

SPARK SQUAD

A STORY FROM THE NATIONAL RENEWABLE ENERGY LABORATORY

VOLUME 3



 **NREL**

U.S. Department of

ENERGY

Office of Nuclear Energy

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A BRIEF INTRODUCTION TO

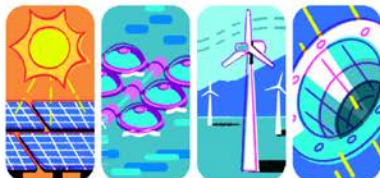
ENERGY



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.



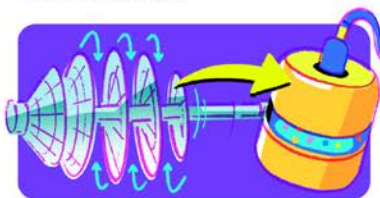
POWER OFFICERS AND ENERGIZERS USE SPECIAL GOGGLES TO SEE ENERGY AS...



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 BECOMING AN ENERGIZER!

ONE FALL AFTERNOON...



HEY! WE GOT A LETTER FROM SPARK SQUAD HQ!



"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 !!





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?



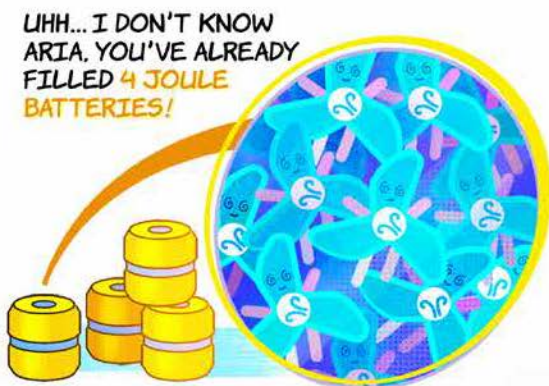
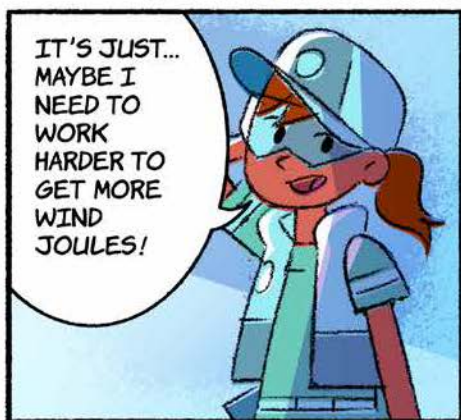
I GOT UP TO
50%. BUT NOW
IT'S 8%...



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?



WASN'T SHE THE JUNIOR ENERGIZER'S INNOVATOR OF THE YEAR??



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.

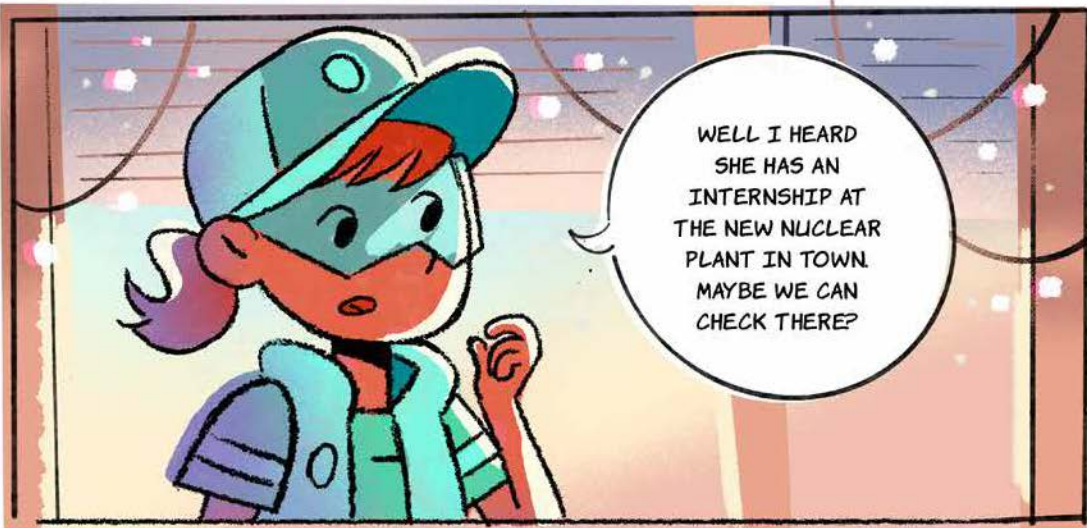
AW ARIA I'M SURE
SHE DOES ! EVEN MORE OF
A REASON TO MEET UP
WITH HER !

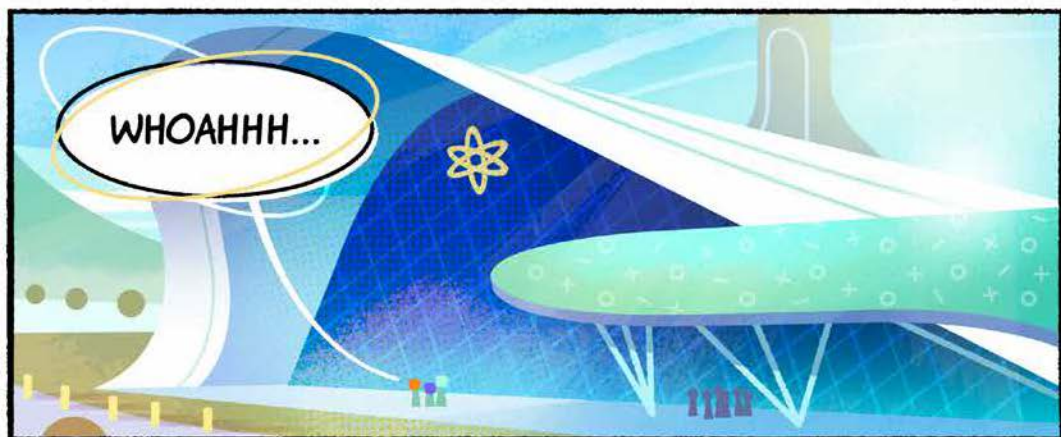


WE'RE
ALSO
RUNNING
OUT OF
TIME ...




WELL I HEARD
SHE HAS AN
INTERNSHIP AT
THE NEW NUCLEAR
PLANT IN TOWN.
MAYBE WE CAN
CHECK THERE?









OH MY GOSH. ARIA!
IT'S BEEN SO LONG!



THIS IS JASMINE
AND THOMAS.




WAIT AREN'T
YOU ALL PART
OF THE SPARK
SQUAD?!!



I NEED TO
SHOW YOU
SOMETHING.

RUSTLE
RUSTLE



SHE KNOWS
US...?



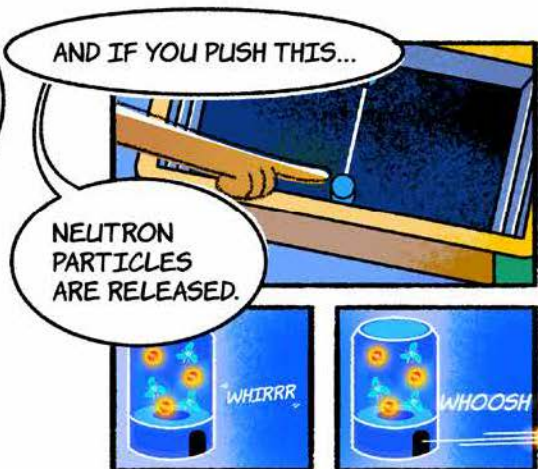
I MODIFIED A CLOUD
CHAMBER AND SOME OF
THE GADGETS SPARK SQUAD
GAVE US.

IT'S SUPPOSED TO
HELP GENERATE
AND CAPTURE NUCLEAR
JOULES.



WAIT...
ARE
THESE
JOULES?







OKAY! WE CAN TRY AND HELP GET THE U-235'S EXCITED!



WAIT, DO YOU THINK YOUR MOM COULD ORDER US SOME PIZZA?

HOW WILL THAT HELP?



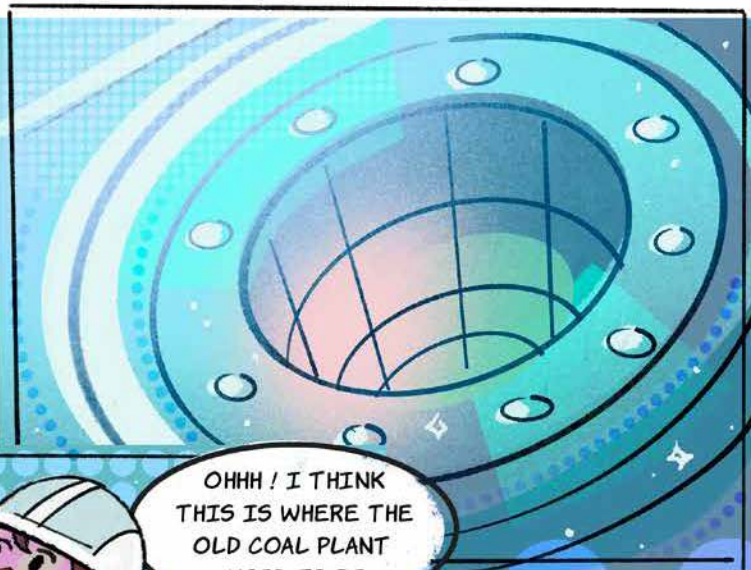
OH, I JUST FELT LIKE HAVING PIZZA.



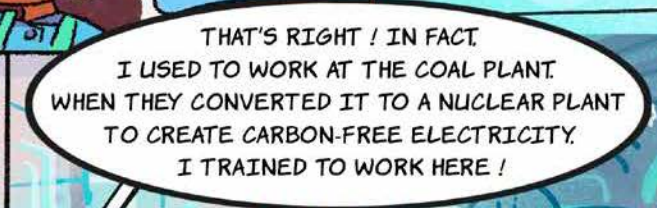
HMM... NOTHING IS WORKING.

I THINK WE HAVE TO GO TALK TO SOMEONE.





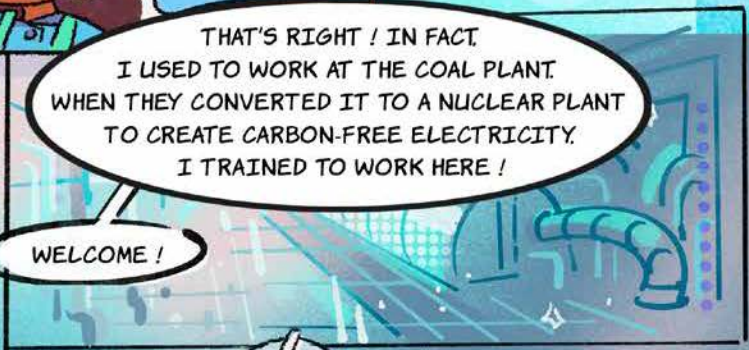
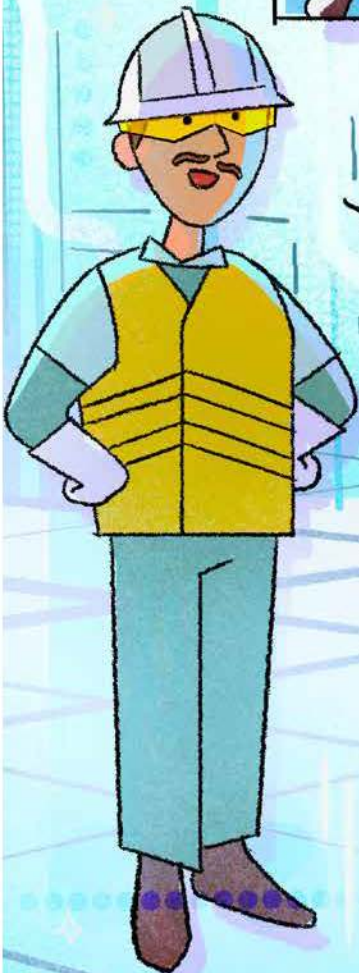
OH!! I THINK
THIS IS WHERE THE
OLD COAL PLANT
USED TO BE.



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 !

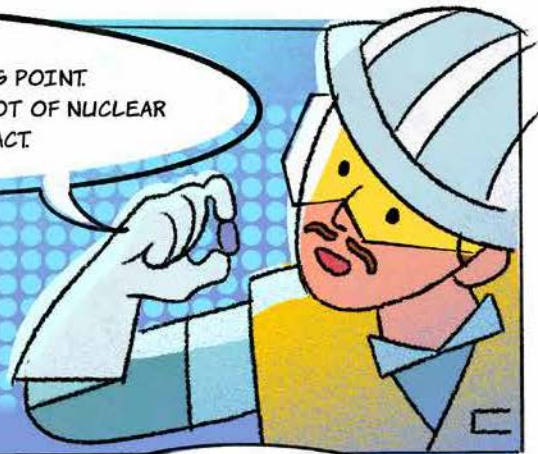


WELCOME !



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 PELLETT IS EQUAL TO 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.

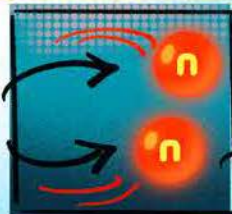


WATER IS ONE TYPE OF COOLANT USED TO COOL THE TEMPERATURE OF THE REACTOR ! IT ALSO HELPS SLOW DOWN THE NEUTRONS AND SUSTAIN THE CHAIN REACTION.

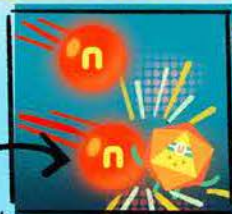
THE REACTION ITSELF IS LIKE A DODGEBALL GAME



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.



WHRRR

TO PRODUCE ...

... ELECTRICITY!



I GOT IT!

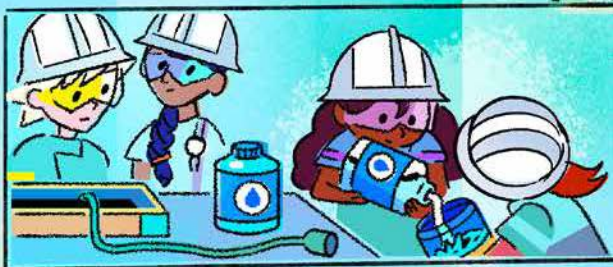
WE NEED TO GET THE PARTICLES TO PLAY DODGEBALL.

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?

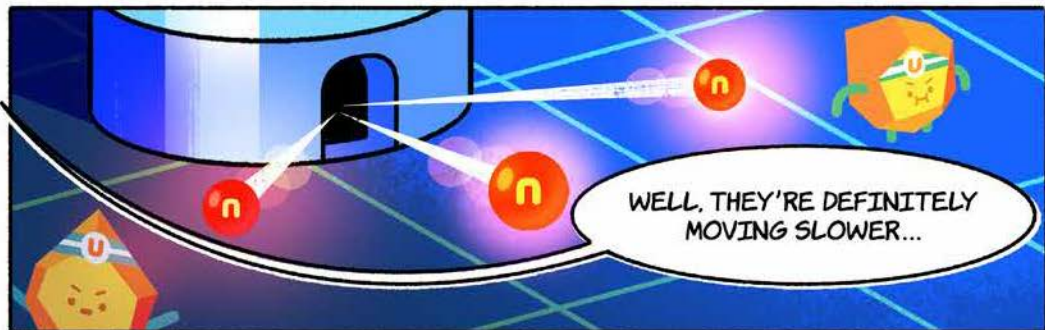
DO ANY OF YOU HAVE ANY WATER WE CAN USE?!

I THINK JASMINE DOES!



CLICK!





OH...?



OH!



THEY MADE CONTACT!

POOF!

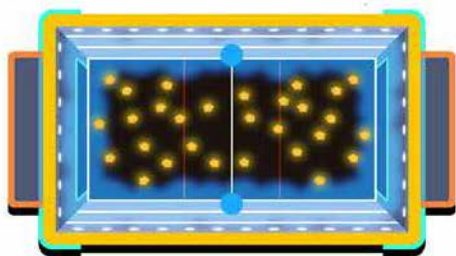
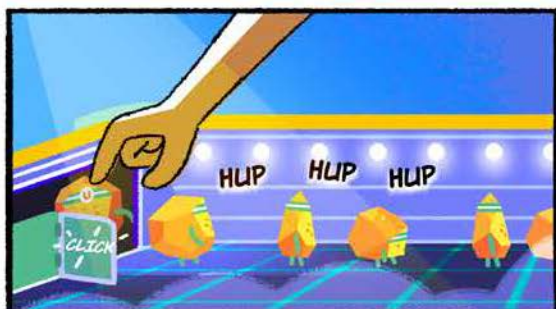


IT'S SPLITTING!



DANG IT, THE NEW NEUTRONS ARE FLYING AWAY NOW...





WELL THERE ARE CERTAINLY LOTS NOW...





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



PING!

PLINK

WHOOOSH

YOU GOT JUST THE RIGHT AMOUNT OF NEUTRONS! THAT'S A **CRITICAL MASS!**

BEEP BEEP!!

WE GOTTA SUBMIT!



WOO HOO!

BING!

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:

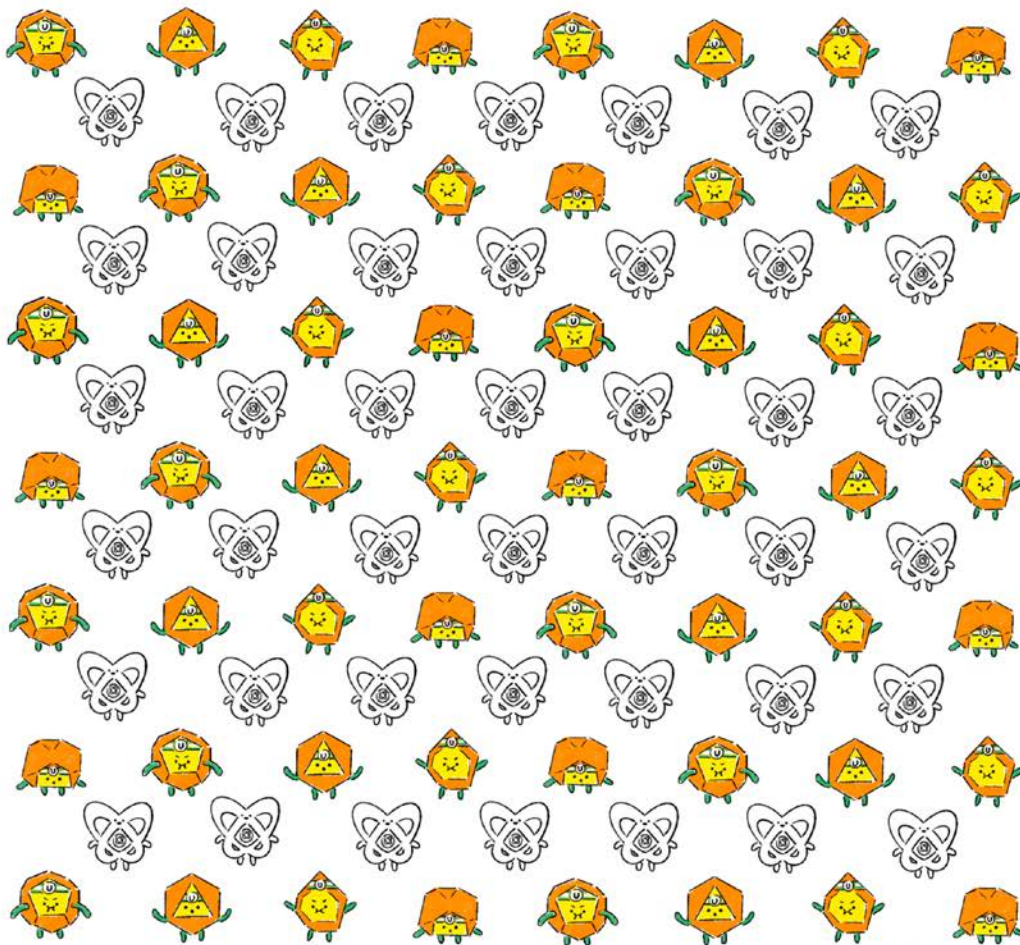
1) GET A FRIEND AND TWO DIFFERENT COLORS TO DRAW WITH.

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!

BRING IT ON!



GOOD LUCK!





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
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