2011-2012

Primary Energy Infobook Activities

A companion workbook to the Primary Energy Infobook: activities to reinforce basic energy information and introductory facts about the energy sources.

NEED

National Energy Education Development Project

ENERGY SOURCES

E GENERAL ENERGY

Grade Level:

- Primary

Subject Areas:

- Science
- Social Studies
- Language Arts

Teacher Advisory Board

NEED Mission Statement

The mission of The NEED Project is to promote an energy conscious and educated society by creating effective networks of students, educators, business, government and community leaders to design and deliver objective, multi-sided energy education programs.

Teacher Advisory Board Statement

In support of NEED, the national Teacher Advisory Board (TAB) is dedicated to developing and promoting standards-based energy curriculum and training.

Permission to Copy

Energy Data Used in NEED Materials

NEED believes in providing the most recently reported energy data available to our teachers and students. Most statistics and data are derived from the U.S. Energy Information Administration's Annual Energy Review that is published in June of each year. Working in partnership with EIA, NEED includes easy to understand data in our curriculum materials. To do further research, visit the EIA website at www.eia.doe.gov. EIA's Energy Kids site has great lessons and activities for students at www.eia.doe.gov/kids.

NEED
National Energy Education Development

1.800.875.5029
www.NEED.org

Printed on Recycled Paper

Primary Energy Infobook Activities

NEED Curriculum Resources

For more in-depth information, inquiry investigations, and engaging activities, download these curriculum resources from www.NEED.org.

- Primary Energy Infobook
- Energy Stories and More

Table of Contents

Correlations to National Science Education Standards: K-4

This book has been correlated to National Science Education Content Standards.

For correlations to individual state standards, visit **www.NEED.org**.

Content Standard B | *PHYSICAL SCIENCE*

- **Properties of Objects and Materials**
  - Objects have many observable properties, including size, weight, shape, color, temperature, and the ability to react with other substances. Those properties can be measured using tools, such as rulers, balances, and thermometers.
- **Position and Motion of Objects**
  - The position of an object can be described by locating it relative to another object or the background.
  - The position and motion of objects can be changed by pushing or pulling. The size of the change is related to the strength of the push or pull.
  - Sound is produced by vibrating objects. The pitch of the sound can be varied by changing the rate of vibration.
- **Light, Heat, Electricity, and Magnetism**
  - Light travels in a straight line until it strikes an object. Light can be reflected by a mirror, refracted by a lens, or absorbed by the object.
  - Heat can be produced in many ways, such as burning, rubbing, or mixing one substance with another. Heat can move from one object to another by conduction.
  - Electricity in circuits can produce light, heat, sound, and magnetic effects. Electrical circuits require a complete loop through which an electrical current can pass.

Content Standard D | *EARTH AND SPACE SCIENCE*

- **Properties of Earth Materials**
  - Earth materials are solid rocks and soils, water, and the gases of the atmosphere. The varied materials have different physical and chemical properties, which make them useful in different ways, for example, as building materials, as sources of fuel, or for growing the plants we use as food. Earth materials provide many of the resources that humans use.

Teacher Guide

Background

Primary Energy Infobook Activities is a series of student worksheets designed to reinforce the vocabulary and energy information in the *Primary Energy Infobook*.

Skills

- Nonfiction Reading
- Critical Thinking
- Vocabulary

Preparation

- Decide which worksheets you will use and make copies for each student.
- Duplicate and enlarge the energy sources graphics on pages 13-17 as visual aids when teaching the students the energy chants on pages 11-12.

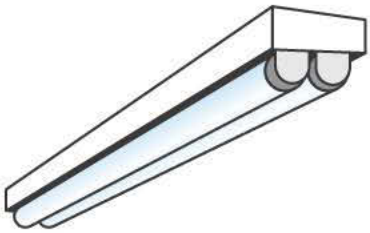
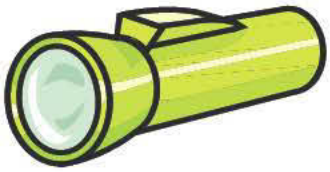
Procedure

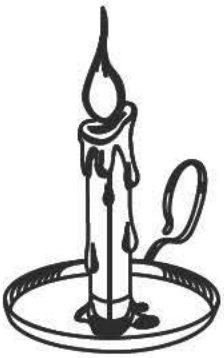
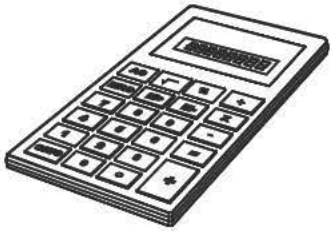
- After you have read the *Primary Energy Infobook* to the students and discussed the information, have the students complete the worksheets on *Light, Heat, Motion*, *Sound,* and *Growth*. Discuss the worksheets with the students.
- Using the energy source graphics, teach the students the energy chants.
- Have the students complete the energy source worksheets on pages 18-21. Discuss the answers when completed.
- Have the students make a multi-level flip book of the tasks energy performs or of one of the energy sources.
- Use the *Evaluation Form* on page 27 to evaluate the activities.

NOTE: *Energy Stories and More* contains short stories and hands-on activities to further reinforce the information presented in the *Primary Energy Infobook*. Download *Energy Stories and More* from www.NEED.org.

Light

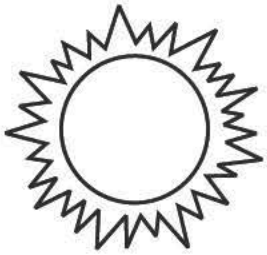
Draw a circle around the objects that people use for light.

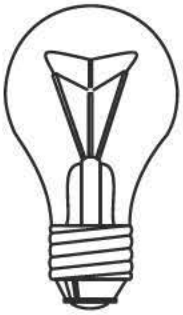


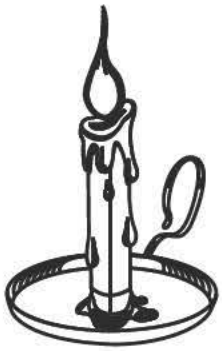


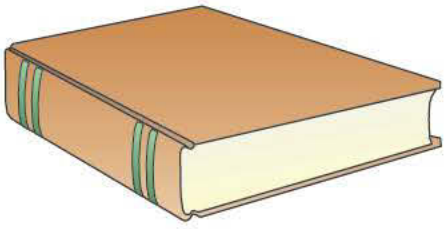


Heat

Draw a circle around the objects that people use for heat.



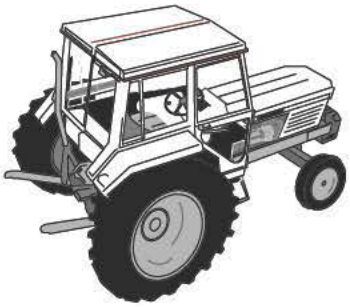




Motion

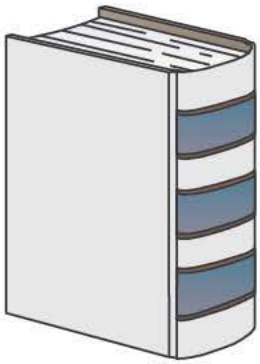
Draw a circle around the objects that burn fuel to move.

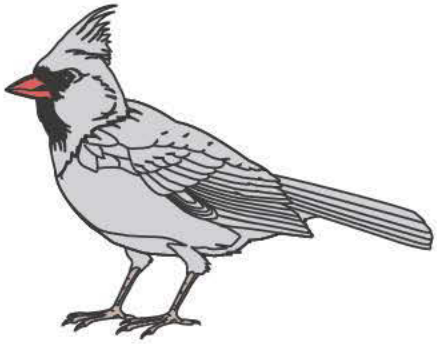
Color the objects that need "people power" to move.

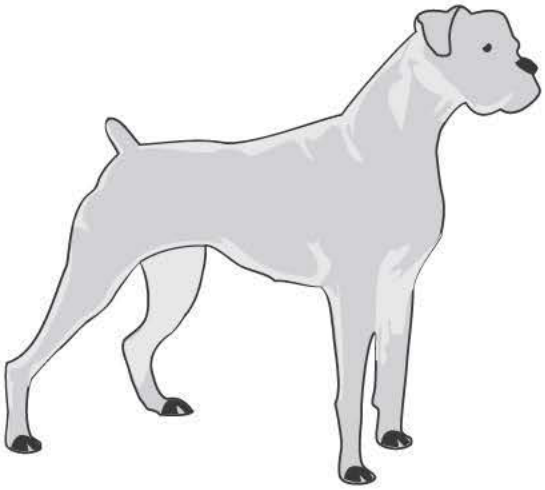


Sound

Draw a circle around the objects that send warnings with sound.



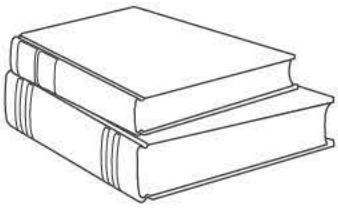


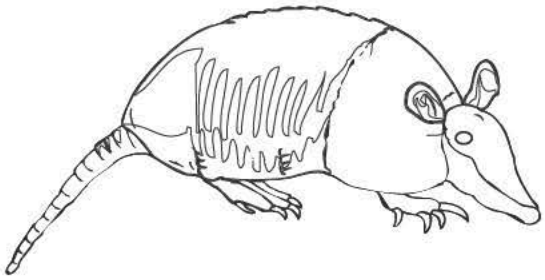


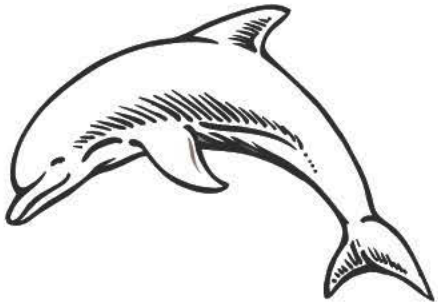
Growth

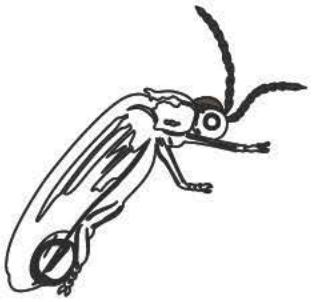
☒ Make an X on the objects that DO NOT use the sun's energy to grow.

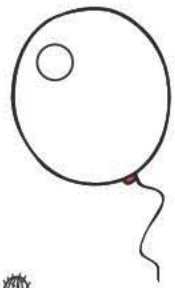
Color the objects that need the sun's energy to grow.

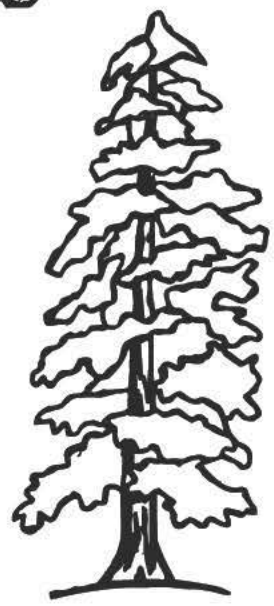


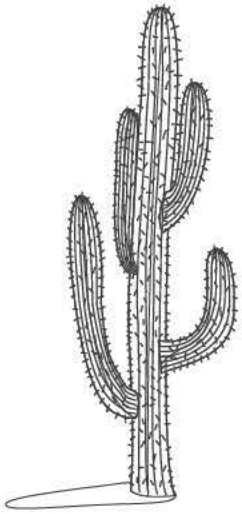












Renewable Energy Chants

BIOMASS

Garbage, wood, landfill gas…it's all BIOMASS!

Start with your hands down, then move them over your head and out like a tree. Hold your nose at "garbage," then shake your hands in front of you as you shout "BIOMASS."

GEOTHERMAL

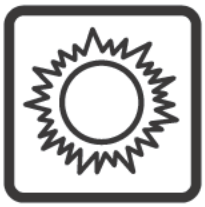
Geo-Earth, Thermal-heat—GEOTHERMAL—Earth-heat!

Hold arms in a circle in front of you during "Geo-Earth." Cross arms and hug yourself for "Thermal-heat." Shout "GEOTHERMAL," then repeat the motions quickly for "Earth-heat."

HYDROPOWER

Falling water, HYDROPOWER, HYDROPOWER!

With your finger tips touching, hold your hands under your chin and glide your hands down like a waterfall during "Falling water." For "HYDROPOWER, HYDROPOWER" spin your hands like a turbine.



SOLAR

SOLAR ENERGY—sun shine bright, SOLAR ENERGY—give me light!

Begin with arms over head in a big circle, swaying from side to side during "SOLAR ENERGY." Spread arms out wide during "sun shine bright." Repeat motions for second part of chant.

WIND

Energy is flowin' in the WIND!

Make big arm circles, mimicking a windmill, as you say this chant.

Nonrenewable Energy Chants

COAL

COAL in the hole—makes light in the night!

During "COAL in the hole," point down with thumbs, hands in fists. During "makes light in the night," point thumbs upward in rhythm with the cadence of the chant.

NATURAL GAS

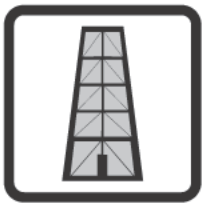
Burn clean, burn fast—NATURAL GAS!

During "Burn clean," bring one hand up in front of you, palm facing inward. During "burn fast," bring the other hand up to the first hand. During "NATURAL GAS," move hands upward together to make the shape of a flame.

URANIUM

URANIUM, URANIUM—split goes the atom!

Clap twice during "URANIUM, URANIUM." During "split goes the atom," clap and bring hands out and up, representing the splitting atom.



PETROLEUM

Pump, pump—PETROLEUM!

Place hands together in fists in front of you. During "Pump, pump," partially extend fingers twice and return them to a fist. During "PETROLEUM," fully extend hands and move them upward, representing oil shooting from a well.

PROPANE

Put a little pressure on me—PROPANE!

Begin with hands wide apart and bring palms closer together at each word of the chant.

BIOMASS

COAL

GEOTHERMAL

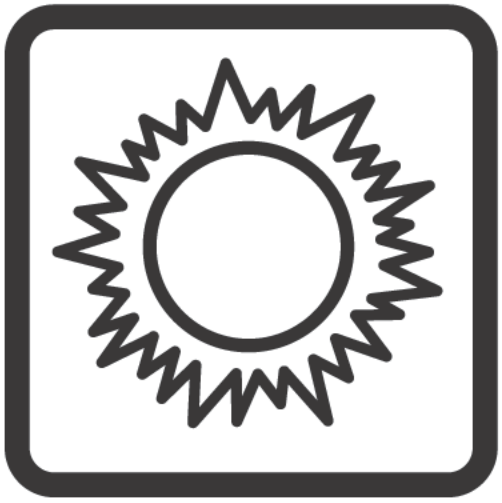
HYDROPOWER

NATURAL GAS

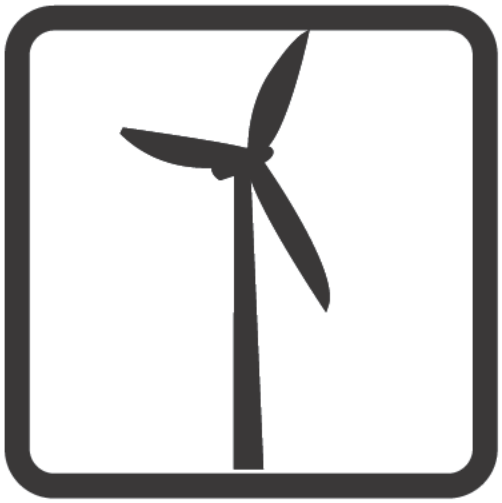
URANIUM

PETROLEUM

PROPANE



SOLAR



WIND

Energy Source Matching

Write the number of the energy source on the line next to its symbol.

1. Petroleum (oil) _____

2. Wind _____

3. Biomass _____

4. Uranium _____

5. Propane _____

6. Solar _____

7. Geothermal _____

8. Hydropower _____

9. Coal _____

10. Natural Gas _____

Energy Source Matching

Write the number of the energy source on the line next to its definition.

1. Petroleum (oil)	_____	**Black rock burned to make electricity.**
2. Wind	_____	**Energy from heat inside the Earth.**
3. Biomass	_____	**Energy from flowing water.**
4. Uranium	_____	**Energy from wood, waste, and garbage.**
5. Propane	_____	**Energy from moving air.**
6. Solar	_____	**Energy from splitting atoms.**
7. Geothermal	_____	**Portable fossil fuel gas often used in grills.**
8. Hydropower	_____	**Fossil fuel for cars, trucks, and jets.**
9. Coal	_____	**Fossil fuel gas moved by pipeline.**
10. Natural Gas	_____	**Energy in rays from the sun.**

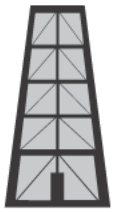
Renewable or Nonrenewable?

Draw a circle around the renewables.

Draw a square around the nonrenewables.

Biomass

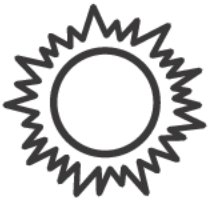
Coal



Petroleum

Propane

Geothermal



Solar

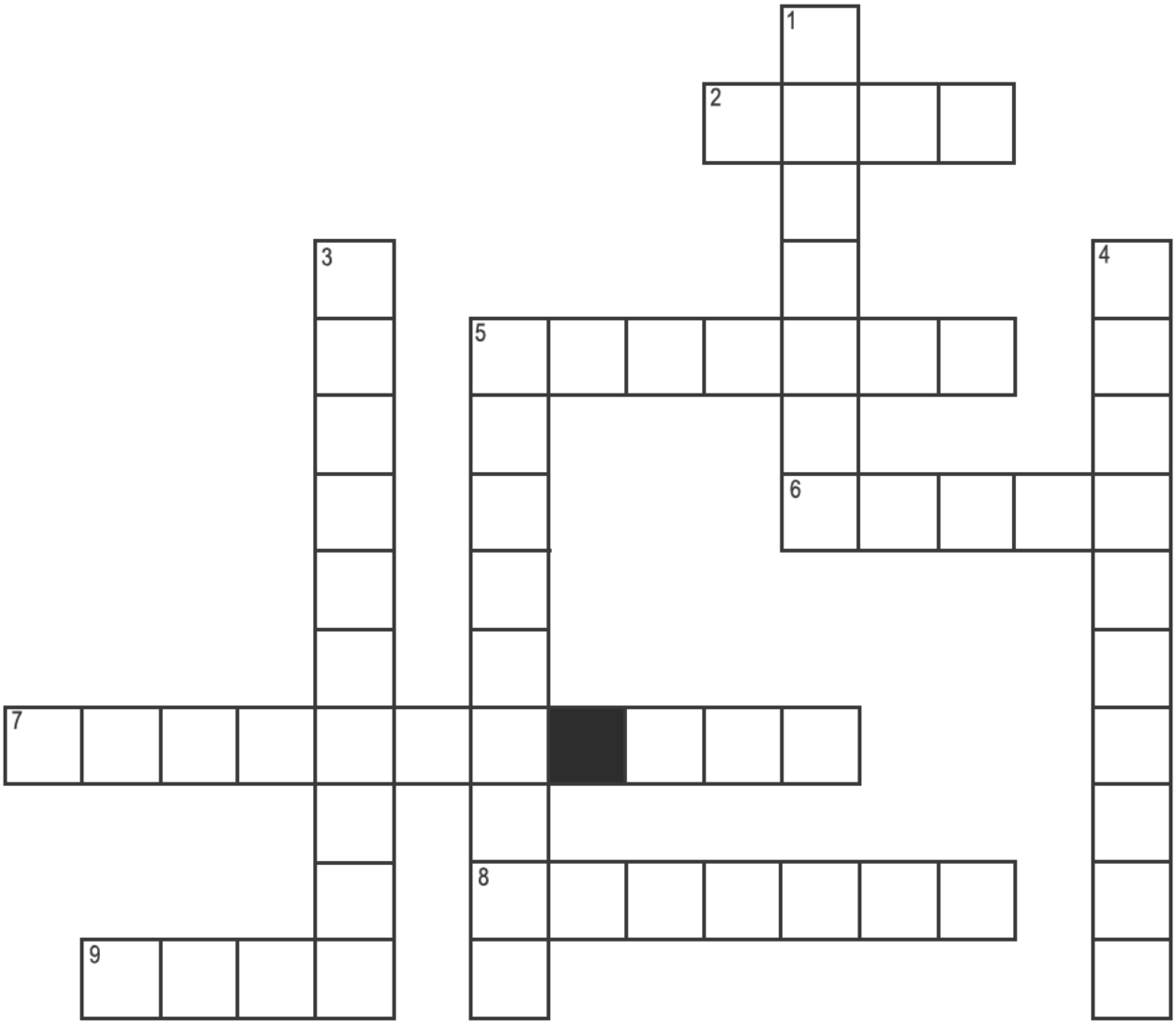
Hydropower

Uranium

Natural Gas

Wind

Energy Source Crossword



ACROSS

2. The energy of moving air.

5. The portable gas.

6. Energy from the sun.

7. Gas moved in pipelines.

8. An atom of this element can split.

9. Black, solid fossil fuel.

DOWN

1. The energy in waste and wood.

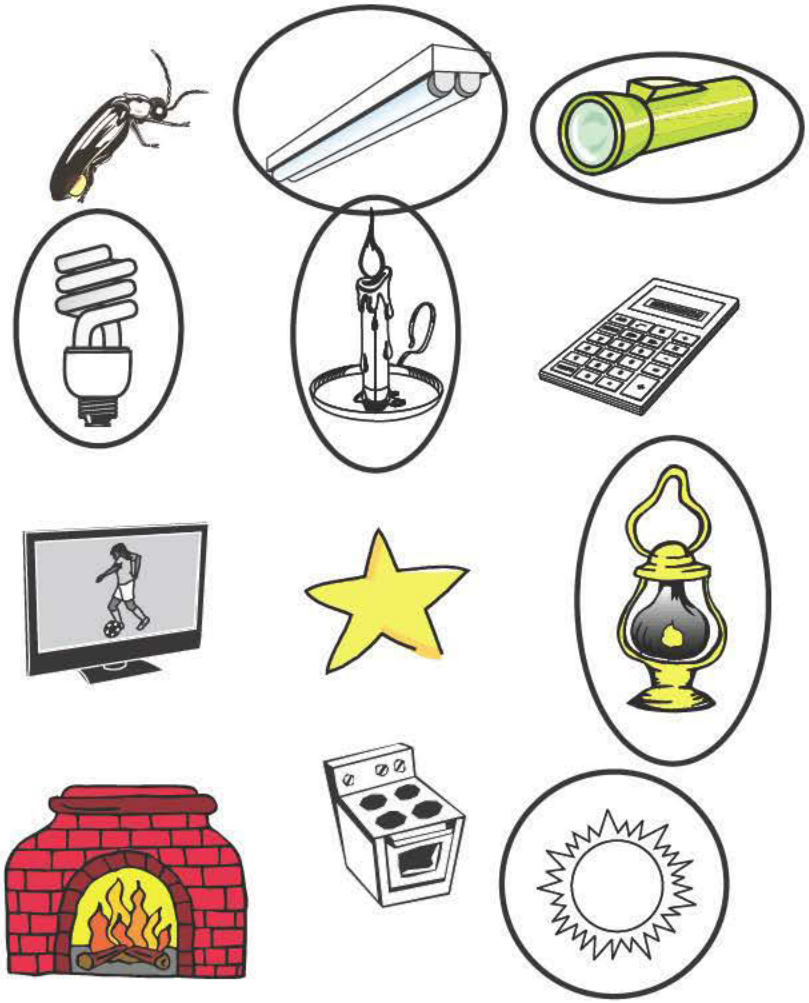
3. Heat energy from inside the earth.

4. The energy in flowing water.

5. Liquid fossil fuel.

Light Answer Key

Draw a circle around the objects that people use for light.



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Motion Answer Key

Draw a circle around the objects that burn fuel to move.

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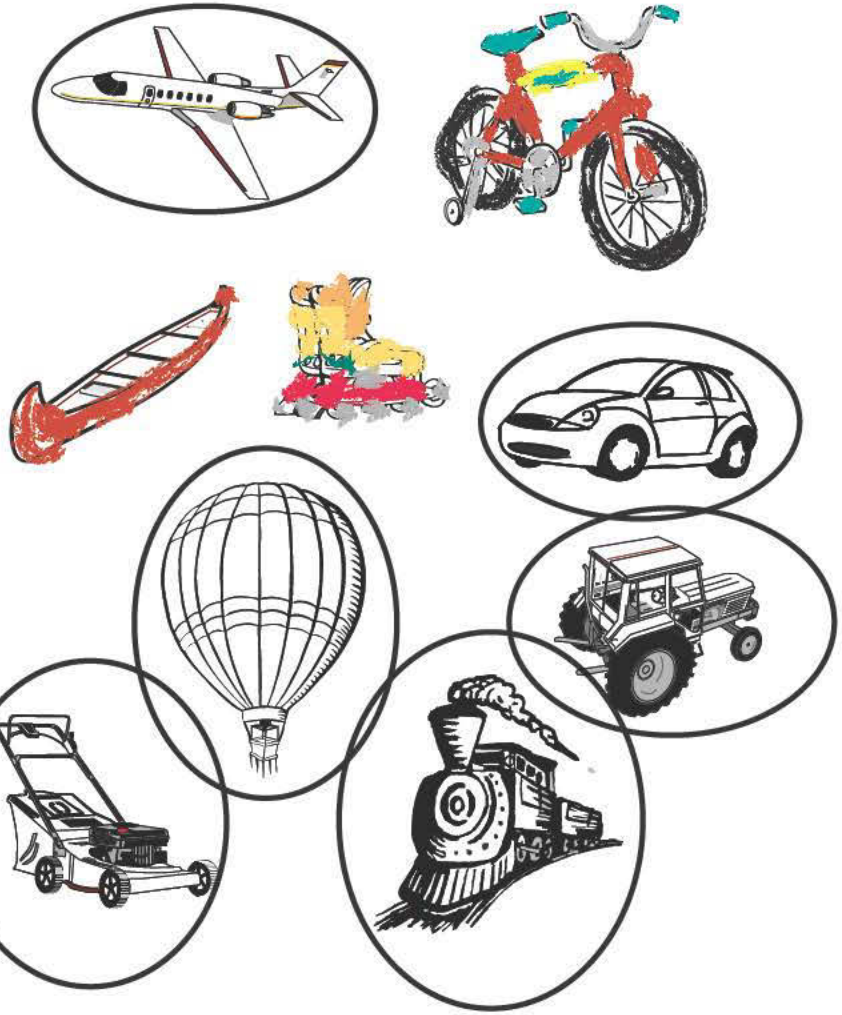


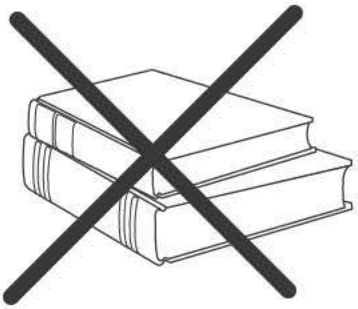
Sound Answer Key

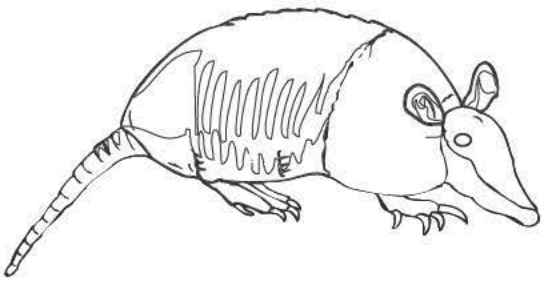
Draw a circle around the objects that send warnings with sound.

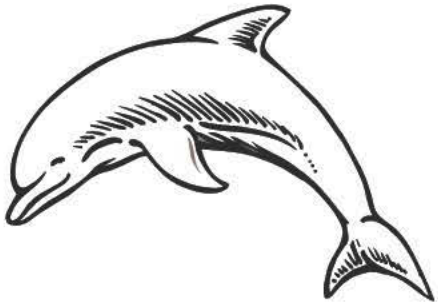
Growth Answer Key

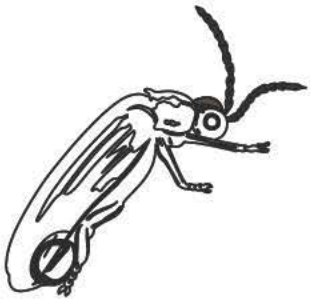
☒ Make an X on the objects that DO NOT use the sun's energy to grow.

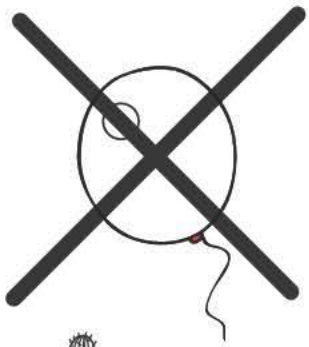
Color the objects that need the sun's energy to grow.

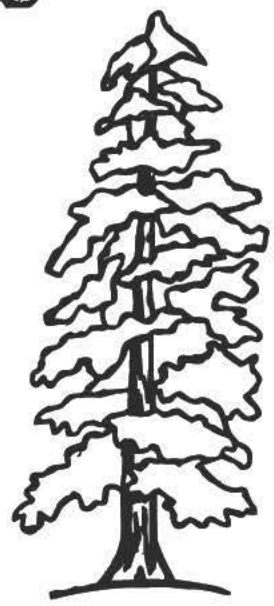


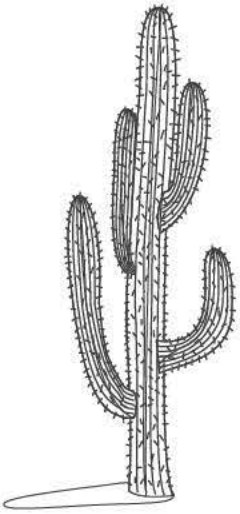












Energy Source Matching (page 18) Answer Key

Write the number of the energy source on the line next to its symbol.

1. Petroleum (oil) ___3___
2. Wind ___4___
3. Biomass ___7___
4. Uranium ___8___
5. Propane ___10___
6. Solar ___1___
7. Geothermal ___5___
8. Hydropower ___6___
9. Coal ___9___
10. Natural Gas ___2___

Energy Source Matching (page 19) Answer Key

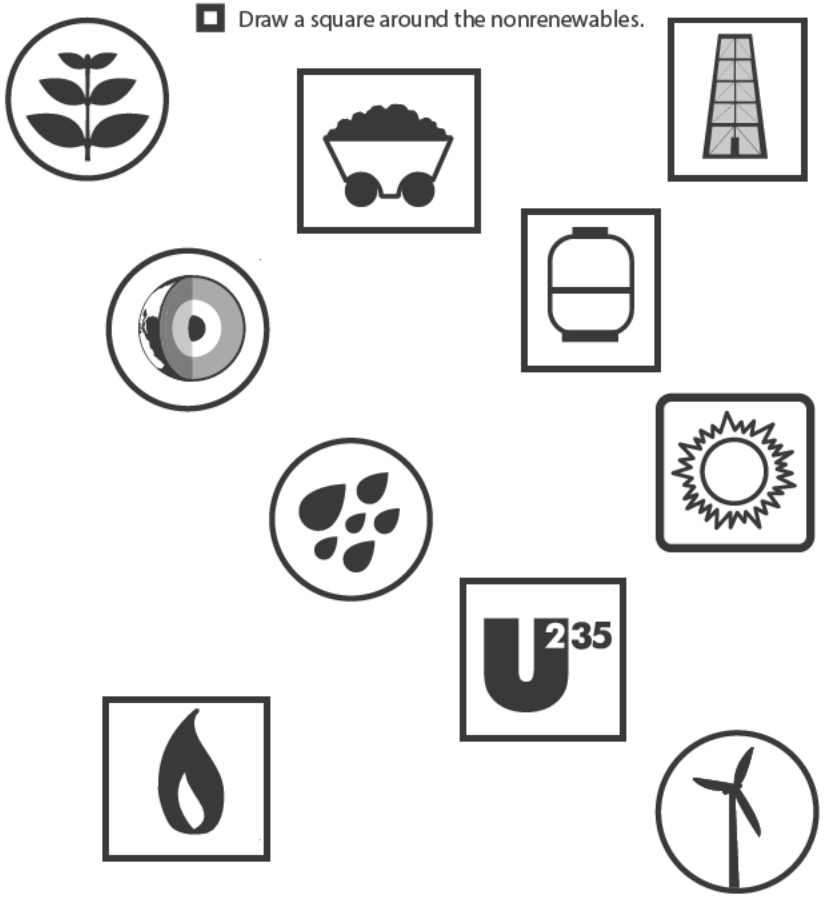
Write the number of the energy source on the line next to its definition.

1. Petroleum (oil)	___9___	Black rock burned to make electricity.
2. Wind	___7___	Energy from heat inside the Earth.
3. Biomass	___8___	Energy from flowing water.
4. Uranium	___3___	Energy from wood, waste, and garbage.
5. Propane	___2___	Energy from moving air.
6. Solar	___4___	Energy from splitting atoms.
7. Geothermal	___5___	Portable fossil fuel gas often used in grills.
8. Hydropower	___1___	Fossil fuel for cars, trucks, and jets.
9. Coal	___10___	Fossil fuel gas moved by pipeline.
10. Natural Gas	___6___	Energy in rays from the sun.

Renewable or Nonrenewable?

Draw a circle around the renewables.

Draw a square around the nonrenewables.



Energy Source Crossword

ACROSS

2. The energy of moving air.
5. The portable gas.
6. Energy from the sun.
7. Gas moved in pipelines.
8. An atom of this element can split.
9. Black, solid fossil fuel.

DOWN

1. The energy in waste and wood.
3. Heat energy from inside the earth.
4. The energy in flowing water.
5. Liquid fossil fuel.

Primary Energy Infobook Activities Evaluation Form

State: _____ **Grade Level:** _____ **Number of Students:** _____

1. Did you conduct the entire activity?	❑ Yes	❑ No
2. Were the instructions clear and easy to follow?	❑ Yes	❑ No
3. Did the activity meet your academic objectives?	❑ Yes	❑ No
4. Was the activity age appropriate?	❑ Yes	❑ No
5. Were the allotted times sufficient to conduct the activities?	❑ Yes	❑ No
6. Was the activity easy to use?	❑ Yes	❑ No
7. Was the preparation required acceptable for the activity?	❑ Yes	❑ No
8. Were the students interested and motivated?	❑ Yes	❑ No
9. Was the energy knowledge content age appropriate?	❑ Yes	❑ No
10. Would you teach this activity again?	❑ Yes	❑ No

Please explain any 'no' statement below.

How would you rate the activity overall?	❑ excellent	❑ good	❑ fair	❑ poor
How would your students rate the activity overall?	❑ excellent	❑ good	❑ fair	❑ poor

What would make the activity more useful to you?

Other Comments:

Please fax or mail to: **The NEED Project**
P.O. Box 10101
Manassas, VA 20108
FAX: 1-800-847-1820

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BP
BP Alaska
C&E Operators
Cape and Islands Self Reliance
Cape Cod Cooperative Extension
Cape Light Compact–Massachusetts
L.J. and Wilma Carr
Central Virginia Community College
Chevron
Chevron Energy Solutions
ComEd
ConEd Solutions
ConocoPhillips
Council on Foreign Relations
CPS Energy
Dart Foundation
David Petroleum Corporation
Desk and Derrick of Roswell, NM
Dominion
Dominion Foundation
Duke Energy
East Kentucky Power
El Paso Foundation
E.M.G. Oil Properties
Encana
Encana Cares Foundation
Energy Education for Michigan
Energy Training Solutions
Energy Solutions Foundation
Entergy
Equitable Resources
First Roswell Company
Foundation for Environmental Education
FPL
The Franklin Institute
GenOn Energy–California
Georgia Environmental Facilities Authority
Georgia Power
Government of Thailand–Energy Ministry
Guam Energy Office
Gulf Power
Halliburton Foundation
Gerald Harrington, Geologist
Houston Museum of Natural Science
Hydro Research Foundation
Idaho Department of Education
Idaho National Laboratory
Illinois Clean Energy Community Foundation
Independent Petroleum Association of America
Independent Petroleum Association of New Mexico
Indiana Michigan Power
Interstate Renewable Energy Council
iStem–Idaho STEM Education
Kansas City Power and Light
KBR
Kentucky Clean Fuels Coalition
Kentucky Department of Education
Kentucky Department of Energy Development and Independence
Kentucky Oil and Gas Association
Kentucky Propane Education and Research Council
Kentucky River Properties LLC
Kentucky Utilities Company
Lenfest Foundation
Littler Mendelson
Llano Land and Exploration
Los Alamos National Laboratory
Louisville Gas and Electric Company
Maine Energy Education Project
Maine Public Service Company
Marianas Islands Energy Office
Massachusetts Division of Energy Resources
Lee Matherne Family Foundation
Michigan Oil and Gas Producers Education Foundation
Midwest Energy Cooperative
Mississippi Development Authority–Energy Division
Montana Energy Education Council
The Mosaic Company
NADA Scientific
NASA
National Association of State Energy Officials
National Association of State Universities and Land Grant Colleges
National Fuel
National Grid
National Hydropower Association
National Ocean Industries Association
National Renewable Energy Laboratory
Nebraska Public Power District
New Mexico Oil Corporation
New Mexico Landman's Association
New Orleans Solar Schools Initiative
New York Power Authority
NSTAR
Offshore Energy Center/Ocean Star/ OEC Society
Offshore Technology Conference
Ohio Energy Project
Pacific Gas and Electric Company
PECO
Petroleum Equipment Suppliers Association
PNM
Puerto Rico Energy Affairs Administration
Puget Sound Energy
Rhode Island Office of Energy Resources
RiverWorks Discovery
Roswell Climate Change Committee
Roswell Geological Society
Sacramento Municipal Utility District
Schneider Electric
Science Museum of Virginia
C.T. Seaver Trust
Shell
Snohomish County Public Utility District–WA
Society of Petroleum Engineers
David Sorenson
Southern Company
Southern LNG
Southwest Gas
Space Sciences Laboratory–University of California Berkeley
Tennessee Department of Economic and Community Development–Energy Division
Tennessee Valley Authority
Timberlake Publishing
Toyota
TXU Energy
United States Energy Association
University of Nevada–Las Vegas, NV
U.S. Department of Energy
U.S. Department of Energy–Hydrogen Program
U.S. Department of Energy–Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy–Office of Fossil Energy
U.S. Department of Energy–Wind for Schools
U.S. Department of Energy–Wind Powering America
U.S. Department of the Interior– Bureau of Land Management
U.S. Department of the Interior–Bureau of Ocean Energy Management, Regulation and Enforcement
U.S. Energy Information Administration
U.S. Environmental Protection Agency
Van Ness Feldman
Virgin Islands Energy Office
Virginia Department of Education
Virginia Department of Mines, Minerals and Energy
Walmart Foundation
Washington and Lee University
Western Kentucky Science Alliance
W. Plack Carr Company
Yates Petroleum Corporation