
SPARK SQUAD
A STORY FROM THE NATIONAL RENEWABLE ENERGY LABORATORY
VOLUME 3

NREL

U.S. DEPARTMENT of ENERGY



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# A BRIEF INTRODUCTION TO ENERGY

HI! I'M POWER OFFICER GINA AND I'M HERE TO TALK ABOUT ENERGY!

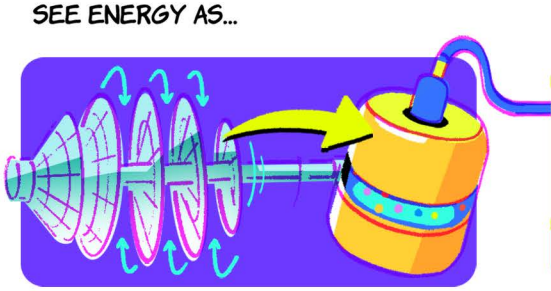
WE USE ENERGY TO POWER ALMOST EVERYTHING IN OUR LIVES!

ENERGY COMES FROM ALL DIFFERENT KINDS OF PLACES.

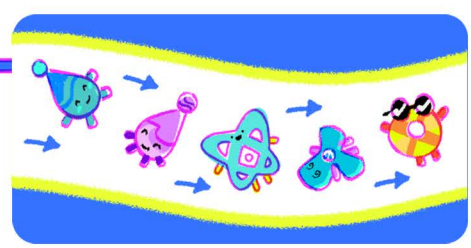
POWER OFFICERS AND ENERGIZERS USE SPECIAL GOGGLES TO SEE ENERGY AS...

JOULES!

THE JOULES ARE PLAYFUL AND FULL OF ENERGY! WE USUALLY FIND THEM ENJOYING VARIOUS OUTDOOR ACTIVITIES.



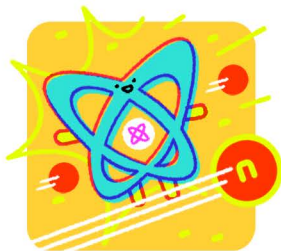
USING GENERATORS SUCH AS TURBINES, WE CAN USE THE JOULES FOR ELECTRICITY OR CAPTURE THEM AND STORE THEIR ENERGY TO USE LATER!



WHEN WE'RE READY TO USE THE ENERGY FROM THE JOULES, THEY TRAVEL THROUGH WIRES...

AND USE THEIR ENERGY AND EXCITEMENT TO POWER OUR DEVICES!

ONCE A JOULE HAS BEEN USED TO POWER SOMETHING, IT GETS REALLY TIRED...



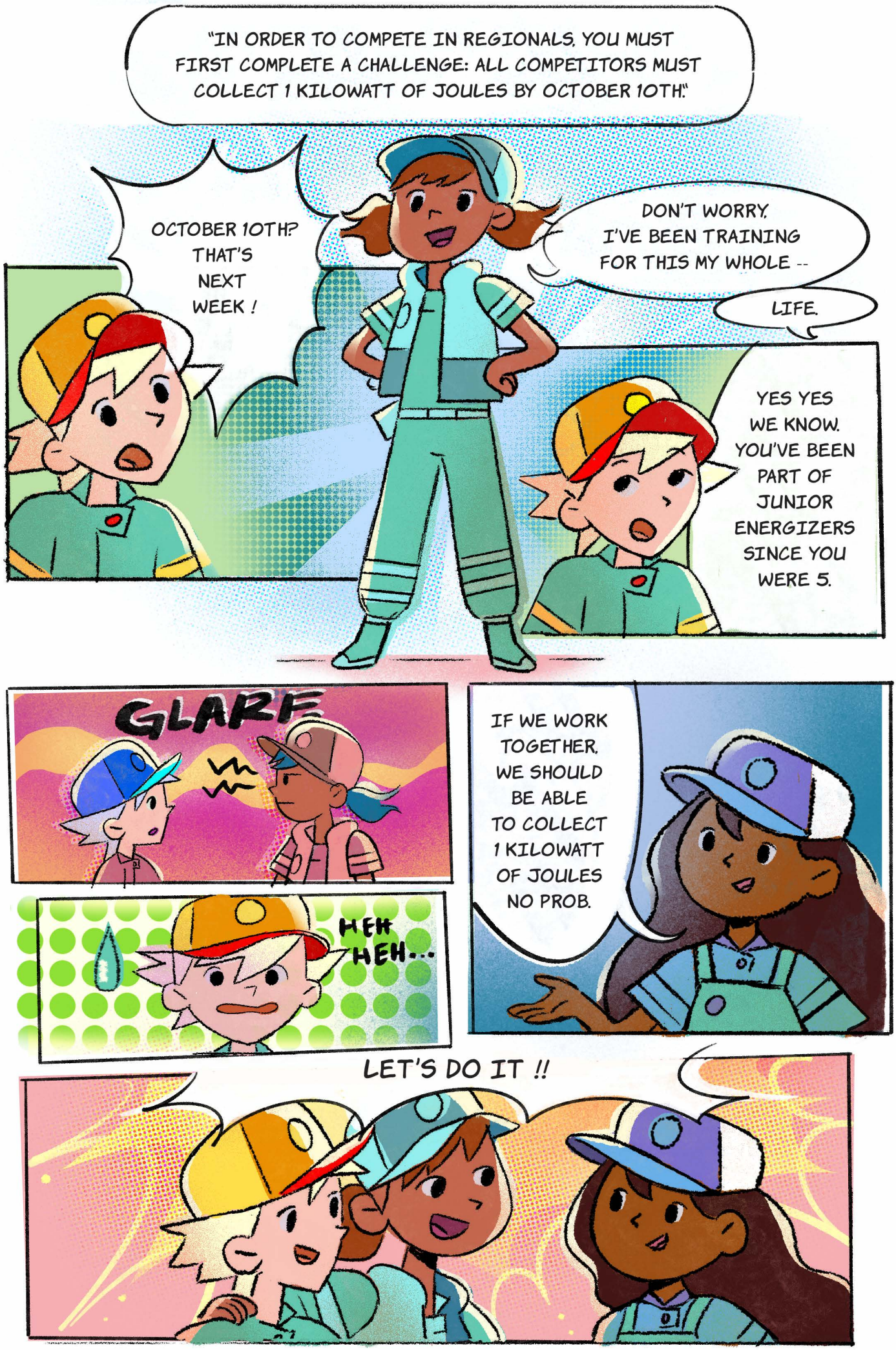
BUT AFTER A REST, THE JOULE RETURNS TO DOING WHAT IT LOVES TO DO!

THEN THE WHOLE PROCESS CAN START AGAIN!

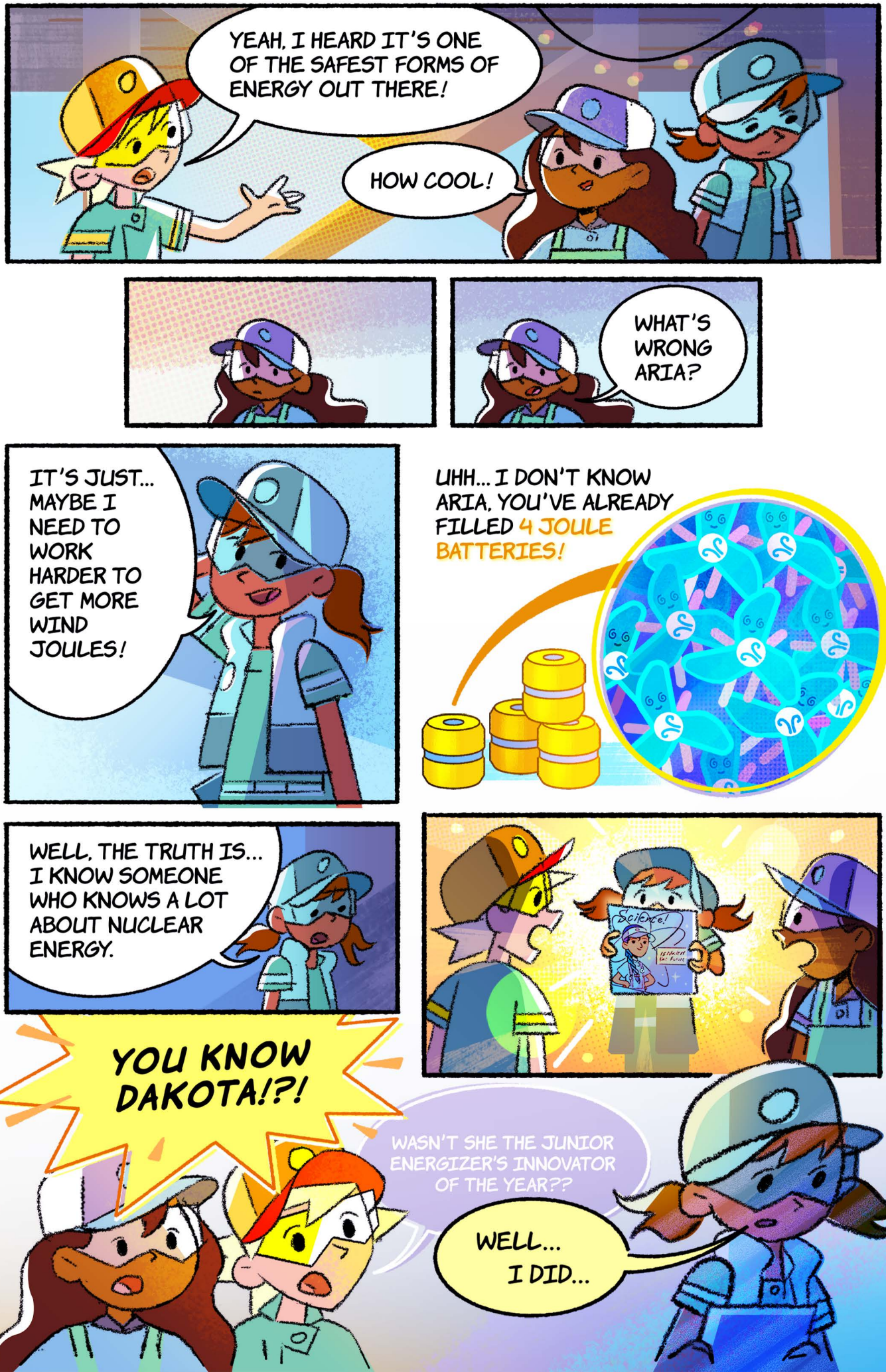

IF YOU THINK YOU WOULD LIKE TO LEARN MORE ABOUT ENERGY AND JOULES, CONSIDER JOINING THE SPARK SQUAD!


ONE FALL AFTERNOON . . .
Science!
Is Nuclear the Future?
Science!
HEY ! WE GOT A LETTER FROM SPARK SQUAD HQ !


CONGRATULATIONS !
OUR COMMITTEE HAS
YOUR PROPOSED INVE
LIKE TO FORMALLY
CONGRATULATIONS ! OUR COMMITTEE HAS REVIEWED YOUR PROPOSED INVENTIONS AND WOULD LIKE TO . . .
. . . FORMALLY INVITE YOU TO COMPETE IN THE REGIONAL QUALIFYING COMPETITION FOR THE POWER FAIR !
YAY ! WE'RE GOING TO REGIONALS !
WAIT IT SAYS SOMETHING ELSE . . .


"IN ORDER TO COMPETE IN REGIONALS, YOU MUST FIRST COMPLETE A CHALLENGE: ALL COMPETITORS MUST COLLECT 1 KILOWATT OF JOULES BY OCTOBER 10TH."
OCTOBER 10TH? THAT'S NEXT WEEK !
DON'T WORRY. I'VE BEEN TRAINING FOR THIS MY WHOLE --
LIFE.
YES YES WE KNOW. YOU'VE BEEN PART OF JUNIOR ENERGIZERS SINCE YOU WERE 5.
GLARE
IF WE WORK TOGETHER, WE SHOULD BE ABLE TO COLLECT 1 KILOWATT OF JOULES NO PROB.
HEH HEH...
LET'S DO IT !!

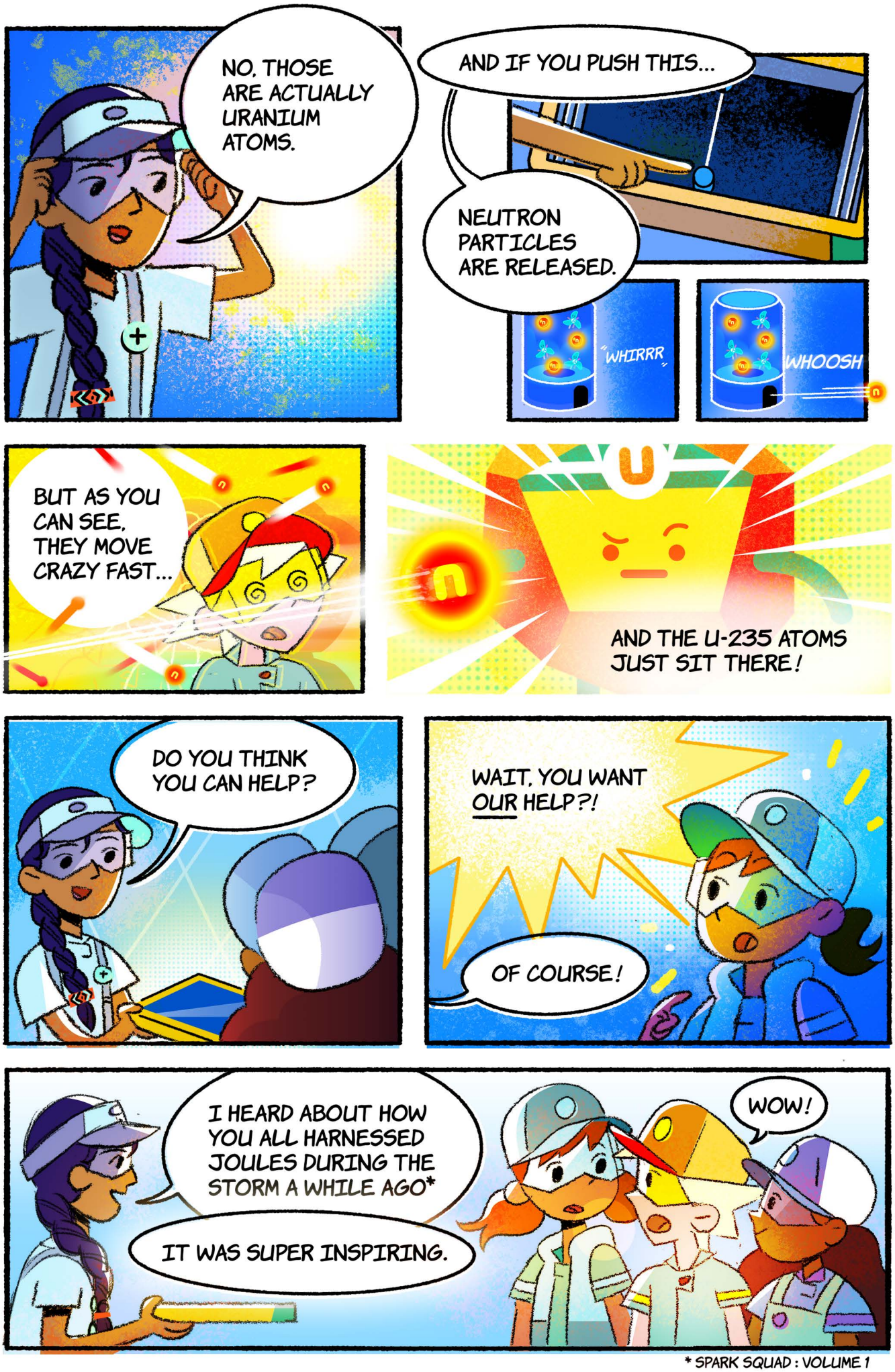

YOU ARE . . .
LOADING . . .
10% COMPLETE
DRUMROLL...
KEEP GOING, STILL A LONG WAY TO GO !
OKAY WE'VE BEEN AT THIS ALL WEEK AND I'M ONLY 10% TO 1 KILOWATT, WHAT ABOUT YOU TWO?
I GOT UP TO 50%, BUT NOW IT'S 8% . . .
I THINK WE'RE GOING TO NEED MORE POWERFUL JOULES.
I WAS TALKING TO SOMEONE THE OTHER DAY AND THEY SAID THAT NUCLEAR JOULES ARE LIKE WAY MORE POWERFUL THAN ANY OTHER.
REALLY?


YEAH, I HEARD IT'S ONE OF THE SAFEST FORMS OF ENERGY OUT THERE!
HOW COOL!
WHAT'S WRONG ARIA?
IT'S JUST... MAYBE I NEED TO WORK HARDER TO GET MORE WIND JOULES!
UHH... I DON'T KNOW ARIA, YOU'VE ALREADY FILLED 4 JOULE BATTERIES!
WELL, THE TRUTH IS... I KNOW SOMEONE WHO KNOWS A LOT ABOUT NUCLEAR ENERGY.
Science!
YOU KNOW DAKOTA!?!
WASN'T SHE THE JUNIOR ENERGIZER'S INNOVATOR OF THE YEAR??
WELL... I DID...


I JUST HAVEN'T TALKED TO HER IN A WHILE . . .
AND NOW SHE'S SUPER FAMOUS.
SO I'M NOT SURE SHE REMEMBERS WHO I AM.
AW ARIA I'M SURE SHE DOES ! EVEN MORE OF A REASON TO MEET UP WITH HER !
WE'RE ALSO RUNNING OUT OF TIME . . .
WELL I HEARD SHE HAS AN INTERNSHIP AT THE NEW NUCLEAR PLANT IN TOWN. MAYBE WE CAN CHECK THERE?


WHOAHHH...
LOOM
WAIT, LOOK!
THERE SHE IS!
ARIA?!? IS THAT YOU??
THUMP THUMP
SQUEEZE


OH MY GOSH, ARIA! IT'S BEEN SO LONG!
THIS IS JASMINE AND THOMAS.
WAIT AREN'T YOU ALL PART OF THE SPARK SQUAD?!!
RUSTLE RUSTLE
I NEED TO SHOW YOU SOMETHING.
SHE KNOWS US . . ?
I MODIFIED A CLOUD CHAMBER AND SOME OF THE GADGETS SPARK SQUAD GAVE US.
IT'S SUPPOSED TO HELP GENERATE AND CAPTURE NUCLEAR JOULES.
WAIT. . . ARE THESE JOULES?




* SPARK SQUAD : VOLUME 1


TAP
TAP
OKAY! WE CAN TRY AND HELP GET THE U-235'S EXCITED!
TADA!
BANANA
WAIT, DO YOU THINK YOUR MOM COULD ORDER US SOME PIZZA?
HOW WILL THAT HELP?
OH, I JUST FELT LIKE HAVING PIZZA.
. . .
HMM . . . NOTHING IS WORKING.
I THINK WE HAVE TO GO TALK TO SOMEONE.


OHHH ! I THINK THIS IS WHERE THE OLD COAL PLANT USED TO BE.
THAT'S RIGHT ! IN FACT, I USED TO WORK AT THE COAL PLANT. WHEN THEY CONVERTED IT TO A NUCLEAR PLANT TO CREATE CARBON-FREE ELECTRICITY, I TRAINED TO WORK HERE !
WELCOME !

SO ACTUALLY, THE OLD COAL PLANT IS A GOOD STARTING POINT. COMPARED TO COAL, YOU DON'T NEED A LOT OF NUCLEAR ENERGY TO MAKE A BIG IMPACT.

URANIUM FUEL IS SO CONCENTRATED THAT 1 CERAMIC URANIUM PELLET IS EQUAL TO THE SAME AMOUNT OF ENERGY AS 1 TON OF COAL !

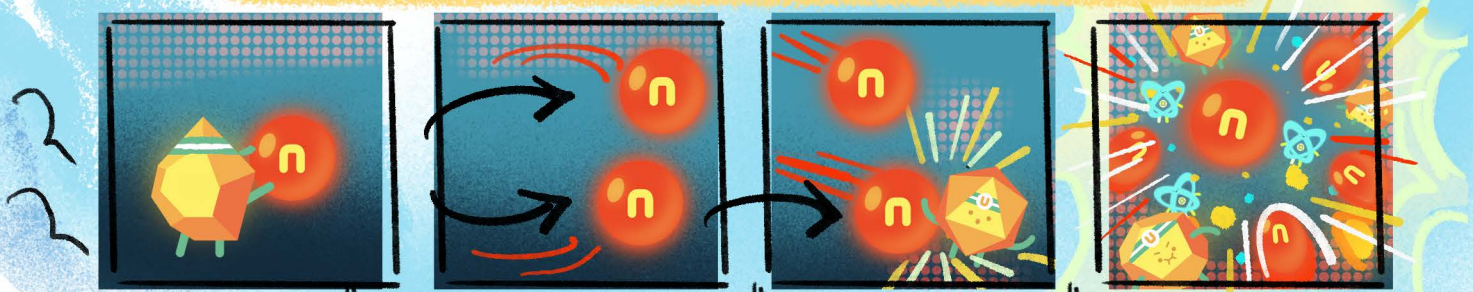
THESE SMALL CERAMIC PELLETS ARE STACKED IN METAL TUBES CALLED FUEL RODS.

THESE ARE GROUPED TOGETHER AND PLACED INTO THE REACTOR CORE.

CONTROL RODS ARE USED TO HELP REGULATE AND CONTROL THE NUCLEAR REACTION.

WATER IS ONE TYPE OF COOLANT USED TO COOL THE TEMPERATURE OF THE REACTOR ! IT ALSO HELPS SLOW DOWN THE NEUTRONS AND SUSTAIN THE CHAIN REACTION.

## THE REACTION ITSELF IS LIKE A DODGEBALL GAME




WHEN URANIUM IS HIT BY A NEUTRON

IT SPLITS AND RELEASES 2 OR 3 NEUTRONS

WHICH HIT OTHER U-235 ATOMS

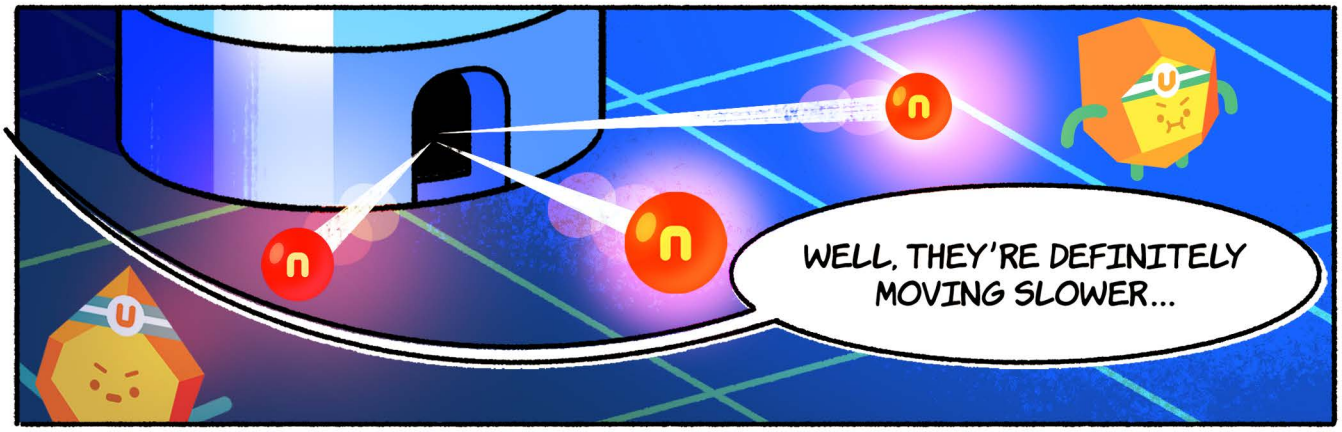
STARTING A CHAIN REACTION !

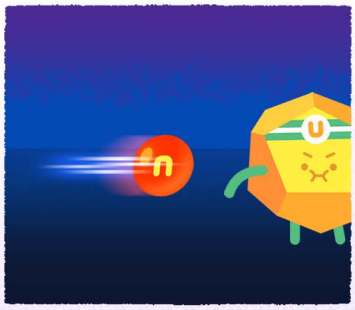
THE CONTROLLED SPLITTING RELEASES HEAT ENERGY. THE COOLANT ABSORBS THE HEAT AND CARRIES IT AWAY TO GENERATE STEAM !

AND FINALLY . . . THE STEAM SPINS A TURBINE.


TO PRODUCE . . .

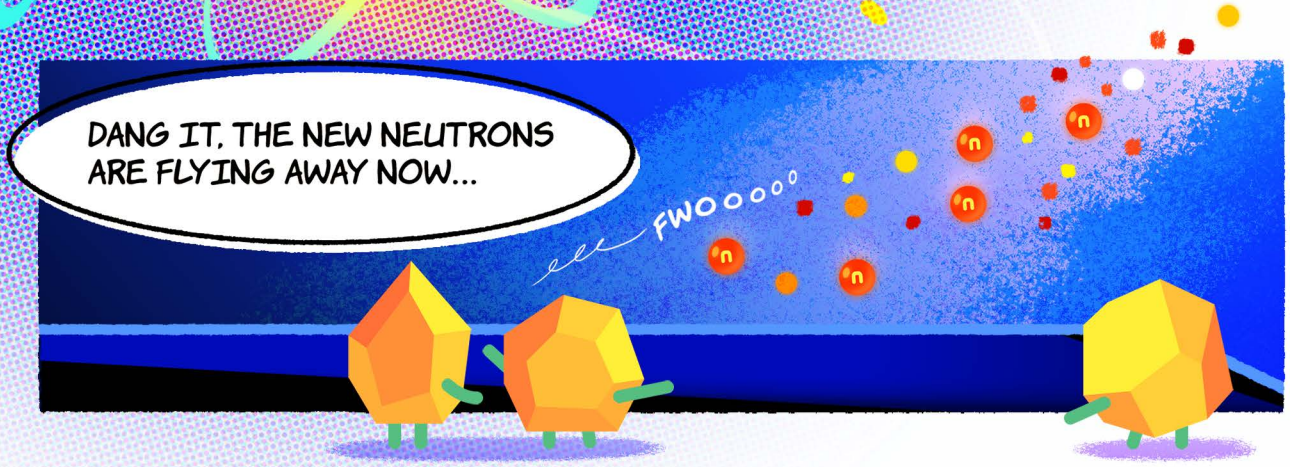

. . . ELECTRICITY !
I GOT IT !
WE NEED TO GET THE PARTICLES TO PLAY DODGEBALL.
RIGHT. . . SO IF WE CAN SLOW THE NEUTRONS DOWN ENOUGH, THE U-235'S CAN USE THEM AS DODGEBALLS.
BUT HOW DO WE SLOW THEM DOWN?
DO ANY OF YOU HAVE ANY WATER WE CAN USE?!
I THINK JASMINE DOES !
CLICK!
GURGLE
GURGLE

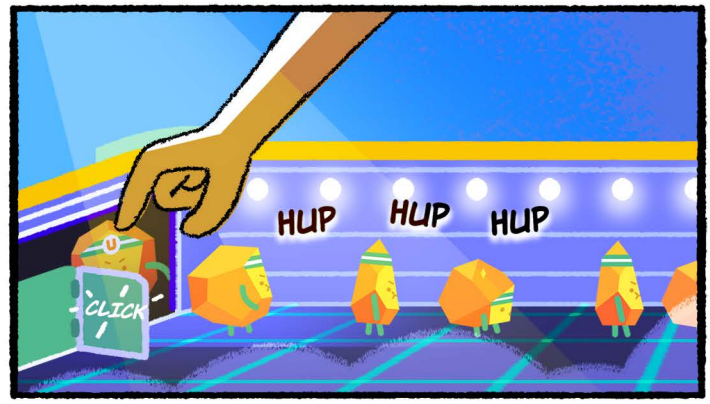


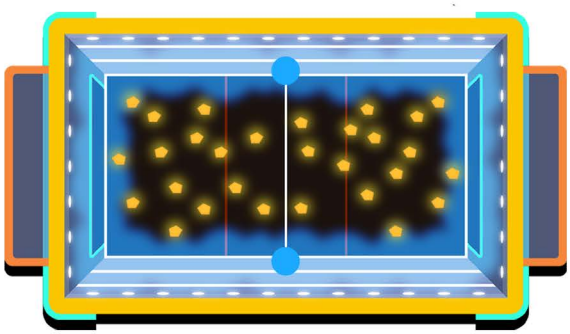


OH...?


OH!

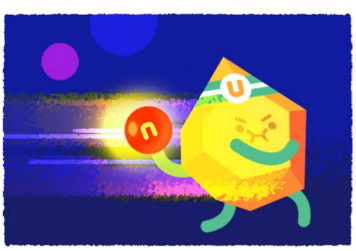

THEY MADE CONTACT!

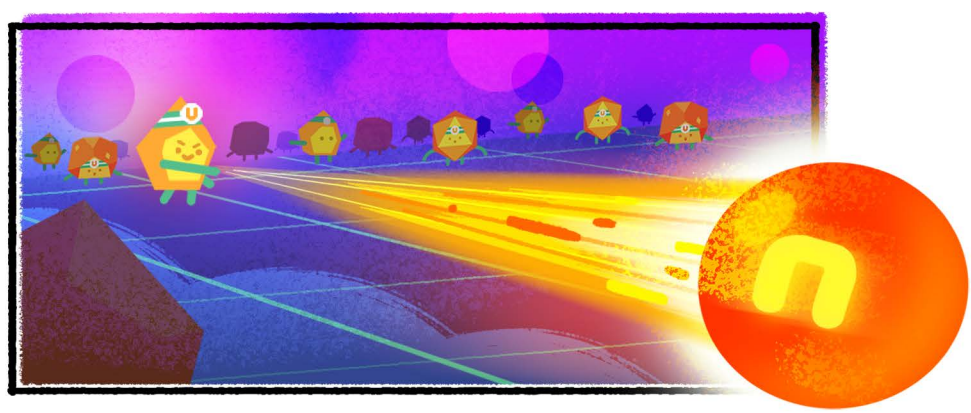



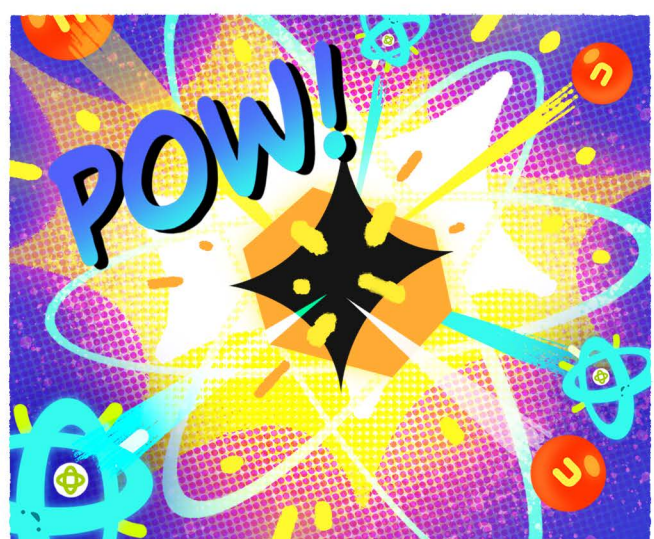



WELL THERE ARE CERTAINLY LOTS NOW...








IT'S WORKING!
IT'S STARTING
A CHAIN REACTION!


PING!
PLUNK
WHOOSH!
YOU GOT JUST THE RIGHT AMOUNT OF NEUTRONS! THAT'S A CRITICAL MASS!
BEEP BEEP!!
WE GOTTA SUBMIT !
200%


BING!
WOO HOO!
YOU DID IT ! WE'LL BE WAITING FOR YOU AT REGIONALS !
PHEW ! THAT WAS CLOSE !
HAHA JUST LIKE OLD TIMES.
HEY DO YOU THINK YOU'LL BE ABLE TO HANG OUT AT THE POWER FAIR?
OF COURSE !
I CAN'T WAIT TO SEE WHAT YOU ALL COME UP WITH !


## HOW TO PLAY:

1 ) GET A FRIEND AND TWO DIFFERENT COLORS TO DRAW WITH.

2 ) TAKE TURNS CONNECTING THE ORANGE U-235 ATOMS TO FORM A HORIZONTAL OR VERTICAL LINE. YOU CAN ONLY DRAW A LINE BETWEEN 2 ATOMS AT A TIME.

3 ) IF YOU COMPLETE A SQUARE, COLOR THE NUCLEAR JOULE IN THE MIDDLE THAT YOU'VE "COLLECTED".

4 ) KEEP GOING UNTIL ALL OF THE JOULES ARE COLORED IN. WHOEVER HAS COLORED THE MOST JOULES HAS THE BIGGEST CHAIN REACTION AND WINS THE GAME !


READ MORE ENERGIZING ADVENTURES FROM THE SPARK SQUAD

THE SPARK SQUAD IS GETTING CLOSER TO THEIR GOAL OF MAKING IT TO THE POWER FAIR. THE TEAM IS CHARGED UP BUT HAVE A BIG OBSTACLE IN THEIR PATH: THE REGIONAL COMPETITION. IN ORDER TO QUALIFY, THE TEAM ENLISTS THE HELP OF ARIA'S OLD FRIEND DAKOTA, A RISING CELEBRITY IN THE WORLD OF NUCLEAR ENERGY. WITH DAKOTA'S KNOWLEDGE OF THIS POWERFUL BUT CLEAN & SUSTAINABLE ENERGY SOURCE, SHE MAY HOLD THE KEY TO HELP THE SPARK SQUAD CAPTURE ENOUGH JOULES TO MAKE IT TO THE POWER FAIR !

SCAN TO VISIT THE SPARK SQUAD WEBSITE

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