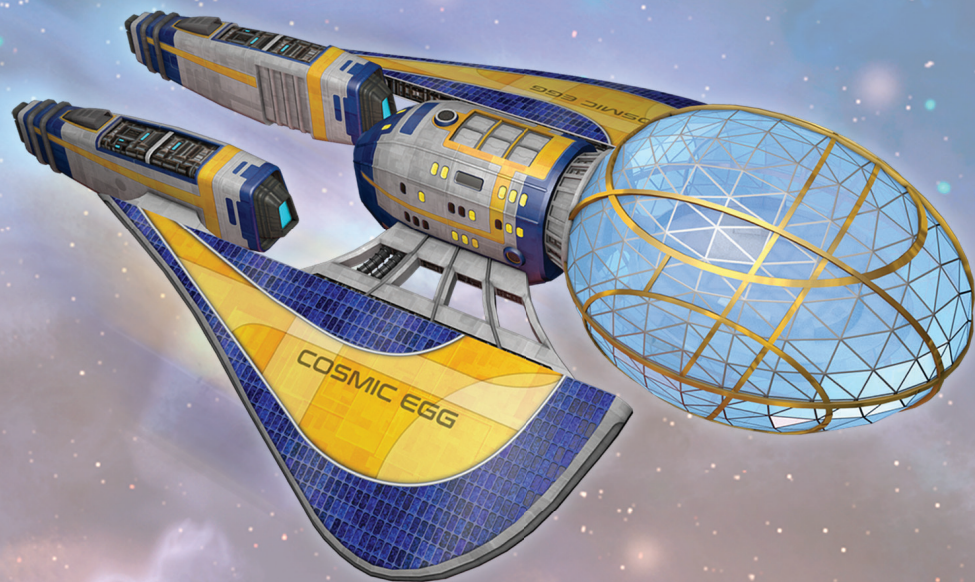


THE STARDUST MYSTERY



by Peter Solomon
With Additional Story by
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with Sara Ringler, Michael Hughes, Bhavin Patel,
and Danielle Weinberg



The Stardust Mystery

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Published by TheBeamer LLC
East Hartford, CT USA
<http://TheStardustMystery.com>

ISBN: 978-0-578-72219-1 (paperback)
ISBN: 978-0-578-72220-7 (ebook)
LCCN: (coming soon)

FOR

Everett

Marina

Max

Jordan

Shea

Izzy

Ella Rose (ER)

Eden

Liliana

Troy

Leo

Griffin

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ABOUT THE STARDUST MYSTERY

This book is one product of a National Science Foundation (NSF) project (Award #1738291) whose objective is to provide an engaging independent-learning experience which weaves science into an exciting story for children ages eight to thirteen. The project combines time-travel adventure video games, this complementary book, science videos featuring the book characters, and Expert Avatars for important scientists (like Albert Einstein) that can verbally answer spoken questions about their lives, science, and opinions. The story is about STARDUST (atoms) and its creation during the evolution of the universe and its sharing during the history of planet Earth. It spans the time from the Big Bang to today, tracking the trillions of atoms we personally inherited from Albert Einstein and the last T-Rex. The project information and links to the video games and videos can be found on TheBeamer LLC's web site: <https://TheStardustMystery.com>. Science videos and game trailers are available on the [Stardust Mystery YouTube channel](#). The Albert Einstein Expert Avatar and tools to create customized Experts can be found at <https://ExpertAvatars.com>. More game information can be found on our Facebook pages. Links to these resources are on our web site and at the end of the book.



ACKNOWLEDGMENTS

First the authors would like to thank the four cousins—Shea, Izabella, Ella Rose, and Eden—Peter and Sally Solomon’s grandchildren, whose personalities and accomplishments have been the inspiration for the four main characters in the book. Joselyn Linder did a wonderful job of adding depth to the characters as she edited the manuscript.

We give a huge thank-you to the education professionals Francine Lazarus, Tina Pipp, Elizabeth Shamroth, Ruth Grubin, Linda Lucatorto, Sandra Kaplan Solomon, Zara Lenihan, and Lorna Solomon, whose feedback helped to further *The Stardust Mystery* as an education piece. Thank you to Tom Lucatorto, Stephen Shamroth, Elizabeth Shamroth, Michele Solomon Caton, Cynthia Peterson, and Pendred Noyce for providing feedback on the story in general and for the physics, chemistry, and biology information, in particular.

Next, we have been fortunate to have a number of readers, ages ten to fourteen, who provided lots of comments, criticism, and suggestions: Tom Gambaro, Danielle Weinberg, Shea Friedman, Sam Steen, Jack Steen, Ella Rose Friedman, Ben Rosenthal, Ben Kaplan, Zachary Rubin, Hanna Lazarus, Eden Raviv, Zoe Solomon, and Izabella Raviv.

Many of the book’s illustrations and chapter stories were derived from two video games: *MissionKT* and *Building the Universe* that feature the book characters as avatars. A huge thank-you goes to Professor Robert McCloud and his team at Sacred Heart University, to Andrew Nelson and his team at Half Full Nelson, LLC, and to Professor Kenneth Thompson and his team at the University of Connecticut for the production of the *MissionKT* video game. Another huge thank-you goes to Professor Keo Heng and his team at Becker College for production of the *Building the Universe* video game and for production of the science and How-To animated videos starring the book characters.

Finally, thank you Lori Conser from Wheatmark Publishing and editor Jill Saginario for your help in the final production of the book.

PART 1

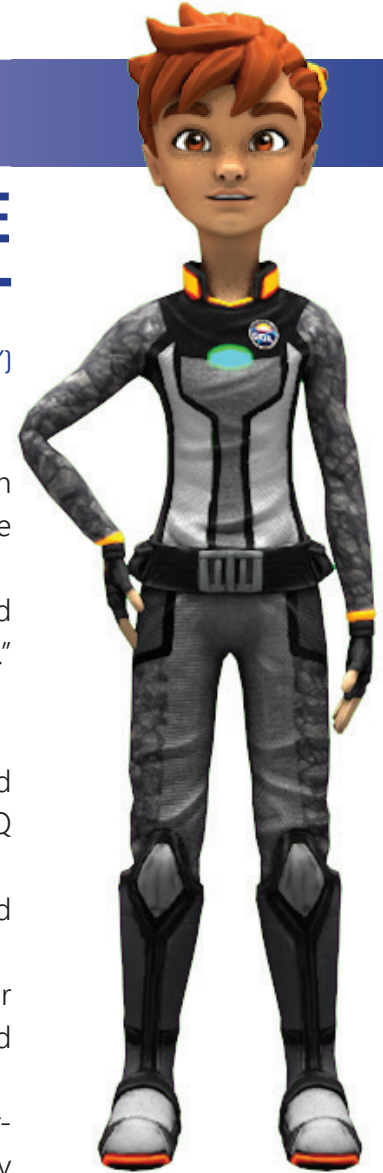
VIRTUAL WORLD

(OCTOBER TO DECEMBER)



THE SCIENCE AND THE FUTURE CONTEST

(AS TOLD BY LIZZY)



The back door slammed shut. The back door is always slamming when Neddy comes home. I heard her sprint through the kitchen and fly up the stairs, probably two at a time. Then she crashed open our bedroom door.

She waved a piece of paper in her hands, tried to catch her breath, and screamed at the same time, "Lizzy, Lizzy, Lizzy, we *have* to enter this contest." She dropped the papers on my open textbook in front of me.

"Not now," I yelled back at her. "I'm busy."

"But, but—but Lizzy—" She paused, took a deep breath, and started screaming again. "It's called the Science and the Future contest. Dr. Q announced it right after you left."

"Oh, zip it," I replied, shooting her my meanest "mom" look as I pushed the papers aside. "Can't you see I'm doing my homework?"

"But . . . but . . . but, Lizzy," she begged, "you've got to see this. It's for kids all over the United States. We can ask the cousins to enter it with us, and if we win, we can go to the moon."

I still didn't look up, even though that last part definitely sounded interesting. We could go to the moon? I ignored her anyway. It's one of my greatest skills, because Neddy isn't always easy to ignore.

"Lizzy!" She practically screamed directly into my ear. "If we win, we can take Grandpa to the moon, just like he's always dreamed of!"

I dropped my pen. Grandpa had always wanted to go to the moon. More than anything, I loved the idea of winning that for him. I was in Grandpa's physics class this year, and so far I'd been off to a terrible start, which I knew was a huge embarrassment for him. My cousin Milo was in the same class and he was doing really well. But the first pop quiz had caught me off guard. I was usually pretty good about homework, but the evening before I had been busy with basketball practice and a history test, so I had skimmed the reading. I got a C–, which—let's just say—isn't something Mom's going to hang on the fridge. I did well on the first real test, but basketball had been a distraction again during the second test because we'd lost before making it to the finals. Another C.

So far, I was doing fabulous as Grandpa's biggest disappointment. So getting him to the moon sounded like a great idea to me.

I turned to Neddy and gave her my full attention. "OK, I'm listening." I sighed. "Calm down and show me what you're yelling about."

She pushed the papers back in front of me. I started reading as Neddy continued to annoyingly buzz around me, talking about how she thought we could win.

I was studying the announcement when an image popped into my head: We were all buckled into seats in a rocket ship, one on top of the other, with Grandpa at the very top. He was smiling and he was happy, wearing a giant pointed wizard cap on his head, visible through the window as we launched into space. It made me happy.

"How did you get this?" I asked, realizing I was grinning weirdly.

"I told you! After you guys left the science fair," she responded with her patented Neddy-whiny voice. "Dr. Q gave a talk about it and handed out those announcements. It's called the *Science and the Future* contest."

"Neddy, you're either a total genius or totally loony."

"Grandpa would say those aren't mutually exclusive."

I laughed. "Are you sure you're only in sixth grade?"

"Last time I checked."

I looked at my little sister, staring at me with her intense brown eyes just visible behind the wild mess of long curly auburn hair surrounding her face. Maybe genius was right.



This all started about three weeks ago. Neddy and I were on our beds up in the room we share, which Dad calls the *girl cave*. I was doing my homework when I heard Neddy quietly sniffing. I had no idea what was wrong with her, but it wasn't really like her to cry.

Neddy is my pain in the you-know-what little sister. She's eleven and in the sixth grade, two years behind me. I only got to have a year and a half without her following me around, and I really couldn't remember any of it. It must have been heaven! What were my Mom and Dad thinking, having a second kid so soon?

There're really two Neddys: her usual self, "Neddy the Nerd," and her sometimes self, "Neddy the Nice." Neddy the Nerd drives me crazy, picks fights with me, steals my clothes, and embarrasses me at school. Nerd is always breaking the rules, sometimes just because she's so spacey she doesn't know what the rules are to begin with. Nerd gets lost in her own world, and those of us here on Earth wonder if she's weird, rude, or just in need of a good old-fashioned lesson in paying attention. (That last one is something I've heard our cousin Milo say.)

But Neddy the Nice is fun to play with. Sometimes she has great ideas. Sometimes she even teaches me how to break the rules, which I almost never do, except for Mom's rules, which I always break. Most times she is my ally against Mom and Dad. When she is paying attention, Nice is also very observant and artistic like Grandpa, so she helps me with shopping for new clothes, which I am not good at and totally don't like doing. If I could wear pajamas all day every day, I'd be living the dream.

When Neddy sniffled again, I knew she was crying and not just trying to suck up snot. "OK, spit it out," I said. "What's your problem?"

"I'm tired of being called names." Neddy looked over at me with her big sad brown eyes. Her glasses were in her hand instead of on her face because they'd probably fogged up. "I don't want to go to school anymore. I do everything wrong, and I always get laughed at, so what's the point?"

"Well, what happened?" I demanded.

"Today was the worst day of my life," she added in an almost-whine, but she was crying so I let it go. "First, I came to school with toilet paper tangled in my hair."

"How did that happen?" I asked, trying to be supportive while also trying not to laugh.



"Yesterday, Dad and I pulled most of the toilet paper out of our front-yard tree," she explained. The night before, some rotten kids from our school had mummified it for Halloween. We didn't catch them in the act because we'd dressed up and gone trick-or-treating, even though we were probably too old for that. I think after age nine it goes from looking cute to desperate for free candy. But Neddy had a great idea that we go as Peter Pan and his shadow. I dressed in all black and even covered my face with a black ski mask. Neddy dressed as Peter Pan. She made the hat and tunic out of green felt, and she looked great.

Meanwhile, Neddy was still telling me her teary story. "I saw more toilet paper in the tree this morning, so I got on a ladder, and I shook the branch to get it out." I understood the rest.

"Some of it landed in your hair," I guessed.

She nodded. "Then Richie Torres sees me in homeroom and calls out, 'Look who's here, it's Hairy Potty.'" *Poor Neddy*, I thought, feeling the blood rush into my own cheeks. Neddy looked at me with all that awful embarrassment still fresh on her face. "The whole class cracked up, and pretty soon everyone was calling me 'Hairy Potty.'"

"OK, first of all, Richie is the worst," I replied. "But aren't you friends? I thought you were saying how much you loved his artwork."

"We used to be friends," Neddy answered, "then he started calling me all these mean names."

"Like what?" I asked.

She looked down at the yellow bedspread on her bed and picked at a thread. "Space Cadet," she answered quietly, then went on, "Spacey, Space Station, Loony Probe, Cosmic Cuckoo, and . . ."

I couldn't help it. I burst out laughing.

"Lizzy!" she cried.

"Come on, Cosmic Cuckoo is pretty funny." I took a deep breath. Neddy did not look like she agreed.

"That's not even all of the names," she whined with a look of total dejection.

"Oh, Neddy," I said, pulling myself together, "don't let them get to you."

"Actually, the day got worse," Neddy went on. "For science class, we were discussing space travel. You know how I love everything about space and astronomy?" I nodded. "Mrs. Wilson asked each of the kids, 'If you could go to the moon, what is the thing you would love most?' When she gets to me, I say, 'Being weightless, floating in space.' I thought that would be really neat. Then, Richie whispered loud enough so that everyone would hear, 'Of course that would be Spacey's favorite thing.' And the whole science class cracked up."

"Don't worry," I said unhelpfully, "the boys are still awful in eighth grade."

Neddy sighed.

I felt bad for her. Usually, nothing really got to Neddy. It wasn't like she'd never been teased before. It's just that this time she wasn't shrugging off the teasing. I wondered if she liked Richie more than she was letting on. No matter what it was, I didn't like it. Richie and the other kids were killing her spirit. Nobody gets to bully my little sister except me.

"Let's go visit Grandpa after dinner," I said, knowing that Grandpa can usually cheer her up. Neddy had always been a little bit like our Grandpa. Nerdiness and spaciness sum up both of them pretty well. They both love space travel, and like Neddy, Grandpa tends to daydream too. "I bet he has a good idea about how you should handle this." Reluctantly, Neddy agreed to go with me.



We walked to Grandpa and Grandma's big house which was about ten blocks from ours. When we got there, Grandma opened the door.

"Hi, Grandma," I said. "Neddy and I need to speak to Grandpa."

After Grandma's hugs and kisses, she announced, "Your grandfather is in his usual place in the basement, doing something secret. Be careful," she said with a wink. Our grandma gave us the best winks.

The basement walls were covered with pictures of outer space stuff. I guess he still wished he was an astronaut at NASA and not a physics teacher at a middle school. Grandpa was in his lab coat and rubber gloves sitting at his work bench.

"Hi, Grandpa," I said. "What's up?"

"Oh, hi," he responded, "just testing a new theory. What's up with my beautiful girls?"

"Neddy needs your advice," I said. "Neddy, tell Grandpa what happened."

Neddy told him about the kids teasing her about the toilet paper in her hair and about being called Hairy Potty and Spacey.

Grandpa responded, "You think Albert Einstein cared about how his hair looked?" Neddy loves anything about science, so Einstein goes a long way with her, as he is like the all-time science genius. "Here," said Grandpa, showing her a picture of Einstein with his hair all wild and twisted like a cave man, "he didn't care because he had his mind on other things. BIG THINGS! Like the workings of the universe . . . where we came from. Deep stuff. And you're like him, Neddy. You're thinking of important stuff too."

Neddy looked at me and smiled. I knew taking her to Grandpa was a good thing.

"Hey," I said, suddenly having a brilliant idea. "You should enter the science fair next week!" Neddy's eyes widened. It felt good to be the smart one in the room with these two. "You could show up everybody by winning!"

The science fair was just a week away, but if anyone could pull it off, it was Neddy.

Grandpa agreed. "That's a great idea, Neddy. You should do it."

Neddy started to smile pretty big, so I said one last thing to lock it in: "You could show all those lame kids *and* Richie Torres that being a nerd has advantages."



2

THE STAR IN THE JAR

[AS TOLD BY NEDDY]

Nothing could wipe the smile off my face as I worked all week on my science-fair submission, showing it to Lizzy now and then for her approval. On the following Sunday, the day before it was due, I called Lizzy over to my desk which had my exhibit covered with a green blanket. I removed the blanket with a *ta-da*.

Lizzy looked impressed. My project was all about the birth, life, and death of a star. Not like a movie-star star or rock-'n'-roll-star star, but an actual twinkling star in the sky! I had made three posters that used beautiful images I found on NASA's Astronomy Picture of the Day website, where they put up pictures every day taken from the [Hubble Space Telescope](#) and other satellites and telescopes. One picture said *Star Factory* and showed a picture of a place where stars are forming. The next one said *Sun* and was of course a picture of our sun—the star that makes life on Earth possible. Then the last one said *Supernova Explosion* and was an action shot of a star dying.

I was so excited I almost started jumping up and down. But I took a deep breath and turned to Lizzy. "My project is called *The Life of a Star*," I announced.

Lizzy read each poster to herself then she pursed her lips and looked over at me quizzically.

"There's a factory that makes stars?" Lizzy asked, looking at the first picture titled [Star Factory](#).

"They also call it a star nursery," I replied excitedly. "It is a region of space where gravity gathers up hydrogen gas to make a new star. The middle poster of the Sun," I said, pointing, "shows a star after it was born, where the hydrogen is being used in a nuclear [fusion reaction](#) to produce light and heat for the planets like Earth. And the [Supernova Star Explosion](#) is how big stars die when they have used up all their hydrogen and explode in a blaze of glory."

"I hope that doesn't happen to our sun anytime soon," Lizzy commented.

"Me either!" I agreed.

"Is that it?" she asked.

I was so glad she'd asked. "Uh-uh," I replied shaking my head. I'd been thinking about this for so long, I was almost dizzy with excitement just preparing to say it.

"What?" Lizzy coaxed, matching my grin.

"I'm also going to *make* a star!" I said and showed her a picture of my setup. "The demonstration is called *The Star in a Jar*."

Lizzy looked at me for a minute like she didn't believe me. Then her face broke into a wide smile, and she said enthusiastically, "I bet you'll win."



The contest itself was probably the most excitingly wonderful day of my life. I presented my project to the judges third, after someone presented a project on birds and another person shared a series of plants that had been given different feeding recipes. They were good projects, I thought.

But when it was my turn, it seemed like almost everyone came over to watch. There was a lot of hype surrounding me—the girl who was going to put a star in a jar! I couldn't even see how far back the crowd went. Later Dad said he was standing in the middle, and he couldn't see the back of the crowd either.

Because I was basically creating nuclear fusion in one of Grandma's giant pickling jars, Grandpa had to stand beside me the whole time. He was the physics teacher at our school, so he had to be at the science fair anyway. And this was a dangerous experiment. Our glass jar could implode, and we were using high-voltage electricity. So we had to get special permission to do it, we had to shield everything in a Plexiglas box, and Grandpa had to be there all the time to supervise.

All week long I had been in Grandpa's basement with him, making a nuclear fusor. That is a device in which nuclear fusion actually takes place. We used a very big, old pickle jar from Grandma. She said it had been her grandma's! But she said it was OK for me to use, because it was quite strong, and anyway, she had another one if it broke. I made a coil out of copper wire in the shape of a sphere about the size of a softball. The sphere gets put into the jar that gets pumped out to make almost a complete vacuum. The sphere gets connected to the power source, with another copper plate in the middle connected to ground. That arrangement would create and contain the star once we applied the power.

Grandpa helped me figure out how to connect my apparatus to a source of high-voltage electricity. He had one that was used for powering neon signs. The vacuum environment created in the glass jar, coupled with the high-voltage electricity, would create my star.

The room was totally silent as I powered everything on. The first thirty seconds were really hard for me because nothing happened except for one small spark and the humming of the electricity. I felt like everyone in the room was holding their breath. But then, slowly, my little ball began to glow. Pretty soon the color turned a fuchsia shade of purple. I heard someone call "Turn off the lights!" The gym lights flicked off, and my purple star shone brightly. Everyone started clapping. Grandpa smiled at me. Lizzy smiled at me. Mom and Dad smiled at me. Some kids in my class smiled at me. I can't remember what I did back, but I'm pretty sure it involved smiling too.

Afterwards, people formed a line so that they could walk by and look at my star. The line lasted for thirty minutes. As they walked by, I said, "You are actually seeing [nuclear fusion](#). High voltage accelerates the gas ions inside the vacuum so that they crashed into one another with enough force to create nuclear fusion. It isn't a practical way to use nuclear fusion, because we are putting in way more electrical energy than we are getting out with fusion."

Still, everyone was impressed.

Then Grandpa said, "Time to turn it off before we melt the copper, or the jar implodes."

The judges were meeting that evening, so the winner wouldn't be announced until the next day. I woke up about seven times that night. The last time, I was too excited to stay in bed. I got up before anyone else. Only I was banging around so much, the rest of the family was soon downstairs, crowded

around my computer. Lizzy has curly hair like mine, except long and red. She had put it into the single braid that she likes. I'm sure mine looked crazy, like Albert Einstein's.

"The email is supposed to come at eight a.m.," I announced.

Dad got Mom a cup of coffee. Then we sat around the table in our usual places, basically watching the clock.

"This is just a silly school contest," I said. "Why are you guys so interested?"

"Because your reputation is at stake!" answered Lizzy. "Remember Spacey and Hairy Potty?"

"Oh yeah, that," I said. Sometimes I really loved my sister because she looked out for me.

Finally, eight a.m. rolled around. I clicked through my email. Slowly. And then . .

"I won! I won! Oh! Look!" I said, and jumped up, almost knocking over my computer. Then I tumbled back into my chair, and the family crowded behind me. There it was, the email that said I'd won. I won for the entire school, not just my class. Then Mom, Dad, and Lizzy did a little happy dance so that I seemed like the calm one.

"I knew you could do it!" Lizzy said, smiling and sitting down across from me. Mom and Dad hugged me and kissed me. I sat back in my chair. Smiling.

"Look," Dad said. "It says you're qualified to go to the Connecticut-wide science fair at the Convention Center."

I nodded excitedly. I knew that was one of the major perks of winning.

"You did it!" Dad whooped. "Our daughter is the smartest kid in the whole school!"

"Hey!" Lizzy said, folding her arms.

"Both our daughters are," Mom said. She was trying to give Dad a disapproving look, but she was beaming.

Lizzy and I made eye contact. She wasn't actually mad. We both knew Lizzy was at least as smart as me if not smarter, even if our parents—and even Grandpa—didn't always seem to know.

"You should call Grandpa," Dad suggested.

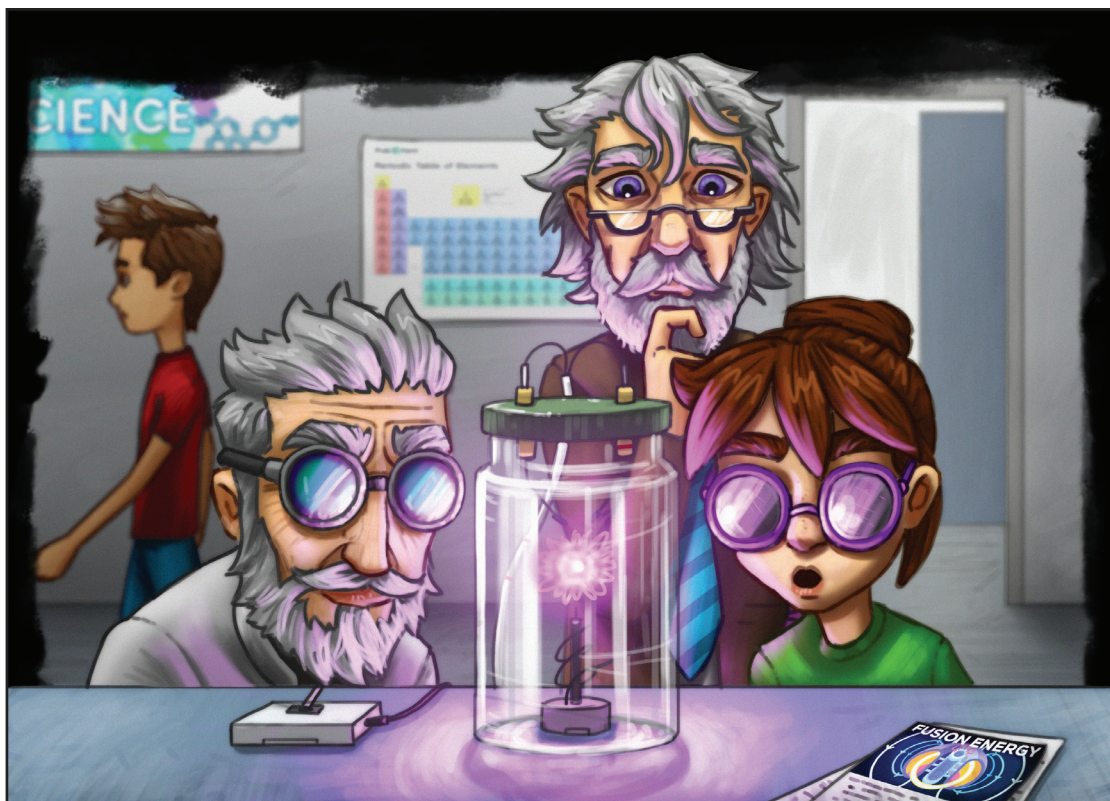
Our grandpa had worked for NASA right out of college in the astronaut training program. I knew my school win would make him happy, especially since he had helped me with the *Star in the Jar*, so winning at the state finals! I could only imagine .

"I'm going to call him right now!" I ran off to get my phone, and Lizzy went upstairs to get ready for school.



One week later I was competing in the Connecticut-wide science fair at the Convention Center. Again, I had to get special permission for my high-voltage vacuum project, Grandpa had to be there to supervise, and we needed to use our Plexiglas shield. I went down on the school bus early to set up my exhibit. Mom, and Dad, and Lizzy followed by car an hour later. The place was packed with kids and projects. Proud parents were beaming all over the Convention Center.

"I think your exhibit looks fantastic," said Dad when they found me. Then they toured around the exhibits. After a while, they came back to listen to me explain about the stars. I turned on my star maker and waited for the particles to swirl around the metal skeleton. The light turned purple and my star began shining brightly in the pickling jar.



Just then I heard an unfamiliar voice behind us and turned to see an older man in the ugliest brown coat that I had ever seen.

"Hi," he said. "I'm Dr. Quixote, but everyone calls me Dr. Q. I am one of the judges for the science fair."

Dr. Q was tall, had a gray beard, and was distinguished looking. But he had the same kind of wild look in his eyes as Grandpa.

"I really like your work," he said to me. "We'll see what the other judges think this afternoon."

"Thank you!" I replied. I was happy a judge liked my work.

Then he leaned in, so he was basically talking directly into my ear. "Make sure you stay to the end of the presentations," he said, almost conspiratorially. "I have an announcement that you may be interested in."

I wasn't sure if he was weird, crazy, or just a nice old man with boundary issues. But I knew no matter what, I was going to stay. I nodded and watched him walk away. But as he did, he and Grandpa looked at each other, nodded like they knew one another, and said something to each other. They kinda looked like how Lizzy and our cousin Milo behave when they pass each other in the hallway at school: like they are each a magnetic pole that repels the other.

At two in the afternoon, we took our seats in the big auditorium to find out who the winners were. The judges, including Dr. Q, were on stage watching as the Governor of Connecticut gave a speech. Then she began to announce the winners. First there were a bunch of special awards that we had to sit through.

Then she said, "And the winner for the best science fair exhibit goes to a sixth-grader from West Hartford, Nealda . . ."

I almost didn't recognize that I had won because she pronounced my real name "Neal-da" instead of "Ne-al-da." That is why I go by Neddy. I didn't hear anything else that she said after that.

"Oh, wow!" Lizzy screamed at Mom and Dad. "She won, she won! That is so awesome. My nerdy little sister won the state science fair. Oh, wow." Mom and Dad were cheering too. They seemed excited and proud of me.

They stayed to hear some more of the other awards, but then they had to go because Dad had an appointment. I was going to stay and take down my exhibit and come home on the school bus. I also wanted to hear what Dr. Q had to say.



Hi, kids. I am Grandpa, or G-Pa, as Milo likes to call me, or Papa, as VC calls me. I hope you enjoyed reading Neddy's chapter. You may not know everything about what she talked about in this chapter, or in the chapters to come. To help, I decided to provide some extra information just in case there is something you would like to know more about. Throughout the book, I underlined and printed in blue some interesting things you may want to learn more about. If you have an e-book, just click on the blue topic, and you'll be taken to a section that gives you more information about the topic. If you have a printed book, just turn to the section on that topic in the back of the book.

Now, I have a question for you.

What is your favorite thing about the stars?



NEDDY'S LOONY PLAN

(AS TOLD BY LIZZY)

It was that night that Neddy won the science fair that she ran into our room screaming, "Lizzy, Lizzy, Lizzy, we *have* to enter this contest. If we win, we can take Grandpa to the moon, just like he's always dreamed of!"

She told me about a man she called Dr. Q who gave a presentation about how his company is going to take people to the moon. He told everyone about a contest his company is running. It wasn't just for kids in Connecticut, but for kids from all over the country.

"And if we win the contest," said my little sister, "we can go to the moon too. Winning this contest would look great on your college application too."

I read the paperwork. It looked like it had to be a team of family members.

"Family members?" I groaned.



November 1

SCIENCE & THE FUTURE CONTEST

Grand Prize:

A trip around the moon for your team and coach aboard the Cosmic Voyager

WHO MAY ENTER:

Teams of up to 4 plus Coach

Must be members of the same family (cousins or closer)

Team members must be no older than 13 years old on December 31 this year

1. REGIONAL QUALIFYING CHALLENGE:

Submit the best "*Invention for the Future*"

Submissions due December 31

Regional finalists announced in March next year.

2. NATIONAL CHALLENGE FOR GRAND PRIZE:

Starts June next year

Entry form attached

Quentin Quixote, President

Time & Space, Inc, 33 Navaho Blvd, Palo Alto, CA 13456, 555 432 1234

"I know. It was super weird when Dr. Q said it, like he was really . . . what's the word when you are really strongly, passionately saying something?"

"Emphatic?" I suggested.

"Yes," Neddy agreed. "He was really *emphatic* that teams be made up of people who are family."

So we didn't know why Dr. Q wanted it that way, but from my experience making families work together was like throwing a bunch of cats into a box and hoping they all survived. Neddy and I are at war all the time, and my relationship with my cousin Milo is even worse. Maybe Dr. Q was a lonely child and liked the idea of family? Maybe he was into torturing people? Or maybe he was just one pickle shy of a picnic? It's possible Dr. Q was just plain old eccentric, like my basketball coach Miss Lindy who had rainbow hair, and who liked to sing the theme from the 1970's boxing movie *Rocky* on the word "duh" while we practiced.

"Duh duh dududuh duduh duh duduhduh."

Neddy was talking a mile a minute, but she had to stop and take a breath. "We can have one adult as a coach for our team. I have to ask Grandpa. And the kids have to be thirteen or under. So we have you, and me, and VC, and Milo . . ."

That's where I drew the line. "No way," I said, cutting her off.

Our cousin VC was great. She was really good at computers which would definitely come in handy. And our cousin Milo was smart. But Milo was *Milo*.

"Neddy," I said, whining like Neddy, "the only person I fight with as much as you, is lame-o Milo."

Milo and I are both thirteen and we've been in the same class for almost our whole lives. Now we are both in the eighth grade at King Phillip Middle School.

"It's bad enough that I have to see him every day with his stupid boy-band haircut, but even worse that the girls in our class actually think he's cute! It's so gross." Neddy looked at me and rolled her eyes. "Also, he hates me."

"No, he doesn't!" she interjected.

"Yes, he does!"

"Lizzy, you think everyone hates you."

"No, I don't."

But then "Neddy the Worst" started naming names. "Grandpa, Milo, me . . ."

She was right, I did think they all hated me. I mean, definitely Grandpa who was less than impressed with my work in his class. Definitely Milo who never missed an opportunity to tell me. And probably Neddy most of the time, just because a lot of the time it was mutual.

"I'm just not sure I could work with Milo. You shouldn't be so sure either. You're definitely not his number-one favorite," I pointed out. "Last week he almost throttled you when you scratched up his new skateboard." Neddy narrowed her eyes at me. "Look, all I'm saying is, our cousin Milo just isn't going to want to work with us, anyway. He won't cooperate."

"But he cooperates when we go hiking and camping," replied Neddy.

"Only because Grandpa is usually there too . . ." I responded, but Neddy cut me off.

"But Grandpa *will* be there. He'll be working with us as our coach."

I wasn't ready to concede, but it was true, Milo did usually at least try to cooperate in front of Grandpa. I had a lot of competition getting my grandfather to like me since everyone else was so great at everything, especially kissing up. I was good at basketball, martial arts, and softball. But Grandpa wasn't sporty. Grandma was. Grandma came to all my games and matches. Grandpa did too, but sometimes I noticed him checking his phone. I guess eighth-grade basketball isn't everyone's thing.

Neddy had gone on with her Milo sermon, talking about how he was a master internet researcher because of his sneaker obsession. "His collection of rare and vintage sneakers is now over fifty pairs."

"I'm onboard with VC," I said. That was all I could give her. VC is short for Victoria Claire. She was adopted from Guatemala when she was a baby. I remember when we met her at the airport. My mom put her on my lap, and I loved her so much. I called her "my baby." I never called Neddy "my baby." Neddy was born two months later, and when I held her the first time everyone says I said, "When do we take her back?" as if she was a library book who would later be returned. Everyone laughs when they tell the story, but it sounds about right to me.

VC is twelve and in seventh grade. She's a great runner like me and wins lots of races against

much-bigger kids. I actually think we're a lot alike. She's the only one in our family with any common sense besides me.

"VC has a great vocabulary," I added, not that Neddy needed convincing about putting VC on our team. "She's the best of any of us at swear words. She knows as many as Milo and me combined!"

"Actually more," Neddy added, "because she knows them in French too."

Neddy settled into her computer chair and logged on to her computer. When she can, she plays computer jigsaw puzzles. She says they help calm her down. I think she's probably a little bit addicted. I plopped down onto my bed and propped myself up with my many throw pillows and watched her for a few minutes rapidly moving her mouse as she attached puzzle pieces.

Then I focused on the announcement Neddy had brought home. The contest was about *Science and the Future*. It had two parts. The first was regionals, where we would compete against other teams from New England. We'd have to come up with an *Invention for the Future*. If we won regionals, we get to compete in the finals for the moon trip. The whole thing was going to take months—even our whole summer! But when I thought about taking Grandpa to the moon like he'd always wanted, it felt worth it.

"You're right about Grandpa, Neddy," I said, while she continued to play her game. "He will be a great coach."

"So you think we could win?" Neddy asked almost calmly.

"Maaaybe." I got off her bed and gave her a bop on her head.

Neddy pushed herself back from the monitor with a giant grin and we spent the next hour looking over all the rules for the contest. Our team would fit the contest objectives really well, since the contest required inventing, doing science, and making presentations. The more I read, the more I figured Milo was probably going to be our best bet for our fourth teammate after all. Not only did we not have any more cousins in town besides VC's four-year-old brother, Griffin, but Milo was also pretty good at science. That combined with Neddy's recently proven track record of winning science competitions, VC's computer skills, and my desperate need to show my family I was not the family mental defective, we just might have a chance.



Of course, who did I run into first thing the next day, probably before Neddy had a chance to find him herself, but my least-favorite family member. My skin crawled as the giggling girls around him scattered on my approach.

"Hey, Lizard," Milo greeted me in his usual charming way.

I wasn't taking the bait.

"Has Neddy talked to you yet?"

"Negatory, E-lizard-breath." Another oldie but goodie, riffing off my full name, Elizabeth. How fun. Milo was already more trouble than he was worth. He had been a royal pain in the butt since first grade. He argued with me about everything. Actually, he argued with everyone about everything. Still, if we were going to have to spend all this time together, I was going to have to suck it up.

"Neddy wants us to be on a team with her and VC . . ." I began. I told him about the contest and how we could make Grandpa's dream come true. "I know you and I are better suited at trying to kill each other, but maybe we can try and work together."

I handed him the contest announcement and rules. I swallowed my pride. "We really need you," I said. "Please, just take a look. And if you agree to join, I will try not to drive you crazy . . ." I saw him ready to interject something annoying, "if you promise the same."

Milo raised his eyebrow, and his face was twisted in that obnoxious Milo smirk. I stuffed the papers in his hand. He began to read, and his face shifted.

"Is this real?" he asked. I was sure he'd just read the part about the moon trip. "OK, this could be actually kind of awesome." He began smiling in a way that did not make me want to smack him on the side of the head. "I could totally design the best *Invention for the Future*, no problem. I mean, if anyone can . . ." I suddenly wanted to smack him again. "And a trip to the moon would be awesome if we win the finals," he continued. "OK, Lizard—I mean Lizzy," he said, just as I was rethinking my ability to work with him, "I'm in. But remember, keep your annoyingness to a minimum."

I glared at him. "Ditto," I said, and made a grimace that I hoped vaguely resembled a smile. "Now let's see what you can come up with for a great invention."

GRANDPA

(AS TOLD BY NEDDY)



I thought about Grandpa and the trip to the moon, and what a great coach Grandpa would be. Grandpa loves science and has a PhD in physics. He once told me that the best job he ever had was working for NASA on the space program when he first got out of school. But he never would tell me about why he left. Grandma wouldn't say anything either. It's been kinda like a deep dark secret, and we're always trying to find out what happened.

After Grandpa left NASA, he started inventing things and developing video games. He even created a character called Grandpa in his video games that looks kinda like him. Grandpa is tall, though not quite as tall as Dr. Q, and he also has a gray beard.

After a few years of mostly working out of his basement, he told us he really missed being around people, so he got his teaching certificate and started teaching as a science substitute. He even substituted in my science class for a week when I was in third grade.

I told Lizzy that it was way weird having Grandpa in our school as my teacher. But Grandpa was really an awesome teacher. He always made science seem really cool.

Now he teaches physics at our middle school. He's Lizzy and Milo's teacher this year. I can't wait, because in two more years he'll be mine!

All of us really love Grandpa because we know how much he loves us. Lizzy is having a hard time with Grandpa this year. I'd say it was because he's her teacher this year, but she's kind of having a hard time with everyone lately. First her basketball team didn't make the finals, and then her grades started suffering. I know how smart my sister is, so I think she's just distracted and maybe in some kind of a depression spiral.

I guess I think all of us might really need this contest right now.



The next day, as we were getting ready in our bathroom, Lizzy told me that I was right about getting Grandpa involved, but then she said, "Let's keep the moon trip a secret from Grandpa for now. Let's enter regionals, and if we are regional finalists, we can surprise Grandpa then."

"Good idea," I agreed. "There's no need to get his hopes up on a long shot. So you're in?" I asked her just to make double sure.

"Yeah, I'm in," she answered. And then of course, she couldn't resist adding, "it wouldn't hurt for you, Nerdy Neddy, to make good use of your nerdiness."

She smiled at me and I smiled back only because I knew she only used that nickname for me when we were completely alone.

"Yeah," I said giving Lizzy a little punch on her arm, "I'll show those kids what Cosmic Cuckoo can do when I win."

"So here's the plan," she said, talking fast. "I already miraculously got Milo, so he's in."

"I already texted VC. She's in too."

"We should schedule a meeting," she suggested.

"Sounds good." Then I added, "You talk to Milo, I'll talk to VC."

"Come on. I already asked Milo to be on the team. Anyway, he'll be much happier hearing from you."

I rolled my eyes because I knew it wasn't just Milo's happiness she was thinking of. The less Lizzy had to talk to Milo, the happier she was.

THE INVENTION REJECTION

(AS TOLD BY MILO)

I am really glad Lizzy asked me to join this team. It's pretty clear how much they need me. Neddy is smart, I mean almost as smart as me. VC is great with languages and computers. But don't get me started on Lizzy. She means well, but if she doesn't have a ball in her hand, she's kind of a walking disaster. But I'm really the whole package, which you know, isn't the most humble thing to say. But I'm social, I love science, I am super at sports, and based on my grades and teacher's comments I'm pretty good in school too. So I'm just trying to be honest. Plus, I have an awesome vintage sneaker collection!

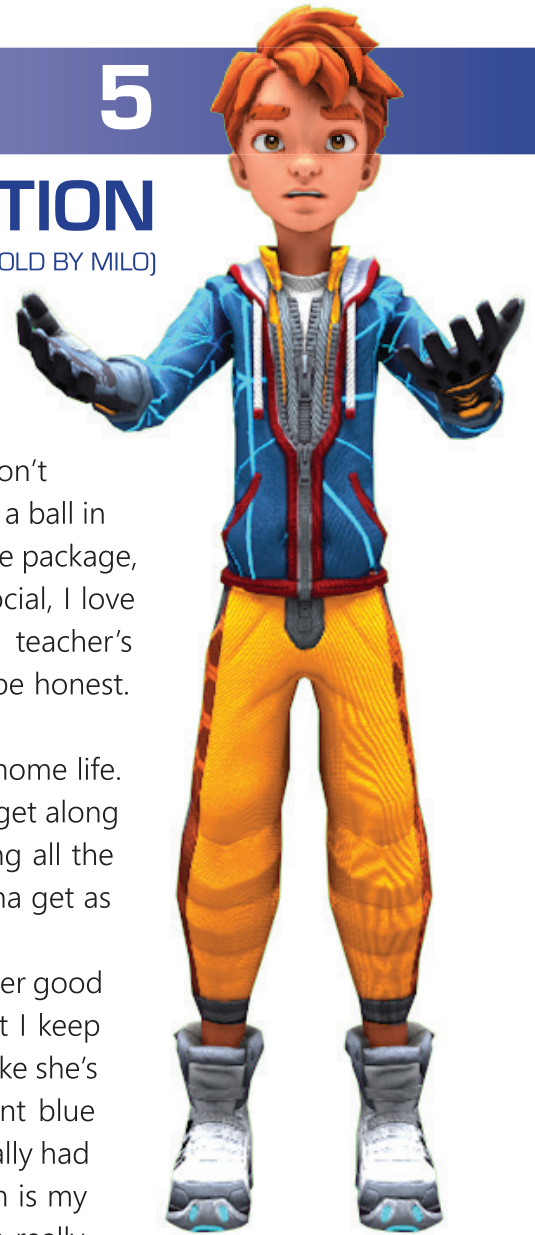
This contest is going to be a welcome distraction from my home life. My mom and dad were divorced two years ago and they don't get along very well. I started off living with my mom, but we were fighting all the time, so now I live with my dad. When I go to college, I'm gonna get as far away from the chaos as possible, like California maybe.

But being on the team is going to take time away from another good distraction. I'm trying to become friends with this new girl that I keep seeing around school. I mean, I see her everywhere. It's almost like she's following me. She's really pretty with long blond hair and giant blue eyes. I have been trying to talk to her. Then the other day we finally had this talk about snakes, because she is in my biology class which is my favorite science. She was really smart and insightful. She had a really cute accent, something Eastern European. She said that humans had an innate fear of snakes—that's how long we've shared the world with them. Like if you threw a rope at a baby it would freak out. But if you put a baby in a car, it wasn't scared, even though many more people are killed in cars than by snakes.

So the next time I saw her I said that we should go snake hunting, and she looked at me like I was insane and walked away.

I don't think people should give up anything for a girl, no matter how smart and pretty she is, but I was thinking of my free time. I wanted to devote it to this amazing girl who thinks I'm crazy. But now I'm going to have to hang out with all of my cousins instead.

But a trip to the moon would be totally awesome. And I've got to admit, even Lizzy is pretty creative and will be good for the team. And she promised to be totally cooperative. We'll see about that. I like the idea of doing it for G-Pa, which is what I call Grandpa. So I agreed to join the team.



I wanted to find out more about that girl. But all I learned was that her name was either Svetlana or Natasha, which didn't seem too helpful. She had moved to Connecticut with her parents from Brooklyn, and from what I could tell, she went back there as often as she could. Someone told me she still had a lot of family in Brighton Beach, which they said is near Coney Island.

Not being distracted by Svetlana/Natasha gave me time to focus on the contest. For our first meeting, G-Ma and G-Pa said that we could meet in the family room of their house.

When I got to the house, the girls were already out front.

"We rang the bell," Lizzy said, "but nobody is home." We decided to wait, and VC and Lizzy started playing catch. Neddy and I looked at our phones. Guess you can tell which twosomes are the most alike.

A few minutes later, G-Ma pulled into the driveway in her awesome Mercedes convertible. She got out of the car holding her tennis racket and waved to us.

"Hey, Grandma," called Neddy. "I love your new short haircut and color."

G-Ma was now a blond with her hair almost covering one eye. I really like how cool G-Ma is.

G-Ma let us into the house.

We ran to the family room. "OK, guys," I announced, "I'll get us organized."

"Why should you take charge?" said Lizzy with one of her angry stares.

"Because, I'm the oldest," I answered, staring right back.

"Whoa," said Lizzy. "But you're only three months older, and besides I get better grades." We continued staring at each other. Then she remembered her promise to be cooperative. "Oh, OK, go ahead, be in charge," she said, grunting in defeat.

"OK," I said feeling satisfied, "let's hear the invention ideas."

"We should invent a [Flying Car](#)," said VC, as she ran around the room with her arms out to demonstrate.

"I wanna do time travel," added Lizzy. "I want to build a [Time Machine](#). That would be so cool."

Neddy said, "I want a fashion machine to design my own clothes, and then manufacture them right then and there."

"How about a [Teleporter](#) like on Star Trek?" I suggested. "*Beam me up Scotty*. That would really be awesome."

"How about this for cool," said VC, "a [Brain Machine](#) that you wear on your head when you go to sleep, and when you wake up, you know a new language, like French."

"Or all your multiplication tables," added Neddy. "Or, history and science facts."

We went back and forth for about an hour like this and made a list of all the best ideas. We included ideas for a [Medical Cure Scanner](#) and an [Anti-Gravity Machine](#). "Let's show these to G-Pa and see what he thinks," I suggested.



Lizzy and I met with G-Pa the next day. We didn't want him to know what we were up to until after we won regionals, so we left the younger girls out of it.

"Hi, G-Pa," I said, as I handed him the list. "Lizzy and I are working on a school project, and we need to come up with ideas for an Invention for the Future. What do you think of this list of ideas? Pretty awesome, huh?"

After reading our list, G-Pa said, "An invention is more than just an idea." Then he started to explain how we had to know not just what we wanted to make, but how we could make it. "Do you know how to make a time machine or teleporter? I sure don't."

"No, I don't," I admitted. Neither did Lizzy.

We had our feedback from G-Pa. He shot us down. We decided to walk home. I knew G-Pa was right, but I couldn't help feeling annoyed.

"I mean, a time machine," I said to Lizzy, maybe unfairly. "That's pretty lame."

"Seriously?" she responded. "You wanted to make a teleporter!"

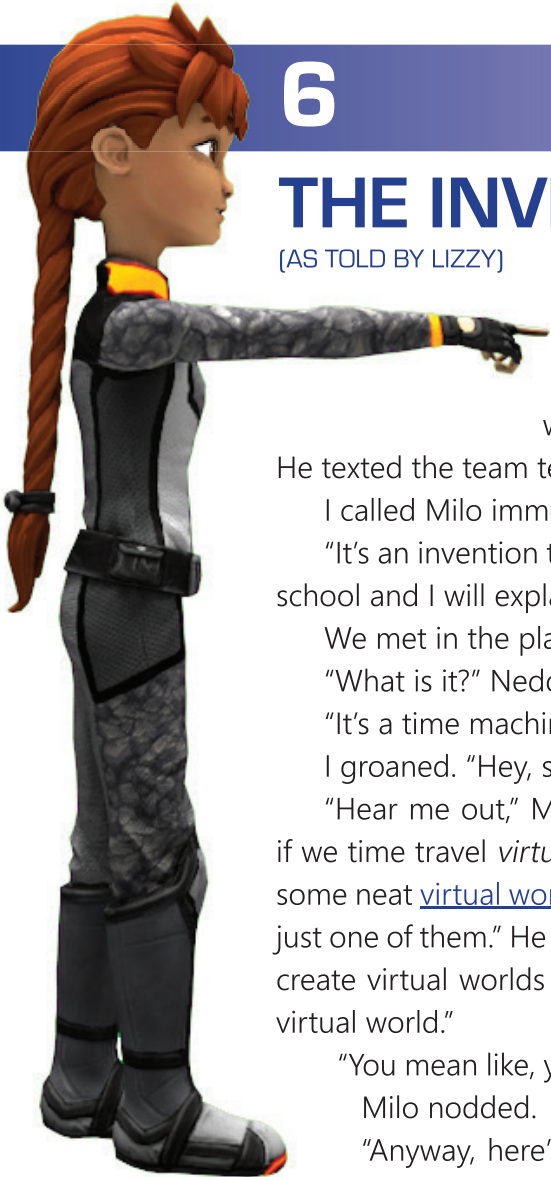
"Whatever Lizard. This isn't working. We should just quit while we're ahead." I walked on while Lizzy slowed down.

When I turned around, she was looking at me like her head was gonna explode. I rolled my eyes and turned to keep walking. Luckily, she stayed far enough behind that we didn't have to speak anymore for the rest of the walk to our houses. Why all of our parents wanted us to live in the same neighborhood, I will never understand.

I was depressed about it for a while. When I'm depressed, I play a lot of videogames. I know it probably sounds like a giant time suck. But while I was fighting an Org army something occurred to me—and then that idea just got so big in my head, I had to drop everything and text the cousins quick.

THE INVENTION BOUNCE

[AS TOLD BY LIZZY]



I am definitely an idea person, but by the end of the following week nothing had come to me. But apparently Milo had an idea.

He texted the team telling everyone to look at the picture he posted on Instagram.

I called Milo immediately and asked, "So what's with the picture?"

"It's an invention that will actually work," he said. Let's get everyone together after school and I will explain."

We met in the playground after school.

"What is it?" Neddy asked when Milo showed us the picture.

"It's a time machine," he replied.

I groaned. "Hey, slime-brains. Remember what G-Pa said?"

"Hear me out," Milo said excitedly. "What if we don't actually time travel? What if we time travel *virtually*?" We all just looked at him blankly. He went on. "There are some neat [virtual world](#) websites on the internet. The picture I posted on Instagram is just one of them." He opened his laptop and showed us the screenshot. "The websites create virtual worlds that you can enter. You pick an [avatar](#) to represent you in the virtual world."

"You mean like, you get to design your clothes and face and hair?" Neddy asked.

Milo nodded.

"Anyway, here's my idea," he said. "Instead of entering someplace imaginary, you enter a virtual representation of a *real place* at *any time* in the past or future.

Of course, the future will be a made-up projection based on its past history!"

"Wait!" Neddy said, perking up. "So if I want to travel to Pisa to see the Leaning Tower, I type that in, and my avatar gets to explore it?"

"Yes," Milo nodded.

I could tell everyone liked his idea. Even I was impressed.

"We can use maps and street scenes of places we want to re-create from all around the world, to make the destinations."

"It's like time travel and teleporting rolled into one." Milo was smiling at me as he said it. For a minute I wondered if he winked at me.

"That's a great idea," Neddy cried. "Fantastic! We should also make sure every location is created based on its accurate history, climate science, and geology."

We all just stared blankly at my nerdy sister for a minute, not because it wasn't a great idea—it was. It was brilliant. So brilliant that we just didn't know what to say. And then this really awesome thing

happened, like bouncing a ball from person to person, like when my team practices basketball. The idea bounced from one of us to another getting better with each bounce.

First my bounce: "We could travel to other planets and even under the oceans!"

The next bounce was from VC: "And, instead of communicating with just each other, people who lived there at the time could respond to our comments and questions."

Neddy's bounce: "Or we could create characters who really *used to* live there to also answer our questions!"

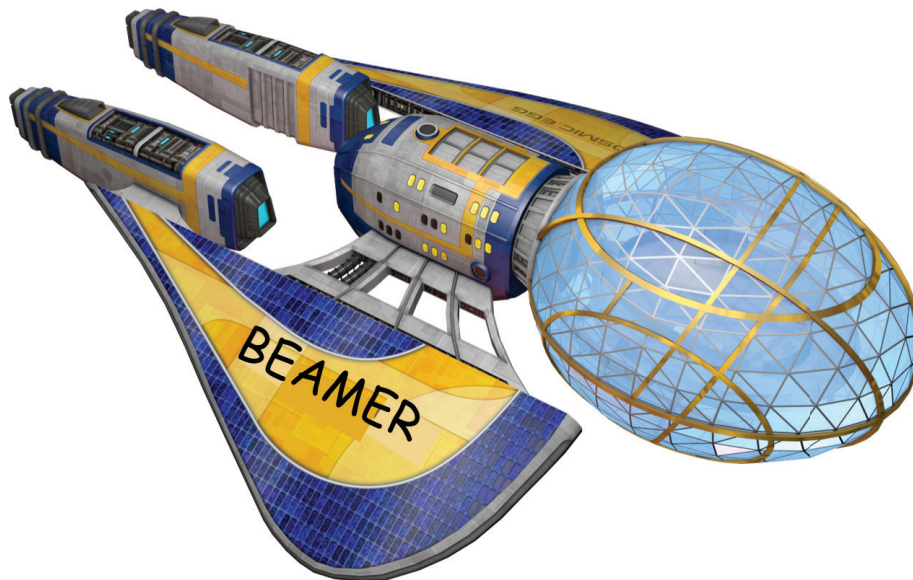
The bounce to me was off of Neddy's: "We can make them famous people that lived in those places," I said.

"Like Italian scientists who lived near the Leaning Tower of Pisa!" Milo added.

"And we could have a smartphone app," added VC. "It would allow people to talk to the historical person on the phone if you want a quick answer to a question."



So we had our idea, and we spent the rest of December writing it up. We thought it would be neat if our avatars traveled through time and space in something that looked like a spaceship. Neddy drew some cool pictures of what it could look like. We called it the *Beamer* because it was our teleporter, like in the *Star Trek* movies where Mr. Spock says, "Scotty, beam us up."



We didn't know how to build the website, but we knew what was needed to do it. We needed technology to create the display screens with the avatars, like video game programs use. We named the avatars that would answer our questions Expert Avatars. To create them, we needed software that translated speech to text and a way to respond to the text question with a spoken or written answer. We made pictures and diagrams to explain the *Beamer* using a visit to Pisa in 1590 with VC, Neddy, Milo, and me as avatars. We made pictures showing us in the *Beamer* and me and VC at the Leaning Tower talking with Galileo—a famous scientist Neddy loved—who had lived there.

THE STARDUST MYSTERY



So that was our entry for regionals.



On December 31, we got together and looked over our stuff for one last time and then emailed it into the contest.

"I really hope we make it to the finals," Neddy announced. "I want to go into space and it would be awesome to win the trip for Grandpa. Our invention rocks." We all high-fived.

Even Milo agreed that our invention was awesome, and he and I miraculously managed to get along while we did the inventing. He was starting to surprise me that maybe he wasn't the world's worst human, minus several serial killers and assorted criminals .

The important thing I learned was that by cooperating, we came up with a better idea than any one of us could've come up with by ourselves. Milo came up with the original idea (which he reminded us about continuously), but the team helped make something much better. An idea can bounce around from one person to another and get more fantastic with each bounce. And that's how we came up with our invention. It worked, because for the first time Milo and I were actually cooperating. Together with the other kids, we produced something really, really, spectacular.

What would you pick for the best invention for the future?

