

LESSON ACTIVITIES (Completed after the lesson)

✓ **Further Understanding:** Investigation/Reasoning Skills

Earth is referred to as the blue planet because of all the water on it. Water is the most common substance on earth and covers seventy percent of its surface. The amount of water on earth always remains the same. It is recycled repeatedly and never used up. It just moves from one place to another.

Earth is the only place in the universe where water is known to exist in three states: liquid (water), solid (ice) and gas (water vapor). Water also has characteristics that make it different from all other substances. No other substance exists in liquid form in the temperature range found on earth. In addition, liquid water as it changes into a solid (ice) acts differently from other substances going from a liquid to a solid state.

Normally as heat is removed from a substance, it gets colder as the movement of the molecules in it slows down and the molecules draw closer together. As the molecules draw closer together, the substance becomes denser. This means that there is less space between molecules in a solid. This makes the solid form of a substance heavier than the same volume (amount) of the liquid form. Because the solid form of a substance is denser than the liquid the solid form will sink to the bottom of the liquid.

Ice is the solid form of water. If water acted in the same way as other substances, it would mean that ice would be denser than water. If ice were denser than water, it would sink to the bottom of a glass of water, but instead it floats in it.

Liquid water is denser than solid water (ice) because water doesn't act in the same manner as other substances when it gets cold. As with other substances, water molecules draw closer together when heat is removed until water reaches a temperature of 39.2 degrees F (4 degrees Celsius). Water then does something very different as it continues to lose heat and get colder; it begins to expand until it forms ice at 32 degrees F. This makes ice less dense than water so ice floats in water. All other substances continue to contract and become denser as they get colder.

We need to think about why God designed water to act in a different manner than other substances. Remember liquid water is necessary for life and is the only substance which exists in a liquid form at the temperature range needed for life.

We should examine how the characteristics of water affect a lake in the winter. As heat escapes from the water into the air, the water in the lake gets colder. The colder water on top becomes denser than the water below it and so it sinks to the bottom. When the lake temperature reaches 39.2 degrees the water on the surface of the lake will continue to lose heat and get colder but it will begin to expand instead of sink. Since it is less dense it will stay on top of the water underneath it. When the water on top freezes at 32 degrees a sheet of ice will form over the surface of the lake. Only the very top layer of water will freeze, protecting the life that lives in the warmer (39.2 degree) water below.

In the Beginning – 5

If ice were denser than water, in the winter as water froze on the top of a lake it would sink to the bottom. The bottom of the lake would begin to fill up with ice. More and more ice would accumulate until the whole lake was frozen solid.

If a lake completely froze in the winter then all the life in it would die. The lake wouldn't even thaw out completely in warm weather because the heat of the sun wouldn't be able to penetrate through to the bottom.

Demonstration: You can demonstrate how this works by completing the activity.

Preparation: Add blue food coloring to a small amount of water in two small paper cups. Put one cup in the freezer and leave until completely frozen. Put the other cup in the refrigerator to chill.

Activity:

- 1) Fill a clear glass about 2/3 full with very warm water. Using an eye dropper drip drops of the chilled blue water into the warm water. Observe what happens.
- 2) Remove the frozen water from the paper cup. Put it into the warm water. Observe what happens.

Questions: What is unique about water? Why is God's design for water good? What can be learned about God from examining the properties of water?

✓ Investigation Activity: – The attraction of water molecules

When God gathered the waters together, he caused water molecules to stick together. This means he created a strong attraction between water molecules, which causes them to draw and hold together. This attraction between water molecules causes water to have very strong surface tension.

Instructions:

- 1) Set a clear glass on a plate and fill it to the very top with water. Add water with a medicine dropper to the point where water spills over the edge. At that point the cup is completely full.
- 2) Explain that you will be putting paper clips into the water. Ask the children how many paper clips they think you can put into the glass without the water flowing out over the top.
- 3) Gently slide paper clips into the water. Have the children count the clips and observe the rim of the glass.
- 4) Questions: How many paper clips could we slide into the full glass of water? Where was the water in terms of the glass before the last paper clip caused it spilled over the rim of the glass? (It should have risen above the rim.) What caused the water to spill over the rim? (Surface tension breaks down when the weight of the water and the pull of gravity are too great.) Why is it important for water molecules to have a strong attraction for one another? (It causes water to hold together and flow easily.)

In the Beginning – 5

✓ **Game:** Competition

As a reminder that air is essential for life, hold some air competitions.

Instructions: Test to see who can hold their breath the longest and who can blow up a balloon the fastest or the biggest with just one breath.

✓ **Song:** Water, Light and Air (To the Farmer in the Dell)

Water, air and light, Water, air and light

God provides for living things, Water, air and light

Water's all around. Water's all around.

Water's in our bodies, in the air, and on the ground

Water's in three states. Water's in three states.

Liquid, solid, vapor is the water in three states.

Air surrounds the earth. Air surrounds the earth.

Air is always pushing down as gravity holds it round the earth.

The air makes blue the sky. The air makes blue the sky

Without the air we couldn't breathe and we would surely die.

The sun gives heat and light. The sun gives heat and light.

Without the sun there'd be no life cause life needs heat and light.

God is good and kind. God is good and kind.

God provides what's needed so abundant life we find.