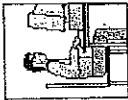


- Petlin, J. 1989. *A Forest Journey: The Role of Wood in the Development of Civilization*. Harvard University Press, Cambridge.
- Perry, D. A. 1994. *Forest Ecosystems*. Johns Hopkins University Press, Baltimore. 649 pp.



Ecofest

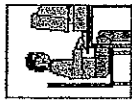
1. Clear-cutting a forest can result in:
 - a. the selective removal of certain tree species.
 - b. an increase in wildlife diversity and abundance.
 - c. severe levels of erosion and fish population declines in the streams of the surrounding watershed.
 - d. the increased productivity of trees planted to replace those removed.
2. One advantage that clear-cutting a forest has over selective cutting is that it:
 - a. sustains species diversity.
 - b. is less disruptive to ground cover and soil.
 - c. is more economical.
 - d. produces sustained yields.
3. The term _____ refers to a forest that has not been cut in the last 250 years or more.
 - a. old growth
 - b. second growth
 - c. canopy forest
 - d. plantation
4. What is an "edge effect"?
 - a. The area around a habitat boundary where some species can live, but which does not provide the same protection as in the center of a habitat.
 - b. In strip cutting method of forest harvest, the impact of deforestation only affects the edge of the forest ecosystem.
 - c. When a track is cut by a skier or a mountain-biker, the edge of the track promotes more species and higher biodiversity.
5. In the creation of nature reserves, conservation biologists must consider:
 - a. All of these are correct.
 - b. the home range size of the species to be protected.
 - c. island biogeography theory.
 - d. the specific habitat requirements of the species to be protected.

3

- e. inbreeding depression.
6. As a forest management practice, clear-cutting:
 - a. will always lead to major loss of soil nutrients in run-off.
 - b. may be important in inducing regeneration of desirable species.
 - c. is not used much anymore.
 - d. is usually best used on hill slopes.
7. "An area of undeveloped Federal land retaining its primeval character and influence, without permanent improvement or habitation, which is protected and managed so as to preserve its natural conditions" is the legal designation for a:
 - a. historic site.
 - b. national park.
 - c. wilderness area.
 - d. seascape.
8. Which of the following is not an example of indirect deforestation?
 - a. Removing trees to create agriculture fields.
 - b. Insect parasitism resulting in the death of an old-growth stand of trees in a pristine area.
 - c. Nutrient leakage from an industrial hog farm that results in toxic levels of nutrients in a swamp forest.
 - d. Increased acid rain as a result of a pulp mill moving into the area causing trees to be more susceptible to a fungal parasitic blight.
9. The amount of land that has been set aside in parks and reserves to sustain and protect the landscapes in the U.S. is approximately:
 - a. 5 %
 - b. 10 %
 - c. 15 %
10. What is a second growth forest?
 - a. One that has never been cut.
 - b. One that has been cut once and is regrowing.
 - c. One that is replanted on a thirty year rotation.
11. What percentage of land is forested today?
 - a. 10%
 - b. 50%
 - c. 26%
12. _____ is a management practice that takes several spatial scales into consideration.
 - a. Coppicing
 - b. Forest certification
 - c. The landscape perspective

13. The profession of growing forest trees is called _____.
- silviculture
 - farming
 - horticulture
 - mariculture
14. Where is most of the deforestation occurring in the world today?
- The USA, Pacific northwest
 - Developing countries in the tropics
 - Siberia and Russia
 - Antarctica
 - New Jersey
15. Which of the following is a function of trees in a forest ecosystem?
- Increases evaporation
 - Photosynthesis
 - Reduces greenhouse gasses
 - Reduces windspeed
 - All of the above

- Forcham, S.V. 1996. *New England Groundfish: From Glory to Grief. A Portrait of America's Most Devastated Fishery*. Center for Marine Conservation. Washington, DC.
- Robinson, S.K. 1996. Nest losses, nest gains. *Natural History Magazine*, July 1996, 105 (7): 40-47.
- Robinson, S. K. 1997. The case of the missing songbirds. *Consequences* 3 (1): 2 - 15.
- Sherman, K., L. M. Alexander, and B. D. Gold (editors), 1990. *Large Marine Ecosystems: Patterns, Processes, and Yields*. American Association for the Advancement of Science. 242 pp.
- Terborgh, J. 1992. Why American songbirds are vanishing. *Scientific American*, May 1992.
- Terborgh, J. 1989. *Where Have All the Songbirds Gone?* Princeton University Press, Princeton, NJ 207 pp.
- Ward, P. 1994. *The End of Evolution: A Journey in Search of Clues to the Third Mass Extinction Facing Planet Earth*. Bantam Books, New York, 301 pp.
- Warner, W.W. 1994. *Beautiful Swimmers; Watermen, Crabs, and the Chesapeake Bay*. Little, Brown, and Company, Boston.



Ecofest

- The Endangered Species Act authorizes the U.S. Fish and Wildlife Service to prepare a _____ for each listed species.
 - recovery plan
 - list of known property owners that have the species on their land
 - wildlife preserve
 - captive breeding program like the one used for California Condors
- A population of which of the following animals has the best chance of surviving in a small (< 10 ha) ecological reserve of appropriate habitat (i.e., one in which that species is normally found)?
 - Bengal tiger
 - Spotted owl
 - Gray wolf
 - White-footed mouse
- Since the Endangered Species Act was passed in the United States, the number of listed species has:
 - decreased as conservation measures have improved.
 - decreased because of the extinction of many listed species.
 - decreased because of political pressures.

- d. increased as new information about animal population dynamics has become available.
4. Since the American alligator was listed as an endangered species in 1967, its population has:
- decreased to the point where extinction is inevitable.
 - remained about the same.
 - increased somewhat but is still in danger of extinction.
 - increased dramatically and is no longer considered endangered.
5. Many people enjoy simply observing, identifying, and learning about wildlife (nondomestic) species of plants and animals. In addition to these aesthetic uses, wildlife provide other benefits to humans, such as:
- clothing from skins and furs.
 - drugs and medical products from wild plants.
 - food from sport hunting, fishing, and plant gathering.
 - All of these choices are true.
6. When plants and animals are introduced into areas that are completely new to them, they:
- often become destructive pests.
 - often outcompete native animals.
 - often increase because they have few natural predators.
 - All of these choices are true.
7. In the course of evolutionary history,
- humans have caused most extinctions.
 - about one-half of all species that have ever existed have gone extinct.
 - extinction has only occurred in conjunction with meteor impacts.
 - about 99 % of all species that have ever existed have gone extinct.
 - None of these are correct.
8. A utilitarian justification for protection of biological diversity in a tropical rainforest is:
- a high diversity of birds will attract birdwatchers.
 - medicinal products may be derived from plants in the forest.
 - food items that may be grown for human consumption will be found.
 - climate conditions worldwide will be maintained if deforestation is stopped.
 - All of these are utilitarian justifications.
9. Populations following a logistic growth curve:
- show exponential growth at low population sizes when resources are unlimited.
 - slow gradually as competition for resources increases.
 - reach an asymptote when the carrying capacity of the system is reached.
 - All of these are correct.
10. The number of individuals (N) at which a population has the greatest potential sustainable harvest is called:
- maximum economic value.
 - carrying capacity.
 - maximum sustainable yield.
 - optimal growth.
11. Humans can cause extinctions as a result of:
- hunting and harvesting.
 - habitat destruction.
 - introducing exotic species.
 - pollution of the environment.
 - All of these are correct.
12. The random loss of genetic material from a population is defined as:
- eugenics.
 - genetic drift.
 - genetic manipulation.
 - natural selection.
13. The cause of the decline in whale populations has been attributed to large-scale:
- pollution.
 - reduction in whale food supplies from overfishing.
 - whaling.
 - habitat destruction.
 - All of these are correct.
14. A fishery is a:
- complex predator-prey relationship between human and aquatic animals.
 - a marketplace where fishes are bought and sold.
 - an environment in which many diverse fish species are found.
15. In the logistic mathematical model used to estimate fish populations and manage them, how are the harvest limits under MSY (maximum sustainable yield) determined?
- Harvest amount = Carrying capacity (K) = MSY
 - MSY harvest = $K/10$
 - MSY harvest = an amount that will lower the population to $K/2$
 - MSY = $r^*N[(K-N)/K]$
 - None of these are correct.

- Colborn, T. D., Dumanoski, and J. P. Meyers. 1996. *Our Stolen Future*. Penguin Group, New York. 306 pp.
- Klassen, C.D., M.O. Amdur, and J.O. Doull. 1986. *Toxicology: The Basic Science of Poisons*. Macmillan Publishing Company, New York.
- Hallenbeck, W.H. and K.M. Cunningham Burns. 1985. *Pesticides and Human Health*. Springer-Verlag, New York.
- Rodicks, J. V. 1992. *Calculated Risk: The Toxicity and Human Health Risks of Chemicals in Our Environment*. Cambridge University Press, New York. 256 pp.
- Worthington, C.R. 1991. *The Pesticide Manual: A World Compendium, 9th ed.* British Crop Protection Council.



Ecotest

1. The level or concentration at which a pollutant causes health problems is called the pollutant _____.
 - a. dosage
 - b. threshold
 - c. risk point
 - d. toxicity point
2. Pollutant sources such as runoff from agricultural and urban areas, and automobile exhaust are examples of _____ sources.
 - a. mobile
 - b. point
 - c. detectable
 - d. area
3. A measure of the total amount of heavy metals in an organism is its _____.
 - a. toxic load
 - b. body burden
 - c. chelation total
 - d. accumulation index
4. _____ is the name of a group of chlorinated hydrocarbons found in herbicides (like Agent Orange) and in wastewater from pulp and paper mills. The community of Times Beach, Missouri was severely contaminated by this synthetic toxin.
 - a. DDT
 - b. PCB
 - c. Dioxin
 - d. Mirex

5. Exposure to _____-type asbestos is especially hazardous to human health; other types of asbestos are less problematic.
 - a. nonfibrous
 - b. crocidolite
 - c. chrysotile
 - d. silicofibric
6. An estimated _____ % of all lung cancers in the United States can be attributed to smoking tobacco.
 - a. 80
 - b. 75
 - c. 50
 - d. 20
7. LD-50 is:
 - a. the point at which a pollutant is diluted to 50% of its initial concentration.
 - b. the point at which a pollutant is detoxified by 50% of its initial concentration.
 - c. the point at which 50% of a test population dies after exposure to a pollutant.
 - d. the point at which 50% of a sampled natural population test positive for a toxin.
8. The high concentration of toxins in the tissue of animals that feed high on the food chain is a consequence of _____.
 - a. toxification
 - b. high ED-50
 - c. low tolerance
 - d. biomagnification
9. Long-term exposure to low level concentrations of pollutants typically cause _____ health effects.
 - a. carcinogenic
 - b. nonadaptive
 - c. chronic
 - d. low-dosage
10. Three of the four steps involved in risk assessment are listed below; which is not one of those steps?
 - a. identification of the hazard
 - b. dose-response assessment
 - c. exposure assessment
 - d. remediation
11. All of the following are examples of a point source except:
 - a. acid rain.
 - b. stormwater collection pipe.
 - c. hog waste lagoon.
 - d. factory smokestack.

12. Thermal pollution presents the most direct threat to:

- a. humans.
- b. fish.
- c. birds.
- d. terrestrial insects.

13. Which of the following is not a toxic heavy metal?

- a. lead
- b. mercury
- c. dioxin
- d. selenium
- e. chromium

14. Noise can be considered a pollutant because:

- a. it can constitute an annoyance that can lead to stress-related health problems
- b. it can cause physiological damage at high-enough levels
- c. it is the part of sound that is "dirty", "unclean", or "impure", or basically the sum of unwanted sound.
- d. All of these are correct.

15. Acute effects occur:

- a. immediately or soon after exposure to pollution.
- b. due to exposure to pollutants at levels that are well below threshold levels.
- c. are always permanent.
- d. All of these are correct

CO₂ came from fossil organisms, so it is being reintroduced into the atmosphere after 300 million years of storage in the Earth).

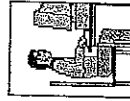
How is your water heated? Most homes and apartments have electric water heaters, which are wasteful because water must be heated twice: first at the power plant to make steam to turn the generators, then later to make the water hot at your house. A better idea is to use natural gas or solar. Solar is by far the best choice, but installation of a solar hot water heater can cost \$5,000. This amount of investment can be recovered in 10 years of fuel-bill savings, however.

What kind of light bulbs do you use? If you use the traditional incandescent bulbs, you are wasting money and contributing to global warming as well. Compare the energy efficiency of fluorescent and incandescent bulbs in Table 16.1 in the text. If everyone switched to compact fluorescent bulbs from incandescent, the amount of energy used and CO₂ released would both decrease. Again, compact fluorescent bulbs cost more initially (\$7.00 or more per bulb), but they last much longer and produce the same amount of light as an incandescent, with a lot less energy used.



Links In The Library

- Fickett, A.P. 1990. *Efficient use of energy*. Scientific American 263 (3): 157-163.
- Lovins, Amory B. 1990. *The negawatt revolution*. Across the Board, September 1990, pp. 18-23.
- Nixon, Will. 1991. *Energy for the next century*. E Magazine, May/June 1991, pp. 31-39.
- Perlín, J. 1991. *A Forest Journey: The Role of Wood in the Development of Civilization*. Harvard University Press. Cambridge, Massachusetts.
- White, David C., Clinton J. Andrews, and Nancy W. Stauffer. 1992. *The new team: Electricity sources without carbon dioxide*. Technology Review, January 1992, pp. 42-50.



Ecofest

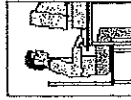
1. Sixty percent of the energy used in the United States is for:
 - a. industrial processes, home heating and air conditioning, and automobiles
 - b. aircraft, automobiles, shipping and trains
 - c. military and government uses
 - d. agriculture and industrial processing.
2. One proven way to avoid shortages of energy and save money at the same time is to:
 - a. use less energy for everyday activities.
 - b. use secondary recovery methods to get more oil from old wells.
 - c. build more small-scale hydroelectric plants.

- d. None of these choices will really succeed.
3. Ultimately, all the energy used on earth is derived from:
- sunlight.
 - abiogenic production of organic compounds.
 - electromagnetism produced by Earth's rotation.
 - nuclear reactions in Earth's core.
4. The United States has 5 % of the world's population and uses _____ % of the world's energy, mostly from non-renewable energy sources.
- 25
 - 75
 - 10
 - 50
5. When an industrial plant, such as a paper mill, produces steam for heat and electricity on-site, this is termed:
- dual-fuel operation.
 - cogeneration.
 - simultaneous fuel utilization.
 - a power cooperative.
6. The measurement of energy used per unit time is called _____.
- kilocalories
 - kilowatt-hours
 - power
 - first-law efficiency
 - second-law efficiency
7. One _____ is equal to the heat needed to raise 1 g of water 1 °C.
- joule
 - calorie
 - kilocalorie
 - BTU
 - kilowatt-hour
8. The total energy consumption in the U.S. in 1999 was _____.
- 31 exajoules
 - 43 exajoules
 - 22 exajoules
 - 14 exajoules
 - 95 exajoules
9. Any process that uses heat to do work is called _____.
- thermodynamically inefficient
 - a heat engine
 - second-law inefficient
 - a frictional force
 - high quality energy process
10. Which of the following systems has the highest level of entropy?
- Gasoline in a car's fuel tank
 - Glucose in a candy bar
 - An incandescent light bulb that is illuminating a room
 - A stationary car at the top of a hill
11. The First Law of Thermodynamics states that:
- Entropy within a system must increase when energy is converted from one type to another.
 - Energy may not be created or destroyed but may be converted from one form to another.
 - Matter can neither be created nor destroyed.
 - Energy equals mass times the square of the speed of light.
12. Which activity would best represent the "hard path" energy policy?
- Carpooling to save gasoline and reduce automobile usage.
 - Building automobiles with increased gas usage efficiencies.
 - Increasing petroleum production to satisfy increasing demand.
 - Encouraging conservation by electricity consumers through economic incentives.
13. The force that converts kinetic energy into heat energy when work is done is called:
- entropy.
 - power.
 - friction.
 - cogeneration.
14. Which of the following is an example of kinetic energy?
- A bowling ball that is rolling down the lane toward some bowling pins.
 - A stationary bowling ball sitting at the top of the ball return rack.
 - The heating of the bowling ball by sunlight, as it sits in a window.
 - The energy stored in wooden bowling pins that could be used for heat by burning the pins.
15. Calculate the energy efficiency, according to second-law efficiency, if it takes 20 units of energy to actually do work that requires a minimum of 15 units to accomplish.
- 133 %
 - 15 %
 - 20 %
 - 33 %
 - 75 %



Links In The Library

- Corcoran, E. 1992. *Cleaning up coal*. Scientific American, May 1992. Can coal be made cleaner? The technologies are being developed now to do this, but this clean coal will be more costly and still cause damage from strip mining.
- Fulkerson, W. R.R. Judkins, and M. K. Sanghvi. 1990. *Energy from fossil fuels*. Scientific American, September 1990.
- Home Energy Magazine, 2124 Kittredge Street, No. 95, Berkeley, CA, 94704-9942. (510) 524-5405. Home Energy Magazine is a source of information on reducing energy consumption.
- Holloway, M. 1991. *Soiled shores*. Scientific American, October 1991. A report on the Exxon Valdez spill and the clean-up.
- Hubbard, H. M. 1991. *The real cost of energy*. Scientific American, April 1991. This article is about the subsidies provided for energy producers by the U.S. government and how market forces need to be allowed to act upon energy prices.
- Lentsen, Nicholas. 1993. *All the coal in China*. World Watch, March/April 1993, pp. 22-29. If China begins to use coal at the rate that other industrial nations have in the past, global warming will get a lot worse. China has abundant coal resources and intends to use them as it industrializes.



Ecotest

- How old are most fossil fuels?
 - 30,000 years
 - 300,000 years
 - 3,000,000 years
 - 3,000,000,000 years
- The type of fossil fuel that is the cleanest burning fuel is _____.
 - coal
 - oil
 - natural gas
 - tar sands
- The size of the proven reserve for oil worldwide is _____.
 - 2000 barrels
 - 1000 billion barrels
 - 1 billion barrels
 - 350 billion barrels
- Which fossil fuel can provide the world's energy needs for the longest time at current rates of consumption?
 - coal
 - natural gas
 - oil
 - shale oil
- Which of these activities causes ground water pollution?
 - oil drilling
 - oil refining
 - oil recovery using steam or water
 - All of these are correct.
- In terms of energy content, which of the following rankings of coal types is correct?
 - bituminous > sub-bituminous > anthracite > lignite
 - bituminous > sub-bituminous > lignite > anthracite
 - anthracite > bituminous > sub-bituminous > lignite
 - lignite > anthracite > bituminous > sub-bituminous
- Which of these environmental effects of coal mining is so extensive that one can see it from remotely sensed satellite images?
 - mine fires
 - acid mine drainage
 - land subsidence
 - land disruption from strip mining
- Each gallon of gasoline burned produces _____ pounds of CO₂.
 - 100
 - 1000
 - 10
 - 19-20
- Pollution trading allowances will:
 - prevent further increases in pollution emissions.
 - cause decreases in pollution emissions automatically through free-market incentives.
 - slow the rate of increase in pollution emissions.
 - prevent further increases and may lead to declines if allowances are bought and retired from the market.
- Prices of gasoline are \$3-4 per gallon in European countries, due largely to taxes. What have the taxes done to fuel consumption rates in those countries?
 - caused a reduction
 - caused an increase
 - no change
 - Fuel consumption rates have fluctuated due to factors unrelated to price.

11. Gasoline for trucks and cars produces _____ of the CO₂ released each year.

- a. 50 %
- b. 10 %
- c. 25 %
- d. 33%
- e. None of these are correct.

12. Currently, it is not economically feasible to mine which of the following fossil fuels?

- a. natural gas
- b. coal
- c. methane hydrates

13. Which type of coal would cause the most air pollution, because of its sulfur content?

- a. bituminous
- b. sub-bituminous
- c. lignite
- d. anthracite

14. The production of petroleum from oil shale is called:

- a. cogeneration.
- b. biofuel production.
- c. oil stimulation.
- d. synfuel production.

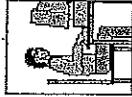
15. The type of fossil fuel that produces the most air pollution is:

- a. coal.
- b. oil.
- c. natural gas.
- d. tar sands.



Links In The Library

- Keising, B. 1983. *The Homeowner's Handbook of Solar Water Heating Systems*, Rodale Press, 1983.
- Manning, R. 1994. *A Good House: Building a Life on the Land*. Penguin, New York, NY.
- Rosenbaum, M. 1991. *Solar hot water for the 90s*. *Solar Today*, September/October 1991, 5(5): p. 20.
- Sklar, S. and Sheinkopf, K. 1991. *Consumer Guide to Solar Energy*, Bonus Books, Inc., 160 East Illinois Street, Chicago, IL 60611, 1991.
- Solar Industry Journal, Solar Energy Industries Association, 122 C Street, NW, 4th Floor, Washington, DC 20001. *Solar Industry Journal* has information on commercializing new technologies, case studies of commercially available technologies, and articles on government policies and regulations that affect renewable-energy businesses.
- *Solar Today*, 2400 Central Avenue, Unit G-1, Boulder, CO, 80301. (303) 443-3130. *Solar Today* covers all the solar technologies, both mature and emerging, in a general-interest format.



Ecotest

1. Each day, more solar energy hits the surface of the Earth than the entire human population of Earth could use in _____
 - a. 15 days
 - b. 27 weeks
 - c. 27 years
 - d. 10 weeks
2. Which of the following renewable fuels releases CO₂ into the atmosphere in the process of making usable energy?
 - a. Passive solar
 - b. Photovoltaics
 - c. Hydropower
 - d. Wind power
 - e. Biomass fuels
3. It has been said that all we are doing when making electricity is "boiling hot water." For which of these renewable energy sources is this not true?
 - a. Solar -thermal
 - b. Photovoltaics
 - c. Geothermal electric

- d. Biomass fuels
- 4. Why was the Luz International Company's solar design different?
 - a. They used a tower power to generate electricity.
 - b. They used a natural gas heater to augment the solar energy on cloudy days and at night for a continuous output.
 - c. They used passive solar design throughout.
 - d. Photovoltaic pumps were used to pump the hot oil through the tubes.
- 5. The solar energy potential of the _____ United States is the best for large scale solar energy.
 - a. Northeastern
 - b. Northwestern
 - c. Southeastern
 - d. Southwestern
- 6. A temperature difference between surface and bottom water can be used to pump ammonia down and allow it to expand rapidly as a gas. This expanding gas drives a turbine and makes electricity in a process known as _____.
 - a. solar pond thermal electric
 - b. hydrogen fuel cells
 - c. tidal power
 - d. ocean thermal conversion
- 7. Which of these is not a disadvantage of hydropower?
 - a. Dams cause anadromous fish deaths.
 - b. River basin is flooded, displacing wildlife.
 - c. The vibrations of the turbines produce radio and TV interference.
 - d. Sedimentation is filling in behind the dams.
- 8. If both release CO₂, why is biomass fuel preferred by environmentalists over fossil fuel?
 - a. It reduces the build-up of organic waste products.
 - b. There is no net increase in CO₂ in biomass.
 - c. Biomass fuels can be grown in areas unsuitable for human food production.
 - d. Biofuels are cleaner burning than all fossil fuels except natural gas.
 - e. All of these are correct.
- 9. What is a major disadvantage of wind power?
 - a. It kills endangered birds.
 - b. The windmills produce excess CO₂.
 - c. The equipment is unreliable.
 - d. Not cost competitive with fossil fuels.
- 10. _____ is the type of design in which the building's design is planned in advance to optimize free solar energy to be used as heat.
 - a. Indirect solar
- b. Direct solar
- c. Active solar
- d. Passive solar
- 11. The record for conversion efficiency of solar energy into electricity using photovoltaics stands at:
 - a. 2.5%
 - b. 16.8%
 - c. 52.1%
 - d. 98.6%
- 12. A major disadvantage of hydrogen fuel is:
 - a. it is much more polluting than fossil fuels
 - b. it does not have much ability for storage of energy
 - c. it has limited practical uses
 - d. it is dangerously explosive
- 13. All of the following are examples of biomass fuels except:
 - a. ethanol created from fermented sugar.
 - b. municipal solid waste.
 - c. wood.
 - d. tar sands.
- 14. Which of the following was closest to the average price of electricity per kilowatt-hour at the Luz International solar electric company?
 - a. \$0.01
 - b. \$0.10
 - c. \$1.00
 - d. \$5.00
- 15. Groundwater, in temperate climates, maintains a constant annual temperature of approximately:
 - a. 13°C
 - b. 32°C
 - c. 55°C
 - d. 10°C
 - e. 0°C

4. Why was the Luz International Company's solar design different?

- a. They used a tower power to generate electricity.
- b. They used a natural gas heater to augment the solar energy on cloudy days and at night for a continuous output.
- c. They used passive solar design throughout.
- d. Photovoltaic pumps were used to pump the hot oil through the tubes.

5. The solar energy potential of the _____ United States is the best for large

- a. Northeastern
- b. Northwestern
- c. Southeastern
- d. Southwestern

6. A temperature difference between surface and bottom water can be used to pump ammonia down and allow it to expand rapidly as a gas. This expanding gas drives a turbine and makes

- electricity in a process known as _____.
- a. solar pond thermal electric
- b. hydrogen fuel cells
- c. tidal power
- d. ocean thermal conversion

7. Which of these is not a disadvantage of hydropower?

- a. Dams cause anadromous fish deaths.
- b. River basin is flooded, displacing wildlife.
- c. The vibrations of the turbines produce radio and TV interference.
- d. Sedimentation is filling in behind the dams.

8. If both release CO₂, why is biomass fuel preferred by environmentalists over fossil fuel?

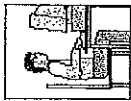
- a. It reduces the build-up of organic waste products.
- b. There is no net increase in CO₂ in biomass.
- c. Biomass fuels can be grown in areas unsuitable for human food production.
- d. Biofuels are cleaner burning than all fossil fuels except natural gas.
- e. All of these are correct.

9. What is a major disadvantage of wind power?

- a. It kills endangered birds.
- b. The windmills produce excess CO₂.
- c. The equipment is unreliable.
- d. Not cost competitive with fossil fuels.

10. _____ is the type of design in which the building's design is planned in advance to optimize free solar energy to be used as heat.

- a. Indirect solar



Ecotest

- How many uranium-235 atoms will be split by the neutrons arising from each collision in the nuclear chain reaction?
 - 1
 - 2
 - 3
 - 4
 - 5
- What is the difference between nuclear fusion and nuclear fission?
 - In fusion, hydrogen atoms are split; in fission, helium atoms are fused.
 - In fusion, hydrogen atoms are fused; in fission, uranium-235 atoms are split.
 - In fusion, helium atoms are fused; in fission, uranium-235 atoms are split.
 - In fusion, uranium-235 atoms are fused; in fission, helium atoms are split.
- Which type of radiation particle is most harmful to humans?
 - alpha
 - beta
 - gamma
 - delta
- The radiation dose which will kill 50% of humans exposed to it is 5000 millisieverts/year (we know this from the atomic blasts at Hiroshima and Nagasaki). What is the dose of radiation that the average person is exposed to annually from all sources (including nuclear power plants)?
 - 10,000 - 20,000 millisieverts/year
 - 1000 - 2000 millisieverts/year
 - 100 - 200 millisieverts/year
 - 10 - 20 millisieverts/year
 - 1 - 2 millisieverts/year
- How do a coal-burning and a nuclear power plant differ?
 - The coal plant releases CO₂ and no radiation, whereas the nuclear plant releases radiation and CO₂.
 - The coal plant releases no radiation, but the nuclear plant does.
 - The coal plant boils water with a coal fire, the nuclear plant boils water with the heat from a nuclear fission reaction.
 - All of these are correct.

- Which of these was associated with the Chernobyl nuclear accident?
 - A fire broke out in the reactor core, causing a steam explosion that blew the roof off the building, releasing radioactivity into the environment, and killing 31 people.
 - There was a partial meltdown of the reactor core due to malfunctioning pumps.
 - 1 millisievert of radiation was released.
 - All of these are correct.
 - None of these are correct.
- In the U.S., high-level nuclear waste is currently stored in .
 - Washington, DC
 - pools of water at each nuclear power generating facility
 - South Carolina
 - Washington State
 - Yucca Mountain, Nevada
- Which of the following is a disadvantage associated with nuclear power?
 - We will run out of uranium in 10 years.
 - Nuclear waste generates the precursors to acid rain.
 - Excessive CO₂ is produced, which causes global warming.
 - The decommissioning of nuclear power plants and the safe disposal of nuclear waste are unresolved.
 - All of these are disadvantages.
- Which of the following are advantages associated with nuclear power?
 - It does not pollute the air with particulates, sulfur and nitrogen compounds like fossil fuel plants.
 - It does not produce CO₂ like fossil-fuel burning plants do.
 - It is safer than other sources of energy production.
 - It is less costly at present than other forms of energy that do not generate CO₂.
 - All of these are correct.
- A reactor produces more fuel than it uses.
 - nuclear fission
 - burner
 - nuclear fusion
 - breeder
 - None of these are correct.
- If all of the nuclear reactors online today were to increase power production to 40% of the total electricity produced, the supply of uranium-235 fuel would be exhausted in:
 - 3 years
 - 30 years
 - 300 years
 - We will never run out of uranium.
- All of the following are units used to measure radiation except:

- a. Becquerel
 - b. Curies
 - c. roentgen
 - d. sievert
 - e. Geiger
13. The dominant isotope in uranium ore is:
- a. U-235
 - b. U-236
 - c. U-237
 - d. U-238
14. The unit of radiation called the "rad" measures:
- a. radioactive decay.
 - b. absorbed dose of radiation.
 - c. the biological damage that is caused by different types of radiation.
 - d. the amount of power created by the fission process.
15. The fusion of two hydrogen atoms results in:
- a. a hydrogen molecule, H_2
 - b. a helium atom, He
 - c. an oxygen atom, O
 - d. a carbon atom, C

