



Riley Loves
Robotics

by Nikki Arm

Riley Loves Robotics



Written and Illustrated by

Nikki Arm

This book is lovingly dedicated to

Bobbie and Darrahl Walton

Thank you both for being some of the best mentors I could ask for
and for your constant support through this entire process!



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Words written in **red** can be found in the Terminology section in the back of book.

As the bell rang in class
At the end of the day,
I rushed straight on home
Though friends asked me to stay.

“Come on Riley!”
They pleaded with me
“Let’s go play some soccer
Or swim at the beach!”

“I’d love to!” I called back
“But I just can’t today!
I’ve got 100 posters to make
For **Ocean Conservancy Day!**”



A young girl with glasses and a purple backpack is running on a sidewalk. She is wearing a light blue dress and purple shoes. In the background, there is a brick building with a large doorway and several windows. Three other children are standing near the doorway. The scene is brightly lit, suggesting daytime.

**For 12 blocks I ran
As fast as I could,
I wanted those posters
To be sensationally good!**

**But just how to make
So many posters for school?
I had only one night
And wasn't sure what to do...**



I was met at the door
By Winston, my dog.
He hopped up and down
Like a white curly frog.

“Down boy!” I cried
As he licked at my hands,
“I’ve got so much to do!
I must finish my plans!”

**I went to my room,
My favorite place to think,
I plopped on the bed
And heard something go “klink”.**



**I looked down at my feet,
But had only a quick glance
For then from the hall
Came a cottonball’s prance...**



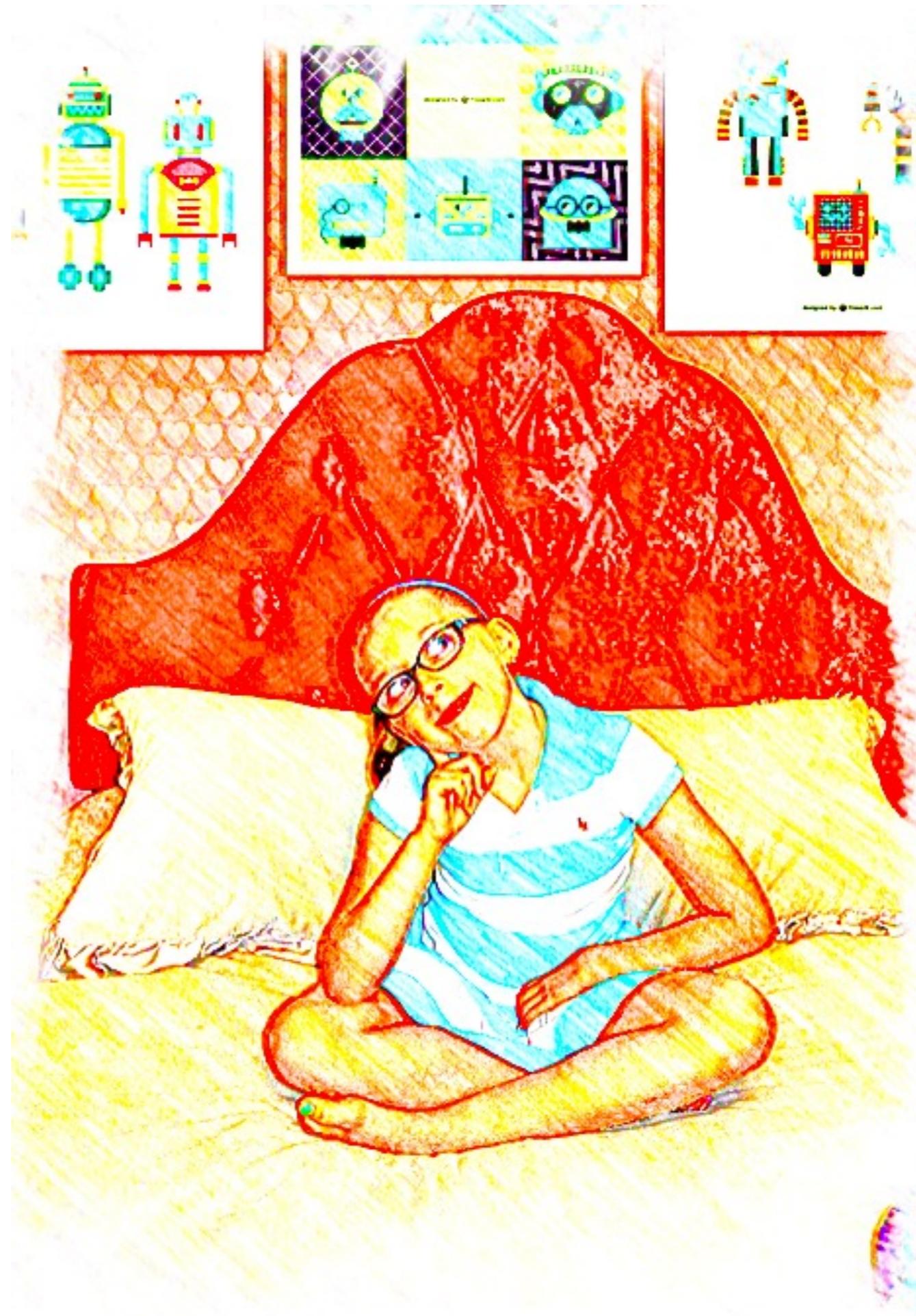
**Mom's round robo-vac
Had rolled in the room.
Closely followed by Winston
Who relished its "vroom".**

**“Winston!” I giggled,
“I don’t have time now!
I’ve got 100 posters to make
and just don’t know how!”**



**He stopped, then he barked,
And nudged the small bot
Which whistled and turned,
From the room they both shot.**

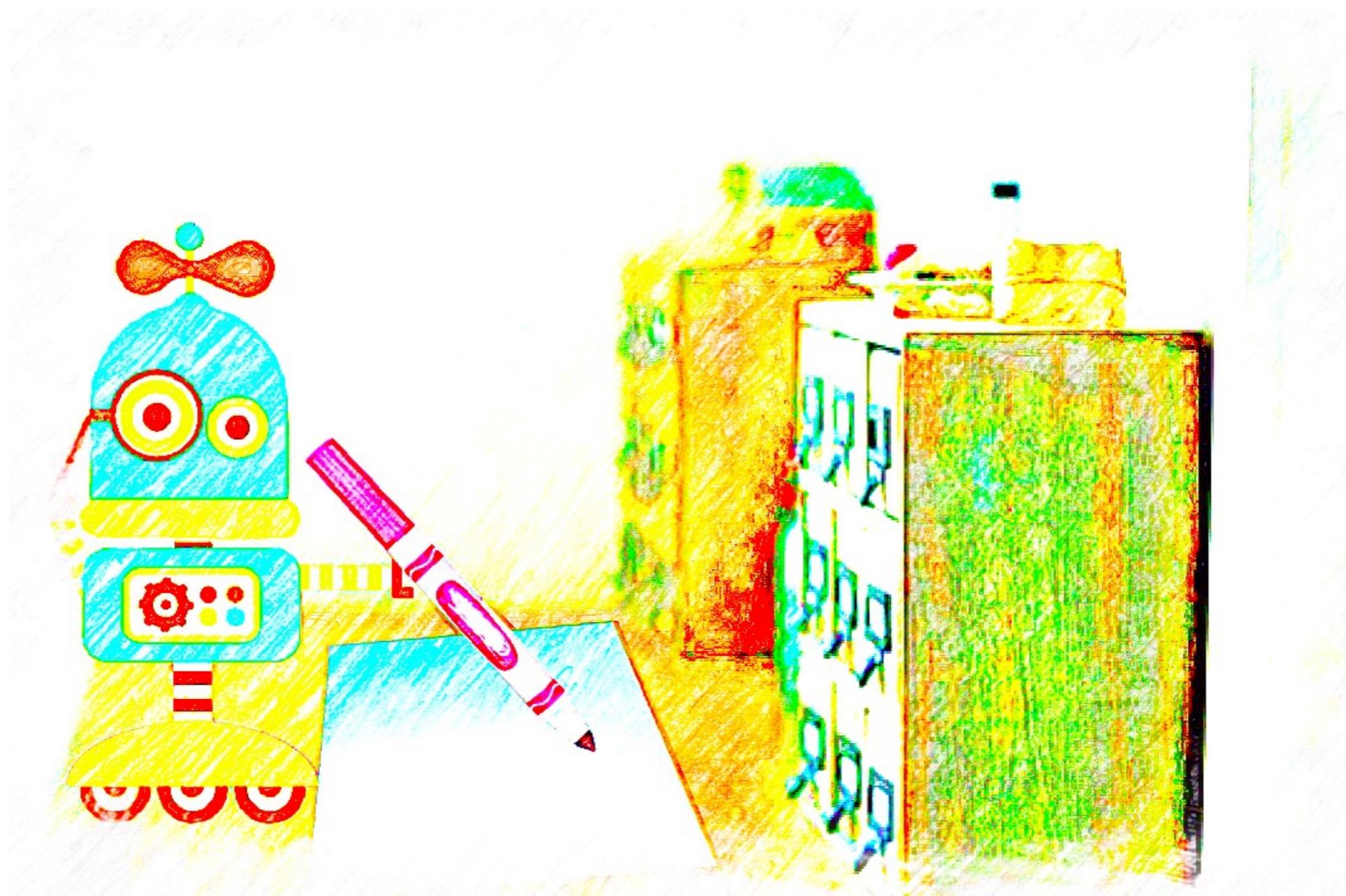
I thought to myself
'My situation is dire',
Then looked 'round my room
For something to inspire...



Then it hit me!
As I gazed at my posters,
At metal figures with **gears**
And powerful **motors!**

“Robots!!!” I yelled
With a shriek of delight.
“They can make 1000 posters
within one single night!”

I knew right away
Just what I should do,
I’ll build a cool **robot**
That could draw - and color too!

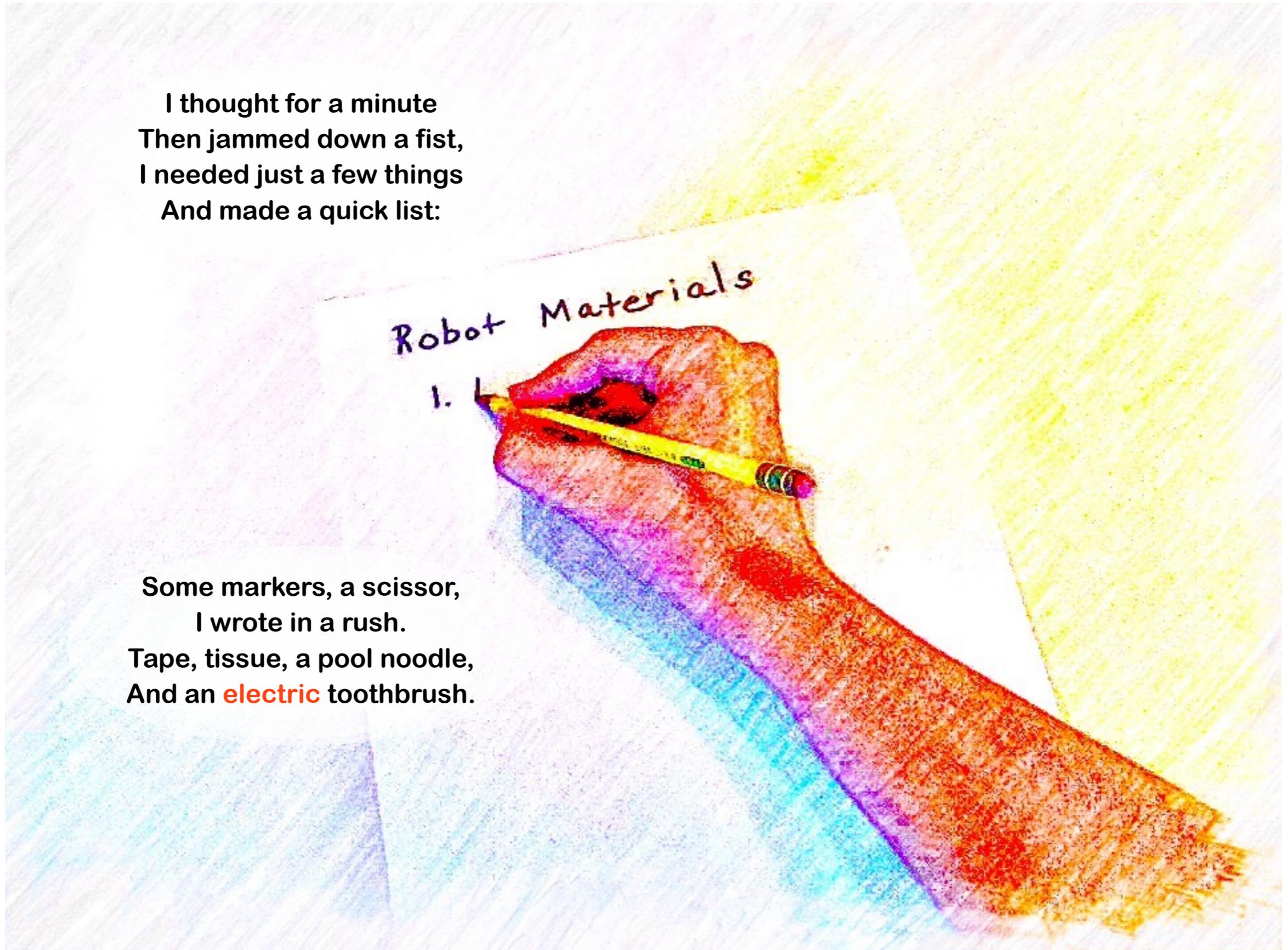


I thought for a minute
Then jammed down a fist,
I needed just a few things
And made a quick list:

Robot Materials

1. |

Some markers, a scissor,
I wrote in a rush.
Tape, tissue, a pool noodle,
And an **electric** toothbrush.





**And just one more thing
To finish my plans,
I freed from my ponytail
Two rubber bands.**

Robot Materials

- 1 Battery-Powered Electric Toothbrush
- Any Batteries required for the Toothbrush
- 1 Pool Noodle
- 3 Markers
- 1 Pair of Scissors
- Tissues
- Tape (Duct Tape is Preferred)
- 2 Rubber Bands

**I looked over my list
And made sure it was right.
Off then I went
On my quest, like a knight.**



First stop was the bathroom,
In search of the 'brush.
Though I stalled at the door
'Til I heard the loud "flush".



Inside then I went,
Not a moment to spare,
I quickly found it
Then took it with care.

I then snagged some tissues
Before leaving the room,
With Winston at my feet
Who was perfectly groomed.

Next on our tour,
Was the shed by the pool
That's where we housed
All the toys and the tools.

But while on my way
To look in the shed,
I noticed the noodle
In the pool instead.

I opened the gate
And grabbed the blue noodle,
But on the way back inside
There stood Winston, the schnoodle...

With a ball in his mouth,
He wanted to play.
"I'm sorry, sweet Winston
"I just can't today!"



Now to mom's office,
For the final three:
Tape and some scissors,
Markers – black, blue and green.

I snatch them all up,
My basket's now filled.
I'm done with collecting,
Next step is to **build**.

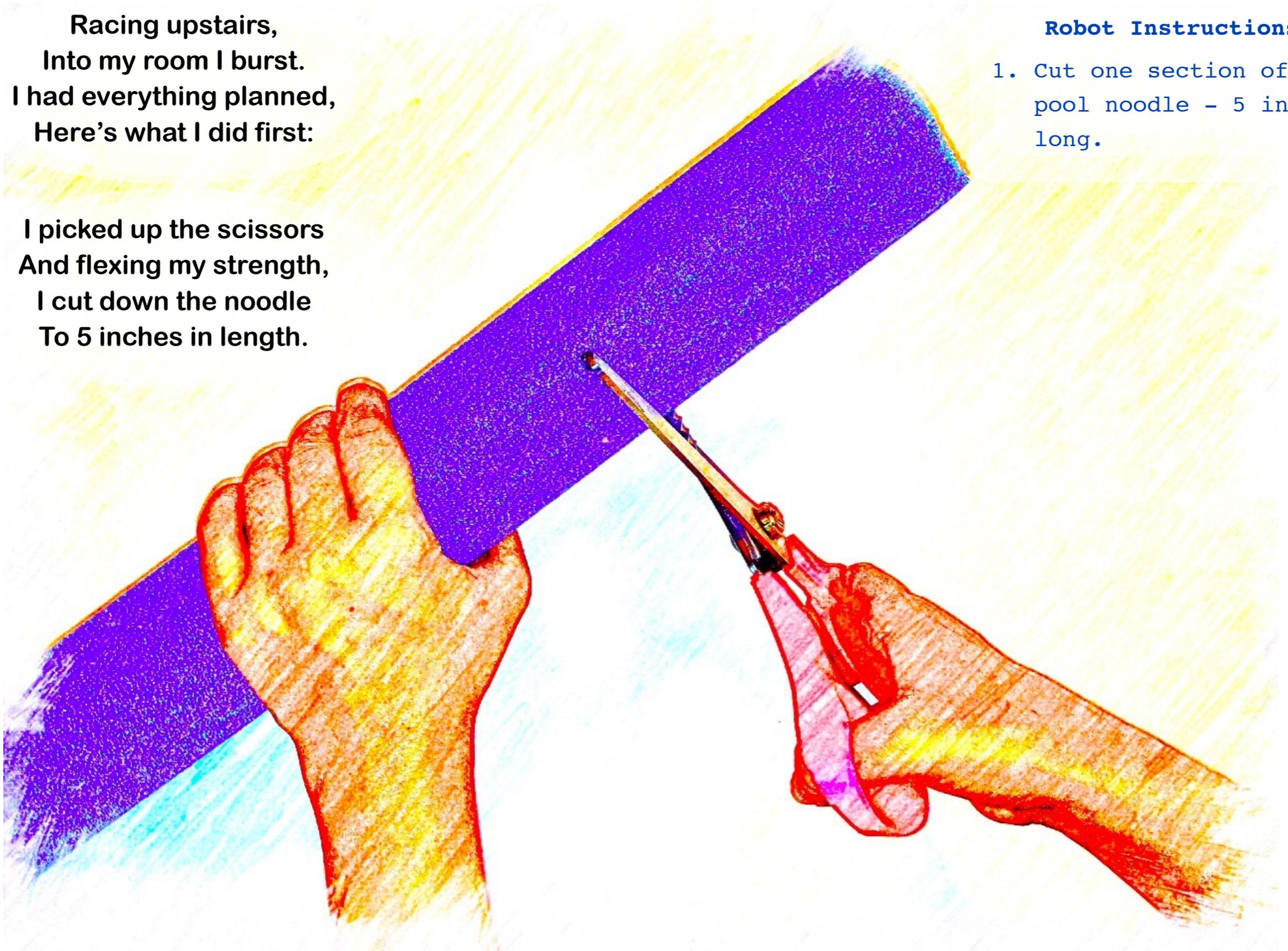


Racing upstairs,
Into my room I burst.
I had everything planned,
Here's what I did first:

I picked up the scissors
And flexing my strength,
I cut down the noodle
To 5 inches in length.

Robot Instructions

1. Cut one section of the pool noodle - 5 inches long.



2. Test the battery powered toothbrush to make sure it runs.

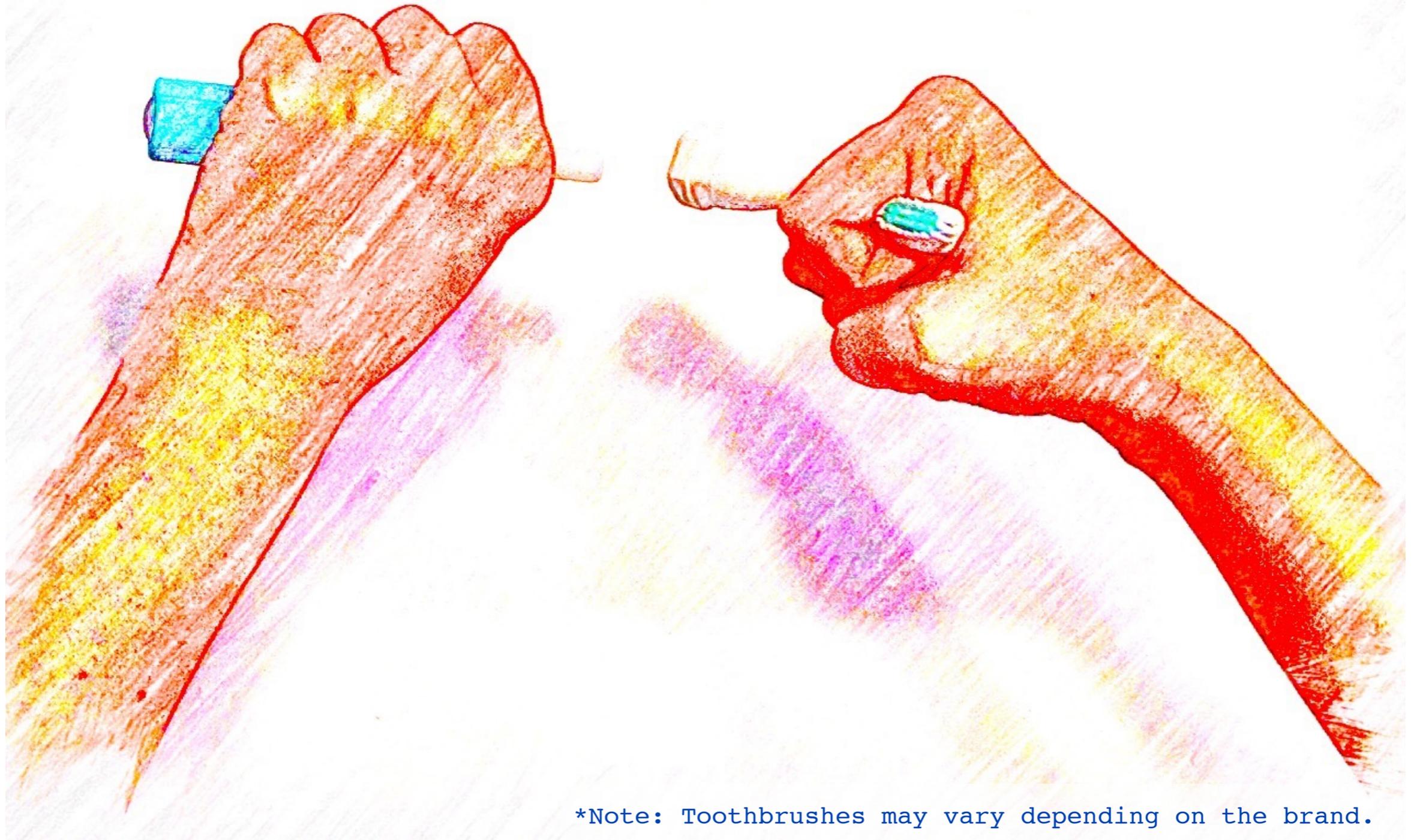
**Next was the toothbrush,
With the power to drive.
I pressed on the button,
It came buzzing to life.**

With the **battery checked
By hearing the sound,
I pushed the button once more
To shut the brush down.**



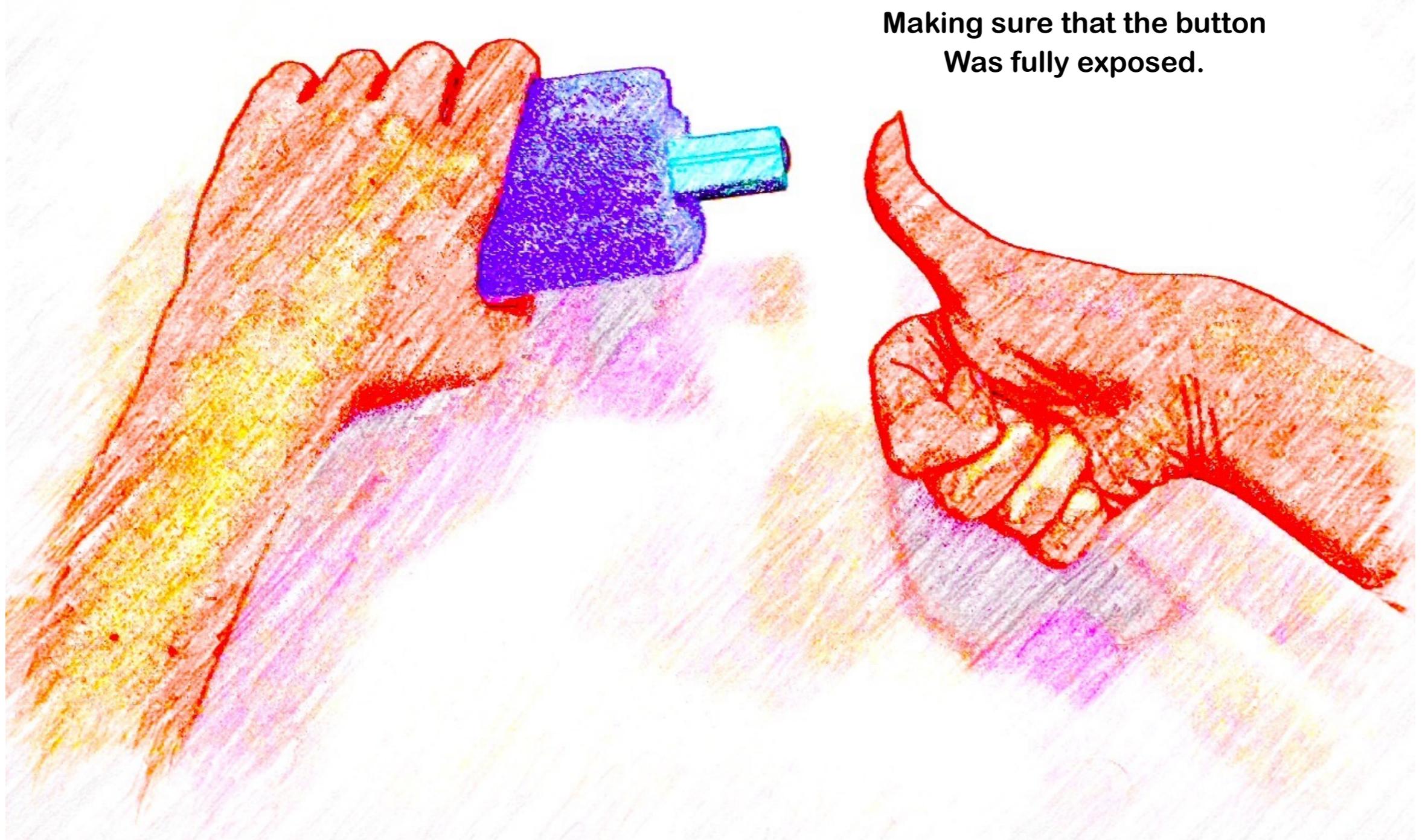
I took the brush in my hands
And gave a firm tug.
It split right in two
Though its fit was quite snug.

3. Take off the top part
of the toothbrush*



*Note: Toothbrushes may vary depending on the brand.

4. Place the base of the toothbrush inside one end of the pool noodle, making sure that the on/off button is still visible.



I stuck the brush's **motor**
In the pool noodle's hole,
Making sure that the button
Was fully exposed.

I then took the tissue,
And stuffed it inside
The other end of the noodle,
Then I heard a small whine...

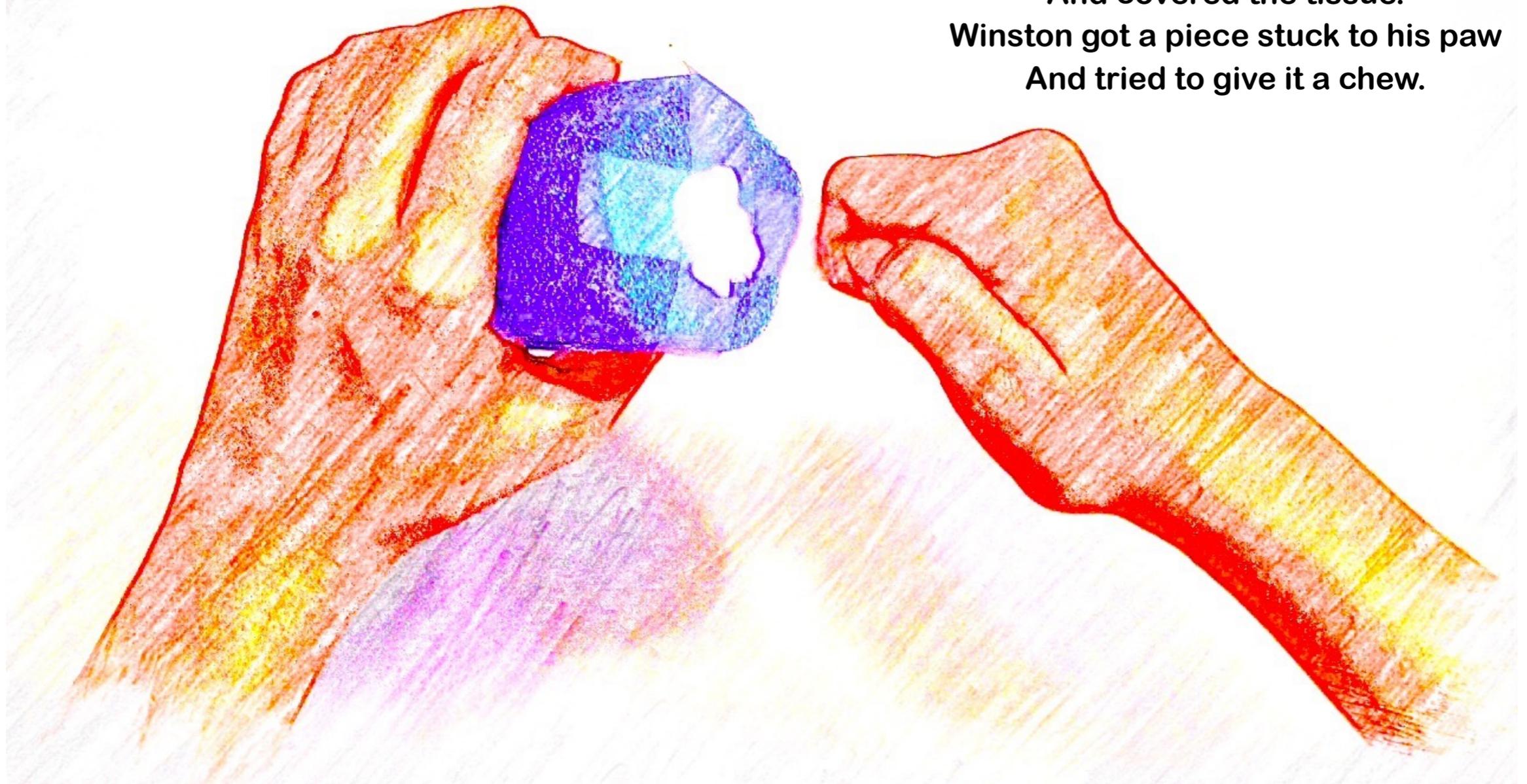
5. Fill in the open side of
the pool noodle with
tissues.



6. Cover hole with tape.

Turning 'round at my desk,
There was Winston again.
"Wanna help boy?"
I asked my curly white friend.

I tore three pieces of tape
And covered the tissue.
Winston got a piece stuck to his paw
And tried to give it a chew.



7. Place 2 rubber bands around the pool noodle.
8. Slip the 3 markers underneath the bands.



**Around the pool noodle
I wrapped the two rubber bands.
Then inserted three markers
“Look Winston – it stands!”**

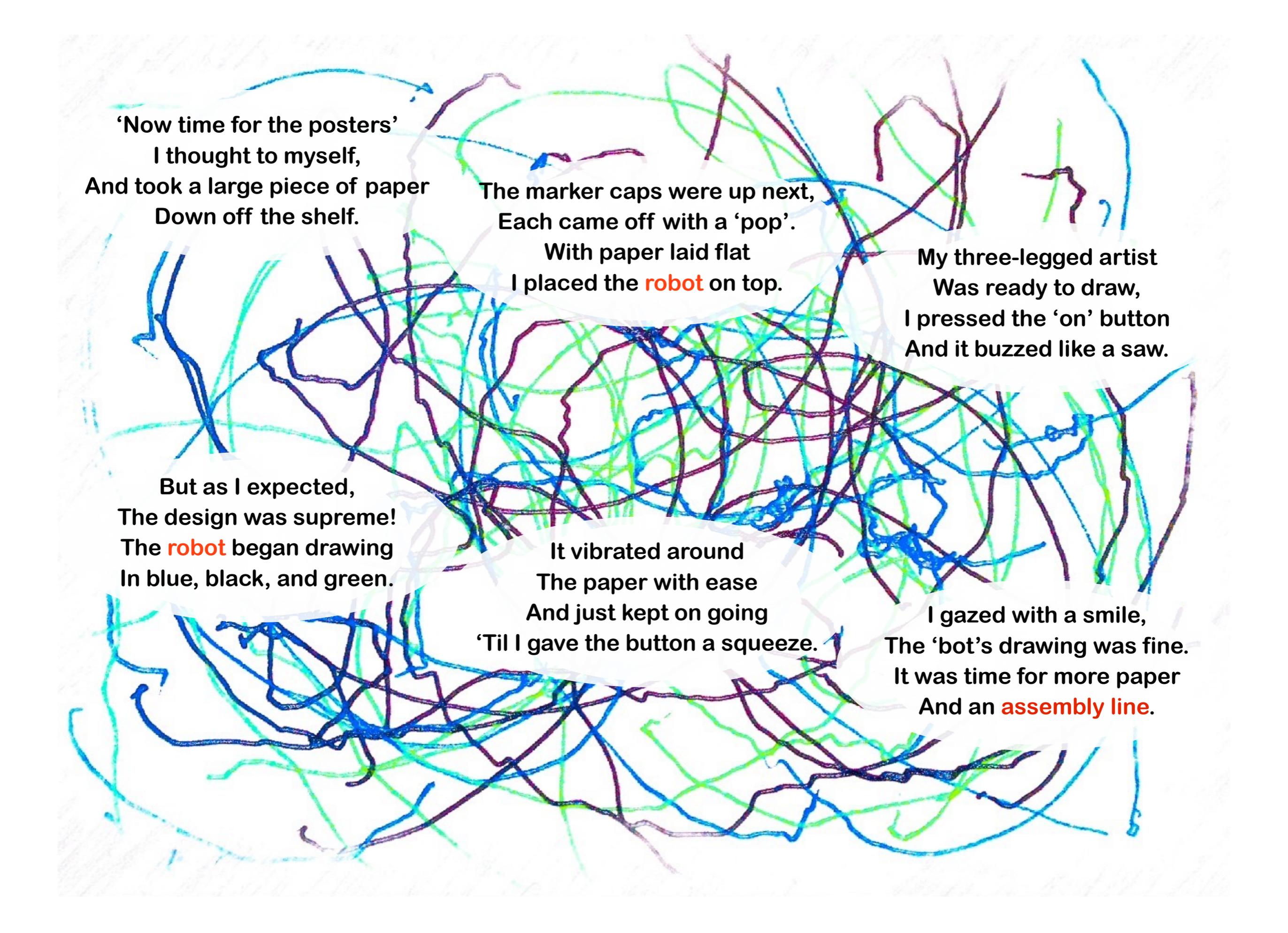
9. Level out the markers.



I then double-checked
That the markers were straight.
“It’s done!” I exclaimed
“This robot is great!”

10. Let your masterpiece come
to life!





'Now time for the posters'
I thought to myself,
And took a large piece of paper
Down off the shelf.

The marker caps were up next,
Each came off with a 'pop'.
With paper laid flat
I placed the **robot** on top.

My three-legged artist
Was ready to draw,
I pressed the 'on' button
And it buzzed like a saw.

But as I expected,
The design was supreme!
The **robot** began drawing
In blue, black, and green.

It vibrated around
The paper with ease
And just kept on going
'Til I gave the button a squeeze.

I gazed with a smile,
The 'bot's drawing was fine.
It was time for more paper
And an **assembly line**.

I wrote the wording
While my 'bot drew the pic.
It didn't take long
I was done 'lickety split'!

The posters were finished,
All ready for school,
With the message to kids
That the oceans are cool!





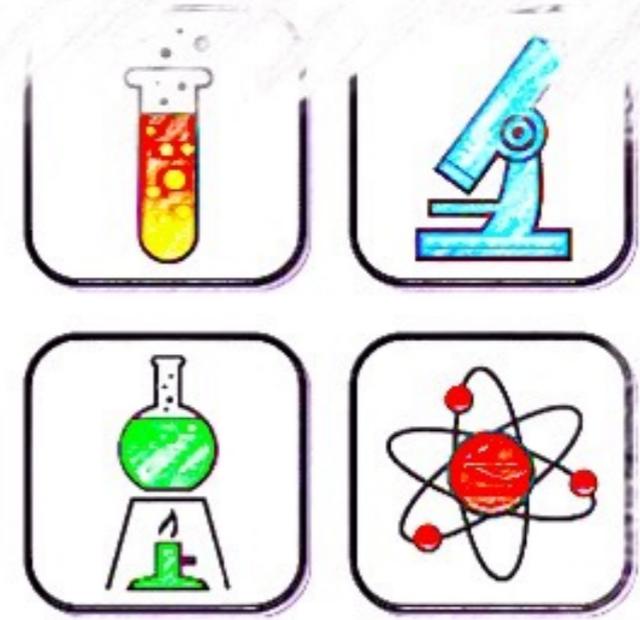
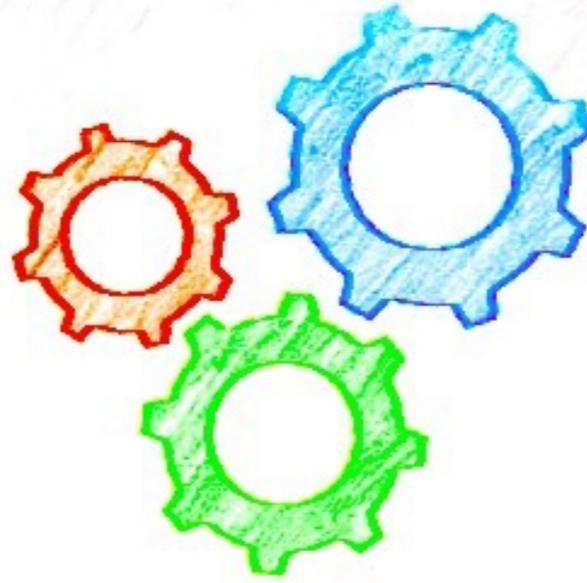
**And now that I had
Some time left in the day,
“Winston!” I called,
“Let’s go out and play!”**

A young girl with long blonde hair, wearing a blue and white striped dress, is walking on a green lawn. A white dog is running towards her. The background shows a house with a dark roof and some trees. The scene is bright and sunny.

While I threw the ball
And Winston gave chase,
My thoughts wandered to **robots**
In sea and in space.

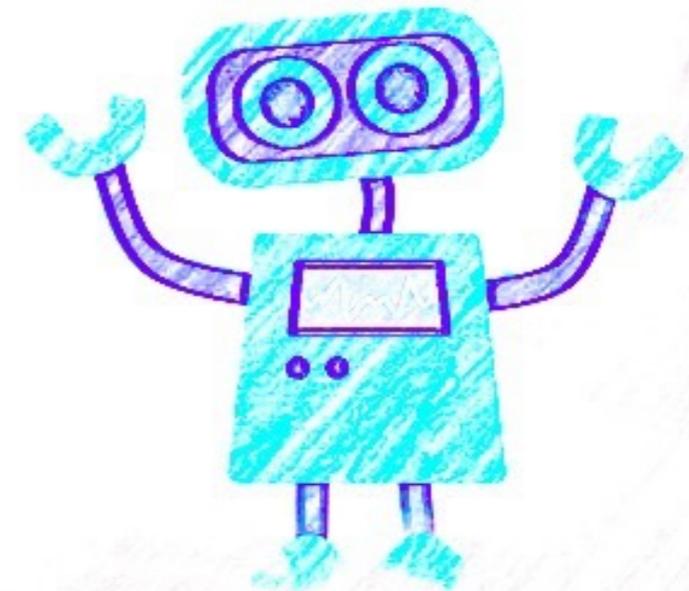
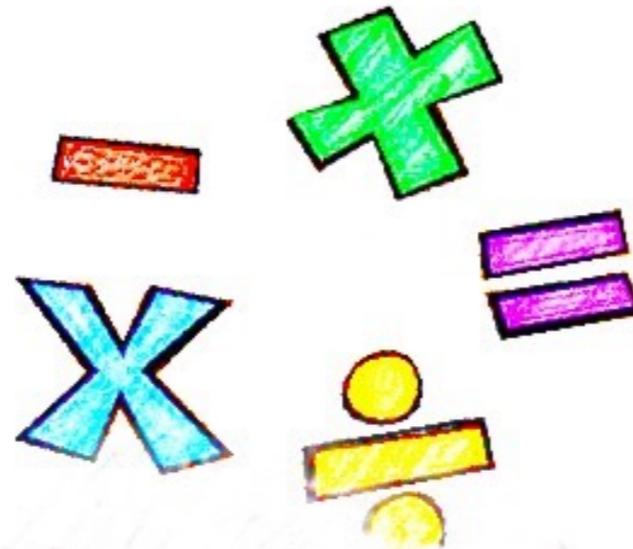
When I get older,
I know what I plan to do:
Designing really cool **robots**
And **building** them too!

‘Bots that are **programmed**
To move with speed and with grace,
To search the ocean depths,
Or explore outer space.



Science! Technology!
Engineering! And Math!
Throw in **Art** for good measure,
As I **STEAM** down my path.

I'll have to take classes
And learn quite a lot,
But then I will build
The perfect **robot**.



Robotics

What is Robotics?

The task of designing, building, and computer programming of a machine to perform a set task. The robot can either be programmed to perform the task on its own or be controlled directly by a person. Robotics requires the use of science, engineering, technology, art, math, and computer programming.

What skills do I need to participate in robotics?

None to start; you will learn and gain many new skills as you progress, and the more you participate the better you'll become.

How can I learn about and participate in robotics?

You can find local camps, learning centers, and not-for-profit groups in your area that provide either classes, after school camps, or summer camps specializing in robotics. Some of these include:

The Boys and Girls Clubs - nationwide

Girl Scouts of America and Boy Scouts of America – nationwide

4H – multiple programs – nationwide

Other not-for-profit organizations provide students opportunities to work as a team to create a robot and then compete in competitions at the local, regional, national, and world levels. Some of these include:

FIRST Robotics (For the Inspiration and Recognition of Science and Technology) – ages K–12th grades

VEX Robotics – ages 8-18 years of age

You can also find a lot of information on robotics online. Make sure you ask permission from your parent(s) or guardian(s) first, prior to searching for websites about robotics. You can find current links to the above programs and many other programs and activities on my website: www.GirlsLoveSTEAM.com

Terminology

Algebra - The branch of math used to solve problems when some of the numbers are not known.

Arithmetic - The branch of math that uses numbers to add, subtract, multiply, and divide.

Assembly Line - An efficient way of manufacturing, where each station does one part of the over all assembly.

Art - The creation of works whose purpose is to be meaningful or beautiful.

Battery - A device that makes electricity by using chemical reactions and stores the energy created. This is one form of stored energy.

Build - The physical act of constructing something that has been designed.

C.A.D. - Computer-Aided Design: a computer program that allows you to design almost any item such as a pen, robot or house.

Designing - To make or draw plans for a machine or structure.

Electricity - A type of energy or power that is carried through wires and is used to operate lights or machines.

Energy - The amount of power needed to make something work or be active.

Engineering - The study and practice of using science and math to do practical things such as design and build roads, bridges, tools, or machines.

Fabrication - The process of creating or building pieces needed for a project.

Gear - A toothed/ notched wheel that works together with other gears to change the direction or speed a motion is transmitted in.

Geometry - The branch of math that studies shapes and objects.

Machine - A device with a system of parts that work together to perform a task by converting stored energy into motion.

Machining - The skills of building, using, or repairing machines.

Machinist - A person who is skilled in building, using, or repairing machines.

Manufacturing - The process of producing a number of products, often from raw materials, using machines and human labor.

Math - The study of numbers, shapes, amounts, and the relationship between them.

Measuring - Determining the exact size, weight, or other property of an object using an appropriate tool to differentiate and compare objects.

Metal - A solid mineral element (like iron, steel, silver, copper, or gold) that has certain characteristics including the ability to conduct heat or electricity.

Motor - A device that creates power or motion in a machine.

Ocean Conservancy Day

- * This is not YET a real awareness day, but is very important, as more than 90% of Earth's water is found in the form of salt water in the oceans.
- * The oceans cover more than 70% of the Earth's surface.
- * We know more about all of outer space than we do about our own oceans.
- * The deepest part of all the oceans, the Marianna Trench, is 5 Empire State Buildings (more than a mile) deeper than Mount Everest is tall.
- * We're almost constantly discovering new species living in the depths of our oceans.
- * The algae (including almost all forms of sea weed) in the oceans provide approximately 70% of the Oxygen on Earth.
- * The oceans provide a steady climate on Earth.
- * There are many, many more reasons!!!

Physics - The branch of science that studies the qualities and relationships between matter and energy. It includes the study of heat, sound, light, force, and electricity.

Plastic - A man-made material formed from a mix of certain chemicals that is easily shaped or molded when soft.

Programming - A set of instructions that allows a computer, machine, or robot to perform a task or a set of commands.

Raw Materials - Any unused material, such as:
Metal, Plastic, & Wood

Robotics - The designing, building, and computer programming of a machine to perform a set task.

Science - A search for general laws about how the world works that uses a system of experimenting, testing, and studying on things in nature.

Scientific Method - The steps a scientist uses to solve a problem. Progress in science is made by asking meaningful questions and conducting careful investigations.

Step 1. Question - A problem or matter that is in doubt or not certain.

2. Research - A careful study of something in order to learn more about it.

3. Hypothesis - Making a prediction based on research and not random guessing; or in other words, an educated guess on what you believe will happen that can be tested.

4. Experiment - A carefully planned set of tasks used to answer a question.

5. Analysis - The process of separating something into parts in order to study it and understand more about the overall object or outcome.

6. Conclusion - The final result or outcome.

S.T.E.A.M. - The acronym used for:

Science

Technology

Engineering

Art

Math

Technology - A particular field of knowledge or method of solving practical problems that comes from research in science and industry.

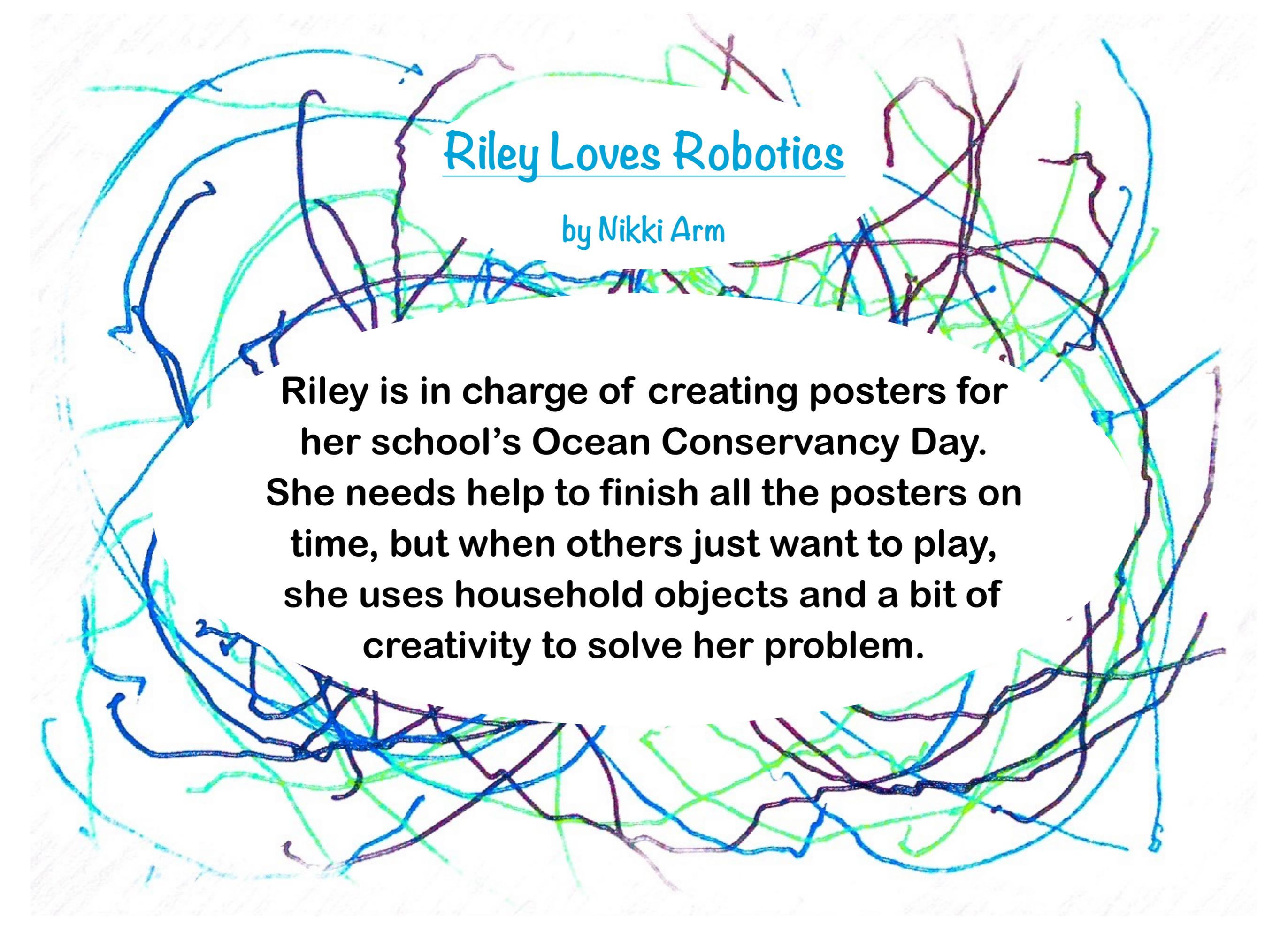
Welding - The joining of pieces of metal by using heat, followed by either adding a melted material or pressure.

Nikki Arm



Nikki was born in Mission Viejo, California but now resides with her family in Carlsbad, California. She is currently attending San Dieguito Academy High School, where she is the Tutoring Advisor for her school's American Sign Language National Honor Society, and is the head machinist for her school's robotics team, FIRST Team 2102 Team Paradox. Nikki proudly participates in Girl Scouts, where she is currently an Ambassador Scout working on her Gold Award to inspire girls to pursue STEAM careers. She is a certified SCUBA diver, and hopes to one day use her robotics expertise as a marine biologist/engineer focusing on deep sea exploration. She also aspires to be the first woman to the bottom of the Mariana Trench.

For more information on STEAM activities and careers please visit Nikki's website: www.GirlsLoveSTEAM.com



Riley Loves Robotics

by Nikki Arm

Riley is in charge of creating posters for her school's Ocean Conservancy Day. She needs help to finish all the posters on time, but when others just want to play, she uses household objects and a bit of creativity to solve her problem.