

THE MIRACLE OF WATER

A Dad-and-Kid Discovery Guide

For curious kids - and the dads who explore with them

START WITH A GLASS OF WATER

It looks simple. It has no color, no smell, and almost no taste. But this ordinary-looking liquid does things that are so unusual that life on Earth depends on them.

*"He turns a wilderness into a pool of water,
And a dry land into springs of water;
And He has the hungry live there,
So that they may establish an inhabited city."*

- Psalm 107:35-36 (NASB)

A few things to have nearby: a clear glass of water, two ice cubes, a paper towel, a penny, an eyedropper or straw, a few M&M candies, and a leafy plant. You do not need all of them - they just make the discoveries more fun.

The Tiny Molecule That Behaves Differently

1. H₂O: tiny molecule, enormous difference

Water is H₂O: two hydrogen atoms joined to one oxygen atom. A similar molecule, H₂S, has two hydrogen atoms and one sulfur atom - but H₂S is a gas at room temperature, while water is a liquid. Why? Water molecules can form many weak attractions called hydrogen bonds. Think of them as millions of tiny handshakes between water molecules.

WHY IT MATTERS

Those tiny "handshakes" help give water its unusual boiling point, surface tension, heat capacity, and many other properties that living things need.

TRY IT TOGETHER

Look at a glass of water. You are looking at trillions upon trillions of tiny H₂O molecules constantly moving and "holding on" to one another.

Ask your child: If two tiny molecules look somewhat alike, why do you think they can behave so differently?

2. Ice floats - and that changes everything

Water does something unusual when it freezes. Liquid water becomes most dense at about 39 F. As it gets colder than that, it begins to spread out. When it freezes, ice is about 9% less dense than liquid water, so ice floats.

WHY IT MATTERS

In winter, floating ice forms a lid on lakes and ponds. The water underneath can stay liquid, giving fish, frogs, insects, and other creatures a place to survive. If ice simply sank to the bottom, winter would be very different for aquatic life.

TRY IT TOGETHER

Drop an ice cube into water. It floats. Ask: "What would happen to a lake if every new piece of ice sank?"

Dad note: Water is not literally the only substance that expands when it freezes, but this behavior is highly unusual and especially important for life.

Water Protects Temperature - and Carries Life

3. Water is a giant heat sponge

Water can soak up a lot of heat without changing temperature very quickly. For the same weight and the same temperature rise, water can absorb about nine times as much heat as iron. That is why a metal object can become scorching hot in the sun while a nearby body of water warms much more slowly.

WHY IT MATTERS

Oceans and lakes help soften huge temperature swings on Earth. Water also helps your body keep a steady temperature - including by carrying heat and cooling you when sweat evaporates.

Ask your child: Why do you think places near a big ocean often have milder temperatures than places far inland?

4. Water is the great carrier

Water dissolves more substances than any other liquid. Because each H₂O molecule has a slightly positive side and a slightly negative side, water can pull many substances apart and carry them along. That is why water can move minerals through soil, nutrients through plants, and nutrients and wastes through our bodies.

WHY IT MATTERS

A grown-up human body is about 60% water. The brain and heart are about 73% water, and the lungs are about 83%. Life is not just surrounded by water - life is filled with it.

TRY IT TOGETHER

Put an M&M in a shallow dish of water with the printed M facing up. Watch the colored sugar coating dissolve. (The white M may eventually lift away.)

Ask your child: What kinds of things does water carry around your body?

Water Climbs - and Water Has a "Skin"

5. Water can climb upward

Water can move through tiny spaces even against gravity. Water molecules stick to one another (cohesion) and also stick to many other surfaces (adhesion). Together, those effects help water move through tiny spaces in soil and plants. This is part of capillary action.

WHY IT MATTERS

Plants pull astonishing amounts of water from the ground. An acre of corn can release about 3,000-4,000 gallons of water into the air in a day. A large oak can release around 40,000 gallons in a year.

TRY IT TOGETHER

Dip the bottom edge of a paper towel into a glass of water and leave most of the towel hanging above the water. Watch the wet line slowly climb upward.

Ask your child: How does water get from the soil all the way to leaves high in a tree?

6. Water has an invisible "skin"

Water molecules pull on one another at the surface. This creates surface tension - almost like an invisible stretchy skin. It helps water form round drops, lets dew bead up, and allows some tiny insects to stand or skate on the surface of a pond.

WHY IT MATTERS

The same molecular attraction behind surface tension is connected to several of water's other life-friendly properties. One simple molecule produces many useful effects at once.

TRY IT TOGETHER

Use an eyedropper or straw to place water on a clean penny one drop at a time. Count how many drops can pile up before the dome spills over.

Ask your child: Why does the water pile up into a little dome instead of immediately running off?

The Water Above Your Head

7. A cloud can hold more than a million pounds of water

Clouds look light and fluffy, but the water inside them is heavy. A typical fair-weather cumulus cloud of a commonly used one-cubic-kilometer example contains about 1.1 million pounds of tiny water droplets. The droplets are so small that air currents can keep them suspended.

WHY IT MATTERS

Those tiny droplets can join together, fall as rain, soak into soil, feed rivers, fill reservoirs, and eventually return to the atmosphere again.

Ask your child: The next time you see a puffy cloud, can you imagine more than a million pounds of water above you?

8. The atmosphere is a water superhighway

Only a tiny fraction of Earth's water is in the air at any one time. About 0.001% of Earth's water is in the atmosphere. If all of that atmospheric water fell at once and spread evenly over the whole planet, it would make a layer only about one inch deep. Yet that small amount is constantly moving around the globe through evaporation, clouds, rain, and snow.

WHY IT MATTERS

The water cycle continually moves fresh water from oceans and land into the air and back again. During Hurricane Harvey in 2017, about 27 TRILLION gallons of water fell on Texas and Louisiana in four days.

Ask your child: Where does rainwater go after it hits the ground - and how might it eventually reach the sky again?

Fresh Water Is Precious - and Powerful

9. Earth looks blue, but drinkable fresh water is scarce

About 71% of Earth's surface is covered by water. But about 96.5% of all Earth's water is salty ocean water. Only about 2.5% is fresh water - and most of that freshwater is locked in ice or stored underground. The water in lakes and rivers is only a tiny slice of the whole.

WHY IT MATTERS

This is why reservoirs, rivers, snowpack, springs, wells, and aquifers matter so much. Communities can only live where they can obtain reliable water.

Ask your child: If Earth has so much water, why can't we simply drink most of it?

10. Water can break rocks and help make soil

The same floating ice that protects a lake can also crack a mountain. Water slips into tiny cracks in rock. If that water freezes, it expands and can push the crack wider. Over many freeze-and-thaw cycles, rock can break apart. Flowing water also carries minerals and pieces of rock from one place to another.

WHY IT MATTERS

Water helps weather rock, move minerals, build soils, carve valleys, and reshape landscapes. The substance that fills your drinking glass is also one of the great sculptors of Earth.

Ask your child: Have you ever seen a crack in a sidewalk or rock that got larger after winter?

It Is Not One Amazing Property - It Is the Combination

Water is remarkable because many unusual properties work together at the same time. Its polarity helps it dissolve and carry materials. Hydrogen bonding helps give it high heat capacity, surface tension, and cohesion. Its open structure when frozen makes ice float. Its liquid, solid, and vapor forms drive the water cycle. Together, these properties affect cells, blood, plants, lakes, weather, climate, rocks, and soil.

FOR DAD: THE CREATION CONNECTION

Mainstream scientific sources describe what water does and why its chemistry behaves as it does. Christian creation ministries such as Creation Ministries International and Answers in Genesis go one step further and argue that this remarkable combination of life-supporting properties points to purposeful design. As Christians, studying the science can become an opportunity to worship the One who made it.

"The deeper we look at something as common as a glass of water, the harder it becomes not to see the fingerprints of its Creator."

Five questions to talk about together

- Which water fact surprised you the most?
- Why is it good that ice floats?
- How does water help a tree?
- Where did the water in your glass come from before it reached your home?
- What does learning about water make you think about God as Creator?

A few Bible passages to explore

Psalm 107:35-36: God provides water so people can live and build communities.

Psalm 104:10-13: Springs, animals, birds, mountains, and the earth are all pictured receiving water.

Job 36:27-28: A beautiful description of water rising, forming clouds, and falling as rain.

Job 38:25-30: God questions Job about rain, dew, ice, and frost.

John 4:14: Jesus uses water as a picture of eternal life.

Sources and Further Reading

The facts in this guide were simplified for a young child. These sources provide the fuller scientific explanations and the Christian creation perspective used to build the guide.

[U.S. Geological Survey - Water Density](#) - Ice is less dense than water; water is most dense near 39.2 F; freezing reduces density by about 9%.

[U.S. Geological Survey - Water, the Universal Solvent](#) - Water dissolves more substances than any other liquid and carries minerals and nutrients.

[U.S. Geological Survey - The Water in You](#) - Adult body-water percentages and the role of water in the body.

[U.S. Geological Survey - Evapotranspiration and the Water Cycle](#) - Corn and oak transpiration estimates.

[U.S. Geological Survey - How Much Does a Cloud Weigh?](#) - About 1.1 million pounds of water droplets in the standard cumulus-cloud example.

[U.S. Geological Survey - The Atmosphere and the Water Cycle](#) - Atmospheric water is about 0.001% of Earth's water; roughly one inch if spread over the globe.

[U.S. Geological Survey - Where Is Earth's Water?](#) - About 96.5% of Earth's water is in oceans; about 2.5% is freshwater.

[OpenStax Chemistry - Energy Basics](#) - Specific heat values for water and iron.

[Texas General Land Office - Texas at Risk report](#) - Hurricane Harvey: about 27 trillion gallons on Texas and Louisiana in four days.

[Creation Ministries International - The Wonders of Water](#) - H₂O/H₂S comparison, hydrogen bonding, ice structure, and creation-design interpretation.

[Answers in Genesis - God's Flawless Design of Water Makes Life Possible](#) - Detailed discussion of polarity, hydrogen bonding, surface tension, capillary action, density, and creation-design interpretation.

Keep asking questions. Keep looking closely. Creation is full of things we pass every day without noticing.