

# **ENERGY AND ECONOMICS:**

A CURRICULUM UNIT FOR

SENIOR HIGH SCHOOLS

by

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and

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Center for Economic Education

University of Nebraska-Lincoln

with

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Cooperation and Funding  
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# MEMORANDUM FOR THE RECORD

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STANDARDIZATION

1. The first step in the standardization process is to identify the variables that are to be standardized. This is done by reviewing the literature and identifying the key variables that are being measured. Once the variables have been identified, the next step is to select the standardization method. There are several methods available, including the use of a standard score, a z-score, and a T-score. The choice of method depends on the nature of the data and the requirements of the study. Once the method has been selected, the next step is to calculate the standardized scores for each variable. This is done by subtracting the mean from each score and dividing the result by the standard deviation. The final step in the standardization process is to interpret the standardized scores. This is done by comparing the standardized scores to the distribution of standardized scores for the population. This allows the researcher to determine the relative position of each individual in the population.

# TO THE INSTRUCTOR . . .

"Energy and Economics" is a unit which introduces senior high students to the topic of energy from an economic perspective.

This unit consists of 12 individual lesson plans which incorporate such economic concepts as supply, demand, equilibrium, scarcity and cartels in the energy marketplace. It contains worksheets and simulation games with teacher background material to help teach the interrelationships between energy and economics.

Since the material sources continue to change periodically, the source, **Energy Info — A Directory of Audio-Visual Materials From the Nebraska Energy Office**, contains a list of topics available from the Office to supplement this Unit. Audio-Visuals are available on a loan basis from the Nebraska Energy Office. You are encouraged to use the ordering page attached to this unit.

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# REPORT OF

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in the County of [County Name], State of California,  
and is described as follows: [Description of Land]

Witness my hand and the seal of the Department of the Interior  
at Washington, D. C., this [Date] day of [Month], 19[Year].

# ACKNOWLEDGEMENTS

The original "Basic Teaching Units on Energy" consisted of a package of 30 instructional packets contained within three volumes. The original fourteen units were written at the University of Nebraska-Lincoln, under the auspices of the Nebraska Energy Office, by Nebraska teachers participating in a three-week Faculty Development Institute sponsored by the U.S. Department of Energy (summer, 1978). The units were edited by the following individuals:

- Dr. Donald McCurdy, Professor of Science Education, University of Nebraska-Lincoln;
- Mr. Gary A. Lay, Education Coordinator, Nebraska Energy Office; and
- Dr. Robert Reeder, Science Department Chairman, East High School, Lincoln, Nebraska.

An additional eight units were written by independent authors in the summer of 1979 and the final eight units were developed as a result of a second federal grant (summer, 1980).

The present format has been achieved as a result of an evaluation conducted by the Nebraska Energy Office, February, 1981. Rather than continue to offer all 30 units as a single package, the Nebraska Energy Office determined to revise, edit, and typeset the 10-12 highest quality units and continue to offer the other units in their present format. Provisions have been made to add additional units as the need arises.

The editors of these revised "Basic Teaching Units" wish to thank the individual writers, original editors, and clerical staff for their contributions in creating the "Basic Teaching Units."

The Nebraska Energy Office extends a special thanks to Joyce Gleason and William Walstad for their efforts in writing "Energy and Economics: A Curriculum Unit for Senior High Schools," and to Gene Acosta and Pam Savery for contributing artwork.

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# ENERGY AND ECONOMICS

## Overview and Rationale

The events of the past decade raised new interest in energy education and created greater recognition of the important role energy plays in our economy. Over the period the price of a barrel of oil increased over six-fold, and at times shortages of oil, gasoline, and natural gas threatened the livelihood of both consumers and producers. The crisis situation also prompted new exploration for basic energy resources and stimulated new investment in research and development of alternative energy sources. Increasing environmental concerns added to the difficulties by slowing the growth of nuclear power and by leading to stricter pollution standards for autos and the usage of coal. In an earlier decade the United States government declared war on poverty; the target of the past decade was energy.

Although energy markets have stabilized in recent years and the economy appears to have adjusted to previous energy shocks, the need for energy education remains strong. From a business viewpoint, energy is a basic resource input in the production of most goods and services—from fertilizers to plastics to transportation. The price of energy has and will continue to have a profound impact on basic economic questions as: What goods and services will be produced? How will the products be produced? And, who will get (or be able to afford) the output produced? From the consumer viewpoint, the price and availability of energy will strongly influence housing, lifestyles, and career decisions. We, as citizens, are often asked to discuss and vote on energy-related matters, ranging from a gasoline tax for roads to energy tax credits for low-income consumers.

Consequently, this curriculum unit on energy and economics is designed to provide high school students with an introduction to the topic of energy from an economic perspective. Energy issues and economics are interrelated. Failure to explore the economic dimension to energy problems means that student understanding will remain incomplete and the depth of the analysis will be limited. The application of basic economic concepts to energy issues can provide students with the tools to improve their analysis of the problems and will help them understand the consequences of alternative solutions to energy problems for consumers, business, or the public.

This curriculum unit offers high school teachers of social studies, science, economics, or consumer education a package of 12 lessons on basic economic concepts and their application to energy issues. The unit is flexible and can be used in whole or in part to fit specific classroom needs. The lesson material should be self-explanatory for both teachers and students and it does not require that teachers or students have a background in economics. A basic description of each lesson is provided in the following paragraphs and it should be read before using the lesson.

### Lesson 1: Energy — A Scarce Resource

The unit begins in Lesson 1 by developing the understanding that energy is a scarce resource (good). Scarcity in economics means that productive resources, such as energy, are limited relative to our wants (uses) for them. Since energy is a scarce good it has economic value, and its value is reflected in our market system by its price. A rising price of energy, as occurred with whale oil from the mid 1700's to the mid 1800's, indicated that this economic good was becoming relatively more scarce; conversely, a falling price for an energy resource, as occurred with whale oil after the mid 1800's, meant that whale oil became relatively less scarce from the economist's perspective.

Persistent shortages (often referred to as crises) are generally not only an indication that economic goods, such as whale oil, wood, or petroleum, have become relatively more scarce, but also that government intervention in the market system, through price controls or other restrictions, prevents prices from rising to a high enough level to

balance quantities supplied with quantities demanded. When price no longer determines who gets to use the scarce resource, then some other mechanism comes into play. During the 1970's, government price controls were imposed on gasoline. Then came the gasoline shortage of 1974 and again in 1979, and a government allocation plan was used along with the old custom of first-come first-served to determine who would get gasoline. Long lines formed at the gas pumps until supplies were exhausted at the controlled price. What needs to be remembered by teachers, however, is that even where there are no energy shortages, and supply needs are balanced with demand needs, energy is still scarce because it has economic value.

## **Lesson 2: Opportunity Cost and Energy**

Since scarcity is a universal condition for all productive resources, people are forced to choose how best to use their limited resources. Any time we choose or make an economic decision, there is an opportunity cost because a decision-maker gives up the opportunity to use those scarce resources in some other way. For example, the opportunity cost of imposing a maximum 55-mile-per-hour speed limit on drivers across the country was the increased time drivers had to spend on the road going from one location to another. Of course there were benefits from this action in the form of saved lives and reduced gasoline consumption, but the fact remains that with any economic decision there is an opportunity cost. Lesson 2 presents this basic concept and allows students to identify the opportunity costs in a transportation problem.

## **Lesson 3: Sources and Types of Energy**

Whenever there is a decision to be made, a person or society needs to know what alternatives are available from which to choose. Energy is a broad topic and students need to identify the major energy resources and to learn about the feasibility of their expanded use. Lesson 3 presents students with basic information on energy sources. Students are then asked to do library research on a selected energy source and write a short report evaluating relative cost and potential benefits of developing this fuel source.

## **Lesson 4: Graphing Energy Data**

Since economics and energy issues deal with numerical relationships, it is helpful to illustrate those relationships in graph form. In Lesson 4 students become familiar with three types of graphs — the pie chart, the bar chart, and the line graph — using energy data. In the first part of the activity students learn how to read graphs, while the second part is an exercise in making graphs using the energy data provided.

## **Lesson 5: Energy Consumption and Demand**

Energy is a commodity which is bought and sold in markets. Knowledge of the essential relationship between energy and economics requires that students develop a basic understanding of demand and supply factors in energy markets. Lessons 5 through 8 build the essential skills necessary for students to learn the basics of supply and demand and apply the concepts to energy decisions.

Lesson 5 asks students to identify from a personal perspective their "essential" and "non-essential" uses for electricity based on their record of the previous day's consumption. Students are then given cost data to estimate the cost of their electricity usage. Given a situation where students must restrict electricity use, due to a price increase or fall in their family income, they would most likely reduce their less essential uses of electricity. Why?

Again, the opportunity cost concept explains this behavior. Less essential uses of electricity have a lower opportunity cost compared with more essential uses. As the price of electricity rises and a person wants to conserve electricity use, the quantity of electricity consumed will be reduced, beginning with the perceived less essential uses.

### **Lesson 6: Energy and the Law of Demand**

Lesson 6 follows the basic understandings presented in Lesson 5 by formally developing "the law of demand". Simply stated, there is an inverse relationship between price and quantity demanded for goods and services in our economy: as price rises, the quantity demand falls; as price falls, the quantity demanded rises. In the lesson, students are asked to develop a demand graph for gasoline and to complete a worksheet on gasoline consumption that illustrates the law of demand.

### **Lesson 7: Energy and the Law of Supply**

Supply factors must also be considered when examining the energy market. Lesson 7 uses a simulation activity (the geologist's dilemma) to illustrate how additional energy supplies are discovered and brought to market. In the simulation students are asked to gather beads scattered throughout the classroom. The beads represent energy resources (e.g., coal, oil, natural gas, solar). At first student companies find it easy to collect the resources, but over time additional exploration produces less energy and the cost of recovery rises. The simulation provides a "hands-on" demonstration that as energy resources become more difficult to extract and search costs rise, the price (or incentive) paid to producers must rise. Thus the simulation provides an intuitive explanation for the observed positive relationship between price and the quantity supplied. The relationship is known as the "law of supply": as price rises, the quantity supplied by producers increases; as price falls, the quantity supplied by producers decreases.

### **Lesson 8: Energy Market Equilibrium**

The determination of energy price and quantity exchanged in a market involves **both** demand and supply. Lesson 8 brings together the demand and supply concepts built in Lessons 5 through 7 by demonstrating the interaction between demand and supply. In this lesson, hypothetical data is presented and students are asked to determine the market equilibrium **price** and **quantity** for oil.

### **Lesson 9: Cartel Power in Competitive Markets**

Lesson 9 is a simulation on how prices are determined in a competitive market for oil. Part I of the simulation provides an excellent example of competitive markets and price determination in action. In Part II of the simulation, a cartel is created by the oil producing nations (sellers) and these nations set the price for barrels of oil. In the debriefing session students are asked to discuss the impact of cartel formation and price setting on the competitive market.

### **Lesson 10: OPEC: Cartel Case Study**

Lesson 10 is a follow-up lesson to the simulation of Lesson 9. In this activity students are given an outline of the OPEC cartel history. Students are asked to complete a worksheet tracing the major events in the past 23 years of the OPEC cartel. Recently, the power of the OPEC cartel has diminished due to an increasing surplus of oil and downward price pressure oil market.

## **Lesson 11: Profits in the Oil Industry**

One of the most misunderstood concepts in economics is profits. Profits provide the incentives for producers to accept the risk and uncertainty involved in bringing a product to market. In recent years, oil companies have made large profits and the subject has attracted substantial media attention. Lesson 11 examines the profits in the petroleum industry and presents several accounting definitions of profit. The key point of the lesson is that profits should not be discussed solely in absolute terms (i.e., oil company X earned \$4 billion dollars) for that fact is insignificant. To evaluate profits, a person needs a relative measure, such as net profits as a percent of return on stockholder's equity, or net profits as a percent return on sales. When viewed in relative terms, profit reports take on more meaning and comparisons can be made across companies and industries. Lesson 11 lets students examine profit rates and changes in the petroleum industry over the 1980 to 1982 period.

## **Lesson 12: Energy Prices and Economic Justice**

Fairness or economic justice is an important economic goal in our society. Low income people are affected more by high energy costs than the rest of the population because as the price of energy rises, energy costs for heat and light begin to take up a larger percentage of low-income consumer budgets than high-income consumer budgets. Often, government solutions are sought as a way to alleviate this problem for the poor and to provide economic justice (fairness) in the energy market place. Lesson 12 highlights the problem and suggests alternative solutions for student analysis.

## **Supplementary Material**

This curriculum unit concludes with a guide describing supplementary materials on energy. Since this unit is only a basic introduction to the topic of the economics of energy, the teacher who uses this unit should make every effort to obtain additional resource material to supplement the basic concepts and lessons. Current material should also be sought that describes recent changes in energy markets so that questions students may ask can be related to current events.

## **Conclusion**

Energy is a complex topic to study in the schools. The discipline of economics and basic economic concepts can be used by teachers to help students analyze the variety of energy issues. Many of the questions which are asked about energy require some economic analysis before a teacher or student can properly answer the questions. Why did oil prices rise and fall over the past three years? Is solar power a feasible energy alternative to oil or coal? Should the government intervene in energy markets to protect low income consumers? Are oil company profits too large? These questions are just a sample of the many questions asked about energy that require some fundamental understanding of economics before they can be properly answered. Certainly there are other questions for students to ask, but if students are exposed to basic economics and if they can see how they apply to energy issues, then they will be better prepared to analyze these complex energy issues. This curriculum unit should help you achieve that important goal.

# ENERGY AND ECONOMICS

## Unit Goals and Objectives

### Recommended Level:

Grades 9-12

### Academic Areas:

Social Studies, Economics, Science, Consumer Education

### Time Required:

12-15 days (optional)

### Process Skills:

- analyzing
- interpreting data
- researching
- writing
- reading
- note taking
- graphing

### Goals:

When students complete this unit, they should be able to make the following generalizations about energy and economics:

1. Energy issues often include an economic dimension.
2. Basic economic concepts, such as scarcity, opportunity cost, market supply and demand, can be applied to energy issues since energy is a scarce resource.
3. An energy-related problem often requires economic analysis before a decision can be made about how to solve the problem.

### Student Objectives:

1. Students will analyze energy problems using such basic economic concepts as scarcity, opportunity costs, and market supply and demand.
2. Students will identify the types and sources of energy used in our society.
3. Students will interpret and construct graphs using energy data.

# ENERGY AND ECONOMICS

## Teacher Planning Guide

### Advance Teacher Preparation:

- Obtain:** As many resources as possible. See Supplemental Materials Guide at the end of this booklet for suggestions. If possible, try to order some of the free or inexpensive resource materials mentioned in the "Supplemental Materials Guide". Allow approximately four weeks time for receiving enough materials to make a good collection.
- Read:** Information in this unit.  
"Energy Info" — A Directory of Publications and AudioVisual Material from the Nebraska Energy Office.
- Preview:** Films and videotapes under consideration.

### Introduction to Energy (optional)

Teachers may want to show a film such as **The Big E's** which depicts energy as a scarce resource and therefore related to economics. (See Supplemental Materials Guide for suggestions).

### Lesson 1

Distribute copies of the student readings on whale and wood shortages. Prepare discussion questions and allow time for brainstorming session on definition of scarcity. Use lecture provided but teacher may want to revise or add to it.

### Lesson 2

Be sure students have pencil and paper for note-taking on lecture. Distribute copies of "Opportunity Cost Worksheet".

### Lesson 3

Distribute copies of student reading materials. Select energy alternatives for research topics and assign students to research topics individually or by groups. Be prepared to help students find two or three reference sources for each topic.

### Lesson 4

Distribute copies of student worksheets, Parts I and II. The teacher may want to provide additional graph paper for practicing line and bar graphs. Also the teacher may want to prepare sample overhead transparencies depicting different types of graphs.

### Lesson 5

Have students do written exercises and then distribute Cost Fact Sheet.

### Lesson 6

Read "Teacher Suggestions" and prepare chalkboard or overhead transparency for step 1. Distribute worksheets. Be sure students save these for Activity 8.

### **Lesson 7**

Supplies needed: A large handful of very small beads, at least four different colors, mixed with an equal amount of cornmeal in a small canister. Read instructions carefully for this activity.

### **Lesson 8**

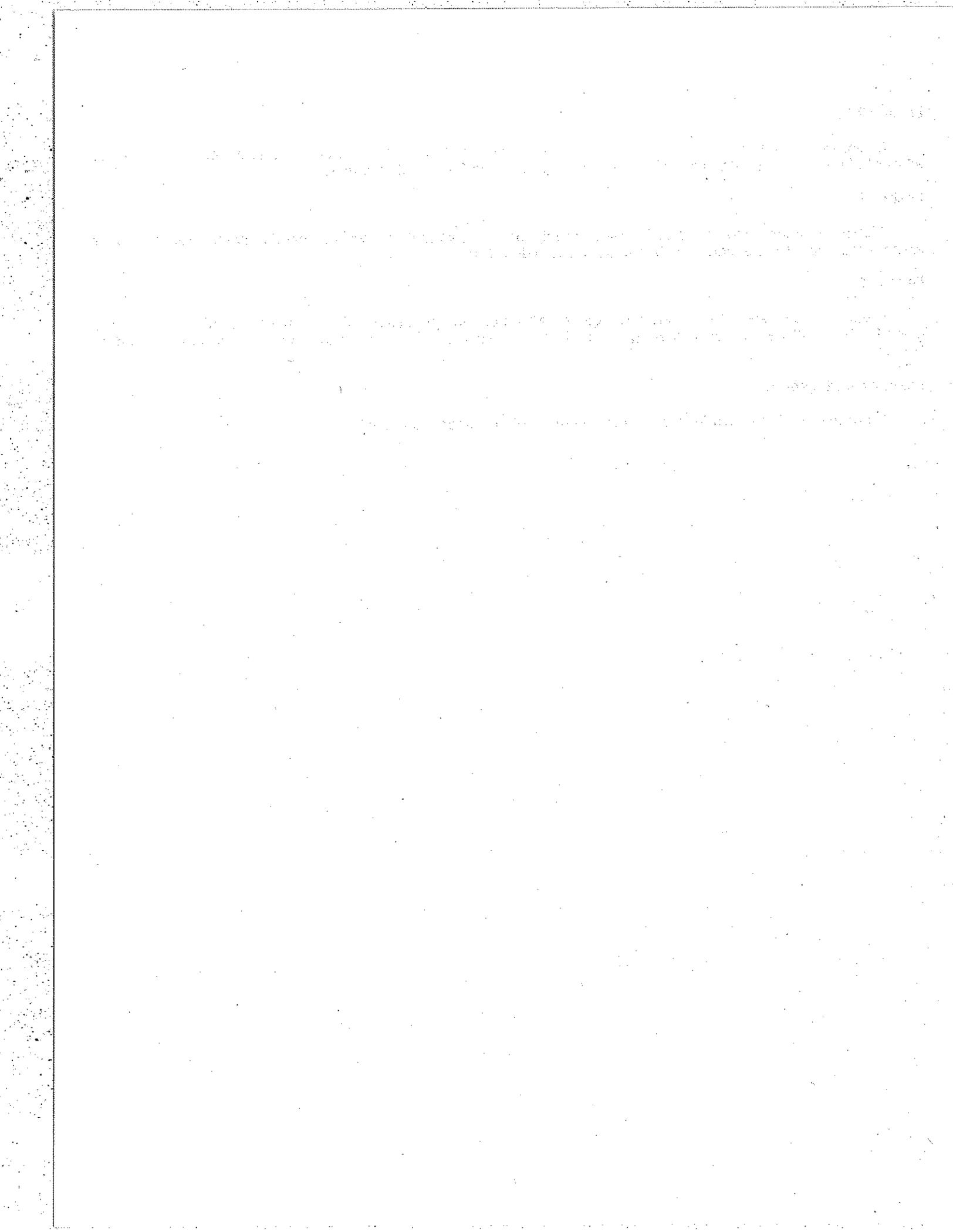
Distribute student worksheets. Students should also have worksheets with demand curve from Activity 6, or teacher may want to duplicate this demand curve and distribute.

### **Lesson 9**

Prepare "Buy" and "Sell" cards for game. Although not necessary, ties, arm bands, gloves, or some identification will be helpful to distinguish buyers from sellers. Put "score card" on board to keep record of transactions.

### **Lessons 10, 11, and 12**

Distribute worksheets and information sheets as directed for each activity.



**Lesson 1: Energy —  
A Scarce Resource**



**Rationale:**

Changes in lifestyle and population growth have led to an increasing demand for energy in the face of limited energy resources. This activity will help students see that energy resources are limited relative to wants. Energy, therefore, is a scarce resource. When an energy resource becomes relatively more scarce, the situation may produce an energy crisis, but at the same time it may prompt the development of alternative fuels. History provides many examples of this process.

**Objectives:**

Students will identify causes of past energy crises.

Students will identify some alternative fuels and discuss factors which lead to development of alternative energy sources.

Students will define scarcity and be able to give examples of it.

Students will compare the problems of whale oil and wood shortages to present oil supply problems.

**Implementation:**

Give each student the readings: "Whale Shortage" and "Wood Shortage". Discuss the readings with students using these questions as a guide:

- (1) Why was whale oil preferred to other lamp fuels? (It burned brighter.)
- (2) What happened to the price of whale oil? (It increased from 43 cents a gallon to \$2.55 over 100 years.)
- (3) Why did the price change? (As more and more whales were slaughtered, it became more costly to find whales. Whale oil became more scarce relative to the amount people wanted to use.)
- (4) What caused people to use less whale oil? (Higher prices, calls to public to conserve oil, and eventually discovery of paraffin and kerosene.)
- (5) Why did consumers look for whale oil substitutes? (There was a whale oil "supply crisis"; that is, whales were becoming so scarce that some people might not be able to get whale oil at prices they could afford.)
- (6) Why did producers develop whale oil substitutes? (They hoped to make a profit.)
- (7) Why is there a wood shortage in underdeveloped countries but not in the United States? (Fewer alternative fuels are available in those countries.)

# INSTRUCTOR INFORMATION...

- (8) Has the United States experienced any fuel shortages similar to these? (During the 1970s, OPEC (Organization of Petroleum Exporting Countries) cut off their exports of oil for a time, creating a shortage at the going price. Then they raised the price of oil from less than \$2.00 per barrel to over \$30 per barrel in ten years. In later lessons we will see that the industrialized countries have conserved fuel and developed alternative fuels and new oil supply sources.)

## Debriefing:

After reading the articles and discussing the above questions, have the students brainstorm until they come up with an acceptable definition of **scarcity**. (One definition follows: **scarcity** means that people do not have as much of everything as they want or that our resources are limited relative to our wants (uses) for them.)

Scarcity is a universal economic problem faced by all individuals and societies. Individuals, even wealthy individuals, face the problem of scarcity because they have, for example, 24 hours a day to use and must allocate scarce time resources among alternative uses. Societies, even wealthy societies, face the problem of scarcity because they do not have enough resources to satisfy all the wants or uses for them and must allocate those scarce resources carefully.

A market system helps a society allocate scarce resources such as energy by attaching a price for the use of the resource. When the price rises, the resource becomes relatively more scarce and when the price falls, the resource becomes relatively less scarce. For the economist, scarcity is a relative concept.

Shortages or energy crises often occur in those markets where a resource becomes relatively more scarce, but the price does not rise high enough so the quantity supplied equals the quantity demanded. Even where there are no shortages of a resource, scarcity still exists because we pay a price for the resource. If we did not have to pay a price for a resource, it would not have economic value and would not be considered scarce, it would be considered abundant and therefore free.

Reading One\*

## ENERGY CRISIS — WHALE SHORTAGE!

In the mid-1700s, people discovered that whale oil could be used in lamps, and a new industry was born. Whaling off the coasts of the United States alone had 178 ships at sea producing more than one million gallons of whale oil a year. Whale oil quickly replaced other animal fats because it burned brighter.

Over the next hundred years the price of whale oil increased from 43 cents a gallon to \$2.55. The slaughter of so many



THE MANNER OF CATCHING WHALES

From an engraving in Monck's "Account of a most dangerous Voyage to Greenland," in "Churchill's Voyages," Vol. 1, London, 1744

whales had created a shortage. Whalers had to go farther and farther out to sea and stay out longer to produce the same amount of oil. This made their expenses higher. They had to charge more for the oil to continue making a profit. Calls went out for the public to reduce the amount of oil used and to conserve oil by using fewer lights.

Many people began to search for alternative fuels that would be as good but cost less. There seemed no doubt that a reward—a chance to earn a profit—awaited anyone who could develop a suitable substitute for scarce, expensive whale oil. That is exactly what happened.

In England, James Young discovered that paraffin could be made from oil, coal, or shale. Paraffin makes such fine candles that it is still the most widely used ingredient. The discovery of paraffin meant whale oil was no longer needed for candles, but what about oil lamps?

Coal, which was used in gaslight systems, was one answer. Kerosene made from petroleum was another. In 1859, a way was found to produce crude petroleum economically. Inventors studied petroleum to see if the thick, smoky oil could be made into a clean-burning fuel. They soon found a way to produce kerosene. Kerosene burned brighter than whale oil at about half the price. It quickly replaced whale oil in lanterns. Jobs disappeared in the whaling industry, but others were created in the kerosene business.

\*Ronald A. Banaszak, "Energy and Economics", **SOCIAL EDUCATION**/April 1980 Vol. 44, No. 4, pp. 284-285.

Reading Two

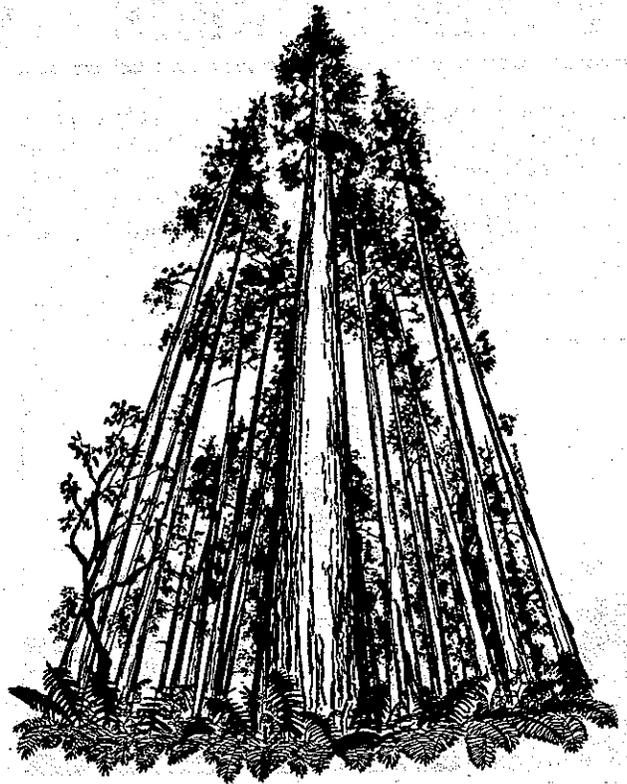
### WOOD SHORTAGE

Today there is a world-wide shortage of wood useful as a fuel. The shortage affects underdeveloped countries the hardest, because they have few alternatives. In many of them, rural citizens are spending more and more of their time searching for wood to heat their homes and cook their food. Often, their food must be eaten cold in dark, cold houses. These people are in a serious energy crisis because few alternatives are available. Their countries have not industrialized enough to make alternative fuels such as electricity or natural gas available.

Though industrialized countries now have alternatives to using wood as a fuel, for centuries they used it as a major source of heat and light. Wood was sometimes burned to make charcoal, which heated forges used by blacksmiths to turn iron into weapons, plows, hammers, and other tools. Even the first steamboats and railroad locomotives were wood burners.

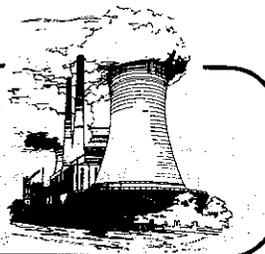
In time the demand for wood began to deplete the supply. Forests near cities and throughout the countryside soon were stripped bare. Destruction of trees caused floods that washed away the land or turned some areas into deserts.

Progress slowed and hardships occurred wherever people and industries began to run short of wood. As wood became scarce, the rush was on to develop entirely new sources of fuel. First, ways were found to use coal and, later on, oil and natural gas. These fuels had lain stored below the surface of the earth for millions of years. No one had known how to make use of them, but the wood shortage forced people to look for alternative fuels.



**Lesson 2:**

**Opportunity Cost and Energy**



**Rationale:**

The opportunity cost concept is one of the most important ideas in economics. It helps people see that the real cost of an economic decision is not just the money cost but the best alternative that is passed by. In making a choice for one thing, we give up something else.

**Student Objectives:**

Students will take notes on a lecture about opportunity costs.

Students will give examples of opportunity costs involved in decisions.

Students will participate in a role playing situation on decision-making and opportunity costs.

**Implementation:**

Students will take notes on teacher's lecture on "Opportunity Cost and Energy". Students will discuss suggested examples (or others). Following the lecture each student will do the worksheet. Discuss student answers to this worksheet.

**Debriefing:**

Questions for discussion on opportunity cost worksheet.

- (1) What are the scarce resources used in this economic decision? (time, fuel, private income, public funds)
- (2) What are alternative uses of these resources?
- (3) Which people would be likely to support plan? Why?
- (4) Which people would be likely to oppose the plan? Why?
- (5) Why do people disagree over resource uses?

## Opportunity Cost and Energy: Lecture\*

An important idea used in analyzing economic problems is the concept of **opportunity cost**. **Opportunity cost** is not measured in dollars, but it can be defined as the "best alternative passed by" when a person makes a choice among several possible opportunities which would use the same resources. Because of the problem of scarcity, people cannot have everything they want or need. They must make choices. The best alternative that is given up when a choice is made represents the **opportunity cost** of that decision.

Let's look at some examples to illustrate this point:

- (1) You may have two invitations to parties on Saturday night and you want to go to both. However, you can only accept one invitation. The **opportunity cost** of accepting one is the other party you give up.
- (2) A piece of land can be used for farming or for a park. It cannot be used for both. If it is used for a park, the **opportunity cost** is the crop that could be grown as well as the peaceful atmosphere that exists without campers and picnickers. If it is used for farming, the **opportunity cost** is the loss of recreational activities that could be enjoyed in the park.
- (3) You can attend a college after high school or go to work at your uncle's store. The cost of attending college includes the income you are giving up plus the money you must pay for tuition, books, etc. The **opportunity cost** is the other things you gave up by not having this money available. If you had gone to work for your uncle, the **opportunity cost** includes a college education plus the probability of a higher future income.
- (4) When a city has vacant land that can be used for housing or a parking lot, what are the opportunity costs involved in deciding on one or the other?
- (5) What about energy? What opportunity costs are involved in your driving to the store rather than walking? In leaving the lights on in a room that no one is using?

As consumers and citizens we should consider **opportunity costs** of our decisions. Remember, the dollar cost alone probably does not measure the **opportunity cost** of each choice. What is the best choice to make? We should choose the alternative that provides enough satisfaction to override the "costs" of the best alternative that was given up.

People may look at the same choice and make very different decisions because opportunity costs will differ depending on their beliefs, ages, personal circumstances, etc. The following worksheet will help you understand that problem and give insight into why energy production and use is such a controversial issue.

---

\*This activity is based on a lesson in **Energy Tradeoffs in the Marketplace**, a unit developed jointly by the Washington State Superintendent of Public Instruction Office and the Washington State Council on Economic Education (Seattle: 1980).

**Opportunity Cost and Energy**

Lesson #2

Page 3, Worksheet

Name \_\_\_\_\_

Date \_\_\_\_\_

**Opportunity Cost Worksheet**

You must vote "for" or "against" a suggested public transportation proposal using your decision-making skills and applying the idea of opportunity cost. Pretend you are in the following roles and decide how each person should vote on the following recommendation:

Your town, Squaresville, will purchase and operate a small bus between Squaresville and a larger city, Rocktown, 20 miles away. Many people in Squaresville work and shop in Rocktown. The bus would make two round-trips each day: one bus is scheduled to meet working hours of 8:00 a.m. to 5:00 p.m. in Rocktown, and the other bus goes at 10:00 a.m. and returns at 3:00 p.m. Bus tickets will cost about the same for one person as it would for that person to drive a mid-size car. Local taxes will be increased by about 3% to help pay for this bus. (\$36 per year for the average homeowner.)

Role: 1: Herman: 18 years old from Squaresville. Owns used car. Works part-time (8:00 a.m. until noon) in grocery in Rocktown.

**Opportunity Cost "Yes" Vote:**

**Opportunity Cost "No" Vote:**

Your Vote \_\_\_\_\_

Role II: Mr. & Mrs. Snurd: Married couple. Young, no children, own large home in Squaresville, and both work in Rocktown. Each drives own car to work. (Her job 8:00 a.m. to 3:00 p.m.; his job 9:00 a.m. to 5:00 p.m.) His job requires frequent use of car on 3 or 4 days each week.

**Opportunity Cost of "Yes" Vote:**

For Her:

For Him:

**Opportunity Cost of "No" Vote:**

For Her:

For Him:

His Vote \_\_\_\_\_

Her Vote \_\_\_\_\_

**Opportunity Cost and Energy**

Lesson #2

Page 4, Worksheet

Name \_\_\_\_\_

Date \_\_\_\_\_

**Role III: Joe Shmo: Forty years old from Squaresville. Family of four. Works in plant on bus route halfway to Rocktown. Now he drives the family's only car.**

**Opportunity Cost of "Yes" Vote:**

**Opportunity Cost of "No" Vote:**

Your Vote \_\_\_\_\_

**Role IV: Susan Sunshine: Eighteen years old, senior in Squaresville High School, hardly ever goes to Rocktown because she doesn't own a car.**

**Opportunity Cost of "Yes" Vote:**

**Opportunity Cost of "No" Vote:**

Your Vote \_\_\_\_\_

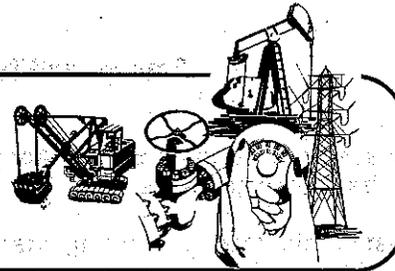
**Role V: The Oldey's, retired Squaresville couple with poor eyesight. Like to go to Rocktown, but driving is difficult in rainy or snowy weather.**

**Opportunity Cost of "Yes" Vote:**

**Opportunity Cost of "No" Vote:**

Your Vote \_\_\_\_\_

**Lesson 3: Sources and  
Types of Energy**



**Rationale:**

In 1978, Congress passed the National Energy Act which set out the nation's energy goals with an emphasis on encouraging efficient use and assuring an adequate supply. This activity will examine our progress in meeting these two goals. It will also give students an overview of alternative sources of energy.

**Objectives:**

Students will identify several different types of energy sources.

Students will research one type of energy source and write about its prospects for future use.

**Implementation:**

Background information summarizing alternative energy sources is provided. The teacher may divide the students into seven or eight groups or assign individuals to work on reports, each covering one of these energy sources and its prospects for future use. This assignment could be combined with a library exercise on using the **Reader's Guide to Periodical Literature**, for example. The teacher may want to have the students focus on specific questions in their research such as:

- (1) What is the future feasibility of using this fuel source? Is it better for some locations than others?
- (2) What are the potential costs of developing this fuel source?
- (3) What are the benefits of this fuel source?
- (4) What is the environmental impact of using this fuel?

**Debriefing:**

The written reports would be due at the end of the entire "Energy and Economics" unit. The teacher may want to have the students present them orally then and discuss their findings.

## Sources and Types of Energy

Lesson #3  
Page 2, Student Information

Name \_\_\_\_\_

Date \_\_\_\_\_

### Sources and Types of Energy\*

In 1978, Congress passed the National Energy Act which sets out the nation's energy goals and serves as a guide to energy activities. Its overall goals are to:

- encourage the most efficient use of existing energy supplies
- assure an adequate future supply of energy

Some of the possible ways of meeting these goals follow.

#### Conservation

Americans are already using energy more carefully. From 1973 to 1980 the growth rate of energy consumption slowed dramatically as prices soared. Projections for energy consumption in 1990 have been revised downward by 20 percent. One study showed the U.S. saved the equivalent of 1.3 billion barrels of oil between 1973 and 1978. (A barrel is 42 gallons.) Thus we can think of conservation as a type of productive investment and a cheap, clean, and fast way of decreasing dependence on foreign oil.

#### Oil and Natural Gas

Responding to higher prices, domestic producers increased oil exploration activities and this resulted in an expansion in proved oil reserves in 10 states in 1979 alone. Gas reserves increased in 17 states. In 1980, drilling had grown to its highest level in history.

#### Coal

Coal is the most abundant U.S. fuel comprising more than three-fourths of the known recoverable energy reserves. The U.S. has more than half of the Noncommunist world's coal resources. However, coal can create environmental problems in mining and burning. But despite the cost of environmental controls, the cost of using coal still falls below the cost of using oil. The use of coal which had declined through most of the 20th century has begun to increase rapidly again. Further expansion of coal use may occur through liquefaction and gasification (See below). Then it can be used as oil or natural gas.

#### Nuclear Energy

There are currently 81 reactors with operating licenses and 57 more with construction permits. In 1982, nuclear plants provided about 12.6 percent of U.S. electricity. The use of nuclear power may increase in the next decade, but serious debate continues over the safety and availability of uranium enrichment and processing services, and spent fuel disposal. Also, there is continued concern over human error such as occurred in the Three Mile Island, Pennsylvania plant. Source: Monthly Energy Review, Energy Information Administration, May 1983

\*Based on information in **Something Special for Teachers**, part of the SEED program (Schoolhouse Energy Efficiency Demonstration), Houston, TX: Tenneco, Inc., 1981, pp. 3-8.

## **Sources and Types of Energy**

Lesson #3

Page 3, Student Information

Name \_\_\_\_\_

Date \_\_\_\_\_

### **Synthetic Fuels**

#### **Coal to Gas or Oil**

Gasification of coal is accomplished by reaction of coal with oxygen and steam. The gases produced are cleaned and converted to methane, the major ingredient in natural gas. Several gasification processes are used commercially in other countries and they are being developed here with government aid.

Liquefaction may be done by a controlled heating process, by solvent extraction, by hydrogenation of coal, or indirectly by conversion to gases and then to liquid products.

Coal conversion efficiencies range from 60 to 80 percent compared to about 40 percent for power generation with coal. Thus converting to gas or liquid improves utilization of coal resources.

#### **Oil from Shale or Tar Sands**

Shale rock contains kerogen, a solid which is partially formed oil. Oil is released through a heating process which can be done below the surface where the rock is found or after the rock is mined and brought to the surface. The costly processes are not yet competitive with the lower cost of oil extraction.

Similar extraction methods can be applied to tar sands which are sands heavily saturated with oil and tar.

#### **Biomass Conversion**

There are many ways that organic materials can be converted to fuel. A few of these include direct burning, conversion to alcohol, and use of bacteria to break down organic waste to form methane.

### **Renewable Energy Resources**

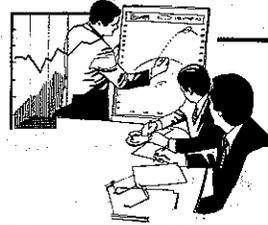
Biomass conversion is both synthetic and renewable, but strictly renewable resources are solar, geothermal, hydropower, wind power, and tidal forces.

Solar power may be passive, using architectural designs which take advantage of site and building materials. Also there are active solar systems such as thermal systems involving pumps, fans and fluids, or photovoltaic systems involving conversion of sunlight directly into electricity.

Geothermal energy comes from heat deep within the earth. Research is also being conducted on new ways to harness wind and tidal energy.



## Lesson 4: Graphing Energy Data



**Rationale:**

Economics often deals with numerical relationships and it is helpful at times to be able to illustrate these relationships in graph form. Graphs help us to visualize relationships. This exercise is designed to familiarize students with three types of graphs. Part I of the activity is an exercise in reading graphs. Part II is an exercise in making graphs.

**Objectives:**

Students will read and interpret data presented in graph form.

Students will construct circle graphs, bar graphs, and line graphs from sets of data.

**Implementation:**

Worksheets will be distributed to the students. The teacher will give the background information for interpretation and construction of each type of graph.

**Debriefing:**

Students will correct Part I of the worksheets before completing Part II which may be a homework assignment. The teacher should review each student's work to be sure the skills have been mastered.

## **Graphing Energy Data**

Lesson #4

Page 2, Graphing Instructions

# **INSTRUCTOR INFORMATION...**

### **Teacher Instructions**

#### **Circle or Pie Graphs**

It is important to teach students how to estimate percentages of a circle. To be exact, students will need a protractor to construct circle graphs.

Remind students that circles measure  $360^\circ$ . Thus 27% of a circle =  $.27 \times 360$  or  $97^\circ$ .

#### **Bar Graphs**

Watch for relevant choice of units on the vertical scale, even spacing of units, and width of bar.

The height of bars should depict data as precisely as possible for easy visual comparisons.

#### **Line Graphs**

As with bar graphs, the choice of units on the vertical as well as horizontal axis is important. The scale should be relevant and units spaced evenly according to equal values.

Points should be placed so that both vertical and horizontal coordinates line up according to data.

**Graphing Energy Data**

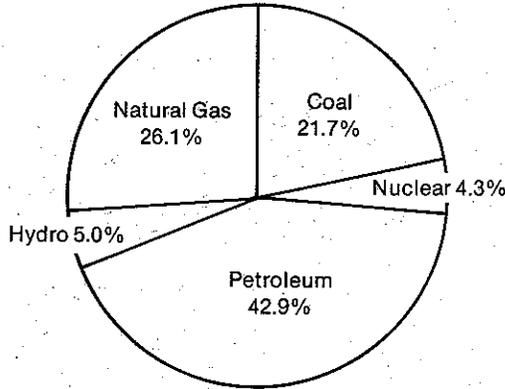
Lesson #4  
Page 3, Worksheet

Name \_\_\_\_\_

Date \_\_\_\_\_

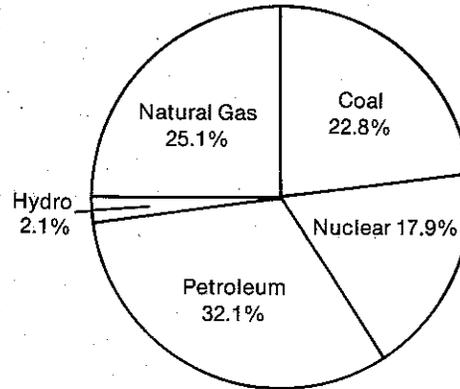
**I. Worksheet on Graph Interpretation**

A. Below are circle or pie graphs. They are used to picture how shares of something are divided among various uses or users. Answer the questions using these graphs.



**U.S. Energy Use \*\*  
by Fuel Type — 1982**

\*\*DOE/EIA — 0384  
1982 Annual Energy Review



**Nebraska Energy Use \*  
by Fuel Type — 1982**

\*Nebraska State Energy Office  
1982 Annual Report

1. What energy source is most used in Nebraska?
2. What energy source is most used in the United States?
3. Complete the columns below listing (in order) from **largest** to **smallest** the types of energy used in **Nebraska and in the United States**.

Nebraska	%	United States	%
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

4. Compare the two graphs. Which uses a greater percentage of nuclear energy, the United States or Nebraska?
5. Compare the two graphs. The United States uses coal for 33.6% of its energy. What percentage of Nebraska's energy is developed from coal?
6. The smallest share of energy used in Nebraska is from \_\_\_\_\_.
7. What is meant by "hydroelectric power"?



**Graphing Energy Data**

Lesson #4

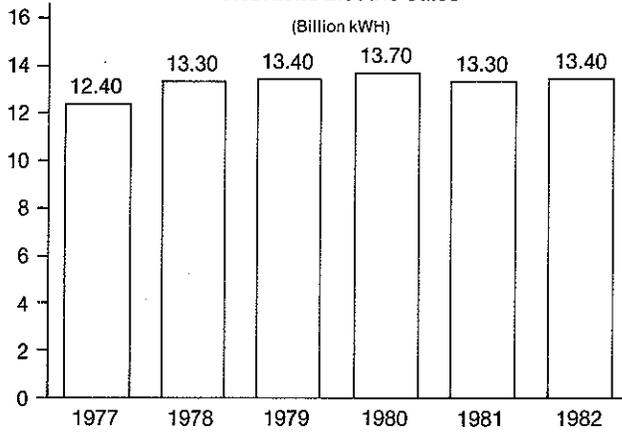
Page 4, Worksheet

Name \_\_\_\_\_

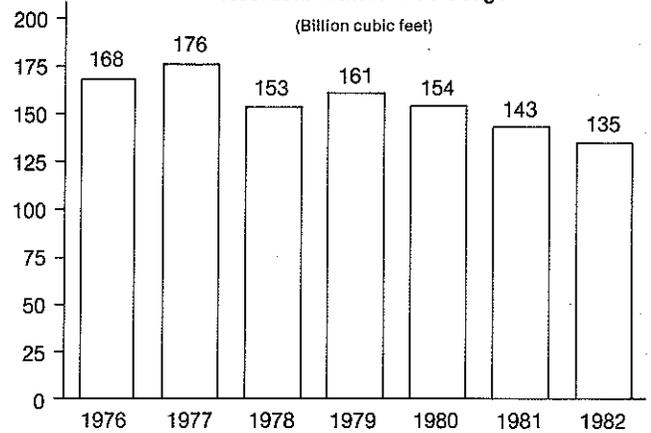
Date \_\_\_\_\_

B. These are bar graphs. Bar graphs are often used to compare quantities used or produced in various time periods. Answer the following questions:

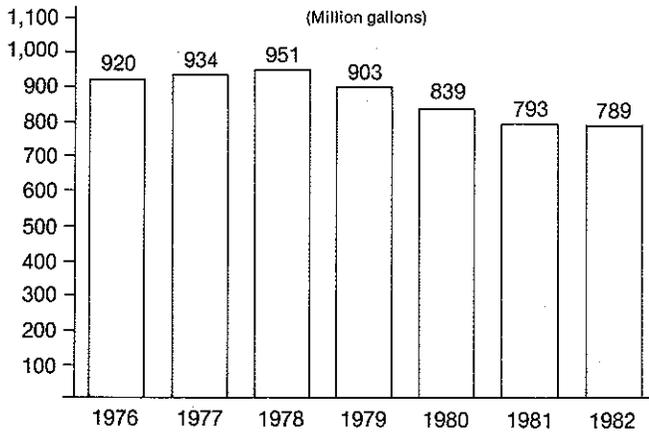
**Nebraska Electric Sales**



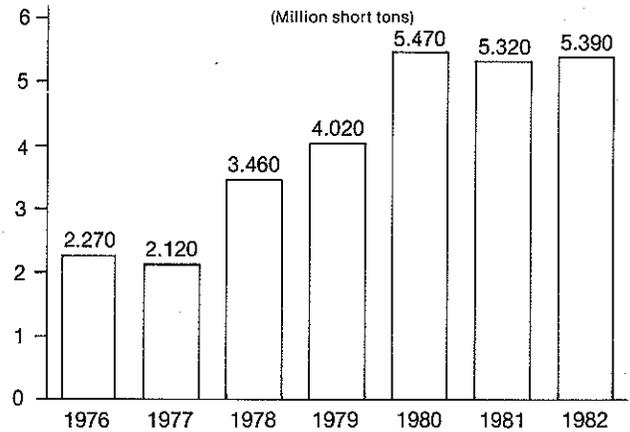
**Nebraska Natural Gas Usage**



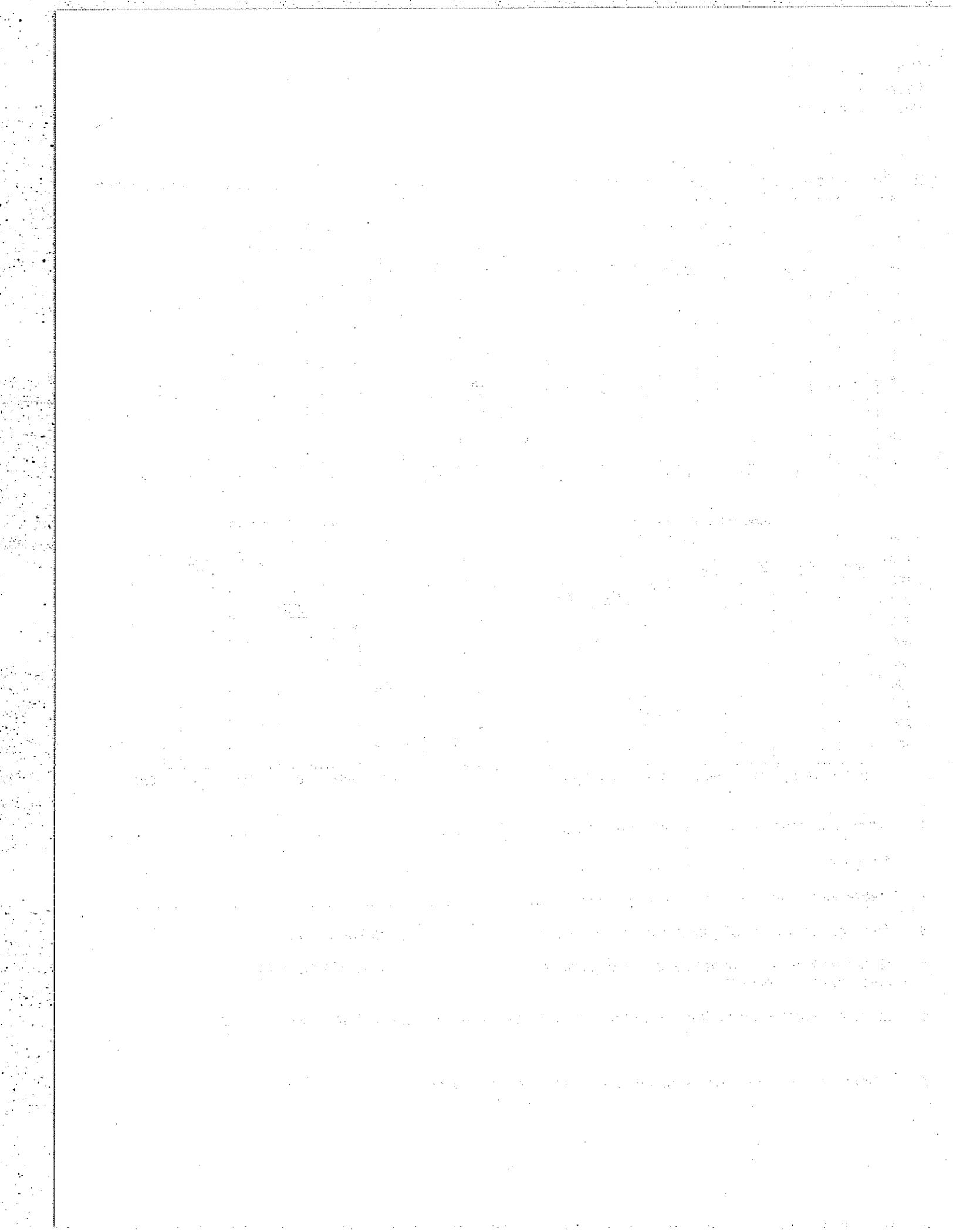
**Nebraska Gasoline Usage**



**Nebraska Coal Usage**



1. What is the measuring unit used for natural gas? \_\_\_\_\_  
For gasoline? \_\_\_\_\_
2. Nebraska gasoline use peaked in what year? \_\_\_\_\_
3. The highest amount of gasoline consumed was \_\_\_\_\_ million gallons.
4. Nebraska's use of both natural gas and gasoline \_\_\_\_\_ from 1976 to 1982.  
(decreased, increased)
5. Is there enough information in the graphs to tell why energy use changed from 1976 to 1982?
6. What kinds of other information might tell us the reasons for change?



**Graphing Energy Data**

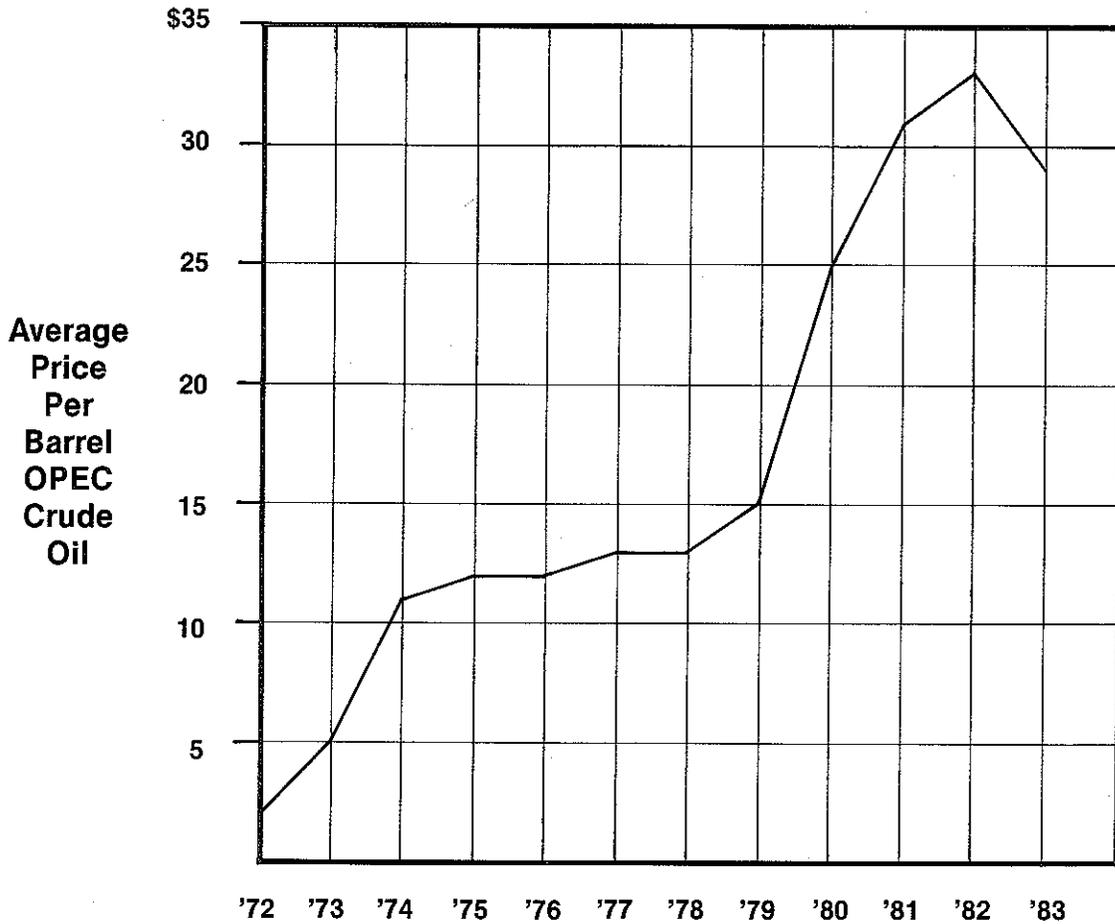
Lesson #4  
Page 5, Worksheet

Name \_\_\_\_\_

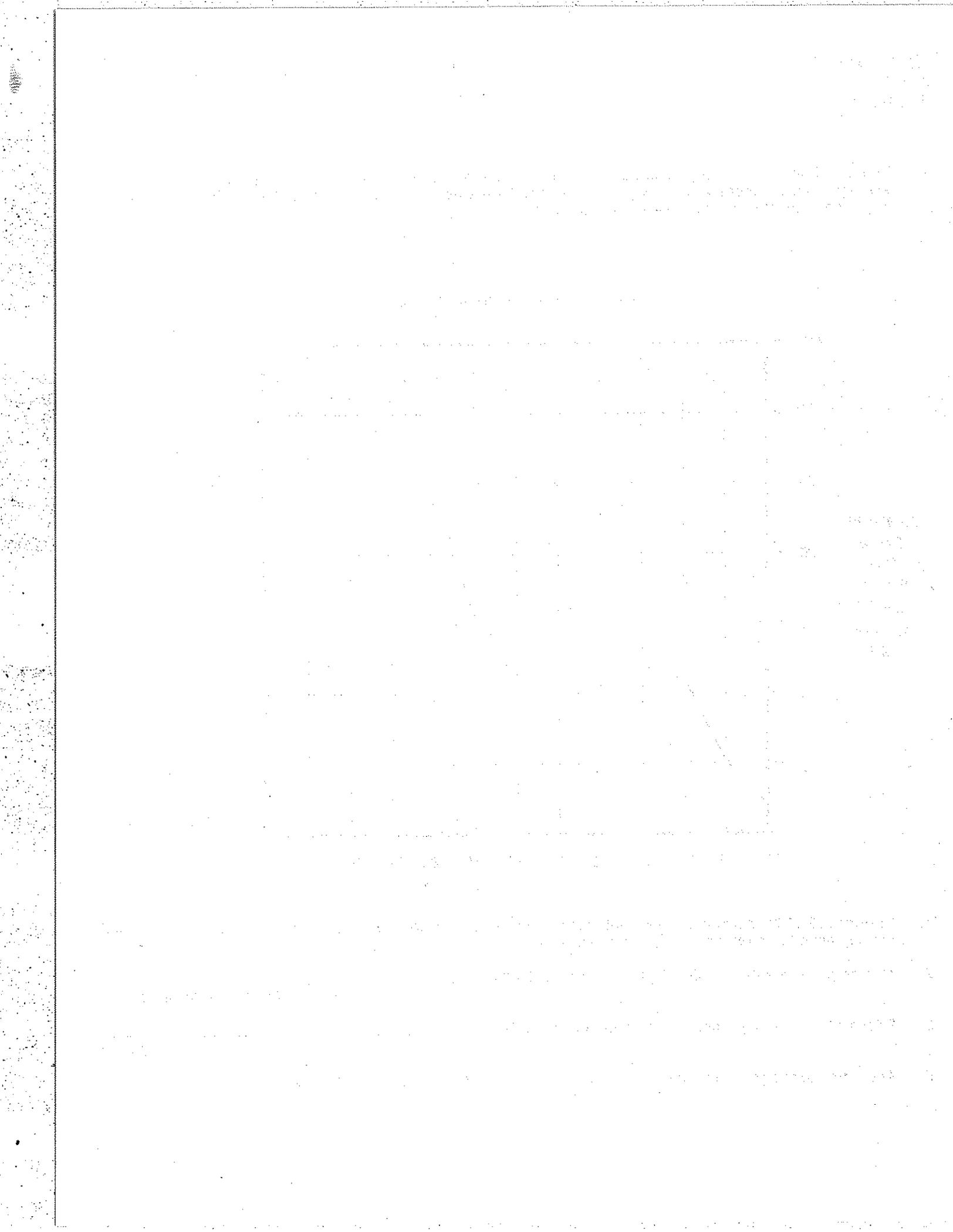
Date \_\_\_\_\_

C. This is a line graph. Line graphs connect points which relate two variables. In this graph the points show average Arab oil prices in various years. Line graphs are used to determine at a glance whether a trend or regular relationship exists between the variables.

**Line Graph on Oil Prices/Barrel**



1. During 1972-1982, this graph shows that the lowest oil price was about \$ \_\_\_\_\_ per barrel in \_\_\_\_\_, and the highest oil price was \$ \_\_\_\_\_ per barrel in \_\_\_\_\_.
2. This graph shows that the OPEC price during 1972-1982 \_\_\_\_\_ (increased or decreased)
3. Prices were generally stable during what time period? \_\_\_\_\_ (years)
5. According to the graph, the price fell from \$ \_\_\_\_\_ in 1982 to \$ \_\_\_\_\_ in 1983.



**Graphing Energy Data**

Lesson #4

Page 6, Worksheet

Name \_\_\_\_\_

Date \_\_\_\_\_

**II. Worksheet on Making Graphs**

Use the following information to construct graphs #1-3.

**A. U.S. Energy Demand and Sources of Supply, 1965-2000 (in percent)**

<b>Energy Source</b>	<b>1965</b>	<b>1979</b>	<b>1990</b>	<b>2000</b>
Nuclear	—	3	8	11
Hydropower & Other	4	4	6	6
Coal	22	19	24	31
Oil & Gas, Domestic Production	65	52	36	32
Synthetics	—	—	2	9
Oil & Gas Imports	9	22	24	11
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>

**Source:** Albert Danielson, **The Evolution of OPEC**, New York: Harcourt Brace Jovanovich, Inc., 1982. Appendix 10A-1.

**Graph #1:** Use the above information to make a circle graph showing the expected shares for each U.S. Energy Source of Supply in 1990.



**Graphing Energy Data**

Lesson #4

Page 7, Worksheet

Name \_\_\_\_\_

Date \_\_\_\_\_

B.

	Nebraska Natural Gas Use	
Year		Billion Cu. Ft.
1976		168
1977		176
1978		153
1979		161
1980		154
1981		143
1982		135

**Source:** Nebraska Energy Office, December 1982.

**Graph #2:** Use the above information to construct a bar graph below.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

**Graphing Energy Data**

Lesson #4  
Page 8, Worksheet

Name \_\_\_\_\_

Date \_\_\_\_\_

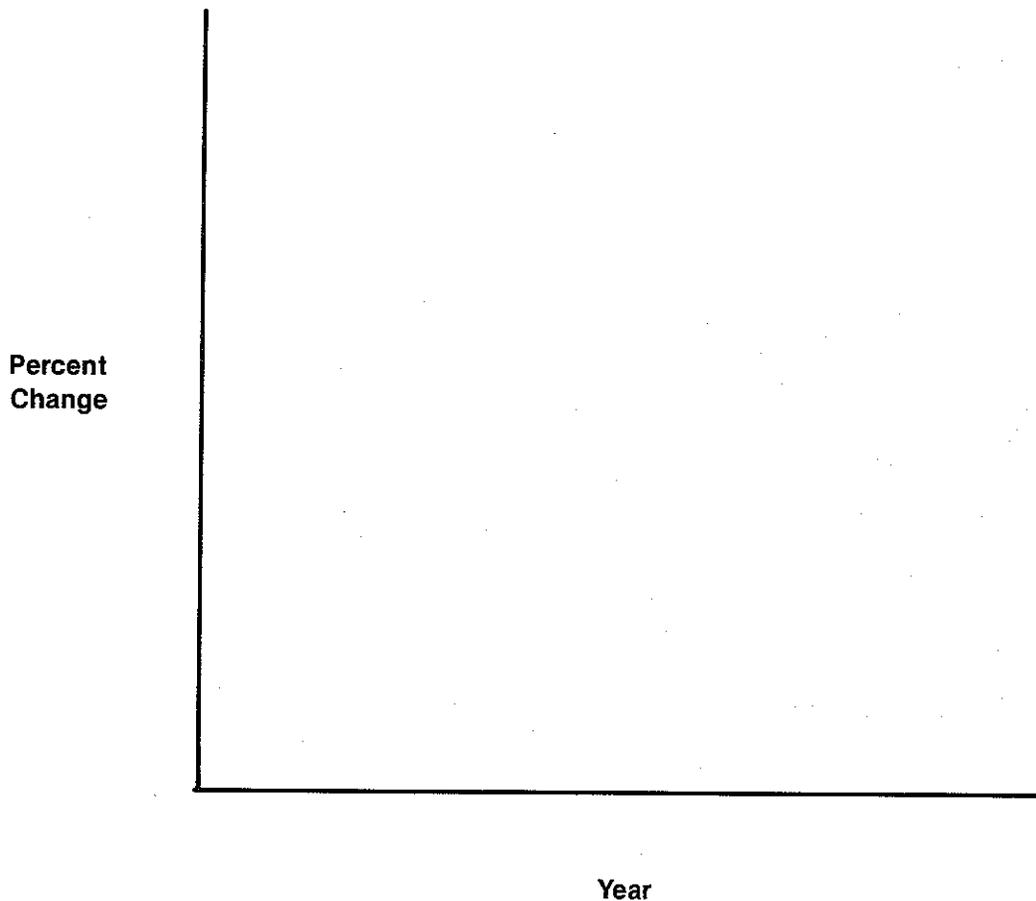
C.

Percent Changes in Energy Prices, 1974-1982

Year	Percent Change
1974	22
1975	12
1976	7
1977	7
1978	8
1979	37
1980	18
1981	12
1982	2

**Source:** Joint Economic Committee of U.S. Congress, **Economic Indicators, December 1982.** Washington: U.S. Government Printing Office, 1982, p. 24.

**Graph #3:** Construct a line graph showing percentage changes in U.S. energy prices, 1974-1982 from the information given above.

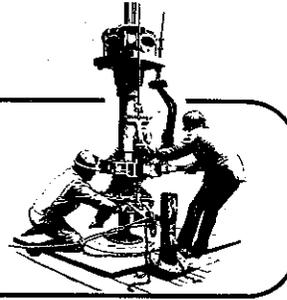


Dear Sir,  
I have the pleasure to acknowledge the receipt of your letter of the 10th inst. in relation to the above mentioned matter.

I am sorry that I cannot give you a more definite answer at this time, but I am sure that you will understand the necessity for this.

Yours faithfully,  
[Signature]

**Lesson 5: Energy Consumption  
and Demand**



**Rationale:**

This activity explores energy consumption and demand. It will be followed by an activity relating consumption to what economists call the "law of demand".

**Objectives:**

Students will list essential and nonessential uses of energy based on their choices about energy usage the previous day.

**Implementation:**

Have each student write a brief summary of their previous day's activities which required electricity use. Through class discussion, students can be made aware of the more subtle electricity uses as well as the obvious ones. For example, the telephone requires electricity, nearly all food uses electricity at some point in preparation, pop machines use electricity, etc.

Have students divide their lists into "essential" and "nonessential" uses. Pass out fact sheet on costs and have students estimate total monthly costs of their electricity use and how much they could save by eliminating nonessential uses.

**Debriefing:**

Ask students to consider their "essential" uses.

What would be the opportunity costs of their eliminating each of these?

What factors would cause them to conserve electricity? (Rising prices, loss of income, shortage of power)

THE UNIVERSITY OF CHICAGO  
DEPARTMENT OF CHEMISTRY



Page 1 of 1

1. The first part of the document is a list of names and titles of the authors and their affiliations.

Page 1 of 1

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Page 1 of 1

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Page 1 of 1

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Page 1 of 1

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**Energy Consumption and Demand**Lesson #5  
Page 2, Fact Sheet

Name \_\_\_\_\_

Date \_\_\_\_\_

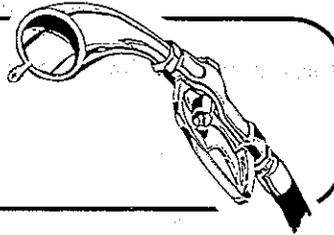
## Typical Operating Costs for Electric Appliances\*

<b>Appliance</b>	<b>Average Cost Per Month</b>	<b>Appliance</b>	<b>Average Cost Per Month</b>
<b>Food Preparation</b>		<b>Comfort Conditioning</b>	
Blender	\$ .07	Blanket (electric)	\$1.08
Deep fryer	1.12	Dehumidifier	4.06
Electric frying pan	.85	Fan (window)	3.79
Garbage disposal	.15	Fan (circulating)	1.67
Microwave	.91		
Mixer	7.00	<b>Air Conditioning</b>	
Toaster	.19	12,000 Btu (window)	11.7¢(per hour)
Range (bake)	1.25	18,000 Btu	18.3¢(per hour)
Range (surface unit)		30,000 Btu	29.0¢(per hour)
6" Unit on High	.08(Per Hour)	36,00 Btu	34.1¢(per hour)
8" Unit on High	.15(Per Hour)	<b>Health and Beauty</b>	
<b>Food Preservation</b>		Curling iron	\$ .01
Freezer (frostless)	8.10	Hand hair dryer	.22
Refrigerator/Freezer		Shaver	.002
15 cu.ft. Frostless	8.40	<b>Home Entertainment</b>	
15 cu.ft. Regular	5.23	Radio	.39
<b>Utility</b>		Stereo	.55
Clock	.08	T.V. (19")	
Dishwasher	1.65	B & W (tube)	.66
Dryer	4.57	B & W (solid-state)	.30
Fluorescent lgt (40w)	.20	Color (tube)	1.59
Incandescent lgt (40w)	.51	Color (solid-state)	.96
Iron	.72		
Vacuum	.21		
Wahser	.48		
Water Bed (heated)	6.61		
Water Heater	27.55		

\*Lincoln Electric System, **Home Energy Saving Tips**, (Lincoln, NE: Lincoln Electric System, 1983) pp. 2-8.



**Lesson 6: Energy and the  
Law of Demand**



- Rationale:** In the last lesson we saw some of the ways we use energy. We also discussed some of the factors which would cause us to cut back on energy use. One of these was rising prices. This illustrates one of the most important concepts in economics. The so-called "Law of Demand" is based on the fact that, generally, as the price for something rises, the quantity demanded will decline.
- Student Objectives:**
- Students will define "demands".
  - Students will state the "Law of Demand" and give examples of it.
  - Students will graph a demand schedule.
- Implementation:** Do the class exercise with gasoline prices and student demand. Use the resulting demand schedule to illustrate the definition of demand: Distribute worksheets on the Law of Demand. Complete these in class, but keep them for the next lesson on supply.
- Debriefing:** Discuss worksheets in class.

## Teacher Suggestions

To illustrate a demand schedule and the law of demand, put several possible gasoline prices on the board. For example:

Price/Gallon	Quantity per week
\$3.00	
2.00	
1.00	
.50	

Then ask one or more of the students who drive to tell how much gasoline they would purchase per week at each price and put this information in the quantity column. The resulting demand schedule should also illustrate the law of demand, because at a higher price (\$3.00) students will generally purchase less gasoline per week than at a lower price (\$.50).

2. Define "Demand" and the "Law of Demand". (Demand is a schedule which shows the various amounts of a product which consumers are willing and able to purchase at each specified price in a set of possible prices during some specified period of time. The so-called Law of Demand is that there is an inverse relationship between price and quantity demanded. As price falls, the corresponding quantity demanded will increase; as price rises, the corresponding quantity demanded will decrease.)
3. Discuss the assumptions which are made in talking about Demand and the Law of Demand. (That is, we assume that all factors remain unchanged, except price during the time period)
4. What are some of these factors which could change the demand schedule? [Changes in income, tastes, price of related goods (substitutes or complements)]
5. Discuss how changes in these factors would affect demand schedule. (Examples: increased income would increase quantity demanded at each price; small cars replacing large would decrease gasoline quantity demanded at every price; falling price of gasoline substitutes would mean more substitutes and less gasoline demanded at each price)
6. Answers to worksheet questions:
  - (2) quantity, price
  - (3) inverse
  - (4) tastes, income, prices of substitutes
  - (5) more, right
  - (6) less

**Energy and the Law of Demand**

Lesson #6

Page 3, Worksheet

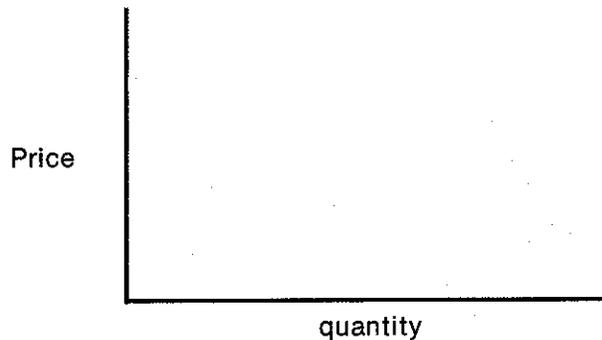
Name \_\_\_\_\_

Date \_\_\_\_\_

**Worksheet: Demand**  
(Save to use again with Lesson 8)

1. Construct a demand curve from the following demand schedule for oil.

Price Per Barrel	Barrels demanded per week
\$36	100
32	300
28	700
24	1,000
20	2,100
16	3,100
12	4,300
8	5,700
4	7,300
1	9,100



Fill in the blank with the correct words from the list below.

- Demand is a schedule which tells the \_\_\_\_\_ of something that people are willing and able to purchase at each specific \_\_\_\_\_ during a specific time period.
- This curve illustrates the "Law of Demand" which states that there is a(n) \_\_\_\_\_ relationship between price and quantity demanded.
- Changes in this demand curve could be caused by changes in \_\_\_\_\_, \_\_\_\_\_, or \_\_\_\_\_.
- An increase in income would probably increase demand. This means \_\_\_\_\_ would be bought at every price. The new curve would be to the \_\_\_\_\_ of the original.
- From the Law of Demand, we can conclude that higher prices generally cause us to demand \_\_\_\_\_ of a product.

**Words to use**

- |          |                       |
|----------|-----------------------|
| quantity | price                 |
| direct   | incomes               |
| tastes   | prices of substitutes |
| inverse  | less                  |
| right    | more                  |
| left     |                       |

STATE OF NEW YORK  
IN SENATE

January 15, 1913.

REPORT OF THE

COMMISSIONER OF

THE STATE

OF

THE STATE

IN RESPONSE TO A RESOLUTION PASSED BY THE SENATE

ON APRIL 10, 1912, CONCERNING THE STATE OF THE

UNION OF THE STATE OF NEW YORK

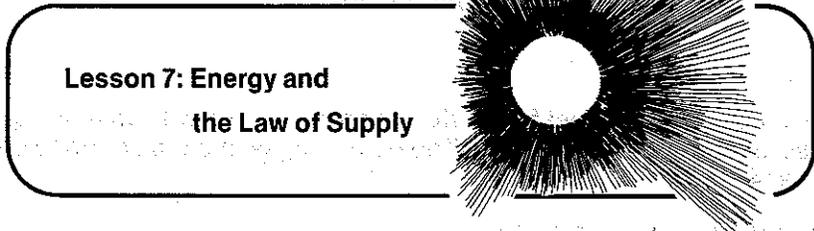
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THE STATE OF NEW YORK



**Rationale:** In the last lesson we examined demand-related concepts. In this activity we analyze some of the factors affecting supply. In the next lesson, we will look at both demand and supply and how they interact to form a market equilibrium price and quantity.

**Student Implementation:** Students will observe that remaining fossil fuel reserves are unknown. Students will predict that as fuels become more difficult to find, the cost of energy will rise. Students will infer that as prices for energy rise, there is incentive for producers to explore and produce new energy sources.

**Implementation:** A large handful of beads and cornmeal will be scattered as suggested. Students will be divided into five companies to search for energy resources in three one-minute intervals. At the end of this activity, the teacher will ask for clean-up volunteers. See how responses would change as you offer various prices for each bead collected.

**Debriefing:** Use set of questions in Teacher Instructions.

## Activity Instructions\*

### Materials Needed:

A large handful of very small beads, at least four different colors, mixed with an equal quantity of cornmeal in a small canister, such as a container for 35mm film. The percentages of bead colors to be placed in the canister are suggested in number 4.

### Directions: READ THE FOLLOWING TO STUDENTS

1. The previous lesson demonstrated how individual demand for energy has increased.
2. This lesson illustrates some of the existing dilemmas in obtaining energy supplies.
3. Before students arrive in class, throw the handful of beads high in the air, hitting the ceiling. Divide the class into five companies.
4. Each company will search for one color bead. The total number of beads should be broken down into the following proportions.

Company I — black (coal) 50%  
Company II — red (uranium) 3%  
Company III — white (natural gas) 10%  
Company IV — blue (oil) 37%  
Company V — cornmeal (solar) heaping tablespoon

**NOTE TO TEACHERS:** (If any company starts to gather all colors, **do not** interfere or comment.)

5. Explain that you have thrown an unknown quantity of beads, energy resources, on the classroom floor. The total resources available represent those available in 1957.
6. The first search will last one (1) minute.
7. Start the search.
8. Stop in one minute.
9. Have each company count its resources.
10. Keep the resources (beads) in separate piles. Record the totals for each group for each round on the blackboard.
11. Start a second search for one more minute. Each company must search for resources **still missing**. Record totals.
12. Start a third and final one minute round. Search and record totals.

---

\*This game is from **Energy Tradeoffs in the Marketplace**, Prepared by Washington State Superintendent of Public Instruction Office and Washington State Council on Economic Education, (Seattle, Washington: 1980) pp. 51-55.

## Debriefing Questions

1. Which energy sources were easiest to collect? Why? Which were most difficult? Why?

**Answer:** Probably coal and oil are the easiest to collect because they were most abundant; most difficult to collect would be uranium and solar.

What makes them easy or difficult to find? Is it the availability of the beads or is it the skill of the searchers?

**Answer:** Both availability and skill are important.

---

**NOTE TO THE TEACHER:** Cornmeal (solar) is diffuse and hard to gather. (The gathering and conversion represents a high cost in terms of land, labor or capital. Until technology reduces costs, **i.e. land, labor or capital, it will not be widely used.**)

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2. Looking at the piles of energy, what generalizations can you make?

**Answer:** The third pile may be smaller than the previous piles because the beads are harder to find and people may not have looked as hard.

3. Did anyone collect more than one energy resource? Is it realistic to collect more than one? Explain.

**Answer:** Yes—it is realistic—companies will gather the most accessible source of energy—i.e. oil companies often mine coal.

4. What **economic** resources were used to gather the energy beads?

**Answer:** Labor resources primarily; capital if a tool was used.

5. What do we know about the number of beads that were left on the floor?

**Answer:** Only that there are fewer beads available now than when the group first started to search for them.

6. What is the supply of energy?

**Answer:** It is not all of the beads thrown on the floor. Instead it is the beads on the table and whatever additional beads students can find in the near future if they think they can receive a good price for what they have found so far.

7. How might we have found more beads in the same time period?

**Answer:** A broom or vacuum cleaner could be used, or everyone could look for all colors.

# INSTRUCTOR INFORMATION...

8. What is the opportunity cost of obtaining a vacuum cleaner or broom during the search period?  
**Answer:** The opportunity cost is any beads that must be foregone while you are looking for a vacuum cleaner.
9. As energy becomes more scarce and demand continues to increase, what should happen to prices?  
**Answer:** Prices should rise.
10. Did you change the room's environment as you looked for beads?  
**Answer:** If the furniture has been disturbed, this would represent environmental costs.
11. Identify a number of examples of social benefits and social costs associated with the production of energy.  
**Answer:** Social costs — strip mining, oil wells, oil spills, etc. Social benefits — air conditioned buildings, improved transportation, etc.
12. Ask for student volunteers to help clean up the room. Then ask how many students would help if you paid them a penny a bead. Increase the amount that you offer per bead to 5¢, 10¢, 25¢ per bead until you can entice the entire class into helping you. Then relate their response to the "Law of Supply" which indicates that increased price will call out larger supply.
13. Note that this direct relationship between quantity supplied and price is known as the "Law of Supply".

**Lesson 8: Market Equilibrium**



**Rationale:**

The interaction of forces which determine demand and supply lead to what economists call the market equilibrium price and quantity. It is at this equilibrium point that the quantity supplied equals the quantity demanded. That is, there is neither a shortage nor a surplus. Analysis of how the market reaches an equilibrium is necessary for understanding how a free market economic system should operate.

**Student Objectives:**

Students will identify an equilibrium point given demand and supply.

Students will predict the effects of price controls, and of shifts in demand or supply.

**Implementation:**

The students will again use their worksheets from Activity 6 on demand along with the worksheet on equilibrium for this lesson.

**Debriefing:**

Correct and discuss the student's worksheets.

**Answers:**

- (1) and (2) Intersect at \$18 and 2600
- (3) Prices below \$18 cause shortages, above \$18 cause surpluses
- (4) Surplus, shortage
- (5) lower, to \$18
- (6) rise, some buyers want to pay more and bid prices up, this means sellers will supply some more until equilibrium is reached
- (7) Buyers demand 4300 but sellers are only willing to supply 1300
- (8) Rationing tickets, first come-first served, restrict amount sold to each, illegal "black market" sales above legal price, sell by license number on different days, etc.
- (9) Both rise
- (10) Price rises, quantity falls

**Market Equilibrium**

Lesson #8  
Page 2, Worksheet

Name \_\_\_\_\_

Date \_\_\_\_\_

**Market Equilibrium Worksheet**

Earlier we had a worksheet about demand using oil and oil prices as the example. In this worksheet we will continue with the oil example and show how product demand and supply are related.

- 1. Using the supply schedule below, construct a supply curve using the price-quantity measures on your demand worksheet.

**Oil Supply Schedule**

Price Per Barrel	Barrels Supplied Per Week
\$1	100
4	300
8	700
12	1,300
16	2,100
20	3,100
24	4,300
28	5,700
32	7,200
36	9,100

On your graph there are now two curves: a supply curve and a demand curve. The upward or positive slope of the supply curve indicates a **direct** relationship between price and quantity supplied. (Remember in the last activity how people were willing to look harder for beads when they were paid more for each bead?) The downward or negative slope of the demand curve indicates an **inverse** relationship between price and quantity demanded. (Remember the Law of Demand?)

- 2. Find the intersection point of the supply and demand curves. What price does this represent? \$ \_\_\_\_\_  
What quantity? \_\_\_\_\_ (approximate)

Notice that this is the only price where quantity demanded is the same as the quantity supplied. This is called the **market equilibrium** price and quantity.

- 3. Look at your graph or the demand and supply schedules to tell whether there will be a "surplus" or "shortage" at each of these prices. The first one is done for you.

Price	Surplus or Shortage	How many barrels
\$1	Shortage	9000 (9100-100)
4		
8		
12		
16		
18	Equilibrium	zero
20		
24		
28		
32		
36		

**Market Equilibrium**

Lesson #8

Page 3, Worksheet

Name \_\_\_\_\_

Date \_\_\_\_\_

4. When prices rise above equilibrium, there will be a \_\_\_\_\_ (surplus or shortage)

When prices fall below equilibrium, there will be a \_\_\_\_\_ (surplus or shortage)

5. Assume that in a market system buyers compete with each other to get the products they need and that producers compete with each other to sell what they produce. No one controls the price.

In this example, would you expect producers to raise or lower prices if the beginning price was \$24 and a surplus existed? \_\_\_\_\_

Where would the price probably settle? \$ \_\_\_\_\_

6. If there was a shortage, would you expect the price to rise or fall?

\_\_\_\_\_ Why?

7. Imagine that most consumers in this example felt that the equilibrium price was unfair and too high. Congress decided to pass a law which did not allow the price per barrel to rise above \$12. Now since price is controlled below the equilibrium, will there be a shortage?

8. A few years ago when gasoline prices were controlled, shortages did occur. What are some possible ways to deal with this problem? Are any of these better than allowing prices to rise to very high levels?

9. Suppose incomes rise, and everyone is willing to buy more oil at each price. Earlier we saw this caused the demand curve to shift right. That is, demand increased. What will happen to the equilibrium price and quantity when demand increases?

10. Suppose oil producers decided to cut back the supply and offer less at each price. The supply curve shifts left. What will happen to equilibrium price and quantity when supply decreases?

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Second paragraph of faint text, continuing the narrative or report.

Third paragraph of faint text, providing further details or context.

Fourth paragraph of faint text, possibly a transition or a new section.

Fifth paragraph of faint text, continuing the main body of the document.

Sixth paragraph of faint text, likely another key point or observation.

Seventh paragraph of faint text, possibly a concluding thought or summary.

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**Lesson 9: Interference with  
Competitive Markets:  
Cartel Power**



**Rationale:**

The world market for oil has not been competitive for most of its history. In this simulation students will observe the different price effects of a competitive market and one dominated by a cartel.

**Student  
Objectives:**

Students will describe the effects that different market conditions have on price.

Students will participate in a market which simulates the pressures that cartel members face to lower their prices.

**Implementation:**

Use the "Oil Price Game" simulation for students to experience transactions occurring in both competitive and cartel-like markets.

**Debriefing:**

Discuss questions included with game instructions.

**Cartel Power in Competitive Markets**

Lesson #9

Page 2, Oil Price Game (I)

# INSTRUCTOR INFORMATION...

## The Oil Price Game— Everybody Plays\*

**Time Allotment:** One class period.

**Materials:** 32 SELL cards  
32 BUY cards

**Teacher Instructions:** Divide the class into two groups. Distribute one set of cards to the Oil Consuming nations; a different set of cards to the Oil Producing nations. Tie white arm bands on the Oil Producers and use another color tie for the Oil Consumers, or use some other identifying symbols.

Allow plenty of time for students to get a notion of the game and learn the procedures.

Anticipate some difficulty with learning how transactions are made and prices reported.

### PART I

Play begins with the distribution of BUY and SELL cards. (It will help speed up the game if you match the color of the card to the arm band color.) Cards suitable for copying are on last page of this activity. Sample cards are found on page 57.

Insert price barrel on each BUY card according to this distribution.

Insert price per barrel on each SELL card according to this distribution.

Price	# of cards	Price	# of cards
\$21.00	4	\$19.00	2
19.00	4	17.00	2
17.00	4	15.00	2
15.00	4	13.00	2
13.00	4	11.00	4
11.00	4	9.00	4
9.00	4	7.00	6
7.00	4	5.00	6
5.00	5	3.00	4
3.00	4		

A complete set of Buyer and Seller cards should be used whenever the game is played with a class of more than 32 students. While the game is played, the cards should be kept in separate stacks on a desk near where the recorder is tallying the prices. As cards are turned in, students should take a different buy or sell order, according to their roles. Individual cards may be used more than once in the game, but make sure students don't keep cards for more than **one** transaction. If a student is unable to complete a transaction within five minutes, a new card may be given out to replace the old instructions.

\*This game is from **Energy in the Global Marketplace**, Oak Ridge, TN: U.S. Department of Energy, 1978, pp. 39-45. 69.

**Cartel Power in Competitive Markets**

Lesson #9

Page 3, Oil Price Game (I)

# INSTRUCTOR INFORMATION...

Record the price on the board where students can see the price at which oil is being sold. One way to show the tendency of prices to reach some "equilibrium" level is to record prices by time period. The following table could be used to record this information on the board.

Price	Five Minutes of Play	Second Five Minutes of Play	Third Five Minutes of Play
\$21			
20			
19			
18			
17			
16			
15			
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3			

Prices at left list the **possible** prices at which oil could be sold in the game. As students report each transaction, make a mark beside the price reported.

Separate transactions made during the first five minutes from those in other time frames. Transactions tend to move toward the equilibrium as time passes, mainly because more buyers and sellers become aware of the price of oil.

**Debrief:** After 15 minutes, or sooner if the price has stabilized, declare the market closed, collect all outstanding cards, and ask the students to analyze what happened. Address the following questions:

1. Economists often talk about the supply and demand for a certain product. Who demanded oil in the game? (The Buyers; the Oil Consuming nations.)
2. Who were the suppliers? (The Sellers; the Oil Producing nations.)
3. At the beginning the game, what was the range, the highest and the lowest prices, at which oil sold? Was the price range as wide during the succeeding five-minute periods? Why or why not? (Most simulations start off with the maximum range, from \$3 to \$21, with transactions moving toward the theoretical equilibrium of \$11, by the end of the game. Don't expect \$11 as the only price at the game's end. Prices will nearly always vary, but with each round the variances will lessen.)
4. By the end of the game, what price do you think would have been acceptable to the majority of Buyers and Sellers? Why? (Answers will vary. Usually students will see that a price becomes acceptable when it is not violating the majority of Buyers and Sellers instructions, and when it still allows some profit to both parties.)

5. What happened when a seller tried to sell at a price higher than the acceptable price? Did the same thing happen when a buyer tried to buy at a price lower than the acceptable one? (Students should suggest that the price above or below this acceptable price would be impossible for most participants to meet.)
6. How does the market for oil differ from the real world market? (Most of the oil sold in the world market is controlled by OPEC. This organization of petroleum exporting nations determines the supply and price of oil. There is no competitive market for the international sale of oil.)

## Part II

The first part of the simulation created a world market for oil, but it was unlike the present real market because it contained competition among both buyers and sellers. Today the world market for oil is dominated by an organization called OPEC whose members are major oil exporting countries. When sellers organize to control production and prices, that organization is called a cartel. OPEC is a cartel.

To simulate a cartel, tell Sellers that they must agree upon a price before beginning any bargaining. They must **not** change this price during the bargaining session.

Allow enough time for the oil producers to determine the oil price. After the "cartel" has decided on a price, distribute buy cards to the rest of the class. These students should be instructed to buy oil at the lowest price possible, and yet not violate their instructions. Record the transactions as before. You should anticipate two outcomes:

1. Students in the "cartel" will stay with their fixed price, thus making it impossible for some buyers to purchase oil. Frustration will bring the game to an end quickly, with only a few students being able to make transactions.
2. Some "cartel" members will be unable to maintain their fixed prices because of pressure imposed by the frustrated buyers. If this happens, keep the game going until the fixed price is either reestablished or dissolves entirely.

**Debrief:** At the end of the simulation, have students review what happened. Use the following questions to help guide the thinking:

- a. How was the price of oil determined in this game? (The cartel members agreed beforehand on the price. They tried to maintain this price despite pressure from their buyers.)
- b. How did the outcome differ from the first one? (Probable answers: difference in final price; cartel produced a higher price.)
- c. Why might some cartel members break a price agreement? (Some nations might think they could make more money by selling more oil at a lower price, pressure from buyers, and distrust of other cartel members also might influence decisions.)
- d. What factors help a cartel maintain a fixed price? (A cartel is most likely to be successful if the members have similar political or ideological ties.)
- e. Of the two types of world oil markets, which is better for consuming nations? Why? (The competitive market. In an open market, prices are lower and quantity produced is greater than in a controlled market.)
- f. Which is probably better for producing nations — the cartel or competitive market? (Probably the cartel, since the profits are generally greater.)

## **Cartel Power in Competitive Markets**

Lesson #9

Page 5, Oil Price Game (II)

# **INSTRUCTOR INFORMATION...**

- g. How can a rise in world oil prices affect production of oil in the United States? (A higher world price might make it profitable to develop new oil wells or seek alternative sources of energy. These activities would increase production of energy in the United States.)
- h. What might happen if the price of oil quadrupled? (Perhaps world-wide economic depression. This, of course, could reduce the demand for oil to a point where oil prices might drop again.)

### **Concluding**

#### **The Lesson:**

Activity 10 really concludes this exercise by reviewing some of the complex forces that bear on pricing of commodities in the real world marketplace.

### **For Further Research:**

Research one aspect of high energy prices. Choose one of the following areas: (a) residential and commercial buildings; (b) agriculture; (c) transportation; (d) leisure time activities; (e) industrial production; (f) new fuels and search for new sources of energy (or a return to old fuels). Use the following questions as a guide to your research.

1. Throughout most of our history, what energy policy have Americans followed with regard to \_\_\_\_\_? (Name your specific area.) Has that policy contributed to any present problems in this area? List them.
2. What other problems does the nation face in this area today?
3. Are there current programs or projects intended to deal with these problems? Is the government sponsoring or encouraging any of these programs, such as conserving energy in these areas? Have they been effective so far? Why or why not? What are some private business programs? Are they effective?
4. Which solutions do you favor? Why?
5. What sacrifices will be needed to overcome high energy use (and resultant customer cost) in the area you are investigating? Do you think people will be willing to make the necessary sacrifices?

# MEMORANDUM FOR THE RECORD

DATE: 10/15/54  
BY: [illegible]  
SUBJECT: [illegible]

On 10/15/54, [illegible] advised that [illegible] had been [illegible] and [illegible] had been [illegible].

[illegible] advised that [illegible] had been [illegible] and [illegible] had been [illegible].

[illegible] advised that [illegible] had been [illegible] and [illegible] had been [illegible].

[illegible] advised that [illegible] had been [illegible] and [illegible] had been [illegible].

[illegible] advised that [illegible] had been [illegible] and [illegible] had been [illegible].

[illegible] advised that [illegible] had been [illegible] and [illegible] had been [illegible].

[illegible] advised that [illegible] had been [illegible] and [illegible] had been [illegible].

## BUY CARDS

Buy 1,000 barrels of oil for **not more than** \$\_\_\_\_\_ per barrel. Try to get the price you can below this price. **Do not** buy oil above this price. If you haven't bought any oil after 5 minutes, get another buy order.

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## SELL CARDS

Sell 1,000 barrels of oil for **not less than** \$\_\_\_\_\_ per barrel. Try to get the price you can above this price. **Do not** sell oil below this price. If you haven't sold any oil after 5 minutes, get another sell order.

Sell 1,000 barrels of oil for **not less than** \$\_\_\_\_\_ per barrel. Try to get the price you can above this price. **Do not** sell oil below this price. If you haven't sold any oil after 5 minutes, get another sell order.

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Sell 1,000 barrels of oil for **not less than** \$\_\_\_\_\_ per barrel. Try to get the price you can above this price. **Do not** sell oil below this price. If you haven't sold any oil after 5 minutes, get another sell order.

1. The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that proper record-keeping is essential for the integrity of the financial system and for the ability to detect and prevent fraud.

2. The second part of the document outlines the various methods used to collect and analyze data. It describes the use of statistical techniques to identify trends and anomalies in the data, and the importance of using reliable sources of information.

3. The third part of the document discusses the role of the auditor in the process. It explains that the auditor's primary responsibility is to provide an independent and objective assessment of the financial statements, and to ensure that they are free from material misstatements.

4. The fourth part of the document discusses the importance of communication in the auditing process. It explains that the auditor must communicate effectively with management and other stakeholders to understand the business and to identify areas of concern.

5. The fifth part of the document discusses the importance of ethics in the auditing profession. It explains that auditors must adhere to a strict code of ethics and must be able to resist pressure from management to engage in unethical behavior.

6. The sixth part of the document discusses the importance of continuous learning and professional development. It explains that auditors must stay up-to-date on the latest developments in the field and must be able to adapt to changing circumstances.

7. The seventh part of the document discusses the importance of teamwork and collaboration. It explains that auditors must work closely with each other and with other professionals to ensure that the audit is completed efficiently and effectively.

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9. The ninth part of the document discusses the importance of risk management. It explains that auditors must be able to identify and assess the risks associated with the business, and must be able to provide advice on how to manage these risks.

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**Lesson 10: OPEC:  
A Cartel Case Study**



**Rationale:**

In the last activity students observed cartel behavior in a simulation. In this activity they will learn about OPEC, a real-world cartel that has dominated news headlines for over a decade.

**Student Objectives:**

Students will be able to describe factors which lead to a successful cartel.

Students will be able to analyze the loss in strength of the OPEC cartel.

Students will be able to give information on the historical development of OPEC and its impact on oil prices.

**Implementation:**

Distribute the reading assignment and worksheet.

**Debriefing:**

Discuss worksheet answers.

**Answers:**

1. 1960, 1971
2. a price-fixing agreement
3. \$35, 19
4. unorganized buyers, few major sellers, nearly equal market shares, similar beliefs, similar costs, new competitors unlikely
5. all except the third
6. Iran-Iraq war; new oil producers—Britain and Norway, Mexico; Nigeria cut prices
7. check latest news—OPEC is definitely weaker than in 1970s

**Worksheet on Cartels and OPEC**

A **cartel** is a group of sellers, business firms, or countries which have agreed to fix prices, market shares, or other matters of importance to them. The purpose is to increase their incomes above the level they would receive if they were competing. This is what happened in the second part of the "Oil Price Game".

Factors which make cartels most successful are when (1) buyers are unorganized, (2) there are a limited number of major producers or sellers so it is easy to form a **cartel**, (3) the sellers' market shares are similar in size so that a few members don't dominate, (4) the members share similar political beliefs, (5) members' production costs are similar, (6) potential or possible new competitors are not likely.

The following excerpt details the success and recent problems of the **OPEC** cartel:

**OPEC: FROM CARTEL TO CHAOS**

- September 1960 At this time several major world oil companies owned or controlled most world oil production facilities. They wanted the producing countries to lower prices.
- Saudi Arabia, Iran, Iraq, Kuwait, and Venezuela meet in Baghdad to map resistance to price cuts. A cartel of countries to confront the business cartel was formed: the Organization of Petroleum Exporting Countries (OPEC). With oil at \$1.80 a barrel and in abundant supply, the world took little notice.
- November 1964 Although unable to agree on production quotas, OPEC managed to negotiate a greater share of oil-company profits. OPEC price: \$1.80
- June 1967 In the wake of the Six Day War, Arab oil producers vowed to boycott Israel's Western supporters, but two key OPEC members, Iran and Venezuela, refused to go along. The boycott collapsed. Price: \$1.80.
- December 1969 Oil was struck in the North Sea. Coming only 18 months after the discovery of the Prudhoe Bay field in Alaska, the find represented a potential threat to OPEC. Price \$1.80.
- October 1970 Under Libya's threat to nationalization, that is, the takeover of their oil production facilities, several oil companies gave in to Libyan demands for more money. Other OPEC countries followed Libya—the "leapfrog effect" always dreaded by the oil companies. Price: \$1.80.
- February 1971 Twenty-three oil companies signed a price-increase agreement with OPEC—as an entity. **OPEC was a real cartel.** Price: \$2.18.

## OPEC: A Cartel Case Study

Lesson #10

Page 3, Worksheet

Name \_\_\_\_\_

Date \_\_\_\_\_

October 1973	Following the Yom Kippur War, Arab producers cut off oil shipments to the United States. OPEC doubled its price to \$5.12.
January 1974	Shipments to the United States resumed, but at a redoubled price of \$10.95. A world-wide recession began.
Jan-Feb 1979	In the turmoil of the Khomeini revolution, Iranian oil production dropped to 500,000 barrels a day, from 6 million. Subsequent shortages and OPEC surcharges pushed prices up. Average OPEC price: \$14.59.
May 1981	OPEC has raised the average price up to nearly \$35—but now confronted a growing global oil glut.
January 1983	At an emergency Geneva meeting, OPEC failed to quell unofficial discounting by members. Expectations of a general OPEC price cut grew. Official average price: \$33.
February 1983	Britain and Norway cut North Sea prices. Nigeria became the first OPEC member to break ranks by cutting prices. Key OPEC nations agreed in principle to a cut hoping to forestall an all-out price war.

Christoph Blumrich, "OPEC: From Cartel to Chaos," *Newsweek*, March 7, 1983, pp. 62-63.

### Questions:

1. According to the reading, OPEC was formed in \_\_\_\_\_ but became a successful cartel in \_\_\_\_\_.
2. What kind of agreement led to the establishment of OPEC as a real cartel?
3. During the ten years of OPEC's successful cartel, prices rose from \$1.80 per barrel to \_\_\_\_\_ per barrel, an increase of approximately \_\_\_\_\_ times.
4. What factors help make a successful cartel?
5. Which of these were present for OPEC in the early 1970's?
6. What incidents happened to cause problems for OPEC?
7. What is the situation today with regard to the OPEC cartel?

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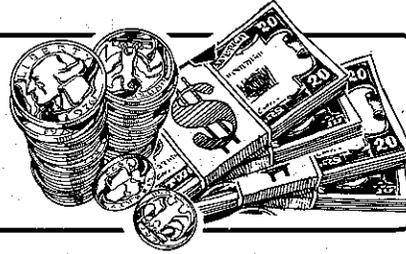
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**Lesson 11:  
Profits in the Oil Industry**



**Rationale:**

The billions of dollars in oil company profits have often made headlines. What are profits? What is their role in our economic system? How should we view a company's profits? These are important questions to ponder in economics.

**Student Objectives:**

Students will define "net profits", stockholders' equity, return on sales, return on equity.

Students will read financial tables giving data on above items.

Students will identify the role of profits in a market economic system and identify possible sources of profits.

**Implementation:**

Distribute information sheet with definitions, tables, and worksheets. Students will complete work sheets using this information.

**Debriefing:**

Correct worksheets and discuss. It is important for students to put profits in perspective compared with sales and equity. The absolute dollar figures alone don't mean much.

**Answers to Worksheet:**

- (1)
  - a. Exxon
  - b. Exxon
  - c. Standard Oil of California
  - d. You are comparing profit dollars to sales dollars. Relative to sales, Standard Oil's profits were better.
  - e. fall, no
- (2)
  - a. Mining, crude oil production
  - b. Mining in 1980, food, clothing in 1982
  - c. Petroleum
  - d. Food
- (3) Reward for risk-taking, new inventions
- (4) New supply sources and declining demand caused lower prices; costs were probably also higher.
- (5) Profits encourage risk-taking, new inventions, innovation, efficient business operation and is a source of investment funds.

**Profit Information Sheet**

In 1980 the U.S. petroleum industry earned its largest profits ever. The twenty-seven largest U.S. oil companies had combined profits of \$29.7 billion which had risen from \$22.98 billion in 1979. However, in 1981, profits began to slide with a year-end total of \$28.1 billion, and by 1982 had fallen to \$21.9 billion which was below the 1979 level. Still the largest U.S. oil company, Exxon, had net profits in 1982 of \$4.2 billion.

What do these large billion-dollar figures mean? Does it mean that the oil industry is more profitable than any other? Looking at just total dollars of net profit does not tell us very much about how well a firm or industry is doing. We want to know how those net profit dollars compare to total sales or revenues, how they compare to the value of stockholder's equity, and how they compare to the profitability of other industries. When these comparisons are made, the total dollar figures might not sound so awesome.

Some of this information is given below:

Table 1

Accounting Profits for leading U.S. Oil Companies for 1980 and 1982.

Rank in Sales Among U.S. Oil Companies in 1980	Net Profit \$Billions	1980 Net Profit as % of Sales	Net Profit as % of Equity	Net Profit \$Billions	1982 Net Profits as % of Sales	Net Profit as % of Equity
1. Exxon	5.7	5.5	22.2	4.2	4.3	14.7
2. Mobil	3.3	5.5	25.0	1.4	2.3	9.4
3. Texaco	2.6	5.2	21.1	1.3	2.7	9.0
4. Standard Oil of California	2.4	5.9	21.7	1.4	4.0	10.4
5. Gulf	1.4	5.3	14.6	.9	3.2	9.1

**SOURCES:** Ford S. Worthy, "The 500," *Fortune*, May 4, 1981, pp. 322-349.  
Alison B. Rea, "The 500," *Fortune*, May 2, 1983, pp. 226-254.

**Profits in the Oil Industry**

Lesson #11

Page 3, Profit Information Sheet (2)

Name \_\_\_\_\_

Date \_\_\_\_\_

Table 2:

**500 Largest Industrial Corporations —  
Selected Financial Items and Selected Industries:  
1980 and 1982**

Industry	Return on Stockholder's Equity (Percent)		Return on Sales (Percent)	
	1980	1982	1980	1982
Median return for all 500	14.4	10.9	4.8	3.6
Petroleum Refining	19.4	12.5	5.5	4.0
Mining, Crude Oil Production	21.0	9.0	9.2	3.0
Food	14.5	15.3	3.0	3.3
Motor Vehicles	8.1	5.1	2.6	1.7
Clothing	12.8	12.3	3.6	3.4

**SOURCES:** Ford W. Worthy, "The 500," *Fortune*, May 4, 1981, pp. 322-349.  
Alison B. Rea, "The 500," *Fortune*, May 2, 1983, pp. 226-254.

## Profits in the Oil Industry

Lesson #11

Page 4, Definitions

Name \_\_\_\_\_

Date \_\_\_\_\_

In order to understand this lesson, you will need to know these definitions:

**Profit:** The basic definition of profit is the money left to a firm from its sales revenues after **all** costs have been met. The expectation of earning profit is an important incentive for business expansion and profits are also an important source of investment funds.

**Net Profit or Net Income:** Deducting cost of products sold, other operating expenses and business income taxes from sales revenue gives **net profit**. It is sometimes called accounting profits.

**Sales Revenue:** Sales figures are for the year ending December 31. They include sales from manufacturing and/or mining, rental and other revenues. Excluded are excise taxes, dividends, interest, and other non-operating revenues earned.

**Stockholders Equity:** Ownership equity is the net worth of a firm, or the value of the firm's total assets after subtracting the firm's total debt. It is the sum of capital stock, surplus, and retained earnings.

How do firms earn profits? Economists generally agree that profits arise from different sources depending on the situation of the firm or industry:

- (1) Profits may be viewed as a reward for firms which took a business risk and succeeded. Since the future is uncertain, every time a new business opens or an old business expands or develops a new product, it is taking a risk. Profits are the reward if the decision was successful, losses will occur if not!
- (2) Profits may arise when a firm has a successful new invention or innovation. Before competing firms take advantage of this, the firm may earn high profits. This reward system encourages firms to develop new techniques.
- (3) Profits may result from monopoly or oligopoly power. OPEC countries were able to earn large profits as a result of such power. This type of profit does not promote economic efficiency.
- (4) Profits may be a result of pure luck. These are called windfall profits. For example, a popular President may mention he eats Brand X jellybeans and suddenly everyone wants that brand. Brand X owners will experience a rise in profits without any real risk-taking or innovation on their part.

**WORKSHEET ON PROFITS**

1. Use Table 1 to answer the following about 1980 data:
  - (a) Which company had the highest sales revenue? \_\_\_\_\_
  - (b) Which company had the highest net profits in dollars? \_\_\_\_\_
  - (c) Which company had the highest net profit as percent of sales? \_\_\_\_\_
  - (d) Why are the answers to (b) and (c) different? \_\_\_\_\_  
\_\_\_\_\_
  - (e) Did net profits generally rise or fall between 1980 and 1982? \_\_\_\_\_  
Were there any exceptions? \_\_\_\_\_
  
2. Use Table 2 to answer the following:
  - (a) In 1980, which industry is most profitable by both measures? \_\_\_\_\_
  - (b) What other industries appear to be about as profitable as petroleum refining in 1980 and 1982 (comparing returns on owner's equity)? \_\_\_\_\_
  - (c) Comparing "petroleum refining" and "food" industries, which industry performed better in 1980 and 1982? \_\_\_\_\_
  - (d) Which industry showed improved profit performance between 1980 and 1982? \_\_\_\_\_
  
3. Looking at the four possible sources of profits, which would you say are helpful and necessary to the economic system?
  
4. From what you know about the oil industry, describe the probable reasons why its net profits fell from 1980 to 1982.
  
5. What are the functions of profits in our economic system?

MEMORANDUM FOR THE RECORD

On 10/10/54, the following information was received from the [redacted] regarding the [redacted] of the [redacted] in the [redacted] area. The [redacted] was [redacted] by [redacted] and [redacted] on [redacted] at [redacted] hours. The [redacted] was [redacted] and [redacted] by [redacted] and [redacted] on [redacted] at [redacted] hours. The [redacted] was [redacted] and [redacted] by [redacted] and [redacted] on [redacted] at [redacted] hours.

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**Lesson 12: Energy Prices  
and Economic Justice:  
Problems with High-Cost Energy**



- Rationale:** Low-income people are affected more by high energy costs than the rest of the population. Since most of their energy expenditures are on necessities like heat and light, it is difficult for them to avoid the impact of rising costs. This issue of economic justice or fairness is one of the major concerns of economic policy. In this activity, information is given which highlights this problem and alternative solutions are suggested for student analysis.
- Objectives:**
- Students will state how low-income persons are affected by rising energy costs.
  - Students will compare the effects of high energy costs on different income groups.
  - Students will analyze the advantages and disadvantages of alternative policies to help low-income groups using a decision-making grid.
- Implementation:**
- Distribute information and worksheets.
  - Have students complete the questions.
- Debriefing:**
- Discuss completed worksheets and decisions made about alternative selections.
- Teacher Instructions:**
- If the class is large, a day or two before this activity:
1. Divide the class into two groups, A and B.
  2. Assign "Group A Questions" to group A and similarly for "Group B Questions". Group B members will need to get estimates of their electric and gas bills from their families.
- In class:
1. Have each group complete their assigned questions.
  2. Have one member from each group report on the information they found, so that the whole class can complete the individual worksheets. Everyone should have information for Group A and B questions.

# INSTRUCTOR INFORMATION...

3. On the board calculate the following:

**Income remaining after paying energy costs for poor family of four:**

- a. Poverty level income (#A-1): \_\_\_\_\_  
minus \_\_\_\_\_
- b. Gas and electricity cost estimate (#B-3) \_\_\_\_\_
- 
- c. Income left for other expenses  
(food, housing, clothing, etc.) = \_\_\_\_\_

**Income remaining after paying energy costs for median income family:**

- a. Median income #(A-4): \_\_\_\_\_  
minus \_\_\_\_\_
- b. Gas & Electric Averages (#B-2): \_\_\_\_\_
- 
- c. Income left for other expenses  
(food, housing, clothing, etc.) = \_\_\_\_\_

4. Discuss the results.

5. Show students a sample of decision-making grid, and explain the procedure for filling in grid squares. Have students complete the decision-making grid after discussing alternative solutions to the problem of energy costs and poverty.

**Energy Price and Economic Justice**

Lesson #12  
Page 3, Worksheet

Name \_\_\_\_\_

Date \_\_\_\_\_

Group A

In 1980 about 10.4% of all Nebraskans were living below the poverty level. For a family of four a poverty level income was defined as \$8418 per year. You can find more recent statistics about poverty in the latest issue of the **Statistical Abstract of the United States** published by the U.S. Department of Commerce, Bureau of the Census. Use this to help you answer the following:

1. What was the poverty level income for a family of four last year?  
\_\_\_\_\_
2. What percent of the U.S. population was below the poverty level?  
\_\_\_\_\_
3. What percent of all U.S. families were below the poverty level?  
\_\_\_\_\_
4. Find the median family income in the U.S. and Nebraska for last year.  
U.S. : \_\_\_\_\_  
Nebraska: \_\_\_\_\_  
(Median income means half of all families earn more and half earn less.)

Group B

It has been estimated that typical low-income families consume about one-half the electricity and one-fourth the natural gas of a typical middle-income family.

1. Using your family's monthly gas and electric bills, estimate what your family spent on electricity last year \_\_\_\_\_; on natural gas \_\_\_\_\_. (If you heat with another fuel, skip the question.)
2. Write down each student's answers to the last question and find the average electric bill and natural gas bill for the group.  
Electric: \_\_\_\_\_  
Gas: \_\_\_\_\_
3. Now take one-half of the average bill for electricity and one-fourth the average natural gas bill.  
1/2 x Electric average: \_\_\_\_\_  
1/4 x Gas average: \_\_\_\_\_

This is a rough estimate of what a poor family would spend. We have seen that the poor may not have enough income to pay for energy and other necessities. Energy prices are predicted to rise more rapidly than incomes in the 1980s. This means the poor will have to pay even greater proportions of their incomes for energy costs. Yet they will need more income for other necessities. This is the problem. Here are some alternative solutions. (Add any others you think of.) Evaluate each alternative in terms of five or six criteria. Some examples of criteria follow. (Add others.) To complete the grid: if an alternative seems to meet a criterion, put a plus sign (+). If not, mark a minus (-). Use a question mark (?) if the criterion is not relevant or if you are uncertain.

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**DECISION-MAKING GRID**

<b>Policy Alternatives</b> Criteria	Saves energy resources	Easy to administer	Preserves Producer's Freedom	Helps the poor	Aids in development of new energy sources
Regulate energy prices					
Give aid to poor with conservation methods					
Give aid for "soft" energy use: wood, sun wind, (for rural use mainly)					
Set lower rates for smaller users; higher for larger users					
Provides subsidies (money to help pay bills)					
Provide free weatherization					
Do nothing					

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**Energy Prices and Economic Justice**

Lesson #12  
Page 5, Decisions

Name \_\_\_\_\_

Date \_\_\_\_\_

**Make Your Choice**

Decision \_\_\_\_\_

Reasons \_\_\_\_\_

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# Energy Information Request Form

Mail to: Nebraska Energy Office  
P.O. Box 95085  
Lincoln, NE 68509  
(402) 471-2867

NAME \_\_\_\_\_

ADDRESS OF SCHOOL/ORGANIZATION \_\_\_\_\_

Phone \_\_\_\_\_

Please forward publications on the following topics:

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Please schedule the following audiovisual(s);

Title	Requested Date	Alternative Date
_____	_____	_____
_____	_____	_____

\_\_\_\_\_ Place my name on the mailing list for the free bimonthly energy newsletter, Nebraska Energy Action.

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**Energy and Economics**



Nebraska Energy Office  
P.O. Box 95085  
Lincoln, Nebraska 68509

UNITED STATES DEPARTMENT OF JUSTICE

Washington, D.C. 20535  
February 10, 1964

Dear Mr. Tolson: I have the honor to acknowledge the receipt of your letter of January 28, 1964, regarding the matter mentioned therein. I am sorry that I cannot advise you more fully at this time, but the information requested is being reviewed and will be furnished to you as soon as possible.

I am sure that you will understand the need for a thorough review of the information provided. I will contact you again once the review is complete.



Very truly yours,  
[Signature]

Director, Federal Bureau of Investigation

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P.O. Box 95085  
Lincoln, NE 68509  
(402) 471-2867

NAME \_\_\_\_\_

ADDRESS OF SCHOOL/ORGANIZATION \_\_\_\_\_

Phone \_\_\_\_\_

Please forward publications on the following topics:

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Please schedule the following audiovisual(s);

Title	Requested Date	Alternative Date
_____	_____	_____
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\_\_\_\_\_ Place my name on the mailing list for the free bimonthly energy newsletter, Nebraska Energy Action.

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**Energy and Economics**



Nebraska Energy Office  
P.O. Box 95085  
Lincoln, Nebraska 68509

# THE UNIVERSITY OF CHICAGO

PHYSICS DEPARTMENT  
5712 S. UNIVERSITY AVE.  
CHICAGO, ILL. 60637

Dear Mr. [Name]:

I am pleased to inform you that your application for admission to the Ph.D. program in Physics has been reviewed and you have been accepted for admission in the fall of 19[Year]. Your qualifications are excellent and we are confident that you will make a valuable contribution to our department.

You will be admitted to the program on a full-time basis. Your tuition and fees will be covered by a fellowship provided by the department. You will also receive a stipend to cover your living expenses. Your advisor will be [Name], who is currently working on [Project].

You should report to the department on [Date]. Please contact [Name] at [Phone Number] if you have any questions.

Sincerely,  
[Name]



