

Wonders of Water

Grade Level: 3-8

Class Size: 20-30

Class Length: 45min-1hr



Class Summary: Students will identify the stages of the water cycle and understand the components necessary for life in different water samples.

Objectives: Students will

- Identify stages of the water cycle
- Understand the importance of pH, temperature and salinity in a water sample

Concepts:

- Water Cycle
- pH
- Temperature
- Salinity
- Conservation



Water is amazing. Life on our planet couldn't exist without it. Water has so many unique characteristics that it truly stands out as the planet's most important chemical!

Probably one of the most amazing things about water is that we only have a limited amount of it. The water we have now is the very same water that the dinosaurs drank millions of years ago!

No new water is ever created, but the water we have is always moving and changing forms.

Water is essential for the survival of all living things. Because only a portion of Earth's water is available for us to use at any given time, we must be careful how we use it. Polluting our water with chemicals and trash ruins it for everyone and everything.

Only 1% of all the water on Earth is available for us to use. 2% is frozen in glaciers and the remaining 97% is ocean saltwater.

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Wonders of Water

PRE-LESSON ASSESSMENT

1. Which of the following is NOT a part of the water cycle? (circle the answer)

Evaporation Condensation Convection Precipitation

2. When water changes forms, we call this a _____ change.

3. We have a limited supply of water available for our use.

True False

4. Name three important factors tested when checking water quality.

5. Record keeping is an important part of performing a science experiment.

True False

6. Which unit is appropriate to use when recording salinity?

mg/L mph ppt psi

7. What is the first thing you should do when performing an experiment that uses chemicals? _____

8. Name three things you can do to conserve water.

Vocabulary

Acid - A substance having a sour taste with a pH less than 7.

Base - A substance with a pH greater than 7.

Brackish - A mix of fresh and saltwater. Brackish water is found in coastal areas and estuaries where saltwater meets freshwater.

Collection - The part of the water cycle where water accumulates into puddles, streams, rivers, lakes, oceans, etc... This is the point where the water cycle starts again with evaporation.

Condensation - The process by which a gas or vapor changes to a liquid.

Evaporation - The process by which a liquid changes to a gas.

Gas - The state of matter distinguished from the solid or liquid states by relatively low density and the tendency to become distributed uniformly throughout any container.

Liquid - The state of matter characterized by a readiness to flow and little or no tendency to disperse,

pH - A measurement of how acidic or basic a solution is.

Phase Change - Changing from one state of matter to another. For example, changing from a solid to a liquid (melting) or from a liquid to a solid (freezing).

Precipitation - Any form of water, such as rain or snow, which falls on the Earth

Salinity - A measurement of how much salt is in water.

Solid - The state of matter characterized by having a definite shape or form.

Wonders of Water

SCAVENGER HUNT

Fill in the table for each gallery, including the type of water, and one animal that can be found in the gallery.

Type of Water: Is this gallery freshwater, brackish water or saltwater?

pH: What is the pH range for this Exhibit Gallery?

Fresh Water: 4-9

Salt Water: 7.5-8.4

Brackish Water: 5-8

Inhabitant: Name one animal found in this gallery.

Example:

Gallery	Type of Water	pH	Inhabitant
Gator Bayou	Freshwater		American Alligator

Gallery	Type of Water	pH	Inhabitant
World Rivers			
Shore Gallery			
Bizarre & Beautiful			
Dangerous and Deadly			
Riverbank			
Frog Bog			
Rainforest			
Amazon Tunnel			
Coral Reef Tunnel			
Jellyfish Gallery			
Shark Tunnel			
Penguins			

Wonders of Water

SCAVENGER HUNT

(Answer Key)

Gallery	Type of Water	pH	Inhabitant
Gator Bayou	Freshwater	4-9	American Alligator

Example:

Gallery	Type of Water	pH	Inhabitant
World Rivers	Freshwater	4-9	Variety of fish, crustaceans, turtles
Shore Gallery	Brackish Water Salt Water	5-8 7.5-8.4	Crustaceans, fish, turtles
Bizarre & Beautiful	Salt Water	7.5-8.4	Fish, Octopus, Anemones, Sea Horse, Crabs
Dangerous and Deadly	Fresh Water Salt Water	4-9 7.5-8.4	Fish, sharks, turtles, sting rays, eel
Riverbank	Fresh Water	4-9	Turtles, fish, ducks
Frog Bog	Fresh Water	4-9	Frogs
Rainforest	Fresh Water	4-9	Fish, turtles, otters, snakes
Amazon Tunnel	Fresh Water	4-9	Fish, turtles, sting rays
Coral Reef Tunnel	Salt Water	7.5-8.4	Fish, lobster, eel
Jellyfish Gallery	Salt Water	7.5-8.4	Jellyfish
Shark Tunnel	Salt Water	7.5-8.4	Sharks, sting rays, eel, fish, turtle
Penguins	Salt Water	7.5-8.4	Penguins

Wonders of Water

POST-LESSON ASSESSMENT

(Answer Key)

1. Which of the following is NOT a part of the water cycle? (circle the answer)

Evaporation Condensation **Convection** Precipitation

2. When water changes forms, we call this a phase change.

3. We have a limited supply of water available for our use.

True False

4. Name three important factors tested when checking water quality.

temperature

salinity

pH

5. Record keeping is an important part of performing a science experiment.

True False

6. Which unit is appropriate to use when recording salinity?

mg/L mph **ppt** psi

7. What is the first thing you should do when performing an experiment that uses chemicals? Safety-goggles and gloves

8. Name three things you can do to conserve water.

Turn water off when brushing teeth

Take short showers

Check for leaks in faucets

There are many more answers!!

Water Cycle

Objective: Students will understand the stages of the water cycle by labeling a water cycle diagram.

Background:

Water Cycle

The Water Cycle describes the continuous movement of water on, above, and below the surface of the Earth.

Evaporation occurs when the sun heats up water in rivers, lakes and oceans turning it into water vapor (also known as **steam**). The water vapor, or steam, leaves the river, lake or ocean and goes into the air.

When water evaporates, the tiny individual particles of water have gained so much heat energy from the sun that they need more room to move. The particles move so far apart from one another that they become water vapor.

Condensation occurs when water vapor in the air gets cold and changes back into liquid, forming clouds.

As the particles of water vapor move around in the air, they get farther away from their heat source and start to cool off. As the particles of water vapor cool down, they have less energy to move around and need less space to move. They will eventually **condense** back down forming a cloud.

Precipitation occurs when so much water has condensed that the air cannot hold it anymore. The clouds get heavy and water falls back to the earth in the form of rain, hail, sleet, snow, frost or dew.

The tiny water particles can change from water vapor to liquid water falling, or precipitating, back to the ground in the form of rain (liquid water). But what happens with snow, sleet or hail? When it is really cold outside, the tiny individual particles in liquid water get so cold that they can barely move! When this happens they freeze into solid chunks of ice, snow or "hail stones."

Collection occurs after water falls back to earth as precipitation. It is collected back into the rivers, lakes and oceans or on land. When water ends up on land, it will either soak into the earth and become the ground water that plants and animals use to drink, or it may run off the soil and collect back in rivers, lakes and oceans. From here, the water cycle can start all over again!

As winter ends and the temperature outside gets warmer, the tiny individual particles of frozen solid water get warmer; they start to move around more; and need more room. The particles get far enough apart that they are no longer a solid chunk of ice or snow. They have turned back into liquid water! The liquid water soaks back into the earth or collects back in rivers, lakes and oceans.

The water cycle is complete. Even though water sometimes changes forms, it is always water. When water changes forms, we call this a phase change. To review:

- When water evaporates, it changes from a liquid phase to a gas phase.
- When water condenses, it changes from a gas phase to a liquid phase.
- When water freezes, it changes from a liquid phase to a solid phase.
- When water melts, it changes from a solid phase to a liquid phase.

Water moves through a watershed in a never-ending cycle. Water in oceans, lakes and rivers is heated by the sun and evaporates into clouds. Rain and snow fall from the clouds into your watershed. Some of the rain and snow is absorbed by plants. Some falls in streams and rushes to the sea. But most of it moves more slowly through your watershed - seeping into the ground or pausing in wetlands and lakes before joining flowing streams.

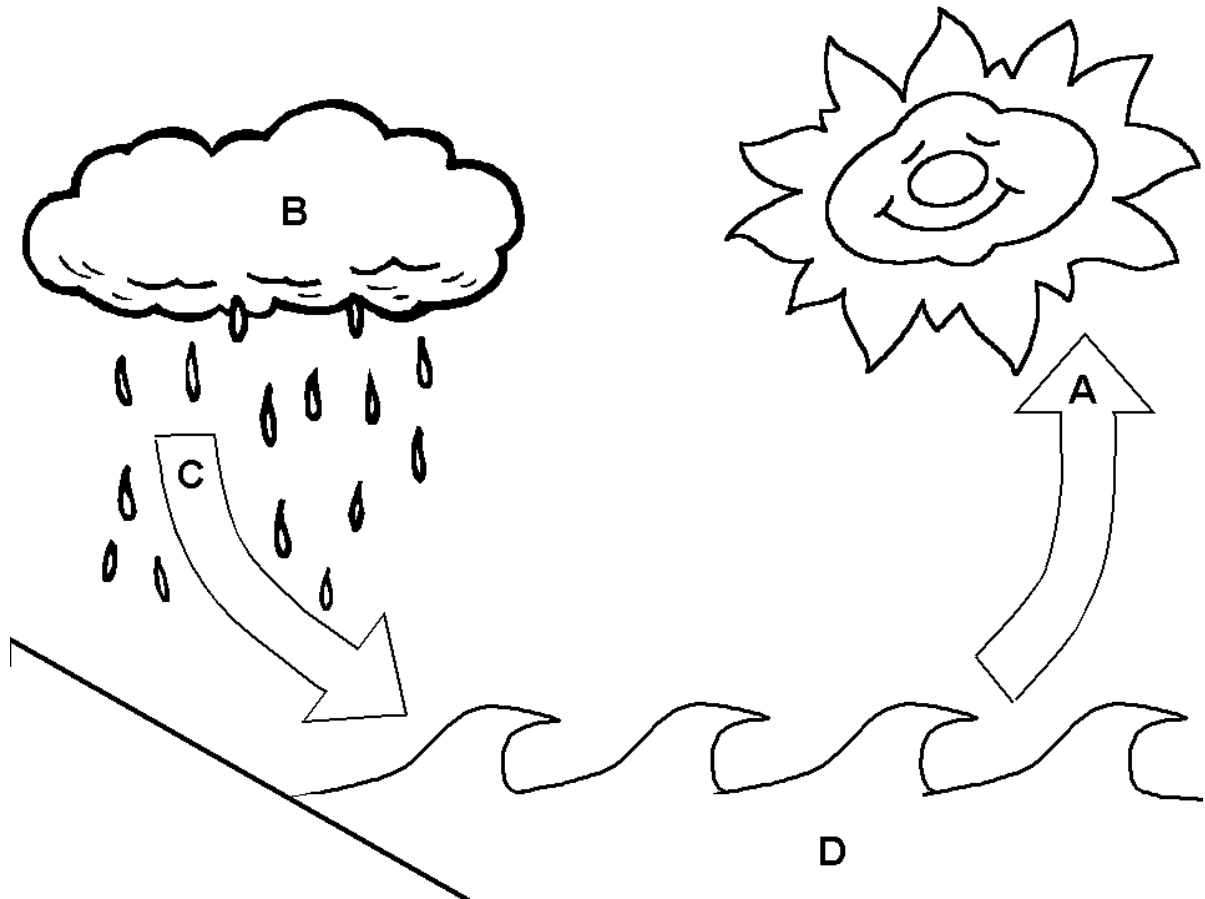
Materials:

For each student: **Water Cycle Diagram**, pencil

Procedure:

1. Review the stages of the water cycle with the students.
2. Give each student a **Water Cycle Diagram**.
3. Have students label the stages of the water cycle.

Water Cycle Diagram



Label the stages of the Water Cycle

A.

B.

C.

D.

Water Cycle Stages

Collection

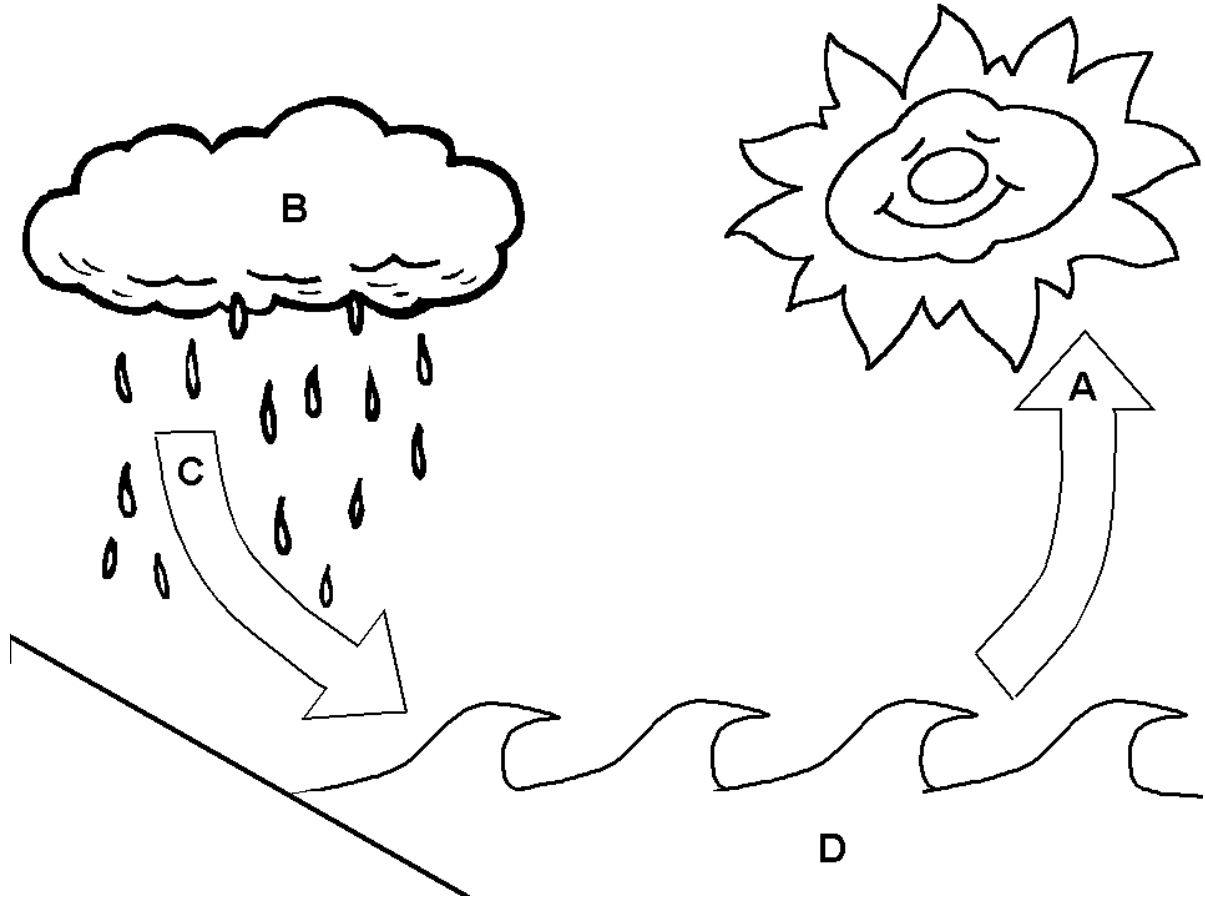
Condensation

Evaporation

Precipitation

Water Cycle Diagram

(Answer Key)



Label the stages of the Water Cycle

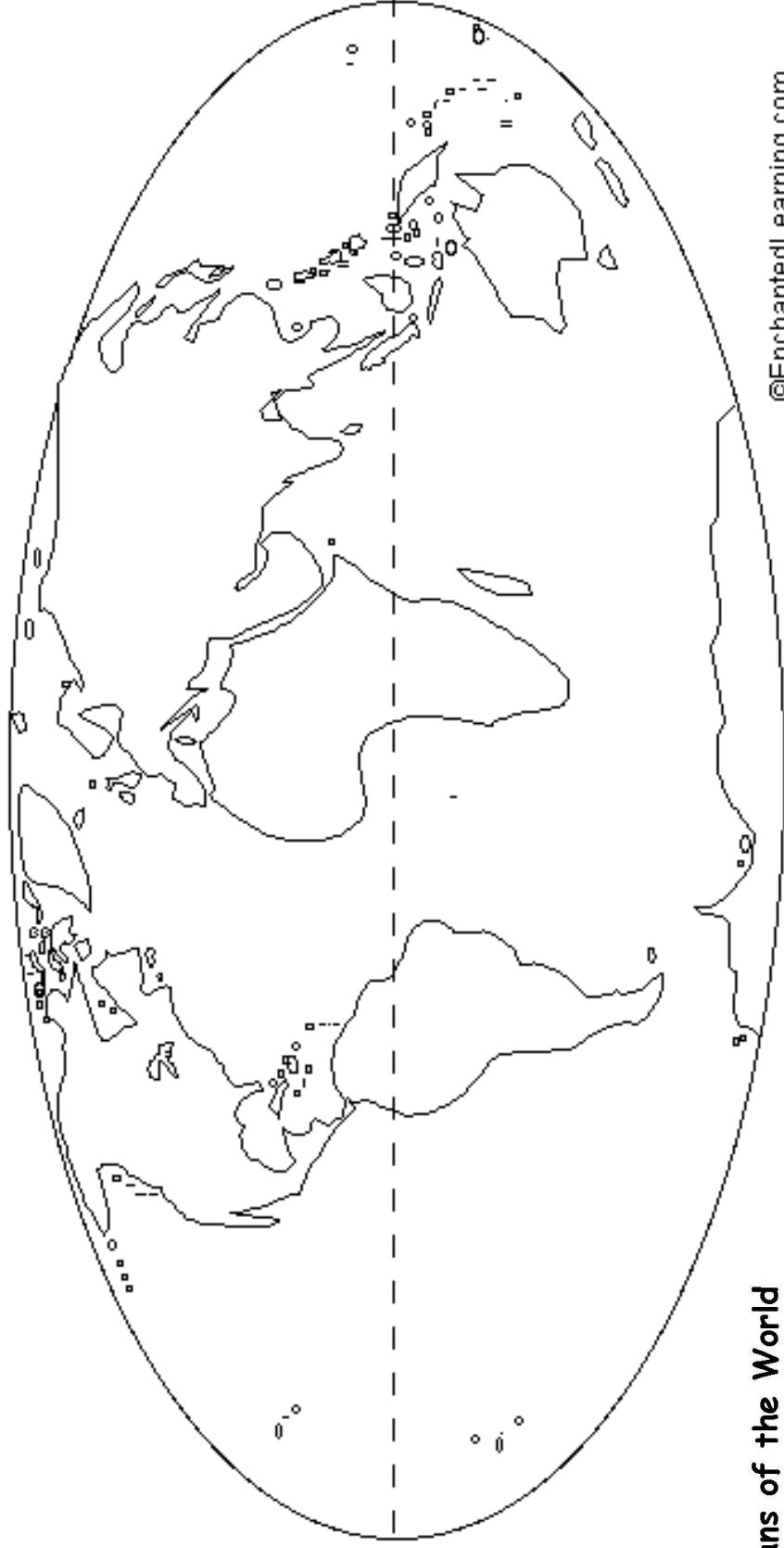
- A. Evaporation
- B. Condensation
- C. Precipitation
- D. Collection

Water Cycle Stages

- Collection
- Condensation
- Evaporation
- Precipitation

Label the oceans of the world.

The World



Oceans of the World

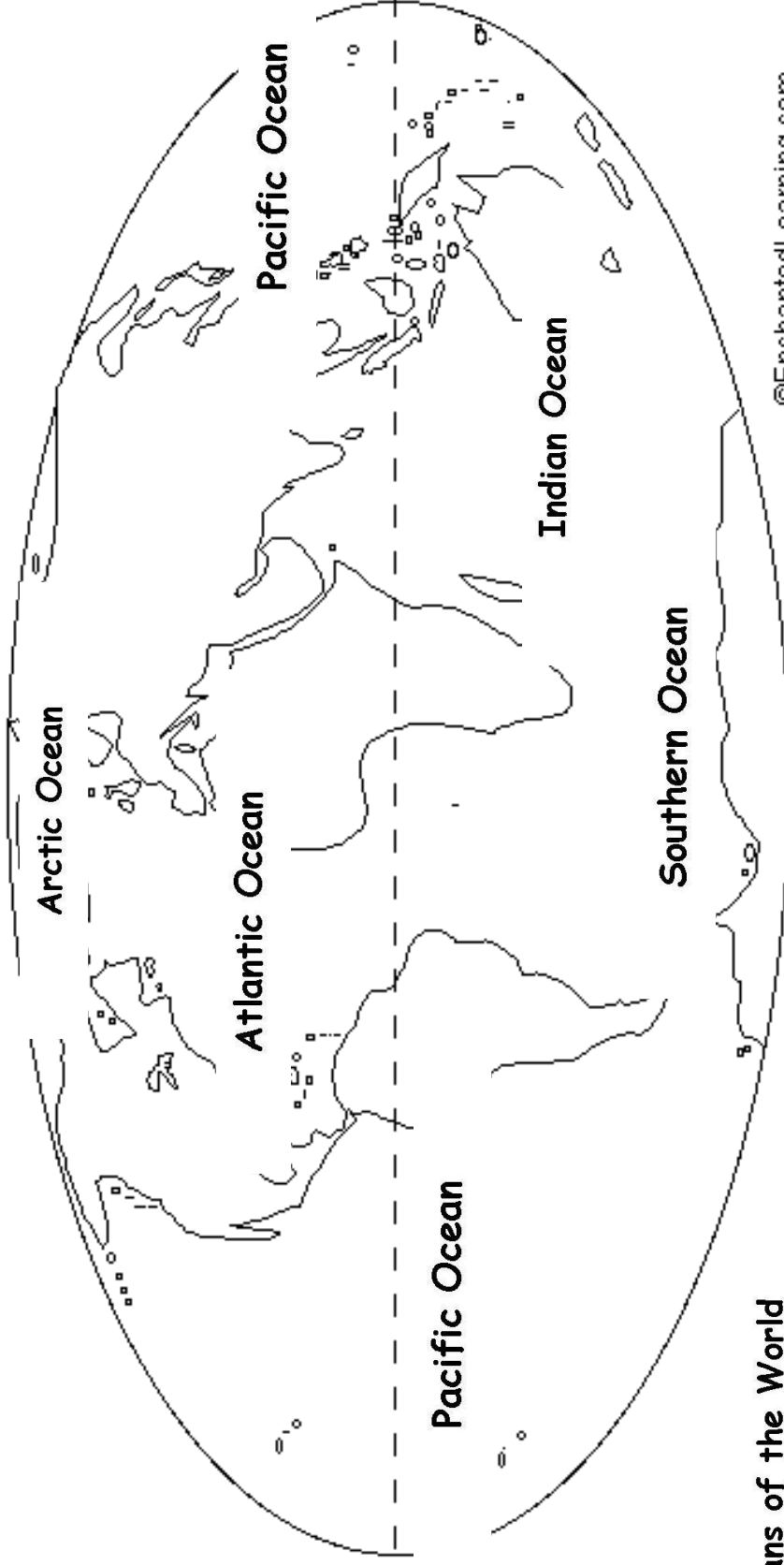
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- Atlantic Ocean
- Arctic Ocean
- Indian Ocean
- Pacific Ocean
- Southern Ocean

Label the oceans of the world.

Answer Key

The World



Oceans of the World

- Atlantic Ocean
- Arctic Ocean
- Indian Ocean
- Pacific Ocean
- Southern Ocean

Wonders of Water

POST-VISIT ACTIVITY

Word Scramble: Rearrange the letters in the parenthesis to complete the sentences.

1. All living things need _____ to live. (rtawe)
2. When water evaporates, it _____ and becomes part of a cloud. (docnsesn).
3. Less than 1% of all the water on earth is _____ water. (sefrh)
4. We _____ water in the liquid form. (ikrdn)
5. Check for leaks and save hundreds of _____ of water a day. (gloans)
6. You'll save water by taking a quick _____ (howser).
7. Wash cars with a _____ and a sponge instead of a running hose. (kecbut)
8. Ask your family to find ways to _____ water. (ecsovner)

(Adapted from www.epa.gov/OGWDW.kids)

Water Usage

Match the items on the left to the amount of water used on the right.

- | | |
|--|-------------------|
| 1. Taking a shower | A. 30 gallons |
| 2. Watering the lawn | B. 180 gallons |
| 3. Washing the dishes | C. 4-7 gallons |
| 4. Washing clothes | D. 1/2 gallon |
| 5. Flushing the toilet | E. 39,090 gallons |
| 6. Brushing teeth | F. 69,600 gallons |
| 7. Drinking | G. 15-30 gallons |
| 8. Producing 1 ton of steel | H. 9.3 gallons |
| 9. Processing 1 can of fruit or vegetables | I. 1 gallon |
| 10. Producing a new car a 4 tires | J. 9-20 gallons |

Wonders of Water

POST-VISIT ACTIVITY

(Answer Key)

Word Scramble: Rearrange the letters in the parenthesis to complete the sentences.

1. All living things need water to live. (rtawe)
2. When water evaporates, it condenses and becomes part of a cloud. (docnsesn).
3. Less than 1% of all the water on earth is fresh water. (sefrh)
4. We drink water in the liquid form. (ikrdn)
5. Check for leaks and save hundreds of gallons of water a day. (gllons)
6. You'll save water by taking a quick shower (howser).
7. Wash cars with a bucket and a sponge instead of a running hose. (kecbut)
9. Ask your family to find ways to conserve water. (ecsovner)

(Adapted from www.epa.gov/OGWDW.kids)

Water Usage

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Wild About Water Word Search

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

Find the following words in the word search.

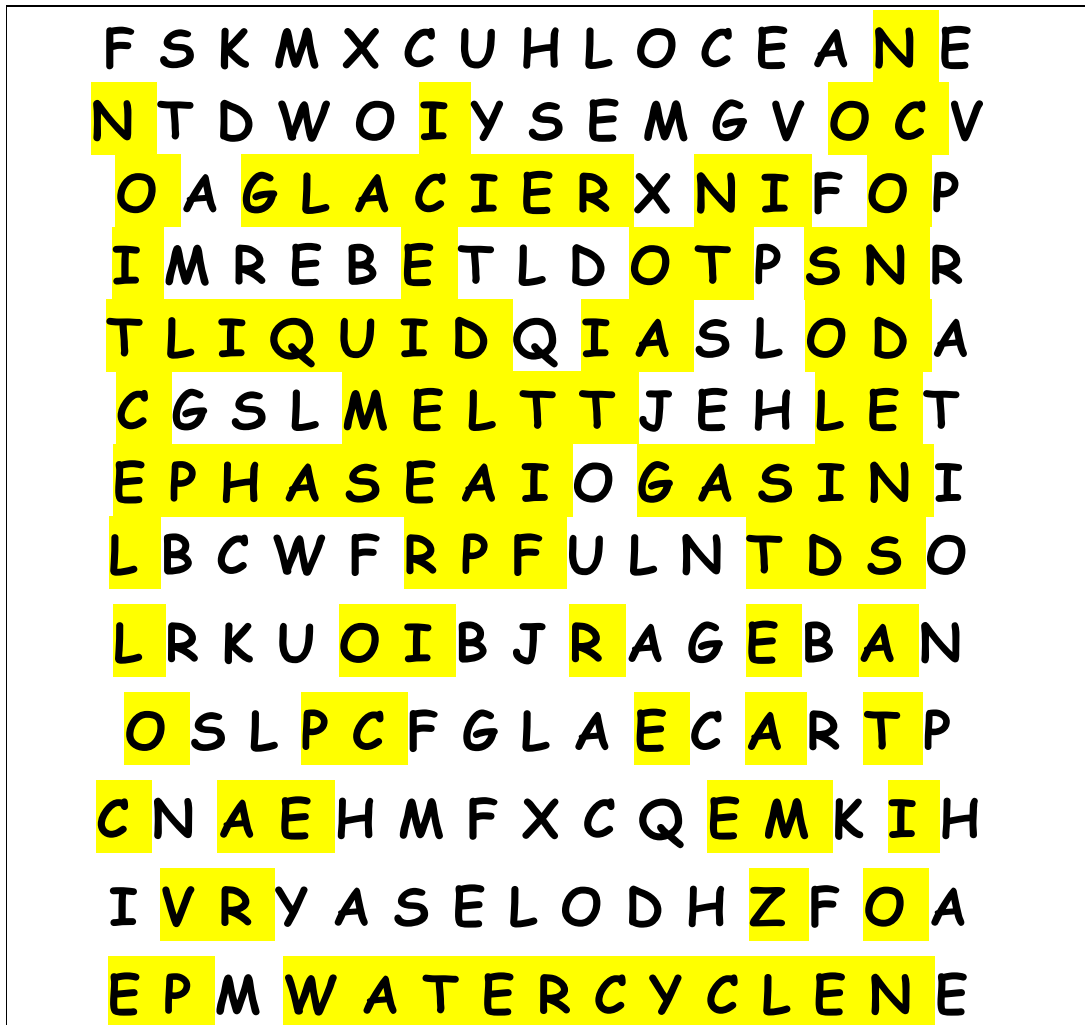
water cycle
evaporation
condensation
precipitation
collection
liquid
gas
solid

melt
steam
ice
ocean
glacier
freeze
phase

Wild About Water

Word Search

(Answer Key)



Find the following words in the word search.

water cycle
evaporation
condensation
precipitation
collection
liquid
gas
solid

melt
steam
ice
ocean
glacier
freeze
phase

Wonders of Water

National Science Standards (Grades 3-8)

Below is a list of National Science Standards discussed during the teaching of **Wonders of Water**.

Science as Inquiry K-4

Content Standard A: As a result of activities in grades K-4, all students should develop:

- Abilities necessary to do scientific inquiry
- Understanding about scientific inquiry

Physical Science K-4

Content Standard B: As a result of the activities in grades K-4, all students should develop an understanding of:

- Properties of objects and materials

Earth and Space Science K-4

Content Standard D: As a result of activities in grades K-4, all students should develop an understanding of:

- Properties of earth materials
- Objects in the sky
- Changes in earth and sky

Science and Technology K-4

Content Standard E: As a result of activities in grades K-4, all students should develop an understanding of:

- Abilities of technical design
- Understanding about science and technology

Science in Personal and Social Perspectives K-4

Content Standard F: As a result of activities in grades K-4, all students should develop an understanding of:

- Types of resources
- Changes in environments

History and Nature of Science K-4

Content Standard G: As a result of activities in grades K-4, all students should develop an understanding of:

- Science as a human endeavor

Science as Inquiry 5-8

Content Standard A: As a result of activities in grades 5-8, all students should develop:

- Abilities necessary to do scientific inquiry
- Understandings about scientific inquiry

Physical Science 5-8

Content Standard B: As a result of activities in grades 5-8, all students should develop an understanding of:

- Properties and changes of properties of matter

Earth and Space Science 5-8

Content Standard D: As a result of their activities in grades 5-8, all students should develop an understanding of:

- Structure of the earth system

Science and Technology 5-8

Content Standard E: As a result of their activities in grades 5-8, all students should develop:

- Understandings about science and technology

Science in Personal and Social Perspectives 5-8

Content Standard F: As a result in activities in grades 5-8, all students should develop an understanding of:

- Populations, resources and environments
- Natural Hazards
- Risks and Benefits

The NSES publication (ISBN 0-309-05326-9) can be viewed at
<http://books.nap.edu/html/nses/html/index.html>.

A bound, paperback copy can be purchased from the [National Academy Press](#), 2101 Constitution Avenue, N.W., Washington, D.C. 20418; tel. (202) 334-3313 or 1-800-624-6242.