
85

1
00:00:09,400 --> 00:00:02,990
and Deborah ISS this is Houston are you

2
00:00:11,660 --> 00:00:09,410
ready for the event we're ready

3
00:00:13,789 --> 00:00:11,670
university of arizona this is Houston

4
00:00:20,120 --> 00:00:13,799
please call endeavour ISS for voice

5
00:00:24,400 --> 00:00:20,130
check hi this is Mike Drake at the

6
00:00:29,779 --> 00:00:26,960
yeah Mike we got you loud and clear

7
00:00:32,120 --> 00:00:29,789
welcome aboard we're on board the

8
00:00:42,650 --> 00:00:32,130
Japanese module on the space station

9
00:00:45,350 --> 00:00:42,660
right now well as you can hear there's a

10
00:00:48,260 --> 00:00:45,360
lot of applause in the room we have a

11
00:00:51,560 --> 00:00:48,270
lot of different people here today we

12
00:00:53,720 --> 00:00:51,570
have staffers and friends from your wife

13
00:00:55,880 --> 00:00:53,730

congressman Gabby Giffords office who

14
00:00:57,500 --> 00:00:55,890
with us we have a number of first

15
00:01:00,740 --> 00:00:57,510
responders from the fire department

16
00:01:02,150 --> 00:01:00,750
little with us most importantly for us i

17
00:01:03,830 --> 00:01:02,160
think is we got a lot of middle school

18
00:01:07,190 --> 00:01:03,840
students who are going to be the ones

19
00:01:09,620 --> 00:01:07,200
asking you questions and we also have a

20
00:01:12,320 --> 00:01:09,630
number of university of arizona space

21
00:01:14,000 --> 00:01:12,330
grant students which your wife gabby has

22
00:01:18,100 --> 00:01:14,010
been very strongly supportive of a great

23
00:01:20,210 --> 00:01:18,110
program NASA so let me get right to it

24
00:01:21,440 --> 00:01:20,220
appreciate you taking time tonight mark

25
00:01:23,450 --> 00:01:21,450
on your two colleagues do you want to

26
00:01:24,560 --> 00:01:23,460
introduce the other two colleagues with

27
00:01:29,690 --> 00:01:24,570
you so that the people in the audience

28
00:01:33,399 --> 00:01:29,700
know who they are absolutely to my right

29
00:01:37,700 --> 00:01:33,409
your left is our pilot Greg Greg Johnson

30
00:01:40,940 --> 00:01:37,710
Air Force colonel just retired and on my

31
00:01:42,230 --> 00:01:40,950
left your right Ron Garan who is the US

32
00:01:44,330 --> 00:01:42,240
segment commander of the International

33
00:01:51,469 --> 00:01:44,340
Space Station he's been on board here

34
00:01:53,090 --> 00:01:51,479
about what seven weeks now great thank

35
00:01:54,770 --> 00:01:53,100
you very much let me bring up our first

36
00:01:56,510 --> 00:01:54,780
middle school student I'm going to ask

37
00:01:58,880 --> 00:01:56,520
her to say our name and ask her question

38
00:02:00,800 --> 00:01:58,890

hi my name is lynn arriaga from Gridley

39
00:02:02,060 --> 00:02:00,810
middle school my question is what

40
00:02:07,999 --> 00:02:02,070
feeling did you have when you first

41
00:02:10,219 --> 00:02:08,009
looked out the window well let me first

42
00:02:13,729 --> 00:02:10,229
say you know for everybody there welcome

43
00:02:14,390 --> 00:02:13,739
aboard the space station it's a great

44
00:02:16,699 --> 00:02:14,400
opportunity

45
00:02:19,100 --> 00:02:16,709
he for us to have a chance to talk to

46
00:02:21,770 --> 00:02:19,110
the folks there back in Tucson I know I

47
00:02:25,550 --> 00:02:21,780
probably know some people in the in the

48
00:02:27,199 --> 00:02:25,560
office we can't see you but you know

49
00:02:29,270 --> 00:02:27,209
it's it's nice to have the opportunity

50
00:02:31,190 --> 00:02:29,280
to do this event we just got up I

51
00:02:35,119 --> 00:02:31,200
imagined you guys are getting ready to

52
00:02:36,559 --> 00:02:35,129
go to sleep this morning with rig up or

53
00:02:38,960 --> 00:02:36,569
this evening with regards to your

54
00:02:41,000 --> 00:02:38,970
question though for me when I first saw

55
00:02:43,729 --> 00:02:41,010
the earth it was over 10 years ago I

56
00:02:45,979 --> 00:02:43,739
very distinctly remember it I was the

57
00:02:48,289 --> 00:02:45,989
pilot on the same space shuttle that's

58
00:02:50,119 --> 00:02:48,299
docked just a little bit too out that

59
00:02:53,240 --> 00:02:50,129
hatch and to our left space shuttle

60
00:02:56,240 --> 00:02:53,250
endeavour and at Mach 15 when you're

61
00:02:59,119 --> 00:02:56,250
going into orbit the space shuttle rolls

62
00:03:00,920 --> 00:02:59,129
the head to heads up so it's upside down

63
00:03:03,140 --> 00:03:00,930

and it rolls heads up and I looked over

64
00:03:05,179 --> 00:03:03,150
my right shoulder out the window you can

65
00:03:06,500 --> 00:03:05,189
see this big blue planet out there and

66
00:03:07,610 --> 00:03:06,510
it's really like even though it was 10

67
00:03:11,300 --> 00:03:07,620
years ago it's like it was yesterday

68
00:03:17,869 --> 00:03:11,310
very very spectacular view is pretty

69
00:03:20,629 --> 00:03:17,879
exciting to get to go into space i'm

70
00:03:26,479 --> 00:03:20,639
going to add to that answer only because

71
00:03:29,869 --> 00:03:26,489
i experienced my first day time liftoff

72
00:03:32,569 --> 00:03:29,879
about a week and a half ago and to my

73
00:03:34,699 --> 00:03:32,579
left was commander Kelly and I was the

74
00:03:37,939 --> 00:03:34,709
pilot in the right seat just like Mark

75
00:03:39,800 --> 00:03:37,949
was recalling from 10 years ago my first

76
00:03:42,559 --> 00:03:39,810
flight was three years ago and it was at

77
00:03:45,680 --> 00:03:42,569
night and so this past launch was my

78
00:03:47,930 --> 00:03:45,690
first date launches well and looking

79
00:03:52,819 --> 00:03:47,940
over my right shoulder I was amazed at

80
00:03:55,069 --> 00:03:52,829
how the Atlantic Ocean accelerated by I

81
00:03:58,399 --> 00:03:55,079
do recall looking out the window and

82
00:04:00,020 --> 00:03:58,409
Mark said focus because as the pilot I'm

83
00:04:02,719 --> 00:04:00,030
supposed to focus on the engine sins

84
00:04:04,099 --> 00:04:02,729
other systems but I was amazed it would

85
00:04:10,009 --> 00:04:04,109
it look like out the window so I just

86
00:04:11,719 --> 00:04:10,019
wanted to share that with you thanks so

87
00:04:14,149 --> 00:04:11,729
much it's nice to know you're human as

88
00:04:16,759 --> 00:04:14,159

well as highly talented and trained next

89
00:04:18,649 --> 00:04:16,769
question please say your name hi I'm

90
00:04:20,479 --> 00:04:18,659
Alex Boland and do you have to tie

91
00:04:27,470 --> 00:04:20,489
everything while in space or during left

92
00:04:35,490 --> 00:04:31,770
hi Alex yeah we really do when on launch

93
00:04:37,620 --> 00:04:35,500
everything vibrates and shakes and so

94
00:04:39,330 --> 00:04:37,630
everything has to be tied down but once

95
00:04:41,220 --> 00:04:39,340
we get to orbit it you know it's not

96
00:04:42,950 --> 00:04:41,230
shaking and vibrating anymore but if we

97
00:04:44,820 --> 00:04:42,960
don't tie it down it will float away so

98
00:04:47,970 --> 00:04:44,830
you know one of the big challenges

99
00:04:51,480 --> 00:04:47,980
living up here is not losing your stuff

100
00:04:54,480 --> 00:04:51,490
so we have to keep things tied down keep

101
00:04:55,920 --> 00:04:54,490
things secure because you know you'll

102
00:04:57,450 --> 00:04:55,930
lose it pretty fast but that you know

103
00:04:59,160 --> 00:04:57,460
that becomes challenging but it also

104
00:05:02,070 --> 00:04:59,170
becomes fun too so if you're eating a

105
00:05:03,930 --> 00:05:02,080
meal and you know you have a couple

106
00:05:05,280 --> 00:05:03,940
things in your hands if you if you run

107
00:05:07,650 --> 00:05:05,290
out of hands you could just take your

108
00:05:10,800 --> 00:05:07,660
your food and stick it right there and

109
00:05:12,660 --> 00:05:10,810
then go about go about you know getting

110
00:05:14,310 --> 00:05:12,670
a drink or something else and then just

111
00:05:17,670 --> 00:05:14,320
grab it in there it is ok just like that

112
00:05:19,230 --> 00:05:17,680
so so it's a you know it's challenging

113
00:05:26,490 --> 00:05:19,240

on one hand but it's a lot of fun on the

114
00:05:29,400 --> 00:05:26,500
other sounds like very convenient and

115
00:05:34,080 --> 00:05:29,410
better than growing another arm next

116
00:05:35,760 --> 00:05:34,090
student please say your name hi my name

117
00:05:37,350 --> 00:05:35,770
is baby bishop from Gridley middle

118
00:05:45,570 --> 00:05:37,360
school my question is how are you

119
00:05:48,120 --> 00:05:45,580
adjusting to zero gravity yeah I think

120
00:05:51,180 --> 00:05:48,130
the first time you fly into space it

121
00:05:53,970 --> 00:05:51,190
takes a while to get used to it you know

122
00:05:56,370 --> 00:05:53,980
there's no up and down anymore and it's

123
00:05:58,440 --> 00:05:56,380
hard to manage your stuff and the fluid

124
00:06:00,300 --> 00:05:58,450
shifts in your body so you don't you

125
00:06:03,240 --> 00:06:00,310
don't feel too well the more you do it

126
00:06:06,030 --> 00:06:03,250
the easier it gets seems like for me

127
00:06:08,760 --> 00:06:06,040
this is my fourth flight and it seems

128
00:06:11,880 --> 00:06:08,770
like my body remembers what this is all

129
00:06:14,220 --> 00:06:11,890
about and understands it and I can get

130
00:06:16,560 --> 00:06:14,230
adjusted quicker space station crew

131
00:06:18,390 --> 00:06:16,570
members tend to say it takes about a

132
00:06:20,130 --> 00:06:18,400
month till you're really adjusted on

133
00:06:22,320 --> 00:06:20,140
orbit I've never been in space for a

134
00:06:28,920 --> 00:06:22,330
month at a time so i can't really

135
00:06:36,930 --> 00:06:35,340
thank you and the next question hi my

136
00:06:38,969 --> 00:06:36,940
name is MIA birch from girly middle

137
00:06:40,650 --> 00:06:38,979
school my question is why do you take

138
00:06:42,600 --> 00:06:40,660

dry food with you and can you eat

139
00:06:43,920 --> 00:06:42,610
regular meal in space or is it

140
00:06:51,570 --> 00:06:43,930
impossible to keep the food from

141
00:06:54,420 --> 00:06:51,580
floating off well we have velcro

142
00:06:56,219 --> 00:06:54,430
attached to all our food items mark just

143
00:06:59,670 --> 00:06:56,229
grabbed looks like some dried fruit of

144
00:07:02,180 --> 00:06:59,680
some kind dried pineapple we have a lot

145
00:07:06,480 --> 00:07:02,190
of dehydrated foods like dehydrated

146
00:07:10,290 --> 00:07:06,490
pineapple and we have other items that

147
00:07:12,450 --> 00:07:10,300
come prepackaged all ready to go and

148
00:07:16,950 --> 00:07:12,460
they're in packets that we just put in

149
00:07:19,710 --> 00:07:16,960
the oven and heat we also have clear

150
00:07:23,580 --> 00:07:19,720
packets plastic packets that we inject

151
00:07:28,050 --> 00:07:23,590
water into rehydrate them and and and

152
00:07:31,920 --> 00:07:28,060
every meal is is fun so it's really easy

153
00:07:33,480 --> 00:07:31,930
to eat and the food is great some people

154
00:07:38,310 --> 00:07:33,490
love the shrimp cocktail I actually

155
00:07:40,050 --> 00:07:38,320
prefer the mms and it's it's it's it's a

156
00:07:42,420 --> 00:07:40,060
normal diet I made a hamburger the other

157
00:07:44,580 --> 00:07:42,430
day since it's zero gravity I was able

158
00:07:46,080 --> 00:07:44,590
to stick a tortilla on a clip put a

159
00:07:48,089 --> 00:07:46,090
little ketchup and mustard it doesn't go

160
00:07:50,939 --> 00:07:48,099
anywhere and then I stuck that the

161
00:07:53,370 --> 00:07:50,949
hamburger patty right exact right on the

162
00:07:55,830 --> 00:07:53,380
ketchup and it's stuck because of course

163
00:07:57,270 --> 00:07:55,840

gravity is not acting on it and after I

164
00:07:59,249 --> 00:07:57,280
took it off the clip I rolled it up and

165
00:08:09,089 --> 00:07:59,259
ate it so we have pretty much normal

166
00:08:15,279 --> 00:08:11,350
thank you that looks like fun next

167
00:08:17,260 --> 00:08:15,289
question hi my name is Alison ricas from

168
00:08:19,300 --> 00:08:17,270
Gridley middle school my question is how

169
00:08:25,300 --> 00:08:19,310
long does it take to readjust when you

170
00:08:27,129 --> 00:08:25,310
get back to earth well Alex that's a

171
00:08:29,679 --> 00:08:27,139
good question and a lot of it depends on

172
00:08:30,820 --> 00:08:29,689
how long you've been up here for shuttle

173
00:08:33,279 --> 00:08:30,830
crew members that are up here for maybe

174
00:08:36,519 --> 00:08:33,289
two weeks or so the adjust the

175
00:08:38,709 --> 00:08:36,529
readjustment is pretty quick maybe a few

176
00:08:41,040 --> 00:08:38,719
days I remember on my shuttle flight

177
00:08:43,600 --> 00:08:41,050
about three years ago I think it was

178
00:08:45,009 --> 00:08:43,610
probably a day or two before I could

179
00:08:46,389 --> 00:08:45,019
walk without thinking about it I

180
00:08:48,579 --> 00:08:46,399
remember when I first got back I would

181
00:08:49,870 --> 00:08:48,589
take a step and go okay there goes the

182
00:08:51,250 --> 00:08:49,880
left foot there goes the right foot I'm

183
00:08:53,470 --> 00:08:51,260
starting to lean left and you need to

184
00:08:57,009 --> 00:08:53,480
lean back right and so but that that

185
00:08:58,600 --> 00:08:57,019
passed very quickly for station crew

186
00:09:01,420 --> 00:08:58,610
members who are up here you know maybe

187
00:09:04,180 --> 00:09:01,430
six months the rehabilitation is much

188
00:09:07,960 --> 00:09:04,190

longer and some of the things that we do

189
00:09:09,579 --> 00:09:07,970
to help prevent or to make it so that

190
00:09:13,000 --> 00:09:09,589
when we get back we don't have such a

191
00:09:15,970 --> 00:09:13,010
big adjustment period is exercise and we

192
00:09:19,030 --> 00:09:15,980
do two hours a day of either resistance

193
00:09:20,889 --> 00:09:19,040
exercise like weight lifting or a robic

194
00:09:23,439 --> 00:09:20,899
exercise like riding the bike or running

195
00:09:26,110 --> 00:09:23,449
on a treadmill and that really seems to

196
00:09:29,009 --> 00:09:26,120
help it helps us in our adjustment when

197
00:09:31,780 --> 00:09:29,019
we come back to earth and it also helps

198
00:09:33,699 --> 00:09:31,790
prevent some of the or slow down some of

199
00:09:37,110 --> 00:09:33,709
the processes of just living in space

200
00:09:39,610 --> 00:09:37,120
like losing some of our bone mass and

201
00:09:42,670 --> 00:09:39,620
our muscles weakening and things like

202
00:09:45,280 --> 00:09:42,680
that so it helps to counteract that so

203
00:09:49,150 --> 00:09:45,290
there's a big long period of time after

204
00:09:51,100 --> 00:09:49,160
we get back where we slowly you know do

205
00:09:53,769 --> 00:09:51,110
a lot of exercise and a lot of other

206
00:10:01,870 --> 00:09:53,779
activities to to readjust to gravity

207
00:10:06,250 --> 00:10:01,880
once we get back okay now next question

208
00:10:08,350 --> 00:10:06,260
from my name is shae bushy and I'm from

209
00:10:17,040 --> 00:10:08,360
MIT Gridley middle school my question is

210
00:10:22,210 --> 00:10:20,590
well you know you could sleep just kind

211
00:10:24,700 --> 00:10:22,220
of floating around the problem with that

212
00:10:26,470 --> 00:10:24,710
is you'd bump into other people and

213
00:10:28,920 --> 00:10:26,480

you'd wake them up and then you might

214
00:10:31,480 --> 00:10:28,930
not have any idea where you're going to

215
00:10:34,120 --> 00:10:31,490
go to on the space station it's a really

216
00:10:37,690 --> 00:10:34,130
big place so what we do is we sleep in a

217
00:10:39,880 --> 00:10:37,700
sleeping bag it has a bunch of straps

218
00:10:43,450 --> 00:10:39,890
and hooks and you can tie it to the

219
00:10:45,610 --> 00:10:43,460
ceiling or to the floor or the wall last

220
00:10:48,820 --> 00:10:45,620
night I slept on the floor of the flight

221
00:10:50,350 --> 00:10:48,830
deck of the Space Shuttle Mike Fink one

222
00:10:52,570 --> 00:10:50,360
of our crew members was sleeping on the

223
00:10:55,030 --> 00:10:52,580
wall downstairs and sometimes people

224
00:10:57,070 --> 00:10:55,040
will sleep on the ceiling it takes a

225
00:10:58,720 --> 00:10:57,080
while to get used to sleeping in

226
00:11:01,630 --> 00:10:58,730
zero-gravity there's no pressure on your

227
00:11:04,570 --> 00:11:01,640
body my first night in space ten years

228
00:11:06,640 --> 00:11:04,580
ago I got in my sleeping bag and then I

229
00:11:09,310 --> 00:11:06,650
immediately rolled over on my side like

230
00:11:11,110 --> 00:11:09,320
I would in bed and then thought to

231
00:11:13,630 --> 00:11:11,120
myself well this is kind of dumb because

232
00:11:15,520 --> 00:11:13,640
there is no side because there is no up

233
00:11:24,010 --> 00:11:15,530
or down so you might as well just stay

234
00:11:25,950 --> 00:11:24,020
in the position you're in thank you hey

235
00:11:28,350 --> 00:11:25,960
who do you master

236
00:11:30,330 --> 00:11:28,360
hi my name is Kirsten Bassett and I'm

237
00:11:33,000 --> 00:11:30,340
from goody gridley middle school my

238
00:11:34,830 --> 00:11:33,010

question is how is growing plants in

239
00:11:43,290 --> 00:11:34,840
space different from growing them on

240
00:11:44,370 --> 00:11:43,300
earth Kristen that's a really good

241
00:11:47,700 --> 00:11:44,380
question because we're actually doing

242
00:11:49,230 --> 00:11:47,710
that and you know we're trying to figure

243
00:11:52,380 --> 00:11:49,240
out the answer to that question really

244
00:11:54,900 --> 00:11:52,390
and you know what effect gravity has in

245
00:11:57,630 --> 00:11:54,910
how plants grow and one of the things

246
00:11:59,550 --> 00:11:57,640
we're trying to do is remove because

247
00:12:01,980 --> 00:11:59,560
we're in space and because we're in this

248
00:12:04,350 --> 00:12:01,990
what we call microgravity environment we

249
00:12:06,870 --> 00:12:04,360
can eliminate gravity from the equation

250
00:12:08,910 --> 00:12:06,880
and we can see how plants grow without

251
00:12:11,220 --> 00:12:08,920
gravity and that helps us to better

252
00:12:13,950 --> 00:12:11,230
understand the process of plant growth

253
00:12:16,560 --> 00:12:13,960
which helps us understand how crops grow

254
00:12:17,940 --> 00:12:16,570
and how we can make more food and so one

255
00:12:21,030 --> 00:12:17,950
of the things that we're doing is we're

256
00:12:23,040 --> 00:12:21,040
looking at what fact or gravity plays in

257
00:12:27,230 --> 00:12:23,050
a plant's growth and how that compares

258
00:12:30,300 --> 00:12:27,240
to things like moisture in the soil and

259
00:12:33,360 --> 00:12:30,310
chemicals that are used for fertilizers

260
00:12:35,490 --> 00:12:33,370
and things like that and you know a lot

261
00:12:36,810 --> 00:12:35,500
of the research that we do is so that we

262
00:12:39,780 --> 00:12:36,820
can go farther and farther into space

263
00:12:41,160 --> 00:12:39,790

and you know when we go to Mars and

264
00:12:43,110 --> 00:12:41,170
beyond you know we're going to have to

265
00:12:45,180 --> 00:12:43,120
grow our own food in order to do that

266
00:12:47,610 --> 00:12:45,190
and so that's a very important part of

267
00:12:49,440 --> 00:12:47,620
the research that we do up here but you

268
00:12:51,360 --> 00:12:49,450
know on the one hand we're trying to

269
00:12:53,550 --> 00:12:51,370
discover how to go further in space but

270
00:12:56,760 --> 00:12:53,560
we're also helping you know all the

271
00:12:58,590 --> 00:12:56,770
people on earth as well as we grow you

272
00:13:00,410 --> 00:12:58,600
know figure out how to grow crops in

273
00:13:03,360 --> 00:13:00,420
areas that are stricken with drought and

274
00:13:04,710 --> 00:13:03,370
you know areas that don't have a really

275
00:13:07,440 --> 00:13:04,720
good soil and so there's a lot of

276
00:13:09,060 --> 00:13:07,450
experimentation that we do to look at

277
00:13:10,890 --> 00:13:09,070
the the effects of gravity and we also

278
00:13:13,680 --> 00:13:10,900
have you know cameras on the space

279
00:13:15,630 --> 00:13:13,690
station that look at crops throughout

280
00:13:17,880 --> 00:13:15,640
the world and evaluate how they're

281
00:13:20,040 --> 00:13:17,890
growing over time so that we could

282
00:13:26,500 --> 00:13:20,050
better understand that process a very

283
00:13:32,570 --> 00:13:29,990
hi my name is Nora Thompson from goodly

284
00:13:45,010 --> 00:13:32,580
middle school and my question is how can

285
00:13:51,250 --> 00:13:48,110
if you've watched any science fiction

286
00:13:53,870 --> 00:13:51,260
movies you might have seen rotating

287
00:13:56,510 --> 00:13:53,880
spaceships large rotating spaceships and

288
00:13:59,000 --> 00:13:56,520

that would really be the only way that I

289
00:14:01,910 --> 00:13:59,010
can think of to artificially create

290
00:14:04,550 --> 00:14:01,920
gravity we really don't know exactly

291
00:14:08,120 --> 00:14:04,560
what gravity is so that's one of the

292
00:14:10,370 --> 00:14:08,130
problems but we do know that by rotating

293
00:14:12,620 --> 00:14:10,380
a large object we can create the

294
00:14:15,490 --> 00:14:12,630
sensation of gravity now the space

295
00:14:19,160 --> 00:14:15,500
station although we're pretty much

296
00:14:20,780 --> 00:14:19,170
stationary in space with relative to the

297
00:14:24,770 --> 00:14:20,790
earth so we feel pretty much zero

298
00:14:27,620 --> 00:14:24,780
gravity we are slowly rotating as we

299
00:14:31,280 --> 00:14:27,630
orbit the earth every 90 minutes and so

300
00:14:33,950 --> 00:14:31,290
one of our fellow comrades an Italian

301
00:14:36,260 --> 00:14:33,960
astronaut he can actually sense that

302
00:14:38,810 --> 00:14:36,270
feeling where one side of the space

303
00:14:41,420 --> 00:14:38,820
shuttle has just a little bit of a drift

304
00:14:42,770 --> 00:14:41,430
up and and way at the far end and the

305
00:14:46,760 --> 00:14:42,780
Russian side it has a little bit of a

306
00:14:52,250 --> 00:14:46,770
drift down as we gradually rotate around

307
00:14:54,260 --> 00:14:52,260
the earth so I would say we possibly are

308
00:14:56,630 --> 00:14:54,270
experiencing that now some of us don't

309
00:14:58,760 --> 00:14:56,640
necessarily believe that's true but if

310
00:15:00,590 --> 00:14:58,770
you really rotate the vehicle quickly

311
00:15:09,950 --> 00:15:00,600
we'd be able to kind of have an

312
00:15:12,020 --> 00:15:09,960
artificial sense of gravity hi my name

313
00:15:14,420 --> 00:15:12,030

is Emily jhonatan from Gridley middle

314
00:15:16,700 --> 00:15:14,430
school my question is what do you do

315
00:15:25,340 --> 00:15:16,710
with the ways to in space and how do you

316
00:15:28,190 --> 00:15:25,350
recycle and the shuttle a space shuttle

317
00:15:32,120 --> 00:15:28,200
missions only about two weeks long we're

318
00:15:34,340 --> 00:15:32,130
going to land on flight day 17 so we

319
00:15:36,470 --> 00:15:34,350
bring home all our garbage it gets

320
00:15:39,000 --> 00:15:36,480
recycled on the ground we separated a

321
00:15:41,250 --> 00:15:39,010
little bit just because of areas we won

322
00:15:44,520 --> 00:15:41,260
the wet stuff together and the dry stuff

323
00:15:46,890 --> 00:15:44,530
in a different spot but on the space

324
00:15:48,840 --> 00:15:46,900
station they've got a bigger garbage

325
00:15:54,090 --> 00:15:48,850
problem someone to turn that over to Ron

326
00:15:56,820 --> 00:15:54,100
maybe he's got some comments well some

327
00:15:59,220 --> 00:15:56,830
of the garbage like just the the things

328
00:16:01,530 --> 00:15:59,230
that we make like packaging material and

329
00:16:03,510 --> 00:16:01,540
leftover food and stuff like that we

330
00:16:06,750 --> 00:16:03,520
actually have cargo ships that come up

331
00:16:08,310 --> 00:16:06,760
and deliver it goods to us and then when

332
00:16:10,710 --> 00:16:08,320
they go back to the earth they actually

333
00:16:13,290 --> 00:16:10,720
burn up in the atmosphere and so before

334
00:16:16,500 --> 00:16:13,300
they leave we pack them full of as much

335
00:16:18,720 --> 00:16:16,510
garbage as we can but on a space station

336
00:16:21,300 --> 00:16:18,730
you know it's very very expensive and

337
00:16:23,910 --> 00:16:21,310
very difficult to bring up supplies so

338
00:16:26,220 --> 00:16:23,920

whatever we can produce ourselves we

339
00:16:28,230 --> 00:16:26,230
want to do that so water for instance

340
00:16:29,670 --> 00:16:28,240
it's very difficult to bring up water so

341
00:16:33,270 --> 00:16:29,680
the water that we have we want to use

342
00:16:35,520 --> 00:16:33,280
over and over again and so when we go to

343
00:16:38,760 --> 00:16:35,530
the bathroom the urine that that is

344
00:16:42,630 --> 00:16:38,770
captured by our by our toilet basically

345
00:16:44,940 --> 00:16:42,640
is recycled and some of the condensation

346
00:16:47,760 --> 00:16:44,950
in the air that the air conditioners

347
00:16:50,280 --> 00:16:47,770
capture is also recycled and then we

348
00:16:52,590 --> 00:16:50,290
drink that so it's a it's an interesting

349
00:16:54,720 --> 00:16:52,600
process and again you know when we go

350
00:16:56,430 --> 00:16:54,730
farther and farther in space we're not

351
00:16:58,680 --> 00:16:56,440
going to be able to launch with as much

352
00:17:07,340 --> 00:16:58,690
water as well need to go to Tamar's for

353
00:17:12,720 --> 00:17:10,530
hi my name is Leo braless from criminal

354
00:17:19,260 --> 00:17:12,730
school my question is why are the space

355
00:17:21,240 --> 00:17:19,270
shuttles and spacious and so why do you

356
00:17:31,500 --> 00:17:21,250
mean like why is it the space shuttle

357
00:17:35,240 --> 00:17:31,510
white on the outside yeah yeah I really

358
00:17:37,980 --> 00:17:35,250
I don't know I imagine it has to do with

359
00:17:42,420 --> 00:17:37,990
you know when we designed it early on we

360
00:17:44,880 --> 00:17:42,430
designed spacecraft and we made the the

361
00:17:48,330 --> 00:17:44,890
Saturn a white rocket it certainly could

362
00:17:51,030 --> 00:17:48,340
be a different color when you're outside

363
00:17:54,030 --> 00:17:51,040

of the Earth's atmosphere and in the Sun

364
00:17:57,240 --> 00:17:54,040
it gets really really hot and in the

365
00:17:59,070 --> 00:17:57,250
shade it gets really really cold so I

366
00:18:02,730 --> 00:17:59,080
imagine because of the thermal

367
00:18:05,190 --> 00:18:02,740
properties and the need to reject heat

368
00:18:08,340 --> 00:18:05,200
inside the space shuttle we also have a

369
00:18:12,150 --> 00:18:08,350
lot of electronics that make heat so you

370
00:18:14,910 --> 00:18:12,160
want the outside to be a little bit on

371
00:18:17,010 --> 00:18:14,920
the cooler side so you don't have heat

372
00:18:20,340 --> 00:18:17,020
buildup so that's probably why we chose

373
00:18:22,920 --> 00:18:20,350
white as the color if you notice black

374
00:18:24,960 --> 00:18:22,930
paid pavement there in the summer

375
00:18:26,970 --> 00:18:24,970
especially in Tucson and in Arizona

376
00:18:28,530 --> 00:18:26,980
where it gets really really hot that

377
00:18:30,720 --> 00:18:28,540
stuff is a lot hotter than the white

378
00:18:33,210 --> 00:18:30,730
stuff so white would be a good choice

379
00:18:35,610 --> 00:18:33,220
the space station actually isn't white

380
00:18:38,010 --> 00:18:35,620
on the outside a lot of the panels are

381
00:18:39,870 --> 00:18:38,020
aluminum part of the Russian segment is

382
00:18:42,720 --> 00:18:39,880
kind of white it's got solar arrays that

383
00:18:45,780 --> 00:18:42,730
are orange sometimes they look a little

384
00:18:50,850 --> 00:18:45,790
bluish and some radiators so the space

385
00:18:53,700 --> 00:18:50,860
shuttles more multicolored yeah we also

386
00:18:56,010 --> 00:18:53,710
made the original external tank we

387
00:18:57,450 --> 00:18:56,020
painted white and I don't think we had

388
00:19:01,020 --> 00:18:57,460

even a good reason to do that eventually

389
00:19:03,000 --> 00:19:01,030
we took the paint off to save weight was

390
00:19:11,549 --> 00:19:03,010
about a thousand pounds i think of

391
00:19:16,570 --> 00:19:14,649
hi my name is Amanda Duncan from Gridley

392
00:19:19,060 --> 00:19:16,580
middle school my question is can you see

393
00:19:26,529 --> 00:19:19,070
signs of man-made or natural disasters

394
00:19:30,220 --> 00:19:26,539
from space Amanda you can and you know

395
00:19:31,450 --> 00:19:30,230
that's one of the really good things

396
00:19:33,070 --> 00:19:31,460
about being up here and having this

397
00:19:35,769 --> 00:19:33,080
vantage point to see the to see our

398
00:19:37,899 --> 00:19:35,779
planet from and one of the most recent

399
00:19:39,609 --> 00:19:37,909
ones is the flooding of the Mississippi

400
00:19:42,009 --> 00:19:39,619
River and we were able to take pictures

401
00:19:44,259 --> 00:19:42,019
that and kind of document over time the

402
00:19:46,659 --> 00:19:44,269
changes to the river and the effect in

403
00:19:50,349 --> 00:19:46,669
the surrounding communities and so you

404
00:19:54,970 --> 00:19:50,359
know volcanoes hurricanes pollution all

405
00:19:56,649 --> 00:19:54,980
those type of you know things that are

406
00:19:59,289 --> 00:19:56,659
affecting our environment you know we

407
00:20:00,940 --> 00:19:59,299
can monitor we can watch we can keep

408
00:20:03,639 --> 00:20:00,950
track of up here and it's really

409
00:20:05,379 --> 00:20:03,649
interesting to see that and to see the

410
00:20:08,019 --> 00:20:05,389
good things and the bad things and see

411
00:20:10,840 --> 00:20:08,029
how you know man made of effects on our

412
00:20:12,669 --> 00:20:10,850
planet are making some changes at it

413
00:20:14,139 --> 00:20:12,679

that some of them good some of them bad

414
00:20:15,700 --> 00:20:14,149
so it's good to keep track of that and

415
00:20:25,419 --> 00:20:15,710
it's a it's a wonderful place to do that

416
00:20:27,310 --> 00:20:25,429
from hi my name is Jessica Luna from

417
00:20:30,220 --> 00:20:27,320
grizzly middle school my question is

418
00:20:43,659 --> 00:20:30,230
what is a typical day like on the space

419
00:20:45,700 --> 00:20:43,669
shuttle well a typical day on the space

420
00:20:48,340 --> 00:20:45,710
shuttle is we all have a particular wake

421
00:20:51,549 --> 00:20:48,350
up time right now our wake-up time is

422
00:20:53,649 --> 00:20:51,559
about 12 hours shifted away from yours

423
00:20:55,989 --> 00:20:53,659
we just woke up and you're probably

424
00:20:58,840 --> 00:20:55,999
starting to think about going to bed

425
00:21:02,440 --> 00:20:58,850
tonight once we get up we have a couple

426
00:21:05,889 --> 00:21:02,450
hours to ourselves where we shower brush

427
00:21:07,659 --> 00:21:05,899
our teeth shave we get some to eat get a

428
00:21:11,460 --> 00:21:07,669
cup of coffee although it's not really a

429
00:21:14,590 --> 00:21:11,470
cup it's more like a bag like this and

430
00:21:16,899 --> 00:21:14,600
then and then we look at our schedule

431
00:21:18,759 --> 00:21:16,909
for the day on the space station they

432
00:21:20,409 --> 00:21:18,769
have they're given a schedule we're also

433
00:21:22,839 --> 00:21:20,419
given a schedule on the space shuttle

434
00:21:24,220 --> 00:21:22,849
and we do our various tasks they might

435
00:21:29,350 --> 00:21:24,230
be spacewalks

436
00:21:32,310 --> 00:21:29,360
they might be filling a water bag they

437
00:21:34,990 --> 00:21:32,320
might be operating the robotic arm or

438
00:21:37,299 --> 00:21:35,000

might be moving water from one place to

439
00:21:39,460 --> 00:21:37,309
another but we have various tasks they

440
00:21:42,580 --> 00:21:39,470
allow times for meals they had allowed

441
00:21:44,590 --> 00:21:42,590
times for exercise and then prior to

442
00:21:46,539 --> 00:21:44,600
sleep we have another couple hours that

443
00:21:48,280 --> 00:21:46,549
we can kind of get our stuff together

444
00:21:50,560 --> 00:21:48,290
get a little free time look out the

445
00:21:52,630 --> 00:21:50,570
window and then we go to bed on the

446
00:21:55,419 --> 00:21:52,640
space shuttle most of our schedule is

447
00:21:57,010 --> 00:21:55,429
very very regimented and and structured

448
00:21:59,799 --> 00:21:57,020
and busy for the entire time we're here

449
00:22:02,919 --> 00:21:59,809
we kind of compare it to like a sprint a

450
00:22:04,810 --> 00:22:02,929
fast running race where is on the space

451
00:22:06,240 --> 00:22:04,820
station and I've only heard I've never

452
00:22:08,049 --> 00:22:06,250
been assigned on the space station

453
00:22:09,909 --> 00:22:08,059
because they're going a little bit

454
00:22:13,240 --> 00:22:09,919
longer duration I think they do get a

455
00:22:15,010 --> 00:22:13,250
few weekend days off now and then with

456
00:22:17,110 --> 00:22:15,020
just Ronnie here I'm sure he's not going

457
00:22:19,030 --> 00:22:17,120
to get as much time off as he wants but

458
00:22:21,340 --> 00:22:19,040
they view that more is like a marathon

459
00:22:30,039 --> 00:22:21,350
and so that's pretty much a typical day

460
00:22:32,140 --> 00:22:30,049
in space hi my name is Chris krycek from

461
00:22:41,140 --> 00:22:32,150
Gridley middle school and my question is

462
00:22:43,600 --> 00:22:41,150
do you exercise or run in space on the

463
00:22:45,580 --> 00:22:43,610

space shuttle we have a bike and I'm

464
00:22:48,730 --> 00:22:45,590
actually scheduled to ride the bike here

465
00:22:52,930 --> 00:22:48,740
in a few hours helps us not lose as much

466
00:22:55,090 --> 00:22:52,940
bone mass and and be more adjusted for

467
00:22:57,370 --> 00:22:55,100
entry for which for us is actually just

468
00:22:59,590 --> 00:22:57,380
a few days from now on the space station

469
00:23:02,830 --> 00:22:59,600
they've got a more options they have a

470
00:23:04,900 --> 00:23:02,840
treadmill with with some straps to give

471
00:23:07,780 --> 00:23:04,910
you some gravity so you're strapped to

472
00:23:10,260 --> 00:23:07,790
the treadmill there's also a bike and

473
00:23:14,289 --> 00:23:10,270
there's a resistive exercise device

474
00:23:16,720 --> 00:23:14,299
which allows you to lift weights in

475
00:23:19,750 --> 00:23:16,730
space there are there's nothing has any

476
00:23:21,850 --> 00:23:19,760
weight but this device seems pretty much

477
00:23:24,190 --> 00:23:21,860
like you're lifting weights like at a

478
00:23:26,890 --> 00:23:24,200
gym so there there are options on the

479
00:23:29,380 --> 00:23:26,900
space station and like Ron said earlier

480
00:23:31,360 --> 00:23:29,390
the space station crew members are

481
00:23:33,430 --> 00:23:31,370
assigned to exercise about two hours a

482
00:23:42,700 --> 00:23:33,440
day so well after six months when they

483
00:23:48,140 --> 00:23:45,500
hi my name is Taylor Reynolds from

484
00:23:50,330 --> 00:23:48,150
goodly middle school my question is how

485
00:23:58,220 --> 00:23:50,340
does the human body change in space both

486
00:24:00,410 --> 00:23:58,230
long and short term well you know the

487
00:24:02,720 --> 00:24:00,420
human body is an amazing thing and it

488
00:24:05,360 --> 00:24:02,730

really adapts very quickly to any

489
00:24:07,670 --> 00:24:05,370
environment that it's in and you know

490
00:24:10,640 --> 00:24:07,680
very quickly after you get to space your

491
00:24:12,680 --> 00:24:10,650
body starts to to adjust and that's a

492
00:24:14,450 --> 00:24:12,690
good thing but but some of that some of

493
00:24:16,400 --> 00:24:14,460
that adjustment is not that good so one

494
00:24:17,840 --> 00:24:16,410
of the things that your body realizes is

495
00:24:20,420 --> 00:24:17,850
it doesn't really need a skeleton

496
00:24:22,370 --> 00:24:20,430
anymore and so you start losing a lot of

497
00:24:24,980 --> 00:24:22,380
the mess and your bones the density of

498
00:24:26,900 --> 00:24:24,990
your bones you don't need the muscles in

499
00:24:30,500 --> 00:24:26,910
your legs as much so you start to lose

500
00:24:32,540 --> 00:24:30,510
those as Mark said the fluid shifts so

501
00:24:34,250 --> 00:24:32,550
in your body there's fluid that is all

502
00:24:36,980 --> 00:24:34,260
kept towards your feet because of

503
00:24:39,560 --> 00:24:36,990
gravity so once you get to space that is

504
00:24:41,720 --> 00:24:39,570
free to flow to different parts of your

505
00:24:43,970 --> 00:24:41,730
body that it normally doesn't so those

506
00:24:46,640 --> 00:24:43,980
are all changes that occur your eyes

507
00:24:49,400 --> 00:24:46,650
change shape so there's a lot of these

508
00:24:50,870 --> 00:24:49,410
different effects that occur as your

509
00:24:53,780 --> 00:24:50,880
body tries to adjust to its new

510
00:24:55,760 --> 00:24:53,790
environment and like we had talked about

511
00:24:57,860 --> 00:24:55,770
before so you know some of these bad

512
00:25:01,340 --> 00:24:57,870
effects like losing bone density we have

513
00:25:04,460 --> 00:25:01,350

to counteract through other means like

514
00:25:08,630 --> 00:25:04,470
exercise so like I said the body is an

515
00:25:10,640 --> 00:25:08,640
amazing adaptive thing and it's it's you

516
00:25:11,540 --> 00:25:10,650
know something that we study up here a

517
00:25:13,970 --> 00:25:11,550
great deal we have a lot of

518
00:25:16,370 --> 00:25:13,980
experimentation that we use that we do

519
00:25:18,770 --> 00:25:16,380
on ourselves and on each other as

520
00:25:20,900 --> 00:25:18,780
crewmates and you know where we are

521
00:25:29,150 --> 00:25:20,910
learning more about the human body with

522
00:25:31,790 --> 00:25:29,160
our time up here hi my name is Jonas

523
00:25:41,180 --> 00:25:31,800
list from Grilli milk oh my question is

524
00:25:44,540 --> 00:25:41,190
what is astronaut training like it

525
00:25:46,490 --> 00:25:44,550
varies a little bit between the space

526
00:25:48,560 --> 00:25:46,500
station and the Space Shuttle actually

527
00:25:51,200 --> 00:25:48,570
pretty significantly for a space station

528
00:25:53,060 --> 00:25:51,210
crew member you're training to be

529
00:25:56,180 --> 00:25:53,070
on an expedition for a very long period

530
00:25:58,669 --> 00:25:56,190
of time and operating different

531
00:26:00,649 --> 00:25:58,679
laboratories aboard the space station as

532
00:26:03,680 --> 00:26:00,659
well as the space station systems that

533
00:26:06,500 --> 00:26:03,690
keep you alive and recycle urine into

534
00:26:08,630 --> 00:26:06,510
water like ron was talking about on the

535
00:26:12,169 --> 00:26:08,640
space shuttle it's more like I mean it's

536
00:26:14,180 --> 00:26:12,179
a chip more like a maybe a ship at sea

537
00:26:17,090 --> 00:26:14,190
but an airplane the combination of the

538
00:26:19,700 --> 00:26:17,100

two it has environmental systems for

539
00:26:22,010 --> 00:26:19,710
life support but also as a systems that

540
00:26:25,190 --> 00:26:22,020
an airplane would have as well as a

541
00:26:27,620 --> 00:26:25,200
robotic arm to do robotic arm operations

542
00:26:30,919 --> 00:26:27,630
the space station has us as well so we

543
00:26:33,019 --> 00:26:30,929
got to learn about the systems and we

544
00:26:35,510 --> 00:26:33,029
got to learn how to operate them really

545
00:26:38,389 --> 00:26:35,520
well particularly on liftoff and landing

546
00:26:41,450 --> 00:26:38,399
it's very dynamic environment things can

547
00:26:44,149 --> 00:26:41,460
happen very fast things can break so we

548
00:26:47,269 --> 00:26:44,159
spend a lot of time in space shuttle

549
00:26:50,930 --> 00:26:47,279
simulators practicing to handle things

550
00:26:53,450 --> 00:26:50,940
when they go wrong so Greg and I here

551
00:26:57,139 --> 00:26:53,460
have spent probably thousands of hours

552
00:26:59,720 --> 00:26:57,149
in in the space shuttle simulator during

553
00:27:01,430 --> 00:26:59,730
liftoff and landing for the Space

554
00:27:05,120 --> 00:27:01,440
Shuttle we also have to practice landing

555
00:27:06,769 --> 00:27:05,130
it we practice space walks we had three

556
00:27:10,519 --> 00:27:06,779
of our crew members do four spacewalks

557
00:27:14,480 --> 00:27:10,529
over the last week or so they spent a

558
00:27:16,850 --> 00:27:14,490
lot of time in a very large pool in the

559
00:27:19,070 --> 00:27:16,860
spacesuit that provides some neutral

560
00:27:21,019 --> 00:27:19,080
buoyancy so it's similar to the

561
00:27:23,630 --> 00:27:21,029
spacewalk we practice robotic arm

562
00:27:26,810 --> 00:27:23,640
operations we're in a classroom kind of

563
00:27:29,090 --> 00:27:26,820

like you guys might be at your at your

564
00:27:36,639 --> 00:27:29,100
middle school so it's it's very varied

565
00:27:42,440 --> 00:27:39,049
okay mark I'm told we have time for one

566
00:27:44,480 --> 00:27:42,450
last question so here's the last one hi

567
00:27:46,730 --> 00:27:44,490
my name is Maddie Shaw from Gridley

568
00:27:52,010 --> 00:27:46,740
middle school my question is how do you

569
00:27:57,680 --> 00:27:52,020
shower in space well thanks thanks

570
00:28:00,139 --> 00:27:57,690
Maddie we don't have a shower a Skylab

571
00:28:01,549 --> 00:28:00,149
after the Apollo program where we went

572
00:28:04,700 --> 00:28:01,559
to the moon actually had something that

573
00:28:06,289 --> 00:28:04,710
was like a shower and I think work

574
00:28:09,110 --> 00:28:06,299
pretty well on the space station and

575
00:28:11,779 --> 00:28:09,120
space shuttle we don't so we take a bath

576
00:28:13,190 --> 00:28:11,789
kind of like like somebody would if they

577
00:28:15,919 --> 00:28:13,200
were in a hospital bed I mean with a

578
00:28:18,740 --> 00:28:15,929
towel and water and soap on it you rub

579
00:28:20,899 --> 00:28:18,750
it on yourself and then you you wipe it

580
00:28:24,500 --> 00:28:20,909
off later so it's not the greatest

581
00:28:26,539 --> 00:28:24,510
shower but you know it works it works

582
00:28:30,590 --> 00:28:26,549
for two weeks for us and it'll it'll

583
00:28:33,139 --> 00:28:30,600
work for six months for Ron so that

584
00:28:35,330 --> 00:28:33,149
that's a very good question before we go

585
00:28:37,820 --> 00:28:35,340
I wanted to congratulate the University

586
00:28:39,169 --> 00:28:37,830
of Arizona on their new project and I

587
00:28:41,330 --> 00:28:39,179
can't remember the name of it we just

588
00:28:43,820 --> 00:28:41,340

saw it in the news since we've since we

589
00:28:46,399 --> 00:28:43,830
launched on the on the sixteenth of may

590
00:28:50,149 --> 00:28:46,409
but their project to visit an asteroid

591
00:28:53,870 --> 00:28:50,159
that's you know very exciting it's I

592
00:28:57,470 --> 00:28:53,880
think one of the biggest NASA related

593
00:29:00,200 --> 00:28:57,480
projects at a university has had as I

594
00:29:02,480 --> 00:29:00,210
wanted to congratulate the University of

595
00:29:04,700 --> 00:29:02,490
Arizona for for you know for that

596
00:29:06,919 --> 00:29:04,710
milestone in their in their exploration

597
00:29:09,289 --> 00:29:06,929
of space so thanks very much everybody

598
00:29:16,610 --> 00:29:09,299
it was great talking to you today and

599
00:29:30,880 --> 00:29:16,620
hope to see you in Tucson thank you much

600
00:29:30,890 --> 00:29:39,010
I'm going to fly out of the way here

601
00:30:03,590 --> 00:30:00,320
safe travels you're welcome endeavour

602
00:30:08,120 --> 00:30:03,600
ISS this is Houston ACR thank you that