Ohio | Environmental Protection Agency

Environmental Activity Book

Environmental Activity Book

Learn about the environment and how you
can help protect the quality of Ohio's water, land and air

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Environment and Energy Word Search

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

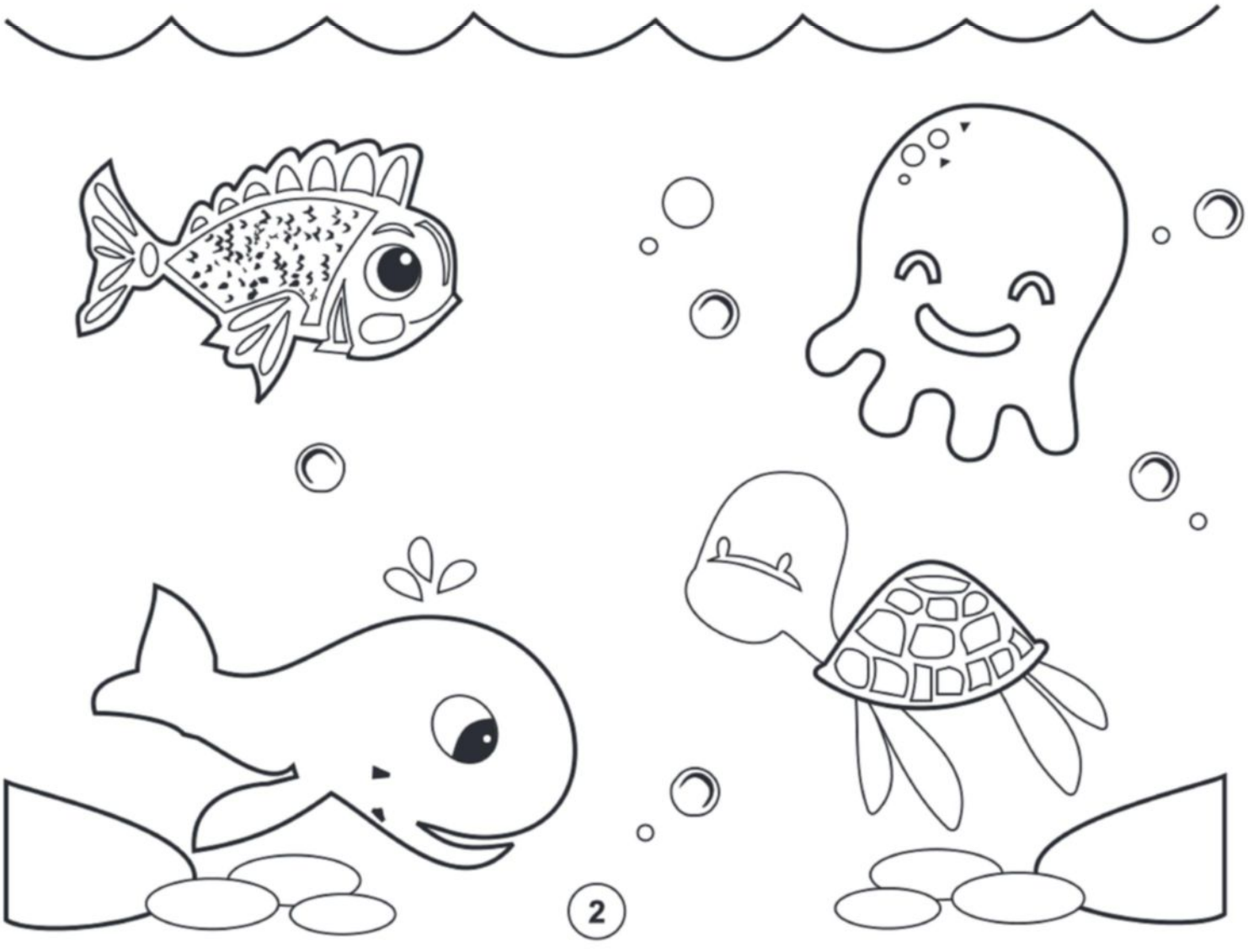
Acidic
Acidification
Buffer
Carpool
Cars
Chemical
Coal
Deposition
Ecosystem
Emissions
Energy
Fish
Fog
Frogs
Geothermal
Hydropower
Insects
Lake
Leaching
Pollution
Rain
Scrubbers
Snow
Soil
Trees
Walk
Wind

Answers on page 14

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.



Water Word Scramble

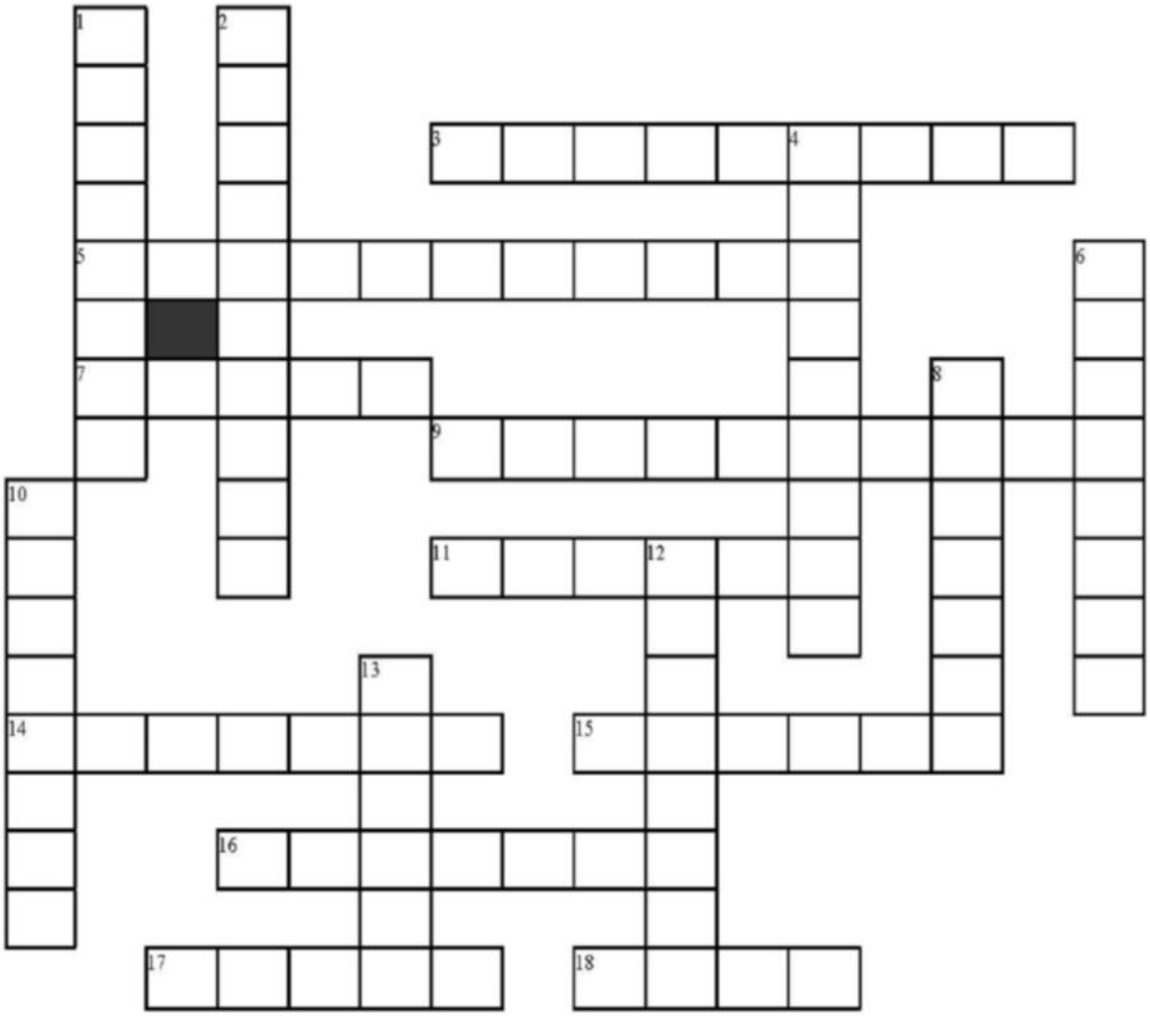
Unscramble the words to learn some interesting facts about water.
Answers are on page 14.

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. A whdeaster is the land area that drains into a river, stream or lake. _____
5. If water is too polluted, it might not be safe to eat the hsif you catch or to wsmi in the water. _____ _____
6. An eqrifau is an underground area of water that collects between spaces in rocks. _____
7. A lewl is a deep hole dug or drilled below the ground surface into an aquifer to get water. _____
8. tolatunPls can seep through the soil and make ground water unsafe to drink. _____
9. Water treatment plants can remove pollutants from water so it is asfe to drink. _____
10. Drinking water can come from grduon or usrfaec water. _____ _____
11. There are two types of water pollution: opitn suorcse and nonpoint sources. _____
12. Point source pollution comes from a specific facility or ohem. _____
13. Nonpoint source pollution comes from namy places, like farm fields or parking lots. _____
14. fnuoRf is water that naturally flows off the land, sometimes forming streams. _____
15. Soil and other pollutants are often draeopsrtnt to streams as storm water runs off the ground. _____
16. Water that has been used by people in homes, businesses, farms or factories is called wrsetawtea. _____
17. Wastewater treatment plants remove contaminants so the water can be safely released back to the nnoirvemetn. _____
18. It is everyone's pesrobsiniltiy to help prevent water pollution. _____

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

1. _____
2. _____
3. _____

Environmental Crossword



ACROSS

3. Land that catches rain and drains into a river, stream, lake or ground water.
5. Taking care of the land, air and water is called environmental _____.
7. Summer heat increases this air pollutant.
9. An abandoned industrial site is referred to as a _____.
11. One _____of gasoline can contaminate one million gallons of ground water.
14. What an animal needs to survive (for example food, water, space).
15. Ohio EPA has loaned more that $3 billion dollars for _____ treatment systems.
16. An underground source of drinking water is an _____.
17. Only _____ percent of the water on earth is drinkable.
18. Toxic metal found in old paint.

DOWN

1. Cancer-causing substance that needs to be removed from old buildings.
2. The only hazardous waste allowed in a landfill comes from _____.
4. Name of the law to clean up toxic sites.
6. This is not a dump...
8. The type of gas a landfill generates.
10. Garbage juice.
12. Lake that borders northern Ohio (two words).
13. What farm animals produce that can be used as fertilizer.

Answers on page 14

Never Underestimate the Power of a Worm!

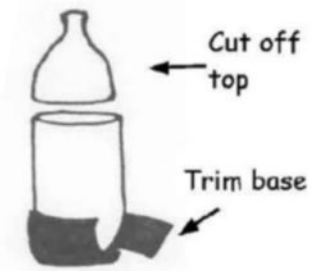
Worms play a major role in breaking down plant matter and creating fertile soil. Earthworms eat fallen leaves and other plant parts. Their droppings, or "castings", fertilize the soil. As they tunnel into the earth, they move leaves and other organic material downward, and bring deeper soil to the surface. 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!

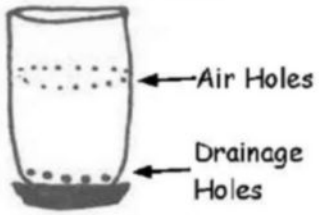
Materials:

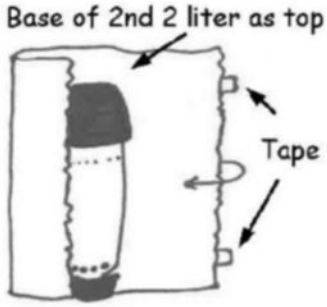
- Two 2 liter bottles
- One large paper bag or sheet of brown paper for a screen
- 15-30 red composting worms
- Shredded newspaper (cut 8 –10 pages into thin strips, cut strips in half)
- Worm food: organic leftovers from your kitchen, garden or yard (plant material, egg shells, coffee grounds).
- Water

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 5 millimeter 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 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.







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, the 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.)

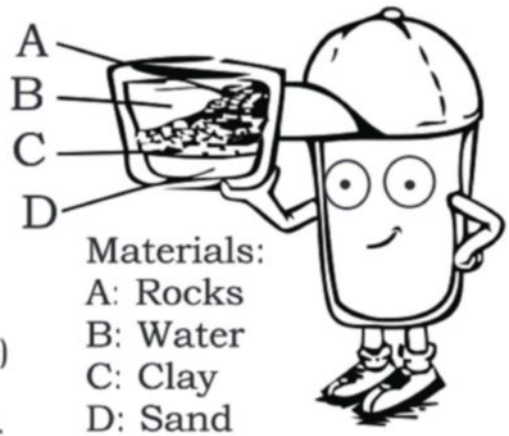
Red food coloring.

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*

Is it Safe to Play Outdoors Today?

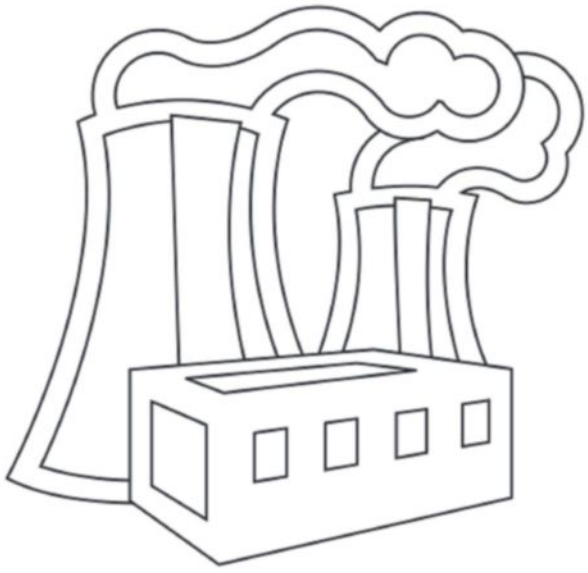
Sometimes, especially during the summer, the air is harder to breathe because of pollution. Scientists measure the quality of the air with the Air Quality Index (AQI). On days that the air quality is bad, people with asthma or other breathing problems should try to stay inside. Once you know what the 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/*.

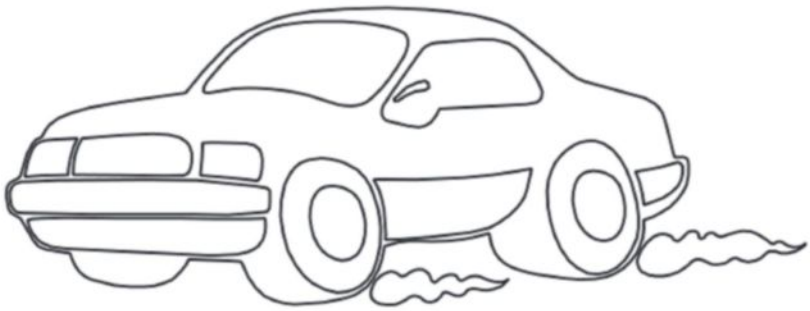
Color the rectangles and then draw a line from the AQI word(s) on the left side to the correct color on the right.

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

Answers on page 14

Green
Yellow
Orange
Red
Purple





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.

This is polypropylene. This plastic is also considered safe, and is increasingly being accepted by curbside recycling programs.

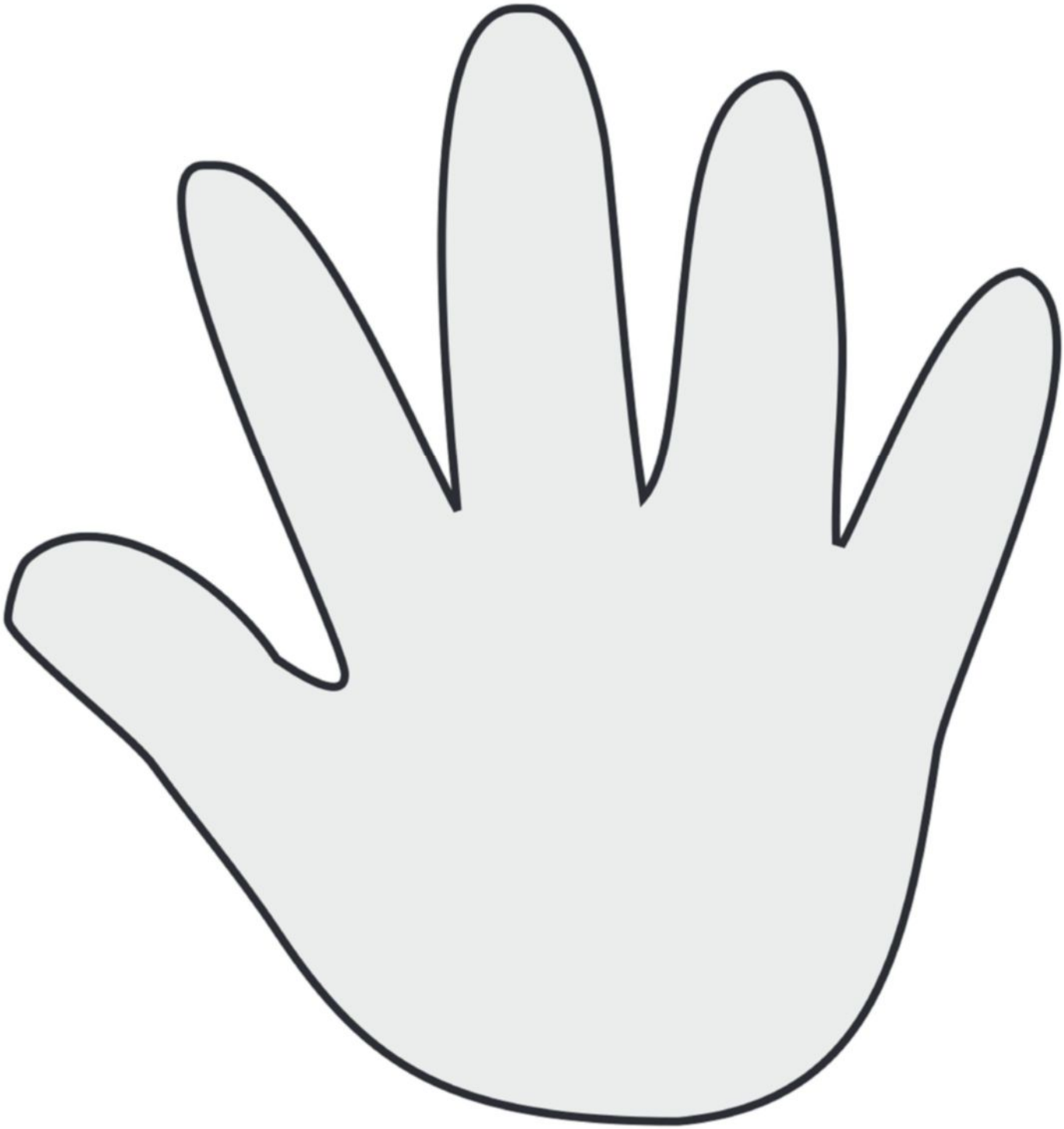
This is polystyrene, or Stryofoam. It is difficult to recycle and most recycling programs won't accept it.

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.

Answers on page 15

Give a Hand to Mother Earth

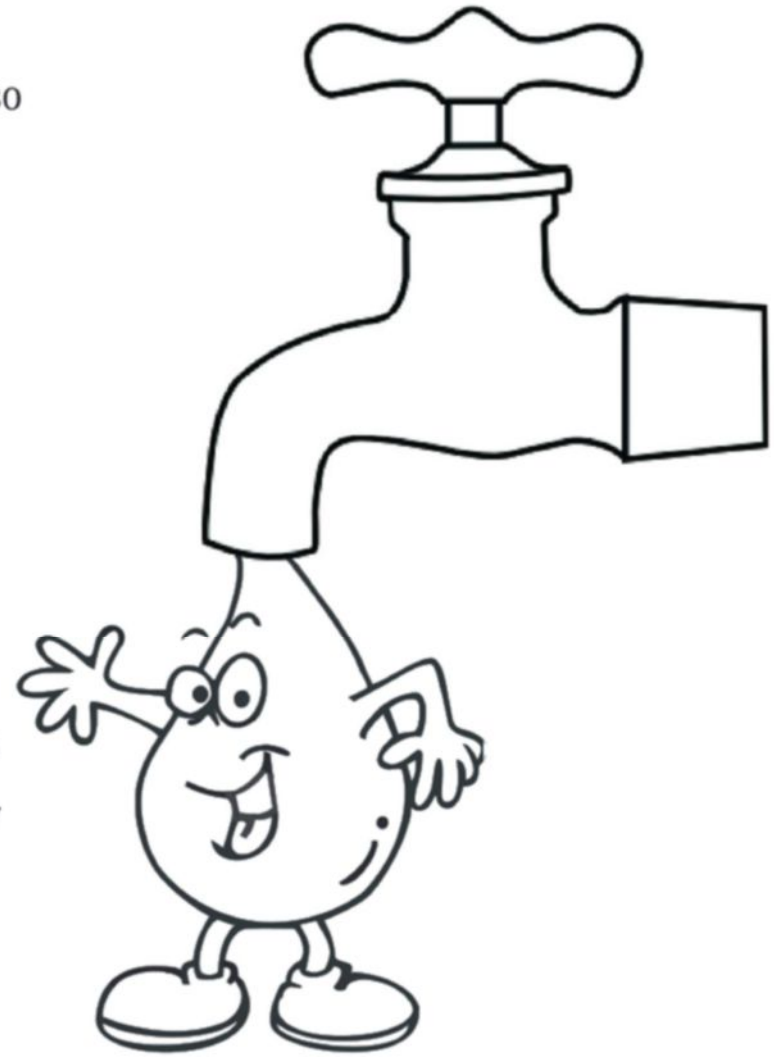
Everyone likes a compliment. Mother Earth likes to be appreciated also. One way we pay a compliment to Mother Earth is by taking care of her. On each finger, write one thing you should remember to do to take care of Mother Earth.



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?	1) 15-30
B) Brush your teeth (with the water running)?	2) 0.5
C) Brush your teeth (with the water turned off)?	3) 40
D) Take a shower?	4) 1
E) Take a bath?	5) 10
F) Flush the toilet?	6) 50
G) Get a drink?	7) 1
H) Wash the dishes by hand?	8) 180
I) Water the lawn?	9) 0.25
J) Wash the car?	10) 4-7



Answers on page 15

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

Climate Change Quiz

Question 1: *Which of these is an example of climate?*

A) A windy day
B) A rainy day
C) A hot summer
D) A sunny day

Question 2: *Where do greenhouse gases trap energy?*

A) In the atmosphere
B) In the mountains
C) In outer space
D) In the soil

Question 3: *Which one of these is a greenhouse gas?*

A) Oxygen
B) Carbon dioxide
C) Wind
D) Sulfur dioxide

Question 4: *How long has the Earth's climate been changing?*

A) One hundred years
B) One million years
C) One billion years
D) Five billion years

Question 5: *What's one reason why scientists think that the sea is getting higher?*

A) Ships make the water higher.
B) Melting glaciers add more water to the sea.
C) The ozone hole is warming the ocean.
D) All of the above.

Question 6: *At what time in history did humans start to add lots of greenhouse gases to the atmosphere?*

A) The little ice age
B) The great depression
C) The industrial revolution
D) The Mesozoic era

Question 7: *Which one of these activities sends greenhouse gases into the atmosphere?*

A) Riding in a car
B) Riding your bike
C) Walking
D) Sailing

continued...

Climate Change Quiz (continued)

Question 8: *What do scientists study in order to learn more about past climate?*

A) Sediments
B) Ice
C) Tree rings
D) All of the above

Question 9: *Why have plants and animals been able to adapt to changes in climate in the past?*

A) Humans protected them from changing climate.
B) Past climate changes occurred slowly enough for plants and animals to adapt.
C) The climate has not changed in the past, so plants and animals did not have to adapt to a new environment.
D) Plants and animals always benefit from changes in climate.

Question 10: *How can you help slow global warming?*

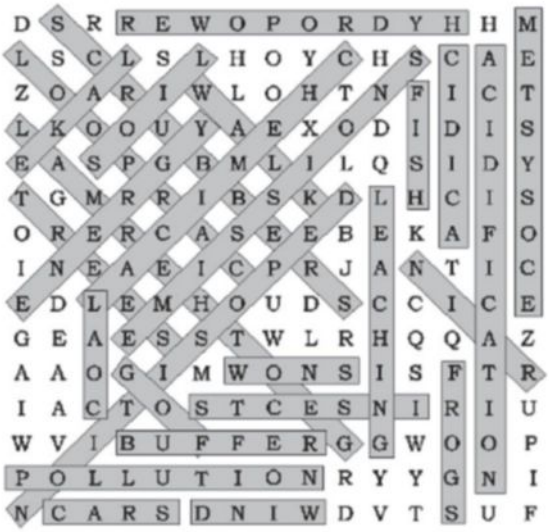
A) Save electricity
B) Plant trees
C) Recycle
D) All of the above

SOURCE: U.S. EPA, *www.epa.gov/climatechange/kids/*

Answers on page 15

Answer Key

Environment and Energy Word Search



Water Word Scramble

1. living
2. gallons
3. earth
4. watershed
5. swim
6. aquifer
7. well
8. pollutants
9. safe
10. ground, surface
11. point sources
12. home
13. many
14. runoff
15. transported
16. wastewater
17. environment
18. responsibility

Environmental Crossword

ACROSS
3. Watershed
5. Stewardship
7. Ozone
9. Brownfield
11. Gallon
14. Habitat
15. Sewage
16. Aquifer
17. Three
18. Lead

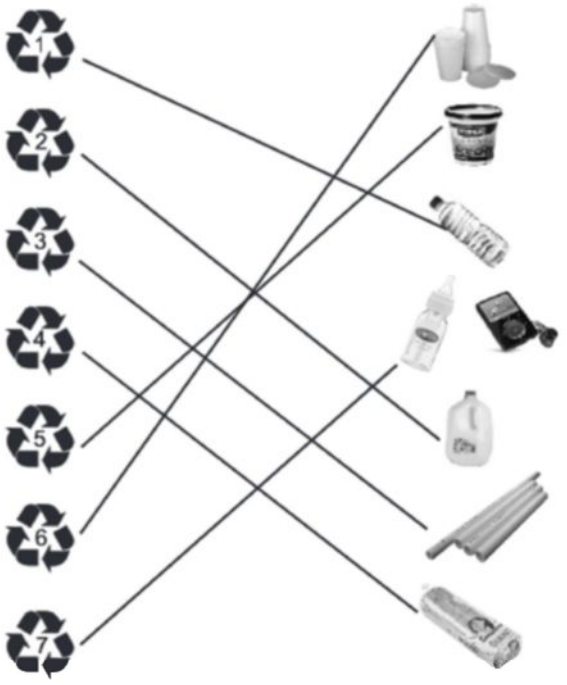
DOWN
1. Asbestos
2. Households
4. Superfund
6. Landfill
8. Methane
10. Leachate
12. Lake Erie
13. Manure

Is it Safe to Play Outdoors Today?

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

Answer Key

Decoding the Recycling Symbol



Down the Drain- How Much Water Do You Use?

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

Climate Change Quiz

1. C
2. A
3. B
4. D
5. B
6. C
7. A
8. D
9. B
10. D