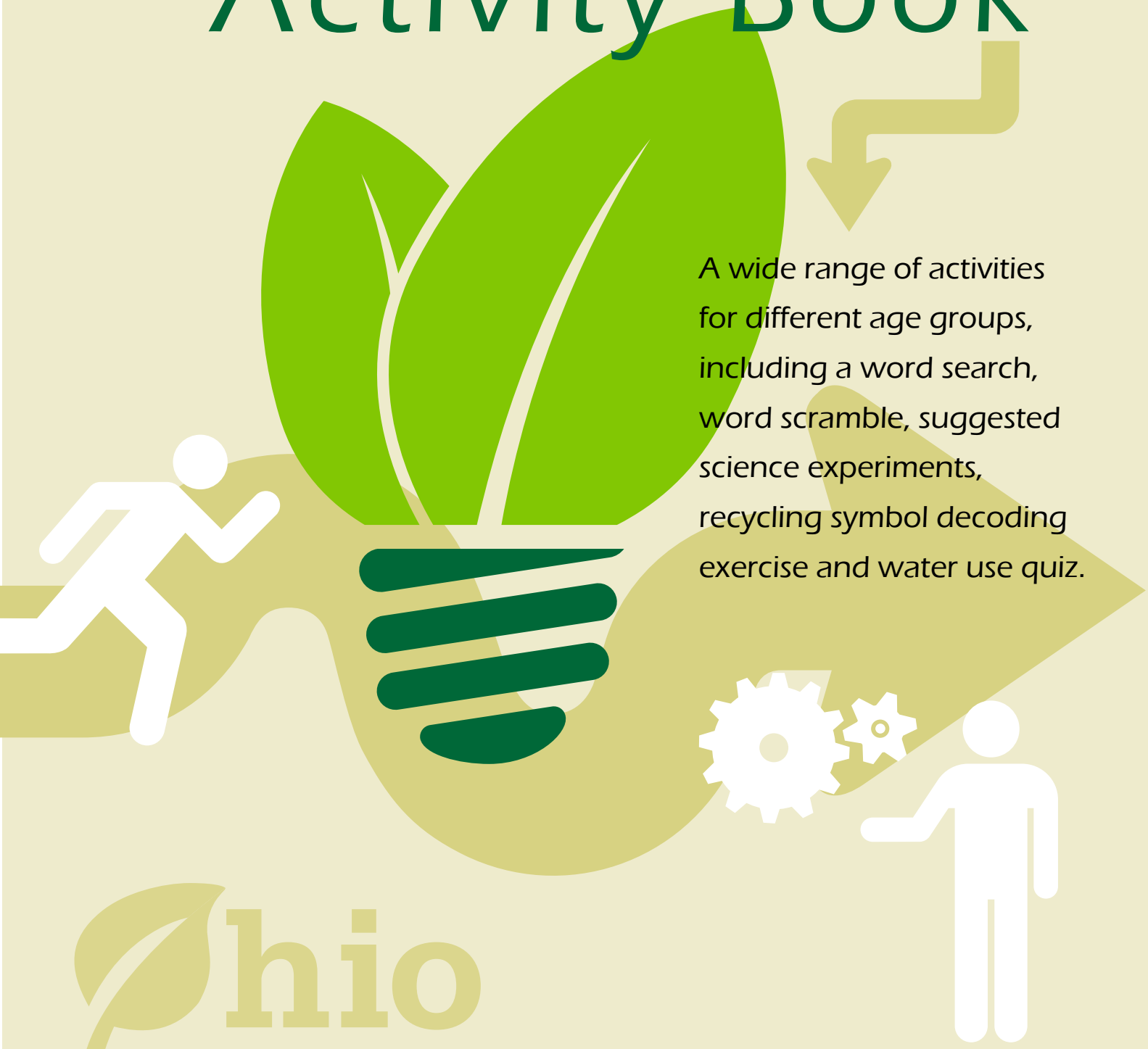
Environmental Activity Book



A wide range of activities for different age groups, including a word search, word scramble, suggested science experiments, recycling symbol decoding exercise and water use quiz.

Ohio

Ohio Environmental Protection Agency

Answers on page 12

Environment and Energy Word Search

D S R R E W 0 P 0 R D Y H H M
L S C L S L H 0 Y C H S C A E
Z 0 A R I W L 0 H T N F I C T
L K 0 0 U Y A E X 0 D I D I S
E A S P G B M L I L Q S I D Y
T G M R R I B S K D L H C I S
0 R E R C A S E E B E K A F 0
I N E A E I C P R J A N T I C
E D L E M H 0 U D S C C I C E
G E A E S S T W L R H Q Q A Z
A A 0 G I M W 0 N S I S F T R
I A C T 0 S T C E S N I R I U
W V I B U F F E R G G W 0 0 P
P 0 L L U T I 0 N R Y Y G N I
N C A R S D N I W D V T S U F

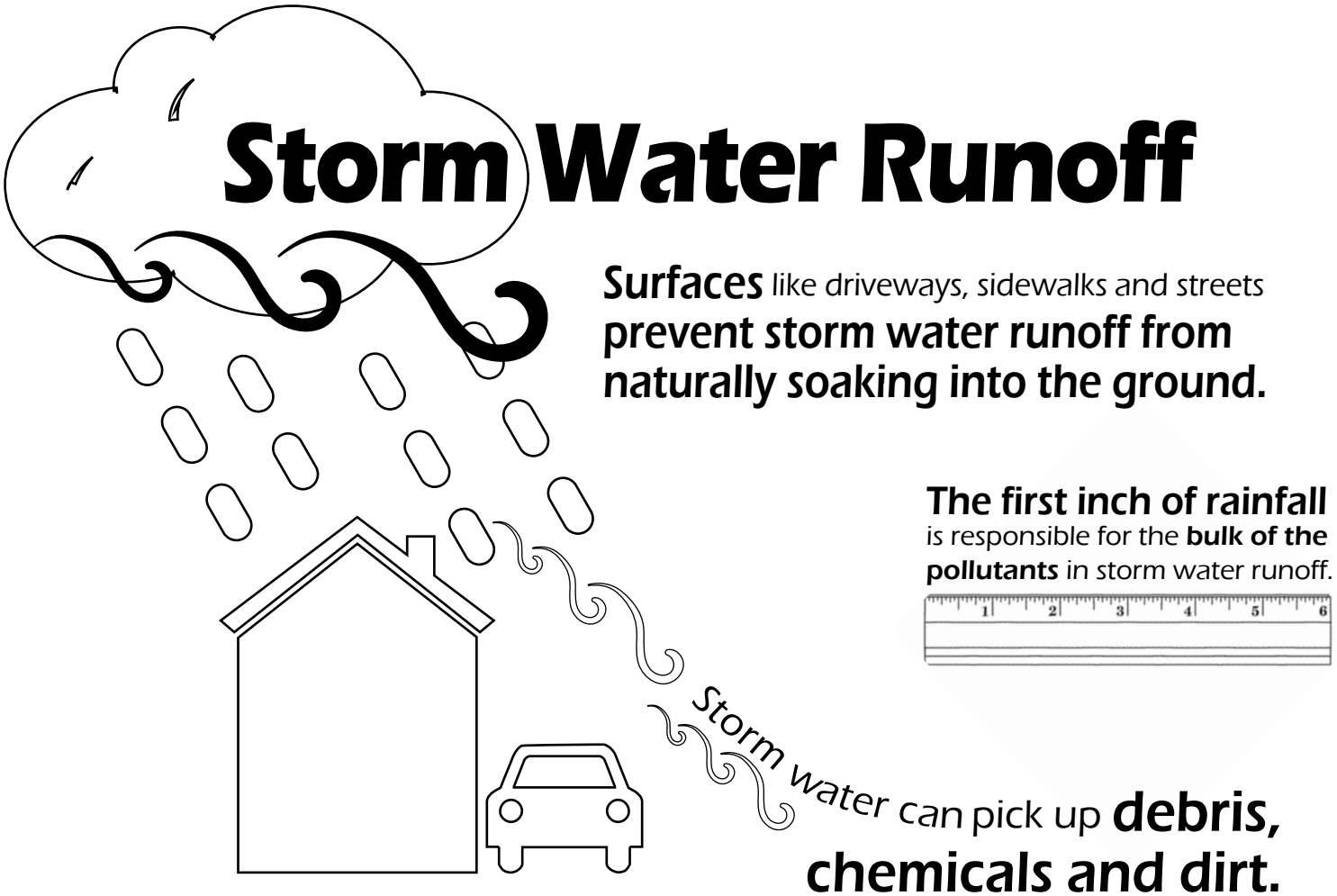
Acidic
Carpool
Coal
Emissions
Fog
Hydropower
Leaching
Scrubbers
Trees
Acidification
Cars
Deposition
Energy
Frogs
Insects
Pollution
Snow
Walk
Buffer
Chemical
Ecosystem
Fish
Geothermal
Lake
Rain
Soil
Wind

What About Our Water?

Most people in North America get their water from a public water utility. Public utilities are companies or government agencies that supply needs such as electricity, gas or water to the public. Water utilities get their water from rivers, lakes, reservoirs or underground aquifers. The water is treated to make it safe to drink.

Because we reuse the same water over and over, it can become polluted by people and industry. Even deep underground aquifers can be polluted from the surface. For example, many household items, such as car wax, spot remover or floor polish and other chemicals should not be poured down the drain or thrown out in the trash.

Even lawn chemicals and other garden products used outdoors may be toxic, and can contaminate water sources by running off the land into storm drains. That water can end up in lakes and rivers. Let's take care of our water resources. Use your "Blue Thumb" to conserve water, protect it and get involved.

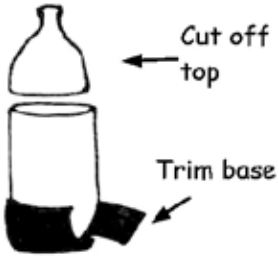


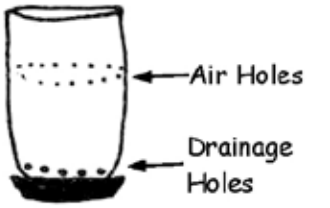
Never Underestimate the Power of a Worm!

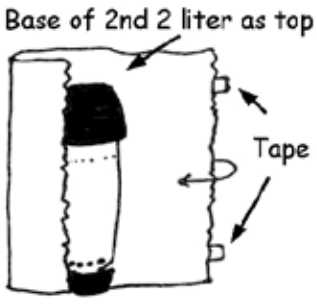
Worms play a major role in breaking down plant matter and creating fertile soil. Earthworms eat fallen leaves and other plant parts. Their droppings, or "castings," fertilize the soil. As they tunnel into the earth, they move leaves and other organic material downward, and bring deeper soil to the surface. This tunneling and mixing aerates the soil so that plant roots and water penetrate it more easily. Observe wonderful worm activity yourself by building a worm column!

Materials:

- **Two 2 liter bottles**
- **One large paper bag or sheet of brown paper** for a screen
- **15-30 red composting worms.** These can be ordered from a variety of sites online.
- **Shredded newspaper**
  (cut 8 –10 pages into thin strips, cut strips in half)
- **Worm food**: organic leftovers from your kitchen, garden or yard (plant material, egg shells, coffee grounds).
- **Water**







Procedure:

1. Remove the label from your two-liter bottle and cut the top off about 10 cm below the top. If your bottle has a base, cut the sides off for better viewing.
2. Ask your parents to help you poke at least four holes with a large hot nail. Poke low around the base of the bottle. Poke a row of air holes toward the top of the container using a smaller nail.
3. Cut the brown paper bag so it encircles the bottle and extends about 4 centimeters higher. Tape the paper around the column but leave it loose so you can easily pull it up. Worms prefer the dark, so leave the screen on the bottle unless you plan to observe the worms. Cut the bottom off the second two-liter bottle and use as a top to your worm column.
4. Fill the worm column (two-liter bottle) two-thirds full with shredded newspaper bedding. Add about a cup of water to the newspaper then fluff it until the paper strips are well separated. Make sure bedding is moist, but not saturated with water! Place worms on top of bedding. Add organic food, such as kitchen waste and leaves, to the column every 3 to 4 days. Worms feed by sucking or pumping material into their bodies, so the food should be moist and cut into small pieces.

   After several months, you'll have a rich compost product that you can use in yor garden.

Ask your family to consider making a "worm condo" out of a five-gallon bucket, which can support a larger worm colony and can compost all of your family's organic kitchen wastes!

SOURCE: OSU Extension

Aquifer in a Cup (Aquifer on the Go)

Background

Many communities obtain their drinking water from underground sources called aquifers. Water suppliers or utility officials drill wells through soil and rock into aquifers for the ground water contained therein to supply the public with drinking water. Homeowners who cannot obtain their drinking water from a public water supply will have their own private wells drilled on their property to tap this supply. Unfortunately, ground water can become contaminated by harmful chemicals such as lawn care products and household cleaners that were used or disposed of improperly after use or any number of other pollutants. These chemicals can enter the soil and rock, polluting the aquifer and eventually the well. Such contamination can pose a significant threat to human health. The measures that must be taken by well owners and water plant operators to either protect or clean up contaminated aquifers are quite costly.

NOTE: This demonstration should follow a class discussion on potential sources of pollution to drinking water supplies.

Objective

To illustrate how water is stored in an aquifer, how ground water can become contaminated, and how this contamination ends up in a drinking water source. Ultimately, students should get a clear understanding of how careless use and disposal of harmful contaminants above the ground can potentially end up in the drinking water below the ground. This particular experiment can be done by each student at their work station.

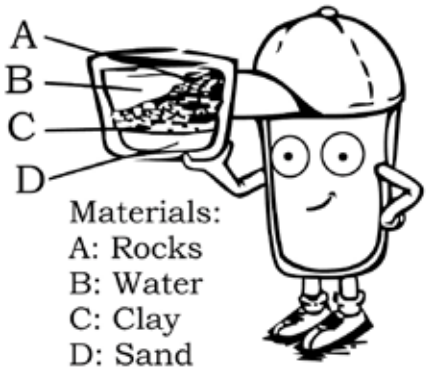
Materials Needed Per Student

- **One clear, plastic cup** that is 2 3/4" deep by 3 1/4" wide for each student.
- **One piece of modeling clay or floral clay** that will allow a 2" flat pancake to be made by each student for their cup.
- **White play sand** that will measure 1/4" in the bottom of each student's cup.
- **Aquarium gravel** (natural color if possible) or small pebbles (approximately ½ cup per student.) (Hint: As many small rocks may have a powdery residue on them, you may wish to rinse them and dry on a clean towel prior to use. It is best if they do not add cloudiness to water.)
- **Red food coloring**
- **1 bucket of clean** water and **small cup** to dip water from bucket

continued on next page

Aquifer in a Cup (continued)

Procedure



1. Pour 1/4" of white sand in the bottom of each cup completely covering the bottom of the container. Pour water into the sand, wetting it completely (there should be no standing water on top of sand). Let students see how the water is absorbed in the sand, but remains around the sand particles as it is stored in the ground and ultimately forming part of the aquifer.

2. Have each student flatten the modeling clay (like a pancake) and cover 1/2 of the sand with the clay (have each student press the clay to one side of the container to seal off that side).

   The clay represents a "confining layer" that keeps water from passing through it. Pour a small amount of water onto the clay. Let the students see how the water remains on top of the clay, only flowing into the sand below in areas not covered by the clay.

3. Use the aquarium rocks to form the next layer of earth. Place the rocks over the sand and clay, covering the entire container. To one side of your cup, have students slope the rocks, forming a high hill and a valley (see illustration). Explain to students that these layers represent some of the many layers contained in the earth's surface. Now pour water into your aquifer until the water in the valley is even with your hill. Students will see the water stored around the rocks. Explain that these rocks are porous, allowing storage of water within the pores and openings between them. They will also notice a "surface" supply of water (a small lake) has formed. This will give them a view of both the ground and surface water supplies which can be used for drinking water purposes.

4. Use the food coloring and put a few drops on top of the rock hill as close to the inside wall of the cup as possible. Explain to students that often old wells are used to dispose of farm chemicals, trash and used motor oils and other activities above their aquifer can end up in their drinking water. They will see that the color spreads not only through the rocks, but also to the surface water and into the white sand at the bottom of their cup. This is one way pollution can spread throughout the aquifer over time.

Follow-up:

Discuss with students other activities that could pollute their aquifer. Assign students the task of locating activities around the school or their own homes that could pollute their drinking water sources if not properly maintained. Allow students to drain off the water in their cups and carry home their container to refill with water and show their parents surface and ground water and how the food coloring illustrates pollution activity above their aquifer can affect all water. Students should discuss with parents what steps they can take as a household to prevent water pollution.

SOURCE: U.S. EPA, Office of Water, www.epa.gov/safewater

Answers on page 12

Water Word Scramble

Unscramble the words to learn some interesting facts about water.

1. Every ngivli thing needs water to live. _____
2. The average American uses about 50 oslgaln of water each day for personal use. _____
3. Only one percent of the water on rteha is fresh water that is available for drinking or other uses. _____
4. If water is too polluted, it might not be safe to eat the hsif you catch or to wsmi in the water. _____
5. An eqrifau is an underground area of water that collects between spaces in rocks. _____
6. A lewl is a deep hole dug or drilled below the ground surface into an aquifer to get water. _____
7. tolatunPls can seep through the soil and make ground water unsafe to drink. _____
8. Water treatment plants can remove pollutants from water so it is asfe to drink. _____
9. Drinking water can come from grduon or usrfaec water. _____ _____
10. fnuoRf is water that naturally flows off the land, sometimes forming streams. _____
11. Soil and other pollutants are often draeopsrtnt to streams as storm water runs off the ground. _____
12. It is everyone's pesrobsiniltiy to help prevent water pollution. _____
13. Many communities get their drinking water from underground sources called an qfiuaer. _____
14. Cleaning pollution from aquifers is ycsolt. _____

Write down three things you or your family can do to help prevent water pollution.

1. _____
2. _____
3. _____

Answers on page 12

Is it Safe to Play Outdoors Today?

Sometimes, especially during the summer, the air is harder to breathe because of pollution. Scientists measure the quality of the air with the Air Quality Index (AQI). On days that the air quality is bad, people with asthma or other breathing problems should try to stay inside. Once you know what the colors mean, you can use the AQI to help decide if you should play indoors or out. Look for the AQI in the newspaper, on the weather forecast or ask a grown-up to sign up for daily e-mail alerts at www.enviroflash.info.

Color the rectangles and then draw a line from the AQI word(s) on the left side to the correct color on the right.

1. Unhealthy
2. Moderate
3. Very Unhealthy
4. Hazardous
5. Unhealthy for Sensitive Groups
6. Good

Green
Yellow
Orange
Red
Purple
Maroon

Motor vehicles are the **primary source of smog** and account for almost **50% our air pollution.**

Avoid unnecessary driving: The most effective way to **save fuel and reduce emissions** from your vehicle is to use it less.

Alternatives include consolidating trips, telecommuting, carpooling, using public transit and biking or walking.

Answers on page 12

Decoding the Recycling Symbol

You have probably seen the recycling symbol on plastic containers around your house. But, do you know what the different numbers mean? They help people to know what type of plastic the container is made of and whether it can be recycled with other household items or if it needs to be taken to a special facility. See if you can match up the symbols below with the correct item. You may want to look around your house for help.

This is polyethylene terephtalate, also known as PETE or PET. It is generally clear. This plastic is picked up by most curbside recycling programs.

This is high density polyethylene, or HDPE. It is usually opaque (cloudy). It is also picked up by most curbside recycling programs.

This is polyvinyl chloride, also known as PVC. PVC is a tough plastic. It is rarely accepted by recycling programs.

This is low-density polyethylene (LDPE). This plastic is considered safe, but is unfortunately not often accepted by curbside recycling programs. It is typically clear, thin and flexible.

This is polypropylene. This plastic is also considered safe, and is increasingly being accepted by curbside recycling programs. It is hard plastic used in food containers and textiles.

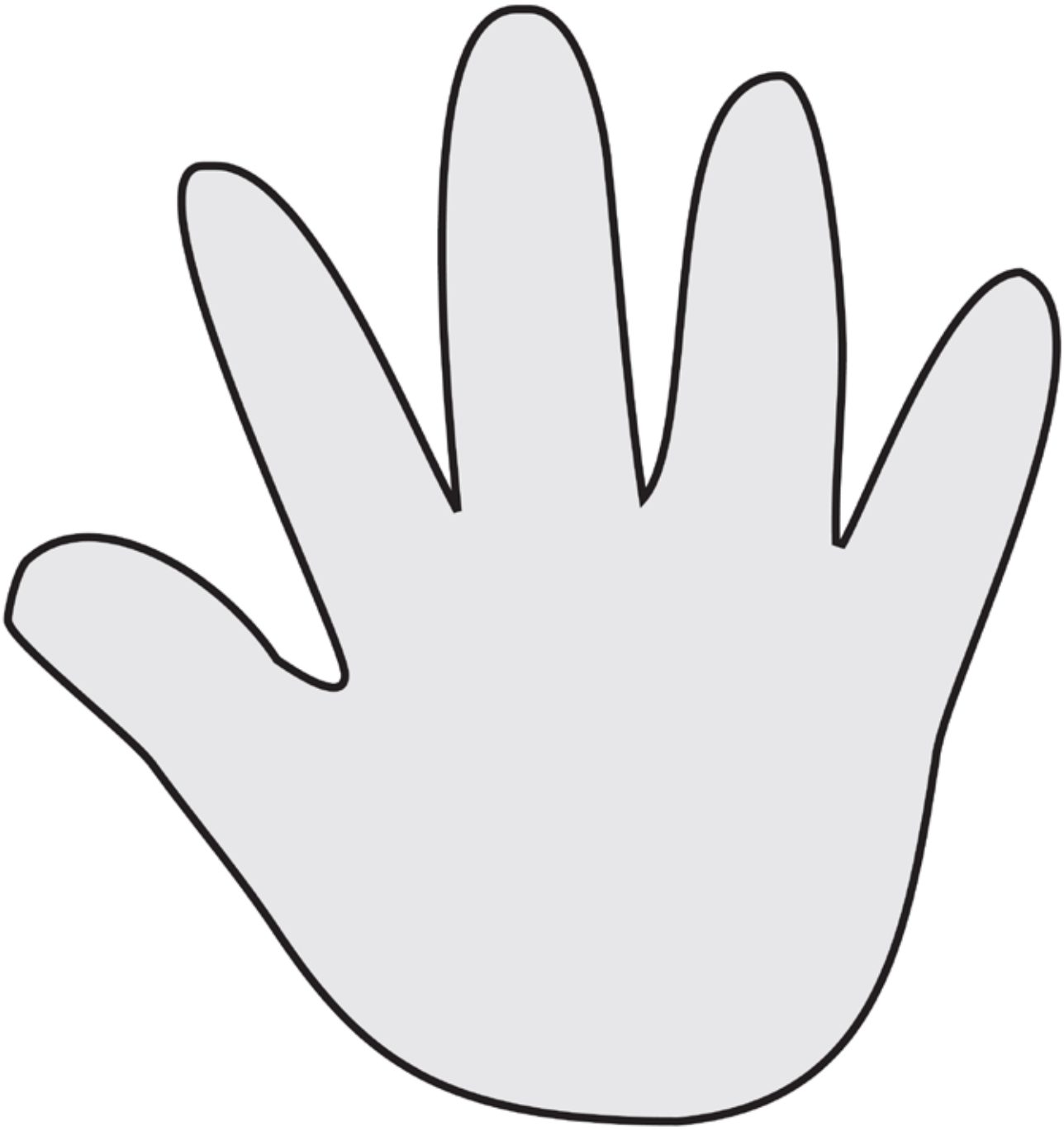
This is polystyrene, or Stryofoam. It is difficult to recycle and most recycling programs won't accept it.

This number basically means "everything else." It includes polycarbonate and BPA, which are not safe for use as food or drink containers. It is difficult to recycle and most curbside recycling programs won't accept it.

Give a Hand to Mother Earth

Everyone likes a compliment. Mother Earth likes to be appreciated also. One way we pay a compliment to Mother Earth is by taking care of her.

On each finger, write one thing you can do to take care of Mother Earth.



Answers on page 12

Down the Drain: How Much Water Do You Use?

Most of us don't think about how much water we use on a daily basis. Using the numbers on the right, fill in the blank to guess how many gallons of water you think you would use for the following. It may be helpful to picture a gallon of milk in your mind to help you see how much water is in a gallon.

A Wash your hands? _____

B Brush your teeth _____ (with the water running)?

C Brush your teeth _____ (with the water turned off)?

D Take a shower? _____

E Take a bath? _____

F Flush the toilet? _____

G Get a drink? _____

H Wash the dishes by hand? _____

I Water the lawn? _____

J Wash the car? _____

1 15-30 gallons

2 0.5 gallons

3 40 gallons

4 1 gallon

5 10 gallons

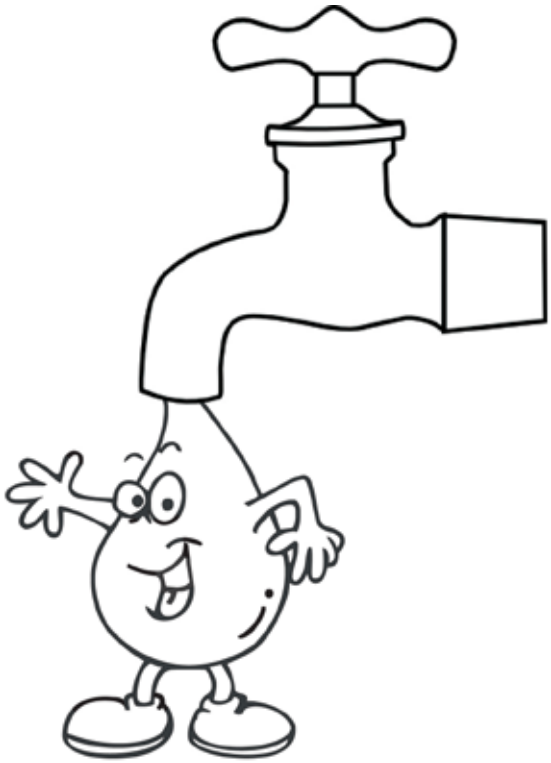
6 50 gallons

7 1 gallon

8 180 gallons

9 0.25 gallons

10 4-7 gallons



Here are some other interesting water usage facts.

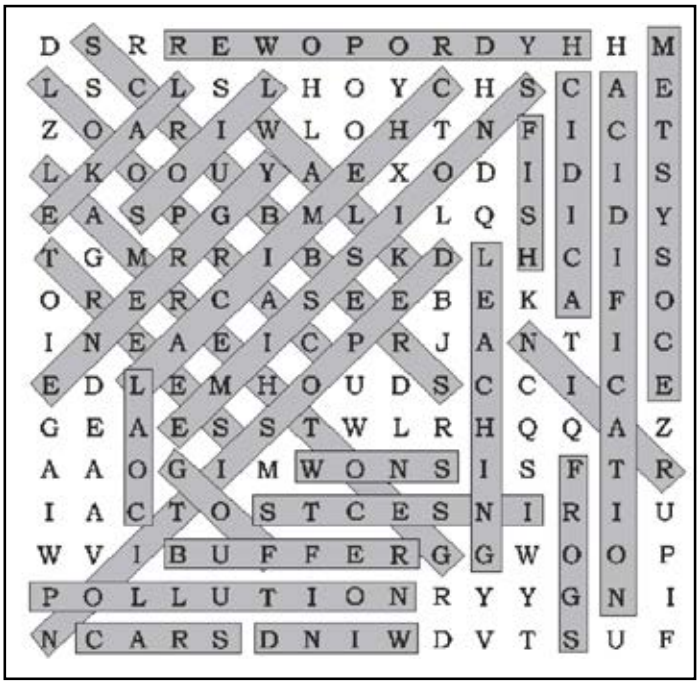
To process one can of fruit or vegetables – 9.3 gallons

To manufacture a new car and its four tires – 39,090 gallons

To produce one ton of steel – 62,600 gallons

Answer Key

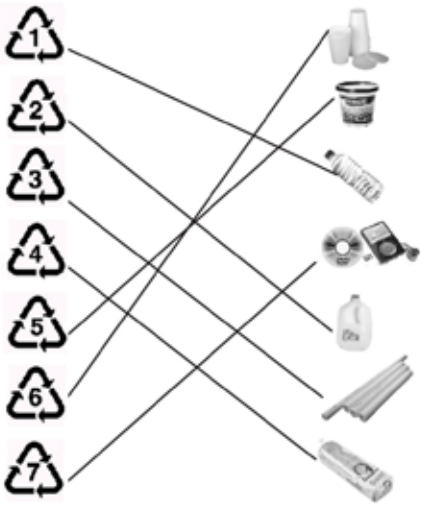
Environment and Energy Word Search
page 2



Water Word Scramble
page 7

1. living
2. gallons
3. earth
4. swim
5. aquifer
6. well
7. pollutants
8. safe
9. ground, surface
10. runoff
11. transported
12. responsibility
13. aquifer
14. costly

Decoding the Recycling Symbol
page 9

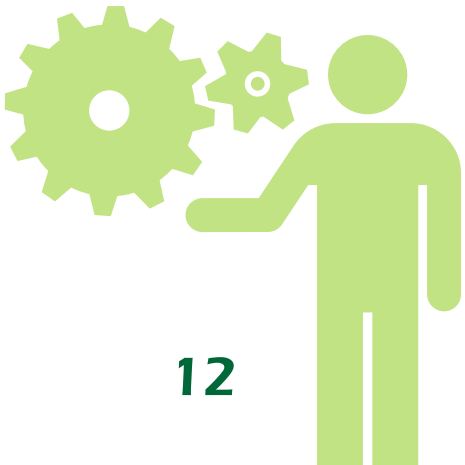


Is it Safe to Play Outdoors Today?
page 8

1. Unhealthy - red
2. Moderate - yellow
3. Very unhealthy - purple
4. Good - green
5. Unhealthy for sensitive groups - orange
6. Hazardous - maroon

Down the Drain: How Much Water Do You Use?
page 11

A. 1 gallon
B. 1 gallon
C. 0.25 gallons
D. 15-30 gallons
E. 40 gallons
F. 4-7 gallons
G. 0.5 gallons
H. 10 gallons
I. 180 gallons
J. 50 gallons



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