



LIVING AND WORKING IN SPACE

USA

Smithsonian
National Air and Space Museum



1
00:00:04,160 --> 00:00:06,830
>>> TODAY'S THE DAY OF THE SHOW
AND I'M WALKING TO WORK.

2
00:00:06,830 --> 00:00:08,540
THIS IS MY COMMUTE.

3
00:00:08,540 --> 00:00:10,780
HOW SOMEBODY GETS TO WORK IS
CALLED A COMMUTE.

4
00:00:10,780 --> 00:00:12,250
FOLLOW ALONG ON MINE.

5
00:00:16,369 --> 00:00:15,240
>> THIS IS MY COMMUTE.

6
00:00:16,369 --> 00:00:18,730
>> MAN, HEY TIM!

7
00:00:18,730 --> 00:00:21,820
HEY, ARE YOU HEADING TO WORK TO
THE MUSEUM.

8
00:00:21,820 --> 00:00:22,820
>> AEROSPACE?

9
00:00:22,820 --> 00:00:23,820
>> YES.

10
00:00:23,820 --> 00:00:24,820
>> YEAH.

11
00:00:24,820 --> 00:00:27,430
HOP ON IN.

12
00:00:27,430 --> 00:00:31,359
>> GREAT.

13

00:00:31,359 --> 00:00:35,290

>> WHOA!

14

00:00:35,290 --> 00:00:51,000

THIS IS MY COMMUTE.

15

00:00:51,000 --> 00:01:01,949

>> HEY PIERS, YOU WOULD NOT
BELIEVE MY COMMUTE THIS MORNING.

16

00:01:01,949 --> 00:01:03,559

>> WHOA!

17

00:01:03,559 --> 00:01:06,770

>> COME ON.

18

00:01:06,770 --> 00:01:08,350

>> YOU CALL THAT A COMMUTE?

19

00:01:08,350 --> 00:01:14,390

YOU SHOULD HAVE SEEN MY RIDE.

20

00:01:14,390 --> 00:01:20,429

>> SIX, FIVE, FOUR, THREE, TWO,
ONE.

21

00:01:20,429 --> 00:01:28,490

AND ZERO AND LIFTOFF OF SPACE
SHUTTLE ATLANTIS.

22

00:01:28,490 --> 00:01:32,520

HISTORIC ACHIEVEMENTS IN SPACE.

23

00:01:32,520 --> 00:01:34,560

>> WOW, THAT WAS SOME COMMUTE.

24

00:01:34,560 --> 00:01:36,300

I'LL BET IT WAS A LOT LONGER
THAN MINE.

25

00:01:36,300 --> 00:01:40,100
>> YEAH, MINE IS FURTHER BUT IT
ONLY TOOK 8 MINUTES.

26

00:01:40,100 --> 00:01:41,100
THAT'S GOING FAST.

27

00:01:41,100 --> 00:01:44,610
>> WOW, I'M JUST GLAD I MADE IT
HERE IN TIME FOR THE SHOW.

28

00:01:44,610 --> 00:01:45,610
>> WHEN DID THE SHOW START?

29

00:01:45,610 --> 00:01:46,970
>> IT'S RIGHT NOW.

30

00:01:46,970 --> 00:02:03,349
THIS IS STEM IN 30.

31

00:02:03,349 --> 00:02:18,749
>> HI.

32

00:02:18,749 --> 00:02:21,380
>> WE ARE COMING TO YOU LIVE
FROM THE NATIONAL AIR AND SPACE

33

00:02:21,380 --> 00:02:22,380
MUSEUM.

34

00:02:22,380 --> 00:02:24,640
>> TODAY WE'RE IN THE MOVING
BEYOND EARTH GALLERY, AND THIS

35

00:02:24,640 --> 00:02:26,700
GALLERY IS AMAZING.

36

00:02:26,700 --> 00:02:29,640

THERE ARE ALL KINDS OF ARTIFACTS
THAT HAVE FLOWN IN SPACE IN THIS

37

00:02:29,640 --> 00:02:30,640

GALLERY.

38

00:02:30,640 --> 00:02:34,090

ONE OF MY FAVORITES IS THIS
SPACE SHUTTLE ENGINE.

39

00:02:34,090 --> 00:02:36,340

THERE ARE THREE OF THESE ON THE
ORBITER AND EACH OF THEM

40

00:02:36,340 --> 00:02:40,390

PRODUCES OVER 400,000 POUNDS OF
THRUST.

41

00:02:40,390 --> 00:02:43,130

COUPLE THAT WITH THE TWO
EXTERNAL BOOSTERS AND IT GETS

42

00:02:43,130 --> 00:02:44,970

YOU INTO SPACE FAST.

43

00:02:44,970 --> 00:02:48,240

ALSO IN THIS GALLERY THERE'S A
LITTLE GREEN SPACE RANGER THAT'S

44

00:02:48,240 --> 00:02:50,330

BEEN IN SPACE THAT YOU MIGHT
RECOGNIZE.

45

00:02:50,330 --> 00:02:55,900

I THINK YOU KNOW HIM AS BUZZ
LIGHT YEAR.

46

00:02:55,900 --> 00:02:58,850
>> YOU GUYS ARE FRIENDS FROM
LUTHER JACKSON MIDDLE SCHOOL,

47
00:02:58,850 --> 00:03:01,680
WE'LL HAVE SOME TIME TOO LOOK
FOR BUZZ LIGHT YEAR AFTER THE

48
00:03:01,680 --> 00:03:02,680
SHOW.

49
00:03:02,680 --> 00:03:05,900
>> WE'D LIKE TO WELCOME OUR
ONLINE VIEWERS.

50
00:03:05,900 --> 00:03:09,710
THANK YOU FOR WATCHING ON NASA
TV, AND ALSO REMEMBER THAT YOU

51
00:03:09,710 --> 00:03:11,250
CAN PARTICIPATE TODAY ONLINE.

52
00:03:11,250 --> 00:03:14,020
GO TO OUR WEBSITE AND YOU CAN
SUBMIT QUESTIONS.

53
00:03:14,020 --> 00:03:17,150
WE HAVE AN EXPERT STANDING BY
DOWNSTAIRS READY TO ANSWER THOSE

54
00:03:17,150 --> 00:03:21,930
QUESTIONS AND SOME OF THEM WE'LL
ACTUALLY ON THE SHOW TODAY.

55
00:03:21,930 --> 00:03:25,630
>> WE'RE GOING TO BE LOOKING AT
LIVING AND WORKING SOME SPACE.

56
00:03:25,630 --> 00:03:28,650
LET'S LOOK AT THE OUTPOSTS WE

HAVE UP THERE RIGHT NOW, THE

57

00:03:28,650 --> 00:03:32,310

INTERNATIONAL SPACE STATION.

58

00:03:32,310 --> 00:03:35,230

>> I'M STANDING IN FRONT OF THE
NATIONAL AIR AND SPACE MUSEUM IN

59

00:03:35,230 --> 00:03:37,110

WASHINGTON D.C.

60

00:03:37,110 --> 00:03:40,520

WE COLLECT ARTIFACTS ON SPACE
AND AVIATION HISTORY, BUT

61

00:03:40,520 --> 00:03:43,140

THERE'S ONE ARTIFACT THAT WE
CAN'T SELECT.

62

00:03:43,140 --> 00:03:45,170

THAT'S THE INTERNATIONAL SPACE
STATION.

63

00:03:45,170 --> 00:03:48,850

RIGHT NOW IT'S ORBITING 250
MILES ABOVE THE EARTH.

64

00:03:48,850 --> 00:03:52,060

TO GET AN IDEA OF HOW BIG IT IS,
LET'S BRING IT A LITTLE BIT

65

00:03:52,060 --> 00:03:57,739

CLOSER.

66

00:03:57,739 --> 00:04:01,180

>> TRAVELING AT OVER 17,500
MILES PER HOUR, THE STATION

67

00:04:01,180 --> 00:04:04,180
COMPLETES ONE ORBIT EVERY 90
MINUTES.

68
00:04:04,180 --> 00:04:08,040
IT'S POWERED BY A SOLAR ARRAY
THAT COVERS MORE THAN AN ACRE.

69
00:04:08,040 --> 00:04:11,910
IT HAS TAKEN OVER 180 SPACE
WALKS TO CONSTRUCT THE STATION

70
00:04:11,910 --> 00:04:14,280
WHICH WEIGHS MORE THAN 1 MILLION
POUNDS.

71
00:04:14,280 --> 00:04:19,269
THERE ARE 52 COMPUTERS ON BOARD
AS WELL AS OVER 8 MILES OF WIRES

72
00:04:19,269 --> 00:04:23,000
CONNECTING ELECTRICAL POWER
SYSTEMS.

73
00:04:23,000 --> 00:04:25,860
THE LIVABLE AREA OF THE SPACE
STATION IS ABOUT THE SAME AS A

74
00:04:25,860 --> 00:04:27,620
SIX-ROOM HOUSE.

75
00:04:27,620 --> 00:04:35,180
IT HAS TWO BATHROOMS, A GYM, AND
A 360-DEGREE WINDOW.

76
00:04:35,180 --> 00:04:38,740
>> THE SPACE STATION HAS BEEN
CONTINUOUSLY OCCUPIED FOR ALMOST

77
00:04:38,740 --> 00:04:39,740

15 YEARS.

78

00:04:39,740 --> 00:04:43,780

IT HAS BEEN HOME TO ASTRONAUTS
FROM 15 DIFFERENT COUNTRIES.

79

00:04:43,780 --> 00:04:47,370

CURRENTLY THERE'S A CREW OF SIX
ON BOARD, INCLUDING MIKHAIL

80

00:04:47,370 --> 00:04:51,380

KORNIYENKO AND SCOTT KELLY WHO
ARE SPENDING AN ENTIRE YEAR IN

81

00:04:51,380 --> 00:04:53,160

SPACE.

82

00:04:53,160 --> 00:04:56,270

THEY'RE PART OF TEN
INVESTIGATIONS TO STUDY THE

83

00:04:56,270 --> 00:04:59,690

SUBTLE AND NOT SO SUBTLE AFFECTS
OF SPACE FLIGHT ON THE HUMAN

84

00:04:59,690 --> 00:05:01,870

BODY.

85

00:05:01,870 --> 00:05:08,720

THE SPACE STATION IS TRULY AN
INTERNATIONAL ENDEAVOR,

86

00:05:08,720 --> 00:05:12,960

EVERYTHING FROM HUMAN BIOLOGY TO
BIOCHEMISTRY TO PHYSICAL

87

00:05:12,960 --> 00:05:13,960

SCIENCES.

88

00:05:13,960 --> 00:05:16,690
WHO KNOWS WHAT SORTS OF
WONDERFUL DISCOVERIES WILL COME

89
00:05:16,690 --> 00:05:18,410
FROM THESE.

90
00:05:18,410 --> 00:05:21,430
>> I'D LIKE TO INTRODUCE OUR
GUESTS TODAY, DR.

91
00:05:21,430 --> 00:05:23,850
VALERIE NEAL,
THE CHAIR OF THE SPACE HISTORY

92
00:05:23,850 --> 00:05:26,010
DEPARTMENT HERE AT THE NATIONAL
AIR AND SPACE MUSEUM.

93
00:05:26,010 --> 00:05:29,070
THANK YOU FOR JOINING US TODAY.

94
00:05:29,070 --> 00:05:31,620
OUR THEME TODAY IS LIVING AND
WORKING IN SPACE.

95
00:05:31,620 --> 00:05:34,370
TELL US A LITTLE BIT ABOUT THE
DAY TO DAY ACTIVITIES OF

96
00:05:34,370 --> 00:05:36,370
ACTUALLY LIVING IN SPACE.

97
00:05:36,370 --> 00:05:39,480
>> THE DAY TO DAY ACTIVITIES OF
SPACE ARE A LOT LIKE THOSE HERE

98
00:05:39,480 --> 00:05:40,650
ON EARTH.

99
00:05:40,650 --> 00:05:45,199
THE ASTRONAUTS WAKE UP, CLEAN
UP, HAVE BREAKFAST, GO TO WORK,

100
00:05:45,199 --> 00:05:50,990
TAKE A LUNCH BREAK, DO A LITTLE
MORE, DO A LITTLE EXERCISE,

101
00:05:50,990 --> 00:05:54,900
MAYBE HAVE RECREATION OR
ENTERTAINMENT AND RELAXATION IN

102
00:05:54,900 --> 00:05:57,050
THE EVENING AND GO TO SLEEP.

103
00:05:57,050 --> 00:06:00,000
WHAT THEY DO IS NOT ALL THAT
DIFFERENT THAN WHAT WE DO HERE

104
00:06:00,000 --> 00:06:04,080
ON A TYPICAL DAY BUT WHERE THEY
DO IT AND HOW THEY DO IT IS WHAT

105
00:06:04,080 --> 00:06:05,240
IS DIFFERENT.

106
00:06:05,240 --> 00:06:08,260
>> IT SEEMS LIKE THINGS THAT WE
TAKE FOR GRANTED HERE THAT ARE

107
00:06:08,260 --> 00:06:11,610
SIMPLE HERE ON EARTH BECOME MUCH
MORE COMPLEX WHEN YOU GET INTO

108
00:06:11,610 --> 00:06:12,610
SPACE.

109
00:06:12,610 --> 00:06:13,610
>> THAT'S TRUE.

110

00:06:13,610 --> 00:06:14,610

THEY BECOME DIFFERENT.

111

00:06:14,610 --> 00:06:16,910

NOT NECESSARILY MORE COMPLEX BUT
DIFFERENT BECAUSE WHEN YOU'RE IN

112

00:06:16,910 --> 00:06:19,830

SPACE OF COURSE YOU'RE
WEIGHTLESS AND EVERYTHING AROUND

113

00:06:19,830 --> 00:06:20,830

YOU IS WEIGHTLESS.

114

00:06:20,830 --> 00:06:24,570

THINGS FLOAT UNLESS THEY ARE
HELD IN PLACE.

115

00:06:24,570 --> 00:06:26,300

THAT CHANGES EVERYTHING.

116

00:06:26,300 --> 00:06:29,949

YOU HAVE TO THINK MORE ABOUT THE
THINGS YOU'RE DOING.

117

00:06:29,949 --> 00:06:32,310

YOU ALSO HAVE TO MAKE SOME
ACCOMMODATIONS TO

118

00:06:32,310 --> 00:06:33,310

WEIGHTLESSNESS.

119

00:06:33,310 --> 00:06:36,240

A GOOD EXAMPLE IS FOR WOMEN
ASTRONAUTS, PARTICULARLY THOSE

120

00:06:36,240 --> 00:06:39,560

WHO HAVE LONG HAIR, THEY HAVE TO

GIVE SOME THOUGHT TO HOW THEY

121

00:06:39,560 --> 00:06:41,389

WEAR THEIR HAIR IN SPACE.

122

00:06:41,389 --> 00:06:44,300

IF I WERE THERE RIGHT NOW, THIS
HAIR WOULD BE FLOATING ALL

123

00:06:44,300 --> 00:06:48,840

AROUND MY HEAD IN A HALO, BUT IF
I HAD LONG HAIR, IT WOULD BE

124

00:06:48,840 --> 00:06:50,790

REALLY FLOATING AROUND.

125

00:06:50,790 --> 00:06:52,150

IT MIGHT GET IN MY EYES.

126

00:06:52,150 --> 00:06:53,990

IT MIGHT TICKLE YOUR NOSE.

127

00:06:53,990 --> 00:06:57,389

IT MIGHT GET TANGLED UP IN SOME
OF THE EQUIPMENT.

128

00:06:57,389 --> 00:07:01,040

SO NASA MADE A RULE THAT PEOPLE
WITH LONG HAIR IN SPACE NEED TO

129

00:07:01,040 --> 00:07:05,270

KEEP THEIR HAIR CONFINED IN A
PONYTAIL WITH A SCRUNCHIE, A

130

00:07:05,270 --> 00:07:06,270

HEAD BAND, A BARRETTE.

131

00:07:06,270 --> 00:07:11,139

THAT HAS AFFECTED REALLY ONLY

THE WOMEN ASTRONAUTS SO FAR

132

00:07:11,139 --> 00:07:13,580

BECAUSE MOST OF THE MEN GO UP
WITH SHORT HAIR.

133

00:07:13,580 --> 00:07:17,130

BUT WE ACTUALLY HAVE A SCRUNCHIE
ON DISPLAY IN THIS GALLERY THAT

134

00:07:17,130 --> 00:07:21,130

WAS WORN BY ONE OF THE FEMALE
ASTRONAUTS IN SPACE.

135

00:07:21,130 --> 00:07:24,229

THAT'S ONE EXAMPLE OF THINGS YOU
HAVE TO DO A LITTLE DIFFERENTLY.

136

00:07:24,229 --> 00:07:26,870

>> NOW, EATING IS SOMETHING THAT
ALL THE ASTRONAUTS HAVE TO DO IN

137

00:07:26,870 --> 00:07:29,850

SPACE.

138

00:07:29,850 --> 00:07:31,630

>> THAT'S DIFFERENT AS WELL.

139

00:07:31,630 --> 00:07:35,280

THE REASON IS THERE'S NO
REFRIGERATOR NOR A FREEZER ON

140

00:07:35,280 --> 00:07:40,060

BOARD, SO ALL THE FOOD HAS TO BE
PREPARED IN ADVANCE AND PACKAGED

141

00:07:40,060 --> 00:07:42,080

IN A WAY THAT IT WON'T SPOIL.

142

00:07:42,080 --> 00:07:47,180
SO THE FOOD THEY USE IS A LOT
LIKE THE FOOD THAT SOLDIERS USE

143
00:07:47,180 --> 00:07:50,140
WHEN THEY'RE ON ACTIVE DUTY OR
THAT YOU MIGHT USE WHEN YOU GO

144
00:07:50,140 --> 00:07:51,140
CAMPING.

145
00:07:51,140 --> 00:07:52,490
IT'S ALL PREPARED.

146
00:07:52,490 --> 00:07:55,010
IT'S READY TO BE WARMED UP.

147
00:07:55,010 --> 00:07:59,180
IF IT'S IN A PACKET LIKE THIS OR
IF IT'S IN A PACKET LIKE THIS,

148
00:07:59,180 --> 00:08:03,520
IT JUST NEEDS TO HAVE SOME WATER
ADDED, SHAKE IT AROUND TO MAKE

149
00:08:03,520 --> 00:08:08,300
SURE IT DISSOLVES AND SUDDENLY
YOU HAVE A DRINK OR MACARONI AND

150
00:08:08,300 --> 00:08:12,380
CHEESE OR OATMEAL BY ADDING
WATER.

151
00:08:12,380 --> 00:08:15,340
YOU DON'T REALLY NEED A WHOLE
SET OF SILVERWARE.

152
00:08:15,340 --> 00:08:19,289
YOU NEED A SPOON AND A PAIR OF
SCISSORS.

153

00:08:19,289 --> 00:08:23,651

AFTER YOU HAVE PREPARED YOUR
FOOD, YOU NEED TO SNIP INTO IT,

154

00:08:23,651 --> 00:08:27,479

OPEN IT UP SO YOU CAN GET A
SPOON IN THERE AND EAT IT SO IT

155

00:08:27,479 --> 00:08:29,320

WON'T GO FLOATING AWAY.

156

00:08:29,320 --> 00:08:34,060

THEY DON'T USE DISHES, CUPS,
GLASSES, NOTHING THAT HAS TO BE

157

00:08:34,060 --> 00:08:35,259

CLEANED UP AFTERWARDS.

158

00:08:35,259 --> 00:08:38,029

YOU EAT RIGHT OUT OF THE
PACKAGES AND THEN THROW IT ALL

159

00:08:38,029 --> 00:08:39,029

IN THE TRASH.

160

00:08:39,029 --> 00:08:40,029

>> INTERESTING.

161

00:08:40,029 --> 00:08:44,019

ONE OF THE THINGS THE ASTRONAUTS
ENJOY, THEY HAVE THE SAME THING

162

00:08:44,019 --> 00:08:46,550

THEY LIKE TO DO IN THEIR FREE
TIME WHEN THEY'RE IN SPACE.

163

00:08:46,550 --> 00:08:48,079

>> IT'S SURPRISING.

164

00:08:48,079 --> 00:08:52,910

THEIR FAVORITE LEISURE ACTIVITY
IS JUST SIMPLY TO LOOK OUT THE

165

00:08:52,910 --> 00:08:53,910

WINDOW.

166

00:08:53,910 --> 00:08:54,959

THINK OF THE VIEW.

167

00:08:54,959 --> 00:08:57,379

OUR INCREDIBLE EARTH BELOW THEM.

168

00:08:57,379 --> 00:09:01,620

THEY'RE FLYING OVER IT AT 17,500
MILES PER HOUR.

169

00:09:01,620 --> 00:09:05,579

IN AN HOUR AND A HALF THEY CAN
GO ENTIRELY AROUND THE WORLD,

170

00:09:05,579 --> 00:09:10,959

SEE ALL THE CONTINENTS, SEE DAY
AND NIGHT, LIGHTNING, PLACES

171

00:09:10,959 --> 00:09:14,329

WHERE PEOPLE LIVE AND PLACES
THAT ARE SO REMOTE, THEY'RE HARD

172

00:09:14,329 --> 00:09:15,329

TO GET TO.

173

00:09:15,329 --> 00:09:17,009

SO THEY LOVE WATCHING THE EARTH.

174

00:09:17,009 --> 00:09:18,009

>> THAT'S AMAZING.

175

00:09:18,009 --> 00:09:19,839

WE'VE GOT SOME QUESTIONS AND
WE'RE GOING TO START WITH A

176

00:09:19,839 --> 00:09:25,029

VIDEO QUESTION FROM BENJAMIN
FROM KANSAS CITY, KANSAS.

177

00:09:25,029 --> 00:09:31,769

>> HI, MY QUESTION IS, HOW DO
YOU EXERCISE OUT IN SPACE?

178

00:09:31,769 --> 00:09:32,769

>> HOW DO YOU EXERCISE IN SPACE?

179

00:09:32,769 --> 00:09:33,959

>> VERY GOOD QUESTION.

180

00:09:33,959 --> 00:09:35,449

YOU HAVE A GYM.

181

00:09:35,449 --> 00:09:39,170

RIGHT INSIDE THE INTERNATIONAL
SPACE STATION THERE ARE THREE

182

00:09:39,170 --> 00:09:41,429

PIECES OF EQUIPMENT.

183

00:09:41,429 --> 00:09:46,860

ONE IS A TREADMILL, ONE IS A
STATIONARY BICYCLE AND ONE IS A

184

00:09:46,860 --> 00:09:49,720

WEIGHT LIFTING MACHINE
BASICALLY.

185

00:09:49,720 --> 00:09:51,860

THE BICYCLE OF COURSE HAS NO
WHEELS.

186

00:09:51,860 --> 00:09:55,410

IT'S ONE YOU SIT ON AND PEDAL TO
YOUR HEART'S CONTENT.

187

00:09:55,410 --> 00:09:59,889

BUT YOU HAVE TO USE BUNGEE CORDS
AND SEATBELTS AND STRAPS OF

188

00:09:59,889 --> 00:10:04,199

VARIOUS KINDS TO STAY ON THE
EQUIPMENT TO GET YOUR RESISTANCE

189

00:10:04,199 --> 00:10:05,959

EXERCISE.

190

00:10:05,959 --> 00:10:08,910

OTHERWISE YOU WOULD JUST FLOAT
OFF OF IT.

191

00:10:08,910 --> 00:10:11,129

>> WE'VE GOT AN ONLINE QUESTION
NEXT.

192

00:10:11,129 --> 00:10:14,259

DO ASTRONAUTS KNOW IF IT'S DAY
OR NIGHT?

193

00:10:14,259 --> 00:10:17,199

>> ASTRONAUTS DO KNOW IF IT'S
DAY OR NIGHT SIMPLY BY LOOKING

194

00:10:17,199 --> 00:10:18,249

OUT THE WINDOW.

195

00:10:18,249 --> 00:10:22,100

BUT WHAT'S DAY OR NIGHT ON THE
EARTH MAY NOT BE DAY OR NIGHT

196

00:10:22,100 --> 00:10:23,279
FOR THEM.

197
00:10:23,279 --> 00:10:27,050
THEY'RE OPERATING ON THEIR OWN
24-HOUR CYCLE.

198
00:10:27,050 --> 00:10:29,720
IT'S KIND OF INDEPENDENT OF
WHETHER IT'S LIGHT OR DARK

199
00:10:29,720 --> 00:10:30,720
OUTSIDE.

200
00:10:30,720 --> 00:10:32,670
IT'S BASED ON THE CLOCK.

201
00:10:32,670 --> 00:10:34,449
>> WE'VE GOT AN AUDIENCE
QUESTION NEXT.

202
00:10:34,449 --> 00:10:39,019
>> HAVE THERE EVER BEEN ANY
PROBLEMS WITH SPACE SUITS?

203
00:10:39,019 --> 00:10:41,089
>> ANY PROBLEMS WITH SPACE
SUITS?

204
00:10:41,089 --> 00:10:45,420
>> OCCASIONALLY THERE ARE
PROBLEMS WITH SPACE SUITS, NOT

205
00:10:45,420 --> 00:10:50,999
FITTING QUITE PROPERLY OR THE
EQUIPMENT THAT RUNS THE SPACE

206
00:10:50,999 --> 00:10:54,980
SUIT TO CIRCULATE THE AIR,
CIRCULATE THE WATER, MAY DEVELOP

207

00:10:54,980 --> 00:10:58,879

A PROBLEM, BUT THE ASTRONAUTS
HAVE SPACE SUIT REPAIR KITS ON

208

00:10:58,879 --> 00:10:59,959

BOARD.

209

00:10:59,959 --> 00:11:03,239

IF THEY'RE HAVING A PROBLEM THEY
CAN FIX IT OR THERE'S ALWAYS A

210

00:11:03,239 --> 00:11:06,420

SPARE SPACE SUIT SO THEY CAN
JUST USE A DIFFERENT ONE IF

211

00:11:06,420 --> 00:11:09,089

THEIR OWN ISN'T WORKING
PROPERLY.

212

00:11:09,089 --> 00:11:10,550

>> AWESOME.

213

00:11:10,550 --> 00:11:12,899

BETH HAD AN OPPORTUNITY A FEW
DAYS AGO TO TALK WITH PAOLO

214

00:11:12,899 --> 00:11:16,339

NESPOLI WHO IS A TWO-TIME SPACE
FLIGHT VETERAN.

215

00:11:16,339 --> 00:11:19,170

HE FLEW ONCE ON THE SPACE
SHUTTLE AND ONCE ON THE SOYUZ

216

00:11:19,170 --> 00:11:20,170

SPACECRAFT.

217

00:11:20,170 --> 00:11:22,709

SHE HAD AN OPPORTUNITY TO TALK
TO HIM ABOUT HIS SIX MONTHS THAT

218

00:11:22,709 --> 00:11:24,079

HE SPENT IN SPACE.

219

00:11:24,079 --> 00:11:25,079

LET'S HEAD OVER TO BETH.

220

00:11:25,079 --> 00:11:29,929

>> I'M BETH WILSON HERE WITH
PAOLO NESPOLI WHO IS AN ITALIAN

221

00:11:29,929 --> 00:11:32,689

ASTRONAUT WITH THE EUROPEAN
SPACE AGENCY.

222

00:11:32,689 --> 00:11:36,519

THANK YOU SO MUCH FOR COMING AND
TALKING TO US TODAY AT STEM IN

223

00:11:36,519 --> 00:11:37,519

30.

224

00:11:37,519 --> 00:11:38,759

>> IT'S A PLEASURE.

225

00:11:38,759 --> 00:11:39,881

>> WE'VE GOT SOME QUESTIONS FOR
YOU.

226

00:11:39,881 --> 00:11:42,429

I KNOW YOU SPENT A LOT OF TIME
ON THE INTERNATIONAL SPACE

227

00:11:42,429 --> 00:11:43,429

STATION.

228

00:11:43,429 --> 00:11:46,360

WHAT WAS YOUR MOST CHALLENGING
WORK YOU HAD TO DO ON THE

229

00:11:46,360 --> 00:11:47,609

INTERNATIONAL SPACE STATION?

230

00:11:47,609 --> 00:11:51,839

>> I THINK ONE OF THE CHALLENGES
THAT YOU GET WHEN YOU GO IN

231

00:11:51,839 --> 00:11:55,420

SPACE AND YOU STAY FOR A LONG
DURATION IS THAT YOU ESSENTIALLY

232

00:11:55,420 --> 00:11:57,379

HAVE TO BECOME AN EXTRA
TERRESTRIAL PERSON.

233

00:11:57,379 --> 00:12:00,121

SOMEONE ASKED ME DO YOU BELIEVE
IN EXTRA TERRESTRIAL AND I SAY

234

00:12:00,121 --> 00:12:01,259

YES, I WAS ONE OF THEM.

235

00:12:01,259 --> 00:12:07,699

YOU HAVE TO LEARN TO LIVE IN
ZERO GRAVITY.

236

00:12:07,699 --> 00:12:13,990

AT THE BEGINNING YOU REALLY TRY
HARD TO BEHAVE THE SAME WAY YOU

237

00:12:13,990 --> 00:12:15,759

BEHAVE HERE ON EARTH AND IT
DOESN'T WORK.

238

00:12:15,759 --> 00:12:17,569

YOU CANNOT DO THINGS.

239

00:12:17,569 --> 00:12:20,170

THINGS ARE NOT EFFICIENT.

240

00:12:20,170 --> 00:12:21,319

IT'S CRAZY.

241

00:12:21,319 --> 00:12:25,540

AND THEN AFTER A WHILE WHEN YOU
UNDERSTAND THIS IS A NEW

242

00:12:25,540 --> 00:12:27,230

SITUATION, YOU NEED TO EXPLORE.

243

00:12:27,230 --> 00:12:28,699

YOU NEED TO TRY THINGS.

244

00:12:28,699 --> 00:12:33,040

YOU NEED TO BECOME SUPERMAN, FLY
FROM ONE PLACE TO THE OTHER AND

245

00:12:33,040 --> 00:12:35,649

DO EXCEPTIONAL THINGS THAT YOU
CANNOT DO HERE.

246

00:12:35,649 --> 00:12:40,050

THEN IS WHEN YOU ACTUALLY REALLY
START WORKING AND THAT'S A VERY

247

00:12:40,050 --> 00:12:41,199

GOOD CHALLENGE.

248

00:12:41,199 --> 00:12:44,939

>> NOW, YOU FLEW BOTH ON THE
SHUTTLE AND ON THE SOYUZ.

249

00:12:44,939 --> 00:12:45,939

>> YES.

250

00:12:45,939 --> 00:12:47,499
>> CAN YOU EXPLAIN THE
DIFFERENCE BETWEEN THE TWO

251
00:12:47,499 --> 00:12:48,979
SPACECRAFT?

252
00:12:48,979 --> 00:12:54,420
>> THE LAUNCH ITSELF BETWEEN THE
TWO VEHICLES IS PRETTY MUCH THE

253
00:12:54,420 --> 00:12:55,559
SAME MORE OR LESS.

254
00:12:55,559 --> 00:12:58,179
THE SHUTTLE IS A LITTLE ROUGHER
IN THE BEGINNING BUT THEN IT

255
00:12:58,179 --> 00:13:03,269
SMOOTHS OUT.

256
00:13:03,269 --> 00:13:07,309
BUT THE RE-ENTRY IS COMPLETELY
DIFFERENT.

257
00:13:07,309 --> 00:13:13,089
THE SHUTTLE RE-ENTERS ALMOST
LIKE A SPACECRAFT.

258
00:13:13,089 --> 00:13:17,769
THE SOYUZ RE-ENTERS WITH A
PARACHUTE AND THE WAY IT BREAKS

259
00:13:17,769 --> 00:13:22,869
IN THE ATMOSPHERE AND EVERYTHING
THAT HAPPENS INSIDE IN THIS

260
00:13:22,869 --> 00:13:29,129
HALF-AN-HOUR HORROR IS PRETTY
MUCH FAIRLY ROUGH I WOULD SAY.

261

00:13:29,129 --> 00:13:30,290

YOU ARE INSIDE THERE.

262

00:13:30,290 --> 00:13:33,949

YOU TRAIN FROM A TECHNICAL POINT
OF VIEW MANY, MANY TIMES ON

263

00:13:33,949 --> 00:13:36,730

EARTH, BUT WHEN THINGS HAPPEN IN
THERE, YOU ARE COMPLETELY

264

00:13:36,730 --> 00:13:40,110

CONSTANTLY SURPRISED AND YOU
ACTUALLY ARE LIKE, WHOA, WHAT

265

00:13:40,110 --> 00:13:41,110

WAS THAT?

266

00:13:41,110 --> 00:13:42,110

AM I ALIVE?

267

00:13:42,110 --> 00:13:43,110

ARE WE ALIVE.

268

00:13:43,110 --> 00:13:47,109

I USUALLY SUMMARIZE IT AND SAY
IT'S A SEQUENCE OF CATASTROPHIC

269

00:13:47,109 --> 00:13:52,459

EVENTS THAT HAPPEN IN RAPID
SUCCESSION UNTIL YOU EVENTUALLY

270

00:13:52,459 --> 00:13:56,329

GO TO THE LAST PART WHICH IS THE
SOFT LANDING WHICH IS IF WE WERE

271

00:13:56,329 --> 00:14:00,980

IN A CAR CRASH BETWEEN A TRUCK

AND A CAR AND YOU'RE IN THE CAR,

272

00:14:00,980 --> 00:14:05,119

NOT IN THE TRUCK, AND THEN
YOU'RE ON EARTH LIKE WHOA, THAT

273

00:14:05,119 --> 00:14:07,240

WAS PRETTY GOOD ENTRY.

274

00:14:07,240 --> 00:14:09,940

>> WHAT WAS YOUR FAVORITE JOB
WHEN YOU WERE ON THE

275

00:14:09,940 --> 00:14:13,290

INTERNATIONAL SPACE STATION,
YOUR FAVORITE THING TO DO?

276

00:14:13,290 --> 00:14:17,269

>> WE WORK PRETTY HARD WHEN
WE'RE UP THERE.

277

00:14:17,269 --> 00:14:21,420

ONE OF THE RESOURCES ON OF THE
SPACE STATION AND ON THE GROUND

278

00:14:21,420 --> 00:14:25,860

TRIES TO MAKE THE MOST OF THE
LABORATORY AND THE RESOURCES SO

279

00:14:25,860 --> 00:14:28,949

YOU'RE PRETTY BUSY LET'S SAY
FROM 7:30 IN THE MORNING UNTIL

280

00:14:28,949 --> 00:14:31,519

8:30 IN THE EVENING RUNNING
EXPERIMENTS.

281

00:14:31,519 --> 00:14:37,429

YOU CAN BE EITHER A GUINEA PIG
OR THE HAND OF THE SCIENTIST OR

282

00:14:37,429 --> 00:14:42,149

YOU CAN BE GOING AROUND FIXING
BROKEN STUFF, UNLOADING THE

283

00:14:42,149 --> 00:14:46,079

CARGO, MOVING THE ROBOTIC ARM OR
EVEN GO OUT ON A SPACE WALK IF

284

00:14:46,079 --> 00:14:47,079

YOU'RE LUCKY.

285

00:14:47,079 --> 00:14:53,119

ALL OF US AND I DID THE SAME,
LIKE TO GO TO LOOK AT THE EARTH

286

00:14:53,119 --> 00:14:57,660

WHEN IT PASSES BY AT FIVE MILES
A SECOND.

287

00:14:57,660 --> 00:15:00,149

YOU CAN ACTUALLY SEE IN AN HOUR
AND A HALF THE WHOLE WORLD

288

00:15:00,149 --> 00:15:03,579

PASSING UNDER YOUR FEET AND
THAT'S AN AMAZING VIEW.

289

00:15:03,579 --> 00:15:06,410

>> THANK YOU SO MUCH FOR
ANSWERING OUR QUESTIONS TODAY.

290

00:15:06,410 --> 00:15:08,940

>> YOU'RE WELCOME.

291

00:15:08,940 --> 00:15:12,139

>> PAOLO TALKED A LITTLE ABOUT
HIS FAVORITE JOBS IN SPACE.

292

00:15:12,139 --> 00:15:15,550
CAN YOU TELL US A LITTLE ABOUT
WHAT THOSE DAY TO DAY JOBS ARE

293
00:15:15,550 --> 00:15:16,720
WHAT THEY DO?

294
00:15:16,720 --> 00:15:17,720
>> SURE.

295
00:15:17,720 --> 00:15:20,259
THERE ARE SIX ASTRONAUTS RIGHT
NOW ON THE INTERNATIONAL SPACE

296
00:15:20,259 --> 00:15:21,259
STATION.

297
00:15:21,259 --> 00:15:24,259
ALL OF THEM ARE SCIENTISTS OR
ENGINEERS.

298
00:15:24,259 --> 00:15:27,170
THERE ARE THREE LABORATORIES
THAT MAKE UP THE INTERNATIONAL

299
00:15:27,170 --> 00:15:30,519
SPACE STATION, SO MOST OF THE
CREW IS ACTUALLY DOING RESEARCH

300
00:15:30,519 --> 00:15:31,740
IN SPACE.

301
00:15:31,740 --> 00:15:34,829
THEY'RE WORKING ON A COUPLE
HUNDRED EXPERIMENTS THAT HAVE

302
00:15:34,829 --> 00:15:38,359
BEEN PROVIDED BY SCIENTISTS ALL
AROUND THE WORLD.

303

00:15:38,359 --> 00:15:40,620

ALSO THERE WILL BE SOME
HOUSEKEEPING GOING ON.

304

00:15:40,620 --> 00:15:44,470

SOMEBODY ALWAYS HAS TO VACUUM,
MAKE SURE THE PLACE IS CLEAN OR

305

00:15:44,470 --> 00:15:48,049

WIPE DOWN THE GALLEY TO MAKE
SURE THAT ANY FOOD MESS IS

306

00:15:48,049 --> 00:15:49,569

CLEANED UP.

307

00:15:49,569 --> 00:15:52,839

AND THEY MAY ALSO BE TAKING CARE
OF REPAIRS.

308

00:15:52,839 --> 00:15:55,160

THERE ARE A LOT OF COMPUTERS
ABOARD.

309

00:15:55,160 --> 00:15:58,240

THERE'S A LOT OF PROGRAMMING
THAT NEEDS TO SWITCH.

310

00:15:58,240 --> 00:16:03,759

THEY'RE DOING EARTH PHOTOGRAPHY
ACCORDING TO A LIST OF TARGETS

311

00:16:03,759 --> 00:16:05,160

THAT ARE SET UP TO THEM.

312

00:16:05,160 --> 00:16:09,259

SO THEY ARE WORKING HARD FOR
MORE THAN 12 HOURS A DAY, AND

313

00:16:09,259 --> 00:16:12,559

THEY TRY TO FIND SOME TIME IN
THERE TO EXERCISE AS WELL.

314

00:16:12,559 --> 00:16:16,329

EACH PERSON HAS TO EXERCISE TWO
TO THREE HOURS A DAY.

315

00:16:16,329 --> 00:16:17,649

THINK OF THAT.

316

00:16:17,649 --> 00:16:20,899

>> NOW, ONE OF THE LIFE SCIENCE
EXPERIMENTS THAT'S GOING ON

317

00:16:20,899 --> 00:16:24,189

RIGHT NOW IS WITH A SET OF
TWINS, SCOTT AND MARK KELLY.

318

00:16:24,189 --> 00:16:26,879

SCOTT KELLY IS IN SPACE AND MARK
KELLY IS STAYING HERE ON EARTH.

319

00:16:26,879 --> 00:16:28,309

TELL US A LITTLE ABOUT THAT.

320

00:16:28,309 --> 00:16:31,199

>> SCIENTISTS ARE REALLY
INTERESTED IN WHAT HAPPENS TO

321

00:16:31,199 --> 00:16:35,709

THE HUMAN BODY IN SPACE, AND
WE'VE NOT HAD A U.S. ASTRONAUT

322

00:16:35,709 --> 00:16:38,169

STAY IN SPACE FOR AN ENTIRE YEAR
BEFORE.

323

00:16:38,169 --> 00:16:42,929

SO THE FACT THAT THESE TWINS WHO
ARE ACTUALLY BOTH ASTRONAUTS ARE

324

00:16:42,929 --> 00:16:47,310

AVAILABLE TO PARTICIPATE IN AN
EXPERIMENT IS REALLY UNIQUE.

325

00:16:47,310 --> 00:16:50,290

SO THEY'RE GOING TO BE TRACKING
SCOTT IN SPACE.

326

00:16:50,290 --> 00:16:53,730

DURING THAT PERIOD OF TIME HIS
BONES AND MUSCLES ARE GOING TO

327

00:16:53,730 --> 00:16:56,839

BE CHANGING BECAUSE OF THE TIME
IN WEIGHTLESSNESS.

328

00:16:56,839 --> 00:17:01,670

HIS BODY WILL BE AT REST FOR A
WHOLE YEAR EXCEPT FOR WHEN HE'S

329

00:17:01,670 --> 00:17:02,859

EXERCISING.

330

00:17:02,859 --> 00:17:06,299

THEN HIS BROTHER IS MOVING
NORMALLY HERE ON EARTH.

331

00:17:06,299 --> 00:17:09,650

AT THE END OF THE YEAR THEY'LL
BE ABLE TO COMPARE AND CONTRAST

332

00:17:09,650 --> 00:17:12,070

TWO IDENTICAL BODIES THAT HAVE
BEEN LIVING IN DIFFERENT

333

00:17:12,070 --> 00:17:13,070

CIRCUMSTANCES.

334

00:17:13,070 --> 00:17:17,240
ALL OF THE ASTRONAUTS ARE
SUBJECT TO EXPERIMENTS

335
00:17:17,240 --> 00:17:18,240
THEMSELVES.

336
00:17:18,240 --> 00:17:22,070
THEY ARE THE TEST SUBJECTS FOR
FIGURING OUT HOW DOES THE BODY

337
00:17:22,070 --> 00:17:26,120
RESPOND TO LONG-TERM
WEIGHTLESSNESS IN SPACE.

338
00:17:26,120 --> 00:17:29,580
>> WORKING INSIDE THE SPACE
STATION IS ONE SET OF JOBS BUT

339
00:17:29,580 --> 00:17:32,120
THEY ALSO WORK OUTSIDE THE SPACE
STATION.

340
00:17:32,120 --> 00:17:35,440
>> WELL, AS PAOLO SAID, THOSE
WHO ARE LUCKY GET TO GO OUTSIDE

341
00:17:35,440 --> 00:17:37,420
ON SPACE WALKS.

342
00:17:37,420 --> 00:17:40,050
SOME OF THE ASTRONAUTS ARE
TRAINED SPECIFICALLY TO WORK

343
00:17:40,050 --> 00:17:41,580
OUTSIDE.

344
00:17:41,580 --> 00:17:47,810
THEY WEAR THE BULKY WHITE EVA
SUIT, WHICH IS LIKE THEIR OWN

345

00:17:47,810 --> 00:17:49,330

PERSONAL SPACECRAFT.

346

00:17:49,330 --> 00:17:53,510

IN IT THEY CAN WORK OUTSIDE FOR
UP TO 8 HOURS AT A TIME DOING

347

00:17:53,510 --> 00:17:55,910

ASSEMBLY OR REPAIR TASKS.

348

00:17:55,910 --> 00:17:59,650

THE ENTIRE SPACE STATION WAS PUT
TOGETHER BY ASTRONAUTS, WORKING

349

00:17:59,650 --> 00:18:03,680

WITH MODULES AND TRUSSES.

350

00:18:03,680 --> 00:18:07,850

THEY'VE REPAIR WORK TO DO
OUTSIDE.

351

00:18:07,850 --> 00:18:11,920

THEY NEED TO CHANGE BATTERIES OR
MAY NEED TO MOVE SOMETHING FROM

352

00:18:11,920 --> 00:18:18,250

ONE END OF THE SPACE STATION TO
THE OTHER.

353

00:18:18,250 --> 00:18:21,721

THE REST OF THE TIME EVERYBODY
IS CONFINED INSIDE TO WHAT

354

00:18:21,721 --> 00:18:25,050

AMOUNTS TO A GREAT BIG CAN.

355

00:18:25,050 --> 00:18:27,530

>> ONE OF THE THINGS THAT THEY

USE WHEN THEY'RE WORKING OUTSIDE

356

00:18:27,530 --> 00:18:30,400

ARE TOOLS AND TO LEARN A LITTLE
MORE ABOUT THE TOOLS THAT THEY

357

00:18:30,400 --> 00:18:33,580

USE ON THESE SPACE WALKS, WE'RE
GOING TO GO OVER TO STEM IT TO

358

00:18:41,540 --> 00:18:40,150

WIN IT.

359

00:18:41,540 --> 00:18:45,550

AS MARTY SAID, WHEN YOU'RE IN
SPACE WORKING YOU NEED SPECIFIC

360

00:18:45,550 --> 00:18:46,550

TOOLS.

361

00:18:46,550 --> 00:18:49,390

SO WHAT MY FRIENDS HERE ARE
GOING TO DO IS I'M GOING TO SHOW

362

00:18:49,390 --> 00:18:52,360

THEM EACH A TOOL AND THEY'RE
GOING TO GUESS WHAT IT IS.

363

00:18:52,360 --> 00:18:54,430

ARE YOU ALL READY TO GO?

364

00:18:54,430 --> 00:18:55,530

>> All: YES.

365

00:18:55,530 --> 00:18:56,530

>> OKAY.

366

00:18:56,530 --> 00:19:03,360

FIRST TOOL, WHAT IS THIS?

367

00:19:03,360 --> 00:19:07,290

[INAUDIBLE]

>> THIS WOULD BE SOMETHING THAT

368

00:19:07,290 --> 00:19:11,260

WOULD STRAP YOU ONTO THE
SPACECRAFT IS WHAT YOU'RE

369

00:19:11,260 --> 00:19:12,260

THINKING?

370

00:19:12,260 --> 00:19:15,640

WELL, WE ALSO PUT THIS ONLINE
AND WE HAVE AN ONLINE POLL.

371

00:19:15,640 --> 00:19:17,930

LET'S SEE WHAT OUR ONLINE
VIEWERS SAID.

372

00:19:17,930 --> 00:19:20,310

100% SAID IT WAS A TETHER.

373

00:19:20,310 --> 00:19:22,210

TO ANSWER WHAT THIS ACTUALLY IS
WE HAVE DR.

374

00:19:22,210 --> 00:19:23,790

JENNIFER LEVASSEUR.

375

00:19:23,790 --> 00:19:28,050

>> THIS IS AN ASTRONAUT WAIST
TETHER USED DURING SPACE WALKING

376

00:19:28,050 --> 00:19:29,050

ACTIVITIES.

377

00:19:29,050 --> 00:19:32,110

AN ASTRONAUT WOULD CLIP ONE END

OF IT TO THE WAIST.

378

00:19:32,110 --> 00:19:35,850

THERE'S A SMALL CLIP ON THE
WAIST OF THE SPACE SUIT.

379

00:19:35,850 --> 00:19:37,980

THEN THEY WOULD CLIP THE OTHER
END TO THE SPACE STATION.

380

00:19:37,980 --> 00:19:39,330

IT'S A TWO-PART MECHANISM.

381

00:19:39,330 --> 00:19:44,140

YOU HAVE TO PRESS THE BUTTON AND
THEN UNLATCH IT.

382

00:19:44,140 --> 00:19:46,111

THAT PRETTY MUCH GUARANTEES
THEY'RE NOT GOING TO BECOME

383

00:19:46,111 --> 00:19:49,029

DETACHED FROM THE SPACE STATION.

384

00:19:49,029 --> 00:19:53,529

>> ARE WE READY FOR THE NEXT
ONE?

385

00:19:53,529 --> 00:19:54,529

WHAT ARE THESE?

386

00:19:54,529 --> 00:19:57,560

QUICKLY, COME UP WITH A GUESS!

387

00:19:57,560 --> 00:20:01,340

COME ON, SOMEONE KNOWS?

388

00:20:01,340 --> 00:20:02,650

WHAT ARE THEY?

389

00:20:02,650 --> 00:20:03,650

>> FOR GRABBING THINGS?

390

00:20:03,650 --> 00:20:05,910

>> ACTUALLY, I THOUGHT THEY WERE
BUBBLE WANDS.

391

00:20:05,910 --> 00:20:11,610

LET'S SEE WHAT OUR ONLINE POLL
HAS TO SAY.

392

00:20:11,610 --> 00:20:13,120

86% SAID THEY WERE WIRE TIES.

393

00:20:13,120 --> 00:20:14,290

LET'S SEE WHAT DR.

394

00:20:14,290 --> 00:20:16,169

LEVASSEUR HAS
TO SAY.

395

00:20:16,169 --> 00:20:19,170

>> SO ASTRONAUTS NEED TO USE
THINGS JUST LIKE WE DO ON EARTH.

396

00:20:19,170 --> 00:20:22,740

THESE ARE CALLED WIRE TIES WHICH
MAY SEEM A LITTLE BIT MORE

397

00:20:22,740 --> 00:20:24,220

COMPLICATED THAN THEY ACTUALLY
ARE.

398

00:20:24,220 --> 00:20:27,140

JUST IMAGINE TRYING TO USE A
TWIST TIE IN YOUR OWN HOME TO

399

00:20:27,140 --> 00:20:28,180

CLOSE A GARBAGE BAG.

400

00:20:28,180 --> 00:20:30,520

IF ASTRONAUTS NEED TO
TEMPORARILY TIE SOMETHING

401

00:20:30,520 --> 00:20:33,290

TOGETHER THEY CAN TAKE ONE OF
THESE TIES AND WIND IT AROUND

402

00:20:33,290 --> 00:20:34,290

SOMETHING.

403

00:20:34,290 --> 00:20:37,410

THEY HAVE NICE BIG HOLES ON THE
END FOR THEM TO PUT THEIR GLOVED

404

00:20:37,410 --> 00:20:40,110

HANDS THROUGH.

405

00:20:40,110 --> 00:20:44,020

>> WE HAVE ONE LAST TOOL.

406

00:20:44,020 --> 00:20:47,050

WHAT DO YOU THINK THIS IS?

407

00:20:47,050 --> 00:20:55,210

>> SOMETHING LIKE YOU PUT THINGS
IN IT.

408

00:20:55,210 --> 00:20:57,900

>> SOMETHING THAT YOU MIGHT PUT
THINGS IN.

409

00:20:57,900 --> 00:21:01,290

LET'S SEE WHAT OUR ONLINE
AUDIENCE THOUGHT IT WAS.

410

00:21:01,290 --> 00:21:03,080

A TOOLBOX.

411

00:21:03,080 --> 00:21:05,910
THAT WAS 57% THOUGHT IT WAS A
TOOLBOX.

412

00:21:05,910 --> 00:21:07,650
LET'S SEE WHAT IT IS.

413

00:21:07,650 --> 00:21:10,820
>> WHEN ASTRONAUTS ARE DOING
EVAs AND NEED A SAFE PLACE TO

414

00:21:10,820 --> 00:21:14,270
USE LITTLE THINGS THEY'VE USED
UP SO THIS IS ACTUALLY A TRASH

415

00:21:14,270 --> 00:21:15,820
BAG.

416

00:21:15,820 --> 00:21:19,580
IT HAS ELASTICIZED CLOSURES ON
TOP SO WHEN THEY PUT SOMETHING

417

00:21:19,580 --> 00:21:23,620
INSIDE IT DOESN'T FLOAT BACK
OUT.

418

00:21:23,620 --> 00:21:28,410
>> WELL, MY FRIENDS DID A GREAT
JOB HERE AT STEM IT TO WIN IT.

419

00:21:28,410 --> 00:21:32,130
NOW, FOR YOU ALL AT HOME AND
HERE IN THE AUDIENCE, IF YOU

420

00:21:32,130 --> 00:21:33,950
HAVE WANT TO SEE THE
INTERNATIONAL SPACE STATION,

421

00:21:33,950 --> 00:21:37,110

WE'RE GOING TO SHOW YOU HOW TO
SPOT IT FROM YOUR OWN BACK YARD.

422

00:21:37,110 --> 00:21:41,180

>> WE CAN SPOT THE INTERNATIONAL
SPACE STATION FROM OUR BACK YARD

423

00:21:41,180 --> 00:21:44,290

AND ALL THAT WE NEED TO KNOW IS
WHEN AND WHERE TO LOOK.

424

00:21:44,290 --> 00:21:48,540

LET'S START BY DOING TO THE NASA
WEBSITE.

425

00:21:48,540 --> 00:21:51,380

SPOTTHESTATION.NASA.GOV.

426

00:21:51,380 --> 00:21:57,200

NOW, LET'S TRY TO SPOT THE
STATION.

427

00:21:57,200 --> 00:21:59,720

WE SEE ON THIS PASS THE STATION
WILL BECOME VISIBLE AT

428

00:21:59,720 --> 00:22:03,470

NORTH/NORTHWEST AT 8:32 P.M.

429

00:22:03,470 --> 00:22:06,810

LET'S BE SURE WE ARE ON TIME
BECAUSE THE SPACE STATION WON'T

430

00:22:06,810 --> 00:22:07,810

WAIT.

431

00:22:07,810 --> 00:22:12,020

FIRST, LET'S USE OUR COMPASS TO

FIND WEST.

432

00:22:12,020 --> 00:22:15,690

NOW FIND NORTH.

433

00:22:15,690 --> 00:22:19,120

NORTHWEST IS BETWEEN NORTH AND WEST.

434

00:22:19,120 --> 00:22:23,810

NORTH/NORTHWEST IS BETWEEN NORTHWEST AND NORTH.

435

00:22:23,810 --> 00:22:24,860

OKAY.

436

00:22:24,860 --> 00:22:26,950

GOT IT.

437

00:22:26,950 --> 00:22:33,970

NEXT, WE SEE IT'S GOING TO DISAPPEAR IN THE EAST.

438

00:22:33,970 --> 00:22:36,060

GOT THAT LOCATION.

439

00:22:36,060 --> 00:22:42,010

THE ENTIRE VISIBLE PASS WILL HAPPEN BETWEEN THOSE TWO AREAS.

440

00:22:42,010 --> 00:22:45,250

NOW WE HAVE TO DETERMINE HOW HIGH IT'S GOING TO BE.

441

00:22:45,250 --> 00:22:47,390

HEIGHT IS MEASURED IN DEGREES.

442

00:22:47,390 --> 00:22:49,820

THERE'S A SIMPLE WAY TO

DETERMINE THIS HEIGHT.

443

00:22:49,820 --> 00:22:53,140

HOLD YOUR HAND OUT AWAY FROM
YOUR BODY AND MAKE A FIST.

444

00:22:53,140 --> 00:22:57,050

IF YOU PLACE THE BOTTOM OF YOUR
FIST ON THE HORIZON, THAT LINE

445

00:22:57,050 --> 00:23:00,450

WHERE THE SKY MEETS THE GROUND,
THE TOP OF YOUR FIST WILL BE

446

00:23:00,450 --> 00:23:03,080

APPROXIMATELY 10 DEGREES.

447

00:23:03,080 --> 00:23:06,990

YOU CAN THEN STACK YOUR FISTS ON
TOP OF EACH OTHER TO REACH 20,

448

00:23:06,990 --> 00:23:11,400

30, 40 DEGREES OR HIGHER.

449

00:23:11,400 --> 00:23:14,030

TONIGHT THE SPACE STATION WILL
APPEAR AT 10 DEGREES

450

00:23:14,030 --> 00:23:15,330

NORTH/NORTHWEST.

451

00:23:15,330 --> 00:23:18,150

IF I PLACE ONE FIST IN FRONT OF
ME WHILE LOOKING

452

00:23:18,150 --> 00:23:23,000

NORTH/NORTHWEST, THIS IS WHERE
IT SHOULD FIRST BECOME VISIBLE.

453

00:23:23,000 --> 00:23:24,340
GOT IT.

454
00:23:24,340 --> 00:23:28,630
IT WILL DISAPPEAR AT 20 DEGREES
EAST.

455
00:23:28,630 --> 00:23:30,520
RIGHT THERE.

456
00:23:30,520 --> 00:23:36,080
AT ITS HIGHEST POINT IT WILL
REACH 40 DEGREES.

457
00:23:36,080 --> 00:23:37,960
BINGO.

458
00:23:37,960 --> 00:23:41,070
WE NOW HAVE A GOOD IDEA OF THE
APPROXIMATE PATH THAT THE SPACE

459
00:23:41,070 --> 00:23:44,350
STATION WILL BE TRAVELING ALONG.

460
00:23:44,350 --> 00:23:45,740
IT'S ALMOST TIME.

461
00:23:45,740 --> 00:23:47,880
LET'S LOOK IN THE GENERAL
DIRECTION OF WHERE THE PASS WILL

462
00:23:47,880 --> 00:23:48,880
BECOME VISIBLE.

463
00:23:48,880 --> 00:23:52,580
WE WILL SCAN A WIDER AREA IN
CASE WE ARE A LITTLE OFF WITH

464
00:23:52,580 --> 00:23:53,990

OUR MEASUREMENTS.

465

00:23:53,990 --> 00:23:57,200

THE STATION DOES NOT HAVE LIGHTS
OUTSIDE THAT ARE VISIBLE FROM

466

00:23:57,200 --> 00:23:58,200

EARTH.

467

00:23:58,200 --> 00:24:01,410

WHEN WE SEE IT, WE ARE ACTUALLY
SEEING THE SUN REFLECTING OFF OF

468

00:24:01,410 --> 00:24:02,410

IT.

469

00:24:02,410 --> 00:24:04,870

ONCE THE STATION BECOMES
VISIBLE, IT WILL TAKE ABOUT SIX

470

00:24:04,870 --> 00:24:07,160

MINUTES TO PASS ACROSS THE SKY.

471

00:24:07,160 --> 00:24:09,500

IT WILL NOT BLINK LIKE AN
AIRPLANE.

472

00:24:09,500 --> 00:24:13,020

IT WILL LOOK LIKE A VERY BRIGHT
STAR THAT'S TRAVELING VERY FAST

473

00:24:13,020 --> 00:24:15,140

ACROSS THE SKY.

474

00:24:15,140 --> 00:24:16,140

HERE IT COMES.

475

00:24:16,140 --> 00:24:20,540

WAVE TO THE ASTRONAUTS.

476

00:24:20,540 --> 00:24:30,150

>> WE HAVE A LITTLE BIT OF TIME
FOR MORE QUESTIONS AND WE'RE

477

00:24:30,150 --> 00:24:35,500

GOING TO START WITH A VIDEO
QUESTION FROM KANSAS CITY,

478

00:24:35,500 --> 00:24:37,030

KANSAS.

479

00:24:37,030 --> 00:24:38,560

>> HI.

480

00:24:38,560 --> 00:24:44,600

MY QUESTION IS WHAT HAPPENS WHEN
SOMETHING BREAKS?

481

00:24:44,600 --> 00:24:47,110

>> THE ASTRONAUTS TAKE A LOT OF
TOOLS WITH THEM TO THE

482

00:24:47,110 --> 00:24:48,540

INTERNATIONAL SPACE STATION.

483

00:24:48,540 --> 00:24:51,570

THERE ARE SOME LOCKERS FILLED
WITH TOOLS LIKE YOU WOULD FIND

484

00:24:51,570 --> 00:24:56,040

IN YOUR GARAGE OR YOUR BASEMENT,
AND THEY ARE WELL TRAINED FOR

485

00:24:56,040 --> 00:24:59,190

ALL THE EQUIPMENT THAT'S ON
BOARD.

486

00:24:59,190 --> 00:25:06,400

MOST OF THEM WERE TINKERERS, SO
THEY CAN HANDLE THE REPAIRS

487

00:25:06,400 --> 00:25:07,950
THEMSELVES VERY WELL.

488

00:25:07,950 --> 00:25:14,300
>> WE HAVE AN ONLINE QUESTION
NEXT.

489

00:25:14,300 --> 00:25:16,880
WHAT HAPPENS IF AN ASTRONAUT
BECOMES SICK OR INJURED IN

490

00:25:16,880 --> 00:25:17,880
SPACE?

491

00:25:17,880 --> 00:25:19,710
ARE THERE DOCTORS?

492

00:25:19,710 --> 00:25:24,490
>> ONE OF THE DOCTORS IS ALWAYS
DESIGNATED TO BE THE FLIGHT

493

00:25:24,490 --> 00:25:26,690
MEDICAL OFFICER ON BOARD.

494

00:25:26,690 --> 00:25:29,600
THEY HAVE BASIC FIRST AID KIT.

495

00:25:29,600 --> 00:25:31,880
THEY CAN TAKE CARE OF MINOR
INJURIES THERE.

496

00:25:31,880 --> 00:25:35,270
IF SOMEBODY SHOULD BECOME
INJURED WHICH IS VERY, VERY

497

00:25:35,270 --> 00:25:39,120

UNLIKELY BECAUSE THERE ARE NO
SHARP EDGES THERE AND THEY'RE

498

00:25:39,120 --> 00:25:41,830

WEIGHTLESS SO THEY'RE NOT GOING
TO TRIP AND STUMBLE ON THINGS,

499

00:25:41,830 --> 00:25:46,140

BUT IF SOMEBODY SHOULD DEVELOP A
PROBLEM THAT COULDN'T BE DEALT

500

00:25:46,140 --> 00:25:49,500

WITH ON BOARD, THEY CAN GET BACK
TO EARTH PRETTY QUICKLY FROM

501

00:25:49,500 --> 00:25:50,760

LOWER EARTH ORBIT.

502

00:25:50,760 --> 00:25:53,450

THEY CAN BE BACK DOWN ON THE
GROUND IN ABOUT THREE HOURS'

503

00:25:53,450 --> 00:25:54,450

TIME.

504

00:25:54,450 --> 00:25:56,760

FORTUNATELY THAT HAS NEVER
HAPPENED YET.

505

00:25:56,760 --> 00:26:00,241

THEY'VE NEVER HAD TO EVACUATE
SOMEBODY TO A HOSPITAL ON THE

506

00:26:00,241 --> 00:26:01,241

GROUND.

507

00:26:01,241 --> 00:26:03,970

>> WE'VE GOT AN AUDIENCE
QUESTION NEXT.

508

00:26:03,970 --> 00:26:07,080

>> HOW DOES IT FEEL EMOTIONALLY
AND PHYSICALLY WHEN YOU RETURN

509

00:26:07,080 --> 00:26:08,080

TO EARTH?

510

00:26:08,080 --> 00:26:11,340

>> HOW DO THE ASTRONAUTS FEEL
NOT ONLY PHYSICALLY BUT ALSO

511

00:26:11,340 --> 00:26:13,100

EMOTIONALLY WHEN THEY GET BACK
TO EARTH?

512

00:26:13,100 --> 00:26:16,640

>> THAT'S A REALLY GOOD QUESTION
BECAUSE AS YOU MIGHT SUSPECT

513

00:26:16,640 --> 00:26:21,180

THERE ARE A WHOLE RANGE OF
SENSATIONS AND EMOTIONS.

514

00:26:21,180 --> 00:26:23,970

OBVIOUSLY THEY'RE GLAD TO BE
BACK WITH THEIR FAMILIES AND

515

00:26:23,970 --> 00:26:24,970

WITH THEIR FRIENDS.

516

00:26:24,970 --> 00:26:26,290

THEY'RE GLAD TO BE HOME AGAIN.

517

00:26:26,290 --> 00:26:29,670

THEY'RE GLAD TO EAT A REALLY
GOOD HAMBURGER BECAUSE THEY

518

00:26:29,670 --> 00:26:34,840

HAVEN'T HAD FRESH FOOD OR COOKED

FOOD IN A LONG TIME, BUT THEY

519

00:26:34,840 --> 00:26:39,110

ALSO, A LOT OF THEM SAY THEY
FEEL A NOSTALGIA FOR THE SPACE

520

00:26:39,110 --> 00:26:43,420

STATION BECAUSE IT'S SUCH AN
ENTRANCING PLACE TO BE.

521

00:26:43,420 --> 00:26:47,200

FOR THE FIRST COUPLE OF DAYS
THEY STILL FEEL WEIGHTLESSNESS.

522

00:26:47,200 --> 00:26:50,130

ESPECIALLY IF THEY WAKE UP IN
THE NIGHT, THEY FEEL LIKE THEY

523

00:26:50,130 --> 00:26:52,940

COULD FLOAT OUT OF BED AND GET A
DRINK OF WATER AND THEN THEY

524

00:26:52,940 --> 00:26:55,300

FALL FLAT ON THE FLOOR.

525

00:26:55,300 --> 00:26:59,540

SO IT TAKES A FEW DAYS FOR THAT
FEELING OF BEING ON EARTH TO

526

00:26:59,540 --> 00:27:00,540

COME BACK.

527

00:27:00,540 --> 00:27:03,790

THEY ALSO SAY THAT AS SOON AS
THEY'RE BACK IN EARTH'S GRAVITY

528

00:27:03,790 --> 00:27:06,110

THEY FEEL VERY HEAVY.

529

00:27:06,110 --> 00:27:09,070
THEY'RE REALLY AWARE OF THE
WEIGHT OF THE AIR PRESSURE ON

530
00:27:09,070 --> 00:27:14,660
THEM AND AFTER BEING LIGHT FOR
WEEKS OR MONTHS AT A TIME,

531
00:27:14,660 --> 00:27:17,930
THAT'S A REAL SENSATION OF BEING
ABLE TO FEEL GRAVITY.

532
00:27:17,930 --> 00:27:20,980
>> I'VE HEARD THAT THE SHEETS
EVEN FEEL LIKE THEY'RE SUPER

533
00:27:20,980 --> 00:27:22,650
HEAVY WHEN THEY GET BACK TO
EARTH.

534
00:27:22,650 --> 00:27:23,650
>> YES.

535
00:27:23,650 --> 00:27:24,650
>> THANK YOU SO MUCH FOR JOINING
US.

536
00:27:24,650 --> 00:27:25,890
WE'RE OUT OF TIME FOR TODAY.

537
00:27:25,890 --> 00:27:28,510
I'D LIKE TO THANK YOU FOR
JOINING US AS WELL AS THE

538
00:27:28,510 --> 00:27:30,230
ASTRONAUTS YOU SAW ON THE SHOW.

539
00:27:30,230 --> 00:27:34,420
WE WOULD LIKE TO THANK THEM AS
WELL AS JENNIFER LEVASSEUR FOR

540

00:27:34,420 --> 00:27:36,780

ANSWERING SOME QUESTIONS ABOUT
TOOLS.

541

00:27:36,780 --> 00:27:43,040

BIG THANKS TO YOU GUYS HERE IN
THE AUDIENCE.

542

00:27:43,040 --> 00:27:46,490

THANK YOU FOR SUBMITTING GREAT
VIDEO QUESTIONS.

543

00:27:46,490 --> 00:27:49,710

YOU CAN CHECK OUT OUR ARCHIVE ON
THE STEM IN 30 WEBSITE WHERE YOU

544

00:27:49,710 --> 00:27:53,330

CAN SEE SHOWS ON SPACE JUNK,
COMPOSITE AND HOT AIR BALLOONS

545

00:27:53,330 --> 00:27:54,330

AMONG OTHERS.

546

00:27:54,330 --> 00:27:57,890

I WANT TO GIVE A SHOUTOUT TO OUR
CREW.

547

00:27:57,890 --> 00:28:01,330

IT TAKES ABOUT 11 OR 12 PEOPLE
TO BRING YOU THIS SHOW EVERY

548

00:28:01,330 --> 00:28:05,020

TIME WHEN WE COME OUT SO THANK
YOU TO THOSE GUYS.