

The Science Behind the Poetry

Based on the text and illustrations of *I Am the Rain*
by John Paterson

Water is matter and exists in three states: solid, liquid, or gas. Water changes its state depending on the amount of energy (heat) that is available. As the temperature increases, the amount of energy increases, and water molecules move faster.

Solid Water—called *ice, snow, or hail*. When the temperature is at or below freezing, water molecules slow down and are close together in a fixed position. Solid water (like an ice cube) retains its shape as long as it stays cold.

Liquid Water—simply called *water*. When the temperature increases to above freezing, water molecules move around faster, but they still remain close to one another. Liquid water (like a river) flows. It needs a container to hold its shape.

Gas Water—called *water vapor*. When liquid water heats up, the molecules spread out (vaporize) and lose contact with one another. We can't see water vapor. It's invisible.



Why does it rain? Water vapor rises in warm air (*evaporation*). As it gets higher in the atmosphere, it is cooled and tiny water droplets form (*condensation*). When the droplets combine with bits of dust, dirt, or pollutants, they form clouds. If the droplets get large enough, they fall as rain (*precipitation*).



Why does water flow downhill? Gravity pulls water towards the Earth's center of gravity, always following the path of least resistance. The force of gravity prevents water from flowing uphill.



Why do we sometimes see a rainbow? Sunlight looks clear or white to us, but it is actually made of seven colors—red, orange, yellow, green, blue, indigo, and violet. When sunlight shines through water droplets, it bends and these colors are revealed (*refraction*). When we're standing in the right place, and the angle of the sunlight is just right, we can see a rainbow.



What color is water? Water by itself is colorless. One way it takes on color is from whatever stuff is dissolved in it. For example, dirt particles make the water look brown. Water also gets its color from the way light passes through it. When sunlight shines on clean water, the red, yellow, orange, and green colors are absorbed by water molecules, and we see the remaining colors of blue and purple—the deeper the water, the darker the color blue.



What is a breaking swell? A swell is a long, moving ridge of water. When an ocean swell reaches shallower water, usually along a coastline, it topples over (breaks) and is called a breaking swell.



Are ice and snow really sleeping?

No, that's just a poetic way of saying that ice and snow are formed when water molecules slow down. It's comparing ice and snow to people who slow down when

they sleep at night.



Do rivers search for the ocean? This is a poetic way of saying that water flows into the ocean. When ice is warmed, it becomes liquid water and immediately begins to follow the path of least resistance, pulled along by

gravity. Creeks and streams flow into rivers. Eventually rivers can't go any further and the water forms oceans (*collection*).



What is a thunderhead? A thunderhead is a type of cloud—*cumulonimbus*. It often produces rainstorms with lightning and thunder. **What causes haze?** Haze forms when very fine particles, such as water

droplets, are suspended in the air.



What is fog? Fog is a low cloud that forms near or on the surface of the Earth.

What causes frost? When air cools overnight, water droplets are formed (*condensation*). These droplets create

frost when it's below freezing or dew when it's warmer.



Is water only found on Earth? Water is found throughout the known Universe.

Comets are made of ice, dust, and gas.

Scientists have discovered frozen water on Mars, and canyons on its surface tell of a time when large amounts of liquid water carved deeply into the ground.



Why does all life depend on water? Two-thirds of Earth's surface is covered in water. Green plants on Earth are the basis of most food chains, and all green plants need water to live. And animals and people need green

plants to live. Our bodies are 80% water!



How does water move in a circle?

Water's circle is called the Water Cycle—water forms clouds, falls as rain and snow, moves across the Earth as rivers and glaciers, and flows into the ocean,

where it starts its journey again.

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