

BART'S BIG BRAIN TURNS BLUE□

A history of potential events as chronicled by Steven Coburn-Griffis

Chapter One

Friday, March 16, 2018

The students in Ms. Raczkowski's 7th Grade Earth Sciences class at Gateway Middle School weren't themselves. They were quiet. They were attentive. They were *focused*. That is not to say that these were bad kids, troublemaking kids, just that they were kids: twitchy, jittery, chatty, ready to jump and dance and play kids with bodies that all too often outran their brains. But not on this particular day. Each sat up straight in his or her Smartt chair, their faces awash in the glow from their Smartt desks, eyes firmly fixed on the big Smartt screen at the front of the room. If asked for an example of "anticipation", every Smartt desk in the school would have burned with a picture of Ms. Raczkowski's 7th Grade Earth Sciences classroom as it was at that very moment.

Clearly, this was unusual, but it was an unusual day. You just had to look at the way the big Smartt screen at the front of the room was bubbling a silvery blue to know that.

A soft chime sounded and an image of a turning Earth filled the big Smartt screen that covered most of the front wall. The round ball of Earth was blue and green and brown and white and it spun against a black backdrop of space. As it continued to turn, a familiar voice began talking to anyone and everyone listening.

"Earth," the voice said, and then paused for dramatic effect. During that pause, every single boy and every single girl sitting at every single Smartt desk in Ms. Raczkowski's classroom felt the tickling itch of that familiar voice and asked themselves, *Who? Who is that? I know that voice; know it almost as well as my own.*

"Earth," the voice continued, "is a wonder, a unique and radiant jewel travelling in its elliptical path around the sun. In the whole of our solar system, from Mercury to Neptune, there is no other planet like Earth."

On the Smartt screen, the Earth stopped spinning and began to blur, distorting in form from the round sphere of planet Earth to something quite a bit more oval in shape.

"And what is it that makes Earth so special? So rare? So *blue*?"

The blurred blob on the screen continued to change shape, gaining definition and becoming clearer and clearer until it had morphed into the face of a man. And not just any man, but a man who was very familiar to the kids in Ms. Raczkowski's 7th Grade Earth Sciences class: Bart Buttermann, host and quizmaster of the game show *Bart's Big Brain*, filmed right nearby their very classroom in Ohio. Bart Buttermann was grinning his famous grin, his face filled the big Smartt screen from top to bottom and side to side.

"So, do you know?" Bart Buttermann asked. "Do you know what makes Earth extraordinary?"

He paused for just a beat and – although if you had asked anybody watching Bart Buttermann in that classroom, they would have said it was impossible – his grin grew even bigger.

"Water!" he crowed.

Chapter One questions

1. Why do you think the word smart is spelled with two letter ts in the story? Can you think of other brand names that are deliberately misspelled?
2. Current classroom technology includes smartphones and smartboards. In Ms. Raczkowski's classroom three years from now, students sit in Smartt chairs at Smartt desks. Use your imagination to decide what this chairs and desk can do and how they might help you learn.
3. Look at a globe and a map of the United States. Using the scale of distance, how far are you from a large body of water (something bigger than the nearest reservoir).

Chapter One vocabulary words

chronicled

Earth Sciences

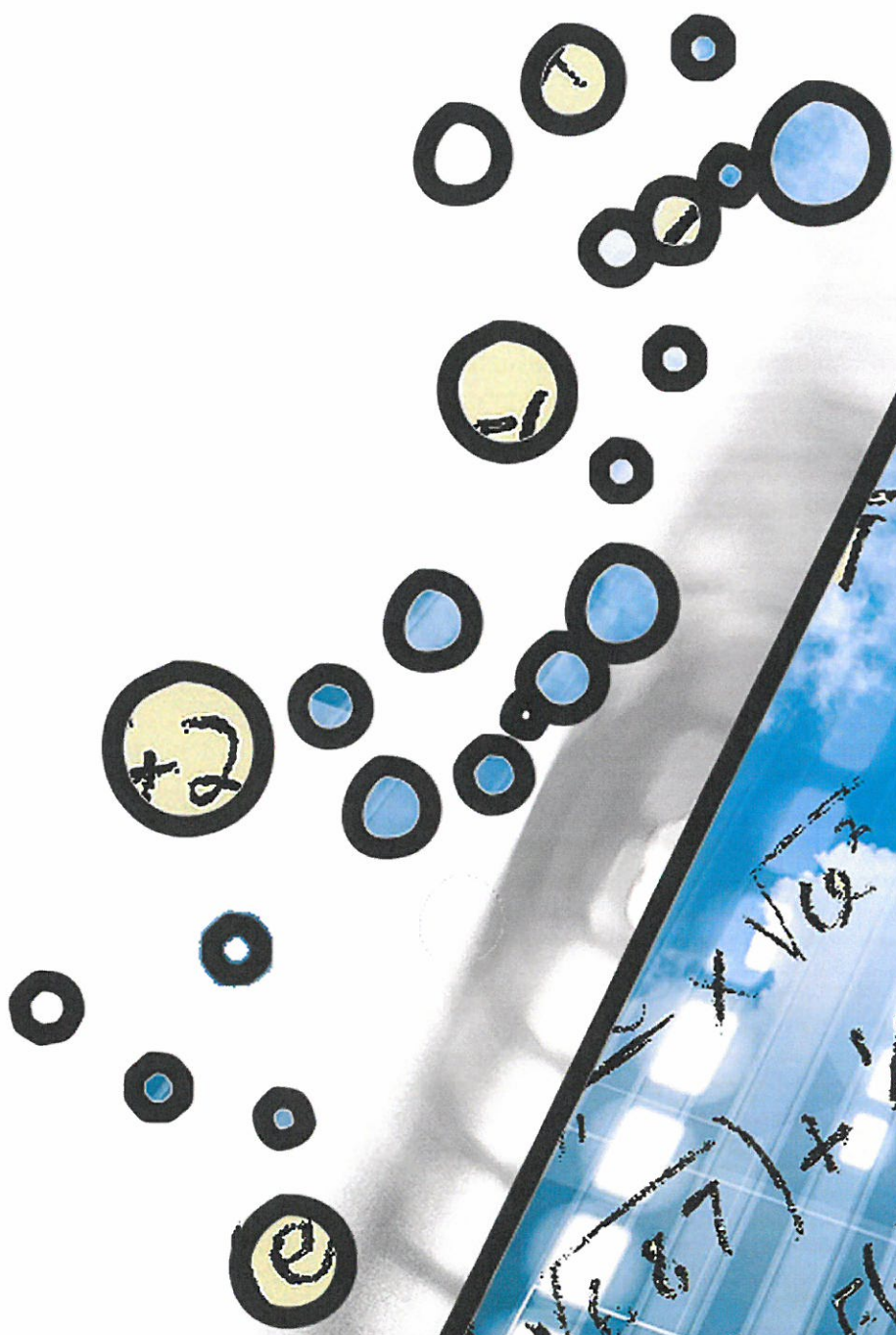
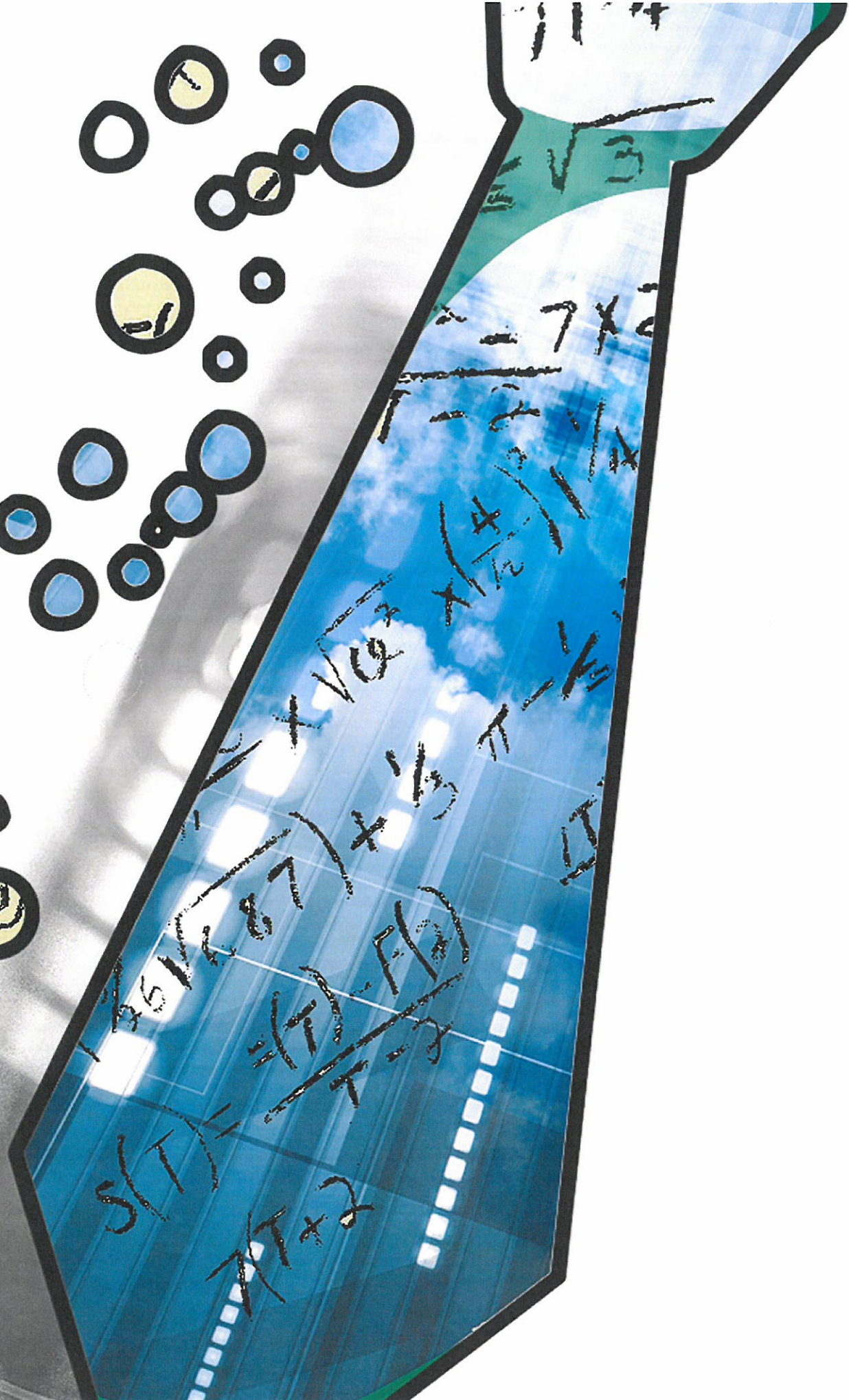
anticipation

elliptical

distorted

morphed

quizmaster



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Chapter Two

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"Yes indeed," Bart Butterman said through his grin, "Plain old water. Two parts hydrogen to one part oxygen."

As Bart Butterman talked, more and more of him came into view, including the patented Bart Butterman Smartt tie. It worked just like a Smartt screen, but it was a tie. Anybody watching that tie closely enough would see all manner of interesting things appear and then disappear again: mathematical equations, quotes from famous philosophers and even pictures of inventions, like Leonardo da Vinci's flying machine or some really strange Rube Goldberg devices.

Even while the kids were focused on Bart Butterman's Smartt tie, they began to hear a new sound; a chuckling, happy, liquid sort of sound. On the screen, Bart Butterman was pouring water from a clear glass pitcher into a crystal-clear glass. He took a sip, smacked his lips and then looked serious.

"But I misspoke; there's nothing 'plain' about water," he said. "Water has changed lives. Blind and deaf, Helen Keller's first understanding of the world was through water. Many religions, including Christianity and Islam, draw a comparison between water and life. And then there is the simple truth that over half of the human body, what makes up the greater part of all of us, is water.

"Water has inspired poets and painters, artists like William Shakespeare and Carl Sandburg, Claude Monet and Winslow Homer. And water has held an important place in music, giving musicians something to write about, to sing about, whether it's in opera, rock or rap. Call Beyonce and ask her. I'm pretty sure I've got her cell number here somewhere."

With his one free hand, Bart Butterman patted at his jacket pockets, then shrugged and grinned his famous grin.

As the students in Ms. Raczkowski's 7th Grade Earth Sciences class watched, the camera continued to pull back until it was clear that Bart Butterman was standing out in the open in front of a large, circular pool. Beside him was a small round table and as he set his glass down on its surface, a tremendous jet of water erupted from the center of the pool behind him. Bart Butterman jumped and pretended to look startled before grinning and talking some more.

"Water covers 71 percent, nearly three-quarters of the surface of planet Earth," he said. "But most of that is salt water, water we can't drink unless it has gone through a process to remove the salt, a process called desalinization. In fact, there is really very little fresh water on the planet at all; less than four percent. And some of that is underground or frozen in glaciers."

Bart Butterman raised the glass to his lips to take a sip, but the glass was empty. He tapped the glass with his forefinger, turned it upside down and then rubbed his lips.

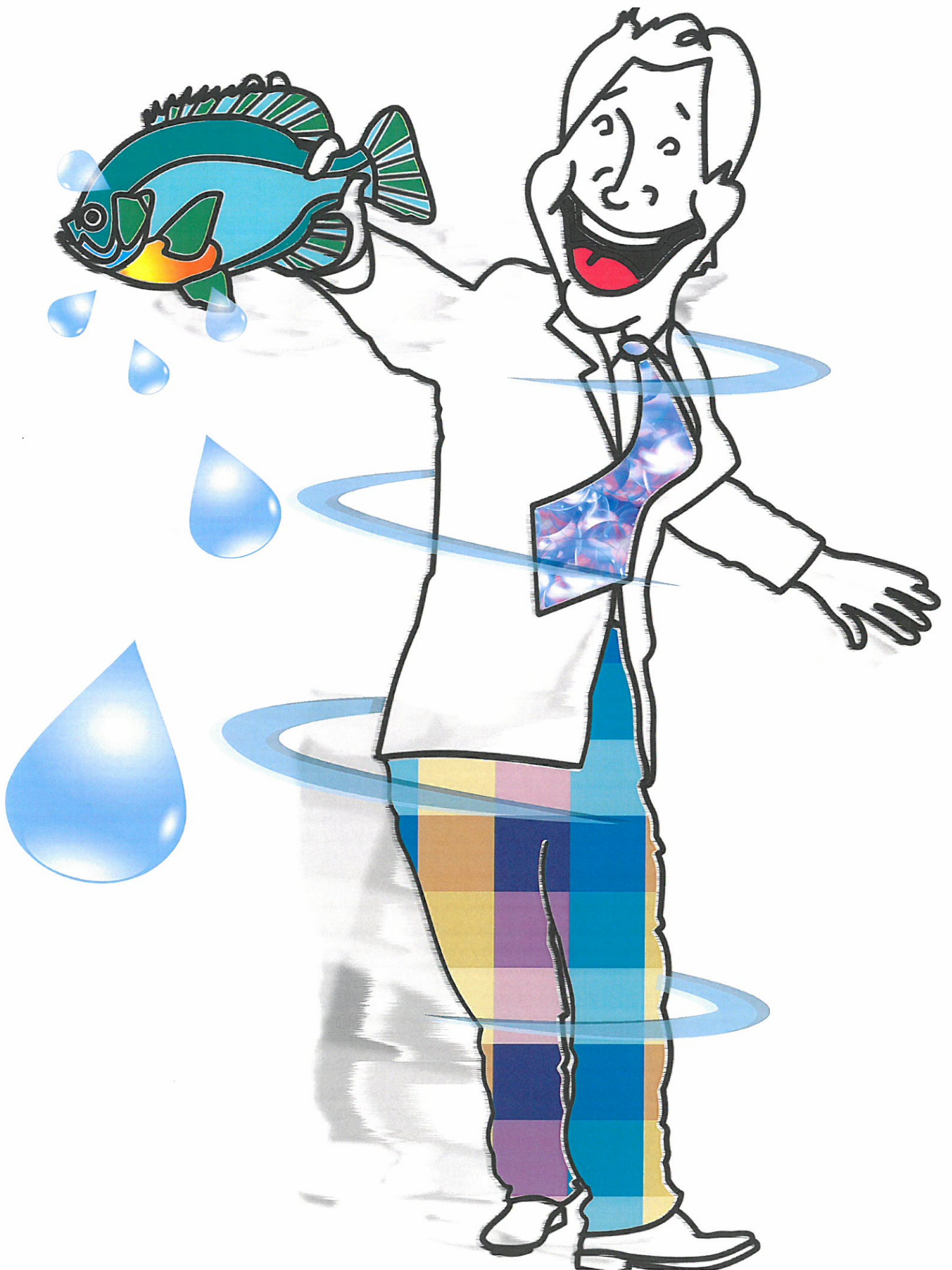
"So that raises the question, 'Should we do more to keep our fresh water safe?' And, possibly more importantly, what *can* we do? Is it already too late? I mean, like Benjamin Franklin said, 'When the well's dry, we know the worth of water.' Is that where we are now, why we're even asking these questions?"

Chapter Two questions

1. Bart Buttermen said that water is two parts hydrogen to one part oxygen. On the periodic table of elements, the chemical symbol for water is H_2O . In chemistry, an element is a substance that cannot be separated into simpler substances by chemical means. Locate a copy of the periodic table of elements online. Look at the list and see how many of them you recognize from foods or somewhere at home. For instance, what foods contain calcium?
2. Bart Buttermen's Smartt tie, a device that may be invented in the future, showed pictures of Leonardo da Vinci's flying machine. Da Vinci sketched his flying machine in the 15th century. It looked a lot like a modern-day helicopter, the first of which was built in the 1940s. Think of three devices that we use every day and research them. Did any of them originate with a very old idea?
3. How much of you is water? Why is getting enough water important to you? What can you do each day to keep our water safe?

Chapter Two vocabulary

hydrogen
oxygen
patented
equations
philosophers
Rube Goldberg
Carl Sandburg
Claude Monet
Winslow Homer



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Chapter Three

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Bart Butterman winked at the camera and, through it, at the kids in Ms. Raczkowski's 7th Grade Earth Sciences class.

But you know me," he said, leaning in close, "I like a good question. Even better, I love getting honest answers. So, to find out more about fresh water, what's going on with it and how to keep it coming, we're in Ohio. Northwest Ohio, if you want to be precise. Putting an even finer point on it, we're on the campus of Bowling Green State University."

The camera angle suddenly changed and the class found themselves looking down at Bart Butterman, who had thrown his arms out wide and was spinning in a circle so quickly that his patented Bart Butterman Smartt tie was flying nearly straight out from his body. His spinning gradually slowed down and as it did, the camera settled back to look square at him once again.

Bart Butterman put his hand to his head, straightened his tie and then said, "'But why Ohio?' you ask? Well, let me tell you. Ohio borders one of the Great Lakes, Lake Erie, and the Great Lakes are important sources of fresh water. Of all the fresh water there is on the surface of the planet, one-fifth of it is in the Great Lakes. And Lake Erie is important for another reason."

While he was talking, Bart Butterman sat down at the edge of the fountain with his back to the camera and dipped his fingers in the water.

"Ahhhh," he said. "The water's warm. And it's warm because it's shallow, shallow enough so that the sun can warm it up and keep it warm during the late spring, summer and early fall months. The same is true for Lake Erie. Now I'm not saying that the lake is like this little fountain; at its deepest point, Lake Erie boasts 210 feet of water. But if you compare 210 feet to, say, 1,332 feet – that's the deepest point in the biggest of the Great Lakes, Lake Superior – then you can understand why scientists say Lake Erie really isn't all that deep and why so many people come here for..."

Bart Butterman suddenly turned back around to face the camera and in his hands something silvery shook and jittered. He stopped shaking his hands and held up a fake rubber fish.

"The fish!" he shouted. "Because it *is* so shallow and warm, there are loads of fish in Lake Erie. In fact, Lake Erie is one of the world's largest commercial freshwater fisheries. So Lake Erie is important for the fish and because it provides drinking water for quite a few cities along its shores."

Bart Butterman stood up and brushed off his hands.

"But there have been problems, in Lake Erie and in other freshwater lakes in Ohio. Big problems with a little something called cyanobacteria, what we used to call blue-green algae."

Bart Butterman waved everybody closer and held up his Smartt tie.

"Come on," he said. "Have a look."

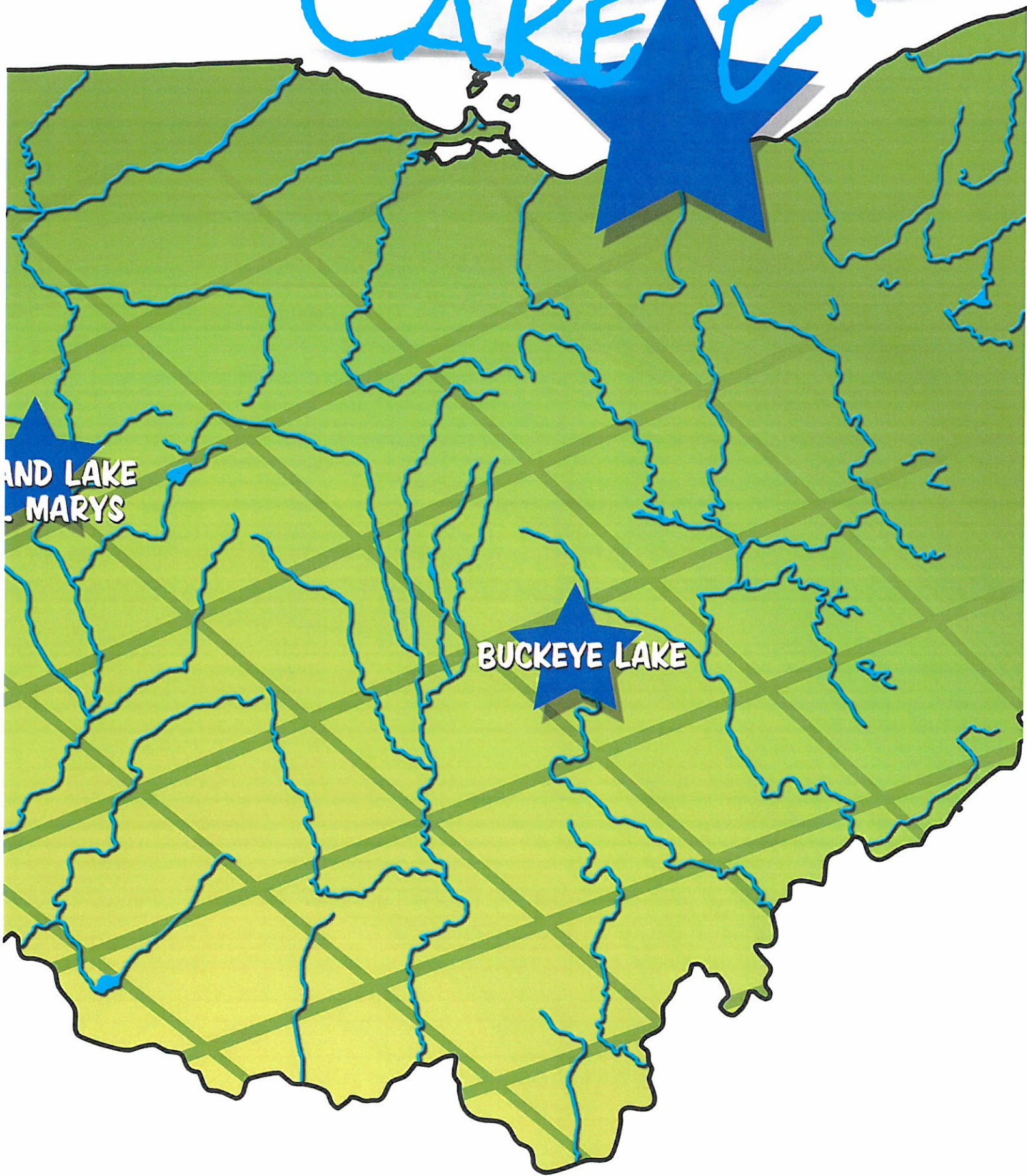
Chapter Three questions

1. About one-third of the rivers and streams in Ohio are in the Lake Erie watershed, which means the water flowing in them flows toward and eventually empties into Lake Erie. The lower two-thirds of the state's waterways flow south toward the Ohio River. Look at the Internet map at <http://soilandwater.ohiodnr.gov/maps/watershed-drainage-basin-maps>. Find your town on the map. Which of Ohio two major watersheds do you live in?
2. Bart Butterman listed several reasons why Lake Erie is so important to people. About 12 million people live in the Lake Erie watershed, which includes parts of Ohio, Michigan, New York, Pennsylvania and Canada. The lake provides drinking water for about 11 million of these people. Bart also talked about fish. Bart also talked about Lake Erie's fish. How many different reasons are there for fish being important to all of us?
3. Lake Erie, the shallowest Great Lake, is 210 feet deep at its deepest point. The deepest Great Lake, lake Superior, is 1,332 feet deep at its deepest point. What is the difference in depth between the two lakes? If it were possible, how many Lake Eries could you stack on top of each other to reach the depth of Lake Superior?

Chapter Three vocabulary

campus
fresh water
shallow
commercial
fisheries
cyanobacteria

LAKE ERIE



AND LAKE
MARYS

BUCKEYE LAKE

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Chapter Four

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The camera closed in on Bart Buttermann's patented Smartt tie until that was all anybody in Ms. Raczkowski's 7th Grade Earth Sciences class could see on the big Smartt screen. A bright point of light appeared on the tie. The point of light zipped up and over and down, zigging and zagging this way and that until there was an outline of the State of Ohio. Within the outline, three dark blue stars appeared: a big star up at the top of the state and two smaller stars; one a little less than halfway down and on the left side of the outline, and the other almost smack dab in the center.

Suddenly, the big star at the top of the state swung open and a cartoon Bart Buttermann pushed his head through the opening.

"This big star right here is Lake Erie," the cartoon host said, smacking at the swinging star with his cartoon hand, then pointed to the smaller star closest to him. "That smaller star right there is Grand Lake St. Marys and over there," he continued, pointing to the star nearly in the center of the state, "is Buckeye Lake. All three have been affected by cyanobacteria. And there are other places, too."

As the cartoon Bart Buttermann talked, little blue dots began to speckle the inside of the outline. Most of the dots appeared on the left side of the outline and from the center on up to the top.

"But what is cyanobacteria?" cartoon Bart Buttermann asked. "Well, it's a big word for a little organism that's creating massive problems for a whole lot of people."

As cartoon Bart Buttermann spoke, the outline of the state collapsed until it was a simple circle. The stars disappeared and the blue dots formed into long chains until it looked like someone had dropped pieces of stiff, pebbly string onto a plate.

"Cyano means, 'related to the color blue' and bacteria...well, that gets a little more complicated," cartoon Bart Buttermann continued. "Bacteria aren't plants and they aren't animals, they belong in a class all by themselves. And they're *small*. Almost all are microscopic, too small for the human eye to see without help. Anyway, when you put the two parts of the word together, you get blue bacteria. And they're called cyanobacteria because, when there are enough of them together so that they're visible, they have a kind of blue-green color."

Bart Buttermann's Smartt tie suddenly went blank. On the big Smartt screen in Ms. Raczkowski's class, Bart Buttermann stood once again beside the fountain. Except, where before the water was clean and clear, now it was almost entirely covered with what looked like a mat of blue-green scum.

Bart Buttermann pulled on a pair of long rubber gloves. He picked up the glass he had drunk from earlier and dipped it into the fountain. He held up the glass of blue-green goo and swirled it around a bit.

"And when there are so many cyanobacteria together that that they cover the surface of the water and reach down below the surface, they call that a 'bloom,'" Bart Buttermann said "And where there's a bloom, you've got trouble."

Chapter Four questions

1. During the 1960s, water quality issues in the Great Lakes became a concern and Lake Erie was perceived to be "dying". By the late 1960s, Canadian and American regulatory agencies were in agreement that limiting phosphorus loads was the key to keeping algal growth under control. Yet in 2014, the City of Toledo, one of the biggest ports in the Great Lakes, was without safe drinking water because of harmful algal bloom. Why do you think that we are still having problems taking care of Lake Erie nearly 50 years later?
2. Bart talked about blue-green algae in lakes, a fountain and in his water glass, but not in a river or stream. What are the differences in the water in a lake compared to a river? How might these differences cause blue-green algae to be in one but not the other? How do the different types of water bodies effect each other?
3. Bart put on rubber gloves to fill his water glass from the fountain? Why? What kinds of things do you do eve day to protect your health as well as the health of others?

Chapter Four vocabulary

Grand Lake St. Marys

Buckeye Lake

organism

massive

bacteria

microscopic



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Chapter Five

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Bart Buttermann gave the glass of blue-green goo one final swirl and then put it down beside the fountain. He peeled off the long rubber gloves and laid them down beside the glass.

"So what's so terrible about a cyanobacterial bloom or some other type of toxic algal bloom?" Bart Buttermann asked. "Flowers bloom and they're beautiful and smell wonderful." He paused, tapped the side of his face with his forefinger and then said, "Well, actually, some flowers smell like rotting meat, but that's a different story for a different day."

On his Smartt tie, the words, "Keep to the subject, Bart!" appeared and then slowly faded. Bart Buttermann looked down, smiled sheepishly and shrugged his shoulders.

"What's dangerous about these blooms?" Bart Buttermann asked. "Well, cyanobacterial blooms create toxins, poisons that can make animals, including people, sick and even kill them. Some toxins affect the nervous system, some affect respiration and some can even damage your liver."

He looked uneasily at the fountain full of blue-green muck behind him and took a quick step away, putting just a little more distance between him and all that goo.

"Now, none of this is new information," Bart Buttermann said. "The first time anybody mentioned toxic blooms was in the magazine, *Nature*, way back in 1858."

Bart Buttermann took a few more steps away from the fountain, putting more and more distance between him and the blue-green gunk it held until the kids in Ms. Raczkowski's 7th Grade Earth Sciences Class could no longer see fountain on the room's big Smartt screen.

"So what *is* new?" Bart Buttermann asked. "First, the blooms are happening much more frequently and in more and more bodies of water. Second, the severity of these toxic blooms is also on the rise. They're becoming bigger, and bigger means more dangerous. As to why this is happening...well, different people have different ideas."

"Toxic blooms happen when the water is warm and there are plenty of nutrients available," Bart Buttermann said. "So some people say that climate change is partially to blame."

On Bart Buttermann's patented Smartt tie the outline of a man wearing a business suit and carrying a briefcase appeared.

"Some people say that agriculture, farming, is responsible," Bart Buttermann continued, and as he spoke, the outline of the man in the suit seemed to speak with him. "They say that rain water carries fertilizers from farm fields into streams and rivers and the bacteria feed on those nutrients."

The figure on Bart Buttermann's Smartt tie changed; where it once wore a suit, now it wore an open-collared shirt and a baseball cap.

"Still others say that wastewater treatment plants, those places where the sewage from communities of people are cleaned up, from towns and cities, are to blame," Bart Buttermann said and, just as with the outline of the man in the suit, the outline of the man in the ball cap on Bart Buttermann's Smartt tie seemed to say those words along with him.

And then both outlines, the outline of the man in the suit and the outline of the man in the ball cap, were on Bart Buttermann's Smartt tie at the very same time. And it looked to the students in Ms. Raczkowski's 7th Grade Earth Sciences Class as if the outlines of the two men were yelling at each other.

Chapter Five questions

1. Bart mentioned that some flowers smell bad, like rotting meat. One group of plants, called carrion flowers, do just that to attract insects so that the insects can carry pollen from flower to flower. What are some other ways that plants and their flowers attract insects and birds? How do other plants protect themselves?
2. Harmful algal blooms, sometimes called HABs, come in all colors all over the world. In freshwater areas, like Lake Erie, we see blue-green algae. Red tide is a term often used for HABs in marine coastal areas, even though the growth of algae is unrelated to the tides. Warming temperatures, changes in the way water moves, and field run-off are thought to affect HABs. During what season are people in Ohio most likely to see HABs? How about people in Australia? China?
3. Why were the two men that appeared on Bart's tie yelling at each other? Look through today's newspaper and see if there are stories about people who are arguing about something. What are they arguing about? Does the article mention any ways they might settle their disagreement? Who do you agree with and why?

Chapter Five vocabulary

cyanobacterial
toxins
algal
sheepishly
nutrients
run-off
wastewater treatment



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Chapter Six

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Bart Butterman looked down at the outlines of the two men on his Smartt tie and then he looked back up at Ms. Raczkowski's Earth Sciences Class.

"Debate is good," he said. "It is very important that we talk about what worries us, about the problems that we face. That way we can come up with solutions to those problems."

Bart Butterman reached up and, with both hands, covered the outlines of the two men on his Smartt tie. And then, although nobody in Ms. Raczkowski's Earth Sciences Class had ever seen such a thing happen before, Bart Butterman loosened his tie and slipped it up and over his head.

"But sometimes talk turns to blame," Bart Butterman said. "And it becomes more important to point fingers at somebody else than it is to fix a problem. When that happens, we need to take a step back."

Bart Butterman reached up and loosened the top button on his shirt.

"The truth is, what's causing these toxic blooms is everything that people have already talked about," he said. "Everything that we've already discussed and probably more besides. So, rather than point a finger of blame, it's time that we all work together to fix the problem."

Bart Butterman slipped both of his hands into his pockets and bounced up onto his toes.

"And we are!" he said, smiling. "At least with this toxic bloom problem. The operators at wastewater treatment plants are working with the Ohio Environmental Protection Agency to find ways to clean up sewage better than ever before. And there are communities, cities and towns that are building wetland areas that help to keep nutrients from getting to where algae and bacteria can feed on them.

"On farms all across the state," Bart Butterman continued, "farmers are installing grass filter strips between their fields and local streams and rivers. These filter strips work in the same way as wetlands by helping to keep dirt and fertilizer from washing into rivers and streams and from there into Ohio's lakes."

Bart Butterman laughed and it was such a happy sound that every single person in Ms. Raczkowski's class couldn't help but laugh along with him, including Ms. Raczkowski herself.

"Why, there is even a small town that is working to process cow manure at one of its old wastewater treatment plants," Bart Butterman exclaimed. "Their idea is to take the manure and turn it into highly nutritious dirt that's even better than fertilizer. And one of the professors here in Bowling Green is helping!

"And that's what it takes to fix a problem like this;" Bart Butterman said, "a whole lot of different people thinking a whole lot of different thoughts about the best way to tackle it. And then getting together and talking their way through it."

Bart Butterman raised both hands and raised his eyebrows, as if to say, "See there, nothing to it. Easy Peasy."

"So, here we are," he said. "Not at the end of our story by a long shot but moving in the right direction, provided we keep working together."

Bart Butterman raised one finger in the air and said, "Oh, and there's one more thing we need to keep in mind."

He turned around and picked up his tie. He held it up so that everybody could see the big question mark that burned along the length of it.

"Ask questions," he said. "Keep asking questions and search for honest answers. You just never know where those questions will take you, what answers you'll find."

Chapter Six questions

1. Bart said that debate is good. During political elections, such as the upcoming 2016 Presidential election, the candidates debate each other about issues that they think are important. Look through recent issues of the newspaper for issues that people are concerned about now. Make a list of them. Over the next several months, pay attention to the people who want to be the next President of the United States and see if they take a stand on any or all of these issues.

2. "Bart's Big Brain Turns Blue" is set in the future, three years from now. In the eighth paragraph of this chapter, Bart said that people are working together to fix the toxic algal bloom problem, and goes on to list all the things people are doing. Make a list of the steps he mentions and research to find out how many of these steps are being considered.

3. Bart is from Bowling Green. Find Bowling Green on a map of Ohio. Using the scale of distance on the map, estimate how far your town is from Bowling Green. Are HABs, and the things that cause them, more or less likely to be a concern where you live?

Chapter Six vocabulary

debate

Ohio Environmental Protection Agency

wetland

grass filter strips

The use of "Bart's Big Brain Turns Blue", end-of-chapter questions and vocabulary as a classroom educational tool helps meet Ohio's new learning standards in: English Language Arts; Mathematics; Science; Social Studies with concentrations in Ohio and High School Contemporary World Issues.