

## Teacher's Guide: Thinking about Energy Survey Answer Key

Note: Included below is the answer key for the *Thinking about Energy* survey. The student version will be accessed via the internet as an html document with interactive animations at: [http://www.pspb.org/e21/media/student\\_energy\\_survey.html](http://www.pspb.org/e21/media/student_energy_survey.html). Note: You will need to print out the student answer sheets for the energy survey from the E21 web site.

### The Warm-Up...

1. Energy is only found in living things.
  - a. True
  - b. False**
2. The sun emits wavelengths of visible light, infrared, and ultraviolet radiation.
  - a. **True**
  - b. False
3. Which of the following are renewable resources? Check all that apply.
  - a. **Biomass**
  - b. Coal
  - c. **Flowing water**
  - d. Natural gas
  - e. Petroleum
  - f. **Solar energy**
  - g. Uranium
  - h. **Wind**
4. Beside oil, the United States has only two other natural resource alternatives: coal and nuclear power.
  - a. True
  - b. False**
5. Finding new technologies to meet all of our growing need for power is the only thing we can do to meet future energy demands.
  - a. True
  - b. False**

### [Energy Basics Animation]

OK, now that you are warmed up, investigate the “**Energy Basics**” animation above and answer the questions below.

6. The amount of heat energy is the same in the teapot and the mug.
  - a. True
  - b. False**
7. The glowing red coil of the range transforms electrical energy to heat energy. It does **not** transform electrical energy to light energy.

- a. True
  - b. **False**
8. The energy in this system is used up when the water boils and steam forms.
- a. True
  - b. **False**
9. The bubbles created when the water boils are air.
- a. True
  - b. **False**
10. The hot water in the pot has more thermal energy than 5 cold swimming pools.
- a. True
  - b. **False**
11. The longer water boils, the hotter it gets.
- a. True
  - b. **False**

**[Students view Photovoltaic Interactive]**

Please take a look at the “**Clean Power**” animation above and answer the following questions.

12. The photovoltaic cells in the photo above can convert one form of energy into another. What would be the most likely energy transformation from these photovoltaic cells?
- a. Chemical energy to electrical energy
  - b. Mechanical energy to electrical energy
  - c. **Light energy to electrical energy**
  - d. Kinetic energy to electrical energy
13. Which of the following would affect how well the solar panels work to produce electricity?
- a. Cold temperature
  - b. **Dense clouds**
  - c. Severe drought
  - d. Strong winds
14. Sunlight is a renewable resource that directly or indirectly provides most of the usable energy on Earth.
- a. **True**
  - b. False
15. The electricity produced by a solar panel is a fuel.
- a. True
  - b. **False**

16. Photovoltaic systems like solar panels cause electricity to flow through conductors.
- True**
  - False
17. Which of the following is not an advantage of using solar energy?
- Abundant supply
  - Simple to operate
  - Doesn't produce air pollution
  - Low cost to produce and install**
18. The energy that we get from burning fuels can be recycled through our ecosystem many times.
- True
  - False**
19. Resources such as the wind, solar energy, and the use of plant biomass are considered nonrenewable resources because they cannot be replenished as they are used up.
- True
  - False**
20. Which of the following is least likely to be considered an alternative energy source?
- Biomass
  - Geothermal energy
  - Fuel cells
  - Diesel generator**

### **Conservation and Efficiency:**

Examine the pictures below and answer the following questions.

[Students view digital images of the appliances listed in Question 21 below]

21. Which of these appliances typically uses the most energy?
- Lamp
  - Small television
  - Refrigerator**
  - Electric clock
22. Most of the electricity that Pennsylvanians use to power our homes and gadgets comes from which of the following?
- Hydrogen (fuel cells)
  - Fossil fuels**
  - Nuclear power plants
  - Power line

23. The top three energy sources used to produce electricity in the United States are:
- Hydrogen, petroleum, and hydroelectric
  - Coal, natural gas, and nuclear**
  - Nuclear, coal, and wind
  - Petroleum, hydroelectric, and natural gas
24. Which of the following is a source of energy that is unlikely to “run out”? Choose one.
- Natural gas
  - Hydroelectric power
  - Sunlight**
  - Nuclear power
25. Which of the following are advantages to using renewable energy resources? Check all that apply.
- Decrease in wildlife niches
  - Unlimited supplies**
  - Decrease in foreign resource dependence**
  - Cost of installation
  - Decrease in usable land area
  - Cost of materials needed
  - Decrease in greenhouse gas emissions**
26. Fossil fuels will provide energy for a limited period of time, because they will eventually be depleted. Which of the following are renewable alternative energy sources that could reduce the use of fossil fuels? Check all that apply.
- Hydroelectric power**
  - Natural gas
  - Petroleum
  - Solar power**
  - Wind**
  - Uranium
27. Which of the following are ways you can individually conserve energy? Check all that apply.
- Walk to school**
  - Take baths instead of showers
  - Recycle your soda cans**
  - Water your lawn at mid-day, when plants need the water
  - Replace light bulbs with low watt halogen bulbs**
  - When you leave a room, leave the lights on if you will return within three hours
  - Ask your parents to use energy efficient appliances**
  - Use the bus instead of driving or riding in your own car**