

# Active Reading

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## Section 1: Energy Resources and Fossil Fuels

Read the passage below and answer the questions that follow.

When petroleum fuels are burned, they release pollutants. Internal combustion engines in vehicles that burn gasoline and diesel pollute the air in many cities. These pollutants contribute to the formation of smog and cause health problems. Emissions regulations and technology such as catalytic converters have reduced air pollution in many areas. However, in developing countries, cars are generally older, and the gasoline that they burn contains significantly more sulfur, a pollutant that contributes to acid precipitation. In addition, the carbon dioxide released from burning petroleum fuels may contribute to climate change.

Oil spills are another potential environmental problem of oil use. Drilling in deep water or very cold ecosystems is increasing, and potential spills from the drilling process are problematic. Compared with surface wells, stopping leaks is very difficult when the wellhead is 5,000 feet under water. In arctic ecosystems, cold temperatures hinder clean-up efforts. Non-point pollution from everyday sources, such as leaking cars or improperly handled motor oil, adds more pollution to waterways but is less obvious to the public.

### IDENTIFYING MAIN IDEAS

One reading skill is the ability to identify the main idea of a passage. The main idea is the main focus or key idea. Frequently, a main idea is accompanied by supporting information that offers detailed facts about the main idea.

Read each question and write the answer in the space provided.

1. What are two potential hazards associated with oil use?

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2. What is one reason the air in cities is often polluted?

\_\_\_\_\_

3. What factor might be contributing to climate change?

\_\_\_\_\_

4. What are issues associated with drilling in deep water and cold ecosystems?

\_\_\_\_\_

**Active Reading** *continued*

**RECOGNIZING SIMILARITIES AND DIFFERENCES**

One reading skill is the ability to recognize similarities and differences between two phrases, ideas, or things. This is sometimes known as comparing and contrasting.

**Read each question and write the answer in the space provided.**

5. What is the difference between cars in developed countries and cars in developing countries?

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**RECOGNIZING CAUSE AND EFFECT**

One reading skill is the ability to recognize cause and effect.

**Read each question and write the answer in the space provided.**

6. What negative effects do pollutants from vehicles cause in cities?

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7. What problem does the burning of gasoline with sulfur contribute to?

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8. Name two things that have reduced air pollution in many areas.

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9. What does the author suggest will reduce the negative effects of using oil?

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# Your Household Energy Consumption

We use electricity for many activities at home, such as drying clothes, cooking food, and heating and cooling. The total amount of energy that we use depends both on how much energy each individual appliance consumes and on how long we use the appliance each day. In this lab, you will survey your household to determine how much electricity you consume and you will analyze an electric bill to calculate how much you pay for your electricity.

## OBJECTIVES

**Identify** the ways in which electricity is consumed in your household.

**Compute** the energy consumption of your household.

**Interpret** an electric utility bill and an electric meter.

## MATERIALS

- calculator
- electric bill
- notebook
- pen or pencil



## Procedure

1. To determine daily energy consumption in kilowatt-hours, divide the wattage of an appliance by 1,000 and then multiply by the number of hours the item is used per day.
2. Walk through your home, and identify all appliances and devices that use electricity. List each item in the table below.

Appliance	Energy Consumed In 1 Hour (watts)	Hours Used (per day)	Daily Energy Consumption (Kwh)

*continued*

3. Fill in each column in the table on page 52. Determine the wattage of each item by referring to the table on page 55.
  4. Find the electric meter. It may be on an outside wall of your house or apartment building. Record the current reading on the meter. The reading may change as you watch it. If so, electricity is currently being consumed in your household. If the reading is changing, write down an estimate of the current reading.
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1. Add up the energy consumption per day for all items. This number is the total energy consumed by your household in one day.
  
  2. On your electric bill, find the total number of kilowatt-hours consumed during this time period. An electric bill usually lists a meter reading for the beginning of the time period and for the end of the time period. The difference is the energy consumption in kilowatt-hours.
  
  3. Divide the number of kilowatt-hours from your electric bill by the number of days in the time period. This number reflects the average daily energy consumption for this time period.
  
  4. Compare the daily energy consumption that you calculated from your home survey with the average calculated from your electric bill. Is there a difference? If so, what could explain the difference?



Your Household Energy Consumption *continued***ENERGY CONSUMPTION FOR COMMON HOUSEHOLD APPLIANCES**

<b>Appliance</b>	<b>Energy consumed in 1 hour (watts)</b>
Ceiling fan	120
Clock radio	10
Clothes washer	425
Clothes dryer (electric)	3,400
Coffee maker	1,050
Dishwasher	1,800
Hair dryer	1,500
Heater (portable)	1,100
Iron	1,400
Light bulbs	60, 75, 100
Microwave oven	900
Personal computer	270
Refrigerator (frost free, 16 ft <sup>3</sup> )	725
Stereo	400
Television (color)	130
Toaster	1,100
Toaster oven	1,225
Vacuum cleaner	1,200
VCR/DVD	19/22
Water heater (40 gal)	5,000
Water pump (deep well)	650
Window fan	150

# Active Reading

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## Section 2: Nuclear Energy

Read the passage below and answer the questions that follow.

Inside a reactor, metal fuel rods that contain solid uranium pellets are bombarded with neutrons. The chain reaction that results releases energy and produces more neutrons. The reactor core contains control rods that control the rate of fission in the reactor. They do this by absorbing neutrons, which prevents the neutrons from causing fission reactions in the uranium fuel.

The heat released during nuclear reactions is used to generate electricity in the same way that power plants burn fossil fuels to generate electricity. In a nuclear power plant, energy released from the fission reactions heats a closed loop of water that heats another body of water. As the water boils, it produces steam that drives a steam turbine, which is used to generate electricity.

### IDENTIFYING MAIN IDEAS

One reading skill is the ability to identify the main idea of a passage. The main idea is the main focus or key idea. Frequently, a main idea is accompanied by supporting information that offers detailed facts about the main idea.

Read each question and write the answer in the space provided.

1. What must metal fuel rods inside a nuclear reactor be bombarded with in order to start a chain reaction?

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### RECOGNIZING CAUSE AND EFFECT

One reading skill is the ability to recognize cause and effect.

Read each question and write your answer in the space provided.

2. How can the rate of fission in a reactor be controlled?

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3. What happens when the control rods in a reactor core are completely lowered between the fuel rods?

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**SEQUENCING INFORMATION**

One reading skill is the ability to sequence information, or to logically place items or events in the order in which they occur.

**Sequence the statements below to show the steps in the process of how nuclear energy generates electricity. Write “1” on the line in front of the first step, “2” on the line in front of the second step, and so on.**

- \_\_\_\_\_ 4. The closed loop of water heats another body of water.
- \_\_\_\_\_ 5. A chain reaction results that releases energy and produces more neutrons.
- \_\_\_\_\_ 6. The body of water boils.
- \_\_\_\_\_ 7. Energy released from the fission reaction heats a closed loop of water.
- \_\_\_\_\_ 8. The boiling water produces steam.
- \_\_\_\_\_ 9. Metal fuel rods containing uranium pellets are bombarded with neutrons.
- \_\_\_\_\_ 10. The turbine generates electricity.
- \_\_\_\_\_ 11. The steam drives a steam turbine.

**RECOGNIZING SIMILARITIES AND DIFFERENCES**

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**Read each question and write the answer in the space provided.**

12. How are nuclear power plants like other power plants?

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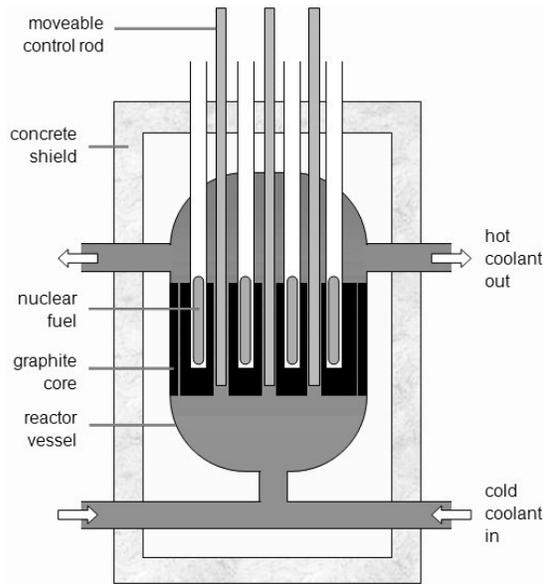
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13. How are nuclear power plants different from other power plants?

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**DAY 15: How Nuclear Reactors Work**  
**Use the 17.2 Active Reading pages if needed!**



N\_\_\_\_\_ reactors use rods of u\_\_\_\_\_ that are rich in  $^{235}\text{U}$  as "fuel" for f\_\_\_\_\_ reactions.

These fission reactions produce more n\_\_\_\_\_ which induce other nuclei to fission - this is called a c\_\_\_\_\_ r\_\_\_\_\_.

The neutrons will only cause a chain reaction if they are s\_\_\_\_\_ down, which allows them to be captured by the uranium nuclei.

Fuel rods need to be placed in a moderator (for example water or g\_\_\_\_\_ ) to slow down and/or absorb neutrons. Coolant is sent around the reactor to remove heat produced by the fission. Often, the same w\_\_\_\_\_ that is being used in the reactor as a m\_\_\_\_\_ is used. The heat from the reactor can be used to make s\_\_\_\_\_ for powering e\_\_\_\_\_ generating turbines.

The chain reaction needs to continue at a steady rate. C\_\_\_\_\_ r\_\_\_\_\_ control the chain reaction by limiting the number of neutrons in the reactor. They are made of a material that a\_\_\_\_\_ neutrons, such as boron, and can be inserted by varying amounts to control the chain reaction. The nuclear reactor is surrounded by a thick c\_\_\_\_\_ case, which acts as shielding. This prevents radiation escaping and reaching the people working in the power station.

In an e\_\_\_\_\_, the r\_\_\_\_\_ can be shut down automatically by the release of control rods into the reactor. The control rods are l\_\_\_\_\_ fully into the reactor, which slows down the reaction as quickly as possible.

emergency    absorb    lowered    neutrons    graphite  
 electricity    chain reaction    reactor    fission    steam    concrete  
 control rods    slowed    nuclear    uranium    moderator    water

