read background essays, conduct research, make oral presentations, and graph the results of your research and the research of other students. Your Powerpod will earn points based on the quality of your work.

As an individual you will develop a detailed world map that charts countries with large oil reserves, countries that consume a lot of oil, and routes that shippers use to move petroleum from where it is found to where it is used. You will earn points based on the quality of your work.

As you work, your Powerpod will progress through several levels of accomplishment.



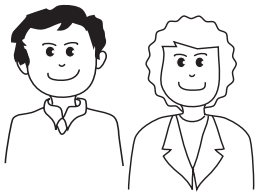
PetroPretenders

After studying the origin and uses of petroleum and organizing your new knowledge your Powerpod becomes PetroPretenders.

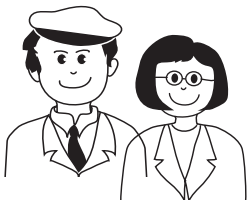
PetroPretenders know that petroleum is valuable.

After learning the location of world petroleum producers (exporters) and consumers (importers) your Powerpod becomes PetroPlebes.

PetroPlebes understand that countries around the world either produce or consume petroleum.



PetroPlebes



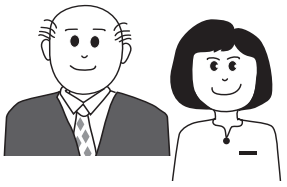
PetroPorters

After studying methods and routes for transporting petroleum from the producer to the consumer nations your Powerpod becomes PetroPorters.

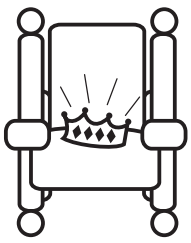
PetroPorters track the transportation of petroleum on the worldwide market.

PetroPooBahs masterfully control the production and shipping of petroleum through their understanding of world petroleum consumption.

PetroPooBahs dominate the production and shipping of petroleum.

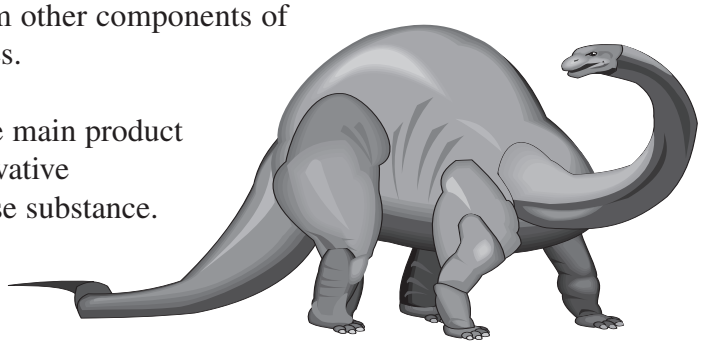


PetroPooBahs

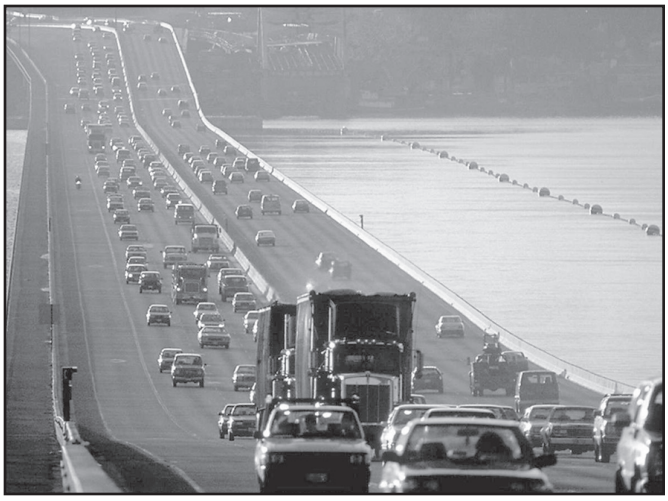


After completing your studies, you will work with one other student to buy and sell petroleum in a classroom oil market. One successful (and wealthy) student pair will be crowned the **PetroPlutocrats**. Keep an eye on your reserves and gas up your super tankers. Good luck.

Crude oil pumped from the ground is in many forms. Some is a thick, black, tarry substance. Some is a light brown, more fluid liquid. All crude oil is a complex mixture of many component parts. We must *refine* crude oil by *distillation* to make it usable. Distillation is the heating and separating of crude oil into its component parts. In an *oil refinery*, scientists take advantage of the fact that each part of crude oil boils at a different temperature. Crude oil placed in large containers is slowly heated. As the temperature increases, different parts of the crude oil boil off as vapors. These vapors are then captured and condensed back into liquids. Distillation produces *refined oil*. Refined oil may be in the form of *gasoline*, *kerosene*, *tar*, *heating oil*, *jet fuel*, *lubricating oil*, and even *paraffin* (a form of wax). Scientists have even found ways to distill gasoline from other components of refined oil. This supplies more gasoline for our vehicles.



When Edwin Drake first pumped oil from his wells, the main product was kerosene. He could never have imagined how innovative inventors could find new uses for this chemically diverse substance. Petroleum is so remarkable it is almost a shame to burn it as a fuel! Petroleum is the base ingredient of a surprising number and variety of other products. Foremost among these are plastics. Plastic resin is derived from petroleum. Think of how many things we use in our modern, disposable culture that involve plastics. Also, petroleum by-products are in paints and stains, cosmetics, nylon, medicines, and fabrics. We have become very dependent on this remarkable substance — not only as a fuel, but also throughout our daily lives.



How did all of that energy get into oil? What makes it so special? Remember eons ago, when all those tiny plants were absorbing light energy from the sun? The plants converted solar energy from the sun to chemical energy (through photosynthesis). Remember how microscopic animals were eating those tiny plants? The animals used the chemical energy of the plants. When the animals died they sank to the bottom of those prehistoric swamps. Some of this chemical energy remained in their bodies. It was stored for millions of years while these ancient creatures became fossil fuels. As we burn the fossil fuels, we release this stored light energy (potential energy) in the form of heat and light energy (kinetic energy). We use this released energy in many ways. We fuel power plants that provide electricity for lighting and heating our homes, businesses, and communities. We use this released energy in many ways. Using coal, oil, and natural gas, we fuel power plants that provide electricity for lighting and heating our homes, business, and communities. Using gasoline, we drive millions of automobiles. Using aviation and diesel fuels, we power airplanes and trucks. Our desire for mechanical, kinetic energy causes us to burn petroleum products at tremendous rates. We have used immense quantities of fossil fuels over the past 50 years.

As we burn fossil fuels, we release heat and light energy. We also release a troublesome teammate: carbon dioxide. Plants absorb carbon dioxide from the atmosphere. They build it into their bodies as they grow. This is the process of photosynthesis. Plants today can absorb some of this extra carbon dioxide, but they cannot absorb it all. Many scientists now believe the extra carbon dioxide gas in our atmosphere is causing the atmosphere to become warmer. This is called the "greenhouse effect." It may lead to global warming, a gradual increase of atmospheric temperatures. We need to be aware that this phenomenon might drastically affect all of our lives in the 21st century.

SAMPLE BIBLIOGRAPHIC FORM

(Always list author's last name first)

Book: (with one author)
Author. Title. Place: Publisher, Year of publication: pages.
Example: Boas, Jacob. We Are Witnesses. New York: Henry Holt and Co., 1995: 13-38.

Book: (with two or more authors)
Example: Barbree, Jay and Martin Caidin. A Journey through Time. New York: Penguin Books USA Inc., 1995.

Encyclopedia:
Author of article. "Title of Article." Title of Encyclopedia. Year of publication.
Example: Klocke, Robert A. "Trachea." The World Book Encyclopedia. 1996 ed.

Encyclopedia CD-ROM:
Author if given. "Title of Article." Name of CD. CD-ROM. Date.
Example: "Acid Rain." Encarta Multimedia Encyclopedia. CD-ROM. 1995.

Magazine:
Author of article if given. "Title of Article." Name of Magazine. Month Day, Year: pages.
Example: Lewis, Michael. "The Ultimate Gold Rush. Soccer. October, 1996: 36-39.

CD:
Author if given. "Title of Article." Name of CD. CD-ROM. Publisher, Date.
Example: Francis, Arthur. "Oxygen." The World of Nature. CD-ROM. Queue, Inc., 1996.

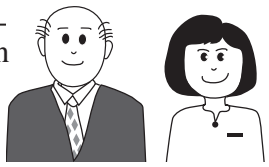
World Wide Web:
Author if given. "Title of Home Page. " [Online] http://www.waunakee.k12.wi.us, Date of document or viewing date.

Example: Relick, Michael. "Color blindness." [Online] http://www.ctw.org, January 9, 1997.

Resource Compiled by: Judy Morgan – Media Director Waunakee Intermediate School.

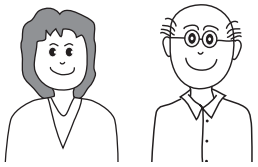
Oral Presentation Rubric

Tycoon



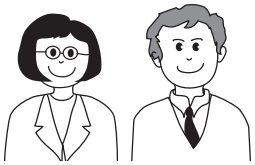
- Additional visual presentation
- Overhead prepared
- No spelling mistakes
- Neatly presented
- Logical explanations given for choices
- Includes more than two source materials during discussion of choices
- Powerpod members evenly share the discussion responsibility

Master Producer



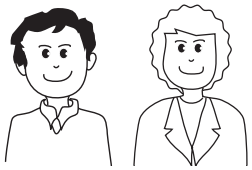
- Overhead prepared
- No spelling mistakes
- Neatly written
- Logical explanations given for choices
- Includes at least two source materials during discussion of choices
- Group members evenly share the discussion responsibility

Producer



- Overhead prepared
- One or two spelling mistakes
- Fairly neatly written
- Some explanations given for choices
- Includes at least one source material during discussion of choices
- Group members share the discussion responsibility

Minor Producer



- Overhead prepared
- Several spelling mistakes
- Not neatly written
- Inadequate explanations given for choices
- Includes no source material during discussion of choices
- Group members do not share the discussion responsibility

Minute Talk Expectations

Mighty Minute
Accurately restate all main ideas of the day … Everyone in the class can hear

Minute Maker
Accurately restate most main ideas of the day … Most people in the class can hear

Minute Mini
Accurately restate some main ideas of the day … Some people in the class cannot hear

Minute Minus
Accurately restate few main ideas of the day … Most people in the class cannot hear

HOW DO WE GET THERE?

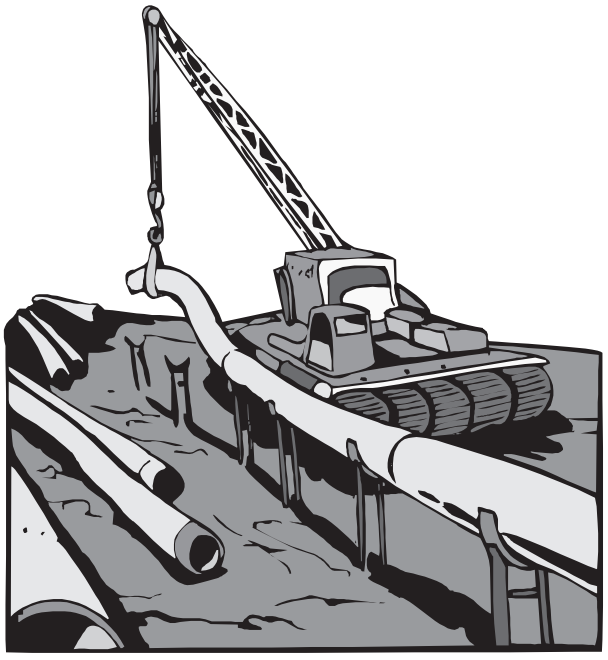
Those who transport petroleum from where it is produced to where it is needed face huge challenges. They must decide how to transport the oil, which routes to use, and how to balance the costs of the transportation method with efforts to protect the environment.

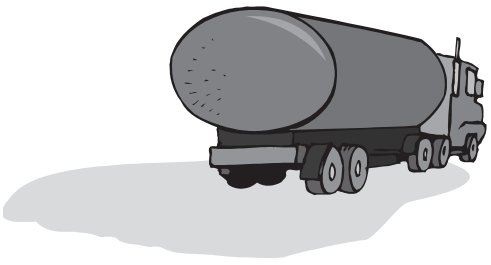
Oil Tankers

Oil tankers are the preferred method of transportation for petroleum products. Tankers are the world's largest ocean-going vessels. The largest tankers are over 500 yards long and nearly 100 yards wide! A football field is 100 yards long and approximately 33 yards wide. Workers may use bicycles to travel around the decks of these monster ships. They are the most economical method for moving vast quantities of oil. Exporters and importers transport both crude and refined oil products using oil tankers. Oil spills are a major problem associated with oil tankers. Many older tankers are built with only a single hull. In the event of a collision, the hulls puncture. The petroleum spills out into the water. These spills result in catastrophic damage to beaches, wildlife, and sea life. New double-hulled ships may help avoid terrible spills, but there are still many old, single hulled ships sailing the oceans.

Pipelines

Pipelines are the fastest, most efficient way to transport large quantities of crude or refined oil from one point to the next over land. Many nations have short pipeline systems connecting their oil production areas with a waterway where the oil is pumped into tankers for ocean transport. Many oil tankers are too large to travel through the Suez and Panama Canals. Egypt and Panama have both built pipelines to accommodate oil transport through these vital choke-points. A tanker may dock at one end of the Su-Med or Panama Canal and pipe its contents through the pipeline for loading into a second tanker on the other side. Pipelines are efficient, although expensive, ways to transport oil over land. The high cost of creating a pipeline along with the need to protect such a system from terrorists or others who may wish to disrupt a country's ability to supply energy are problems with this transportation technique.





Trucks and Trains

Once oil has been refined into components such as gasoline or heating oil, the next step is to transport it to consumers. Fleets of trucks and train tanker cars carry gas and oil around the country. These techniques are safe and work well. The major disadvantage is that the containers are relatively small; therefore the delivery system is both labor-intensive and expensive. Trucks are the method of delivery for most of the petroleum products you consume.

Oil spills have plagued transporters and innocent victims alike since petroleum became a resource of choice. As a result of foul weather, poor tanker design or maintenance, navigation errors, and other unexpected problems, on average 100 million gallons per year of crude oil and its by-products spill into the world's waterways.

Burning oil tanker dumps millions of gallons of crude oil into the ocean, while spewing toxic smoke.

Tremendous quantities of this useful but toxic substance are constantly shipped between exporting and importing nations around the globe.

- The world uses nearly three billion gallons of oil daily.
- The United States uses about 700 million gallons of oil daily.
- The largest spill in U.S. history was the Exxon Valdez spill into Prince William Sound, Alaska, in March, 1989.
  —This spill totaled 11 million gallons of crude oil.
  —This total is less than 2% of the oil the United States uses in one day.
  —11 million gallons would fill nine school gymnasiums.

Rehab efforts to assist the oil-drenched animals.

Shores and beaches are contaminated and destroyed by oil spills washing ashore.

What happens when oil spills?
Oil and most oil products are less dense than water. After a spill, oil quickly spreads out. It floats on the surface of the water and forms an "oil slick." This oil slick causes tremendous damage to nearby plants and animals. You may have seen pictures of coated sea mammals and birds struggling to clean themselves from a fatal coating of oil. Oil destroys the ability of birds' feathers and mammals' fur to repel water and insulate. Without their natural protection, the animals may drown or die from cold in a harsh environment. While attempting to clean themselves, many animals swallow oil, which can poison them. Large spills result in thousands, even hundreds of thousands, of dead and dying animals. Such oil spills also leave an environment and food chain that remains poisoned for an undetermined amount of time.

Fatal coating of oil kills many birds.

Oil-soaked seal pup struggles for survival.

Oil destroys the ability of birds' feathers and mammals' fur to repel water and insulate.

Oil-poisoned fish float to the surface.

What can be done with an oil spill?
The lighter density of oil is an asset when trying to clean it up. If the water is calm and the spill is identified soon enough, booms (floating traps) may "corral" the oil into a rather small area where it can be pumped off of the water's surface. Unfortunately, oil spills do not usually occur under such ideal conditions.

Other clean-up techniques include:

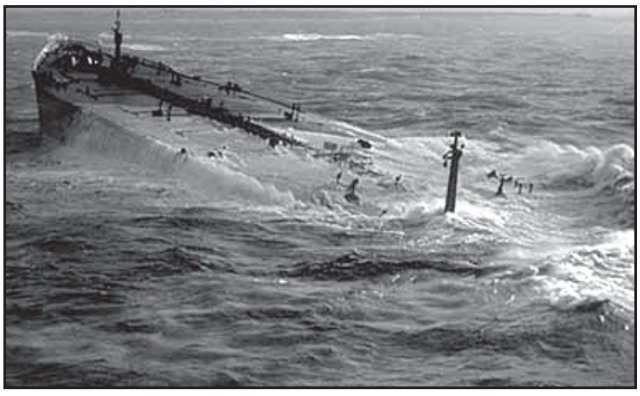
- Burning the oil spill right off the surface of the water
- Speeding the evaporation of oil by dispersing (spreading) the slick into a thinner layer
- Spraying oil-eating bacteria on oil slicks on the water and on oil washed up on beaches
- Collecting oil with sorbents, which are like giant sponges
- Washing contaminated beaches using high-pressure hot water hoses

Officials consider many factors as they decide how to clean up an oil spill. They consider:

- the type of oil spilled (heavy or light, crude or refined)
- where the spill occurred (close to shore or far at sea)
- how fragile or delicate the surrounding area (is it a wildlife area or a populated area)
- weather conditions (are winds light or strong, is a storm coming)
- which cleanup techniques can be deployed (brought in) quickly (is any equipment readily available?).

Beaches are closed to the public as oil slicks wash up and pollute the shores.

Containment booms (floating traps) help to limit the area of the spill.



Sinking oil tankers continue to pollute our oceans for years to come.