Chapter #14- Energy: Some Basics

1: How does the energy crisis in Ancient Greece and Rome compare to the oil crisis today? Explain.

Energy Basics
2: What is “work”? Definition and mathematical equation.

Define the following:

* Chemical Energy:

* Kinetic Energy:

* Heat Energy:

* Potential Energy:

3: What is the “first law of thermodynamics”?

4: What does it mean to have a “higher quality of energy”?

5: What is the “second law of thermodynamics”? 
Energy Efficiency
6: Define: First-Law Efficiency

7: Define: Second-Law Efficiency

Energy Units
8: What is the fundamental energy unit in the Metric System? How is it defined?

9: What is POWER? How is it expressed?

10: What is thermal efficiency?

11: What is electrical resistivity? What does it cause?

Energy Sources and Consumption
12: What percentage of the energy in the United States is derived from fossil fuels?

13: What percentage of the energy use in the United States is used efficiently?

Energy Conservation, Increased Efficiency and Cogeneration
Define the following:

14: Conservation:

15: Cogeneration (define and give an example):

16: In the United States, space heating and cooling of homes and offices, water heating, industrial processes and automobiles account for nearly _____% of the total energy use

Building Design
17: What is a passive solar energy system? Give examples.
18: What are some ways that older homes can be modified to be more energy efficient?

**Industrial Energy**
19: U.S. Industry consumes about _______ of the energy produced.

Values, Choices and Energy Conservation
20: **Name 3 ways** that people could modify their behavior to help save energy

21: What is the concept of **Integrated, Sustainable Energy Management**?

**Micropower**
22: What is the concept of **micropower**?

**Critical Thinking Issue: Use of Energy Today and in 2030**
23: How much energy in exajoules, did the world use in 2010 and what would you project global energy use to be in 2030?

24: The average person emits as heat 100 watts of power. If we assume that 25% of it is emitted by the brain, how much energy does your brain emit as heat in a year?

25: Can the world supply one-third more energy by 2030 without unacceptable environmental damage? How?

26: In what specific ways could energy be used more efficiently in the United States?
Chapter #15: Fossil Fuels and the Environment

1: What is Peak Oil? What is predicted to happen when we reach peak oil?

Fossil Fuels
2: How were fossil fuels created?

3: The major fossil fuels- crude oil, natural gas and coal- are our primary energy sources; they provide approximately _______ of the energy consumed worldwide.

Crude Oil and Natural Gas
4: Where were crude oil and natural gas deposits created?

5: Why do we not find oil and gas in geologically old rocks?

6: What the favorable rock structure to trap oil and gas deposits?

Petroleum Production
7: How much oil can be recovered from wells by primary production?

8: What are enhanced recovery techniques of oil and gas deposits?

9: Where are 60% of the total known reserves found?

10: When will world oil production likely to peak?

Natural Gas
11: How is natural gas primarily transported?
12: Why is natural gas considered to be a *clean fuel*?

**Coal-Bed Methane**
13: What is *coal-bed methane* and *how much* is estimated to exist? (*How many years does this represent?*)

14: What are the **PROS and CONS** of drilling for and using coal-bed methane?

**Black Shale Natural Gas**
15: What are some of the concerns of *hydrologic fracturing* for black shale natural gas?

**Methane Hydrates**
16: What are *methane hydrates* composed of? *How were they formed?*

17: *Where* do methane hydrates form?

**The Environmental Effects of Oil and Natural Gas**
18: What are some of the environmental effects of *recovery* of oil and gas?

19: What are some of the environmental effects of *refining* of oil and gas?
20: What are some of the environmental effects of delivery and use of oil and gas?

21: What are some arguments FOR and AGAINST drilling in the ANWR (Alaskan National Wildlife Refuge)?

Coal
22: What is COAL? How is it created?

23: Which type of coal has the greatest energy content? Which type has the lowest?

Coal Mining and the Environment
24: What is strip mining?

25: What are some of the environmental impacts of strip mining?

Mountaintop Removal
26: What are some of the environmental impacts of mountaintop removal?

27: What does the “Surface Mining Control and Reclamation Act of 1977” require?
Underground Mining
28: Underground Mining accounts for approximately _____% of the coal mined in the United States

29: What are the dangers to miners in underground mining?

30: What are the environmental impacts of underground mining?

Transporting Coal
31: How is most of the coal transported in the United States?

The Future of Coal
32: The burning of coal produces nearly ____% of the electricity used and about ____% of the total energy consumed in the United States today

33: How much air emissions are created using coal to create electricity in the U.S.?

34: What did the Clean Air Amendment of 1990 mandate?

35: What is allowance trading?

Oil Shale and Tar Sands
36: What is oil shale? How is it created and where is it found?
37: What are the environmental impacts of developing oil shale?

**Tar Sands**

38: Why can’t petroleum be recovered from tar sands from conventional methods?

39: How are tar sands processed?