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OF BIRMINGHAM AND TEESIDE UNIVERSITY PRESENTS

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GREENKID



STORIES! PUZZLES! BATTERIES! FANART! THIS ISSUE: GREENKID & SUMMER!

GLOSSARY

CARBONISED GRID - HERE A GRID MEANS AN AREA'S COLLECTION OF ELECTRICITY GENERATION LINKED TO WHERE THE ELECTRICITY IS USED. CARBONISED MEANS THAT ELECTRICITY IS BEING GENERATED USING FOSSIL FUELS LIKE COAL, GAS OR OIL.

COBALT - AN ELEMENT WITH THE ATOMIC NUMBER 27. IT IS WHAT MAKES THE BLUE COLOUR IN CHINESE PORCELAIN AND IS IN VITAMIN B12. IN LI-ION BATTERIES IT'S IN THE FORM OF LITHIUM COBALT OXIDE WHICH LETS BATTERIES BE SMALLER AND MORE POWERFUL.

ELECTRODE - THE POINT WHERE ELECTRONS MOVE FROM THE NON-METAL BIT OF THE BATTERY INTO THE CIRCUIT.

ELECTROLYTE - A SOLVENT (USUALLY) THAT LETS POSITIVELY CHARGED ELEMENTS (LIKE Li^+) MOVE FROM ONE ELECTRODE TO ANOTHER.

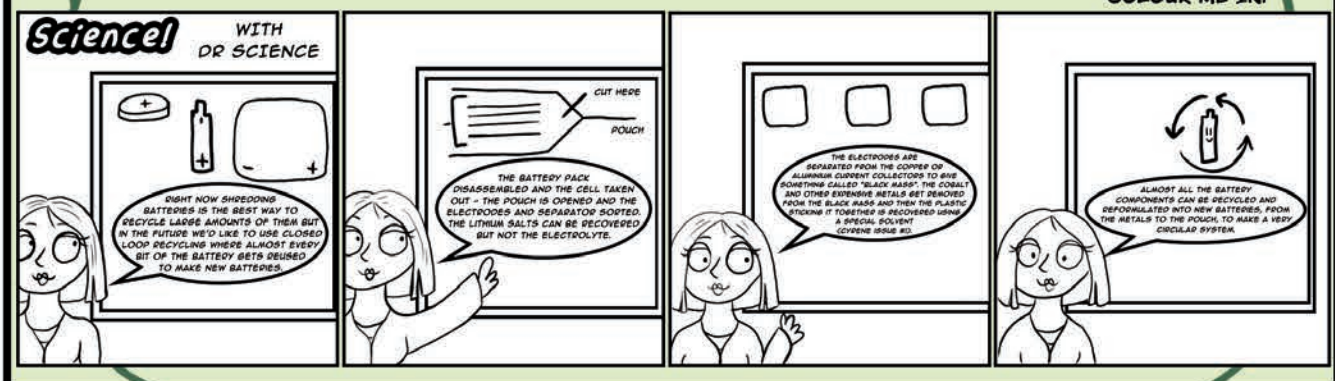
FUEL CELL - A DEVICE THAT CONVERTS CHEMICAL ENERGY INTO ELECTRICITY VERY EFFICIENTLY. BURNING SOMETHING TO MAKE ELECTRICITY ISN'T VERY EFFICIENT!

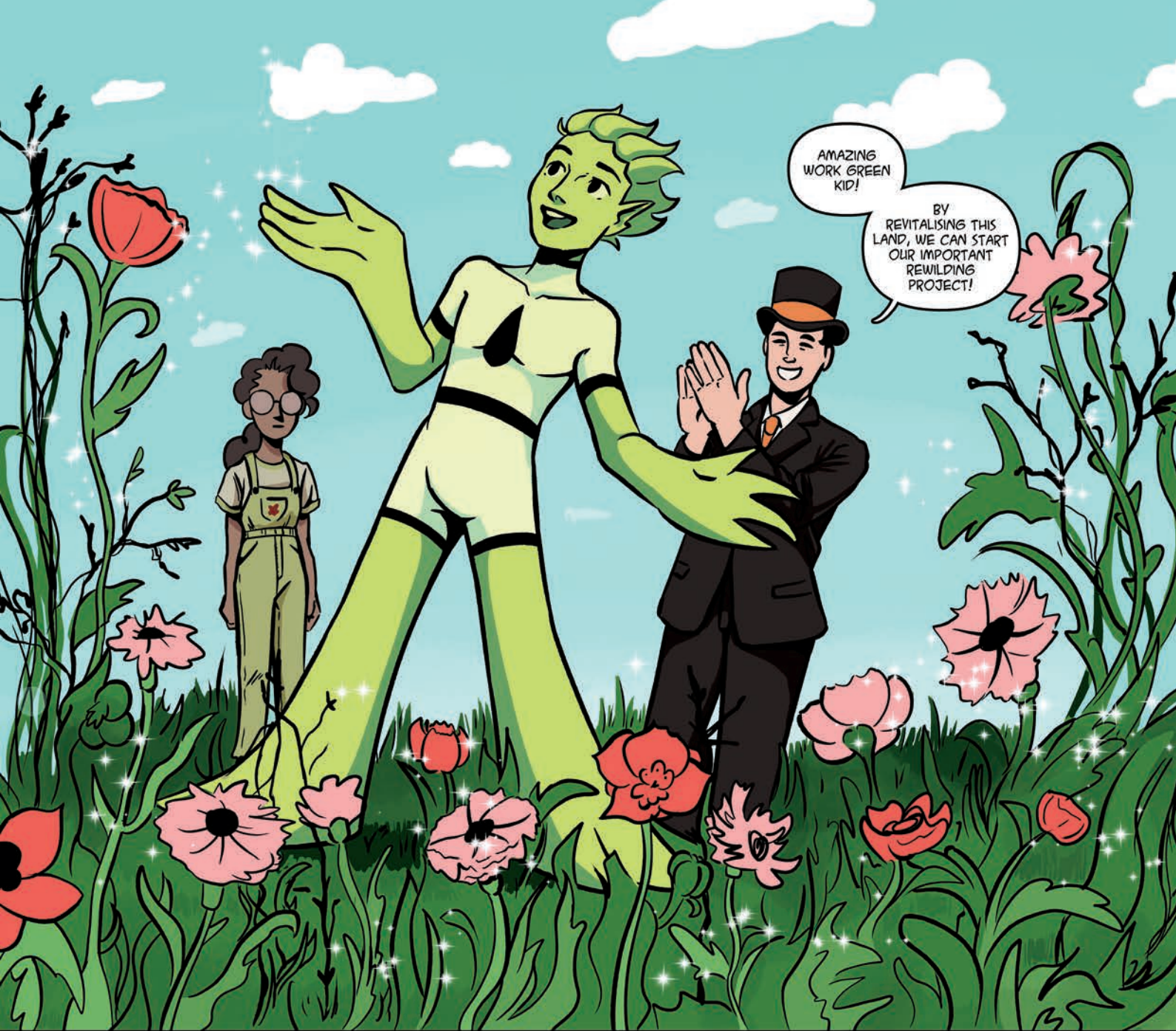
LITHIUM-ION BATTERIES - A BATTERY IS A WAY OF STORING ELECTRICAL ENERGY. LITHIUM-ION BATTERIES ARE LIGHTWEIGHT AND STORE LOTS OF ENERGY!

RENEWABLE ENERGY - THIS IS ANY FORM OF ELECTRICITY GENERATION WHERE THE POWER SOURCE DOESN'T GET USED UP, SUCH AS: WIND, SOLAR, GEOTHERMAL POWER TO NAME A FEW, OR WHERE THE POWERSOURCE CAN BE RENEWED IN OUR LIFETIME (BURNING WOOD).

GRAPHITE - AN ALLOTROPE (A PHYSICAL FORM) OF PURE CARBON THAT IS CONDUCTIVE. IT'S ALSO THE MIDDLE PART OF A PENCIL THAT MAKE MARKS

COLOUR ME IN!





AMAZING
WORK GREEN
KID!

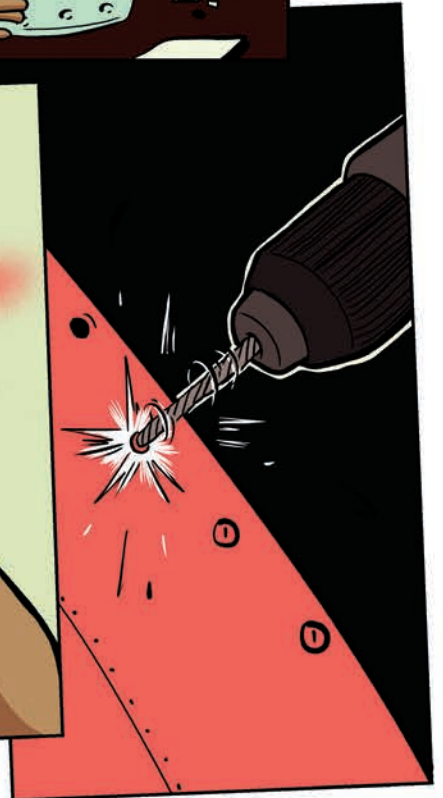
BY
REVITALISING THIS
LAND, WE CAN START
OUR IMPORTANT
REWILDING
PROJECT!

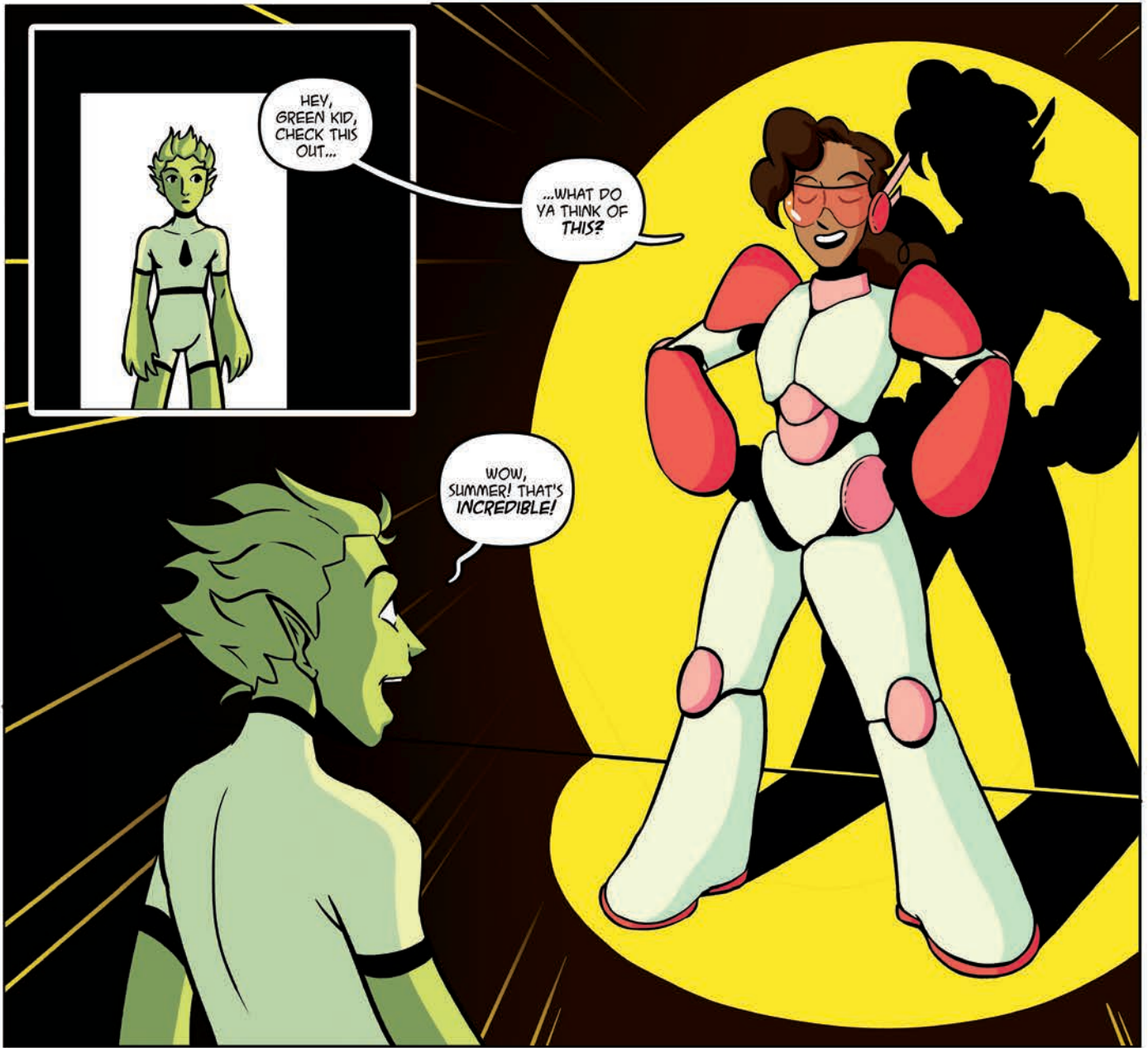


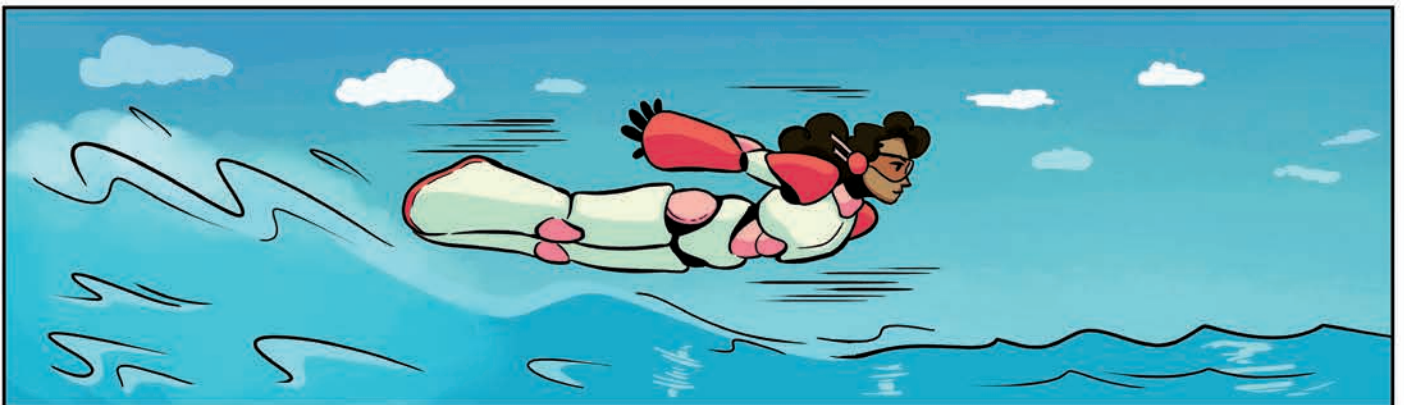
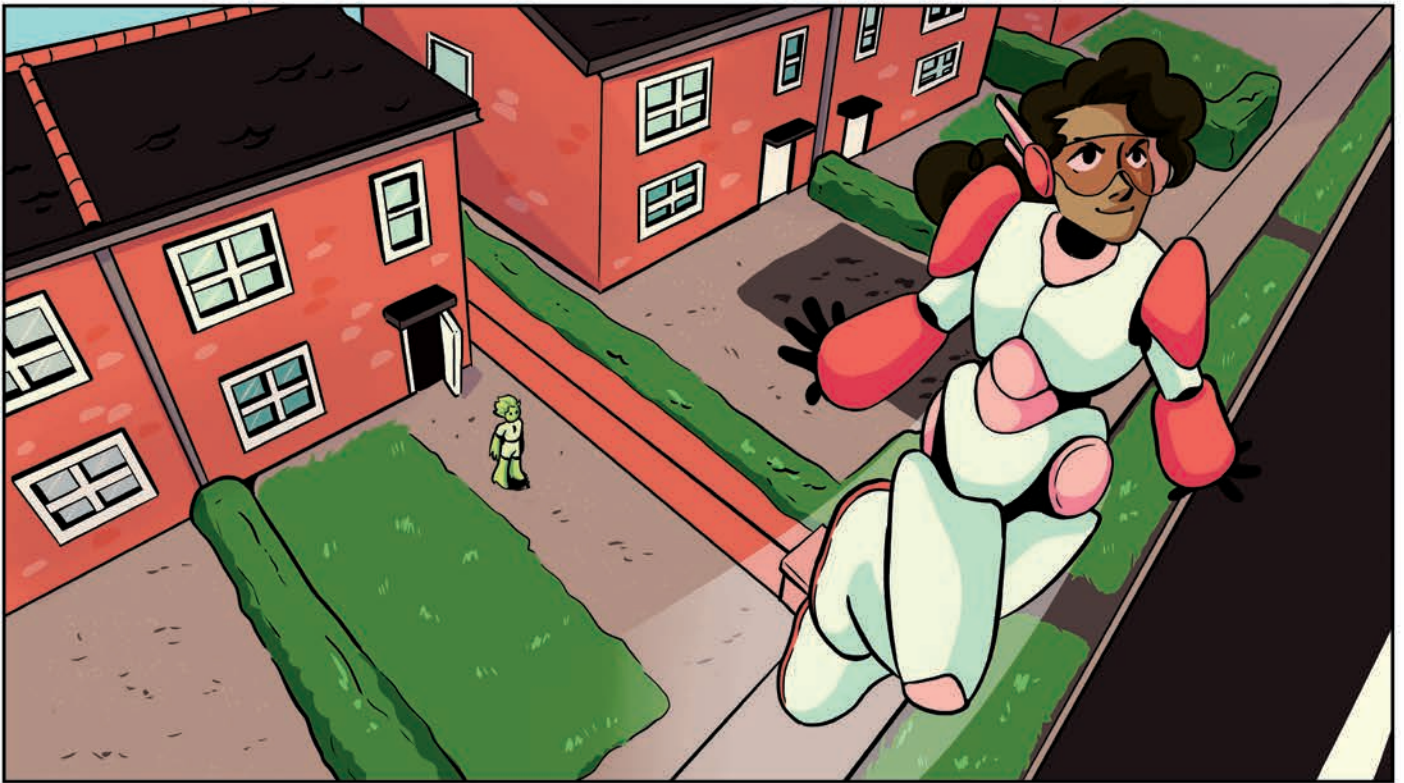
NO
PROBLEM
AT ALL, SIR!



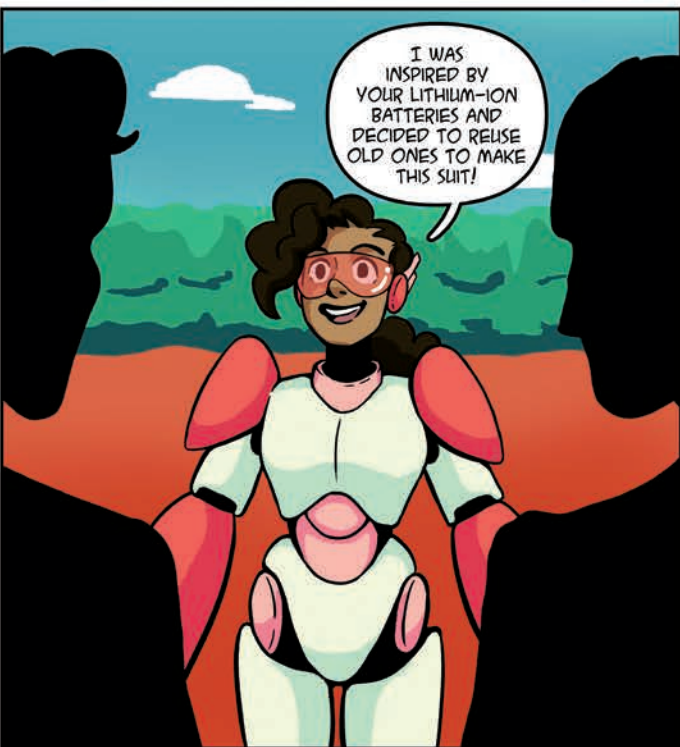
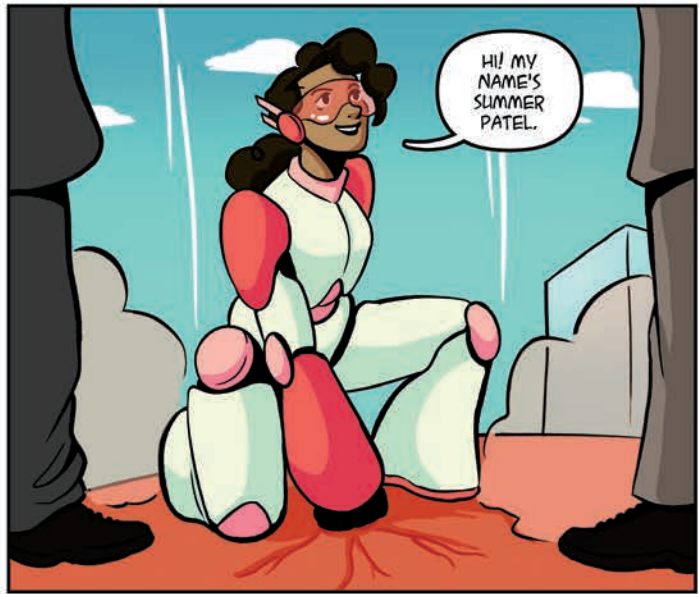
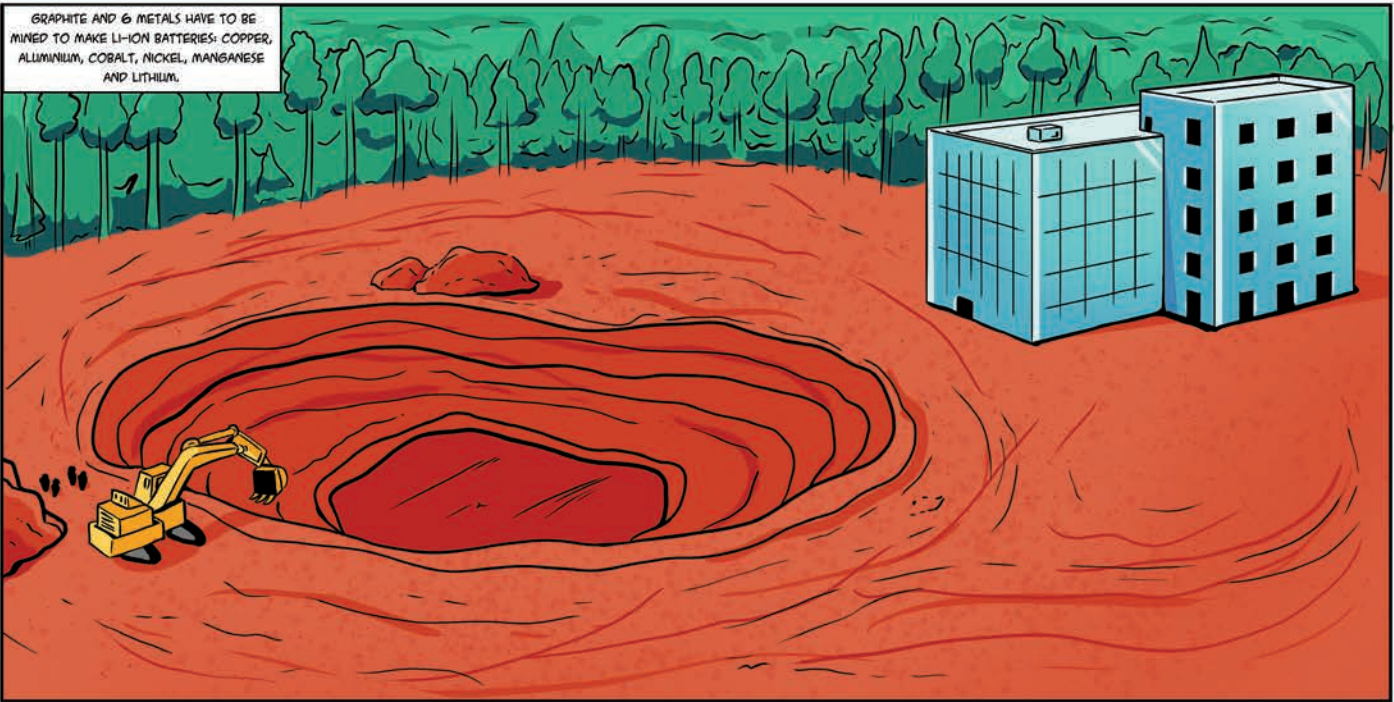




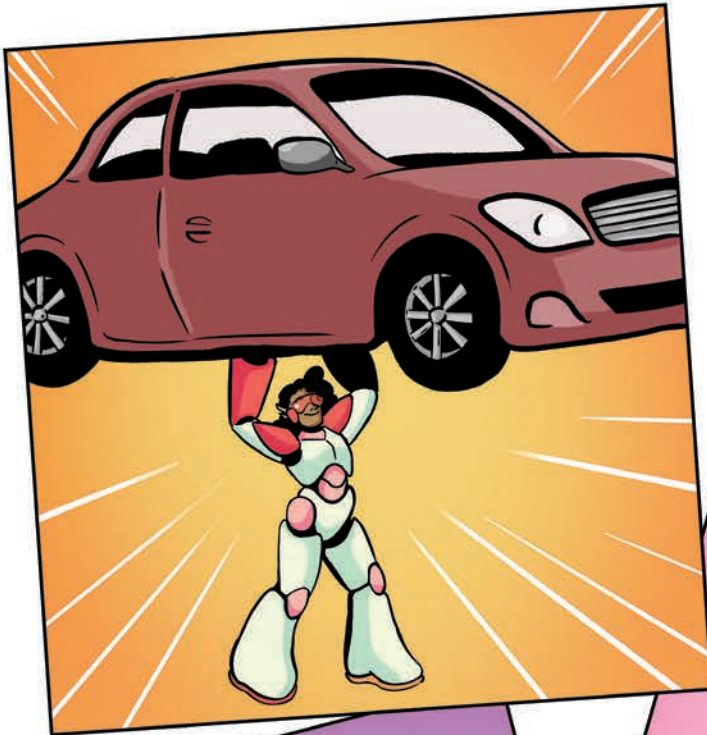
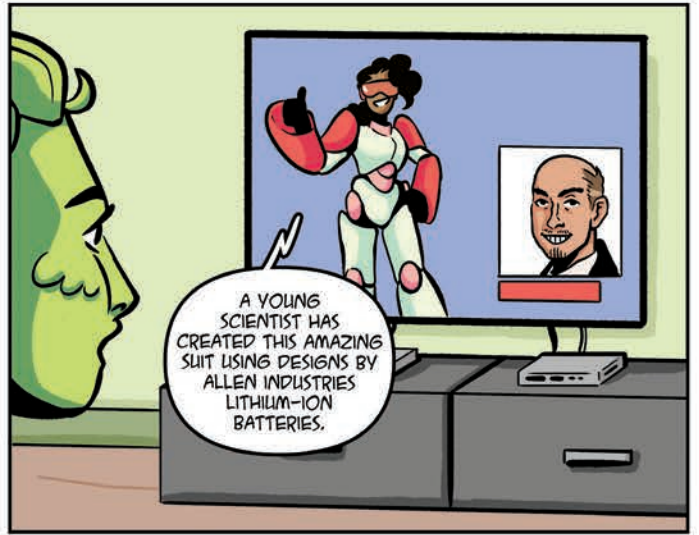
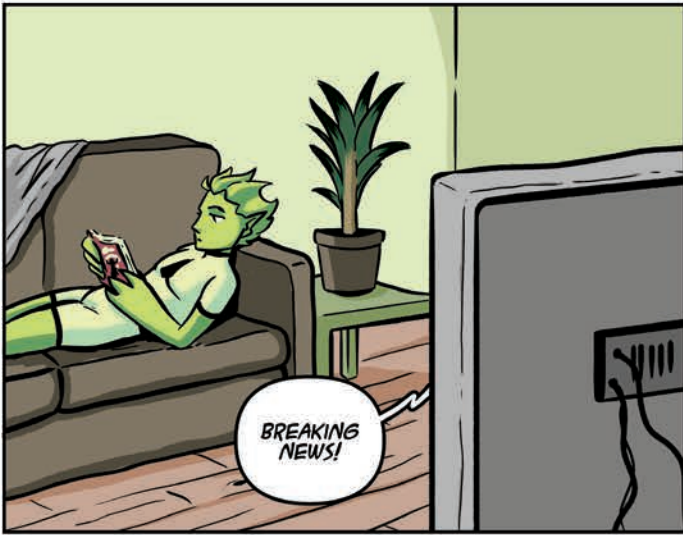


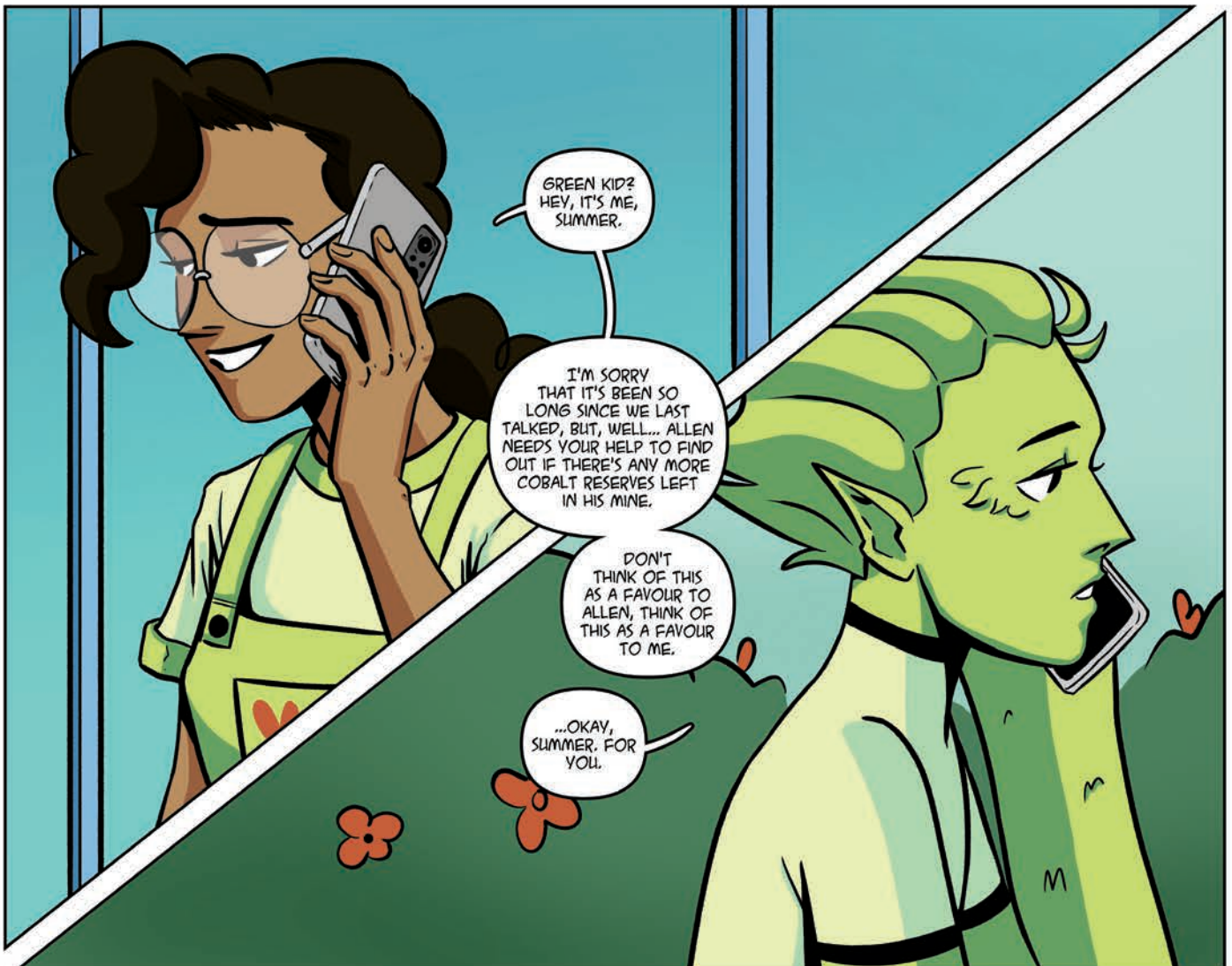
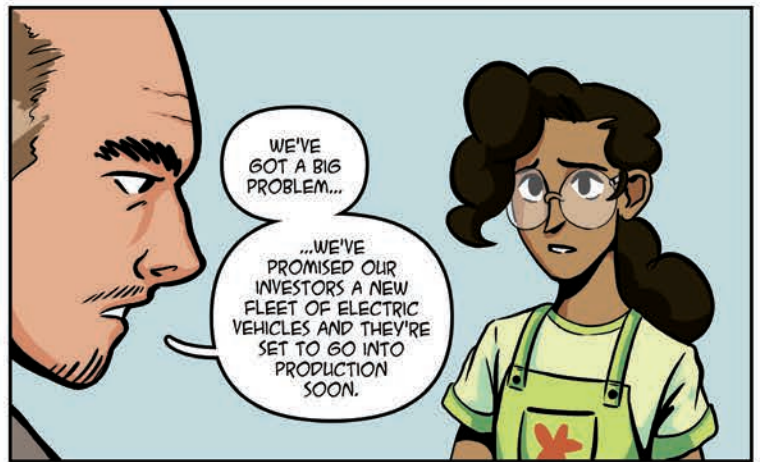
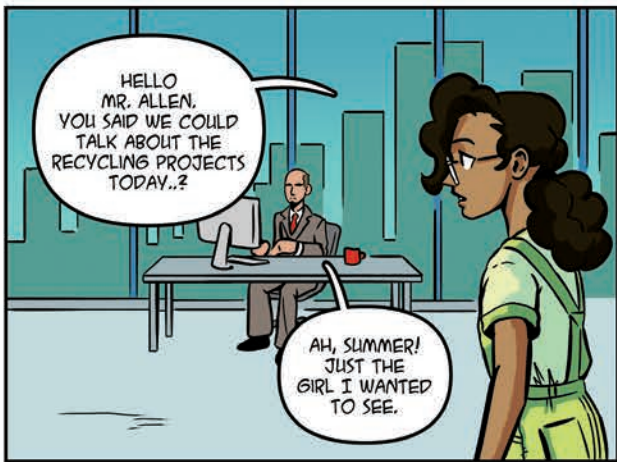


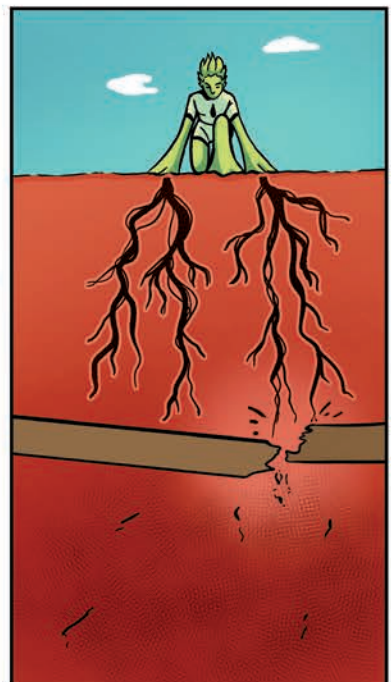
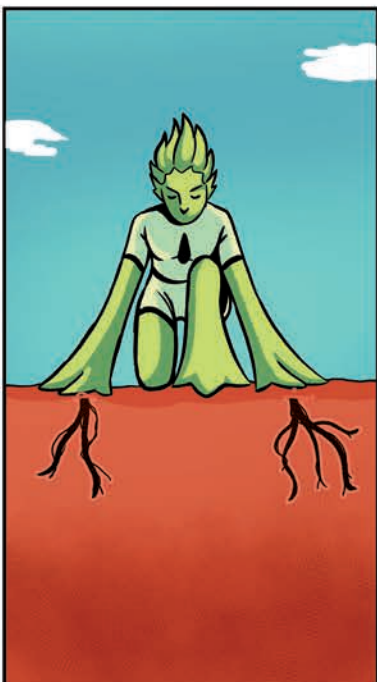
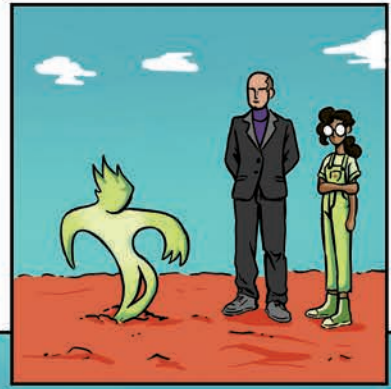
GRAPHITE AND 6 METALS HAVE TO BE MINED TO MAKE LI-ION BATTERIES: COPPER, ALUMINIUM, COBALT, NICKEL, MANGANESE AND LITHIUM.



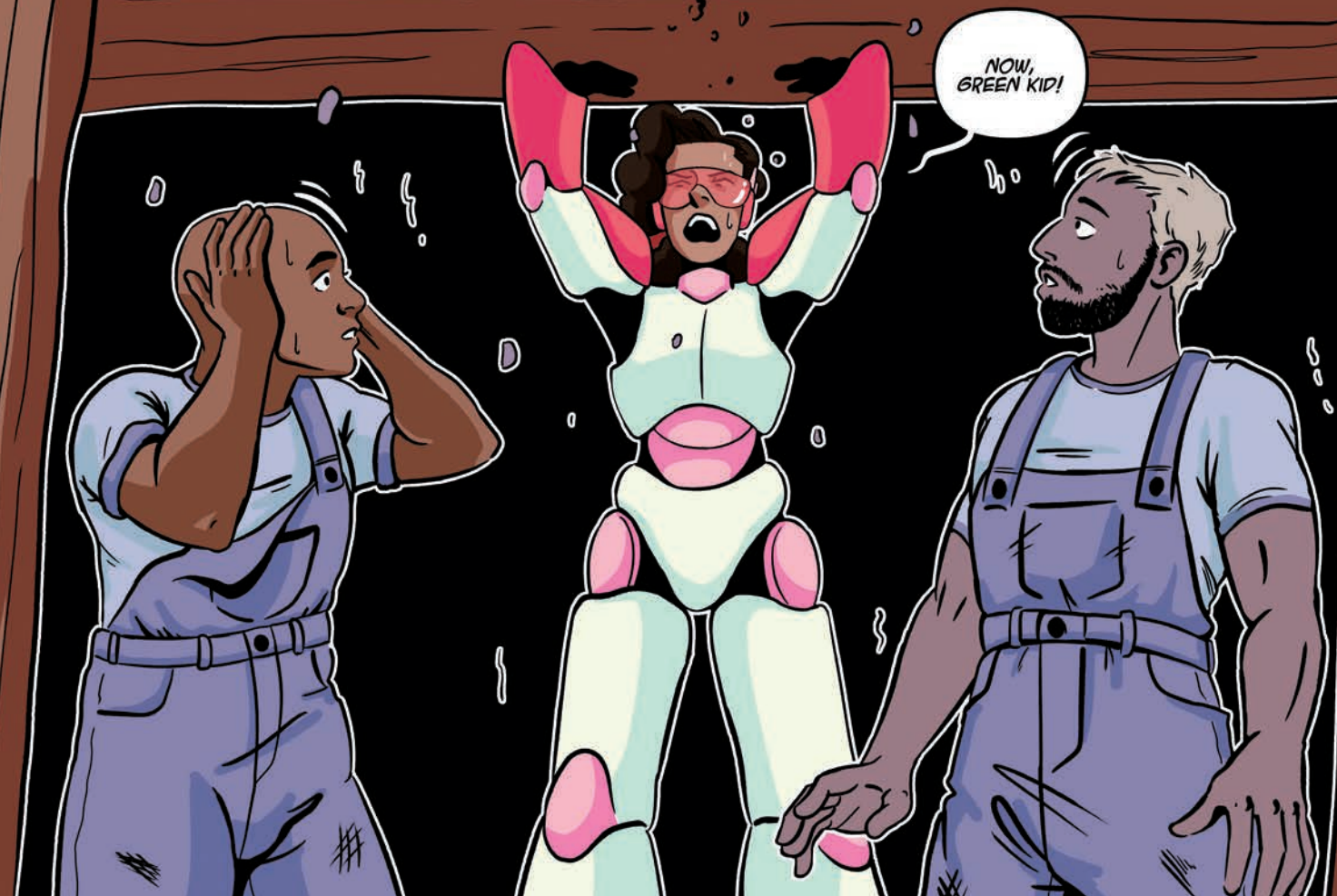


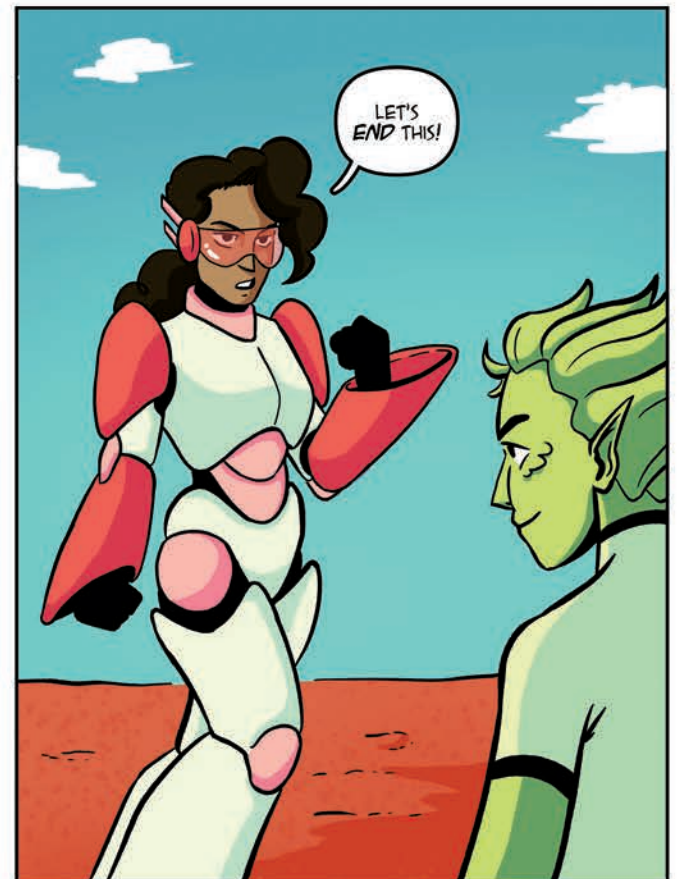


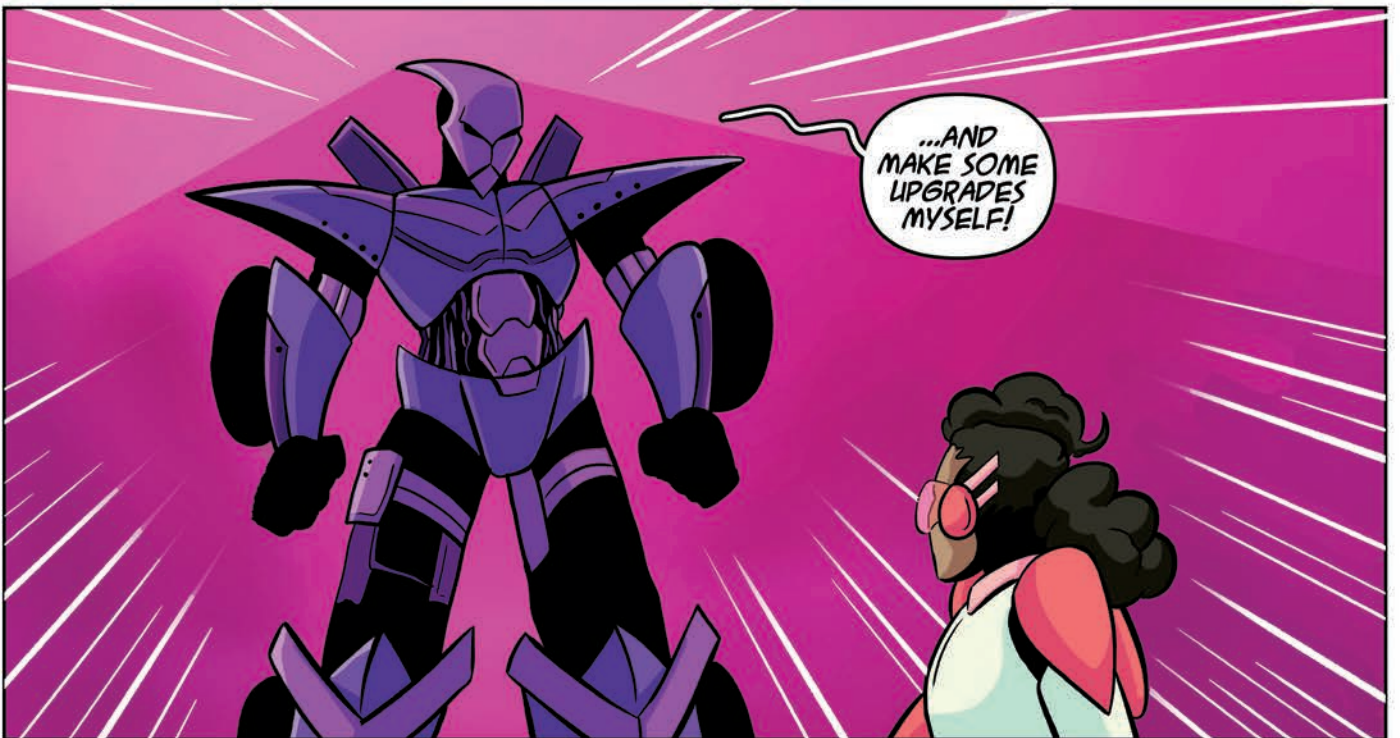
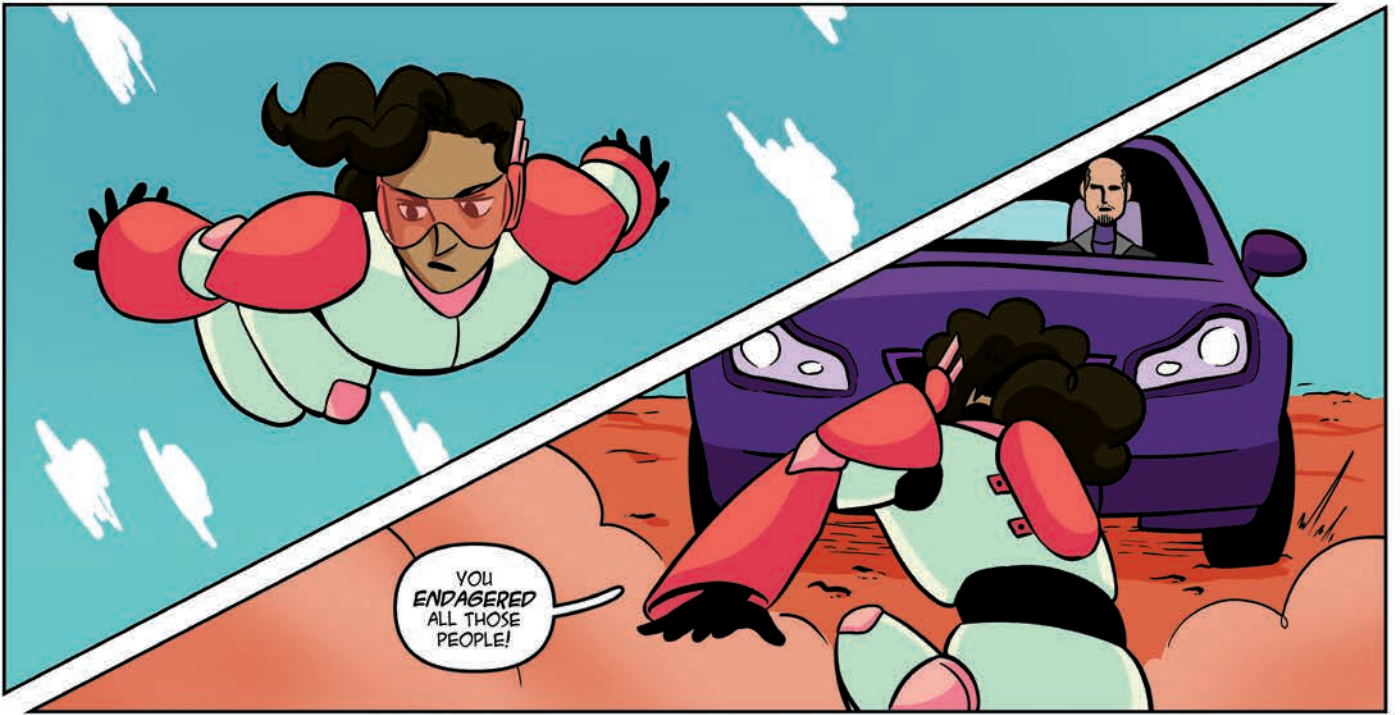


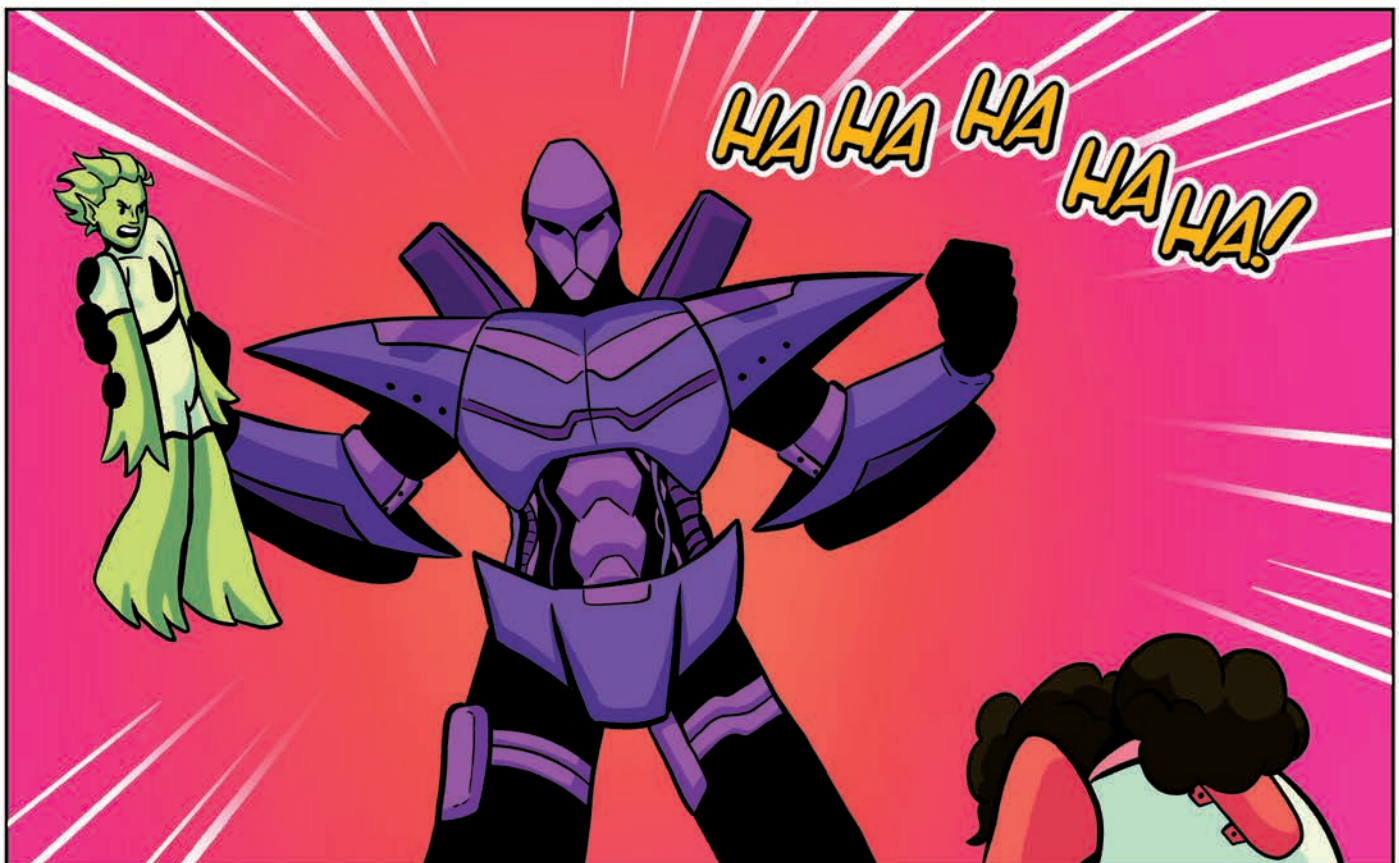
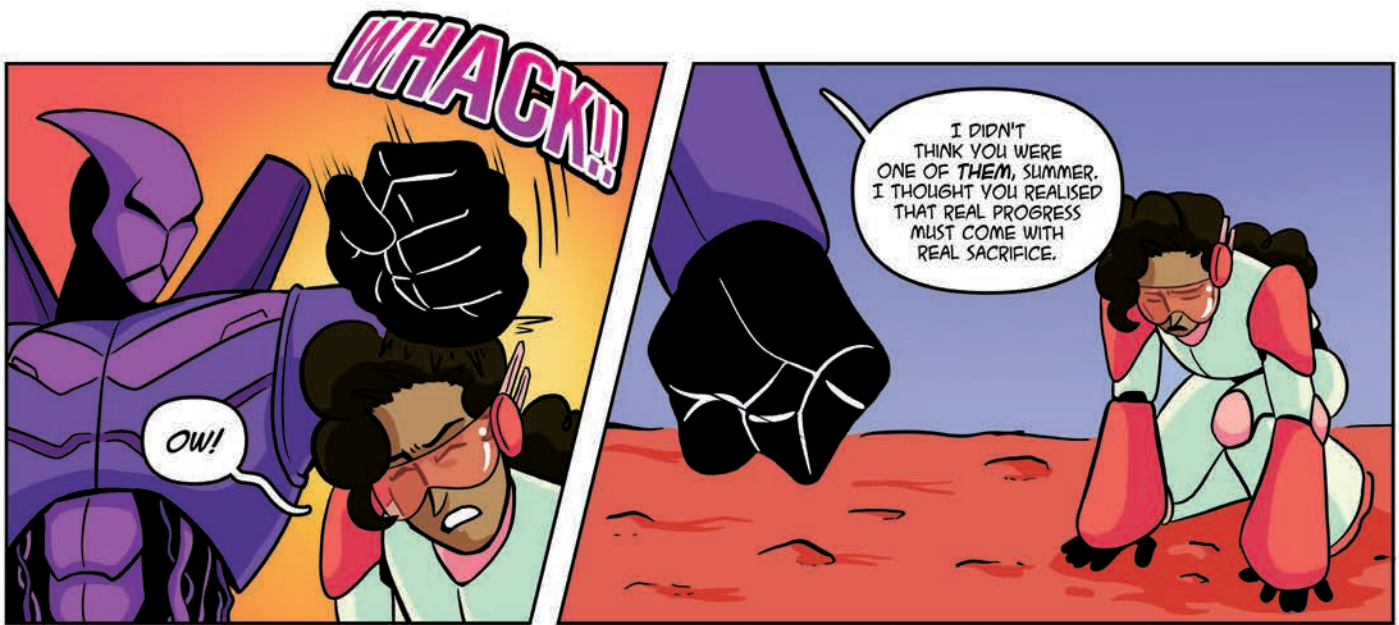


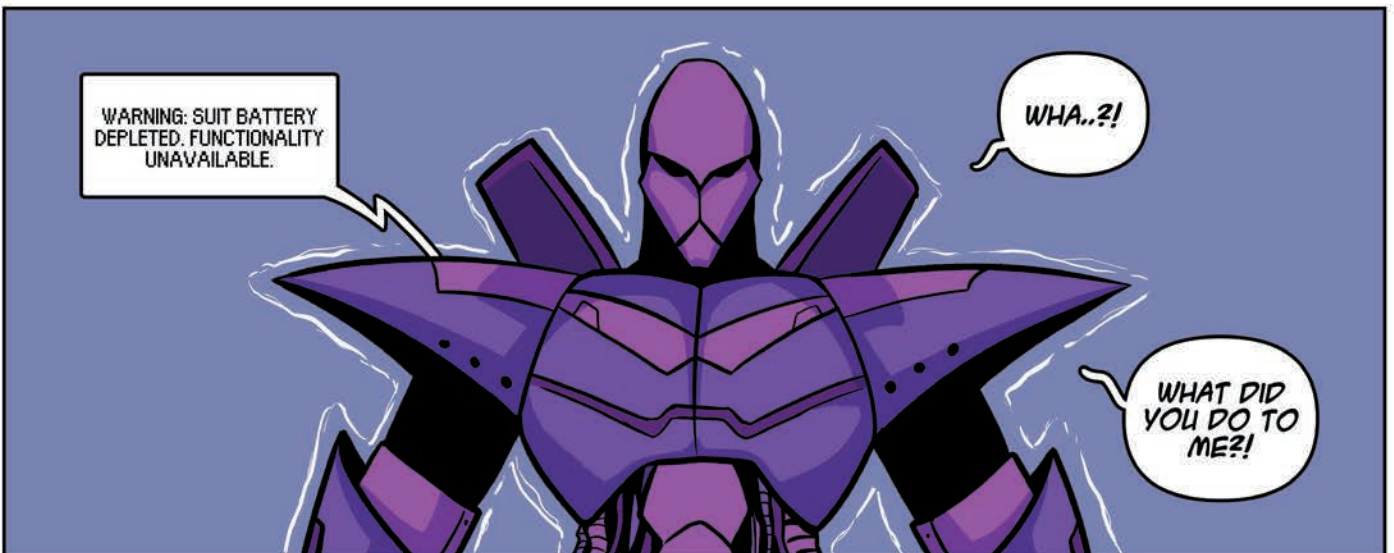
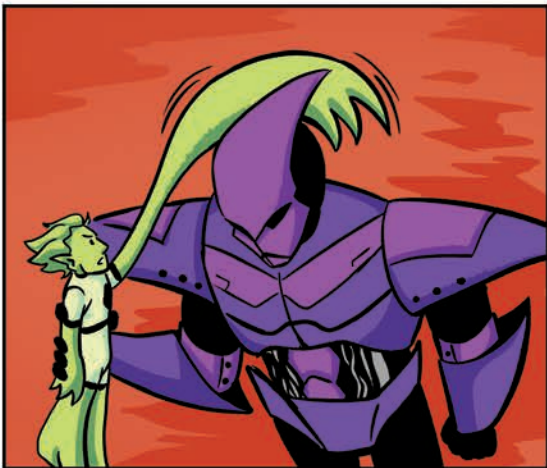
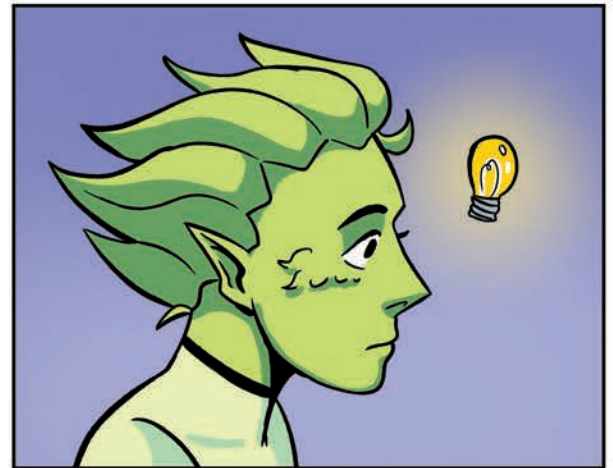


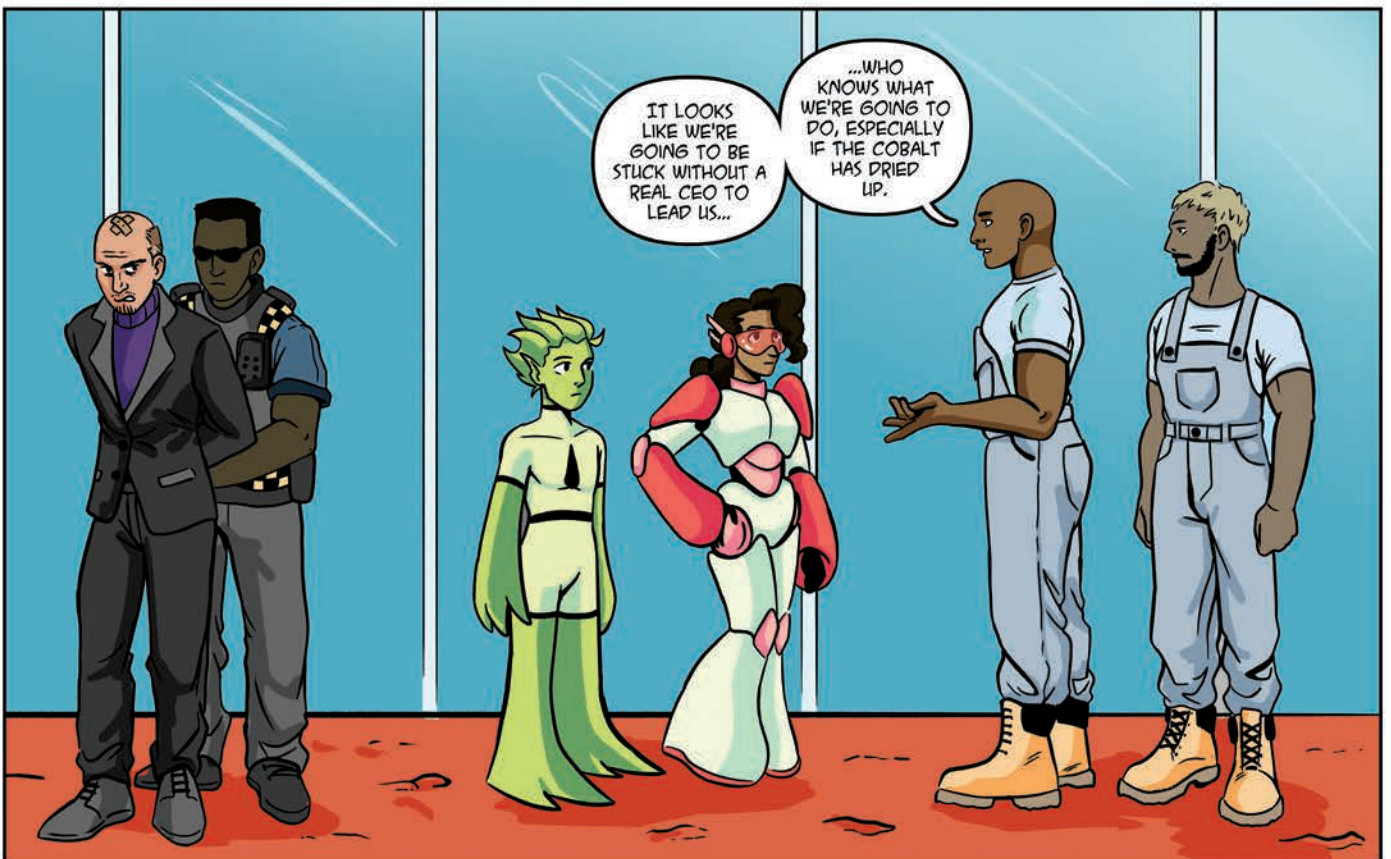
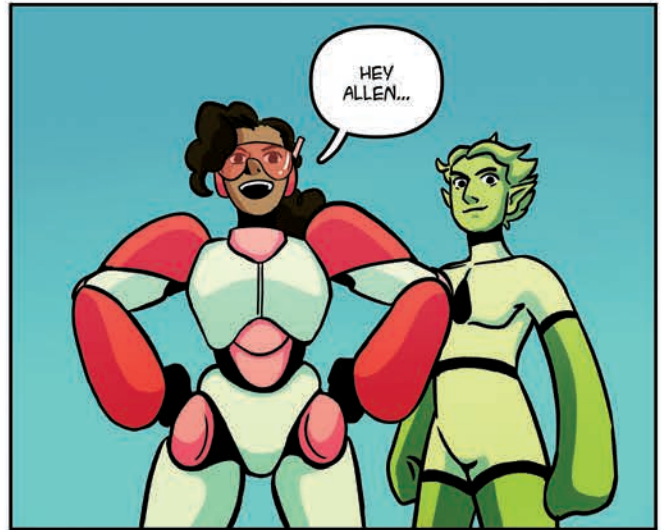






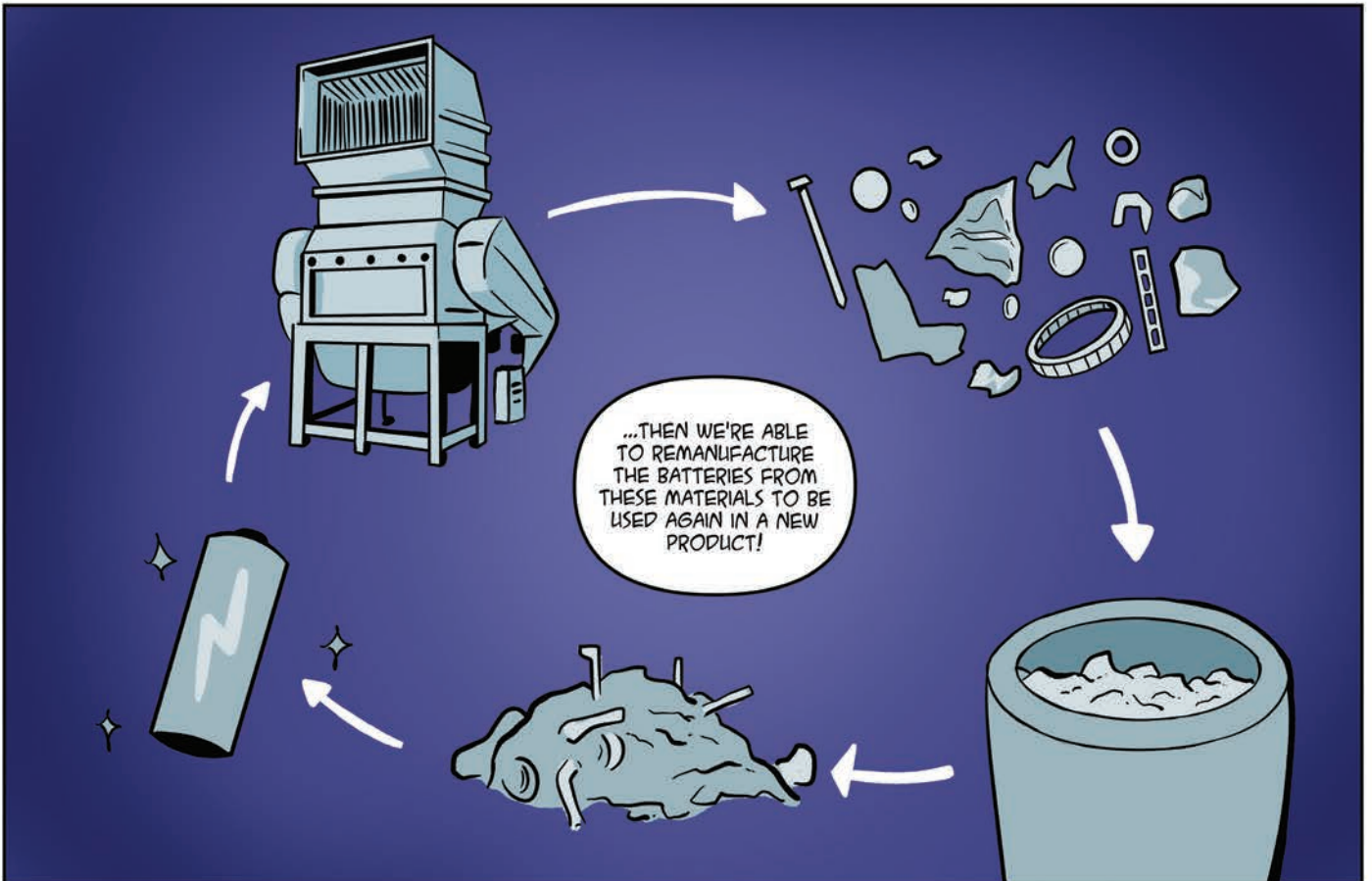


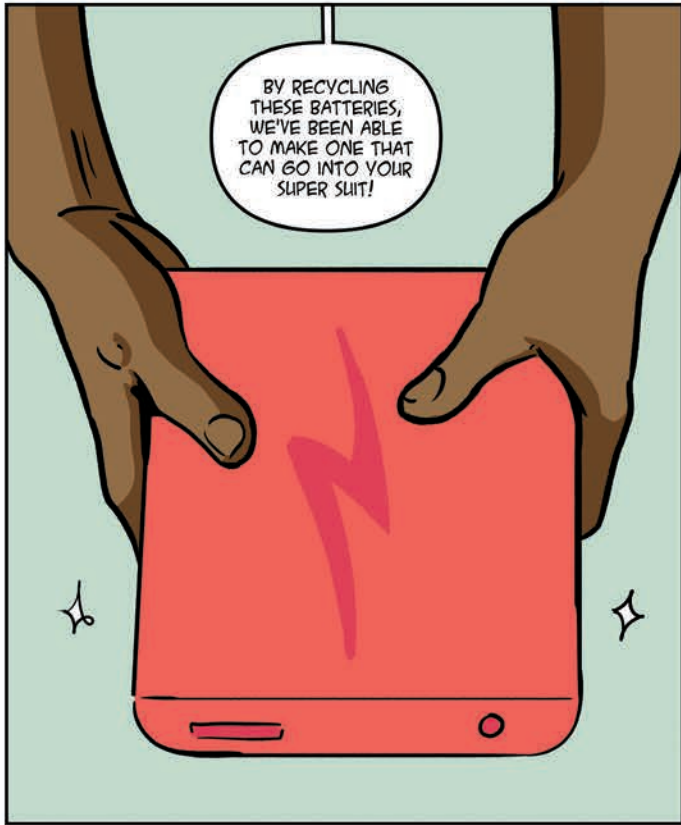




IT LOOKS LIKE WE'RE GOING TO BE STUCK WITHOUT A REAL CEO TO LEAD US...

...WHO KNOWS WHAT WE'RE GOING TO DO, ESPECIALLY IF THE COBALT HAS DRIED UP.

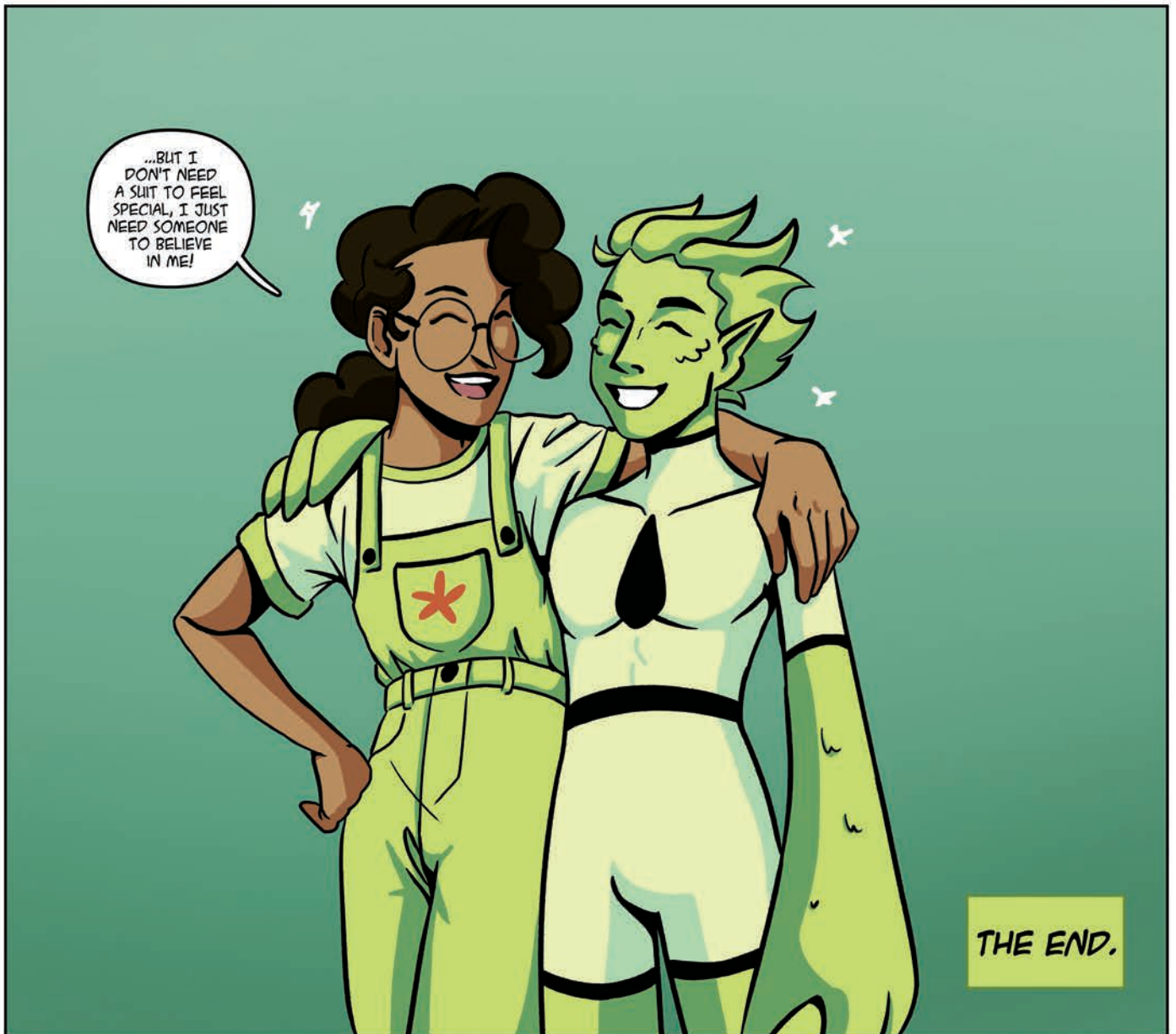




BY RECYCLING THESE BATTERIES, WE'VE BEEN ABLE TO MAKE ONE THAT CAN GO INTO YOUR SUPER SUIT!

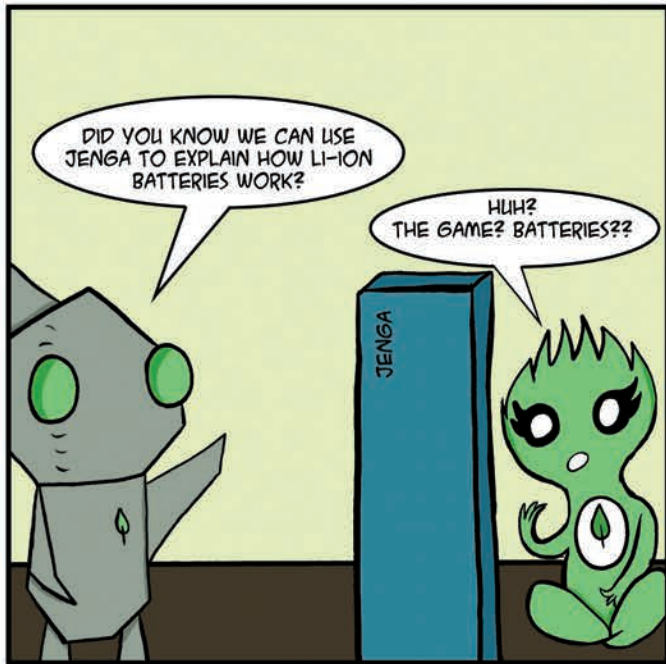


OH!
THANKS SO MUCH...



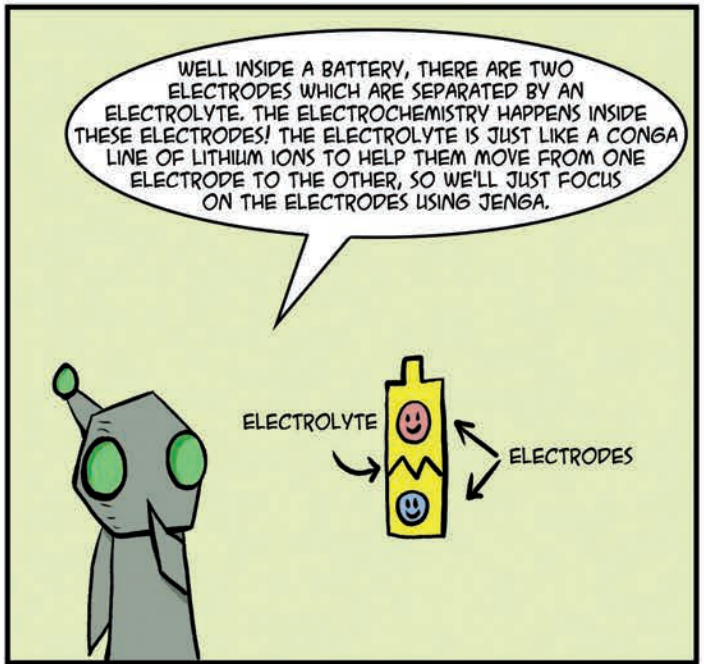
...BUT I DON'T NEED A SUIT TO FEEL SPECIAL, I JUST NEED SOMEONE TO BELIEVE IN ME!

THE END.

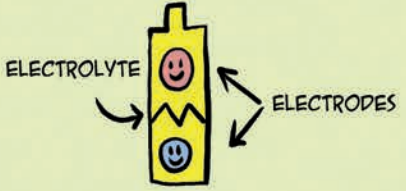


DID YOU KNOW WE CAN USE JENGA TO EXPLAIN HOW LI-ION BATTERIES WORK?

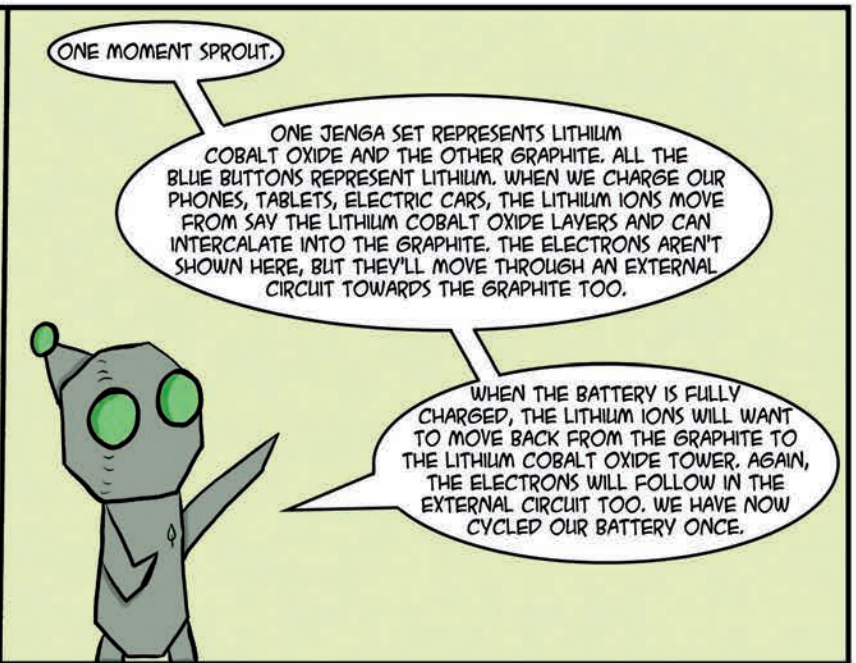
HUH? THE GAME? BATTERIES??



WELL INSIDE A BATTERY, THERE ARE TWO ELECTRODES WHICH ARE SEPARATED BY AN ELECTROLYTE. THE ELECTROCHEMISTRY HAPPENS INSIDE THESE ELECTRODES! THE ELECTROLYTE IS JUST LIKE A CONGA LINE OF LITHIUM IONS TO HELP THEM MOVE FROM ONE ELECTRODE TO THE OTHER, SO WE'LL JUST FOCUS ON THE ELECTRODES USING JENGA.



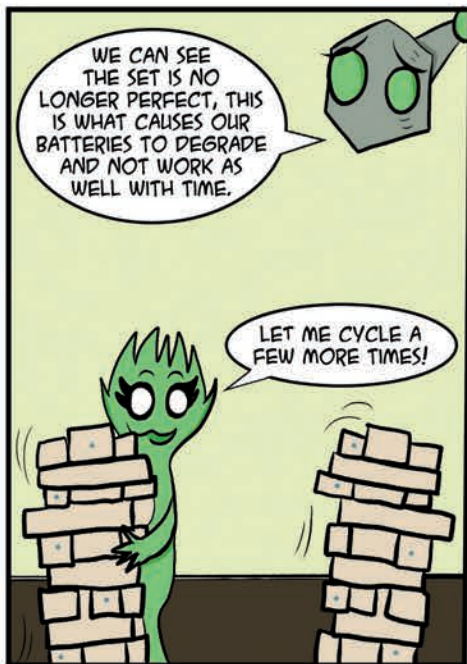
OOOO JENGA! CAN I PLAY!?



ONE MOMENT SPROUT.

ONE JENGA SET REPRESENTS LITHIUM COBALT OXIDE AND THE OTHER GRAPHITE. ALL THE BLUE BUTTONS REPRESENT LITHIUM. WHEN WE CHARGE OUR PHONES, TABLETS, ELECTRIC CARS, THE LITHIUM IONS MOVE FROM SAY THE LITHIUM COBALT OXIDE LAYERS AND CAN INTERCALATE INTO THE GRAPHITE. THE ELECTRONS AREN'T SHOWN HERE, BUT THEY'LL MOVE THROUGH AN EXTERNAL CIRCUIT TOWARDS THE GRAPHITE TOO.

WHEN THE BATTERY IS FULLY CHARGED, THE LITHIUM IONS WILL WANT TO MOVE BACK FROM THE GRAPHITE TO THE LITHIUM COBALT OXIDE TOWER. AGAIN, THE ELECTRONS WILL FOLLOW IN THE EXTERNAL CIRCUIT TOO. WE HAVE NOW CYCLED OUR BATTERY ONCE.



WE CAN SEE THE SET IS NO LONGER PERFECT, THIS IS WHAT CAUSES OUR BATTERIES TO DEGRADE AND NOT WORK AS WELL WITH TIME.

LET ME CYCLE A FEW MORE TIMES!



IF THE LITHIUM BLOCKS ARE REMOVED SLOWLY, WE WOULD CALL THIS A SLOW CHARGE.

ARE YOU LISTENING SPROUT?



AND THAT... IS WHAT HAPPENS WHEN WE CHARGE TOO FAST FOR OUR MATERIAL -- WE HAVE STRUCTURE COLLAPSE. WE NEED TO GET THE BALANCE RIGHT -- FAST ENOUGH FOR USE, NOT TO DESTROY THE STRUCTURE.

FUN AND GAMES

CAN YOU SEE YOUR FANART? CHECK IT OUT!

WORD SEARCH

O	D	E	E	G	S	S	E	E	O	O	U
D	I	E	I	R	U	R	R	T	E	L	L
A	R	L	S	E	M	G	O	A	M	E	C
F	G	E	L	E	M	R	C	L	T	S	E
U	D	C	I	N	E	E	E	E	T	E	L
E	E	T	C	K	R	K	R	G	L	I	I
L	S	R	I	I	L	B	L	E	T	R	R
C	I	O	L	D	M	N	C	H	S	E	R
E	N	L	O	C	B	T	I	N	I	T	C
L	O	Y	C	F	R	U	D	I	L	T	O
L	B	T	E	O	M	I	L	C	D	A	B
L	R	E	D	I	S	O	E	T	L	B	A
B	A	E	O	I	L	R	E	E	L	D	L
O	C	N	C	M	D	G	U	C	N	E	T

CARBONISED GRID
COBALT
ELECTRODE
ELECTROLYTE
FUEL CELL
LITHIUM-ION
BATTERIES
SUMMER
GREENKID
RENEWABLE ENERGY

FAN ART!



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WITH SPECIAL THANKS
TO ACOMB PRIMARY
AND
ALL SAINTS RC
SCHOOL YORK FOR
BETA TESTING.



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THE FARADAY
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REVISE & RECYCLING OF LITHIUM ION BATTERIES

ReLiB



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