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Inspired by Lewis Carroll's *Alice's Adventures in Wonderland*

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ALICE in **NANOLAND**

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ILLUSTRATIONS BY ANTHONY SCLAVI

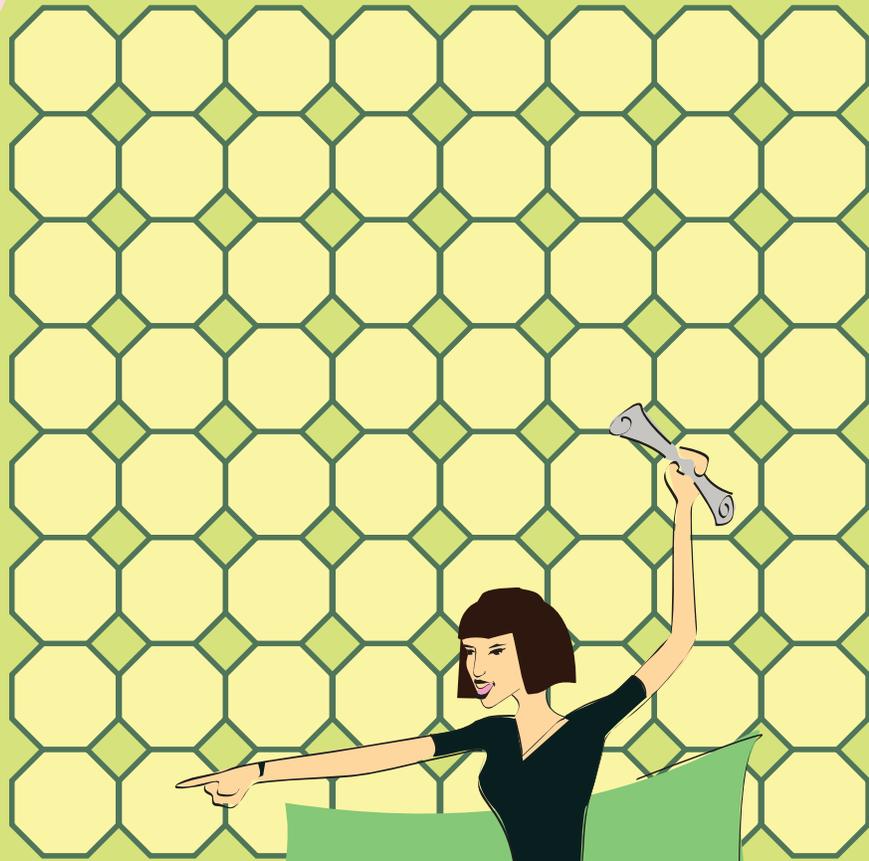


Alice was very bored. All her sister wanted to talk about was nanoscience. “Nano is aaawesome!” her sister hollered. “Did you know...”

But Alice didn't want to hear about nanoscience because Alice didn't care.

Her sister was persistent. She talked about nanorobots that are so small they're invisible, and she talked about how geckos can climb walls because of the itty-bitty nano-sized hairs on their feet.

She talked and talked and talked, but all Alice heard was “blah, blah, blah, nano, blah.”





CAUTION!

Alice couldn't stand any more talk about nanoscience, so she stomped out of the living room, out the back door, into the backyard, out the back gate, into the neighboring field and happened upon a rabbit hole.

A very large rabbit hole.

Alice got down on her hands and knees and crawled to the edge of the hole to take a peek inside.

Just then, the ground gave way beneath her and she fell down, down, down and further down.

Alice landed with a great THUD at the bottom of the hole. She was startled, but not hurt. She looked to her left and looked to her right. No one. Just tunnels.

But then something caught her eye. It was a bottle and on the bottle was a label that read, “Welcome to Nanoland. Drink me.”

Alice looked around again and since no one was there to tell her not to, she drank.



Welcome to Nanoland
DRINK ME



Suddenly Alice began to shrink! And shrink and shrink and shrink! And just when she thought she couldn't shrink any smaller, she shrank some more!

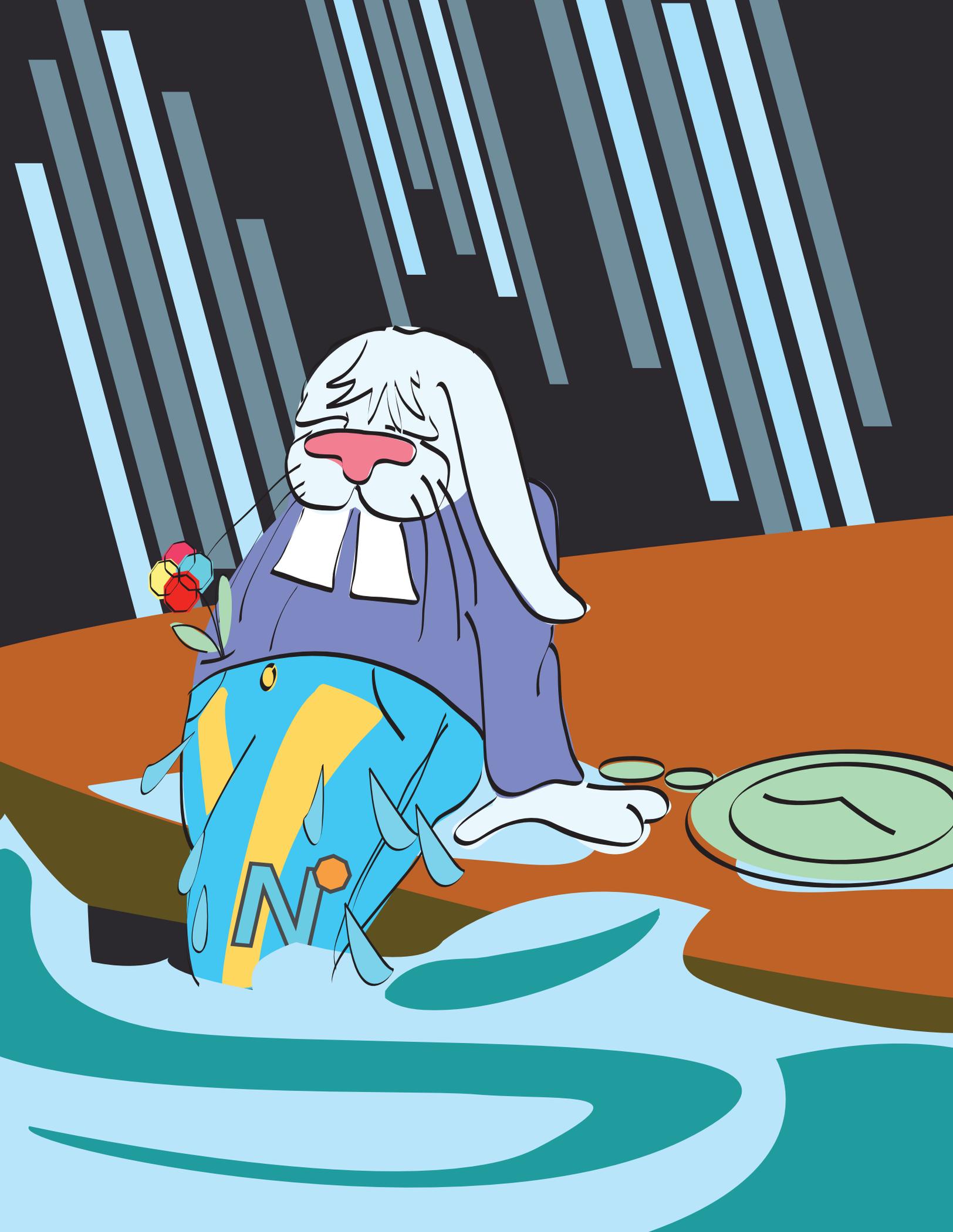
Alice cried, "Oh no! I'm...I'm...NANO-SIZED!" And she cried harder as she wondered how she would be able to hang out with her friends if they couldn't even see her.

Just when Alice thought it couldn't get any worse, she realized that she was sitting in a pool of water created by her very own tears and her clothes were soaking wet.

Alice stopped crying immediately—she didn't want to make her situation even worse.

Just then a frenzied White Rabbit came scampering along. Looking at his pocket watch in despair, he shouted, “I’m late, I’m late, for a very important date!” and landed right in the water beside Alice. She hoped that the Rabbit would be able to help her get home, so she waved at him to get his attention.

The Rabbit scrambled backward out of the water shouting, “Stay away from me, little girl! You’re soaking wet!” Alice followed the Rabbit out of the pool and sighed, “Well, of course I’m soaking wet. We were just in a pool!”



Hydrophobic Nano Pants!



The Rabbit retorted, “I’m not soaking wet.”
Alice took another look at the Rabbit. He was right—he was not wet!

The Rabbit continued, “I happen to be wearing my nanoclothes. When water droplets fall on my clothes, they touch the surface at only a few points. The water beads up and rolls right off. See ya later, wet pants!” And off the Rabbit ran.

This nanoworld is definitely strange, thought Alice, but if she wanted to find her way out, she HAD to follow that Rabbit. So off Alice scampered in the direction the Rabbit had gone.

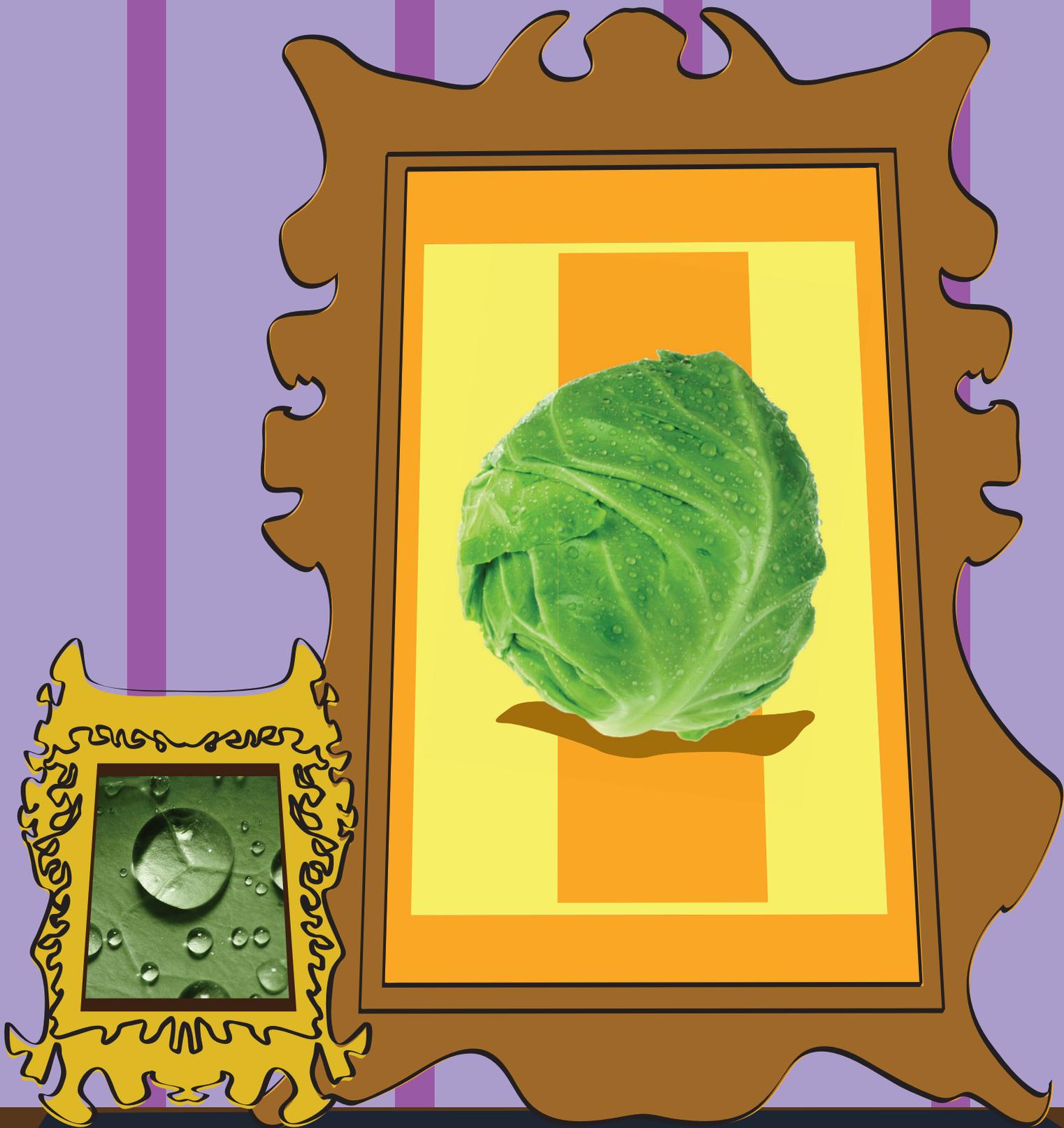
Alice ran and ran and ran, until she ran right into a giant mushroom that blocked her path. Atop the mushroom sat a giant Caterpillar, chomping on a head of cabbage.

The Caterpillar leaned forward to see what had disturbed his lazy afternoon and said, “If you don’t watch where you’re going, you’ll miss the journey along the way, man.”

Alice looked confused. The Caterpillar understood and said, “Dude, Nanoland’s not any stranger than your world.”

Alice couldn’t believe it! “That is not true! I just watched a Rabbit climb out of a pool of water and his clothes were completely dry. That couldn’t happen in my world!”





The Caterpillar laughed and replied, “Yes, it could. Cabbage.”

“What?” Alice asked.

“I’m saying cabbage behaves the same way in your world as nanoclothes do in our world. Cabbage is covered in nano-sized bumps. These bumps keep the water in droplet form, so it can roll right off. Digging it, babe?”

Alice was shocked. “Cabbage repels water?”

“You got it,” the Caterpillar replied. “And scientists in your world are moving atoms and molecules around to copy the way nano-sized bumps on cabbage work, making waterproof material. They’ve already made some groovy things, like clothes that stay dry. This material could be applied to airplane wings or to your car to keep them from icing up. It’s sweet.”

The Caterpillar went on, “They’re making all sorts of wild stuff these days! Silver kills germs, so they put nanoparticles of it in some bandages. Super-light, super-strong sports equipment is made possible through the magic of carbon nanotubes. Man, nano is everywhere! So, technically, your world is the nanoworld too.”

Alice was absolutely amazed, “Wow! Things THAT small can be found in my world!”

The Caterpillar was pleased with Alice. “Right on. You just can’t see them, but they’re there.”

Just then, Alice remembered why she had been running in the first place...to find that Rabbit. She thanked the Caterpillar and was about to leave when he handed her a bottle. “Here, you might want this. Check you later!” And the Caterpillar went right back to chomping on his cabbage.



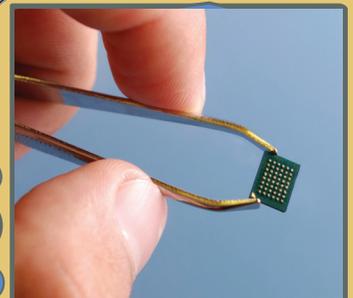
Some sunscreens contain nanoparticles



Silver nanoparticles are used in some bandages to kill germs



Super-thin solar cells are made with nanolayers of materials



Computer chips contain nano-sized transistors



Carbon nanotubes help make tennis rackets stronger and lighter





Alice put the bottle into her pocket without looking at it and hurried off in the direction of the Rabbit. She ran up a little hill and just on the other side, smack dab in the middle of her path, was a table set for tea, occupied by a rather mad-looking Hatter and a March Hare.

The Mad Hatter looked at Alice and roundly dismissed her. “You are unwelcome at our party.”

The March Hare pointed at a chair, looked at Alice and yelled, “DO NOT SIT UPON THAT SEAT!”

Alice had just been insulted twice, but since she was rather stubborn when people were rude and somewhat tired from running, she sat down anyway.

The Mad Hatter and March Hare smiled warmly and offered Alice a plate of cabbage, keeping some for themselves.

“What is it with this place and cabbage?” Alice wondered aloud.

The Mad Hatter sputtered, “I say, who invited this girl?”

Alice rose to leave, but the Mad Hatter begged her to stay, “Please stay! You are too important to leave!”

“Me?” Alice replied. “How can I be important? No one will care about me because I’m too small to see!”

The March Hare shouted, “Young lady, small things can sometimes be more important than larger ones! Without you, this wouldn’t be a tea party—it would just be tea between two friends. Even though you are small, YOU are what makes this a party.”

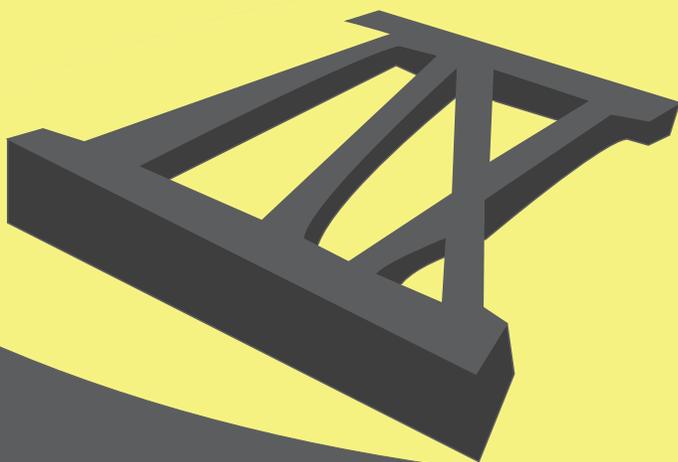
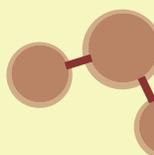


the BIG BOOK of TINY THINGS

Figure 1 - Atom



Figure 2 - Molecule



This made Alice feel better, but she noticed the March Hare's face turning sour and the Mad Hatter suddenly looked grumpy. Alice quickly thanked her hosts and excused herself from the table, explaining that she must run off in search of that elusive Rabbit.

Luckily for Alice, the Rabbit ran right across her path, still looking at his pocket watch, still distressed about the time. Alice followed that Rabbit over the hill and through the dale, under the thicket and through the brush, past fancy gardens, into a large building, down a hall and into a large room with dark wooden benches. A courtroom.

Just then, a very loud, very mean voice bellowed her name. "Alice, you're late!" It was a Queen. A very angry Queen.

The Rabbit stepped forward with a very serious tone, “our next witness: Alice, take the stand.”

Alice was confused. She blurted out, “I didn’t know—I’m sorry!”

The Rabbit continued, “Is it true, Alice, that you are a girl who is now nano-sized?”

Alice answered, “I guess so.”

The Queen yelled, “No guessing! Off with her head!”

Alice was shocked. Did she just hear the Queen correctly? Alice panicked and quickly told the Rabbit everything she knew. “Atoms and molecules are very small, but they’re very important because they make up everything in the world! And scientists have learned how to move atoms and molecules around to make cool stuff that could help everyone, like waterproof coating for airplane wings or stain-resistant clothing! It’s called nanoscale science!”

the **RULES** of **NANO**

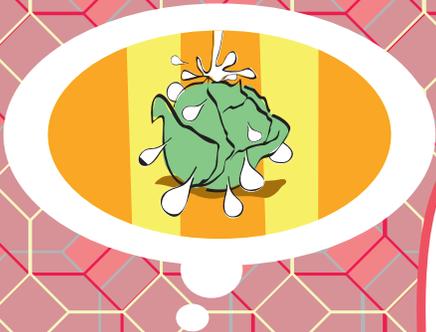
**Nano-sized things are very, very, very small...
the size of atoms and molecules!**

Wacky things can happen at the nanoscale!

**Whoa—scientists can study and make
tiny, nano-sized things!**

**Nanoscience will lead to
all sorts of new innovations!**

Nanotechnologies are part of our world, too!





The Queen roared, “Speaking without permission! Off with her head! And besides, I don’t like her face! Off with her head! Off with her head! OFF WITH HER HEAD!” And she lunged toward Alice.

Alice was terrified, but she was also very smart and very fast. She ran and ran and ran around the courtroom, and the Queen ran and ran and ran (although not as fast) behind Alice.

Alice shouted to the Queen, “Don’t you come near my head! Nanoscale science is very important even if you can’t see it and I’m going to tell that to everyone! Even my boring sister!”

Alice realized that something heavy in her pocket was keeping her from running as fast as she could.

She reached in to take it out and just before she almost tossed the bottle aside noticed the label, which read, "Leaving Nanoland. Drink me."

She hoped with all her might that the label was right, drank the bottle as fast as she could and...



Leaving Nanoland
DRINK ME



POOF

Alice was normal-sized, sitting in the neighbor's field next to a very big rabbit hole. She could hear her sister in the house and couldn't have been happier. "Hey, Sis!" Alice hollered, "Wait 'til you hear where I've been!"

The End



