The Sassafras Science Adventures

Volume 8: Physics



Johnny Congo &
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The Sassafras Science Adventures
Volume 8: Physics {SAMPLE}

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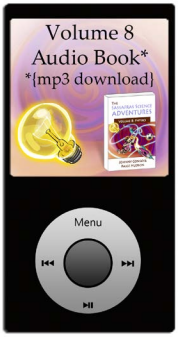
Topics Covered in This Volume

The Sassafras Science Adventures Volume 8: Physics covers a variety of chemistry concepts by looking at the following topics:

- Three Laws of Motion
- Speed
- Circular motion
- Forces
- Balance
- Gravity
- Friction
- Floating
- Energy
- Heat
- Changes in states of matter
- Light
- Colors
- Lenses
- Mirrors
- Sound
- Waves
- Wave behavior
- Musical instruments
- Electricity
- Circuits
- Batteries
- Electronics
- Simple machines
- Engineering design
- Bridges
- Arches
- Computers
- Coding
- Robots

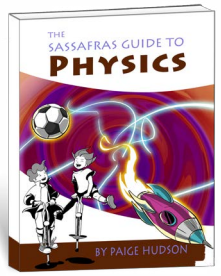
Don't want to do all the reading?



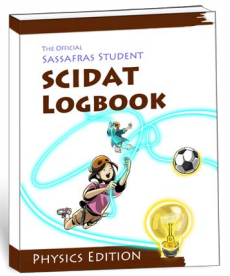
Check out *The Sassafras Science Adventures Volume 8: Physics* audiobook! Listen to the talented Christine Myrick take you on a journey to into the periodic table with the Sassafras Twins as they learn about different principles of physics.

Make the most of your journey with the Sassafras twins!

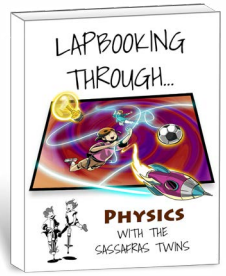
Add our activity guide, logbook, or lapbooking guide to create a full science curriculum for your students!



The Sassafras Guide to Physics includes chapter summaries and an array of options that coordinate with the individual chapters of this novel. This guide provides ideas for experiments, notebooking, vocabulary, memory work, and additional activities to enhance what your students are learning about the principles of physics!



The Official Sassafras SCIDAT Logbook: Physics Edition partners with the activity guide to help your student document their journey throughout this novel. The logbook includes their own SCIDAT log pages as well as lab report sheets and an physics glossary.



Lapbooking through Physics with the Sassafras Twins provides a gentle option for enhancing what your students are learning about the principles of physics through this novel. The guide contains a reading plan, templates and pictures to create a beautiful lapbook on physics, vocabulary, and coordinated scientific demonstrations!

Visit ElementalScience.com to learn more!

Authors' Note

The novel you hold in your hands is both a work of fiction and a teaching tool, which creates the need for a delicate balance.

We have taken fictional liberties when it comes to the story line—to our knowledge, no one is traveling around the world on invisible zip lines. But, when it comes to the information shared by our local experts, we have done our best to accurately reflect the current scientific knowledge at the time of writing this book.

We have drawn from our personal experiences and education, as well as the following resources:

- 🕮 *Basher Science Physics: Why Matter Matters!*
- 🕮 *Basher Science Engineering: The Riveting World of Buildings and Machines*
- 🕮 *DK Children's Encyclopedia*
- 🕮 *DK Encyclopedia of Science*
- 🕮 *Kingfisher Science Encyclopedia*
- 🕮 *The Usborne Children's Encyclopedia*
- 🕮 *Usborne Science Encyclopedia*

In addition to these books, we have drawn on the information found on many different websites.

Please keep in mind that science is ever-changing as our technology advances and our understanding deepens. If you find an issue in this novel, please let us know and take the opportunity to discuss these new developments with your students.

Chapter 1: A Trip to the Library

Poetic Presentation

A match made in heaven. Anybody could see they belonged together. Like bacon and eggs. Like a tire swing and a tree. Like a novel and an easy chair. Like eyebrows and a forehead. These two belonged together.

With enraptured smiles on their faces, the swooning couple walked hand in hand down the quaint neighborhood sidewalk. A fresh morning breeze and sprawling rays cast out by a new sunrise accompanied them as they took unrushed steps, fulfilled and content in each other's company. Their clasped hands swung back and forth as they walked, matching the rhythm of their smiles. What a lovely thing to start the day off like this, walking together. They turned from the picturesque street of homes and yards, continuing down the sidewalk along a slightly bigger road.

Now, instead of sauntering by cute little places of residence, they were passing hospitable places of business: The Left-Handed Turtle Neighborhood Market, The Right-Handed Pelican Pizza Parlor, The Ambidextrous Octopus Bowling Alley. The two lovebirds were not in any hurry, but eventually they needed to get to where they were going. Sadly, that was to two separate locations.

She would stop after the next block, and he would continue for three. Parting would be such sweet sorrow, but these two were used to it. She was the head librarian, and he was the sole junior high science teacher: Mr. and Mrs. Womberfraggle. Ernest and Wilma. They'd moved here as newlyweds and trekked this way every day for almost forty-five years. Over the years they'd realized just as they were a perfect match for each other, they were also a perfect match for this quaint, little town.

The years had been kind to the Womberfraggle's and their little city. The people and the town were older and maybe required a

little more maintenance than before, but they were also still healthy and full of cheerful optimism. The duo floated affectionately over their remaining distance together. Ernest then looked at his wife, lifted the hand he was still grasping, and kissed it.

"Goodbye, my love," he said with a smile. "Have a wonderful day."

Wilma's countenance reflected his. "You too," she said as she let her hand drop from his.

She then turned to look both ways before crossing the crosswalk that would take her to the library. After arriving on the other side safely, she turned to give one last loving wave to her husband. Ernest reciprocated and then walked three more blocks to the junior high school.

Wilma reached into her purse to grab her ring of keys. She was always the one to open the library in the morning, so she didn't expect anyone. But as she approached the door, she saw them. One in a messy white lab coat and bunny house slippers. Two in T-shirts and sneakers. And another was a prairie dog.



"Wowie wee willikers and a wonderiffic morning to you, Mrs. Womberfraggle," the enthusiastic red-headed, happy-faced, lab-coat-wearing oldest member of the group said with a grin.

"Well, good morning, Cecil," Wilma returned the greeting. She then acknowledged the other three in the party. "I recognize President Lincoln, but who are these other two?"

"Why, this is my nephew and my niece, son and daughter of my older brother, Train and Blaisey Sassafras!" Cecil exclaimed.

"Train and Blaisey?" Mrs. Womberfraggle asked pleasantly with a clarifying tone.

Uncle Cecil smiled triumphantly. Tracey Sassafras nodded and smiled, a little embarrassed by her uncle.

Blaine nodded, smiled, and held out his hand to greet the librarian. "Blaine and Tracey," he stated their names correctly. "We are the twelve-year-old twins hanging out with Uncle Cecil this summer, learning all about science!"

Realization found its way to the librarian's expression as she shook the boy's hand and then his sister's. "Oh, yes, that's right. Your uncle mentioned that you two were coming for a visit. Well, how's it going so far?"

"Zip-tastic," Blaine answered exuberantly.

"Zip-tastic?" The elderly librarian needed clarification again.

"It's going very well," Tracey jumped in for her brother. "We have learned so much about zoology, anatomy, botany, earth science, geology, astronomy, and chemistry. It has all been so stupendous!"

"And we're hoping for more," Blaine added.

"That is wonderful to hear," Wilma Womberfraggle gleamed. "It is so nice to see youngsters so eager to learn."

The librarian looked from the children back to their uncle. "Your brother should be very proud of his son and daughter, as you should be proud of your nephew and niece."

"I slippity-slappity am!" Cecil responded in his normal-to-him, slap-dash style.

The white-haired librarian nodded. "Oh yes, Cecil. Now I remember. You wanted to use the library this morning for a presentation of some kind. Isn't that right?"

"It sure is, Mrs. Womberfraggle," Cecil beamed. "Welly welp, it's more President Lincoln's presentation. But yessity, yes, we are here early this morning, bright-eyed and bushy-tailed, for a scientific video presentation!"

Mrs. Womberfraggle nodded and smiled as she used the correct key to open the library door. Blaine, being a gentleman, held it open for her to enter first. Wilma took a couple of steps into the library's entryway. Then she turned back and looked at the twins with a chuckle. "We sure appreciate your uncle here at the library, but if he's going to do any kind of studying, researching, or presenting, we have to let him do it early in the morning before anyone else gets here. His volume gets pretty high when he's excitable."

The twins knew exactly what the librarian was talking about. Cecil Sassafras was definitely one-of-a-kind. Before visiting this summer, Blaine and Tracey hadn't known their pseudo-famous research scientist uncle well, but over the past seven-ish weeks, they had come to know him and all his antics very well.

During the previous school year, Blaine and Tracey had done well in every subject except one: science. They had failed science, which had set their concerned parents' plan into motion. Blaine and Tracey's mom and dad had sent their children down to Cecil's house for the entire summer to do nothing but science.

Initially, this decision devastated the twelve-year-olds. They had hoped to spend their summer at their favorite place in all the world: Camp Zip Fire, a summer camp where virtually all of their friends went. It had a smorgasbord of awesome activities and a staff of the coolest counselors. Instead, they thought they were going to spend a whole summer with no friends and boring learning with a

nerdy scientist. Needless to say, they didn't have the greatest attitudes when their parents put them on the long-distance bus and shipped them to Cecil's place.

However, over the course of the summer, their attitudes toward both the subject of science and their uncle had changed drastically. Uncle Cecil, along with his prairie dog lab assistant, President Lincoln, had invented invisible zip lines. Zip lines that, when used along with custom carabiners, could zip a person anywhere on the globe at the speed of light. When Cecil and President Lincoln had first presented the fantastical concept to them, Blaine and Tracey thought it was some sort of ridiculous joke, but then they had tried it, and it worked! All summer they had donned helmets, cinched up harnesses, calibrated the three rings on the specially designed carabiners and had been zipping to locations all over the planet.

One of the carabiner rings was for longitude, one ring was for latitude, and one ring was to lock the carabiner shut. As soon as the carabiner snapped shut, it immediately connected to the specific invisible zip line that would take them to the set longitude and latitude coordinates. The twins would hang in mid-air a couple feet off the ground for approximately seven seconds, and then, whoosh! Off they would zip at the speed of light. The first location they had zipped off to had been Kenya, where they had plunged into the subject of zoology. The Sassafras twins hadn't looked back since!

Cecil's heart behind the invisible zip lines was to create an adventurous way for his young relatives to study science face to face so they would hopefully go from hating science to loving it. The plan had worked splendidly, and that's exactly what had happened over the course of the summer as the twelve-year-olds zipped back and forth, experiencing adventure and gaining knowledge in multiple subjects of science.

Back at the library, the lovely mustiness of shelved books met the twins' noses like a familiar friend. The dusty notes mixed

with hints of smoke, cedar, and vanilla permeated their senses as the two children entered behind the two adults and the one prairie dog. Blaine and Tracey buzzed with excitement over their long-awaited library visit.

Rows and rows of books greeted them, but they also saw cozy-looking chairs and sofas. Against the back wall stood wooden tables and stools for group study and research. The walls held colorful signs and posters touting the joys and benefits of reading, along with displays of unique local artwork, some crafted by adults and some by children. There were bean bags, carpet squares, hidden nooks, cozy corners, classic desktop computers, and even a couple old microfiche machines. This place was amazing!

At the back of the house of books sat a small semicircle stage apt for giving presentations, and that is where Mrs. Womberfraggle was leading them now. The white-haired woman reached the spot and then gestured toward it with her hand.

"Here you go, Cecil," she said with a smile. "It's all yours. Have fun, but remember, this is a library."

"Dokie-oke. Mrs. Womberfraggle, thankiny thank you so much!" Cecil responded exuberantly and loudly, not picking up the librarian's gentle hint.

The kind woman shook her head, smile still intact. She turned to acknowledge the twins. "It was nice to meet you, Blaine and Tracey. I hope you continue to enjoy your summer."

"Oh, we will!" Blaine responded happily and with certainty. Then Tracey added, "Nice to meet you too, Mrs. Womberfraggle."

The matronly woman turned and began making her way through the maze of books, back toward her desk at the front of the library.

Blaine and Tracey turned toward the small stage, and when they did, they saw that somehow Uncle Cecil and President Lincoln were already ready for their presentation. The twins' wild-haired,

red-headed uncle was standing in his spot on the platform, ready to serve as the orator—something he had done for each and every one of President Lincoln's presentations.

President Lincoln perched atop a small control panel off to the side, ready to tap any needed buttons. Even after seven weeks of observing and interacting with the Prez, the Sassafras twins still weren't sure how the furry mammal contributed so much to their uncle's work. Was he really accomplishing everything their uncle was giving him credit for? The twins weren't sure.

A screen affixed to the back of the stage already displayed the first bright, fun, and colorful image of the coming presentation. The image showed the rodent with outstretched paws and an outstretched smile. Text arched over his head which read, *President Lincoln's Ever-so-brief Presentation on Chemistry*!

Just yesterday, the young science learners had returned to their uncle's house and neighborhood after zipping to eight different invisible zip-line locations to study different topics within the subject of chemistry with the help and guidance of brilliant and capable local experts. Now they would get to see a picture-filled presentation briefly summarizing what they had learned, evidently all organized and put together by President Lincoln.

Their uncle's basement lab, which usually hosted these presentations, was unavailable at the moment. The mammal tapped a button over at the control panel, and the next image came up on the screen: an image of the periodic table.

"The periodic table is a systematic arrangement of the elements, grouping those with similar properties together." Their uncle read the text written above the image in a semi-normal voice. While performing the duties of orator for these ever-so-brief presentations, Cecil channeled a deeper, more professional voice.

"The alkali metals are six very reactive metals. These metals are soft and shiny, but they change color as soon as they hit the air." Cecil read the text over the next image, and then he continued, "The

alkaline earth metals are less reactive than the alkali metals, but they still easily combine with oxygen to form many of the compounds found in the earth's crust."

Over at the control panel, President Lincoln kept tapping a button. Every time he did, the image and text would change.

"The transition metals are a group of elements found in the middle of the periodic table. For the most part, these elements are useful, hard, and shiny. Some examples are iron, copper, gold, silver, and chromium." The images from the periodic table appeared. They were the symbols—the 1-, 2-, or 3-letter codes—that scientists use for the element Cecil was reading the information about.

"The lanthanides are a group of fifteen naturally occurring heavy but soft metals. In modern times, we use lanthanide elements in touchscreens, wind turbines, and batteries." An image of the list of lanthanide symbols came up as Cecil read this part. The letters and numbers reminded the twins of the time they had spent in Japan studying these elements with a ninja Sensi and his dojo full of pupils.

"The actinides are a group of fifteen heavy metals. Many of the actinides are radioactive, which means they easily break apart, releasing energy and potentially damaging particles." Blaine and Tracey exhaled in relief as their uncle read the information about actinides, remembering how they, along with their ninja friends, had helped to stop a nuclear power plant from exploding out on a dark island.

Next, their uncle read about a couple of elements the twins had learned about in Singapore. "Main group metals, also known as ordinary metals, base metals, or poor metals, can conduct electricity and heat well. They are also easy to shape."

Tracey blushed as she thought about the chance she had to be a runway model in a Singaporean fashion show. One that had showcased many of the main group metals, and also some metalloids, which the red-headed scientist announced next. "Metalloids, also

known as semi-metals or semiconductors, look like metals and even have some metallic properties, but they are often too brittle and don't like to behave like metals typically do."

President Lincoln gave another tap of the button, and another image appeared from the periodic table. "Nonmetals can be gases, liquids, or solids, and they behave differently in chemistry. Five of them are essential to life," Cecil read in his refined baritone voice, following fastidiously for the next image. "The halogens are all nonmetals that react strongly. They easily 'steal' electrons from metals, especially the alkali metals, bonding together to form salts. The name halogen literally means 'salt giver.'"

"And last but not least," the research scientist read after the prairie dog tapped the button to reveal the last image of the presentation, "Noble gases."

The image reminded the twelve-year-olds of their escape by cover of night in a hot-air balloon in Morocco.

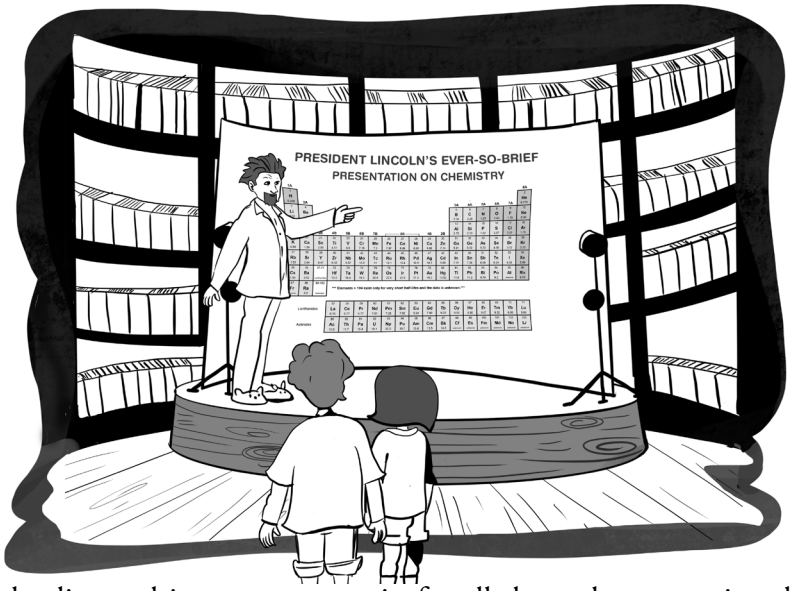
"The noble gases are inert, meaning they don't really react chemically or combine with other elements. Many of the noble gases float around in the atmosphere."

Blaine and Tracey sighed contentedly. They had worked so hard and learned so much. A sense of satisfaction filled them as they saw the elemental symbols and heard the information they had entered. They smiled at the memory of all the places they had invisibly zipped to and all the amazing people they had met along the way.

"This concludes *President Lincoln's Ever-so-brief Presentation about Chemistry*," Cecil Sassafras said with perfect posture in his refined orator's voice.

Foundational Physics

Switching back to his normal, spastic self, Cecil said, "Train and Blaisey, you did it! Isn't it wonderiffic, you did it! You two rickety rocked your way through the study of chemistry, and what



splendimental images you sent in for all those elements using the archive application on your smartphones! Fantabulous job, you two!"

The Sassafras twins smiled sheepishly at all the over-the-top compliments coming from their uncle, fidgeting with the smartphones he'd just mentioned. Uncle Cecil and the Prez had invented the invisible zip lines. The man and the mammal had come up with this mode of study and had also had the idea to use and include these sleek phones.

The smartphones held the keys they needed to learn about science and travel on the invisible zip lines. The devices kept the twins connected to their science-loving uncle. They could reach him from any global location they found themselves. In real time, he could track them and they could call him. The smartphones also held a range of useful applications that helped them proceed through their summer of learning.

The LINLOC application, which stood for "Line Locations," gave the twelve-year-olds the specific longitude and latitude

coordinates around the globe they would zip to. The app also shared the scientific topics they would study and the name of the local expert who would assist them. The SCIDAT application, which stood for "Scientific Data," was used to record the specifics of every scientific topic Blaine and Tracey learned. They would input the information using the app and then send it to their uncle, who could view the data on a large tracking screen in the basement lab he had at his residence. To help with the images required for the SCIDAT data, the phones contained three image-capturing assistants: the archive app, the microscope app, and the high-resolution cameras. During their study of chemistry, the twins had mainly used images they had found in the archive app to send in along with all their texted SCIDAT, but in previous adventures they had used mainly the cameras and occasionally the microscope app.

The twins' smartphones also came equipped with compass applications so they could keep their bearings straight when needed. Then, finally, the Prez had equipped their phones with the taser application. Unbelievably, this app could project jolts of electricity strictly used for protection in the most dangerous of situations. One would think that absolutely everyone would be thrilled about children learning science face to face, but sadly not everyone was.

Since their very first science-learning stop in Kenya, a silent villain had been stalking Blaine and Tracey all over the globe and even beyond. The Man With No Eyebrows was a sinister, scowling man with no hair upon his brow. For reasons unknown to the twins, he had been trying to stop them from learning science every step of the way. Not only could he somehow travel on the invisible zip lines like they did, but he also wore a Dark Cape suit, which he had stolen from a magician named Phil Earp. The suit gave him the ability to operate unseen. Blaine and Tracey had been more than a little afraid of the man at first, but now they just wanted to figure out who he was and understand why in the world he was trying to stop them from learning science.

Back in the library, the Sassafras twins shook away any

thoughts of the Man With No Eyebrows. They grabbed their phones and their backpacks and followed their uncle and his lab assistant. With the study of chemistry finished, Blaine and Tracey were eager to see what was next!



Why in the world was he trying to stop them from learning science? To find the answer to that question, all he had to do was reach up and rub the fleshy padding of his index finger along the anger-wrinkled skin topping his eyeballs.

When he was born, he had been called Thaddeus Wazeezy. A good name. A family name. But those twins called him, "The Man With No Eyebrows." Why? Because he was a full-grown male with no hair between his nose and his skull. His eyebrows had been stolen long ago.

And who was the eyebrow burglar? None other than Cecil Sassafras. The ridiculous uncle of those twins.

Back in junior high school, Cecil had caused a Bunsen burner to explode. The explosion had taken Thaddeus' eyebrows away forever and had replaced them with shame. Over the years, the shame had festered into hate and bitterness. Now, Thaddeus' sole goal in life was to exact revenge on Cecil for robbing him of the joy of an eyebrow-filled life.

What was the best way to exact that revenge? The answer to this question had come as a summer full of frustration and failed attempts. All of Cecil Sassafras's work as an eccentric scientist crescendoed into his grandest of grand inventions: invisible zip-line travel. And his greatest of great ideas: use the invisible zip lines to help his beloved niece and nephew learn science. Thaddeus had

thought if he could ruin those twins' summer and stop them from learning science, this would derail Cecil, crushing the man's hopes and dreams. Thus, pouring out a full measure of vengeance for the eyebrows he had lost.

However, those twins had proven to be too resilient and too resourceful to stop. Even when Thaddeus had secured the use of an immaculate underground science lab, space-age technology, satellite capabilities, a horde of scientists working for him, and an army of Dark Cape suits, those twins had escaped. Yes, it had been a frustrating summer full of attempted revenge.

Thaddeus Wazeezy sat at his lonesome residence two doors down from where Cecil lived, back in the town where they had both attended junior high school. He hadn't been able to stop the twins, and he no longer had an immaculate lab, notable technology, satellites, scientists, or any kind of army. He had failed.

Or had he?

He still had his own Dark Cape suit. But even more, he had the Forget-O-Nator. This lone item survived the destruction of his Siberian underground lab. A mobile-home-sized machine designed to wipe away memories. And it currently sat in his backyard. Usher the target subjects inside the machine, lock the machine, turn the one and only knob to full capacity, and within moments, it would wipe all memories clean.

Yes, he had failed to stop the twins thus far, but once they had been Forget-O-Nated, his failure would cease. Everything they had learned so far this summer would be gone.

A wickedly happy wrinkle shoved its way into the middle of all the angry wrinkles on his hairless brow.



Evidently, this was the height of fashion in men's swimwear during the 1920s. The red-headed scientist had quickly stopped by the lavatory on his way out and had popped back out looking like this. The man was wearing a blue and white horizontally striped 1920s style swimsuit that covered him up from his shoulders to his knees. He accessorized with fins, goggles, a snorkel, and gobs of sunscreen. This was the first time the twins had ever seen their uncle without his pink bunny house slippers. However, he had an inflated pink bunny floatie secured around his waist.

The Sassafras twins wanted to be embarrassed, but they appreciated the novelty of the swimwear. Mrs. Womberfraggle waved goodbye with a smile as they exited the library. She didn't bat an eye at their uncle's outfit. This sort of thing must've appeared normal, at least for Cecil.

"Goodbye, Mrs. Womberfraggle," the twins said in unison. "Thanks for letting us use the library."

The elderly woman smiled. The group of four reciprocated, and from the treasure trove of books back out to beams of sunshine they went.

Blaine, Tracey, and President Lincoln looked just as they had when they had entered the library. Cecil looked altogether different.

"Toodapoo eego! Nek-uph: fizzegs!" Cecil mumbled with excitement, albeit inaudibly because of the snorkel in his mouth.

"Huh?" Blaine asked.

"Toodapoo eego! Nek-uph: fizzegs!" Cecil exuberantly shouted one more time, like what he had spoken was clear as day.

"What?" Tracey wanted to know. Obviously, the twins still didn't understand.

Slightly embarrassed for his human friend, President Lincoln, with a smile on his face, scurried up and pulled the snorkel out of the scientist's mouth. One more time, Cecil made his gleeful announcement, "To the pool we go! Next up, physics!"

The Sassafras twins looked at each other with wide eyes full of excitement and anticipation. They weren't sure what going to the pool had to do with anything, but they knew what, "Next up, physics!" meant. It meant they were about to hop on the invisible zip lines again to start an adventure to learn physics!

"Linc-Dawg and I thought the neighborhood pool would be the perfect place to transition from your successful study of chemistry to your upcoming study of physics!" Cecil explained. "Swimming pools are full of a compound known as H2O."

"Water!" the twins exclaimed, knowing this was the chemical symbol for water.

"Persactly!" confirmed their uncle. "To the pool we go, where we will jump from chemistry and dive into physics. H-two-Oh man, am I excited about this onboarding into a new subject!"

After several blocks of the flip-flopping and slip-slapping sound of Uncle Cecil's swimming fins hitting the sidewalk pavement, the quartet found themselves at the neighborhood pool. President Lincoln and the twins stood poolside, watching Cecil, who was standing on the diving board, still decked out in all his glorious swimwear.

"Nphins fed lah mph mosun stay—" Cecil said from his springy perch, but stopped when he saw all three of his companions pantomiming for him to take the snorkel out of his mouth.

The red-head laughed heartily and removed the piece of equipment from his mouth. "Well, slippery slapping snorkelarious! I keep forgetting that little accouterment is in there!" Cecil made sure the snorkel was out of his mouth, but it stayed attached to his goggles.

"Back to introducing physics!" The happy-go-lucky scientist started again. "Newton's third law of motion states that for every action, there is an equal and opposite reaction."

"For instance," Cecil continued, snorkel free, "On a diving

board, a diver will put energy into the board by jumping on it. The board will then transfer that energy back into the diver, propelling them up and into the pool."

The elder Sassafras took a deep breath, smiled, and then said, "I will attempt to show this phenomenon now."

He took a few steps back to make sure he had the full length of the board for his approach. He leaned forward like he was about to go for it, but then paused as a slight frown made its way directly into the middle of his smile. "I sure dilly dally wish Summer was here with us to see this and to help me introduce physics to you two."

Little frowns found their way to Blaine's and Tracey's faces as well. They wished Summer Beach, their all-time favorite local expert, was here now too. In their minds, this is exactly where she should be. But she wasn't. Frowns were a rarity for Uncle Cecil. It evaporated quickly, replaced by his normal smile.

"Bowacunga!" The red-head shouted as he shot out toward the end of the diving board.

Amazingly, even with all his bulky swimming accessories, Cecil made it to the board's end with graceful agility. He jumped up, then came back down, firmly planting his flippers onto the surface of the diving board. The board returned his energy, launching him into the air, where he hung suspended for a second over the diamond-like, sparkling surface of the H_2O.

Chapter 2: Propelled to Papua New Guinea

Force Falls

Splash!

"Oh, c'mon," he scolded himself internally for not seeing the puddle that lay directly in front of the mailbox. Thaddeus pulled his shoe out of the dirty, shallow water and shook it with disgust. He gathered himself, opened up the street side mailbox at 1104 North Pecan Street, and put the invitation inside.



The very official looking envelope held an invitation to a special event. This invitation would set his plan into motion. Thaddeus wasn't just going to wipe away the memories of those twins—he was going to wipe away the memories of all the people involved. If the plan worked, and he was sure it would, Cecil Sassafras would check his mailbox and find this invitation inviting

him to a junior high class reunion. He knew Cecil would be thrilled and would most certainly attend. Thaddeaus would also make sure both Summer Beach and Paul Sims received invitations as well. The reunion was set to occur right after those twins returned from the zip-learning adventure. He was sure they would be present at the event also. Even President Lincoln, Ulysses S. Grant, and REESE the robot would be there.

In the meantime, Thaddeus planned to discreetly move the large Forget-O-Nator to the junior high campus. He was going to work on a way to lock the machine and then start it from the inside. On the day of the reunion, when the despicable posse arrived at the school, they would be led to enter a certain classroom. However, instead of being a classroom, they would actually be walking into his memory-wiping machine.

He would greet them, revealing his identity to them. He would lay bare the guilt of Cecil Sassafras, reminding everyone how the red-head had caused a Bunsen burner to explode in his face, incinerating his eyebrows forever. He would then crank the machine to life, causing all of their memories to be erased. Cecil and his ingenious mind full of science would be blank. Summer's and Paul's memories would be zapped. The memories of those rodents would be toast. That robot's memory would be gone. And the twins. All the science they had learned this summer would be forget-o-nated into nothing.

And he himself, Thaddeus Wazeezy, the Man With No Eyebrows, with all his mistakes, shortcomings, and failures would have his memory wiped away into nothingness along with the others.

He shut Cecil's mailbox and sighed through a satisfied grimace, "What a glorious end this is going to be," he whispered resolutely. "For us all."



Splash!

The expensive flavored water gurgled as it poured into Summer Beach's glass from a bottle being held by Paul Sims. The museum curator filled her glass to the brim and then poured a glass for himself before sitting down to join her at the patio table.

"Beautiful day, isn't it?" Paul declared, drawing out the word beautiful.

Summer nodded and smiled politely.

The two were sitting at a table in the sunshine on Mrs. Pascapali's—the elderly widow who lived next door to Cecil—backyard patio. Yes, Summer smiled on the outside, but the smile didn't reach her eyes. Confusion more than clarity seemed to be what mostly was churning around internally. Yesterday she had been so hopeful and excited and joyful.

She and Ulysses S. Grant, her arctic ground squirrel lab assistant, had finished up the projects they'd been working on, along with completing their Triple-S, Swiss Secret Service, sanctioned directives. They had strapped on their harnesses and had ridden the invisible zip lines from Summer's Alaskan science lab to the front porch of 1104 North Pecan Street.

Summer had stood on the porch, bubbling over with excitement. She knew that a trapdoor was about to open up: a trapdoor that led to a slide, a slide that would lead to a reunion between her and Cecil Sassafras down in his basement lab.

"What will the reunion be like?" she'd wondered. The last time they'd been together had been at the Ambidextrous Octopus Bowling Alley, where they had shared a deeply meaningful moment under the sparkling light of a disco ball. She had loved Cecil since junior high school. But what about him? Was it love that she saw reciprocated in his eyes? He had started a stumbling sentence there in the bowling alley. Had he been attempting to confess his love for her? Summer didn't know.

The ringing of her smartphone had cut the beautiful moment short. It was a call she'd been compelled to answer, a call from Captain Marolf of the Swiss Secret Service. Answering the call had led to duties that necessitated her immediate departure—her departure from Cecil. But she had returned, more than ready to be reunited with him. She was more than ready to hear the completion of his sentence. More than ready to discover if this love she had long waited for was finally going to be revealed.

The trap door had opened, and she had squealed with uncontrollable joy all the way down the slide. But then, to her shock, the reunion had been nothing like what she'd imagined or hoped for. The basement lab was a lab no longer, but rather a dark room filled with broken glass and a cloud of negativity. Blaine and Tracey were there, looking sad. Anger flashed in President Lincoln's eyes. Socrates and Aristotle remained stoic. But, most shockingly of all, Cecil sat in the middle of the dark, broken mess with an expression on his face that seemed to communicate he was not at all happy to see her.

The only person in the room who'd had a smile on his face had been Paul Sims. Summer hadn't been expecting to see Paul. She didn't know exactly why her old junior high classmate was there. Regardless, he had been the one who'd heroically caught her in his arms as she zipped off the bottom of the slide, before she had crashed into any of the scattered and sharp shards.

Before she could utter a word, Paul had whisked her away, up the stairs, through a door, and back above ground. Her old friend made sure she was okay and walked with her from Cecil's house next door to Mrs. Pascapali's house. The kindly widow, who Summer had resided with for a short time before, had once again invited the scientist to stay in the guest room. Summer accepted her offer, hoping to take the time to make sense of the unexpected and uncharacteristic look she'd seen on Cecil's face.

Right now, Summer found herself sitting on Mrs. Pascapali's

back porch, drinking flavored water with Paul Sims. She wanted to be next door. She wanted to be drinking lemonade with Cecil. She wanted to know what was wrong with him and why he had looked at her like he had. But instead, here she was with Paul, who for some reason seemed extra happy. Wasn't he concerned about Cecil, too? Why was he so chipper?



Splash!

Uncle Cecil plunged down into the pool, causing a magnificent explosion of water, drenching Blaine, Tracey, and President Lincoln where they stood. Cecil resurfaced rather quickly, probably because of the pink bunny floaty around his waist. He immediately exclaimed, "Okay ofenuff yerfleanlogaffs tuseewer yulvee ziffinto firfer fizzegs!"

Dripping wet, the twins began to ask their uncle to take the snorkel out of his mouth and repeat himself. But this time they were actually both able to decipher his enthusiastic snorkel-spoken statement.



"Okay, open up your LINLOC apps!" Blaine said, looking at his sister.

Tracey then finished the waterlogged statement, "To see where you'll be zipping to first for physics!"

Without hesitation, the twelve-year-olds pulled their smartphones out of their backpacks, found them to be dry because of their waterproof cases, and then opened up the information-citing application.

"We're zipping to Papua New

Guinea!" Blaine shouted. "Longitude 9° 24' 43.39" S, latitude 147° 29' 43.26" E. Where we'll be studying the topics of forces, motion, speed, acceleration, and centripetal force!"

Tracey then added, "All with the help of a local expert by the name of Susa Dasini!"

Still wearing his over-the-top swim gear, Cecil clambered up from the pool to the pavement to join his niece and nephew. They were soaking wet, but they were already putting on their harnesses and helmets in order to ride the invisible zip lines. In sheer joy, he observed their enthusiasm as they calibrated their specially designed three-ringed carabiners to the longitude and latitude coordinates. He and President Lincoln smiled widely as the carabiners snapped shut and immediately connected to the invisible line that would whisk them away in approximately seven seconds. He waved gleefully at them as they hung a few feet in the air, waiting for the zip to happen. And then, whoosh! They were gone! Off to start their study of physics.

"Umso frouduv dosetu!" The snorkel-wearing scientist gushed to his lab assistant.

President Lincoln just sighed.



Splash!

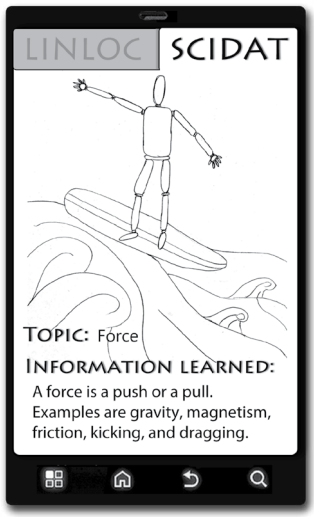
Blaine and Tracey had landed in water in Papua New Guinea. The invisible zip lines landed them as close to their local expert as possible without being detected. The twins assumed no one had witnessed their splashing arrival, but as usual, they were momentarily stripped of sight and strength.

While traveling along the lines, the rider would soar through

swirls of exciting, multi-colored light. But upon landing, the rider would be rendered weak, blind, and tingling for a few seconds until slowly but surely, strength and sight returned. The Sassafras twins were currently in this state of recovery.

Each twin felt their strength fully return, vision going from blind to white light and then finally back to full color. Blaine and Tracey had indeed landed on the water. They were floating, but not getting any wetter. The twelve-year-olds had landed in a hollowed-out log. One that was navigating its way through the exciting twists and turns of an amusement park ride. Both were about to shout out exclamations of joy when they heard approaching voices.

"A force is a push or a pull," a female voice said.



"Examples of forces are gravity, magnetism, friction, kicking, and dragging," the voice continued. "A push force can start objects moving or change their speed as the object moves away from the force. A pull force can also start objects moving or change their speed as the object moves toward the source of the force."

Looking out from their log over the water, the twins saw a wide, paved walkway. A short woman with short black hair and beautiful dark skin stood beside two other people. One was a suit-wearing middle-aged man of average height and build with graying hair and a scowl, and the other was a young twenty-something, tall woman with long blonde hair, a smile on her face, and a bounce in her step. The two women were wearing aqua-colored polo shirts with a small kangaroo teddy bear stitched on them. The man was wearing an expensive suit, complete with a button-down vest.

"Forces act on objects, causing them to move, speed up, and

slow down," the short woman continued. "Forces can also make objects change direction and shape."

"Enough with all the science talk," the middle-aged man complained in staccato-like accented English. "I simply want to know the names of the rides, the general idea of how they work, and if you think they're safe or not."

The woman, who the twins were fairly certain was their local expert, Susa Dasini, ignored the man. "Some forces act visibly by touching the object. We call these contact or direct forces. Other forces act visibly and can seem to act on the objects from a distance. We call these distant or indirect forces."

The man growled after his perturbed statement went unacknowledged.

"Forces are measured in Newtons, which were named after Isaac Newton, a famous physicist. One Newton of force causes a one kilogram object to accelerate by one meter per second." The short woman finally paused, took a breath, and then looked toward the man.

"Finally, a break from the science nonsense. Now, can we get to the ride in front of us? This, what is it called? The Kooky River?"

Their local expert pursed her lips and drew in a deep breath before she said, "As an investor in Centripetal Village, I would think that it is important to know the science behind where you are putting your money. I apologize if that is not the case. We have named the ride, Kroko River."

The Sassafras twins smiled as they watched the woman stand up for science. They were learning a lot as they listened to the conversation on the wide walkway.

They watched as the blonde woman bounced on her toes and interjected, "Did you know that krokodail means crocodile in Papuan."

"I'm not here for a language lesson, Ms. Glot," the man

scowled at the tall woman before turning to the other lady, "Or a science lesson, Ms. Dasini. We're here to assess the viability of this amusement park. And so far, I am not impressed. What even is this water ride? Does it work?"

Blaine and Tracey ducked back into their log as the man gestured wildly in their direction.

"Mr. Becker, I can assure you it works. It's our take on the traditional water flume log ride. Here at Centripetal Village, our log ride includes a double waterfall drop along with several live crocodiles," Dasini countered, clasping her hands in front of her.

Wait! The Sassafras twins glanced at each other. Had she just said LIVE CROCODILES!



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