Friends

Water

Name _____

Grade _____ Teacher _____

School _____

UNIVERSITY OF GEORGIA
EXTENSION

CONTENTS:

Did you know the Earth is about *71% water?*

Yet, it's the same water that was around when the dinosaurs were. We cannot make any new water, so we have to take care of the water we have. People all around the world use water for drinking, gathering and growing food, transportation, recreation, and sustaining life. In order to learn how to conserve and protect our precious water resources, we need to learn more about water. So come with me, Arch the Dawg, and let's DIVE IN and learn more together!

Georgia 4-H is a partner in public education and strives to incorporate Georgia Standards in the educational materials produced for in-school use. The following Georgia Standards are correlated to the content delivery included in this publication:

S4CS2.a/S5CS2.a: Add, subtract, multiply, and divide whole numbers mentally, on paper, and with a calculator.

S4CS2.b/S5CS2.b: Use fractions and decimals, and translate between decimals and commonly encountered fractions – halves, thirds, fourths, fifths, and hundredths (but not sixths, sevenths, and so on) – in scientific calculations.

S4E3. Obtain, evaluate, and communicate information to demonstrate the water cycle.

a. Plan and carry out investigations to observe the flow of energy in water as it changes states from solid (ice) to liquid (water) to gas (water vapor) and changes from gas to liquid to solid.

b. Develop models to illustrate multiple pathways water may take during the water cycle (evaporation, condensation, and precipitation). (Clarification statement: Students should understand that the water cycle does not follow a single pathway.)

S5P1. Obtain, evaluate, and communicate information to explain the differences between a physical change and a chemical change.

b. Construct an argument based on observations to support a claim that the physical changes in the state of water are due to temperature changes, which cause small particles that cannot be seen to move differently.

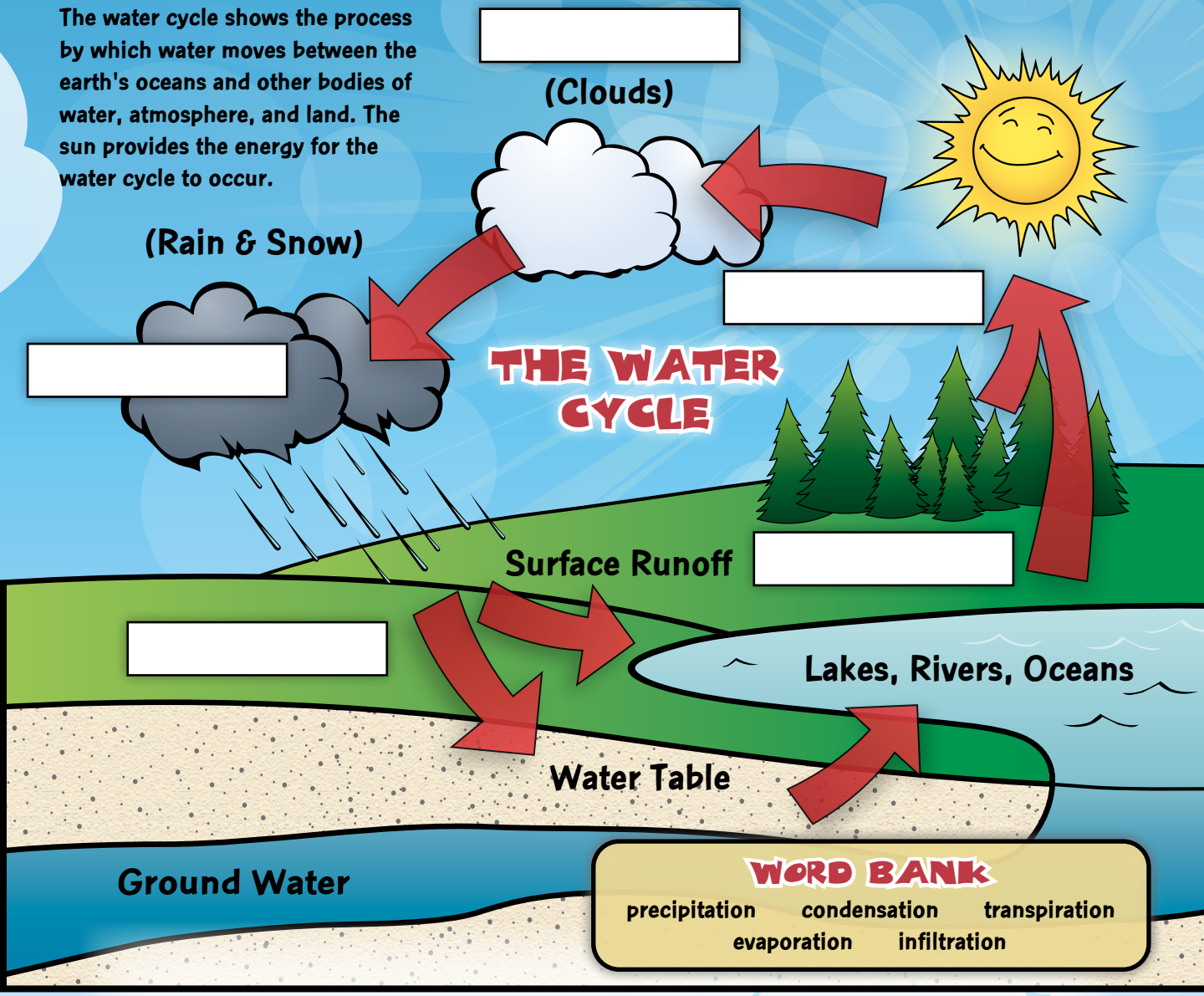
Georgia Standards from www.georgiastandards.org

Think Green! Not just 4-H Green...but let's help do our part to recycle and reuse. Save this book, reread it or pass it along to a friend. If it's too worn, please recycle it.

WATER, WATER, EVERYWHERE

Use your water smarts (and the words in the word bank) to fill in this water cycle!

The water cycle shows the process by which water moves between the earth's oceans and other bodies of water, atmosphere, and land. The sun provides the energy for the water cycle to occur.



If you can remember that energy from the sun powers the water cycle, it will be easy to remember the parts of the water cycle using this song (use the tune of "She'll be Coming Around the Mountain"):

Water travels in a cycle, yes it does, Water travels in a cycle, yes it does
It goes up as evaporation, Forms clouds as condensation,
Then comes down as precipitation, yes it does!

A DROP OF KNOWLEDGE

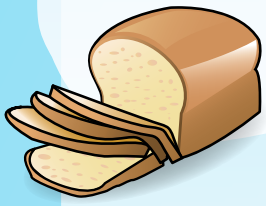
Not only do we drink water, but water is also used to produce and manufacture many common items we use and consume in our lives. Let's investigate how much water is needed for these items.

Assuming it takes about 2,000 gallons of water to produce one pound of beef, how much water does it take to make a ¼ pound hamburger?

_____

Assuming a typical cotton shirt takes about 700 gallons of water to produce, how much water does it take to make five cotton shirts?

_____



Assuming it takes about 10 gallons of water to produce one slice of bread, how many gallons of water does it take to make a loaf of bread (20 slices)?

_____

List a few ways the water is used during the production of cotton shirts.

_____

_____

How many gallons of water are involved in making a ¼ pound beef patty on 2 slices of bread?

_____

Assuming it takes about 50 gallons of water to produce one egg, how much does it take to produce a dozen eggs?

_____

The numbers provided on this page are only estimates. It can be very difficult to come up with exact water use numbers. Some of the variability is explained by the different production techniques used in various places. Another factor is how far back in the production chain one begins to include water usage. Please be aware that there are many uncertainties when providing estimates of water use.

USGS Water Science for Schools, **https://www.usgs.gov/special-topics/water-science-school**

ANSWERS:
1/4 pound hamburger: 2000 / 4 = 500 gallons
Shirt: 700 x 5 = 3500 gallons
Water use in shirt production: growing cotton, production, manufacturing, dying and finishing
Bread = 10 gallons x 20 slices = 200 gallons
Eggs = 50 gallons x 12 eggs = 600 gallons
Hamburger = 500 + 10 + 10 = 520 gallons

SPOTLIGHT ON CAREERS

4-H prepares youth to be "Beyond Ready" for life by encouraging them to explore their sparks and build meaningful relationships with peers and adults. Being "Beyond Ready" also means thinking about your future and learning about careers!

Beyond Ready

Water is essential to life on Earth. How many different careers can you think of that involve water? In addition to food production and manufacturing, don't forget to think about protecting water, cleaning water, and making water available to all those who need it. List as many different careers as you can that involve water. If one career really interests you, ask an adult and do some research for more information about that career.

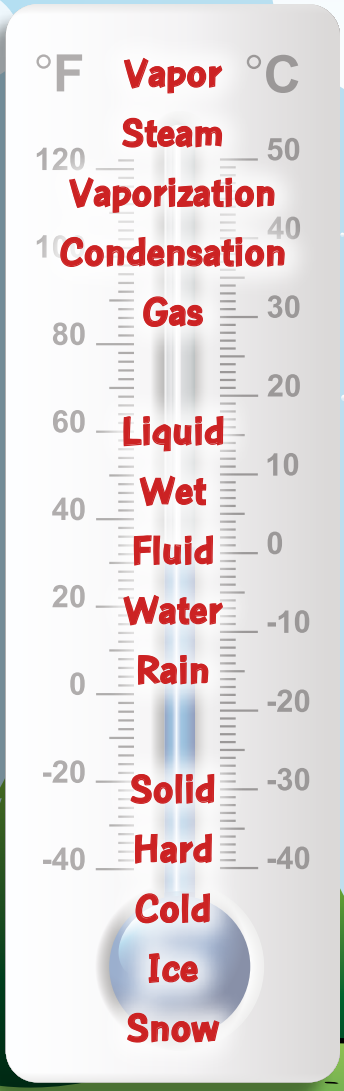
Bryan Fluech has served as the Associate Marine Extension Director for the University of Georgia Marine Extension and Georgia Sea Grant Program since 2015. He is responsible for providing leadership and coordinating Marine Extension activities across Georgia with academic, management, industry, and community partners. His extension programs specifically focus on marine fisheries, seafood sustainability and coastal tourism with the goal of promoting the economic, cultural, and environmental health of Georgia's coast. Bryan has 19 years of experience as a Sea Grant Fisheries Extension Agent in Georgia and Florida, where he has worked with a variety of stakeholders to conduct applied research, outreach, and extension programming aimed at protecting the coast and sustaining livelihoods connected to it. Prior to working for Sea Grant, Bryan's career included teaching middle and high school science, working as naturalist, and conducting field work in freshwater and coastal wetlands. Bryan has a B.S. in Biology from the University of Tennessee and a M.Ed. in Secondary Science Education from the University of Florida.

THE THREE STATES OF WATER

One water molecule (H_20) is made up of 2 hydrogen atoms and 1 oxygen atom.

Water is naturally found in three states of matter, determined by the temperature. When water transitions between different states of matter, the process is a physical change.

Fill in the blanks below, by using each word on the "thermometer" only one time.



1. The three states of matter are _____, _____, and _____.
2. Solid water is called _____.
3. The liquid state is called _____.
4. Water as a gas is called _____ or vapor.
5. Two physical properties of ice are _____ and _____.
6. Liquid water is described as a _____ and _____.
7. Water is always present in the air as water _____.
8. Liquid precipitation is called _____.
9. _____ forms when water vapor in the atmosphere freezes into ice crystals.
10. _____ describes the transformation of water from a liquid state to a gas state.
11. _____ describes the transformation of water in a gas state to a liquid state.

Of the 50+ project areas offered in 4-H Project Achievement, several are related to water including: Environmental Science, Freshwater Fish & Shellfish, Earth and Space Sciences, and Marine & Coastal Ecology.

WATER YOU MADE OF?

Let's think of ways to represent the water content of people and other things.

Water content of an average human is about 60%.

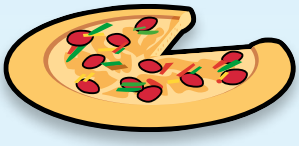
How is that represented as a fraction? _____

What does that look like on a pie chart?

Water content of an average tomato is about 94%.

How is that represented as a fraction? _____

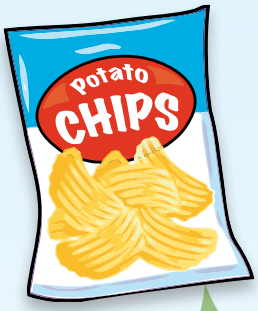
What does that look like on a pie chart?



Water content of an average pizza is about 50%.

How is that represented as a fraction? _____

What does that look like on a pie chart?



Water content of an average potato chip is about 2%.

How is that represented as a fraction? _____

What does that look like on a pie chart?

Knock, knock.

Who's there?

Water.

Water who?

Water you waiting on, let's do the next activity!

TAKE THE 40 GALLON CHALLENGE!

Complete this pledge card today to join others in the **40 Gallon Challenge**, where people are encouraged to reduce their water use by 40 gallons each day.

In addition to my existing water conservation practices or actions in the past, I pledge to:

INDOOR	Daily Savings*	Check to Pledge
Run the dishwasher only when full	2 gallons	
Not leave water running while rinsing dishes	5 gallons	
Turn off water while brushing teeth (twice daily)	8 gallons	
Shorten showers by 2 minutes (once daily)	5 gallons	
Fill the bathtub half full while bathing	18 gallons	
Not use the toilet as a wastebasket (once daily)	2 gallons	
Wash only full loads of laundry and cut back by one load per week	5 gallons	
Fix a leaky faucet	15 gallons	
Fix a leaky toilet	30 gallons	
OUTDOOR	**Daily Savings***	**Check to Pledge**
Make a compost pile instead of using the garbage disposal	4 gallons	
Use a 55-gallon rain barrel to capture rain water for watering landscape or garden	5 gallons	
Use a broom instead of a hose to clean driveways and sidewalks (twice weekly)	22 gallons	
Water yard after midnight and before 10 a.m. to prevent evaporation	20 gallons	
Adjust sprinklers to reduce overspray onto sidewalks, driveways, etc.	20 gallons	
Add mulch (2-3 inches) around trees and plants (1000 sq ft)	25 gallons	
Use automatic car wash that recycles water instead of hand washing cars (weekly)	18 gallons	

*Actual water savings from these actions depends on a number of factors, including a household's water pressure, number of residents, age/efficiency of plumbing devices, size of landscapes and irrigation systems, personal behaviors, etc. These daily estimates for an average household are provided solely as an educational guideline to help the public understand and appreciate the potential of these actions to help the region save water.

TOTAL SAVINGS PLEDGED =		Gallons per day!

Did you know the average Georgian uses 100 gallons of water each day?
Learn more about water conservation practices at epa.gov/watersense

HYDROLOGISTS IN ACTION!

A hydrologist is a scientist who studies water. You try being a hydrologist and match up these words with their definition to learn more about water.

1. ***Dissolved Oxygen*** _____
2. ***Temperature*** _____
3. ***Non-Point Source Pollution*** _____
4. ***pH*** _____
5. ***Groundwater*** _____
6. ***Erosion*** _____
7. ***Macroinvertebrates*** _____
8. ***Point Source Pollution*** _____
9. ***Turbidity*** _____
10. ***Water Quality*** _____

A. *A term used to describe the chemical, physical, and biological characteristics of water, usually in respect to its suitability for a particular purpose*

B. *The wearing down or washing away of the soil and land surface by the action of water, wind, or ice*

C. *The amount of solid particles that are suspended in water and that determine how clear water is*

D. *Organisms that are visible to the naked eye and lack a backbone*

E. *Pollution discharged over a wide land area, not from one specific location; these are forms of diffuse pollution caused by sediment, nutrients, organic and toxic substances originating from land-use activities, which are carried to lakes and streams by surface runoff*

F. *Oxygen gas (O_2) dissolved in water*

G. *A measure of the relative acidity or alkalinity of water. Water with a pH of 7 is neutral; lower pH levels indicate increasing acidity, while pH levels higher than 7 indicate increasingly basic solutions*

H. *Water that infiltrates into the earth and is stored in usable amounts in the soil and rock below the earth's surface; water within the zone of saturation*

I. *The measure of the average kinetic energy of moving molecules within a substance*

J. *Water pollution coming from a single point, such as a sewage-outflow pipe*

Sources: Water Science for Schools, https://www.usgs.gov/special-topics/water-science-school and The Water Sourcebook, http://water.epa.gov/learn/kids/drinkingwater/wsb_index.cfm

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