#4
CONSTANCE & NANO
ENGINEERING ADVENTURE!
WATER WORKS
swe
Society of Women Engineers
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# CONSTANCE & NANO
## ENGINEERING ADVENTURE!

**After making a keen observation about the water levels at the lake in her community Constance was brave enough to speak out and start a much-needed conversation about water conservation. With the help of Nano she was able to launch her next exciting project!**

**Plus, learn more about SWENext, a way for students to become part of The Society of Women Engineers, the world's largest advocate and catalyst for change for women in engineering and technology**

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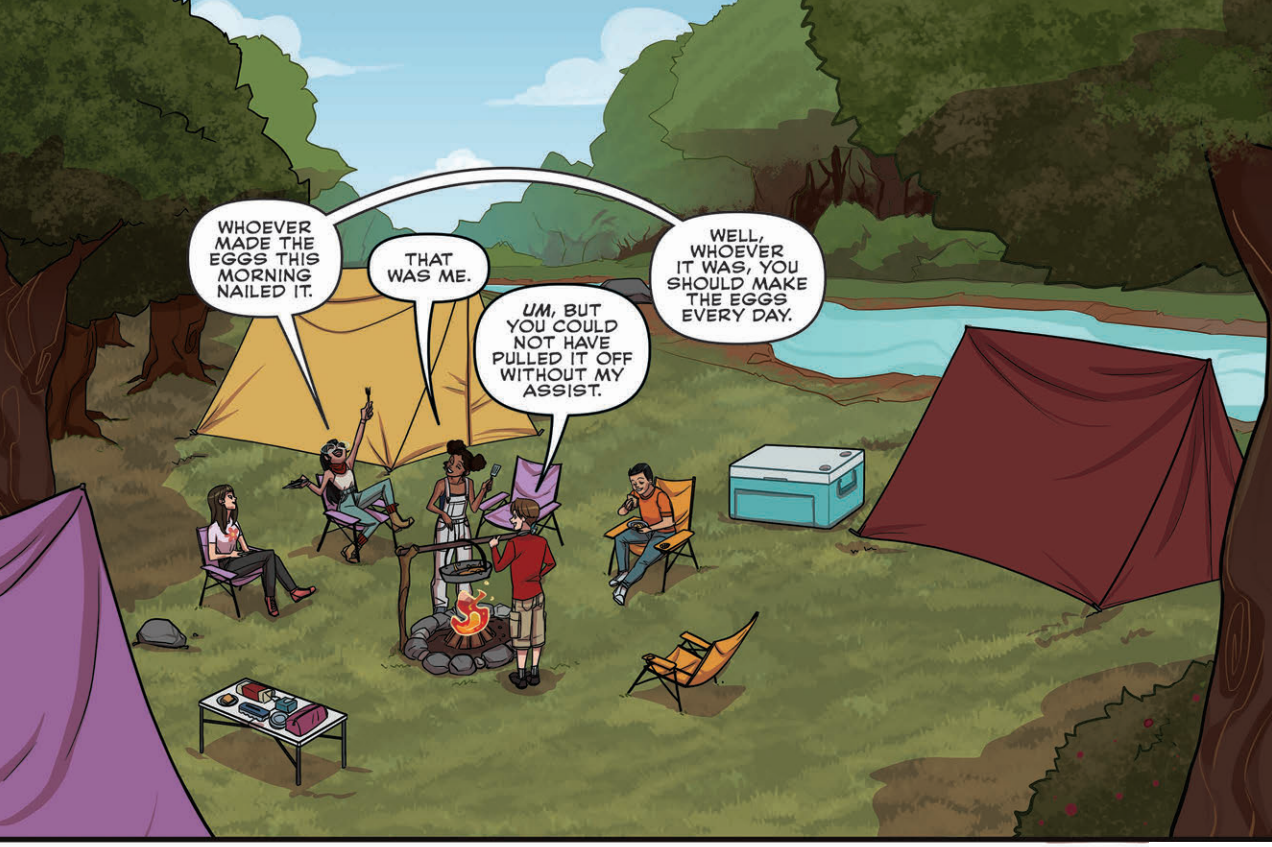
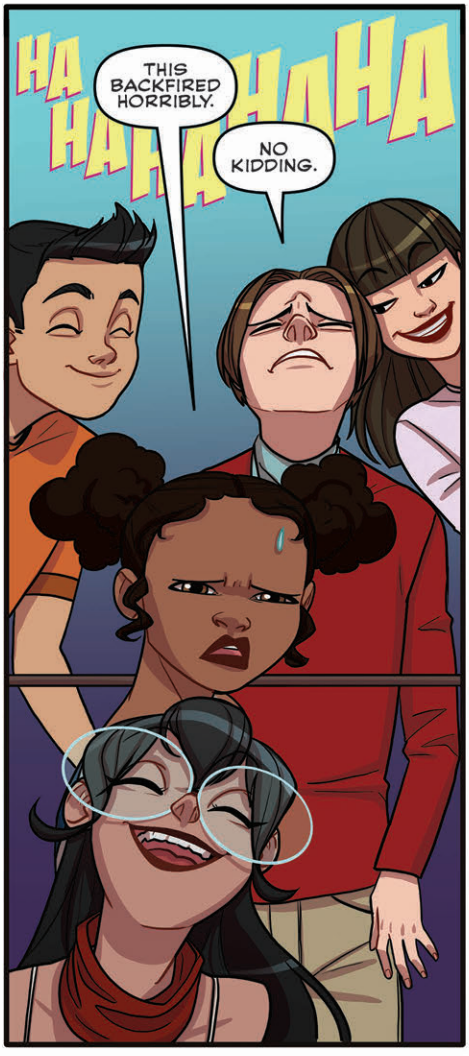
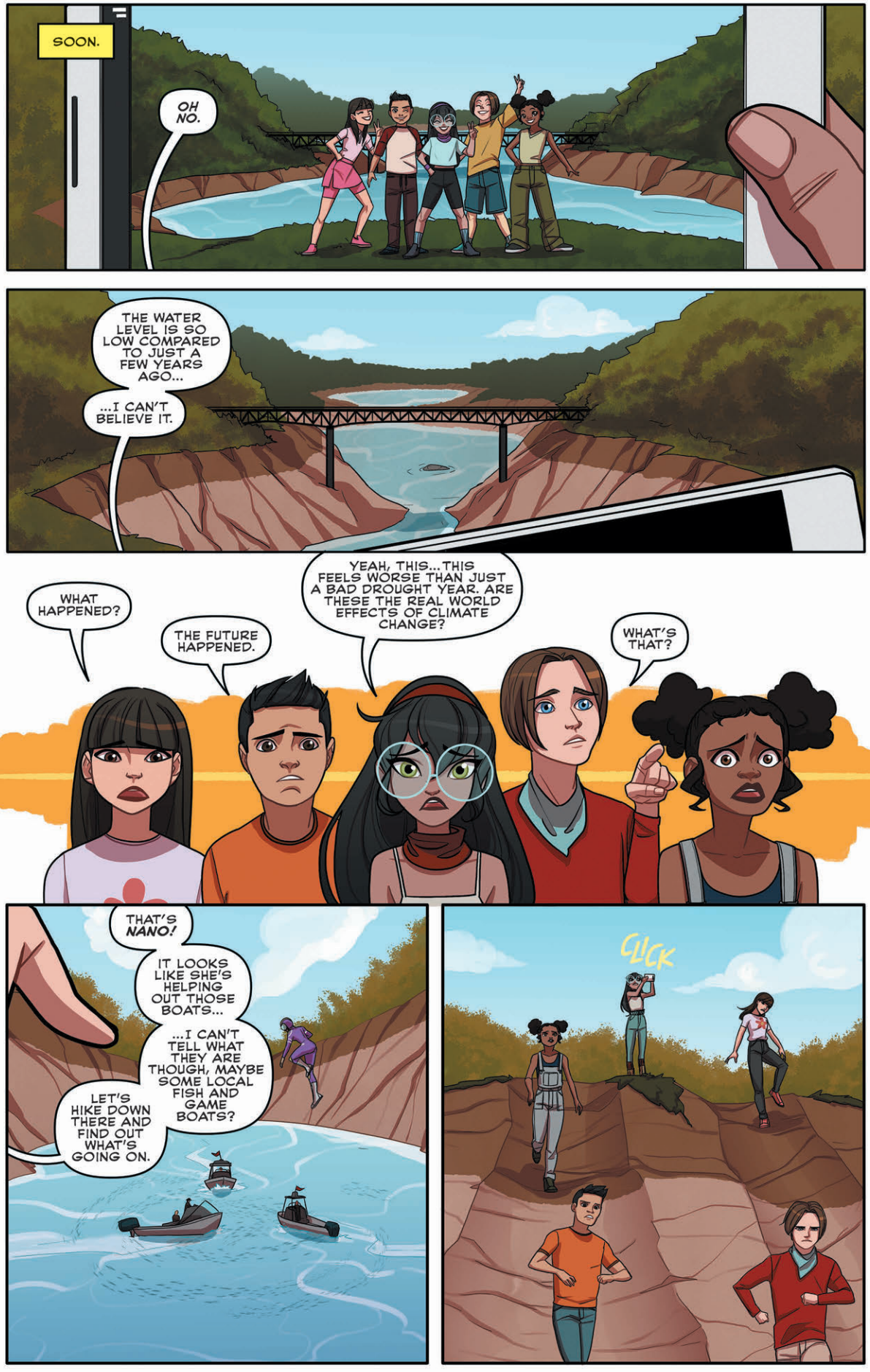
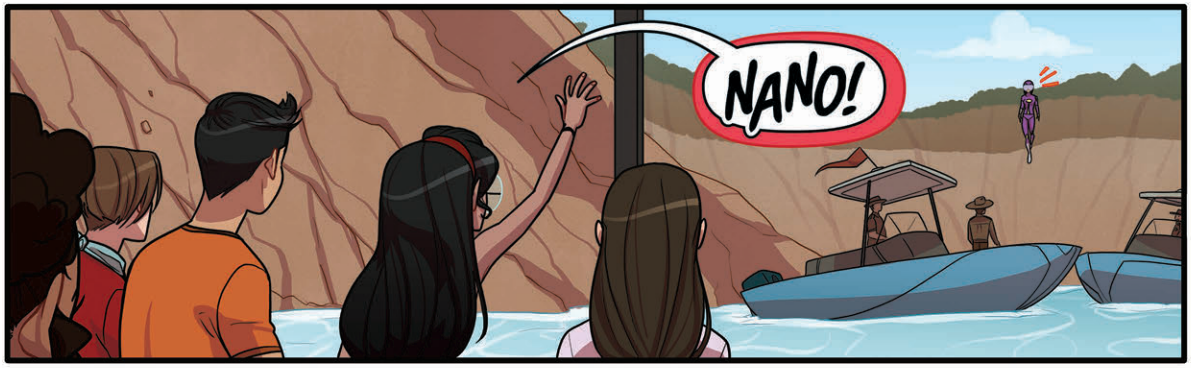

WHOEVER MADE THE EGGS THIS MORNING NAILED IT.
THAT WAS ME.
UM, BUT YOU COULD NOT HAVE PULLED IT OFF WITHOUT MY ASSIST.
WELL, WHOEVER IT WAS, YOU SHOULD MAKE THE EGGS EVERY DAY.


HA HAHAHAHA
THIS BACKFIRED HORRIBLY.
NO KIDDING.

DO YOU MIND DOING MY DISHES? I TOLD LEI I'D HELP HER BRING UP THE WATER BOTTLES CHILLING IN THE CREEK. WE'LL NEED THEM FOR THE HIKE.
DEAL.

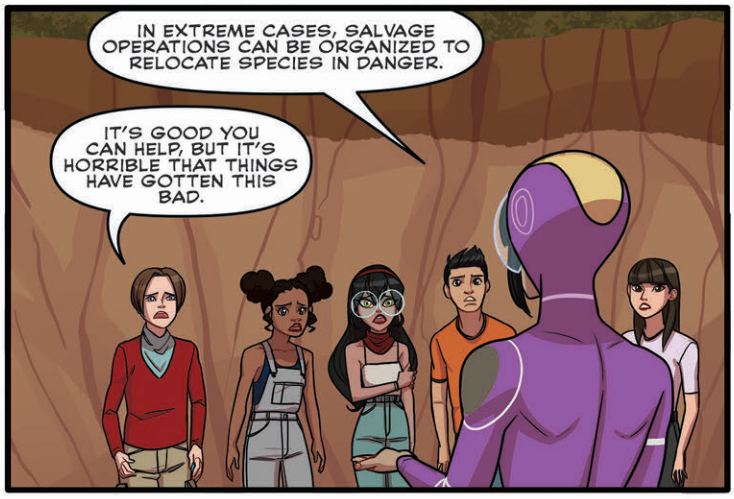
I CAN'T WAIT TO GET BACK TO THE LAKE.
GONNA BE A HOT HIKE TO GET THERE THIS YEAR, THOUGH.
YEAH, YOU'RE RIGHT, IT'S A LOT HOTTER THAN LAST TIME.


SOON.
OH NO.
THE WATER LEVEL IS SO LOW COMPARED TO JUST A FEW YEARS AGO...
...I CAN'T BELIEVE IT.
WHAT HAPPENED?
THE FUTURE HAPPENED.
YEAH, THIS... THIS FEELS WORSE THAN JUST A BAD DROUGHT YEAR. ARE THESE THE REAL WORLD EFFECTS OF CLIMATE CHANGE?
WHAT'S THAT?
THAT'S NANO!
IT LOOKS LIKE SHE'S HELPING OUT THOSE BOATS...
...I CAN'T TELL WHAT THEY ARE THOUGH, MAYBE SOME LOCAL FISH AND GAME BOATS?
LET'S HIKE DOWN THERE AND FIND OUT WHAT'S GOING ON.
CLICK

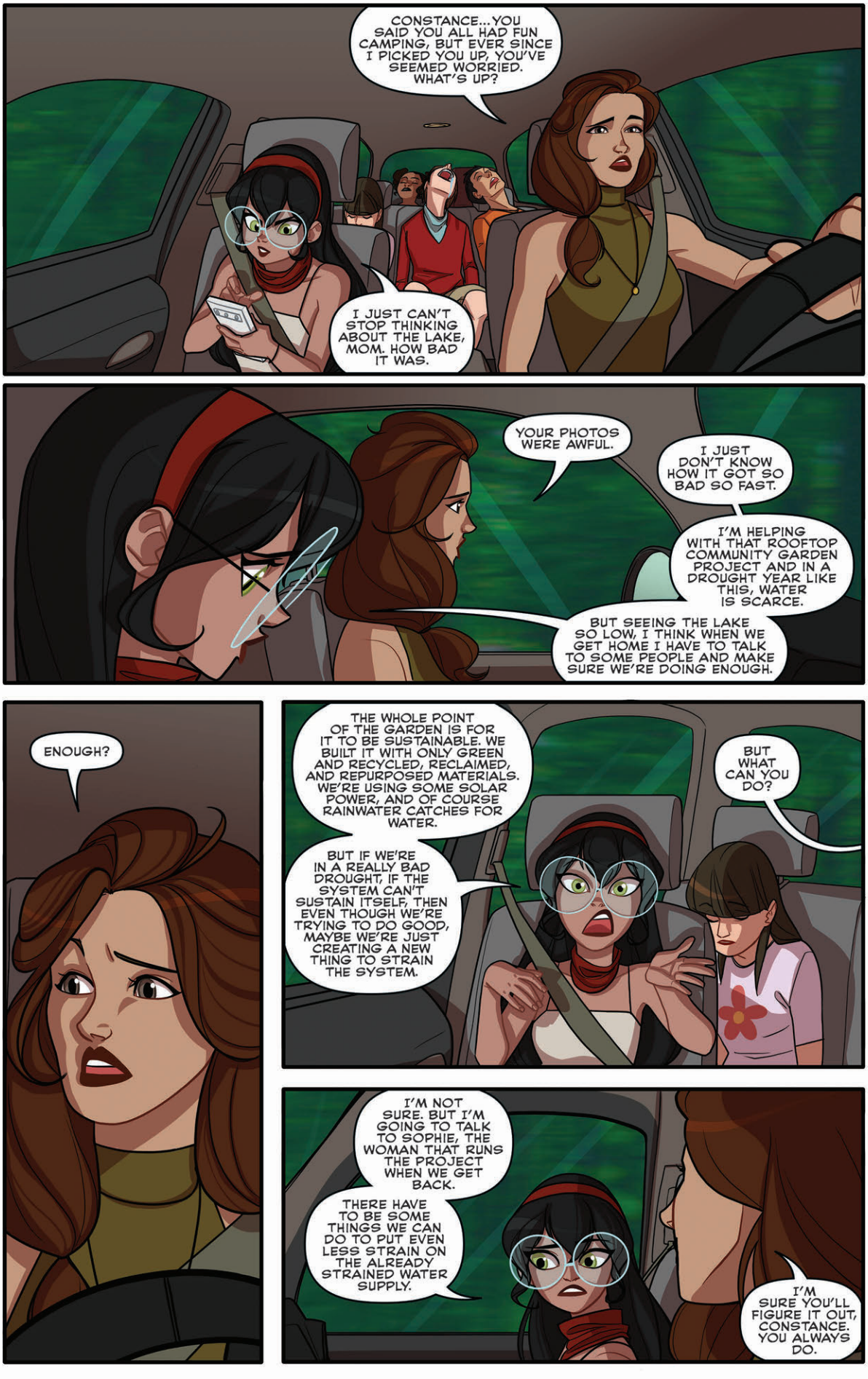

NANO!

CONSTANCE. WHAT ARE YOU DOING OUT HERE?
MY FRIENDS AND I WERE CAMPING NEARBY...
WE HIKED TO THE LAKE, BUT WE CAN'T BELIEVE HOW LOW THE WATER IS, WHAT'S GOING ON?

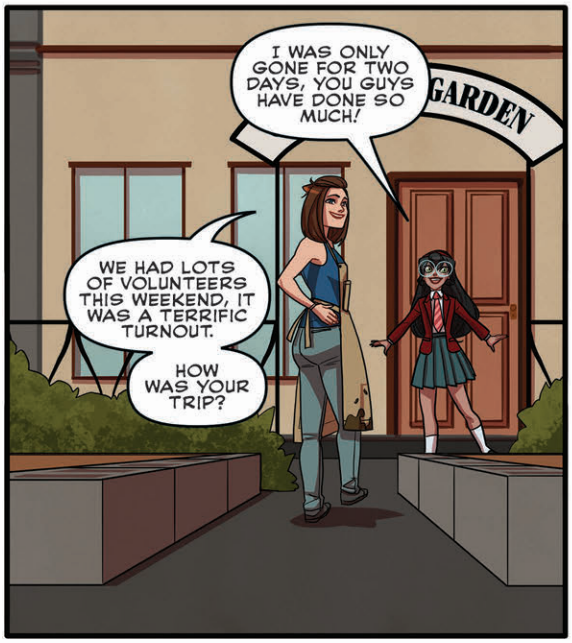
YES, THE WATER LEVELS ARE DANGEROUSLY LOW THIS YEAR. I CAME OUT TO HELP SOME BIOLOGIST FRIENDS AS THEY TAKE $O^2$ MEASUREMENTS.
$O^2$ LEVELS IN THE WATER?
YES. FOR CERTAIN LARGER SPECIES ESPECIALLY, IF THE WATER LEVELS DROP TOO LOW THEY CAN BECOME TOO CROWDED, AND THE DEPLETED OXYGEN LEVELS CAN BE FATAL.

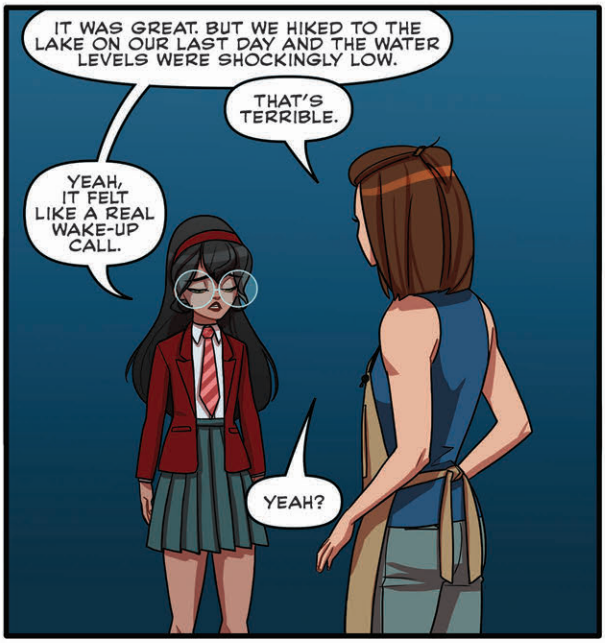

IN EXTREME CASES, SALVAGE OPERATIONS CAN BE ORGANIZED TO RELOCATE SPECIES IN DANGER.
IT'S GOOD YOU CAN HELP, BUT IT'S HORRIBLE THAT THINGS HAVE GOTTEN THIS BAD.

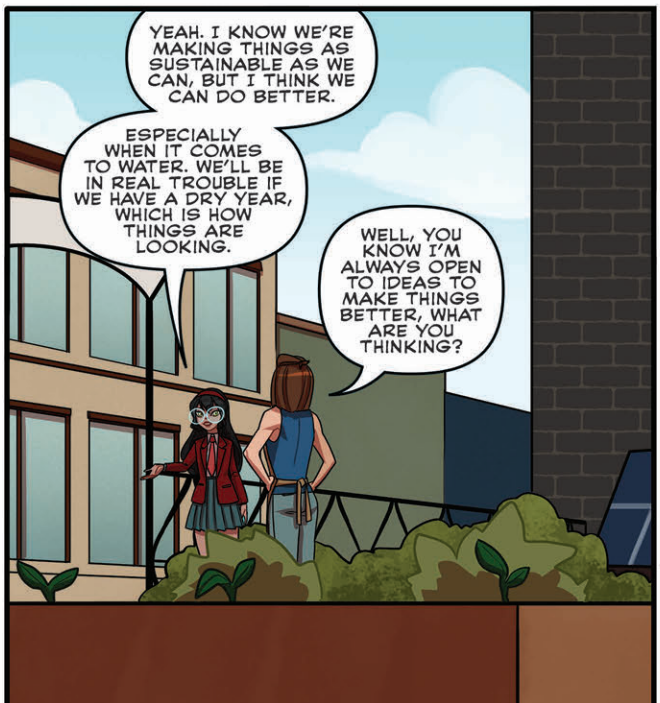
AND THAT'S JUST ONE OF MANY RAMIFICATIONS OF THIS KIND OF CLIMATE CHANGE AND DROUGHT.


CONSTANCE... YOU SAID YOU ALL HAD FUN CAMPING, BUT EVER SINCE I PICKED YOU UP, YOU'VE SEEMED WORRIED. WHAT'S UP?
I JUST CAN'T STOP THINKING ABOUT THE LAKE, MOM. HOW BAD IT WAS.
YOUR PHOTOS WERE AWFUL.
I JUST DON'T KNOW HOW IT GOT SO BAD SO FAST.
I'M HELPING WITH THAT ROOFTOP COMMUNITY GARDEN PROJECT AND IN A DROUGHT YEAR LIKE THIS, WATER IS SCARCE.
BUT SEEING THE LAKE SO LOW, I THINK WHEN WE GET HOME I HAVE TO TALK TO SOME PEOPLE AND MAKE SURE WE'RE DOING ENOUGH.
ENOUGH?
THE WHOLE POINT OF THE GARDEN IS FOR IT TO BE SUSTAINABLE. WE BUILT IT WITH ONLY GREEN AND RECYCLED, RECLAIMED, AND REPURPOSED MATERIALS. WE'RE USING SOME SOLAR POWER, AND OF COURSE RAINWATER CATCHES FOR WATER.
BUT IF WE'RE IN A REALLY BAD DROUGHT, IF THE SYSTEM CAN'T SUSTAIN ITSELF, THEN EVEN THOUGH WE'RE TRYING TO DO GOOD, MAYBE WE'RE JUST CREATING A NEW THING TO STRAIN THE SYSTEM.
BUT WHAT CAN YOU DO?
I'M NOT SURE. BUT I'M GOING TO TALK TO SOPHIE, THE WOMAN THAT RUNS THE PROJECT WHEN WE GET BACK.
THERE HAVE TO BE SOME THINGS WE CAN DO TO PUT EVEN LESS STRAIN ON THE ALREADY STRAINED WATER SUPPLY.
I'M SURE YOU'LL FIGURE IT OUT, CONSTANCE. YOU ALWAYS DO.

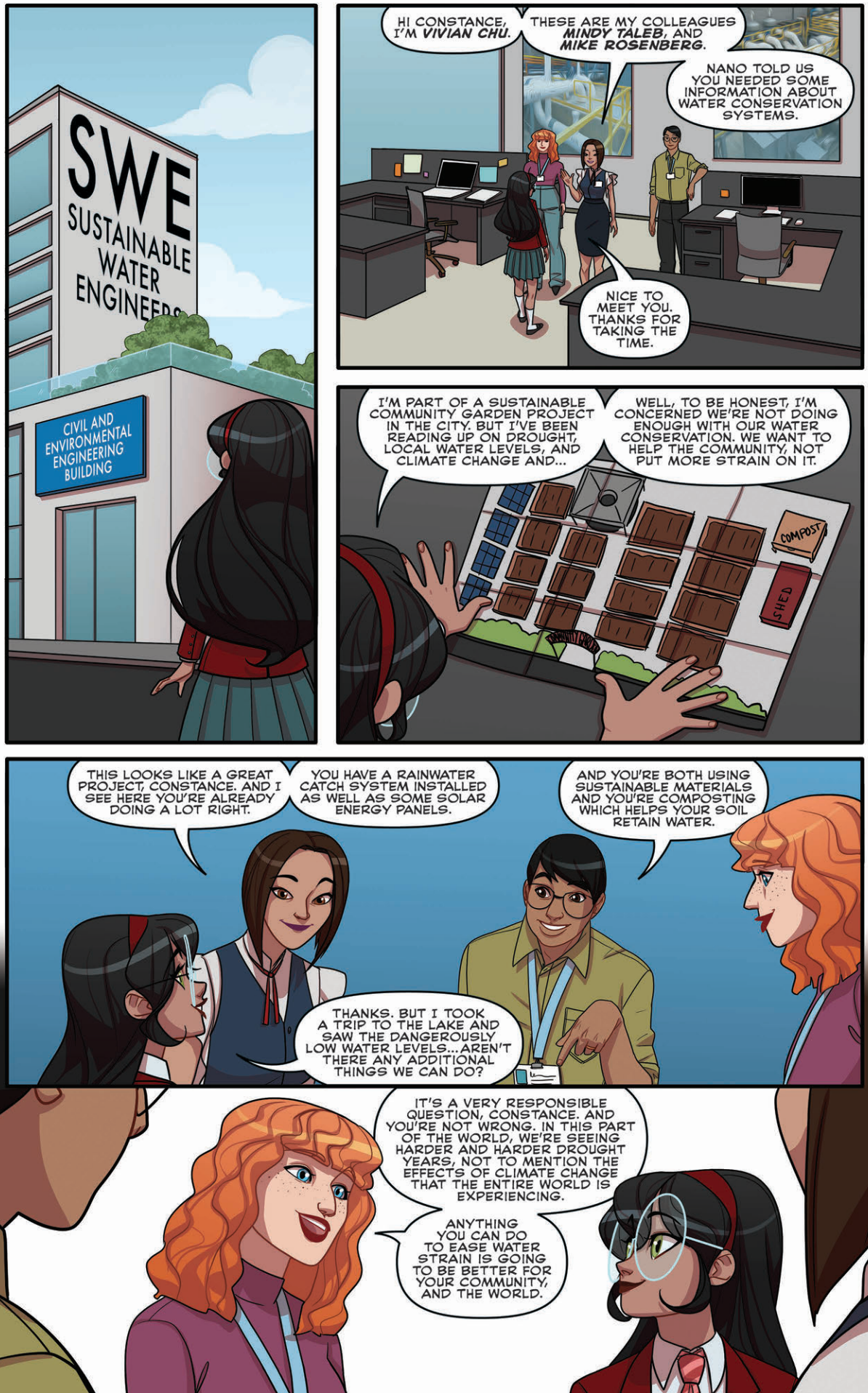
COMMUNITY GARDEN
CONSTANCE!

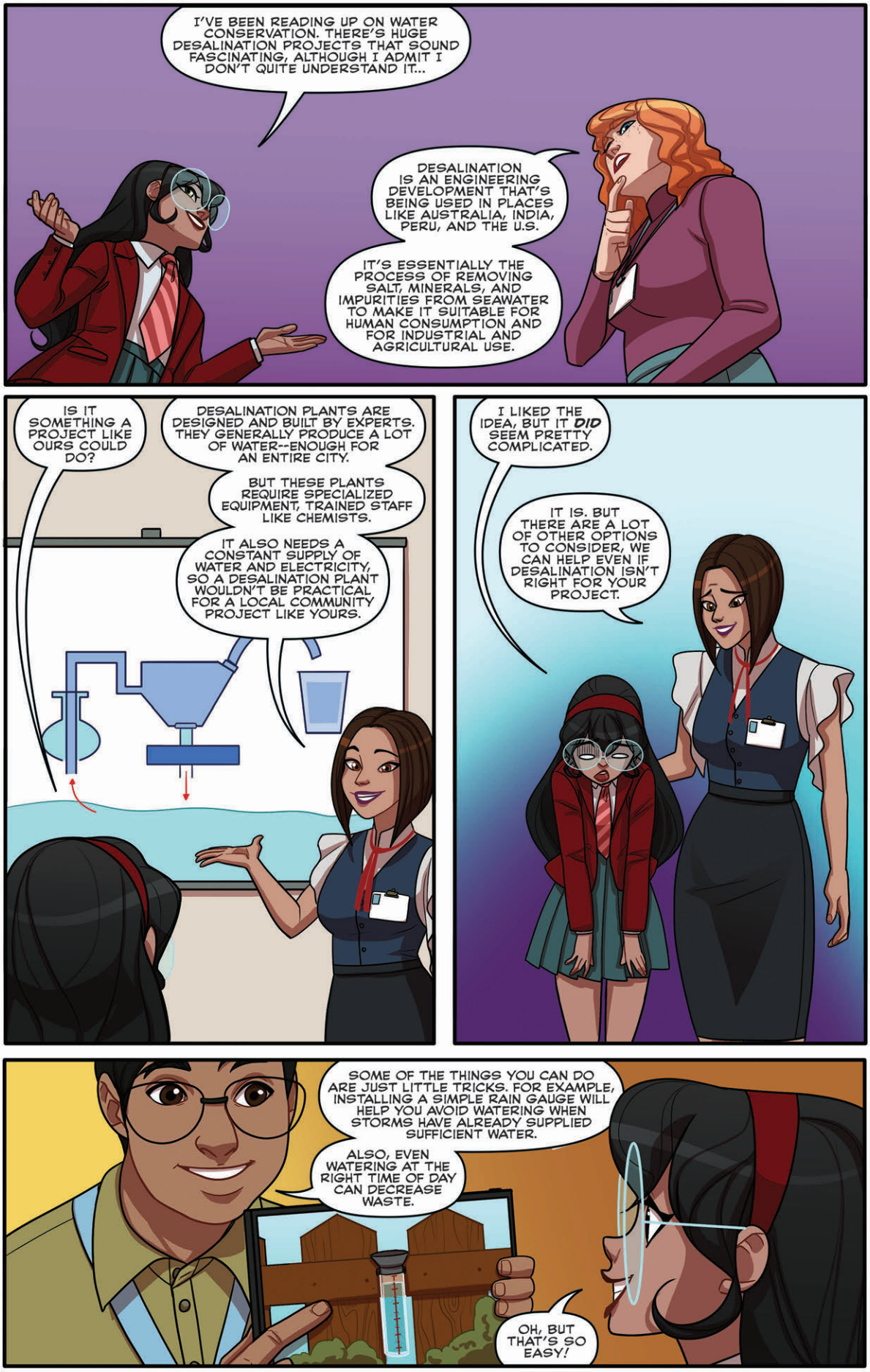

I WAS ONLY GONE FOR TWO DAYS, YOU GUYS HAVE DONE SO MUCH!
GARDEN
WE HAD LOTS OF VOLUNTEERS THIS WEEKEND, IT WAS A TERRIFIC TURNOUT.
HOW WAS YOUR TRIP?

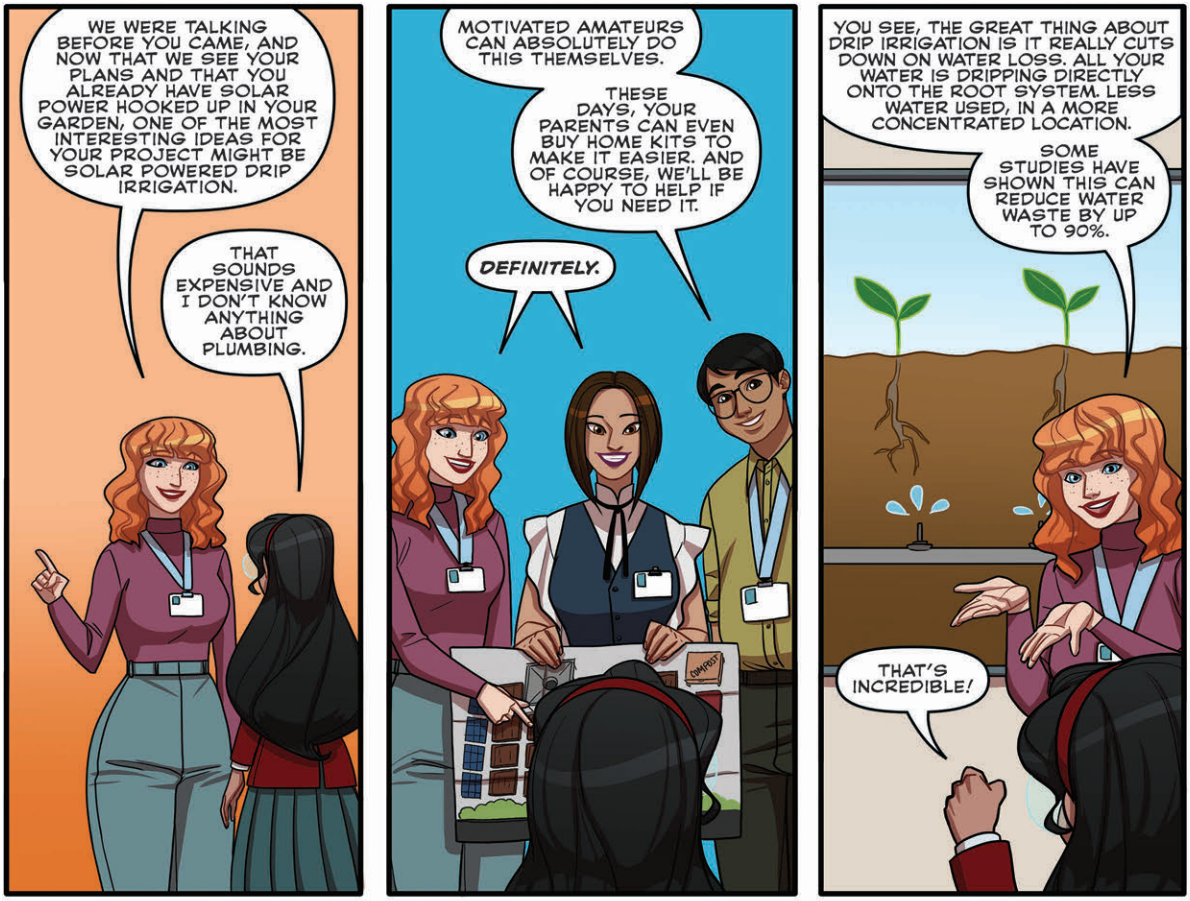

IT WAS GREAT. BUT WE HIKED TO THE LAKE ON OUR LAST DAY AND THE WATER LEVELS WERE SHOCKINGLY LOW.
THAT'S TERRIBLE.
YEAH, IT FELT LIKE A REAL WAKE-UP CALL.
YEAH?

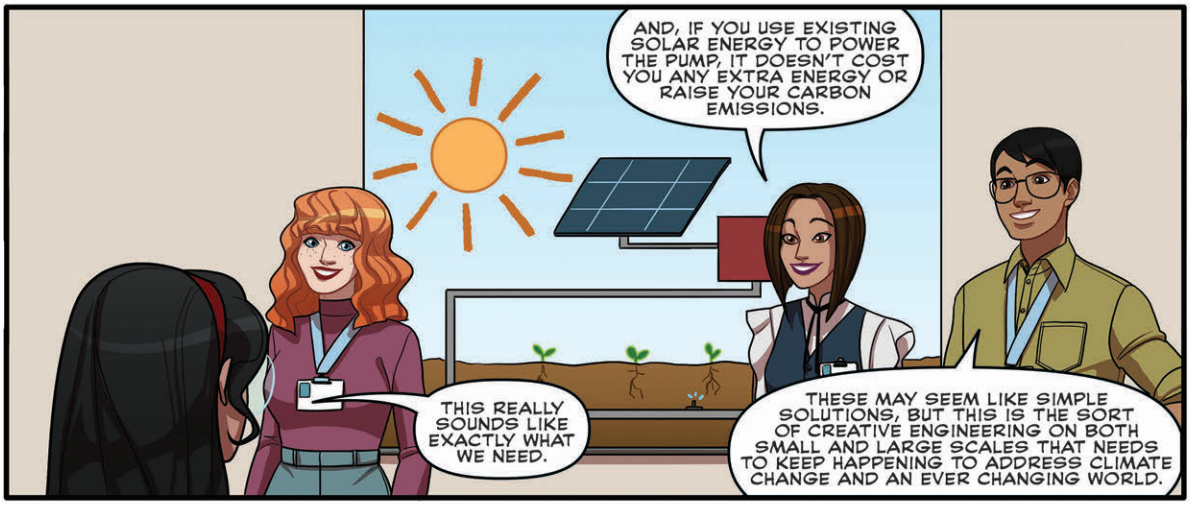

YEAH. I KNOW WE'RE MAKING THINGS AS SUSTAINABLE AS WE CAN, BUT I THINK WE CAN DO BETTER.
ESPECIALLY WHEN IT COMES TO WATER. WE'LL BE IN REAL TROUBLE IF WE HAVE A DRY YEAR, WHICH IS HOW THINGS ARE LOOKING.
WELL, YOU KNOW I'M ALWAYS OPEN TO IDEAS TO MAKE THINGS BETTER, WHAT ARE YOU THINKING?

NOT SURE YET, BUT I BET NANO KNOWS SOMEONE WHO CAN HELP!

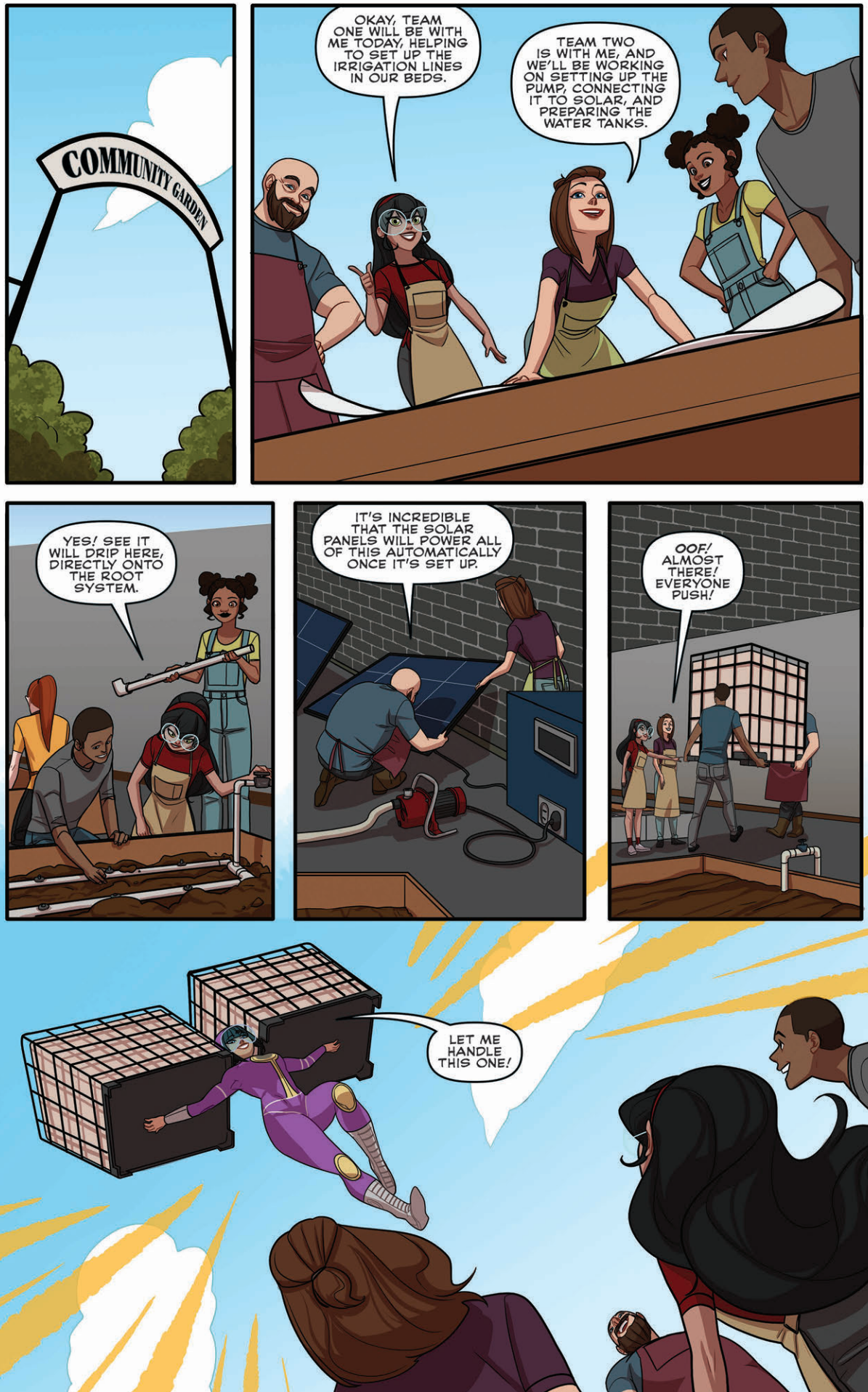

SWE
SUSTAINABLE WATER ENGINEERS
CIVIL AND ENVIRONMENTAL ENGINEERING BUILDING
HI CONSTANCE, I'M VIVIAN CHU.
THESE ARE MY COLLEAGUES MINDY TALEB, AND MIKE ROSENBERG.
NANO TOLD US YOU NEEDED SOME INFORMATION ABOUT WATER CONSERVATION SYSTEMS.
NICE TO MEET YOU. THANKS FOR TAKING THE TIME.
I'M PART OF A SUSTAINABLE COMMUNITY GARDEN PROJECT IN THE CITY. BUT I'VE BEEN READING UP ON DROUGHT, LOCAL WATER LEVELS, AND CLIMATE CHANGE AND...
WELL, TO BE HONEST, I'M CONCERNED WE'RE NOT DOING ENOUGH WITH OUR WATER CONSERVATION. WE WANT TO HELP THE COMMUNITY, NOT PUT MORE STRAIN ON IT.
COMPOST
SHED
THIS LOOKS LIKE A GREAT PROJECT, CONSTANCE. AND I SEE HERE YOU'RE ALREADY DOING A LOT RIGHT.
YOU HAVE A RAINWATER CATCH SYSTEM INSTALLED AS WELL AS SOME SOLAR ENERGY PANELS.
AND YOU'RE BOTH USING SUSTAINABLE MATERIALS AND YOU'RE COMPOSTING WHICH HELPS YOUR SOIL RETAIN WATER.
THANKS. BUT I TOOK A TRIP TO THE LAKE AND SAW THE DANGEROUSLY LOW WATER LEVELS...AREN'T THERE ANY ADDITIONAL THINGS WE CAN DO?
IT'S A VERY RESPONSIBLE QUESTION, CONSTANCE. AND YOU'RE NOT WRONG. IN THIS PART OF THE WORLD, WE'RE SEEING HARDER AND HARDER DROUGHT YEARS, NOT TO MENTION THE EFFECTS OF CLIMATE CHANGE THAT THE ENTIRE WORLD IS EXPERIENCING.
ANYTHING YOU CAN DO TO EASE WATER STRAIN IS GOING TO BE BETTER FOR YOUR COMMUNITY, AND THE WORLD.


I'VE BEEN READING UP ON WATER CONSERVATION. THERE'S HUGE DESALINATION PROJECTS THAT SOUND FASCINATING, ALTHOUGH I ADMIT I DON'T QUITE UNDERSTAND IT...
DESALINATION IS AN ENGINEERING DEVELOPMENT THAT'S BEING USED IN PLACES LIKE AUSTRALIA, INDIA, PERU, AND THE U.S.
IT'S ESSENTIALLY THE PROCESS OF REMOVING SALT, MINERALS, AND IMPURITIES FROM SEAWATER TO MAKE IT SUITABLE FOR HUMAN CONSUMPTION AND FOR INDUSTRIAL AND AGRICULTURAL USE.
IS IT SOMETHING A PROJECT LIKE OURS COULD DO?
DESALINATION PLANTS ARE DESIGNED AND BUILT BY EXPERTS. THEY GENERALLY PRODUCE A LOT OF WATER--ENOUGH FOR AN ENTIRE CITY.
BUT THESE PLANTS REQUIRE SPECIALIZED EQUIPMENT, TRAINED STAFF LIKE CHEMISTS.
IT ALSO NEEDS A CONSTANT SUPPLY OF WATER AND ELECTRICITY, SO A DESALINATION PLANT WOULDN'T BE PRACTICAL FOR A LOCAL COMMUNITY PROJECT LIKE YOURS.
I LIKED THE IDEA, BUT IT *DID* SEEM PRETTY COMPLICATED.
IT IS. BUT THERE ARE A LOT OF OTHER OPTIONS TO CONSIDER, WE CAN HELP EVEN IF DESALINATION ISN'T RIGHT FOR YOUR PROJECT.
SOME OF THE THINGS YOU CAN DO ARE JUST LITTLE TRICKS. FOR EXAMPLE, INSTALLING A SIMPLE RAIN GAUGE WILL HELP YOU AVOID WATERING WHEN STORMS HAVE ALREADY SUPPLIED SUFFICIENT WATER.
ALSO, EVEN WATERING AT THE RIGHT TIME OF DAY CAN DECREASE WASTE.
OH, BUT THAT'S SO EASY!


WE WERE TALKING BEFORE YOU CAME, AND NOW THAT WE SEE YOUR PLANS AND THAT YOU ALREADY HAVE SOLAR POWER HOOKED UP IN YOUR GARDEN, ONE OF THE MOST INTERESTING IDEAS FOR YOUR PROJECT MIGHT BE SOLAR POWERED DRIP IRRIGATION.
THAT SOUNDS EXPENSIVE AND I DON'T KNOW ANYTHING ABOUT PLUMBING.
MOTIVATED AMATEURS CAN ABSOLUTELY DO THIS THEMSELVES.
THESE DAYS, YOUR PARENTS CAN EVEN BUY HOME KITS TO MAKE IT EASIER. AND OF COURSE, WE'LL BE HAPPY TO HELP IF YOU NEED IT.
DEFINITELY.
YOU SEE, THE GREAT THING ABOUT DRIP IRRIGATION IS IT REALLY CUTS DOWN ON WATER LOSS. ALL YOUR WATER IS DRIPPING DIRECTLY ONTO THE ROOT SYSTEM. LESS WATER USED, IN A MORE CONCENTRATED LOCATION.
SOME STUDIES HAVE SHOWN THIS CAN REDUCE WATER WASTE BY UP TO 90%.
THAT'S INCREDIBLE!

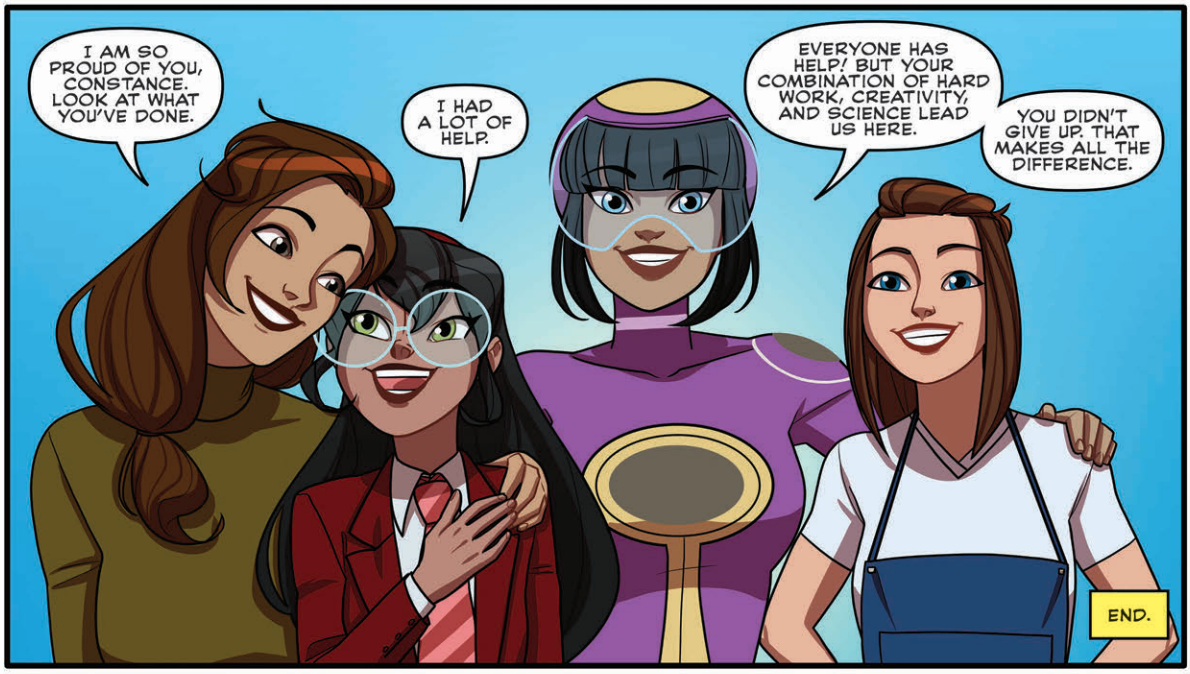

AND, IF YOU USE EXISTING SOLAR ENERGY TO POWER THE PUMP, IT DOESN'T COST YOU ANY EXTRA ENERGY OR RAISE YOUR CARBON EMISSIONS.
THIS REALLY SOUNDS LIKE EXACTLY WHAT WE NEED.
THESE MAY SEEM LIKE SIMPLE SOLUTIONS, BUT THIS IS THE SORT OF CREATIVE ENGINEERING ON BOTH SMALL AND LARGE SCALES THAT NEEDS TO KEEP HAPPENING TO ADDRESS CLIMATE CHANGE AND AN EVER CHANGING WORLD.

THANK YOU ALL SO MUCH FOR THIS.
THANK YOU, CONSTANCE. IT'S GREAT TO SEE YOUNG PEOPLE INTERESTED IN BOTH PRACTICAL ENGINEERING SOLUTIONS AND ADDRESSING CLIMATE CHANGE LOCALLY IN WAYS THAT HAVE IMPACT.


COMMUNITY GARDEN
OKAY, TEAM ONE WILL BE WITH ME TODAY, HELPING TO SET UP THE IRRIGATION LINES IN OUR BEDS.
TEAM TWO IS WITH ME, AND WE'LL BE WORKING ON SETTING UP THE PUMP, CONNECTING IT TO SOLAR, AND PREPARING THE WATER TANKS.
YES! SEE IT WILL DRIP HERE, DIRECTLY ONTO THE ROOT SYSTEM.
IT'S INCREDIBLE THAT THE SOLAR PANELS WILL POWER ALL OF THIS AUTOMATICALLY ONCE IT'S SET UP.
OOF! ALMOST THERE! EVERYONE PUSH!
LET ME HANDLE THIS ONE!

AMAZING EFFORT, EVERYONE.
WHEN WILL WE KNOW IF IT WORKS?
WELL, WE'LL KNOW PRETTY FAST. BUT EVERYONE ELSE WILL HAVE TO WAIT FOR OUR GRAND OPENING NEXT MONTH!

NEXT MONTH!
COMMUNITY GARDEN


I AM SO PROUD OF YOU, CONSTANCE. LOOK AT WHAT YOU'VE DONE.
I HAD A LOT OF HELP.
EVERYONE HAS HELP! BUT YOUR COMBINATION OF HARD WORK, CREATIVITY, AND SCIENCE LEAD US HERE.
YOU DIDN'T GIVE UP. THAT MAKES ALL THE DIFFERENCE.
END.

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*GENERAL MANAGER, AGILUS INC.*
*BACHELOR'S DEGREE IN BUSINESS ADMINISTRATION*
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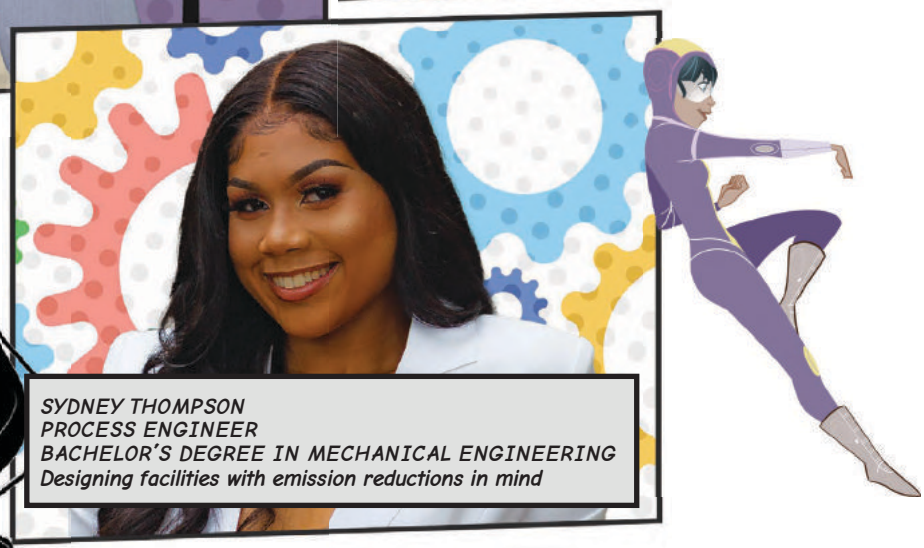

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Bechtel is proud to partner with Constance, Nano, and the Society of Women Engineers to encourage future engineers like you!

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# HAVE YOUR OWN ENGINEERING ADVENTURES!

## JUST LIKE CONSTANCE AND NANO ...

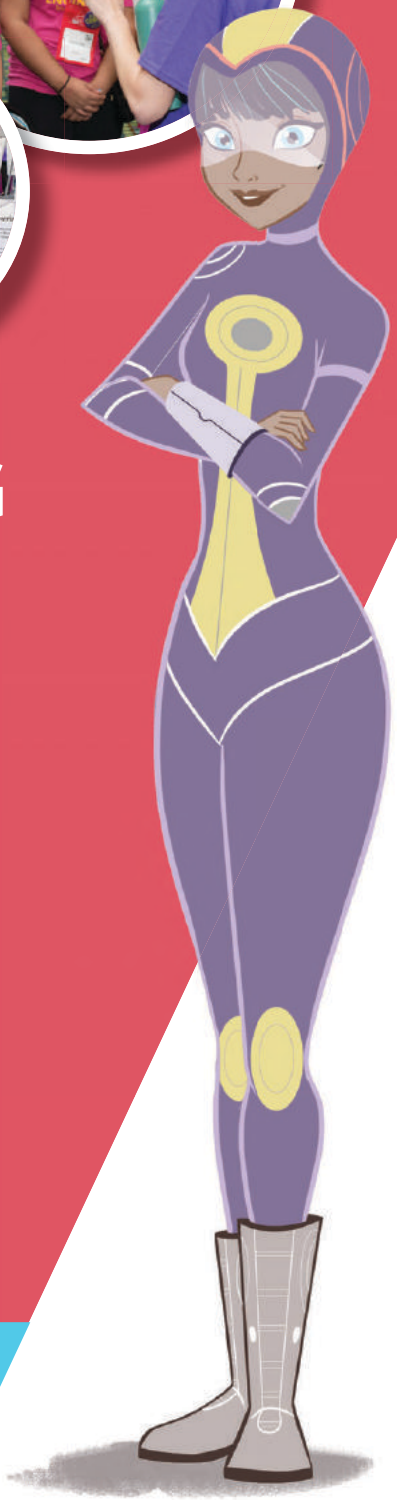
SCAN ME

**If you're a girl 13 or older,** you can be a SWENexter! It's a fun way to learn how to **#BETHATENGINEER** and join SWE for free. You can even start your own SWENext Club and make your own engineering adventures!

**Are you 12 or under?** You can join, too ... you just need a parent to join with you.

SCAN ME

Parents and other adults—you're also welcome to join!



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