



project WET
WATER EDUCATION TODAY

BLUE PLANET

In this hands-on activity, students investigate how much of Earth's surface is covered by water using an inflatable globe. By collecting and analyzing data, students practice estimation, sampling, and basic data analysis, while developing an understanding of surface area. Through guided discussion and reflection, students discover that water covers most of Earth's surface.

Grade levels: All ages!
(K - MS)

Total time: 1 hour

Topics: Figuring out how much of our planet is covered in water!



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At a glance:

Blue Planet - approx. 1 hour

- **Materials:**
 - Inflatable globe
 - Picture of Earth from space
 - Whiteboard or flip chart
 - Calculator
- **How many copy pages:**
 - Do the Math! (one per student)
- **Grouping:** Whole class and Individual
- **Mess factor:** remove any fragile objects from the playing area beforehand and you'll be good as gold!

Blue Planet

Grade Level

Lower Elementary, Upper Elementary, Middle School

Subject Areas

Earth Science, Geography, Math, Health (Physical Education)

Duration

Preparation time

15 min.

Activity time

Warm Up: 10 min.

Part 1: 20 min.

Part 2: 15 min.

Setting

Classroom, gym, or large indoor or outdoor space

Water Literacy Principles

Water connects all Earth systems.

Ocean Literacy Principles

1. The Earth has one big ocean with many features. (a,f,g)

Climate Literacy Principles

2. Climate is regulated by complex interactions among components of the Earth system. (b)

Vocabulary

cartographer, estimate, geographer, guess, percent(age), probability, predict, random sample, sample size, surface water



GUIDING QUESTIONS

- How do we know how much of Earth's surface is water versus land?

Summary

Students estimate the percentage of Earth's surface that is covered by water by tossing an inflatable globe.

Objectives

Students will:

- ✓ identify land and water areas on a globe.
- ✓ define surface water.
- ✓ sample random points on the globe for water or land.
- ✓ determine that water covers most of Earth.
- ✓ estimate the percentage of Earth's surface that is covered by water.
- ✓ determine if the random sample is an accurate representation of surface water in Earth.

MATERIALS

Warm Up (K-2, 3-5, MS)

- Inflatable globe that shows water and land masses or classroom globe
- Photos of Earth from space from NASA's photo gallery
- K-2 Option: Photos of surface water locations and/or water and land animals

Part 1 (K-2, 3-5, MS)

- Inflatable globe that shows water and land masses or classroom globe
- Whiteboard or flip chart
- Calculator (3-5, MS)

Part 2 (Grade 5, MS)

- Copies of **Copy Page—Do the Math!** (3-5, MS)

STANDARDS

Science	Science and Engineering Practices	Develop & Use Models Using Mathematics and Computational Thinking
	Core Ideas	Earth Systems The Roles of Water in Earth's Surface Processes
	Crosscutting Concepts	Scale, Proportion, & Quantity Patterns
Core Disciplines	Mathematics	Number and Operations in Base Ten Statistics & Probability
	English and Language Arts	Speaking & Listening Reading: Science & Technical

Background information about the subject of this activity is found at the end of the activity on the **Copy Page—Background Reading**.

PROCEDURE

Warm Up (K-2, 3-5, MS)

- Show students a photo of the Earth from space. You can find and download photos for free from NASA's Image gallery (see **Digital Resources**).
- Show students an inflated globe or classroom globe.
 - What does this represent? (Earth)
 - What colors do you see? What do the different colors represent? (Blue is water, green, yellow, or brown is land.)
- Why do you think some people call Earth the "blue planet"?
 - Is there more land or water on Earth?
- Where is water found on Earth?
 - *Note: we will only talk about surface water today. For upper elementary and middle school students, ask them to define surface water.*
- *K-2 Option:* Provide photos or pictures of various water and land locations. Younger students may sort these into land or water. (*Option: turn this into an art project!*)

Part 1 (K-2, 3-5, MS)

- 1 Ask students to stand (or sit) and form a circle.
- 2 What percentage of Earth's surface do students estimate is covered by water? (For younger students you can ask if they think that more than half the world is covered by water.)
 - a. Are they guessing, or do they know the percentage is a fact? How do they know?
- 3 Students are going to perform an experiment to test their prediction by randomly sampling Earth's surface. They will do this by tossing (or rolling) and catching the inflatable globe and recording where their left thumb touches water or land.
- 4 Establish rules for tossing the globe. Students may toss the ball to each other or may toss it to you in the center and you then toss it to each student. Younger students or students who cannot toss a ball can roll the ball.
- 5 After each catch, whoever caught the ball announces whether the tip of his or her left thumb is on land or water. If the tip of the thumb is touching both land and water, the student should choose one. Remember that the ice cap in the Arctic (North Pole) is all water, while the continent of Antarctica (South Pole) is land under much of the ice cap.
- 6 Record each catch under headings titled "land" or "water" on a notepad, classroom board, or flip chart. Another option is to use objects to record the touches as a graph (stack beads, poker chips, or paper squares to make a bar graph).



Tips and Tricks

Visual Option:

Using two colors (e.g. blue and white) of beads, poker chips, or paper squares, have one or two students record the results by placing the objects in two lines on strings, a table, or taping them to the board. This represents the data in a graph-like format.



Do the math!

WATER	LAND
 	I
18	6

Total: $18 + 6 = 24$ **Percent Water:**
 $18/24 = 0.75 \times 100 = 75\%$

7

Toss the ball around the group once, then ask students to count the total land and water and the overall total of touches. Record this number on the tally.

- If it is a small sample size, continue to throw the globe until you have at least 30 sample points.

8

For K-3 students, you can stop at this point to assess if there is more water than land.

- Compare the water and land amounts and see if their prediction is correct (there is more water than land!).

Part 2 (Grade 5, MS)

1

For upper elementary and middle school students, pass out copies of **Copy Page—Do the Math!** Ask them to write a ratio expressing the relationship of the number of water touches to the total number of touches. Then have the students convert that ratio into a percentage.

2

What was their percentage? Was it close to their prediction?

- Scientists and geographers have measured Earth's surface and have calculated that approximately 71 percent is covered by water. How did their result compare to the scientists' measurements?
- If their result differs greatly from 71 percent, can they determine why?
- What might they do differently? Would more tosses move the sample percentage closer to 71 percent?



Did You Know?

- The Arctic is frozen sea ice while Antarctica is a continent covered in an ice sheet.
- Sea level rise from climate change will increase the percent of surface water on Earth, impacting coastal communities.



Justice & Equity

Keep track of the countries that students touch in a separate list. How does access to water impact the health and lifestyle of these countries?

- 3** Try it! Have them toss the globe around until they have more sample points for the group.
- 4** Ask students to create a pie chart on the copy page showing the percentage of water and land on Earth.
- 5** Show students views of Earth from space. Use the NASA EPIC Satellite Site. Reflect again on why Earth is called the blue planet.
- 6** Have students produce a digital presentation illustrating the blue planet using the calculations from the class, research from scientists, and images from NASA Images (free image gallery).

REFLECTIONS

- Is there more water or land on the surface of the Earth? (K-2)
- How do we know this? (K-2)
- What water sources are near you? (K-2)
- What is the percentage of water on Earth's surface? (3-5, MS)
- How can we show this percentage as a graph? (3-5, MS)
- What is surface water? (3-5, MS)
- How can we use probability to make estimates of the amount of water on Earth's surface? (MS)
- How can sampling help us determine other data such as fish populations or macroinvertebrates in a waterway? (MS)
- How does sample size effect accuracy? (MS)



Take it Outside!

- Grab flip chart paper and do the activity outside.
- Go for a walk and find examples of water in the area.

DIGITAL RESOURCES

DiscoverWater.org: The Blue Planet—virtual, Internet version of this activity.

National Aeronautics and Space Administration (NASA) Image Gallery—search NASA images for the Earth.

National Center for Educational Statistics (NCES) Kids' Zone: Create a Graph—a fun website where students design their own graphs.

USGS: How Wet is Your State? The Water Area of Each State—find the percent of your state covered in water.

USGS: Surface Water Use in the United States—information about water in the U.S.

CHARTING THE COURSE

Water on Earth	Life Systems
• A Drop in the Bucket • The Incredible Journey	• The Life Box • Aqua Bodies



Localize It!

- Identify your location on the globe. Are you close to the ocean, a lake, or rivers?
- What is the surface water in your area (a river, lake, or ocean)? Do you live somewhere with a lot of water or little water? How available is water near where you live?
- Use the USGS website, “How Wet is Your State? The Water Area of Each State” to find out how much surface water your state has.
- How much surface water does your state rely on for water use? Use the USGS website, “Surface Water Use in the United States” to find data. You can also search for data from your state’s Department of Environmental Quality or Department of Natural Resources.

NAME:

1. Write a ratio expressing the # of water touches to the total # of touches.

2. Calculate the following:

$$\frac{\text{\# of water touches}}{\text{total number of touches}} =$$

_____ (decimal) X 100 = _____ %

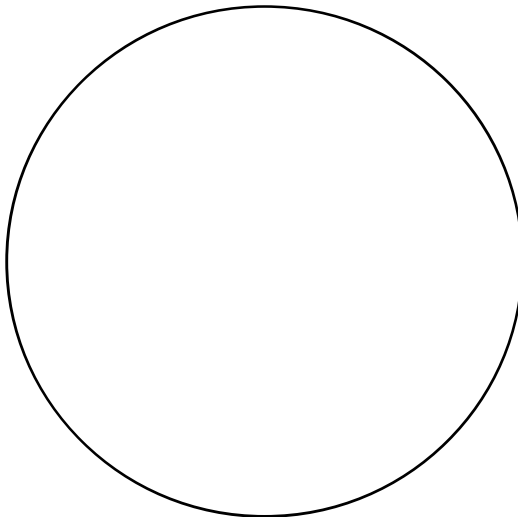
3. Scientists and geographers have measured Earth's surface and have calculated that about 71% is covered by water.

Land area (148,429,000 sq. km) + Water area (361,637,000 sq. km) = 510,066,000 sq. km,
Earth's total surface area

Based on these figures, calculate Earth's water area:

$361,637,000 \div 510,066,000 = \underline{\hspace{2cm}}$ (decimal) $\times 100 = \underline{\hspace{2cm}}$ % water

4. Create a pie chart, using the circle below, showing the correct percentages of land and water on Earth.





Do the math!

1

Land area = 148,429,000 km²
Water area = 361,637,000 km²
Total surface area :
148,429,000 km²
+ 361,637,000 km²
510,066,000 km²

2

To calculate the percent water on Earth, divide water by the total:

$$\frac{361,637,000}{510,066,000} = 0.71$$

3

$$0.71 \times 100 = 71\%$$

When astronauts look at Earth from space, they see that most of its surface is covered by water. Scientists have been studying and measuring Earth's surface for a long time and have found that about 71 **percent** of it is water.

This means that if we randomly choose points on a globe, it's likely that around 71 out of 100 points will be in the water, while the remaining 29 points will be on land. By using **probability**, we can **estimate** the percentage of water on Earth's surface by taking samples of different sizes. The bigger the **sample size**, the more accurate our estimate will be. Probability is a useful tool when we don't know the exact results, like when we want to figure out the amount of water on Earth without measuring every single spot. We can **predict** what will happen if we randomly touch a globe.

Earth's surface has water in many places such as the ocean, rivers, lakes, and streams. This is called **surface water**. The ocean covers a large part of Earth's surface and contains almost all of the water on Earth. This is why using a globe with ocean and land is a good estimate for the actual percentage of water on Earth.



Career Connections

CLIMATOLOGIST • GEOLOGIST • GLACIOLOGIST • HYDROLOGIST •
METEOROLOGIST • OCEANOGRAPHER • CARTOGRAPHER



ABOUT PROJECT WET



Our Mission

We empower educators to engage youth to understand water and solve local and global challenges.

The cornerstone of Project WET is its methodology of teaching about water resources through hands-on, investigative, easy-to-use activities. Lessons are inquiry-based, age-appropriate, and designed to teach place-based STEM education through the lens of water. Our lessons are not only academically rigorous, but they are also fun for educators and youth!

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YOU MAY ALSO BE INTERESTED IN...

- **Discoverwater.org**
 - A free, interactive website designed for use by children ages 7-12.
- **Incredible Journey - free activity download**
 - Students learn about gathering data to determine what percentage of Earth's surface is covered by water.

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