1 00:00:07,700 --> 00:00:12,789
>> EFPTOZL.

2 00:00:12,788 --> 00:00:13,788
>> WHAT ARE YOU UP TO?

3 00:00:13,788 --> 00:00:16,320
>> I AM TESTING MY EYESIGHT.

4 00:00:16,320 --> 00:00:17,320
>> WHY?

5 00:00:17,320 --> 00:00:20,719
>> WELL, THE HUMAN EYE IS
SOMETHING THAT NASA KEEPS AN EYE

6 00:00:20,719 --> 00:00:21,719
ON.

7 00:00:21,719 --> 00:00:23,779
>> I SEE WHAT YOU DID.

8 00:00:23,780 --> 00:00:27,560
>> SINCE THE EARLY DAYS JOHN
GLEN WAS THE FIRST TO ORBIT THE

9 00:00:27,559 --> 00:00:32,820
EARTH AND IN HIS CAPSULE HE HAD
EYE CHARTS AND HE WOULD HAVE TO

10 00:00:32,820 --> 00:00:33,820
TEST HIS EYESIGHT.

11 00:00:33,820 --> 00:00:38,539
WHAT THEY ARE FINDING TODAY IS
ASTRONAUTS SOME OF THEM, WHO

12 00:00:38,539 --> 00:00:42,909
SPEND MORE THAN SIX MONTH IN
SPACE SOME OF THEIR ICE CHANGE

13 00:00:42,909 --> 00:00:44,709
SHAPE.
NASA is studying this to see if tell affect long-term space flight.

>> Can I try?

>> Sure.

Try line a.

>> This is "STEM in 30" that's.

Oh! This is "STEM in 30"

>> I'm ready to be an astronaut.

>> Well is more to it, have a seat.

Sometimes as an astronaut, you have to draw your own blood.

>> I'm-- not such a big fan of--

>> You want to be an astronaut?

Marty?

>> You want to be an astronaut?
MARTY?

OKAY, SHOW ME.

I'M MARTY.

>> I'M BETH WE'RE LIVE TODAY FROM THE MOVING BEYOND EARTH

GALLERY AT THE NATIONAL AARON SPACE MUSEUM IN WASHINGTON, D.C.

>> WELCOME OUR ONLINE VIEWERS AND THOSE WATCHING ON TV AND YOU CAN SUBMIT QUESTIONS TODAY AND SOME WE WILL USE ON THE SHOW.

IF YOU LOOK ON THIS SIDE OF THE SCREEN YOU WILL SEE A BOX WHERE YOU CAN SUBMIT QUESTIONS AND WE HAVE ADDITIONAL CONTENT WE ADD OVER THERE INCLUDING IMAGES AND PICTURES THAT REALLY SUPPLEMENT THE SHOW.

NOW-- WE HAVE A VERY LARGE AUDIENCE TODAY.
WE HAVE STUDENTS FROM SCHOOLS IN MARYLAND, VIRGINIA AND DC.

WE ARE SO GLAD YOU ARE ALL HERE.

AND MARTY, IF YOU WILL GATHER THE AUDIENCE THERE IS SOMEONE†--

ONE THAT DOES NOT QUITE LOOK LIKE THEY ARE A MIDDLE SCHOOL STUDENT.

WHAT'S GOING ON THERE?

TODAY WE HAVE A SPECIAL GUEST WE HAVE NASA ASTRONAUT

ANNA FISHER WITH US.

THANK YOU FOR BEING WITH US.

ARE YOU READY TO TAKE QUESTIONS?

I'M READY, BETH.

YOU HAVE A QUESTION.

Q: HOW DID YOU FEEL WHEN YOU LEFT EARTH'S ATMOSPHERE AND SAW
SPACE FOR THE FIRST TIME IN YOUR OWN EYES.

A: THAT WAS AN AMAZING EXPERIENCE.

LAUNCHING AND GOING TO 7, 500 MILES PER HOUR IN EIGHT AND A HALF MINUTES IS QUITE A RIDE.

THAT WAS JUST FUN THEN ONCE YOU GET UP ON ORBIT AND LOOK AT THE BEAUTIFUL PLAN EARTH OF OURS AND YOU FLOAT. IT IS THE MOST AMAZING FEELING YOU COULD IMAGINE.

LET'S SEE CAROLINE?

NUTRITIONAL NEEDS DIFFERENT IN SPACE?

YOU KNOW THE NUTRITIONAL NEEDS IN SPACE ARE NOT DIFFERENT FROM ON THE GROUND.

THE FOOD THAT WE FLY ON BOARD THE SHUTTLE AND ON BOARD SPACE
00:04:09,599 --> 00:04:12,759
STATION AND PRETTY MUCH ANY
SPACE VEHICLE IS LIKE BACK PACKING FOOD.

00:04:12,759 --> 00:04:13,759
IF YOU BACK PACK OR CAMP?

00:04:13,759 --> 00:04:16,469
AND IT IS REALLY GOOD.

00:04:16,470 --> 00:04:18,590
WE HAVE TO BE CAREFUL ABOUT SALT
INTAKE ON ORBIT SO THAT†-- IT DOES NOT AFFECT YOUR METABOLISM.

00:04:23,939 --> 00:04:27,129
AND THE OTHER THING THAT HAPPENS
IN SPACE FOR A LONG TIME IS YOU

00:04:27,129 --> 00:04:30,968
LOSE YOUR TASTE FOR THINGS.

00:04:30,968 --> 00:04:34,810
PEOPLE WANT IT TO BE SPICY.

00:04:34,810 --> 00:04:39,829
IN TERMS OF NUTRITIONAL NEEDS,
IT IS NOT THAT DIFFERENT THAN

00:04:39,829 --> 00:04:41,560
HERE ON THE GROUND.

00:04:41,560 --> 00:04:43,060
Q: OKAY.

00:04:43,060 --> 00:04:44,329
>> YOU HAVE A QUESTION?
Q: WHAT IS IN THE GREATEST SCIENTIFIC DISCOVERIES THAT HAVE BEEN FOUND BY EXPERIMENTING IN SPACE?

A: WE FOUND A LOT OF THINGS SINCE THE BEGINNING OF THE SPACE PROGRAM.

MANY THINGS WE TAKE FOR GRANTED THE MINIATURIZATION OF COMPUTERS.

HAVING TELEMETRY LIKE THE PARAMEDICS WHEN THEY PICK UP PEOPLE AND ON BOARD SPACE STATION, WE DO HUNDREDS OF EXPERIMENTS.

LEARN TO GROW PROTEINS IN SPACE.

LEARNING HOW FLAMES PROPAGATE IN SPACE.

STUDYING HOW FISH AND ANIMALS AND INSECTS ADAPT IN
SO, WE ARE DOING MANY THINGS ONE NEAT THING ABOUT SCIENCE IS YOU NEVER KNOW WHAT YOU WILL FIND OUT.

YOU MAY START THINKING ONE THING AND FIND OUT SOMETHING DIFFERENT.

IT IS FUN TO USE YOUR MATH AND SCIENCE, TOO TO MAKE NEW DISCOVERIES.

>> SINCE THE BEGINNING WE ARE GOING TO HAVE MORE QUESTIONS AS WE GO ALONG TODAY.

AND ANN WILL ANSWER THEM.

NOW WE WILL BE TALKING ABOUT SCIENCE AND SPACE.

MARTY, YOU LEARNED THAT SCIENCE IN SPACE STARTS ON EARTH?

IT DOES.
BETH SAID YOU NEED TO GO TO THIS GREEN HOUSE.

I WAS NOT WILD ABOUT THAT.

LET US HEAD TO THE GREEN HOUSE.

I'M AT THE SMITHSONIAN GARDEN GREEN HOUSE I'M GOING TO

TALK TO BRETT MC NISH, A HORTICULTURIST.

YOU WILL DIG THIS.

HOW IS IT GOING?

WELCOME TO THE SMITHSONIAN GREEN HOUSE.

THIS PLACE IS INCREDIBLE THIS IS FUNNY LOOKING.

YOU NOTICED THIS.

THIS PLANT HERE IS AMERANTH IT IS A SEMIANNUAL WE GROW IN OUR GARDENS.
WE DECIDED TO HAVE FUN TO SHOW FOLKS AN EXAMPLE OF GEOTROPISM.

>> WHAT IS THAT?

GEOTROPISM IS THE PLANTS RESPONSE TO GRAVITY.

WE KNOW PLANTS WANT TO GROW UP TOWARD THE SUN TO GET THAT

SUNLIGHT.

AND THEY ALSO WANT TO SEND ROOTS DOWN IN THE SOIL WHERE THERE IS NUTRIENTS AND WATER.

DOWN HERE WE HAVE AN EXPERIMENTS WHERE WE HAVE TAKEN A PLANT AND GROWN IT UPSIDE DOWN.

AND NOW THIS PLANT IS TRYING TO GROW UP TOWARD THE SUN.

AND IT IS DONE A NICE CURVE HERE.

LOOKS LIKE A COUP LADLE.
GROWING PLANTS IN SPACE THIS SHOWS IT IS NOT EASY.

RIGHT.

IN SPACE YOU HAVE A LOWER OR ZERO GRAVITY ENVIRONMENT.

PLANT WILL GET CONFUSED.

THEM RUN EXPERIMENTS LIKE THIS IN SPACE AND SEE THE ROOTS AND

CHUTES GROW IN THE SAME CRAZY DIRECTIONS.

CONFUSED.

THERE HAS BEEN AN EXPERIMENT ON THE INTERNATIONAL SPACE

STATION CALLED, VEGGIE?

VEGGIE YOU ARE TALKING ABOUT GROWING SALAD GREEN IN SPACE.

OUTRAGEOUS IS THE NAME THEY ENJOYED UP THERE.

PLANTS REQUIRE THINGS TO GROW.

THEY NEED NUTRIENTS.
THEY WILL GET THROUGH SOIL.

OR GROWING MEDIUM.

THEY NEED WATER.

THEY NEED CO2 AND SUNLIGHT.

LIKE A GREEN HOUSE.

EXACTLY A CONTROLLED ENVIRONMENT.

I GOT A CHANCE TO TALK TO KJEL LINDGREN WHEN THEY HARVESTED THE FIRST CROP OF LETTUCE AND IF IS BEYOND GETTING A CHANCE TO EAT THEM.

AN ADDITIONAL BENEFIT THAT WAS POWERFUL THE PSYCHOLOGICAL ASPECT.

WE GARDEN ON EARTH BECAUSE IT IS FUN.

AND I HAPPENING THE IT IS†-- THE
SAME ON STATION AS WELL.

TO BE TAKING CARE OF A LIVING THING DAILY TO WATCH IT

GROW AND SEE THIS GREEN LIVING THING IN AN OTHERWISE WHITE AND STAINLESS STERILE ENVIRONMENT OF THE SPACE STATION WAS PSYCHOLOGICALLY HELPFUL.

>> ANA YOU HAVE A GREAT STORY ABOUT THAT EXPERIMENT.

TELL US A BIT ABOUT IT.

>> YES.

ONE OF MY COLLEAGUES WAS ON THAT SAME EXPEDITION GROWING LETTUCE IN SPACE AND TOLD US A STORY HOW HIS FATHER IS FROM JAPAN AND

FIRST GENERATION SON WANTED HIS SON TO CONTINUE AND BE A FARMER AS WELL.

KENYA HAD OTHER IDEAS.
HE WANT TO BE A PILOT AND BECAME AN ASTRONAUT.

WHEN HE WAS ON THE SPACE STATION AND GREW THE LETTUCE AND ATE IT WHEN HE GOT BACK TO EARTH HIS DAD ASKED WHICH LUES WAS BETTER THE LETTUCE ON THE FARM OR IN SPACE. BEING THE DIPLOMATIC PERSON HEED, IT WAS HIS DADS. HE GOT TO FARM JUST NOT ON EARTH. THEY EACH PURSUED THEIR DREAMS AND HE PURSUED HIS FARTHER’S DREAMS WE FOLLOW NOTHING HIS FOOTSTEPS, SORT OF. YOU WERE THE FIRST CLASS OF ASTRONAUTS THAT INCLUDED WOMEN AND THE FIRST MOTHER IN SPACE. WILL YOU TELL US ABOUT THOUGH EXPERIENCE. GI WAS HONORED TO BE IN THE
FIRST GROUP OF WOMEN SELECT IN 177
00:10:03,340 --> 00:10:04,340
THE 1978.

178
00:10:04,340 --> 00:10:08,430
IT WAS A TIME NASA WAS PREPARED AND READY AND WELCOMING WOMEN.

179
00:10:08,429 --> 00:10:12,329
IT WAS A WONDERFUL EXPERIENCE AND GETTING A CHANCE TO BE THE

180
00:10:12,330 --> 00:10:13,770
FIRST MOM TO GO IN SPACE.

181
00:10:13,769 --> 00:10:17,259
MY DAUGHTER SAYS I OWE IT ALL TO HER.

182
00:10:17,259 --> 00:10:18,889
IT WAS A VERY CHALLENGING TIME.

183
00:10:18,889 --> 00:10:22,639
BUT AT SAME TIME BOTH WERE EQUALLY IMPORTANT TO ME.

184
00:10:22,639 --> 00:10:27,830
IT WAS REALLY A SPECIAL BUT JUGGLING THE TWO WAS THE

185
00:10:27,830 --> 00:10:28,830
CHALLENGE.

186
00:10:28,830 --> 00:10:29,830
>> I IMAGINE IT WAS.

187
00:10:29,830 --> 00:10:32,720
THERE IS A LOT OF TRAINING THAT GOES INTO IT.

188
00:10:32,720 --> 00:10:36,269
>> A LOT OF TRAINING AND ALSO YOU KNOW, BEING A 50 TIME MOM
LEARNING ALL THAT, TOO, IT WAS CHALLENGING BUT PROBABLY THE BEST YEARS OF MY LIFE.

>> SHALL WE TAKE QUESTIONS?

>> SOUNDS GREAT.

>> START WITH A VIDEO QUESTION.

Q: I WAS WONDERING IF [INAUDIBLE]

A: WELL IS NO DISADVANTAGE THAT I CAN THINK OF OTHER THAN SOME OF US THAT ARE ON THE SMALL ARE SIDE WE DID NOT FIT IN THE SPACE SUIT.

WE WERE NOT ABLE TO DO SPACE WALKS BUT WE ARE WORKING TO DESIGN A SUIT THAT THE FIT THE ENTIRE RANGE.

WE HAVE PERHAPS ONE SLIGHT ADVANTAGE IN THAT WE HAD SOME
ASTRONAUTS COME BACK WITH CHANGES TO THEIR VISION.

A LOT OF THEORIES TO WHY THAT HAPPENS SO FAR AND IT IS NOT SIGNIFICANT, NONE OF THE WOMEN HAD THAT PROBLEM.

MAY BE THERE IS A SLIGHT ADVANTAGE.

BUT REALISTICALLY MALES AND FEMALES ALL DO THE SAME JOB AND SAME TRAINING AND THERE IS NOT AN ADVANTAGE OR DISADVANTAGE.

WE HAVE AN ONLINE QUESTION.

Q: HOW DO YOU CONDUCT SCIENCE ON THE SPACE STATION WITH THE LIMITED WORKING SPACE?

A: WELL, IT IS REALLY NOT THAT LIMITED.

I MEAN THE SIZE OF THE SPACE STATION IS QUITE BIG, IT IS THE SIZE OF A FIVE BEDROOM HOUSE AND THE LAVATORY WOULD BE THREE OF
THE BEDROOMS KIND OF EUROPEAN MODEL, JAPANESE AND U.S. LABORATORY.

AND WEIGHTLESSNESS THE THING THAT IS UNIQUE IN ADDITION TO BEING ZERO GRAVITY IS THE FACT YOU CAN USE THAT ENTIRE VOLUME.

WHERE AS HERE YOU ARE LIMITED TO BEING ABLE TO PUT THING ON THE GROUND YOU CAN USE THAT FULL DIMENSION.

IT WINDS UP WORK OUT FINE.

>> AND MARTY HAS AN AUDIENCE QUESTION.

Q: HOW DO YOU STAY IN SHAPE IN SPACE.

A: GOOD QUESTION IT IS IMPORTANT PARTICULARLY ON LONG MISSIONS TO TRY TO STAY IN SHAPE AND MAKE SURE YOU DON'T HAVE BONE LOSS AND MUSCLE LOSS.
WE HAVE SEVERAL EXERCISE DEVICES ON BOARD.

WE HAD A ROLLING MACHINE.

A BICYCLE.

IT IS IN THE RUSSIAN SEGMENT AND WE HAVE A TREADMILL AND A RESISTANT EXERCISE DEVICE.

EVERY ASTRONAUT IS SCHEDULED FOR 2-1/2 HOURS OF EXERCISE A DAY AN HOUR OF AEROBICS AND AN HOUR OF RESISTANCE TRAINING.

PEOPLE ARE COMING BACK IN BETTER SHAPE FROM A SIX MONTH MISSION THAN FROM SHUTTLE MISSIONS WHERE WE DID NOT HAVE THAT EQUIPMENT.

ON BOARD.

>> A VIDEO QUESTION.

Q: MY QUESTION IS, HOW IS THE VIEW FROM SPACE?

A: THE VIEW FROM SPACE IS
SPECTACULAR AS YOU COULD

POSSIBLY IMAGINE.

ONE OF THE THINGS WE DID ON OUR FLIGHT IS AFTER WE TOOK THE NIGHT TO MISSION CONTROL WE TAKE AN HOUR IN OUR SLEEP PERIOD AND

GO SIT OUT BY A WINDOW AND LOOK OUT AND WATCH THAT VIEW.

ONE OF MY FAVORITE VIEWS WAS LOOKING AT THE SNOW CAPS

HIMALAYAS WITH THE FULL MOON IT IS ABSOLUTELY AMAZING.

AND YOU REALIZE AS YOU LOOK TO THE VAST DARKNESS OF SPACE WE

ALL ARE ON THIS BEAUTIFUL, WONDERFUL PLANET WITH A THIN SLIVER OF ATMOSPHERE AND NEED TO TAKE CARE OF THIS PLANET.

IT WAS ABSOLUTELY AMAZINGLY BEAUTIFUL.

>> MARTY HAS AN AUDIENCE QUESTION.
Q: HOW DOES BEING BACK ON EARTH FEEL AFTER A MISSION.

DOES THE BODY REACT DIFFERENTLY AFTER BEING WEIGHTLESSNESS FOR A WHILE?

A: IT TAKES AWHY TO ADJUST GOING INTO SPACE AND WHEN YOU COME BACK IT TAKES A DAY OR TWO FOR A SHORTER MISSION AND LONGER FOR A MONTH MISSION.

WHEN WE LANDED I FELT LIKE AN 800 POUND GORILLA.

I WAS IN SPACE FOR EIGHT DAYS.

AND I HAD SWITCHES I HAD TO THROW UP ON THE OVER HEAD PANEL

AND IN THE SIMULATOR I DID IT IN 15-20 SECONDS IT TOOK ME SEVERAL SECTS TO LIFT MY ARM UP.

WITHIN A DAY YOU ADAPT.

I REMEMBER GOING TO BED AND I
KEPT FEELING LIKE MY FEET WERE FLOATING AND I HAD TO OPEN MY EYES TO MAKE SURE I WAS IN GRAVITY.

YOU ADAP.

FOR A DAY YOU ARE WOBBLY AND UNCERTAIN.

>> WE HAVE TALKED TO A LOT OF ASTRONAUTS ABOUT THEIR EXPERIENCES OF DOING FLIGHTS ONE WAS STEPHANIE WILSON.

>> I'M JOINED BY STEPHANIE WILSON A VETERAN OF 3 SPACE SHUTTLE FLIGHTS YOU SPENT 42 DAYS IN SPACE.

THANK YOU FOR JOINING US.

>> THANK YOU.

>> TELL ME ABOUT THE SCIENCE THAT GUESS ON IN SPACE.

>> WE HAVE SEVERAL AREAS WE CONDUCT RESEARCH ON THE
INTERNATIONAL SPACE STATION INCLUDES EARTH OBSERVATION.

PHYSICAL SCIENCE OF HUMAN PHYSIOLOGY AND BIOLOGY IN SOME OF THE AREAS FOR EARTH SCIENCE WE ARE LOOKING BACK AT EARTH TO SEE CHANGES IN EARTH BEFORE STATION AND SEE HOW WE CAN BETTER PREDICT STORMS AND WEATHER PATTERNS FOR THE MATERIALS THAT ARE BEING EXPOSED TO THE VACUUM OF SPACE TO LEARN MORE ABOUT IMPROVEMENTS IN MATERIALS.

WE HAVE A COMBUSTION FACILITY WE LEARN ABOUT BURNING MATERIALS AND FIRE SUPPRESSION ON BOARD THE INTERNATIONAL SPACE STATION.

MUCH WORK IS GOING ON IN THE AREA OF SCIENCE ON THE SPACE
STATION.

00:16:16,120 --> 00:16:19,528
>> NOW AS A MISSION SPECIALIST
ONE THING YOU HAD TO DO WAS

00:16:19,528 --> 00:16:22,649
CONTROL THE ROBOTIC ARM TO
RETRIEVE A SATELLITE.

00:16:22,649 --> 00:16:25,899
THAT IS NOT EASY, IS IT?

00:16:25,899 --> 00:16:31,120
>> IT IS DEFINITELY NOT EASY IT
TOOK TRAINING AND PLANNING AND

00:16:31,120 --> 00:16:33,679
THINKING AHEAD OF TIME HOW WE
WOULD DO THAT.

00:16:33,679 --> 00:16:36,949
BECAUSE THAT SATELLITE IS ABOUT
THE SIZE OF A SCHOOL BUS ON THE

00:16:36,950 --> 00:16:38,379
GROUND.

00:16:38,379 --> 00:16:41,919
>> AND YOU WERE SUCCESSFUL IN
THAT AND EVERYBODY GOT THE

00:16:41,919 --> 00:16:43,539
SATELLITE BACK?

00:16:43,539 --> 00:16:46,740
>> WE BROUGHT IT BACK AND TWO
OF THEM, AS A MATTER OF FACT.

00:16:46,740 --> 00:16:50,899
AND ABLE TO RELAUNCH THEM THREE
YEARS LATER.

00:16:50,899 --> 00:16:52,350
>> OKAY.
ONE OF THE THINGS THAT SATELLITES HAVE TO HAVE TO STAY ON TRACK IN THE RIGHT O BIT ARE DRIVER SCOPES.

MARTY DO YOU WANT TO TELL US ABOUT WHAT YOU ARE DOING.

>> YES, HE HAS A BICYCLE WHEEL HE IS HOLDING WITH HANDLES AND HE IS ON A PLATFORM THAT MOVES EASILY WITH NO MOTORS IN IT.

THERE HAS TO BE A FORCE OF LIFE TO IT.

AND WE WILL LOOK AT NEWTON'S THIRD LAW.

NEWTON'S THIRD LAW IS REACTION THERE IS AN EQUAL AND OPPOSITE REACTION.

>> NICE JOB, GUISE.

WE WILL PUT THAT IN PLACE WHILE WE ARE LOOKING AT SCOPES TODAY.
WILL SPIN THIS REAL FAST.

00:17:37,539 --> 00:17:40,539
>> HANG ON.

00:17:40,539 --> 00:17:43,178
>> ALL RIGHT NOW TILT IT TO THE LEFT.

00:17:43,179 --> 00:17:45,710
>> NOT BACK TO THE RIGHT.

00:17:45,710 --> 00:17:47,569
OH, TILT IT BACK THE OTHER WAY.

00:17:47,569 --> 00:17:48,619
ALL RIGHT.

00:17:48,619 --> 00:17:53,419
WHAT IS HAPPENING HERE IS WE APPLIED A FORCE IN ONE DIRECTION

00:17:53,420 --> 00:17:57,640
AND WHEN HE TILT TODAY WHEN HE TILTS THE WHEEL THE OPPOSITE

00:17:57,640 --> 00:18:00,270
REACTION PUSHES HIM BACK THE OTHER WAY.

00:18:00,269 --> 00:18:03,519
NOW HOW DID YOU FEEL WHILE THAT WAS HAPPENING?

00:18:03,519 --> 00:18:07,869
>> I WAS FEELING PUSHED OR FORCED TO THE SIDE OF ON.

00:18:07,869 --> 00:18:09,689
>> DID IT FEEL WEIRD?

00:18:09,690 --> 00:18:10,690
>> YES.
>> ALL RIGHT THIS IS A GREAT EXAMPLE OF NEWTON'S THIRD LAW IN ACTION AS WELL AS A SCOPE THE SCOPES ARE IMPORTANT FOR GUIDANCE ON SATELLITES. WHEN THE GUIDANCE SYSTEMS DON'T WORK WE HAVE ASTRONAUTS RETRIEVE THEM.

>> EXACTLY.

>> NOW YOU STUDIED TO BECOME A MEDICAL DOCTOR.

HOW DID THAT EXPERIENCE HELP YOU FOR YOUR CAREER AS AN ASTRONAUT?

ONE OF THE THINGS THAT JUST REALLY ANY SCIENTIFIC DEVELOP HELPS TO YOU BECOME AN ASTRONAUT WITH IMMEDIATE I WAS ABLE TO HELP ON BOARD MY FLIGHT AS THE CREW MEDICAL OFFICER AND DEVELOPING THE EQUIPMENT FOR THE SPACE STATION.

THE NUMBER ONE WAY IT HELPED ME IS LEARN TO LIVE WITHOUT A LOT
334
00:18:55,039 --> 00:18:58,409
OF SLEEP.

335
00:18:58,410 --> 00:19:01,910
WHEN I CAME TO NASA AND I SAW
THAT ON THE FLIGHT PLAN YOU HAD

336
00:19:01,910 --> 00:19:05,380
EIGHT HOURS OF SLEEP THEY
THOUGHT YOU NEEDED SLEEP TO DO A

337
00:19:05,380 --> 00:19:07,890
GOOD JOB THAT WAS WELCOMED.

338
00:19:07,890 --> 00:19:12,480
>> NOW, WE HAVE BEEN STUDYING
ASTRONAUTS SINCE THE BEGINNING

339
00:19:12,480 --> 00:19:16,558
OF THE PROGRAM AND GOT A CHANCE
TO TALK TO APOLLO 11 ASTRONAUT

340
00:19:16,558 --> 00:19:20,609
MICHAEL COLLINS ABOUT HIS
EXPERIENCES.

341
00:19:20,609 --> 00:19:23,379
>> I’M JOINED BY MICHAEL
COLENCE WHO THROUGH ON GEMINI 10

342
00:19:23,380 --> 00:19:24,650
AND APOLLO 11.

343
00:19:24,650 --> 00:19:26,240
THANK YOU.

344
00:19:26,240 --> 00:19:29,538
>> DELIGHTED BE HERE.

345
00:19:29,538 --> 00:19:32,460
>> YOU WERE PART OF THE SPACE
PROGRAM WHEN REALLY IT WAS IN
INFANCY AND THERE WERE EXPERIMENTS GOING ON?

DID YOU FEEL LIKE A GUINEA PIG FLYING AROUND?

>> FREQUENTLY, YES, YES.

OF COURSE, GUINEA PIGS ARE GETTING INJECTED AND SUBJ ECTING THEMSELVES TO THE LATEST MEDICAL ADVANCES.

AND WE HAD A FAIRLY STRONG BUT FRIENDLY AND COMPETENT MEDICAL COMPONENT TO TRAINING.

>> WHAT DID WE LEARN THAT HELPS US WITH LONG-TERM SPACE FLIGHT?

>> THERE ARE A NUMBER OF THINGS.

MANY OF WHICH I HAVE JUST READ ABOUT.

AFFECTS ON THE BLOOD SUPPLY TO YOUR EYE.

WHICH CHANGES IN WEIGHTLESSNESS.
OF COURSE WE FELT STRETCHED OUT.

WE WERE A BIT TALLER BECAUSE THE SPACE BETWEEN YOUR VERTEBRA EXTENDS.

THESE THINGS ARE NOT IMPORTANT AT ALL FOR THE WORK WE WERE DOING.

YOU KNOW TO THE MOON AND BACK AND EIGHT DAYS, NOT A MEDICAL CHALLENGE IN THAT.

BUT IF YOU ARE TALKING ABOUT SEVERAL YEARS TO MARS AND BACK THE MEDICAL CONSIDERATIONS BECOME EXTREMELY IMPORTANT FOR

Perhaps paramount to such a trip.

ONE OF THE NICE THINGS HAVING ASTRONAUTS ON IS THAT YOU HAVE CONVERSATION WITH THEM PRIOR TO THE SHOW.
AND YOU HAVE A REALLY GREAT STORY ABOUT YOUR NECKLACE TELL US ABOUT THAT.

THIS MY HUSBAND HAD THIS MADE FOR ME BEFORE MY FLIGHT AND IT HAS A STAR IN HOUSTON AND A STAR IN ORBIT.

AND ALSO HAD TWO MADE FOR MY TWO DAUGHTERS I EVENTUALLY HAD.

IT WAS REALLY FUN TO WEAR IN.

YOU LOOK AT THE VIDEO YOU SEE THE NECKLACE FLOATING.

YOU TAKE UP A LOT OF PERSONAL STUFF?

WE DON'T GET TO TAKE A LOT.

FOR THE SHUTTLE PROGRAM I WAS REMEMBERING YOU GOT TO TAKE 10 OR 20 ITEMS AND THEY HAD TO BE SMALL THINGS.

AND SO YOU GOT TO HAVE A FEW PERSONAL THINGS WHICH WAS FUN.
OTHER THING YOU GOT TO DO I ENJOYED WAS WE GOT TO FLY THROUGH THE UCLA I FLEW A BANNER UCLA BANNER AND MY MEDICAL SCHOOL UCLA I FLEW A BOOK FROM THE 1800 WITH THE HIPPOCRATIC OATH IN IT.

IT IS A WAY OF GIVING BACK AND SHARING THE EXPERIENCE WITH PEOPLE WHO HELPED YOU ALONG THAT PATH WAY.

>> AND TO WORK FOR NASA TELL US ABOUT WHAT YOU ARE WORKING ON NOW?

>> YES, I'M WITH NAS AT LONGEST SERVING ACTIVE ASTRONAUT.

AND I WORK NOW ON O'RYAN AND THE DISPLAYS WE ARE GOING TO ELECTRONIC PROCEDURES AND CONTROL.

THAT'S WHAT I'M WORKING ON.
IT IS FUN.

>> AND DOES NASA STILL KEEP UP

00:22:28,720 --> 00:22:31,539
WITH YOUR HEALTH AFTER BEING AN ASTRONAUT

00:22:31,539 --> 00:22:36,589
>> FOR THE REST OF OUR LIVES IF YOU CHOOSE TO PARTICIPATE, WHICH

00:22:36,589 --> 00:22:39,149
I THINK LARGE NUMBER DO.

00:22:39,150 --> 00:22:42,460
CAN YOU COME BACK TO NASA FOR ANNUAL PHYSICAL THEY ARE LOOKING

00:22:42,460 --> 00:22:47,319
AT ALL THE ASTRONAUTS FROM BACK IN THE MERCURY DAYS ALL THE WAY

00:22:47,319 --> 00:22:52,359
TO NOW AND VARIOUS LENGTHS OF TIME IN ORBIT TO SEE IF THERE IS

00:22:52,359 --> 00:22:56,609
AN IMPACT FROM WEIGHTLESSNESS AND RADIATION AND ANYTHING WE

00:22:56,609 --> 00:23:00,869
CAN LEARN TO HELP FUTURE EXPLORATION LIKE MARS.

00:23:00,869 --> 00:23:02,669
>> MORE QUESTIONS?

00:23:02,670 --> 00:23:06,550
>> START WITH A VIDEO QUESTION.

00:23:06,549 --> 00:23:11,710
Q: I'M FROM SOUTH VALLEY I WAS WONDERING HOW LONG DID IT TAKE

00:23:11,710 --> 00:23:14,120
FOR TO YOU GET USED TO ZERO GRAVITY?

A: GETTING USED TO ZERO GRAVITY IS A PRETTY QUICK PROCESS.

MOST OR A LARGE PERCENTAGE OF ASTRONAUTS HAVE SPACE ADAPTATION SYNDROME LIKE SEA SICKNESS IT TAKES ONE-THREE DAYS TO GET OVER THAT.

THE SYMPTOMS ARE LIKE DINC SICKNESS BUT DUE TO THE FLUID SHIFTS AND THE FLECK OF WHAT YOUR EYE IS SEEING AND WHAT YOUR INER EAR IS DETECTING.

ONCE YOU GET USED TO THAT YOU ARE LIKE A BABY LEARNING TO WALK.

YOU ARE MORE CLUMSY.

IF YOU WATCH THE ASTRONAUTS ON BOARD SPACE STATIONS FOR SIX MONTHS THEY GET TO BE REALLY
VERY COOL.

00:23:57.230 --> 00:24:01.370
THEY CAN SLIGHT MOVE AMS AND GET THEMSELVES ORIENTED WHEN YOU COME ON BOARD YOU ARE NOT THAT SKILLFUL AT WEIGHTLESSNESS, YOU

00:24:05.710 --> 00:24:07.910
ADAPT RAPIDLY.

00:24:07.910 --> 00:24:12.320
I WAS SURPRISED HOW QUICKLY YOU ADAPT TO A STRANGE ENVIRONMENT.

00:24:12.319 --> 00:24:14.678
>> ATTACK AN ONLINE QUESTION.

00:24:14.679 --> 00:24:20.298
WHAT WAS THE MOST CHALLENGING TASK YOU HAD TO DO BEFORE

00:24:20.298 --> 00:24:21.808
BECOMING AN ASTRONAUT?

00:24:21.808 --> 00:24:28.298
A: I THINK THE MOST CHALLENGING THING FOR ME WAS THE FACT

00:24:28.298 --> 00:24:31.230
THAT†-- I DIDN'T KNOW I WAS GOING TO GET TO BE AN ASTRONAUT.

00:24:31.230 --> 00:24:34.870
I HAD FELT THAT IT HAD PASSED ME BY.

00:24:34.869 --> 00:24:38.319
EVEN THOUGH I HAD THAT DREAM SINCE I WAS 12.

00:24:38.319 --> 00:24:41.539
IT CAME ABOUT UNEXPECTEDLY.
I'm one of the people who is concerned when something so major happens.

But I think the hardest thing about becoming an astronaut the most challenging is everything you have to do.

You either have to become a pilot and go to the military and get thousands of hours and go to test pilot school which is challenging from listen to my colleagues and the other if you chose to be a mission specialist.

Whatever area you decide a doctor, PhD there is work that goes to either one of those.

That's and then all the other things that NASA looks for.

Like -- whether you are a
PRIVATE PILOT OR SCUBA DIVER AND

MOUNTAIN CLIMBING GETTING THAT TOGETHER.

>> YOU HAVE AN AUDIENCE QUESTION FOR US?

Q: CAN YOU EXPERIMENT WITH SPIDERS IN SPACE?

[LAUGHTER]
A: I'M NOT A FAN, EITHER, BUT I

DON'T KNOW THAT WE HAD SPIDERS IN SPACE.

I KNOW WE HAD FERV.

I KNOW WE HADDANTS.

WE HAD SPIDER PROBABLY, YES, WE PROBABLY DO BUT THERE IS NOTHING

THAT YOU CAN TAKE UP IN SPACE WITH YOU THAT ISN'T APPROVED.

YOU CAN'T LIKE†-- FLIP A SPIED NEVER A ZIP LOCK AND TAKE IT

WITH YOU TO DO YOUR OWN EXPERIMENT.
IT HAS TO BE THOUGHT OUT.

455 00:26:11,450 --> 00:26:15,370
THEY HAVE TO DECIDE IF IT SAFE
AND A DANGER TO YOURSELF OR

456 00:26:15,369 --> 00:26:16,369
OTHERS.

457 00:26:16,369 --> 00:26:18,359
IT GOES THROUGH A REVIEW
PROCESS.

458 00:26:18,359 --> 00:26:22,289
OTHERWISE I WOULD HAVE LOVEED
TAKE DIFFERENT THINGS TO ME IN

459 00:26:22,289 --> 00:26:24,389
SPACE AND HAVE FUN WITH IT.

460 00:26:24,390 --> 00:26:26,111
>> I THINK WE HAVE ANOTHER
VIDEO QUESTION.

461 00:26:26,111 --> 00:26:35,790
Q: MY QUESTION IS†-- WHAT
INSPIRED TO YOU COME BACK?

462 00:26:35,789 --> 00:26:43,460
A: WHAT INSPIRED ME TO BE AN
ASTRONAUT IS WHEN I WAS OF AGE I

463 00:26:43,460 --> 00:26:48,140
LISTENED ALLEN SHEPHERDS ONE
MORNING AND LISTEND AND KNEW AT

464 00:26:48,140 --> 00:26:50,929
THAT MOMENT THAT'S WHEN I WANTED
TO DO.

465 00:26:50,929 --> 00:26:53,850
AND I NEVER FORGOT THAT AND
NEVER LOST SIGHT OF THAT DREAM.

466 00:26:53,849 --> 00:26:57,359
EVEN THOUGH IT DID NOT SEEM POSSIBLE.

THAT'S ONE THING IF YOU HAVE A DREAM GO AFTER IT.

WE TALKED TO ONE MORE ASTRONAUT ABOUT HIS EXPERIENCES ON THE SPACE STATION.

THANK YOU FOR TALKING WITH US WHEN YOU WERE IN SPACE THERE WERE A LOT OF EXPERIMENTS?

WHY IS THAT IMPORTANT?

THE SPACE STATION IS A WORLD CLASS LABORATORY.

WE'RE DOING AN ARARE OF EXPERIMENTS SOME IS BASIC AND A LOT IS ZERO GRAVITY.

WE NEED TO UNDERSTAND THESE DIFFERENT AFFECTS WHICH ARE
NEGATIVE.

00:27:36,220 --> 00:27:37,579
WE LOSE BONE DENSITY.

00:27:37,579 --> 00:27:39,699
MUSCLE MASS AND PROBLEMS WITH ICE.

00:27:39,700 --> 00:27:43,179
WE ARE LEARN BURGLAR THAT AND THAT'S WHAT WE DID ON BOARD THE

00:27:43,179 --> 00:27:45,389
SPACE STATION WITH OUR INVESTIGATIONS.

00:27:45,388 --> 00:27:48,079
WERE YOU THE GUINEA PIG WHILE YOU WERE UP?

00:27:48,079 --> 00:27:51,740
YOU KNOW WE ARE LIKE SCIENTISTS WE ARE EITHER THE

00:27:51,740 --> 00:27:55,009
TECHNICIAN OR WE JUST MOP THE EXPERIMENT.

00:27:55,009 --> 00:27:56,779
OFTEN TIMES WE ARE THE EXPERIMENT.

00:27:56,779 --> 00:27:58,490
WE ARE TAKING SAMPLES.

00:27:58,490 --> 00:27:59,620
WE ARE LOOKING AT ICE.

00:27:59,619 --> 00:28:01,839
WE HAVE WORLD CLASS EQUIPMENT.

00:28:01,839 --> 00:28:07,500
LOOKS LIKE AN OPTOMETRY CLINIC.
THOSE THINGS YOU ARE STUDYING ARE GOING TOWARD A FUTURE TRIP TO MARS?

WE HOPE TO GO TO MARS, IT WILL BE CHALLENGING WE CAN GET PROBES TO MARS BUT TO GET HUMANS TO MARS TELL BE A CHALLENGE AND WE NEED TO UNDERSTAND THE AFFECT EVEREFFECTS.

THANK YOU.

SURE.

THAT’S ALL THE TIME WE HAVE AND THANK YOU FOR JOINING US.

WE WANT TO THANK OUR SPONSOR, NASA.

NEXT MONTH WE WILL LOOK AT THE WRIGHT BROTHERS, CHECK THIS OUT.

THIS IS A WRIGHT BAT SIMILAR TO WHAT THE WRIGHT BROTHER'S FATHER GAVE THEM THAT SPARKED THEIR INTEREST IN AVIATION THAT
LEAD THEM TO INVENT THIS.

THE WRIGHT FLYER NOT JUST THAT SPARK IT WAS A LOT OF DESIGN AND A LOT OF MATH.

THEY DID A LOT OF AERODYNAMIC TESTING AND REFINEMENT OF THE WIND TUNNEL THOO THAT LEAD THEM TO THIS INVENTION.

IF YOU WANT TO LEARN ABOUT IT CHECK OUT. "STEM IN 30".

THANKS FOR JOINING US.

WE WILL BE AROUND FOR A COUPLE MORE MINUTES PUWANT TO JOIN US AFTER THE PROGRAM AND HERE TO ANSWER QUESTIONS.

LET'S WATCH YOUR SPACE SHUTTLE DISCOVERY LAUNCH.

>> SOUNDS LIKE FUN.