

AIRBUS FOUNDATION

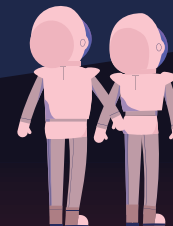
# DISCOVERY SPACE

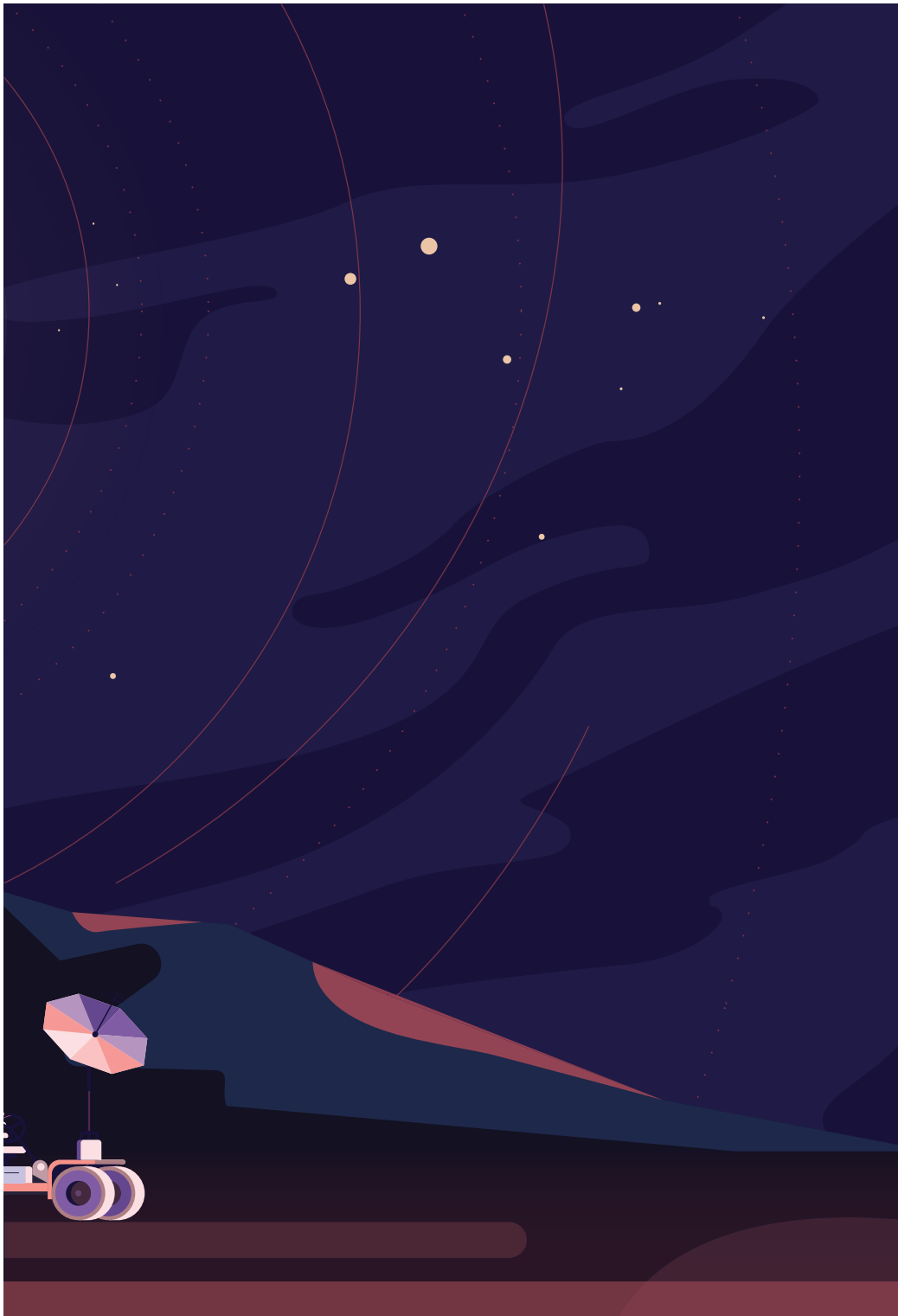
## MISSION TO THE MOON



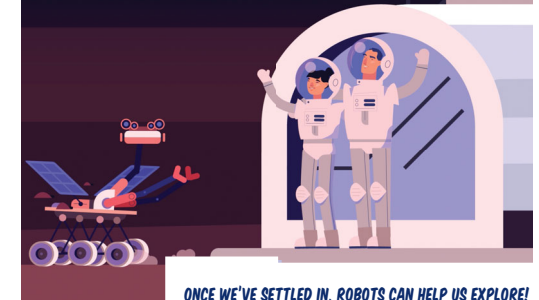
AIRBUS FOUNDATION

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Concept design by Funk-E.  
Illustrations by Funk-E.





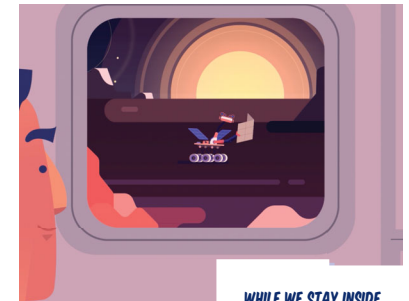
NOW THAT'S A WARM WELCOME!



ONCE WE'VE SETTLED IN, ROBOTS CAN HELP US EXPLORE!



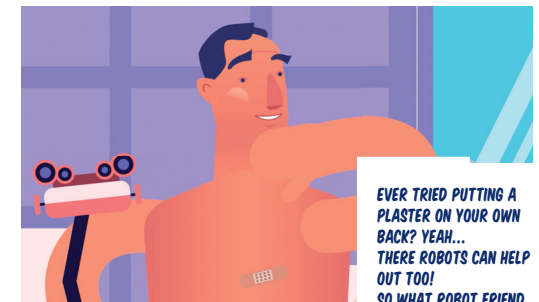
THERE'S DANGEROUS RADIATION ON THE MOON, SO WE CAN'T STAY OUTSIDE FOR TOO LONG. ROBOT ROVERS COULD MAP THE ENTIRE PLANET,



WHILE WE STAY INSIDE, SAFE AND SOUND.



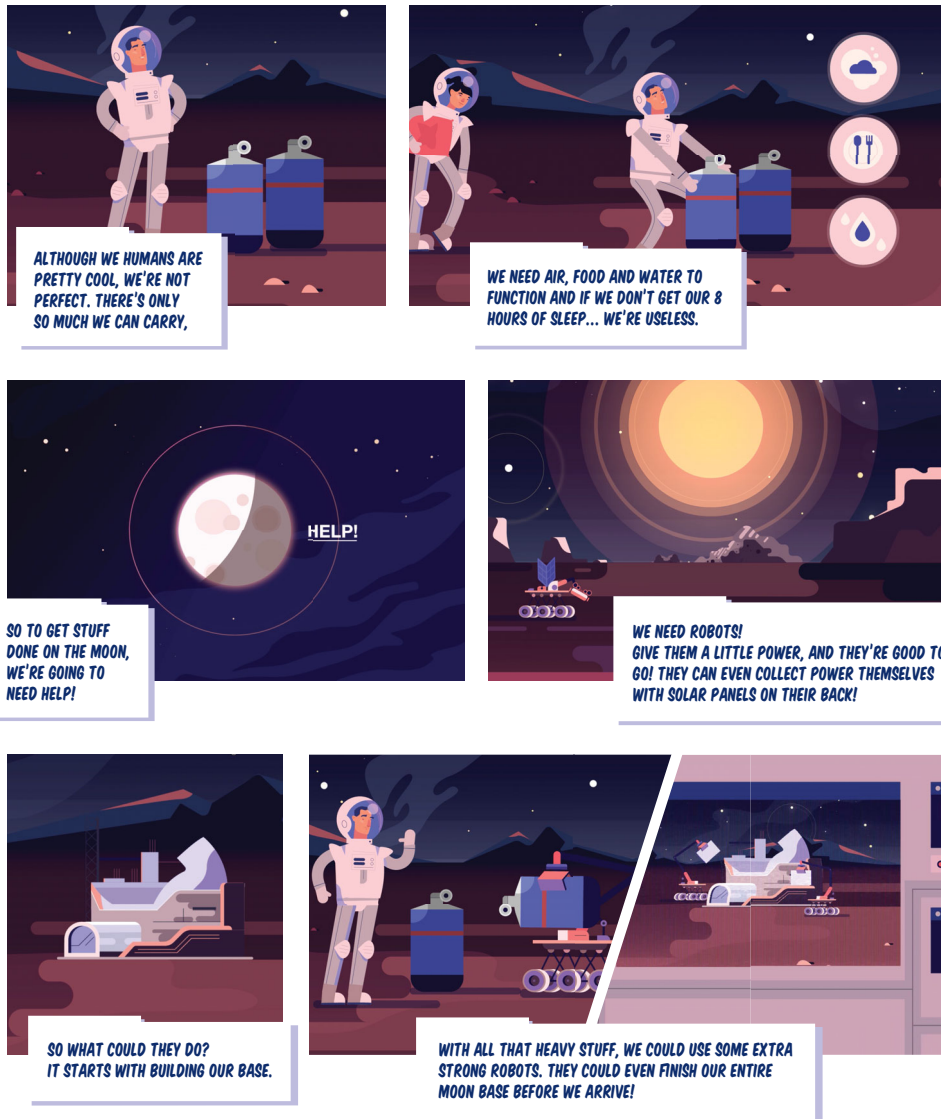
INSIDE THE MOON BASE, THEY CAN BE A BIG HELP TOO! THEY CAN DO EXPERIMENTS, FARM OUR FRUITS AND VEGGIES. AND EHH...



EVER TRIED PUTTING A PLASTER ON YOUR OWN BACK? YEAH... THERE ROBOTS CAN HELP OUT TOO! SO WHAT ROBOT FRIEND WILL YOU BRING TO THE MOON?

Our biggest friends on the moon!

# Content



Chapter 1:

## Fly me to the moon!

You might think going to moon is a simple trip from A to B. But in fact, it's an adventure with big rockets, gravity and no gravity at all. Your adventure starts here!

Chapter 2:

## Moon life 101

If we want to live on the moon, we're going to need some basics. Right now, there is no air, water or food. So how can we make it through the day?

Chapter 3:

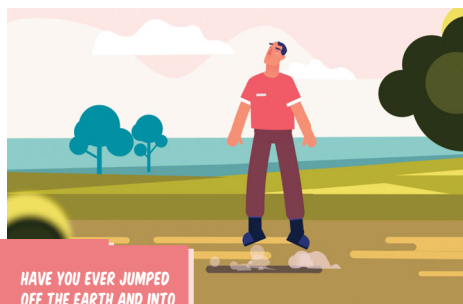
## Architect to the stars

Where would you build your house on the moon? And what would it look like? Discover everything you need to design and build your dream moon home!

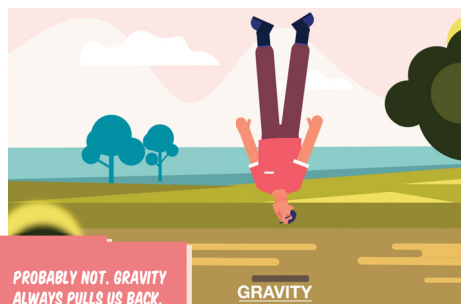
Chapter 4:

## Working nine to five on the moon

There's tons of stuff to do on the moon! Cool places to see, experiments to do and new ways to travel around. This is your travel guide to the moon!

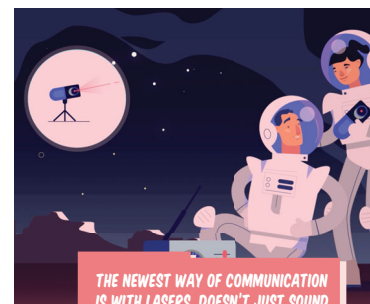


HAVE YOU EVER JUMPED OFF THE EARTH AND INTO SPACE?



PROBABLY NOT. GRAVITY ALWAYS PULLS US BACK.

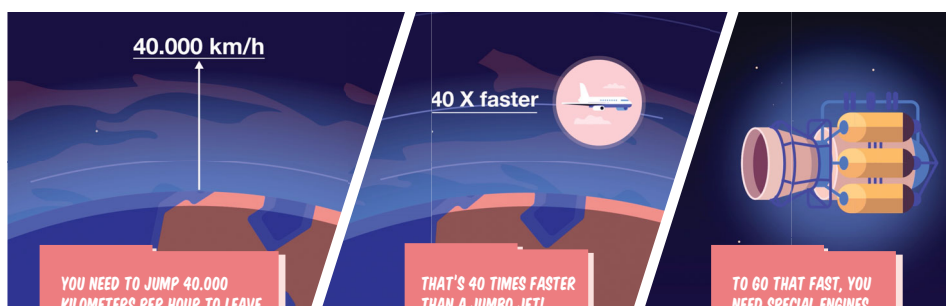
GRAVITY



THE NEWEST WAY OF COMMUNICATION IS WITH LASERS. DOESN'T JUST SOUND COOL, IT'S VERY FAST AS WELL!



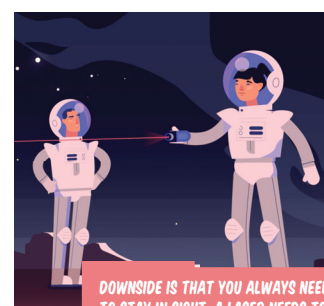
IT'S 20 TIMES FASTER THAN THE AVERAGE INTERNET CONNECTIONS WE HAVE HERE ON EARTH!



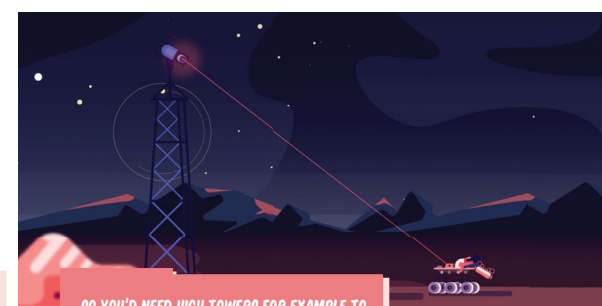
YOU NEED TO JUMP 40.000 KILOMETERS PER HOUR TO LEAVE EARTH.

THAT'S 40 TIMES FASTER THAN A JUMBO JET!

TO GO THAT FAST, YOU NEED SPECIAL ENGINES. ROCKET ENGINES!



DOWNSIDE IS THAT YOU ALWAYS NEED TO STAY IN SIGHT. A LASER NEEDS TO DIRECTLY HIT THE RECEIVER.



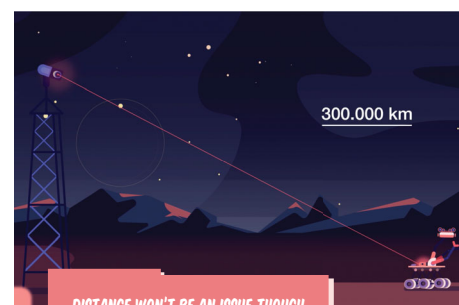
SO YOU'D NEED HIGH TOWERS FOR EXAMPLE TO STAY IN TOUCH WITH AN EXPLORING ROVER.



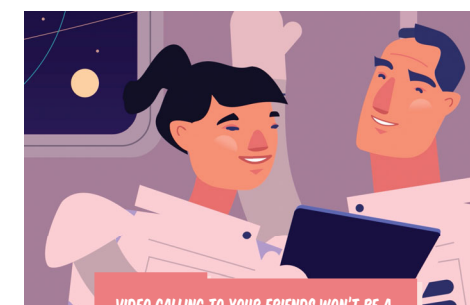
YOU KNOW WHEN THE AIR GOES OUT OF A BALLOON?

THE AIR GOES ONE WAY, AND THE BALLOON GOES THE OTHER, RIGHT?

WELL, ROCKET ENGINES DO THE SAME,

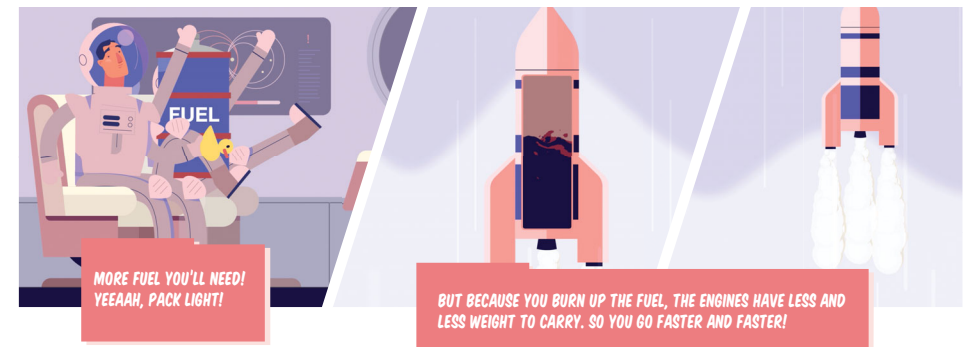
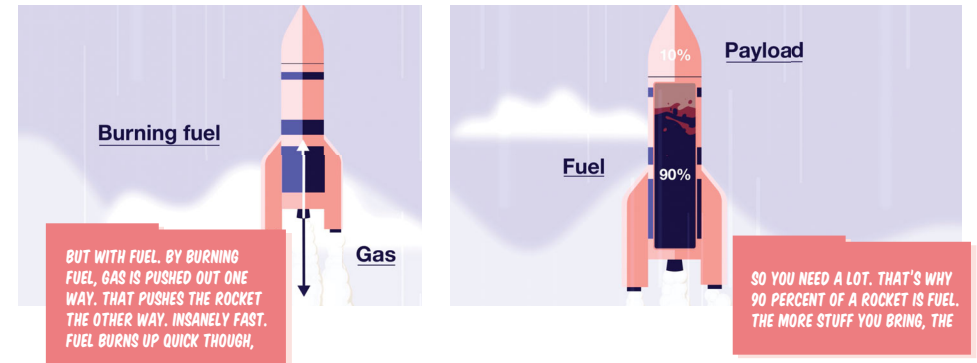


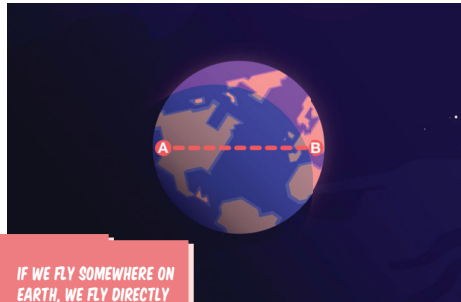
DISTANCE WON'T BE AN ISSUE THOUGH. IT CAN REACH 300.000 KILOMETERS... IN A SECOND.



VIDEO CALLING TO YOUR FRIENDS WON'T BE A PROBLEM! SO, WHAT WILL YOUR MOON PHONE LOOK LIKE?







IF WE FLY SOMEWHERE ON EARTH, WE FLY DIRECTLY FROM A TO B.



SO YOU'D THINK THAT IF YOU FLY FROM EARTH TO THE MOON, YOU'D SIMPLY FLY DIRECTLY TOO, RIGHT?



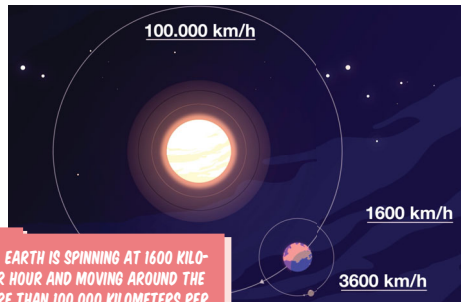
WE COULD ALSO LOOK THE OTHER WAY, FROM THE FAR SIDE OF THE MOON.



THERE YOU HAVE A MUCH CLEARER VIEW INTO SPACE AS THERE IS NO INTERFERENCE FROM RADIO WAVES, OR EARTH'S ATMOSPHERE.



WELL, IN SPACE, IT'S NOT THAT EASY! FIRST... YOU CAN'T FLY DIRECTLY FROM A TO B, BECAUSE A AND B ARE MOVING!



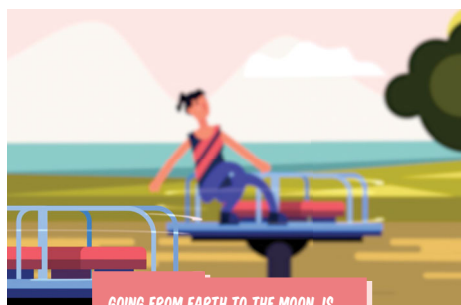
RIGHT NOW, EARTH IS SPINNING AT 1600 KILOMETERS PER HOUR AND MOVING AROUND THE SUN AT MORE THAN 100,000 KILOMETERS PER HOUR! AND THE MOON IS ORBITING US AGAIN!



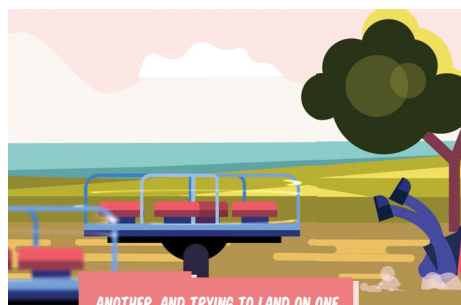
THE MOON'S SURFACE IS NOT VERY HUMAN FRIENDLY THOUGH, SO WE MIGHT NEED ROBOTS TO SETUP EVERYTHING.



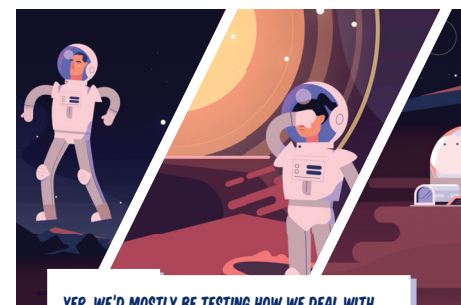
BUT OUR BIGGEST EXPERIMENT... WILL BE US!



GOING FROM EARTH TO THE MOON, IS LIKE JUMPING FROM ONE RIDICULOUSLY FAST TURNING MERRY-GO-ROUND TO



ANOTHER, AND TRYING TO LAND ON ONE SPECIFIC SPOT. GOOD LUCK! BUT THAT'S NOT ALL!



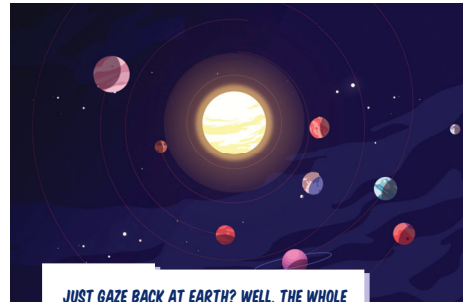
YEP, WE'D MOSTLY BE TESTING HOW WE DEAL WITH LOWER GRAVITY, RADIATION AND LIVING ON THE MOON.



SO WE NEED TO TAKE A LOT OF PICTURES, SKIN SAMPLES, DO PHYSICAL EXAMS. EVERYTHING! WHAT KIND OF EXPERIMENT WOULD YOU DO ON THE MOON?



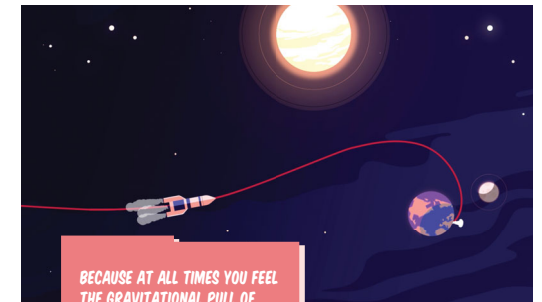
SAY, WE GO TO THE MOON,  
WHAT WOULD WE DO  
THERE?



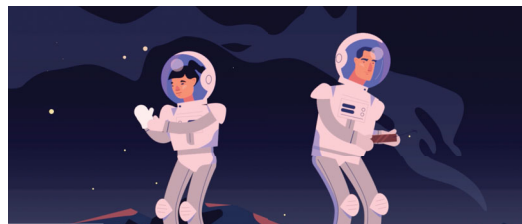
JUST GAZE BACK AT EARTH? WELL, THE WHOLE  
REASON WE WANT TO GO TO THE MOON,



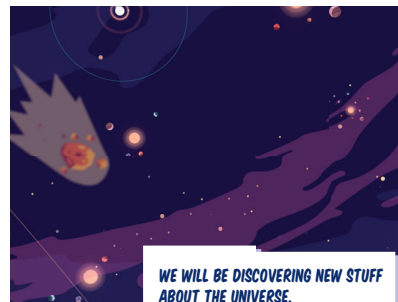
SECONDLY, FLYING DIRECTLY  
TO THE MOON IS DIFFICULT,



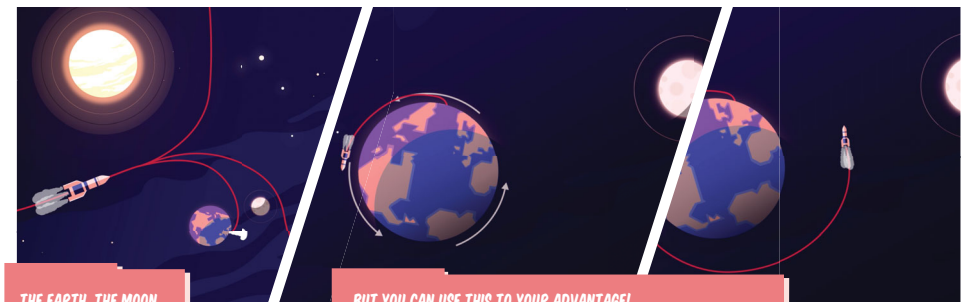
BECAUSE AT ALL TIMES YOU FEEL  
THE GRAVITATIONAL PULL OF  
SOMETHING...



IS TO RESEARCH HOW WE CAN LIVE ON A DIFFERENT  
PLANET. SO WE'D BE TESTING ALL SORTS OF COOL  
NEW GEAR AND TECHNOLOGIES THAT WE WANT USE  
ON MARS FOR EXAMPLE.



WE WILL BE DISCOVERING NEW STUFF  
ABOUT THE UNIVERSE.

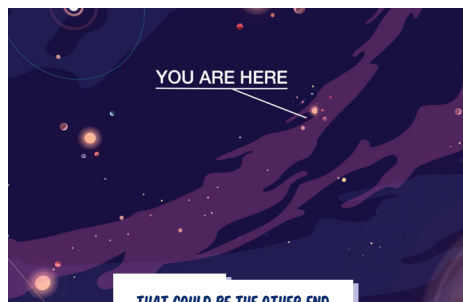


THE EARTH, THE MOON...  
EVEN THE SUN!

BUT YOU CAN USE THIS TO YOUR ADVANTAGE!  
BY LAUNCHING ALONG WITH THE EARTH'S ROTATION, TO THE EAST,  
YOU GET AN EXTRA BOOST TO GO INTO EARTH'S ORBIT!

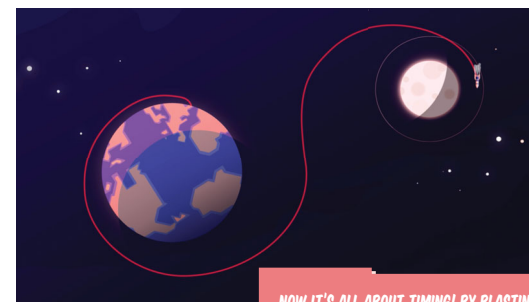


AS THE MOON HAS NO ATMOSPHERE, THE METEORITES  
THAT HIT THE SURFACE ARE COMPLETELY INTACT, WITH  
ALL THE MATERIALS FROM WHEREVER THEY CAME FROM.

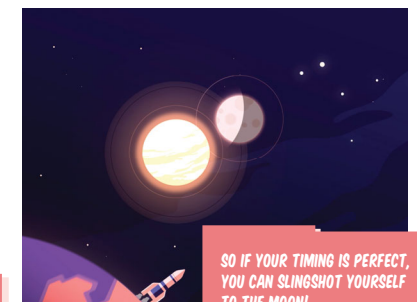


YOU ARE HERE

THAT COULD BE THE OTHER END  
OF THE UNIVERSE!

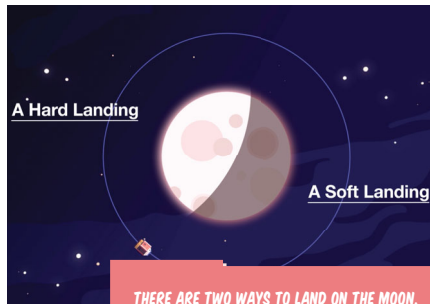


NOW IT'S ALL ABOUT TIMING! BY BLASTING  
AWAY AT JUST THE RIGHT MOMENT... YOU  
FLING YOURSELF TOWARDS THE MOON.



SO IF YOUR TIMING IS PERFECT,  
YOU CAN SLINGSHOT YOURSELF  
TO THE MOON!

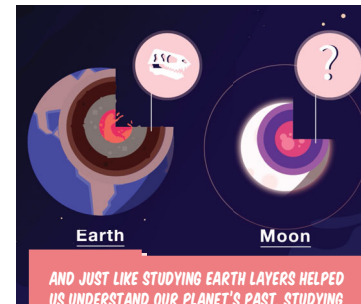




THERE ARE TWO WAYS TO LAND ON THE MOON. A HARD-LANDING AND A SOFT-LANDING.



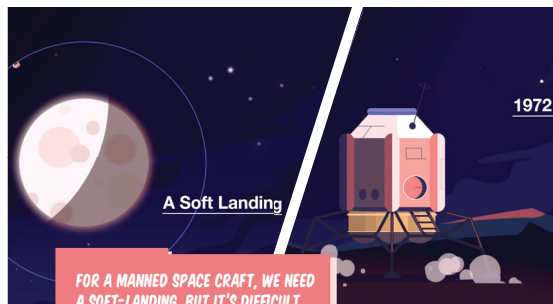
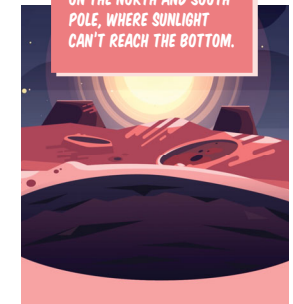
A HARD-LANDING IS SO HARD WE WOULDN'T SURVIVE IT. IN THE PAST DECADES A LOT OF UNMANNED SPACE CRAFTS LANDED THAT WAY ON THE MOON.



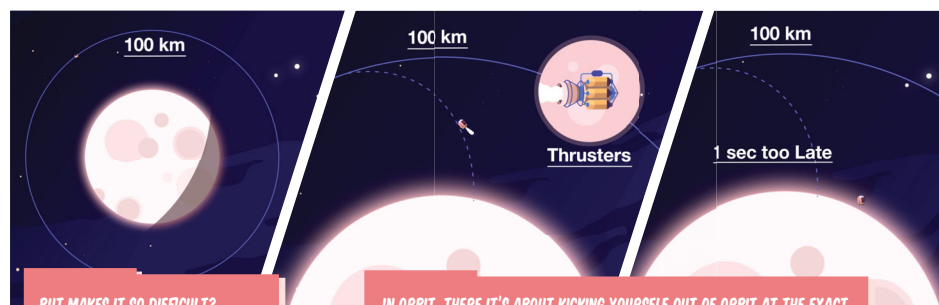
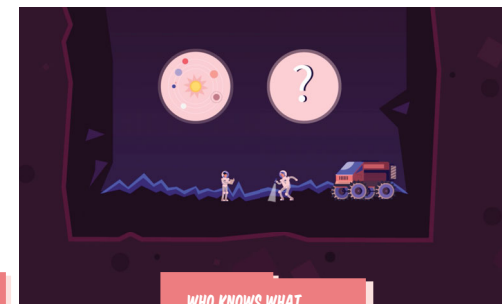
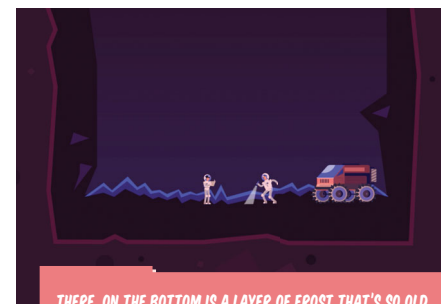
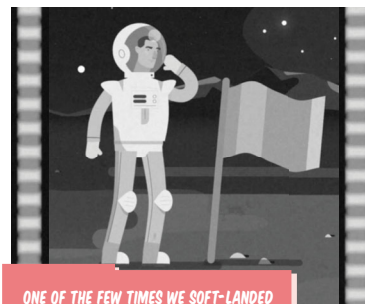
AND JUST LIKE STUDYING EARTH LAYERS HELPED US UNDERSTAND OUR PLANET'S PAST, STUDYING THE MOON LAYERS WILL PROBABLY TEACH US A LOT ABOUT THE MOON TOO.



OTHER "MUST SEE" ARE THE COLD TRAPS.

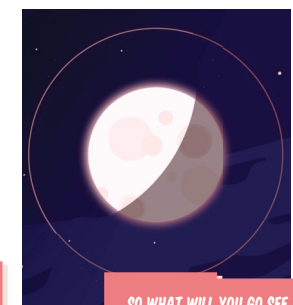
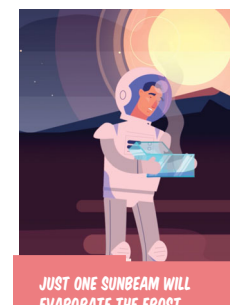
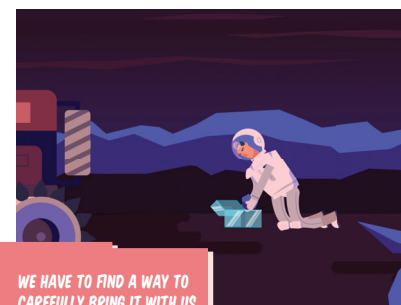


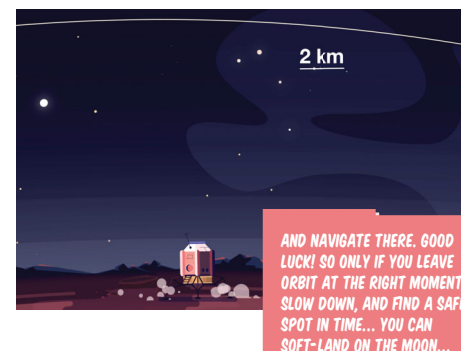
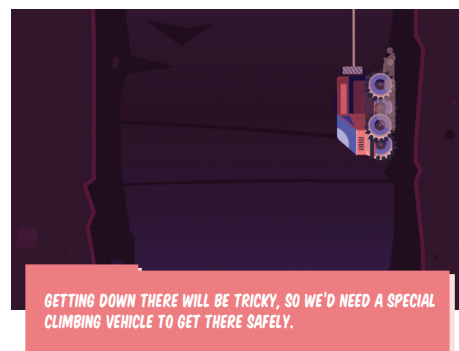
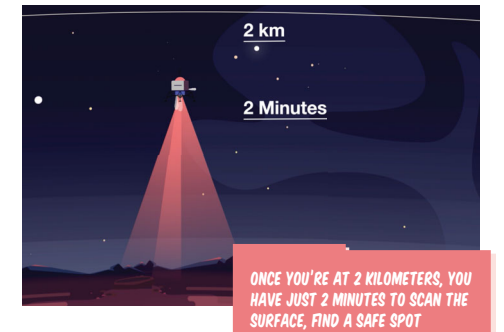
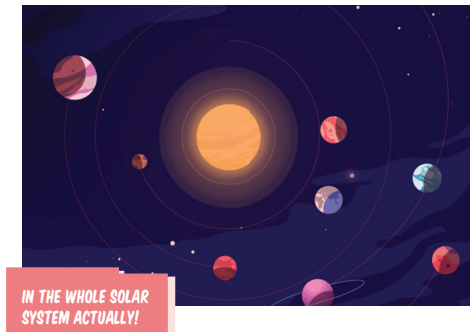
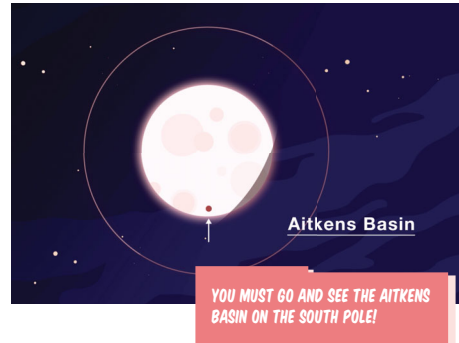
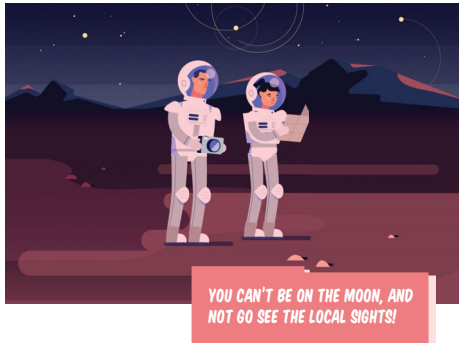
FOR A MANNED SPACE CRAFT, WE NEED A SOFT-LANDING. BUT IT'S DIFFICULT.



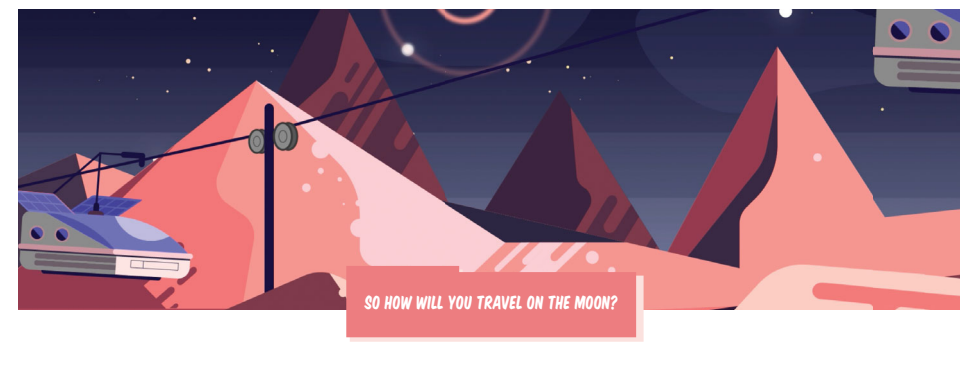
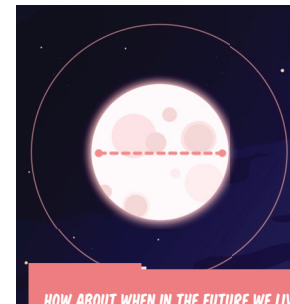
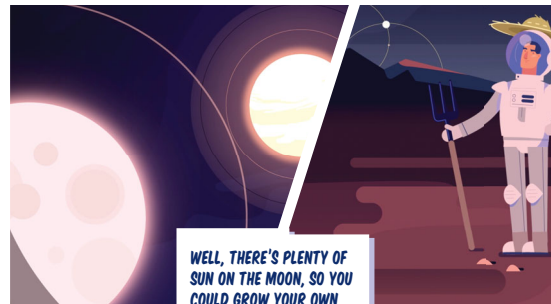
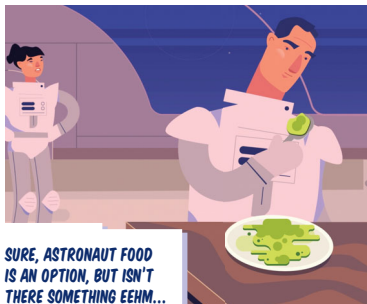
BUT MAKES IT SO DIFFICULT? WELL, IT STARTS AT 100 KILOMETERS.

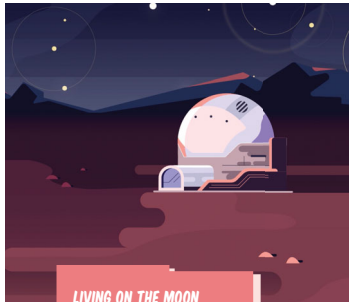
IN ORBIT. THERE IT'S ABOUT KICKING YOURSELF OUT OF ORBIT AT THE EXACT RIGHT TIME, WITH SPECIAL ENGINES, CALLED THRUSTERS. JUST A SECOND TOO LATE, AND YOU MISS YOUR TARGET!







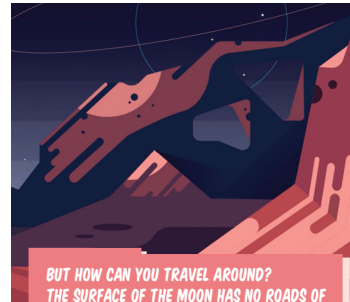




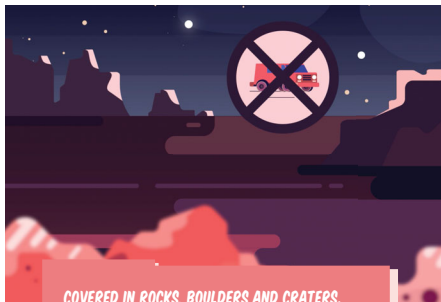
LIVING ON THE MOON  
WOULDN'T DO MUCH GOOD



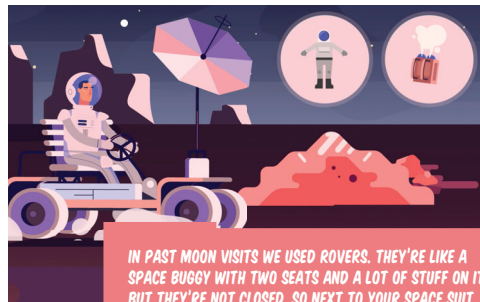
IF YOU COULDN'T GO  
ANYWHERE, RIGHT?



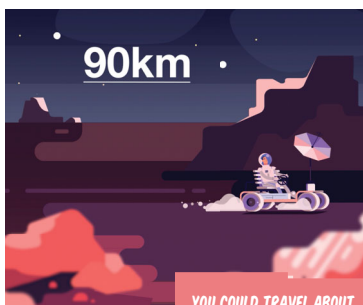
BUT HOW CAN YOU TRAVEL AROUND?  
THE SURFACE OF THE MOON HAS NO ROADS OF  
COURSE AND IS EXTREMELY MESSY.



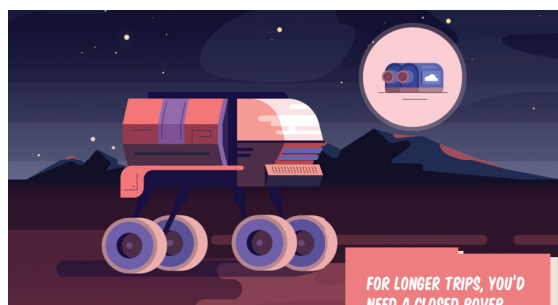
COVERED IN ROCKS, BOULDERS AND CRATERS.  
SO A STANDARD FOUR-WHEEL DRIVE WON'T DO.



IN PAST MOON VISITS WE USED ROVERS. THEY'RE LIKE A  
SPACE BUGGY WITH TWO SEATS AND A LOT OF STUFF ON IT.  
BUT THEY'RE NOT CLOSED, SO NEXT TO YOUR SPACE SUIT,  
YOU'D NEED AN AIR TANK.



YOU COULD TRAVEL ABOUT  
90 KILOMETERS TOPS.



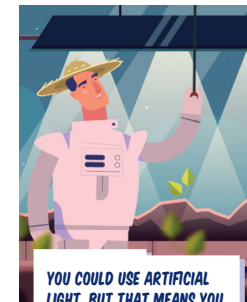
FOR LONGER TRIPS, YOU'D  
NEED A CLOSED ROVER,  
WITH ITS OWN AIR SUPPLY.



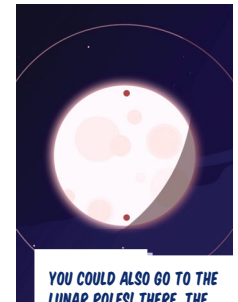
PLENTY OF TIME FOR YOUR PLANTS TO FLOURISH!  
BUT EHM... THEN 14 DAYS OF NIGHT FOLLOW.  
AND YOUR HARVEST WON'T SURVIVE.



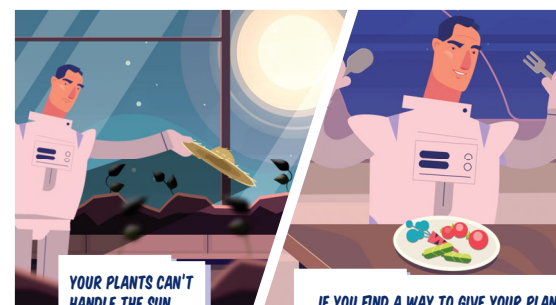
THERE ARE A FEW PLANTS THAT ARE READY  
FOR HARVEST WITHIN 14 DAYS, BUT THEN  
YOU'LL PROBABLY EAT THE SAME EVERY NIGHT.



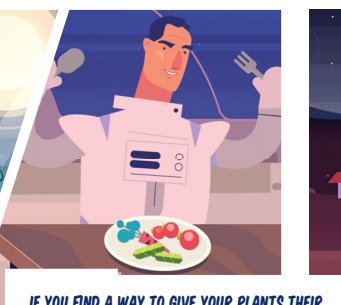
YOU COULD USE ARTIFICIAL  
LIGHT. BUT THAT MEANS YOU  
NEED MORE POWER AS WELL.



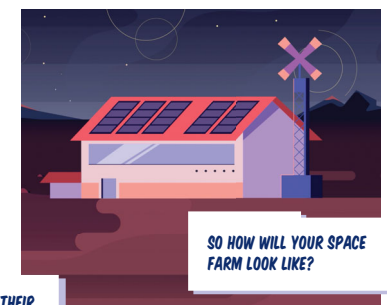
YOU COULD ALSO GO TO THE  
LUNAR POLES! THERE, THE  
SUN ALMOST ALWAYS SHINES.



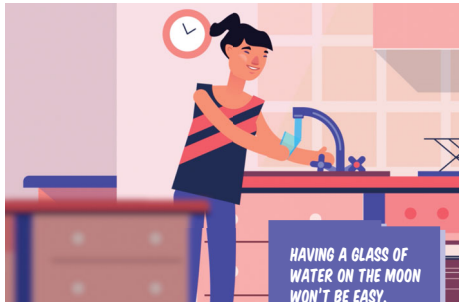
YOUR PLANTS CAN'T  
HANDLE THE SUN  
ALL THE TIME, OF  
COURSE.



IF YOU FIND A WAY TO GIVE YOUR PLANTS THEIR  
8 HOURS OF SUN A DAY, YOU'RE GUARANTEED A  
NICE DINNER EVERY NIGHT!



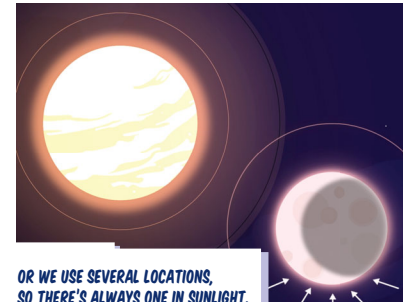
SO HOW WILL YOUR SPACE  
FARM LOOK LIKE?



HAVING A GLASS OF WATER ON THE MOON WON'T BE EASY.



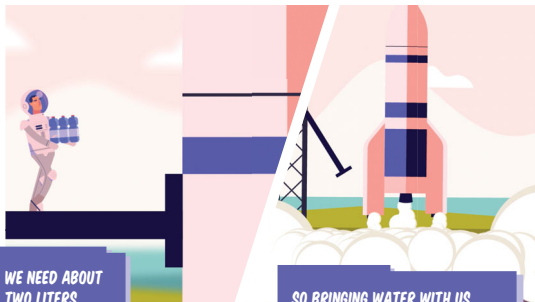
MOST AREAS ARE AS DRY AS OUR DRIEST DESERTS!



OR WE USE SEVERAL LOCATIONS, SO THERE'S ALWAYS ONE IN SUNLIGHT. SOLVED? NOT QUITE.



THE MOON HAS LUNAR ECLIPSES, WHEN THE EARTH IS BETWEEN THE SUN AND MOON. THESE LAST FOR HOURS AND HAPPEN SEVERAL TIMES A YEAR. SO WE NEED A BACKUP.

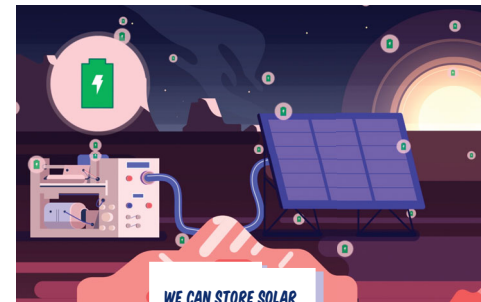


WE NEED ABOUT TWO LITERS EVERY DAY,

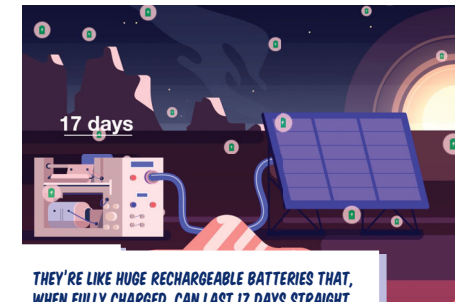
SO BRINGING WATER WITH US, SOUNDS LIKE THE OBVIOUS CHOICE.



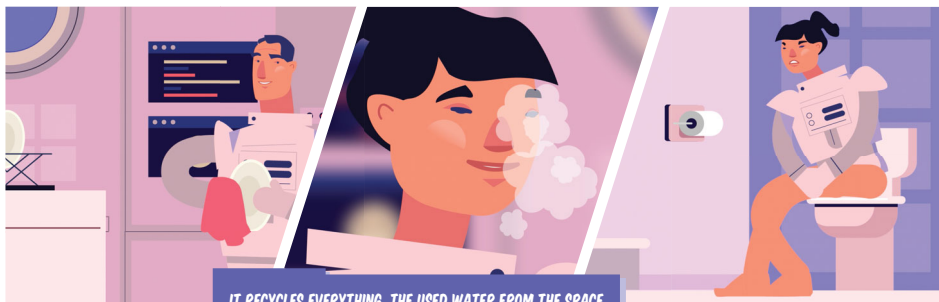
THE WATER RECYCLING SYSTEM USED IN THE INTERNATIONAL SPACE STATION WILL HELP MAKE THE WATER LAST.



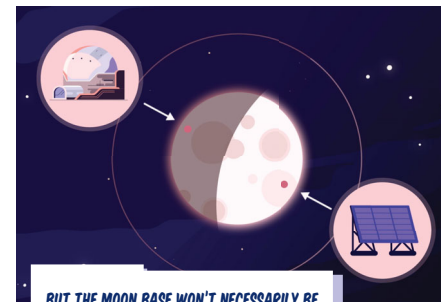
WE CAN STORE SOLAR POWER IN FUEL CELLS!



THEY'RE LIKE HUGE RECHARGEABLE BATTERIES THAT, WHEN FULLY CHARGED, CAN LAST 17 DAYS STRAIGHT. PLENTY TO SURVIVE A LUNAR NIGHT!



IT RECYCLES EVERYTHING. THE USED WATER FROM THE SPACE DISHES. AND WATER WE HUMANS PRODUCE. EVERY TIME WE BREATHE, AND YES... EVERY TIME WE PEE.

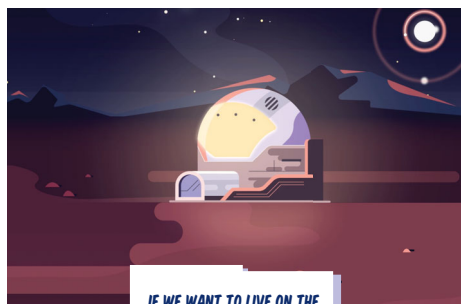


BUT THE MOON BASE WON'T NECESSARILY BE IN THE SAME PLACE AS THE SOLAR PANELS.



SO YOU'D NEED A MOON DELIVERY GUY, TO MOVE YOUR FUEL CELLS AROUND. HOW WILL YOU POWER YOUR MOON BASE?

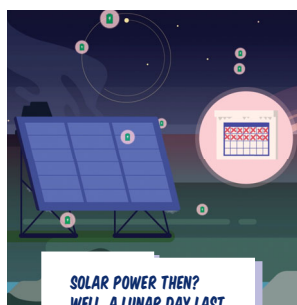




IF WE WANT TO LIVE ON THE MOON, WE NEED POWER.



THERE'S NO WEATHER THERE, SO NO WIND... BUT ALSO NO CLOUDY DAYS!



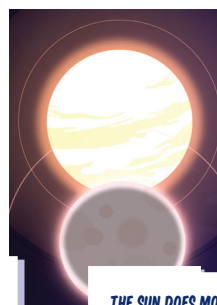
SOLAR POWER THEN? WELL, A LUNAR DAY LAST FOR 14 EARTH DAYS.



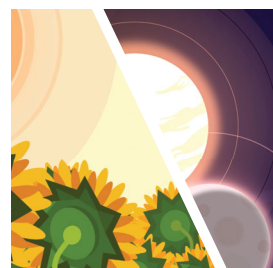
THAT'S A LOT OF POWER! BUT... THE NIGHTS ARE JUST AS LONG.



THERE ARE PLACES ON THE POLES WHERE THE SUN ALWAYS SHINES. FOR EXAMPLE, ON THE RIM OF THE SHACKLETON CRATER ON THE SOUTH POLE!

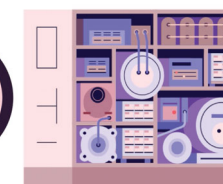


THE SUN DOES MOVE OF COURSE. SO EITHER WE NEED SOMETHING THAT MOVES ALONG WITH THE SUN, LIKE FLOWERS DO.



SOUNDS DISGUSTING PERHAPS, BUT THE RECYCLING SYSTEM IS SO EFFECTIVE, THAT THE RECYCLED WATER IS CLEANER THAN WHAT MOST OF US DRINK ON EARTH.

EVEN THOUGH IT'S GOOD, RECYCLING 100% IS IMPOSSIBLE.



SIMPLY OPENING A DOOR SOMEWHERE WILL ALREADY LET OUT PRECIOUS WATER.



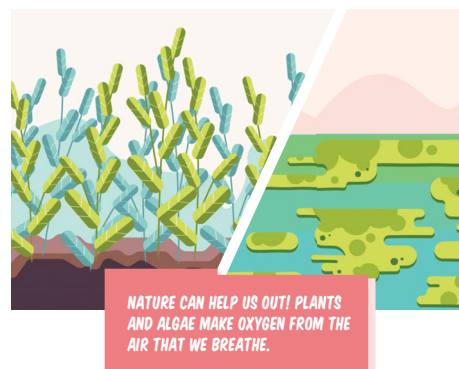
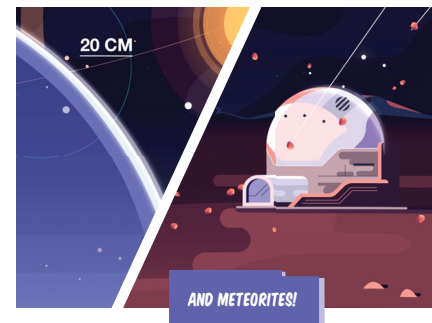
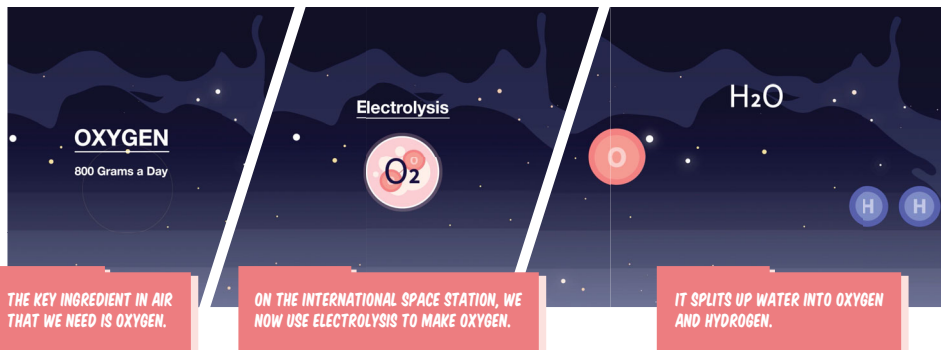
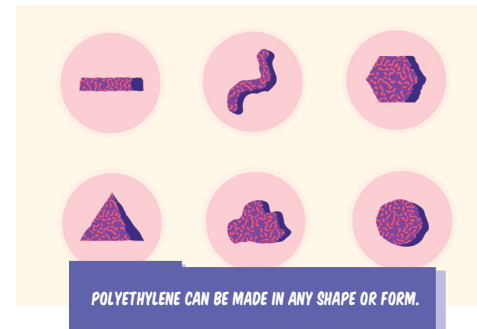
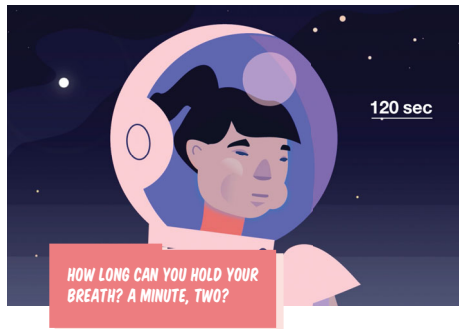
PERHAPS SPECIAL AIRLOCKS MIGHT HELP, BUT WE'D STILL NEED REGULAR WATER DELIVERIES.



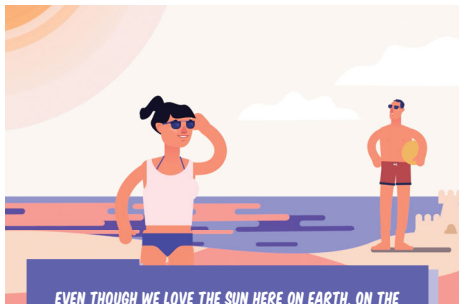
THE ONLY THING IS... IT'S TRAPPED IN THE SOIL, SO IT NEEDS TO BE MINED. AND IT'S COLDER THAN ANYTHING WE'VE EVER MINED BEFORE.

THERE IS A LOCAL OPTION. WATER ICE HAS BEEN DISCOVERED ON THE LUNAR POLES.

SO WE NEED TO INVENT NEW DIGGING TOOLS TO GET TO IT. PERHAPS SUPER SHARP SHOVELS, OR HEATED DRILLS? WHAT DO YOU THINK WILL QUENCH OUR THIRST ON THE MOON?







EVEN THOUGH WE LOVE THE SUN HERE ON EARTH, ON THE MOON IT'S NOT A FRIENDLY GUY IN THE SKY.



NOT ONLY DOES IT HEAT UP THE SURFACE TO 123 DEGREES CELSIUS – OUCH – IT ALSO GIVES OFF DANGEROUS RADIATION.



IN JUST ONE YEAR, YOU'VE ALREADY RECEIVED THE MAX AMOUNT OF RADIATION YOU CAN HANDLE IN A LIFE TIME.



SO FORGET SUNBLOCK. YOU NEED A SUN SHIELD!

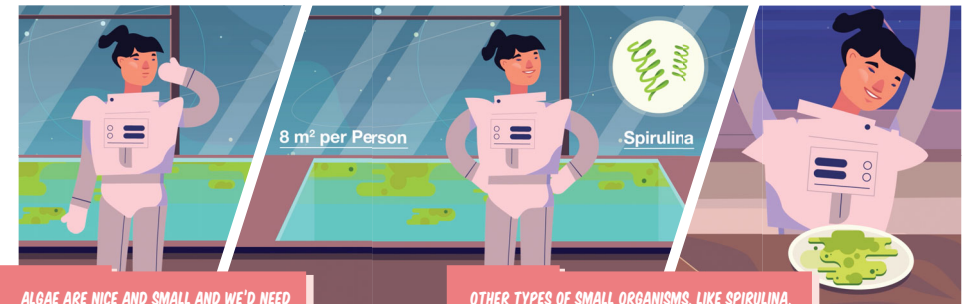


**Polyethylene**

ONE SHIELD OPTION IS POLYETHYLENE. SOUNDS UNFAMILIAR PERHAPS, BUT IT'S ACTUALLY WHAT MOST PLASTIC BAGS AND BOTTLES ARE MADE OF.

IT CAN BE SUPER COMPRESSED INTO PLASTIC THAT'S SO STRONG

IT CAN STOP BULLETS!

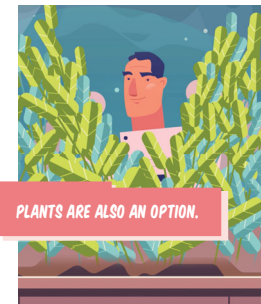


8 m<sup>2</sup> per Person

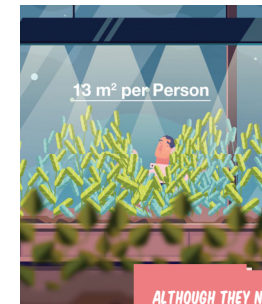
Spirulina

ALGAE ARE NICE AND SMALL AND WE'D NEED ABOUT 8 SQUARE METERS PER PERSON.

OTHER TYPES OF SMALL ORGANISMS, LIKE SPIRULINA, ARE ALSO GOOD TO EAT! TWO BIRDS, ONE STONE.



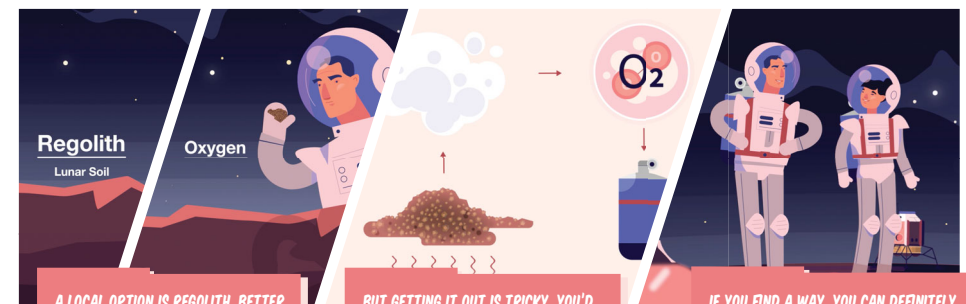
PLANTS ARE ALSO AN OPTION.



13 m<sup>2</sup> per Person



ALTHOUGH THEY NEED A BIT MORE SPACE THAN ALGAE, THEY DON'T JUST MAKE FRESH AIR, THEY GROW INTO A NICE DINNER TOO!



**Regolith**  
Lunar Soil

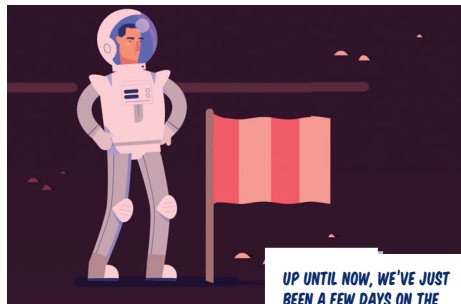
Oxygen

O<sub>2</sub>

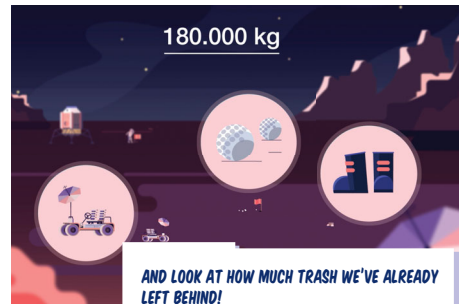
A LOCAL OPTION IS REGOLITH, BETTER KNOWN AS LUNAR SOIL. IT CONTAINS A LOT OF OXYGEN!

BUT GETTING IT OUT IS TRICKY. YOU'D NEED TO HEAT UP THE SOIL, FILTER OUT THE OXYGEN AND STORE IT SOMEHOW.

IF YOU FIND A WAY, YOU CAN DEFINITELY BREATHE EASY ON THE MOON!



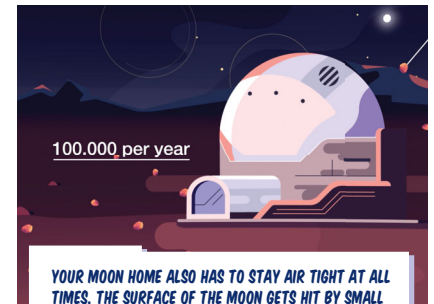
UP UNTIL NOW, WE'VE JUST BEEN A FEW DAYS ON THE MOON.



180.000 kg

AND LOOK AT HOW MUCH TRASH WE'VE ALREADY LEFT BEHIND! VEHICLES, BOOTS, GOLF BALLS... AND MORE. IT COMES DOWN TO ABOUT 180.000 KILOGRAMS.

AND OPENING A WINDOW? NOT AN OPTION. YOU NEED AIRLOCKS AS DOORS TO GET IN AND OUT.

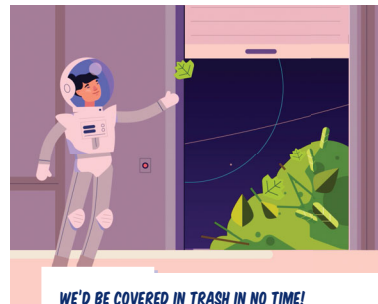


100.000 per year

YOUR MOON HOME ALSO HAS TO STAY AIR TIGHT AT ALL TIMES. THE SURFACE OF THE MOON GETS HIT BY SMALL METEORITES THE SIZE OF GOLF BALLS ALL YEAR LONG (100.000/YEAR).



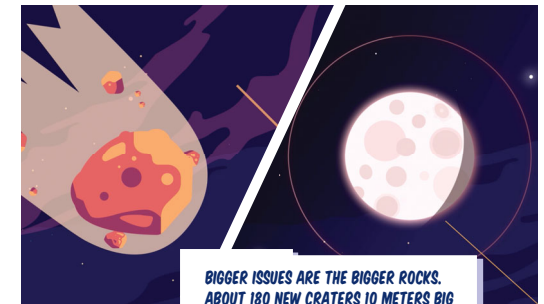
IN THOSE FEW DAYS! IMAGINE WHEN WE LIVE THERE...



WE'D BE COVERED IN TRASH IN NO TIME! SO WE HAVE TO BE SMART FROM DAY ONE!



THE MOON IS BIG THOUGH, SO THE CHANCE YOU GET HIT WHILE YOU'RE ON A MOON WALK IS VERY SMALL.



BIGGER ISSUES ARE THE BIGGER ROCKS. ABOUT 180 NEW CRATERS 10 METERS BIG APPEAR ON THE MOON EVERY YEAR.



Anaerobic composting

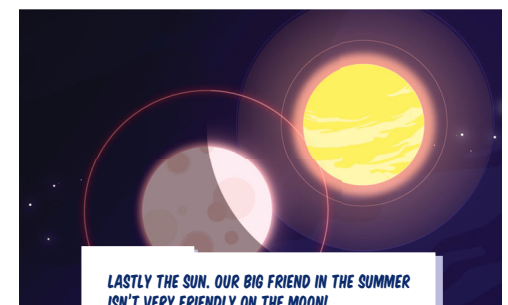
WELL, FOR ORGANIC TRASH, LIKE GREENS, IT'S EASY! WE CAN THROW EVERYTHING ON ONE HEAP, CLOSE IT OFF FROM AIR AND LET NATURE DO ITS THING. THAT'S CALLED ANAEROBIC



COMPOSTING. IT TURNS THE WASTE INTO NICE FERTILE SOIL. PRODUCES HEAT, PERFECT FOR THOSE LONG LUNAR NIGHTS. AND METHANE GAS, WHICH CAN FUEL OUR ROCKETS.



THAT'S THE SIZE OF A HOUSE! YEAH, TRY TO PROTECT YOURSELF FROM THAT!



LASTLY THE SUN. OUR BIG FRIEND IN THE SUMMER ISN'T VERY FRIENDLY ON THE MOON! ON THE NEXT PAGE YOU SEE HOW MUCH SUNSCREEN YOU NEED ON YOUR NEXT MOON TRIP!

