

THE RENEGADE SPY PROJECT

THE RENEGADE GIRLS TINKERING CLUB:
BOOK ONE

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Spiderdust
Studios

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*To my very own Wren, whether she decides to be an engineer,
artist, writer, scientist, programmer, or everything all at once.*

*And to her brother whose limitless patience, creativity, and
kindness astound me.*

TROUBLEMAKER

Wren Sterling took a deep breath and hurled herself into the Friday morning chaos.

She'd stood rooted outside the front door of Ada Lovelace Charter School as the other students flowed around her like one lone tree in a flooded river, and now she was late. She needed to make it to Principal Sophie's office for another dumb lecture before the first class. Someone bumped into her from behind, pushing past as the halls surged and boiled with kids.

It was that stupid student election, mostly.

Wren looked around cautiously, trying to find a clear path through the maze of council candidates and other students. The candidates employed their entire arsenal of posters, badges, magnets, and, the most sinister of all, cupcakes. Those cupcakes were *dangerous*. They lured you in with their delicious vanilla frosting, their glorious rainbow sprinkles and — no. Wren could not get distracted by the sugary little fiends. She had to make it through.

A tall kid walked by. Seizing the opportunity, Wren used him as a shield, walking in his wake until he made eye contact with a candidate and stuttered to a stop. Rookie mistake. There

was no escaping a campaign speech once you made eye contact. She slipped past, unseen.

Locker magnets, fliers, and baked goods sprang out as she moved down the halls. If she lost focus, even for a second, some form of propaganda would materialize right in front of her. She had to grab whatever it was before colliding into it, face first. Which was especially bad with the cupcakes...

Surfacing at the principal's office without being pulled aside once, she waved at Ms. Sophie's secretary. He smiled at her and indicated it was safe to enter. She took another deep breath and yanked the door open.

Inside the cozy office, Principal Sophie looked up from scribbling on some official looking forms. Wren tossed her backpack on the floor and draped, sideways and dramatic, across the armchair in front of the desk. Her head dangled over one of the chair's arms, her feet over the other.

"I don't want to talk about it," she groaned.

Principal Sophie, a small, middle-aged woman in a fancy suit, sighed. "I hoped to see less of you this year, Wren."

Wren flashed the principal a mischievous smile. "Awww, I thought you liked me!" She was beginning to understand why people didn't sit sideways more often. It was really uncomfortable.

"Tell me about Mr. Vincent's class yesterday," Ms. Sophie prompted.

"Same thing as always," Wren pulled herself into a regular sitting position, then dropped her head onto the desk with another loud groan. Much more comfortable, still properly dramatic. "I try as hard as I can, but my body does things without telling me first. I don't want to cause trouble, but I can't sit still and listen. Birds and cars are loud and the lights are too bright. You know what? Bobby had egg salad for lunch. I could totally smell it because he got some on his shirt. ON HIS

SHIRT, Ms. S. and he didn't even care! So disgusting. And honestly, can I tell you a secret? I think Mr. Vincent might actually be a robot. An emotionless robot who doesn't understand the vast complexity and range of human feelings. Either that or he's just a jerk. I don't even know what I'm doing wrong until he tells me! Okay, sure, maybe I was a little loud about expressing my opinion but honestly, what's so wrong about that anyway? Seriously," she gazed up hopelessly into Ms. Sophie's face, "aren't we supposed to stand up for what we believe in?"

"There's a right way and a wrong way to stand up for what you believe in, Wren. You know that," the principal leveled her famous stern expression at Wren. The one that said she wasn't putting up with your shenanigans. The one that stopped most students in their tracks.

But Wren Sterling wasn't most students. It took more than a stern look to intimidate her, no matter how legendary. The entire world was filled with stern looks for a girl like Wren. She'd been on the receiving end of Ms. Sophie's so often since kindergarten that it just didn't have the same power anymore. And she knew that, secretly, the principal of Ada Lovelace Charter School was actually a big softie.

Lovelace, in the middle of San Francisco, was huge. Kindergarten through eighth grade. The elementary school populated the first three floors, while middle school dominated the top two. At just-turned-eleven, Wren was officially the youngest kid in sixth grade. She'd waited forever to be up on the fourth floor, to leave elementary school behind. Make a big change.

This year was supposed to be different. The year she'd get in less trouble. The year everything would change.

But life wasn't magically better up that flight of stairs.

Classes had started three weeks ago, and so far all she'd gotten out of middle school was more exercise.

"You need to find a better outlet for your... enthusiasm.

You're a smart girl, Wren. Make better choices." And now Ms. Sophie was lecturing her again, as she'd done for years. Nothing had changed.

Wren looked out the window, slowly shaking her head, "I'm not sure I can. I honestly try so hard. I'm exhausted from trying so hard. But I'm just not like the other kids. My brain works differently, I know it does. The only place it quiets down is when I'm making stuff in my tinkering club. I don't WANT to see you so much," she paused. "I mean, no offense..."

Ms. Sophie's scowl softened at the corners.

"I believe you, Wren, I honestly do," she said. "You've never lied to me, even when the truth got you into more trouble, and I appreciate that. You're a fascinating girl. You just need to, I don't know, tone it down? Be a problem solver, not a problem starter. Okay?"

"Be like everyone else," Wren agreed. "Gotcha."

"That's not quite what I mean..."

"Actually, yeah. That just might work! Be boring like the other kids," Wren nodded to herself, lost in thought. "Brilliant!"

Ms. Sophie's scowl melted completely into a smile. "Thank you for coming in before class. You can go on now. Don't be late. Rules are rules."

As Wren stood and gathered her things, Ms. Sophie added, "And I do like you, Wren. But I don't want to see you so much this year, either."

"I understand. I promise I'll try even harder to be good," Wren called back over her shoulder. "And boring. Totally boring."

The hallways were the most dangerous right before the start of class. Candidates, desperate to get in one last vote-winning speech, became even more aggressive. Kids lost their focus rushing to class. And here it was, T-minus-five minutes. But she

wasn't going to get in trouble today. Nope. Not today. She'd promised.

As Wren climbed the stairs to the fourth floor, a boy pressed a small piece of paper into her hand. She grabbed it as she pushed past, his voice disappearing behind her.

"McGuckin for Council! Vote Peter!" the paper said, with a drawing of a dog... or maybe it was an otter? Wren dropped it into the closest recycling bin with the rest of her morning's flier collection. She watched sadly as the papers flopped onto the overflowing pile. At least they were being recycled.

Three years ago, nobody even wanted to be a part of the student council. It had been just a dumb popularity contest with winners bossing around kids who generally ignored them. But that was before Benjamin Spencer.

Just an enthusiastic fifth grade council member at the time, Benjamin ascended to school president when the old one never showed up at meetings. Benjamin was the only one willing to step into the position. Since then, Wren had seen the school change.

Benjamin and his student council did actual things. Benjamin, now in eighth grade, led the school in an anti-bullying campaign. Benjamin convinced his aspiring journalist friend, Gail Mendez, to start a school paper, *The Lovelace Gazette*, that everyone adored. Benjamin, a swimmer, revived interest in school sports. Benjamin started a competitive math team and suddenly math trophies lined the front entry shelves, and math was cool. Benjamin, Benjamin, Benjamin. Even Wren was impressed by him, and she had pretty high standards for being impressed by anyone.

This year, two spots on the council had opened up and suddenly everybody wanted in. Kids were fighting for those seats like rabid social gladiators. Bright posters, covered in streamers and slowly deflating helium balloons, plastered every

inch of the hallway with slogans in foil and fluorescent CAPITAL LETTERS. Their visual noise screamed mercilessly at Wren as she moved carefully down the hall.

Finally, exhausted, she reached her locker. It wasn't even nine a.m.

She smacked her head against its door a few times with a groan, then opened it. Hanging her backpack and jacket on the hooks, she pulled out her science book and turned to head to her favorite class.

Amber was waiting.

BE BORING, BE BORED

Amber Rosenberg's delicate, freckled face lit up like sunshine when Wren entered the classroom. Warmth spread through Wren as she sat at the science table next to her best friend. One of her best friends. She had three. Amber and the other members of the Renegade Girls Tinkering Club.

Mr. Malcolm didn't care where kids sat as long as they were paying attention, so Amber and Wren pretty much always sat together, and almost always paid attention.

As Wren sat down, Amber slipped the book she'd been reading, *Sarah and Simon: Super Spies*, into her backpack and leaned over excitedly, "Mr. Malcolm is setting up a hands-on experiment! He's so wonderful."

"If you say so," Wren laughed.

Whimsical, otherworldly Amber. Wren wasn't sure her best friend was entirely human. Tiny and clever, with wavy auburn hair, beautiful clothes, and graceful dance moves, Amber was fascinated by plants and animals. She wanted to know everything about all living things and couldn't be bothered to divide them into "cute" and "icky." She loved cockroaches as much as cats. Well, maybe not exactly as much, but she was a lot less

judgmental than Wren. Secretly, Wren had decided that Amber was some sort of spy, studying Earth for her true people. Amber's species, probably fairies or aliens or something, would eventually use the information to become overlords of the Earth. Amber would rule them all. The thought was one of Wren's favorite daydreams but Amber knew nothing about it.

"What do you think those are?" Amber pointed towards some bins Mr. Malcolm was filling with small items.

Wren shrugged. She saw a baggie with some powder in it and a tiny bottle of liquid. A mystery!

Maybe they'd use the microscopes today. Those weren't boring, not even the ones at school, though Wren was kind of spoiled by the Renegade Girls's professional grade microscope. It had been a gift from Amber's Uncle Tim when his microbiology lab upgraded.

It was a thing of beauty. Looking through it transported Wren to another world--a microscopic world filled with fantasy and wonder. The millions of iridescent, feather-like scales on a butterfly wing, the bubbly geometric beauty of the cells of a plant stem, the shapes and colors in a pinch of beach sand. Intricate and beautiful structures made up everyday objects.

It was real life magic.

Amber felt the same way. That bond had blossomed into their friendship and then their club. It didn't matter to Wren if anyone else at school thought they were weird or nerdy. They had each other. Together, they understood the deep magic of the world.

Thinking about the microscope was definitely not boring, though. Wren reminded herself that her goal was to be boring. Be like the other kids who didn't care about important things, like microscopes, and never got in trouble. This was going to be harder than she'd anticipated.

"Okay, guys," Mr. Malcolm said. "We've been talking about

states of matter. As I'm sure you all remember, matter is the stuff that makes up everything in the universe, everything that occupies space and has weight. Who can remind us what the basic states of matter are?"

Amber's hand shot up, along with most of the class.

"Emma?" Mr. Malcolm chose the dark haired girl to their right.

"Solids, liquids, and gases," Emma answered, punctuating "gases" with a fart noise. Wren rolled her eyes while the class giggled and Mr. Malcolm smiled tolerantly. "Which has something to do with, like, how many molecules whatever has, right?"

Wren's attempt at boredom cracked a little at the mention of molecules. Maybe they really would use the microscopes! You have to use a microscope to see atoms and molecules, the tiny bits that matter is made of. Actually though, it had to be a special kind of microscope. Molecules were too small for even their club microscope to see.

"Exactly!" the science teacher nodded. "In solid things, the molecules are all crammed together too tightly to move around. They are fixed. You can have a 'chair shaped' thing or a 'squirrel shaped' thing. A chair and a squirrel are both solid. But in a liquid, the molecules are looser. They slide around. So a liquid doesn't have a fixed shape. Lemonade can be shaped like a cup, or a straw, or the inside of your mouth. There is no such thing as a 'lemonade shaped' object. You can't compress a liquid or a solid very easily. If you try to squish a mouthful of lemonade, the volume won't change, it'll just change shape and shoot right out of your mouth. But a gas is a different story. Molecules in a gas are really loose..."

A knock came from the door. Walking over, Mr. Malcolm said, "You're doing an experiment today. But first, I have a surprise. Mrs. Yang went into labor this morning right after she got to school."

Whispers surged through the class. Wren didn't think Amber could look more excited, but apparently tiny new babies broke all previous excitement levels.

"Well," he continued, "she's off to the hospital, and the substitute hasn't gotten here yet. So this morning we're going to welcome her class for today's lesson. You'll have to double up your stations."

The classroom got crowded as more sixth graders streamed in. With a groan, Wren watched Axel Andrews and her perky blond ponytail saunter past, joining the table in front of them. Just the sight of Axel stressed out Wren. She desperately scanned the other newcomers, looking for friendly faces.

One had already appeared next to her. Silently, like a ninja.

SCIENCE!

If "secret" were a state of matter, it would be the shape of Kaminia Doyle. Kammie's molecules of secretness were packed tightly, moving quietly and carefully. She rarely spoke to anyone besides her friends, so it was a secret that she actually spoke a bunch of languages. English of course, plus Hindi with her mom's parents and even some French. And to top it all off, she could talk to computers in different programming languages too. Not expert level or anything, but she was working on it. Yet even with so many ways to communicate, Kammie usually hung in the background, unnoticed. Most people thought she was boring, but that was her secret. Kaminia Doyle was one of the most fascinating people Wren had ever met, but you had to hunt for it. And Wren loved a good mystery.

Apparently, though, Wren had missed something in this class.

"Yes, Axel," Mr. Malcolm was saying. "That's very interesting. But the question was, does anyone know what a non-Newtonian fluid is?"

A few eyes skittered towards Amber and Mr. Malcolm pointed to her. "How about you give it a try, Amber?"

"That's a substance that can act like a solid or a liquid, depending on how you interact with it," Amber said confidently. "Like quicksand or ketchup."

Axel seemed jealous, "How is a squished up vegetable a non-Newton fluid? That doesn't even make sense!"

Amber reddened. "But it is! Ketchup is so viscous that it changes between solid and liquid depending on the forces affecting it. Really."

Axel stared at her. "Vixos isn't even a word, Amber."

Amber tilted her head in confusion as Mr. Malcolm watched the two girls with interest. "Wait, what?"

Axel, encouraged by Amber's confusion, opened her mouth to gloat.

But Amber wasn't finished. "Don't you know what viscosity is? It's the rate a liquid flows. You know, like how thick it is. And how fast ketchup flows changes based on outside forces, like when you hit the bottle. That's what makes it non-Newtonian. And by the way, a tomato isn't even a vegetable. It's a fruit."

"BAM!" Wren blurted. "You just got SCIENCED!"

Mr. Malcolm stifled a laugh.

"That's not really the cool comeback you think it is," Axel mumbled.

This class was totally not boring so far. Wren tried to stuff down her emotions by copying Bobby's tuned-out expression at the next table. She wished Ivy were there. Ivy Rose Park, the fourth member of the Renegades, was good at being businesslike and serious. But her science class was in the afternoon.

"Alright, everybody! Back on track," Mr. Malcolm passed out a bin to each table. "Today you'll be making... wait for it... SLIME! And Oobleck too. Work in groups. You'll find recipes and instructions in your bins. Oobleck and slime are both non-Newtonian fluids which, as Amber pointed out, are neither

solids nor liquids, yet have characteristics of both. Non-Newtonian fluids are a fourth state of matter."

"What about plasma?" Wren asked as he set down their bin. "Isn't that another other state of matter?"

Mr. Malcolm paused and gave her a curious look. "Indeed it is, but that's a bit beyond the scope of today's class. Where did you learn about plasma?"

"YouTube," Wren replied absently, already digging in the bin with Kammie.

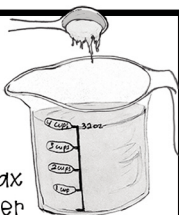
"Apparently, not everyone uses YouTube the same way," Mr. Malcolm chuckled. He continued on. "Follow the directions in your bins. The two substances are simple to make, but messy. Work **INSIDE** your bins. Take out your science notebooks and record your observations. Compare and contrast both substances. Everybody got it?"

Everybody got to work.

MATERIALS:



Borax water
(1.5 tsp Borax powder
mixed in 4 cups hot
water, cooled for slime)



HELLO
my name is
SLIME!

DIFFERENT MATERIALS:



Corn starch
(1/2 cup)

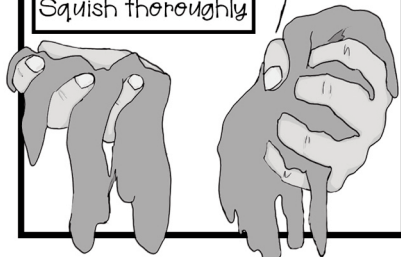
Mix color into glue



Mix equal parts
borax water and
colored glue



Squish thoroughly

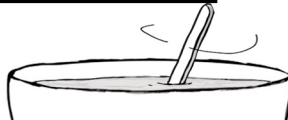


HELLO
my name is
DOBLECK!

Put water in a
bowl, add twice
as much corn
starch as water



Mix it up, adjusting
ingredients as needed



SLIME!

Wren and Kammie started taking the contents out of the bin. Kammie stacked them in neat little piles with a matching instruction card in front of each. She was cross referencing the ingredients as Amber picked up a card.

"He's premixed the borax water for the slime," said Amber, mostly to herself. "One and a half teaspoons borax to four cups of hot water. That's pretty much what I use at home."

"Wait!" Kammie squeaked. "Isn't borax toxic?"

"Nah," Wren replied. "It's an irritant, but only dangerous if you use a whole lot of it. Mom looked it up. She even printed it out and put it on the fridge with all that science and engineering stuff she's always sticking up there. Did you know the reason you can use contact lens solution to make slime is because it has borax in it? Like you put that stuff in your eyeballs!"

Amber looked up in alarm, "Don't put this in your eyeballs, Wren! That's a terrible idea. And we should wash our hands afterwards. With soap."

"Never put anything in your eyeballs, ever, not even as a joke," Kammie agreed as Amber handed the card to Wren. "So what do the slime instructions say?"

"Who cares?" Wren tossed the recipe back into the bin. "Lets get messy!"

"No!" Kammie smacked Wren's hand as she reached to grab a bottle. "This is serious science! We follow the rules."

Wren pouted.

Kammie ignored her and carefully poured a half cup of the boraxy water into the mixing bowl.

Amber measured out an equal amount of glue, then dripped a little purple food coloring into it and stirred slowly with a jumbo craft stick from the box. All three girls paused to watch as rich purple color swirled through the thick white glue. Soon all the glue was evenly purple.

Then it was Wren's turn to stir while Amber poured the glue into the borax water and Kammie held the bowl. Soon the glue coalesced into a blob. Wren grabbed the sticky, gooey glob and began to squish it with her hands. Again and again she squeezed her hand into a fist, letting the substance squirt thickly through her fingers and then catching the gooey ribbons and folding them back in. As she kneaded, it got more and more solid. She had to dunk it in the leftover borax water a few times to firm it up, but soon had a nice ball of purple slime.

Meanwhile, Kammie and Amber had taken out the second mixing bowl and a baggie full of white powder. It was two cups of corn starch. They dumped it in the bowl and added one cup of regular water. As they slowly stirred, the mixture started to look kind of like yogurt. Watching them, Wren wondered if yogurt were a non-Newtonian fluid too.

She held up her slime and let it sag and drip thickly over the edges of her hand, looking at the difference in how the oobleck ran quickly through Amber's fingers like a liquid. The slime didn't ever get that runny. It was pretty much an oozing, slow moving mass. The oobleck was a LOT more liquidy than the slime when Amber left it alone, and almost solid when she

smacked it. Wren imagined she could run over a pool of oobleck if her feet slapped it hard enough, but probably not slime. Apparently even two non-Newtonian fluids could be different. Kammie wrote notes with her quick, tidy handwriting.

Aaaaand Wren was getting bored. Bored was what she'd promised. Bored was going to keep her out of trouble, right? So why did it feel so dangerous? Setting the slime in Kammie's outstretched hands, Wren wiped her own off with a paper towel.

Then it happened.

As she set the wadded paper towel on the table next to a few craft sticks, a rubber band, and the little empty plastic measuring cup, pictures popped into her brain about ways they could all fit together.

A stretched rubber band snapped back with serious force. If two stiff objects, like the craft sticks were rubber banded on one end with something in the middle, would it act like a teeter-totter? The rubber band would stretch when it teetered, and snap back when it tottered. Would it snap back with a lot of force like a rocket-powered teeter-totter?

Or a catapult.

And suddenly all the pieces formed together in her head. Her hands started to assemble before she knew what was going on.

She laid two jumbo craft sticks on top of each other, wrapping the rubber band around one end to hold them in place. Then she wedged the wad of paper towel between them, pushing them apart into a V. She set it flat on the table and, bracing the bottom craft stick with one hand, pulled down on the end of the top craft stick. To her surprise the rubber band didn't really stretch like she thought. Instead, the stick curved. When she let go, the stick shot back straight. Not what she'd planned, but maybe it would work anyway.

Almost in a trance, she taped the tiny mixing cup to the end and dropped in a piece of rolled up tape. Holding the bottom stick again, she pulled and released the cup end. The tape went flying. Catapult!

Then Wren looked at the slow moving slime in Kammie's hands. It moved like thick mud. But the oobleck's non-Newtonian state was a lot more liquidy unless something hit it hard.

Or it hit something.

Wren didn't notice Amber and Kammie look over at her in surprise as she poured a big glob of the oobleck into the catapult's cup. Would the oobleck stay liquid in the air? Would it turn solid when it hit something? She couldn't hear Mr. Malcolm saying something sharply at her or see him moving quickly towards her, reaching out.

She pushed the paper towel closer to the rubber band, increasing the angle of the upper craft stick to give it more power, bent it down, and shot it, watching with fascination.

The oobleck didn't fly out like she'd thought it would. Instead, the force of the motion turned it solid enough that it clung to the little plastic cup. The weight of the cup and substance was too much for the small piece of tape holding it in place though, and the whole cup broke free from the device. Too late, she realized she had no idea where it would land.

Plastic cup and non-Newtonian fluid soared together in a graceful arc across the short distance to the table in front of them, rotating slowly along the trajectory.

Without a sound, the tiny plastic cup plopped right on top of the perky blond head of Axel Andrews, open end down like a little hat.

Harmlessly, the cup fell to the floor. But its contents remained glopped on top of Axel's head. Then it turned back

into a liquid and slowly oozed down her head, through her hair, and into the inside of her shirt.

Axel let out a high-pitched howl, snapping Wren out of her trance. Mr. Malcolm and his angry face came into focus. She could hear laughter from the other kids in class. Wren, suddenly realizing what she'd done, looked over at Amber and Kammie who were frozen in surprise, staring at her.

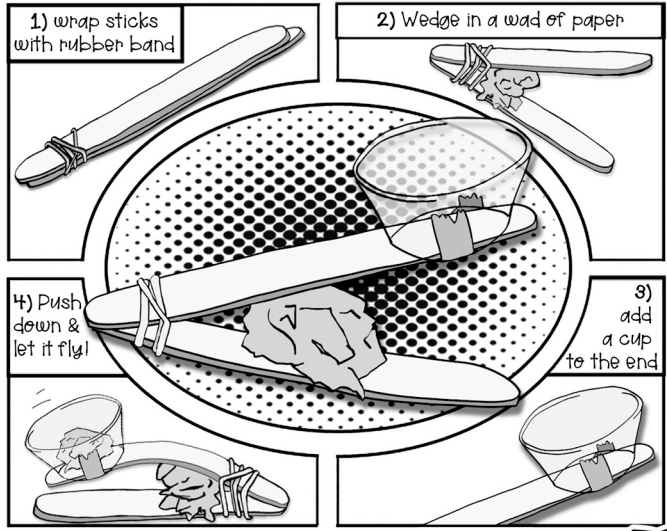
The whole class erupted in chaos. Mr. Malcolm, furious, pointed towards the door, sending her to Ms. Sophie's office. The office she'd just left. She'd already broken her promise.

Wren realized at that moment that she would never be able to do it. She'd always be a problem starter. A troublemaker. Everywhere except the Renegade Girls Tinkering Club. It wasn't even worth fighting anymore.

CATAPULT!

MATERIALS:

- 1 Wad of Paper
- 1 Rubber Band
- 2 Jumbo Craft Sticks
- 1 Sauce or Dixie Cup
- Some Tape



1) wrap sticks with rubber band

2) Wedge in a wad of paper

4) Push down & let it fly!

3) add a cup to the end

NOW MAKE IT BETTER!

- What else can you change?
- Where else could you put the cup?
- What flies better, heavy stuff or light stuff?
- What could you use instead of paper? Instead of a cup?

THE GREENHOUSE

Technically it was Wren's Greenhouse, hidden behind her family's small home in the middle of San Francisco, but all the Renegades felt at home there. In the Greenhouse, they didn't have to worry about other people's rules and opinions. Or try to be boring or be like everyone else. The Greenhouse was their safe space. They could just be themselves. Wren's parents let them use it as their workshop and clubhouse as long as her little sister, Trixie, could be part of the club.

When they'd formed the Renegade Girls Tinkering Club, the Greenhouse had been abandoned and filled with broken pots and spiderwebs. It was small and dirty, but had everything they needed. A door hidden like a secret behind an overgrown wisteria vine. A back wall with shelves from floor to ceiling, and excellent light from a front wall made entirely of glass. A small but sturdy potting table sat against the windows. It was pleasant and warm, with one electrical outlet and a small work sink. They loved it from the first time they saw it.

Amber, Kammie, Ivy, Wren, and even Trixie had worked tirelessly last summer, cleaning and gathering assorted leftovers,

recyclables, and a mishmash of bins to put them in. They categorized and labelled, collected cardboard by cutting down shipping boxes, and saved empty toilet paper rolls from the trash. They snuck random scissors from kitchen drawers, ribbons, buttons, anything that looked useful or had an interesting shape. Amber had borrowed a folding card table from her garage, and Kammie brought in some stools her parents were getting rid of. Wren found an old glue gun, and they had even managed to find an unused sewing machine. The first purchase with their club dues had been copies of the side gate key, so everyone could head directly into the backyard when they came over.

Amber rocketed through that side gate, clutching a cardboard box protectively to her chest with her delicate arms. Beneath a spring green sundress her feet, in their pristine white flats, skipped quickly and skillfully over the ground. The September afternoon sun lit up her auburn hair like a fiery halo.

Amber shoved her way through the overgrown wisteria near the door, but Kammie had gotten there first. The quiet, dark-haired girl had seen Amber coming, and was carefully placing her own copy of *Sarah and Simon: Super Spies* into her backpack.

"Is that what I think it is?" Kammie asked, indicating the box as Amber placed it on the potting table.

"They finally came!" Amber sang, her hazel eyes sparkling with excitement. "Where's Wren?"

"Looks like she's on her way." Kammie pointed at Wren's house.

Wren strode towards them across the yard, wiping some lunch crumbs from her stained cotton dress. A breeze ruffled her unruly mop of light brown hair.

"I'm glad her mom didn't ground her for that thing with Axel yesterday," Amber confided. "I was afraid we wouldn't be able to meet."

Kammie nodded without saying anything and waved at Wren through the window.

In the background, Trixie's little face and hands pressed against the sliding glass door from inside the house, watching as Wren walked away. Trixie was almost six years old and generally sticky. Sure enough, as she peeled off the back door to return to the table, prints from her lunch remained on the glass.

"Is Ivy coming?" Wren asked, closing the Greenhouse door behind her.

"I called her this morning," said Amber. "Her mom said she'd drop her off right after the soccer game."

"Oh good," said Wren. "Aren't they playing McKinley today? I hope she won."

Amber didn't reply as she carefully dug into a bin marked SHARP STUFF and pulled out some scissors. Apparently Wren didn't want to talk about the catapult, and Amber certainly wasn't going to be the one to bring it up.

Holding the scissors over the package with a dramatic gesture Amber sang, "What will we fiiiind inside the booox???" It's a mystereeee for yooouu and meeeeee!"

Wren wriggled on her stool. "We know what's in the box! Open it!"

Amber opened it. A smaller wooden box huddled inside. She pulled it out and lifted the lid. Row after row of glass rectangles glittered in slotted holders. It had taken the Renegades four weeks to save up for those microscope slides. Seventy prepared slides and thirty blanks.



The mysteries of the universe awaited on those little pieces of glass.

Wren moved their club microscope into place. It was heavy, solid, and powerful, but she still handled it like it was made out of newborn puppies. She gently pulled off the cover and plugged it in. It was beautiful. To Amber's Uncle Tim and his lab, it may have been obsolete tech but to the Renegades it was the most professional piece of science any of them had ever gotten their hands on. And it was all theirs. It had two sets of binocular lenses on the viewing head, the type of eyepieces you could look through with both eyes at once. Between them and the three rotating lower lenses, it could magnify up to two thousand times. It had back lights, front lights, and even a camera attachment.

The ten slides Uncle Tim had given them had been explored, researched, compared, and contrasted to death. Wren could draw the cells of a papyrus stem (slide #3) by heart, and she wasn't entirely sure what papyrus even was. So they had decided in the middle of the summer that it was time to purchase more slides. Even using their whole treasury, it had taken them weeks of extra odd jobs and allowances to earn enough money for the new slides. And finally, here they were.

The girls heard the creak and slam of the side gate as Ivy careened into the backyard. She tossed her soccer bag next to the Greenhouse door before bursting in breathlessly. Taller than her friends, she peered right over Wren's head into the box.

"Awwwwww, you opened it without me?" Ivy complained, redoing the ponytail in her long black hair. She smelled like sweat after running around on the field for ninety minutes in the sun.

Kammie slid their inventing journals across to each of them. A fresh section of butcher paper already sat on Trixie's old art easel, also known as their noteboard. Kammie pointed to it. She had started a "Microscope Viewing Order" list and in small, almost apologetic lettering, her own name was in the top spot.

"I mean, I WAS here first," she blushed. "So I thought, you know, maybe this time, if you guys don't mind..."

Amber snagged second place and Ivy slotted in at third.

One of the oldest kids in their grade, Ivy Rose Park was not used to being second, let alone third. Tall, confident, and always getting picked for some sports team or another, Ivy was not friends with the concept of waiting. Wren didn't like the word "bossy," but she'd heard it a lot when people talked about Ivy. Wren could see from her friend's pursed lips and how she kept stopping herself from tapping her pencil that Ivy was trying to wait patiently. She'd agreed to the order and once Ivy agreed to something, she stuck with it like glue. Or at least she did her best to.

Kammie was not helping by methodically, sloooooowly trying to pick EXACTLY the right slide. She didn't get to go first very often and didn't want to waste the opportunity. Plus, she was probably afraid to get it wrong. It could be a real problem, Kammie's fear of messing up. She hated being wrong so much. Wren didn't understand. She, herself, was often wrong. She'd learned to roll with it because she had to. But when something

didn't work out for Kammie, she completely crumpled. More than once Wren had sat and rubbed Kammie's back as the quiet girl sobbed and scolded herself for tiny little mistakes. Because no matter how many times Kammie said she was stupid, she wasn't, and Wren could never figure out why she thought she was.

Ivy, trying not to push, watched Kammie walk her fingers over the slides again, reading and evaluating each label. As Kammie started back at the beginning of the row, Ivy groaned and reached into her backpack. She pulled out her latest book on Arduino, or the Raspberry Pi, or whatever electronic doodad she was obsessed with this week. Ivy wanted to be an electrical engineer like her mom, so she spent what free time she had outside of Renegades, school, and her various sports learning about technology. Wren couldn't understand half of what she was saying sometimes, but the stuff she made usually did what it was supposed to do. Which was helpful when they wanted to attach a light or a buzzer to one of their projects.

Wren turned back to Kammie and started to say something to nudge her along but Amber beat her to it. She leaned past Kammie and plucked a slide out of the box at random, startling the serious expression right off her friend's face.

"Plant tissue! Fascinating..." Amber brought her slide to the microscope immediately, hopping to the front of the line. Kammie, with a panicked look, frantically pulled out the closest slide.

Frowning as she read the name Carpet Fibers, she handed the box to Ivy, who quickly decided on a slide with cat whiskers. Kammie pouted but waited patiently for her turn. Second after all.

Wren pondered the slides. She wished she had some of the slime or oobleck to dribble onto a blank, but she wasn't allowed to touch any more non-Newtonian fluids for at least a week.

"Wren! You have to see this!" Ivy called, pointing to the cat whisker slide that was now mounted on the microscope tray. "I know how much you love cats!"

She put her eyes to the eyepieces, but only glanced at the whisker. At five hundred times magnification, she could see the layered lines of scales along the shaft of the whisker. It was fascinating, but it was too late. Her mind already had different plans.

"What did you pick, Wren?" Amber asked.

"I picked this one," Wren held up a blank slide and winked.

"Yes!" Amber squealed. "Let's make our own!"

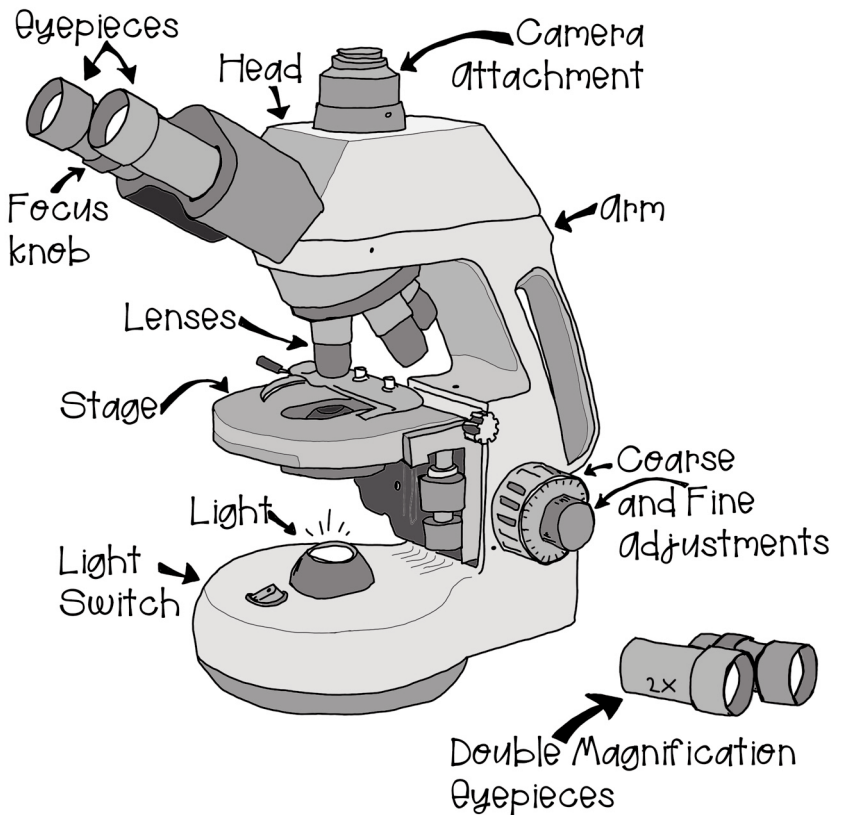
Kammie raised her hand. "We should set a limit on how many we can make though. We don't want to use them all up too fast!"

"Good idea," Ivy agreed. "One a week each, max?"

Kammie did a quick calculation, "That should last us about a month and a half..."

They were already collecting specimens when Trixie wandered into the Greenhouse.

THE MICROSCOPE



GLOSSARY

KNOW WHAT YOU'RE TALKING ABOUT

A

Absconded - to run away so you don't get in trouble

Absentmindedly - without thinking about it

Amorphous - not having any real shape, like a blob

Anticlimactic - an ending that is supposed to be exciting, but is actually just disappointing

Arduino - hardware (physical) and software (virtual) electronics platform that's easy to use and relatively inexpensive. It's made for artists, hobbyists, designers, and as a way to make interactive environments

Atoms - the building blocks everything in the universe is made out of. Sort of like Nature's LEGOs. They are extremely small and made up of electrons, protons, and neutrons

B

Bespoke - made for a specific person, or made for a special order

Binocular lens - the viewing part of a binocular microscope. Some microscopes only have one eyepiece lens. Those

are monocular. Binocular means there are two eyepieces, one for each eye, so it's a lot easier to see. Binocular microscopes tend to have more magnifying power than monocular ones

Blacklight - a light source that emits mostly ultraviolet light. It's not very visible, but will illuminate fluorescent objects

Breadboard - a board with a lot of tiny holes that's used to test or prototype electrical circuit

Button batteries - also called coin cell batteries. They are small, round, powerful batteries that look like buttons or quarters, commonly found in cameras, lights, car remotes, and other things. Button batteries can be dangerous if swallowed, so be careful with them!

C

Cardstock - a stiff, heavyweight kind of paper, like what business cards or greeting cards are made from. It's stronger than printer paper but not as strong as cardboard

Capacitors - a tiny electronic device that holds an electric charge, like a small, lightweight, battery that charges quickly and is built into an electronic device

Carabiner - a strong metal clip shaped like a D with a hinged side. They can be snapped onto things and only release when the hinged side is pushed in. Rock climbers use them to snap onto their protective gear

Cipher - a series of defined steps (a procedure) used to convert plain text into or out of a secret message

Coin cell batteries - the same as button batteries above

Conductive/conductivity - able to transfer something like heat, electricity, or sound from one place to another. Metal is a good conductor, which means electricity can move easily through it. Plastic is a poor conductor (it's an insulator, which is the opposite of a conductor) so electricity doesn't move through

it very well. Human conductors keep things moving, too. A train conductor is in charge of moving trains, people, and cargo around efficiently and a music conductor is in charge of keeping the music in an orchestra flowing on time and in sync.

Copper tape - a thin strip of adhesive copper with a paper backing. Copper is a great conductor (see above) so copper tape can be used in electronic projects. It's also found in gardening stores to keep slugs away from plants but for electronics projects, copper tape should have conductive adhesive (garden copper tape commonly does not).

Corrugation - a wavy, ridged surface designed to give a thin material extra strength

Counteragent - a spy on the other side

Criteria - rules for evaluating or testing something, such as a list of requirements or guidelines

Cryptologist - a scientist who studies hidden information. Usually someone who makes up or tries to figure out codes

D

Dastardly - cruel, nasty, or wicked, but usually intended in a kind of funny way

Decipher - to figure out or follow the procedure to turn a coded message back into plain, readable text

E

Entourage - a famous or important person's group of servants, assistants, or anyone who helps them. Often used to mean a group of friends surrounding one specific friend.

Etch - to draw permanently on a hard surface by cutting partway into it, specifically with acid or a sharp cutting tool

Exfoliating - a beauty process meaning to remove dry, dead skin

F

Fedora - a fancy, old fashion hat with a wide brim hat that used to be commonly worn by men. They are often seen in spy movies over a pair of sunglasses and the upturned collar of a trenchcoat.

Fluorescent - a substance that glows (gives off light) when exposed to a special kind of light or certain kinds of radiation

Force - the push or pull on an object

G

Glass blowing - the art of molding extremely hot melted glass into shapes by using several techniques, including puffing air into it

Grappling hook - a hook with one or more hook parts that's attached to a rope. Grappling hooks are thrown and hooked onto far away objects to either bring the object closer to the thrower or allow the thrower to swing, climb, or lower themselves down.

Guerilla fighter - people who fight in an armed conflict, like a war, but aren't members of a police or military force

I

Incognito - in disguise, to keep someone's identity secret

Irritant - something that causes soreness or sensitivity. An annoyance that might hurt but not seriously damage.

K

Key fob - the small device with buttons used as a key in modern cars and other locked devices. A key fob can open doors, start cars, or set off an alarm.

L

Leads (electrical) - the wires coming out of an electrical device that allow electricity to enter and exit the device.

LED - stands for Light Emitting Diode. A device that shines (emits) light.

M

Matter - a generic word scientists call all the stuff in the universe. Anything that takes up physical space.

Microbiology - a branch of science that studies microscopic organisms, or, living things so tiny you can only see them with a microscope. These tiny living things include bacteria and viruses.

Molecules - the smallest bit of a thing that is still that thing. Scientists say it is the smallest unit of a substance that retains all the properties of the substance. A molecule is made of atoms, but the atoms aren't the thing. An H₂O molecule is the smallest bit of water that is still water, but it is made up of smaller things: one oxygen atom and two hydrogen atoms.

Monstrosities - something that's gigantic or ugly, like a monster

Morosely - really sad or gloomy

N

Nefarious - naughty or wicked, evil

Non-Newtonian fluid - a fluid substance where the viscosity (thickness, the rate it flows) changes when force is applied, like when it's hit

O

Obsolete - out of date, no longer used

Opaque - can't be seen through, the opposite of transparent

P

Parallel - two things that never meet, usually lines or planes. Parallel lines are the same distance from each other all the way down, so they could be infinitely long and never touch

Pariah - an outcast, someone other people don't want to have around

Proof of concept - an exercise or test that proves a theory, concept, idea, or invention works as intended. The phrase is often used interchangeably with prototype.

Prototype - working model of an invention

R

Radioactive - something that gives off dangerous energy when its atoms break apart

Raspberry Pi - an inexpensive computer the size of a credit card. It plugs into a TV or monitor and you can program it with a standard keyboard or mouse, but it's not very powerful.

Reconnaissance - the spy (or military) word for spying. Getting more information or checking out a situation before taking action.

Reputation - what people think of someone. People can have a reputation of being nice, or mean, or silly. Sometimes a reputation is true and sometimes it's not, or it may only be true sometimes

S

Sash - a long piece of decorative fabric, like a tie. It's usually worn around the waist or over one shoulder and across the body as part of a uniform or as part of a fancy outfit

Sebum - the oil everyone's skin produces naturally. It can protect and lubricate skin and hair but too much makes skin oily

Sedate - mellow, calm

States of matter - the different ways matter can exist, the various physical properties of matter

- Solid - something with its own shape, like ice
- Liquid - something without its own shape, like water
- Gas - something without its own shape that can move freely in the air, like steam
- Non-Newtonian fluid - something between a liquid and solid that changes. It sometimes has its own shape and sometimes it doesn't, depending on the forces acting on it, like quicksand.
- Plasma - a gas with a lot of energy, like lightning

T

Telescoping - sliding one part of an object into another to make it longer or shorter

Throwies - little magnetic lights made by attaching an LED to a coin-cell battery and a magnet. Technologically minded street artists like to throw them onto metal surfaces where they glow until their battery runs out.

Taqueria - a Mexican restaurant that specializes in tacos and burritos

Toggle switch - a switch that has a small lever to push one way or the other to turn something on and off, like a lightswitch

Toxic - poisonous, dangerous

Trajectory - the imaginary path a moving object travels along

U

Utility belt - a belt used to carry important equipment in easy reach. Items are usually held to the belt with loops, pockets, or velcro.

UV light - ultraviolet light. Human eyes can't see ultraviolet light itself, but it makes fluorescent objects glow.

V

Viscous, viscosity - how fast or slow a liquid flows, how thick or thin it is. A liquid with low viscosity will flow fast, like water. A liquid with high viscosity will flow slowly, like mud. A non-Newtonian fluid will change its viscosity depending on what's happening to it, or the forces that are acting on it.

W

Welding - gluing pieces of metal together by melting parts of them or using other melted metal.

Z

Zen - being calm, like meditating

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