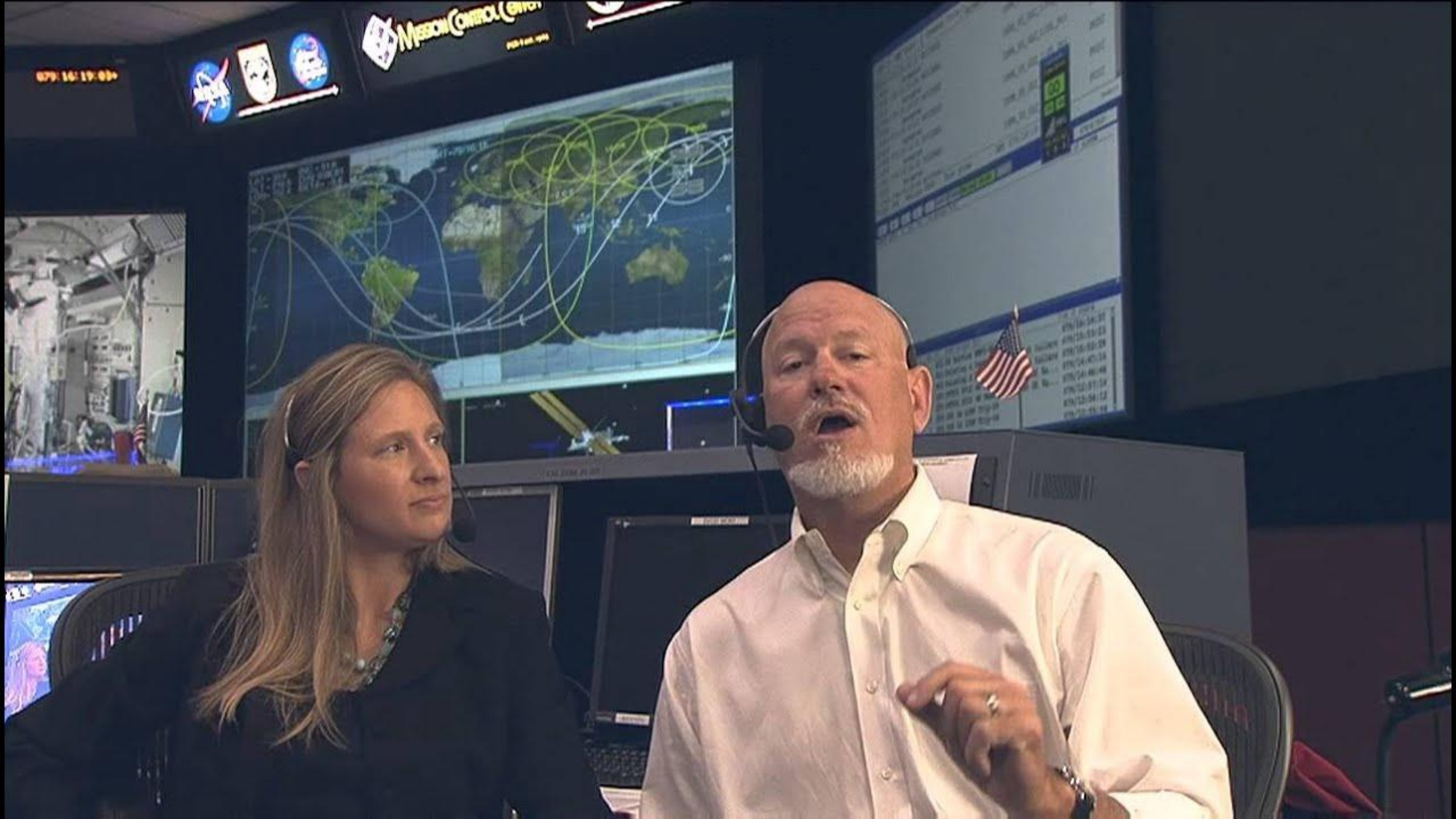
MISSION CONTROL CENTER

1
00:00:05,430 --> 00:00:03,510
hi i'm kelly humphries in mission

2
00:00:07,829 --> 00:00:05,440
control houston and i've got a special

3
00:00:20,150 --> 00:00:07,839
guest christy sauer here with me

4
00:00:23,189 --> 00:00:21,510
and so we're ready for your questions

5
00:00:25,589 --> 00:00:23,199
whenever you want to go

6
00:00:27,990 --> 00:00:25,599
okay um my name is troop lee and i want

7
00:00:29,750 --> 00:00:28,000
to add a question do astronaut have

8
00:00:32,790 --> 00:00:29,760
trouble walking when they return to

9
00:00:34,790 --> 00:00:32,800
earth and what do they do about it

10
00:00:36,549 --> 00:00:34,800
good morning great question

11
00:00:39,270 --> 00:00:36,559
yes it can be challenging for the

12
00:00:41,430 --> 00:00:39,280
astronauts once they get back to earth

13
00:00:44,389 --> 00:00:41,440

feeling gravity again after being away

14
00:00:46,229 --> 00:00:44,399
for it for so long but you know they do

15
00:00:48,470 --> 00:00:46,239
so much exercise while they're up there

16
00:00:50,549 --> 00:00:48,480
to keep their muscles and bones strong

17
00:00:52,229 --> 00:00:50,559
that it really does help to reduce that

18
00:00:53,910 --> 00:00:52,239
that effect and they do bounce back

19
00:00:55,910 --> 00:00:53,920
pretty quickly but um you'll even see in

20
00:00:57,590 --> 00:00:55,920
some of the photos as the crew get back

21
00:00:58,790 --> 00:00:57,600
uh folks standing on either side of them

22
00:01:00,470 --> 00:00:58,800
helping them

23
00:01:02,470 --> 00:01:00,480
to walk when they first get back and and

24
00:01:03,510 --> 00:01:02,480
to make sure that they don't stumble at

25
00:01:06,390 --> 00:01:03,520
all but

26
00:01:11,510 --> 00:01:08,469
what future leader has another question

27
00:01:14,550 --> 00:01:12,630
do morning

28
00:01:17,350 --> 00:01:14,560
ever have

29
00:01:21,429 --> 00:01:17,360
to have a mixed emotions and feeling of

30
00:01:25,590 --> 00:01:22,630
all right and if you didn't quite hear

31
00:01:27,429 --> 00:01:25,600
that one um she was asking do

32
00:01:30,390 --> 00:01:27,439
talk a little bit about

33
00:01:33,109 --> 00:01:30,400
yeah do crew members ever struggle uh

34
00:01:34,789 --> 00:01:33,119
psychologically while being up there so

35
00:01:36,789 --> 00:01:34,799
you know let me tell you that the the

36
00:01:38,550 --> 00:01:36,799
crew members have very packed schedules

37
00:01:40,710 --> 00:01:38,560
while they're up there there's a lot of

38
00:01:42,069 --> 00:01:40,720

maintenance a lot of experiments and

39
00:01:43,670 --> 00:01:42,079
science and technology that needs to be

40
00:01:45,510 --> 00:01:43,680
done while they're up there so first of

41
00:01:47,190 --> 00:01:45,520
all that's going to keep them very busy

42
00:01:48,310 --> 00:01:47,200
to keep their minds off of being away

43
00:01:50,550 --> 00:01:48,320
from home and things like that but at

44
00:01:53,990 --> 00:01:50,560
the same time nasa very much

45
00:01:55,990 --> 00:01:54,000
acknowledges the challenges of

46
00:01:57,990 --> 00:01:56,000
of being away from family being in a

47
00:02:00,389 --> 00:01:58,000
remote location and so there are a lot

48
00:02:02,950 --> 00:02:00,399
of things also in place to make that

49
00:02:05,350 --> 00:02:02,960
experience easier for example being able

50
00:02:06,550 --> 00:02:05,360
to communicate with family via email and

51
00:02:08,469 --> 00:02:06,560
calls

52
00:02:10,229 --> 00:02:08,479
also having some time for entertainment

53
00:02:11,990 --> 00:02:10,239
you know they get to exercise have to

54
00:02:14,550 --> 00:02:12,000
exercise regularly to keep their bodies

55
00:02:17,589 --> 00:02:14,560
fit um and that gives again a chance to

56
00:02:19,430 --> 00:02:17,599
rejuvenate um and you know those times

57
00:02:20,949 --> 00:02:19,440
where they get to look out the window

58
00:02:23,750 --> 00:02:20,959
and just look back at earth and look at

59
00:02:25,270 --> 00:02:23,760
the stars i know that is so cherished by

60
00:02:27,190 --> 00:02:25,280
the crew and again helps them

61
00:02:29,910 --> 00:02:27,200
psychologically with those challenges of

62
00:02:31,750 --> 00:02:29,920
being up there so for the most part um

63
00:02:33,750 --> 00:02:31,760

don't hear much about that and you know

64
00:02:35,190 --> 00:02:33,760
honestly a lot of crew members will keep

65
00:02:37,030 --> 00:02:35,200
that to themselves a little bit even if

66
00:02:38,630 --> 00:02:37,040
they do feel something wanting to push

67
00:02:41,190 --> 00:02:38,640
through with their uh you know they're

68
00:02:42,550 --> 00:02:41,200
very motivated people very driven and

69
00:02:43,430 --> 00:02:42,560
not going to let that stuff get in their

70
00:02:44,790 --> 00:02:43,440
way

71
00:02:46,150 --> 00:02:44,800
and just to add a little bit to that you

72
00:02:48,070 --> 00:02:46,160
know they have christy mentioned the

73
00:02:50,309 --> 00:02:48,080
different communications methods they

74
00:02:51,830 --> 00:02:50,319
actually have a internet telephone that

75
00:02:53,750 --> 00:02:51,840
they can call down to their friends and

76
00:02:55,750 --> 00:02:53,760
family on the earth to talk to them

77
00:02:58,070 --> 00:02:55,760
anytime they want to really

78
00:02:59,670 --> 00:02:58,080
they have email they have the internet

79
00:03:01,350 --> 00:02:59,680
on board the space station so they go

80
00:03:03,509 --> 00:03:01,360
look something up or order flowers for

81
00:03:05,350 --> 00:03:03,519
their kids when it's their graduation

82
00:03:08,630 --> 00:03:05,360
day or whatever and we send them up

83
00:03:10,470 --> 00:03:08,640
movies and sometimes sporting events

84
00:03:13,350 --> 00:03:10,480
and videotape of their friends and

85
00:03:15,430 --> 00:03:13,360
family as they're doing different things

86
00:03:17,350 --> 00:03:15,440
on the earth to help them keep

87
00:03:19,589 --> 00:03:17,360
involved with what's going on back here

88
00:03:21,509 --> 00:03:19,599

at home and so there's a lot of effort

89
00:03:22,949 --> 00:03:21,519
put into making sure that they don't get

90
00:03:25,270 --> 00:03:22,959
to that point and

91
00:03:27,670 --> 00:03:25,280
they also have a periodic talk with

92
00:03:29,350 --> 00:03:27,680
their doctor on the ground so that

93
00:03:31,270 --> 00:03:29,360
their doctor can help them keep a look

94
00:03:33,030 --> 00:03:31,280
out for any symptoms that they not might

95
00:03:34,149 --> 00:03:33,040
not be understanding

96
00:03:37,430 --> 00:03:34,159
that would indicate that they were

97
00:03:39,910 --> 00:03:37,440
having that kind of a problem

98
00:03:41,589 --> 00:03:39,920
and for the ann richards school a quick

99
00:03:43,830 --> 00:03:41,599
question i was just wondering do you

100
00:03:44,630 --> 00:03:43,840
guys have an external microphone and if

101
00:03:46,550 --> 00:03:44,640
so

102
00:03:48,949 --> 00:03:46,560
would you be able to move it even closer

103
00:03:50,550 --> 00:03:48,959
to the students if you don't then have

104
00:03:52,070 --> 00:03:50,560
the students get closer to the computer

105
00:03:53,190 --> 00:03:52,080
so we can definitely hear their next

106
00:03:55,830 --> 00:03:53,200
question

107
00:03:59,670 --> 00:03:55,840
does this basically taste exactly the

108
00:04:01,509 --> 00:03:59,680
same as the regular food on earth

109
00:04:03,830 --> 00:04:01,519
okay does space food take the taste the

110
00:04:05,190 --> 00:04:03,840
same as regular food on earth

111
00:04:06,229 --> 00:04:05,200
great question

112
00:04:07,670 --> 00:04:06,239
so

113
00:04:10,630 --> 00:04:07,680

one thing that's very interesting that

114
00:04:12,390 --> 00:04:10,640
happens in space is that your taste buds

115
00:04:15,190 --> 00:04:12,400
do not sense things the same as they do

116
00:04:17,909 --> 00:04:15,200
on earth and so things that would have

117
00:04:19,590 --> 00:04:17,919
some spice or saltiness to it here often

118
00:04:21,030 --> 00:04:19,600
will taste very bland up there so it's a

119
00:04:22,870 --> 00:04:21,040
very common thing for the crew members

120
00:04:24,710 --> 00:04:22,880
to take their

121
00:04:27,510 --> 00:04:24,720
their extra salt and tabasco and things

122
00:04:30,070 --> 00:04:27,520
like that to to liven things up

123
00:04:33,270 --> 00:04:30,080
as in addition to that you know

124
00:04:35,749 --> 00:04:33,280
the food on up in space needs to last

125
00:04:37,830 --> 00:04:35,759
longer than it would have to here uh on

126
00:04:40,790 --> 00:04:37,840
earth and so our food does go through a

127
00:04:43,830 --> 00:04:40,800
special space lab here at jsc where it

128
00:04:44,950 --> 00:04:43,840
um was formulated especially for space

129
00:04:47,430 --> 00:04:44,960
and so

130
00:04:48,870 --> 00:04:47,440
what we do leading up to a mission is

131
00:04:50,070 --> 00:04:48,880
there will be

132
00:04:52,469 --> 00:04:50,080
lots of

133
00:04:56,150 --> 00:04:52,479
creations of new foods and taste testing

134
00:04:58,150 --> 00:04:56,160
by the food lab and and others i've been

135
00:04:59,749 --> 00:04:58,160
blessed over the years to be able to try

136
00:05:02,390 --> 00:04:59,759
out some of the foods before they go up

137
00:05:04,310 --> 00:05:02,400
in space to help them get them

138
00:05:05,270 --> 00:05:04,320

you know in just the right shape before

139
00:05:07,189 --> 00:05:05,280
they

140
00:05:08,310 --> 00:05:07,199
send them to a crew member so

141
00:05:12,870 --> 00:05:08,320
so you're right it's a different

142
00:05:15,990 --> 00:05:14,629
and i know that makes it all the better

143
00:05:17,990 --> 00:05:16,000
when they get back on earth to enjoy

144
00:05:19,430 --> 00:05:18,000
their favorites back here again yeah you

145
00:05:21,510 --> 00:05:19,440
know one of the favorite items on board

146
00:05:23,590 --> 00:05:21,520
the space station is taco sauce the

147
00:05:25,350 --> 00:05:23,600
little packets they use those a lot

148
00:05:27,189 --> 00:05:25,360
because as christie says

149
00:05:28,790 --> 00:05:27,199
the food can taste a little bit blander

150
00:05:30,070 --> 00:05:28,800
it's the same flavor but it just tastes

151
00:05:32,070 --> 00:05:30,080
a little blander

152
00:05:34,070 --> 00:05:32,080
and another interesting tidbit is

153
00:05:35,670 --> 00:05:34,080
you might not think about it but in

154
00:05:37,270 --> 00:05:35,680
microgravity everything would tend to

155
00:05:39,110 --> 00:05:37,280
float around and so that salt and pepper

156
00:05:40,550 --> 00:05:39,120
she's talking about are not the same

157
00:05:42,230 --> 00:05:40,560
kind of salt and pepper we use on our

158
00:05:45,270 --> 00:05:42,240
tables they're actually salt and pepper

159
00:05:47,430 --> 00:05:45,280
that's mixed in oil or in water so that

160
00:05:48,950 --> 00:05:47,440
it doesn't fly off and get in your eye

161
00:05:50,310 --> 00:05:48,960
and cause a problem because you know if

162
00:05:52,710 --> 00:05:50,320
anybody's had pepper in there i know

163
00:05:55,430 --> 00:05:52,720

that's not a lot of fun and so they use

164
00:05:56,469 --> 00:05:55,440
oil and suspended pepper and water

165
00:05:57,590 --> 00:05:56,479
suspended

166
00:06:03,430 --> 00:05:57,600
salt

167
00:06:09,430 --> 00:06:05,510
what would happen if an astronaut got

168
00:06:12,790 --> 00:06:11,189
okay what would happen if national got

169
00:06:14,150 --> 00:06:12,800
really sick while living on the space

170
00:06:16,469 --> 00:06:14,160
station

171
00:06:18,469 --> 00:06:16,479
good question so you know first of all

172
00:06:21,029 --> 00:06:18,479
we plan for those types of emergencies

173
00:06:21,830 --> 00:06:21,039
and there's all kinds of medications and

174
00:06:24,390 --> 00:06:21,840
um

175
00:06:26,070 --> 00:06:24,400
you know medical supplies on board and

176
00:06:28,230 --> 00:06:26,080
and the astronauts are trained in the

177
00:06:29,990 --> 00:06:28,240
methods for for helping sick uh

178
00:06:31,510 --> 00:06:30,000
astronauts so for you know first of all

179
00:06:33,350 --> 00:06:31,520
you would try to deal with it on board

180
00:06:35,270 --> 00:06:33,360
but if truly it became to the point

181
00:06:37,510 --> 00:06:35,280
where you needed to get them back to

182
00:06:39,749 --> 00:06:37,520
earth in a hurry on the space station we

183
00:06:41,510 --> 00:06:39,759
have that ability we always will have a

184
00:06:43,990 --> 00:06:41,520
soyuz spacecraft ready to bring the

185
00:06:46,390 --> 00:06:44,000
whole crew home um should that need to

186
00:06:48,469 --> 00:06:46,400
happen so you're never stranded and and

187
00:06:50,550 --> 00:06:48,479
that's always an option but um we really

188
00:06:51,670 --> 00:06:50,560

haven't had to do that today uh thank

189
00:06:52,710 --> 00:06:51,680
goodness

190
00:06:55,110 --> 00:06:52,720
yeah you know and that's one of the

191
00:06:56,870 --> 00:06:55,120
reasons again they have periodic talks

192
00:06:58,309 --> 00:06:56,880
with their doctor so that they can be

193
00:07:00,150 --> 00:06:58,319
open and let them know if they're having

194
00:07:02,390 --> 00:07:00,160
anything that the doctor might see as a

195
00:07:04,469 --> 00:07:02,400
symptom of a problem

196
00:07:05,670 --> 00:07:04,479
and so we do try to make sure that

197
00:07:07,189 --> 00:07:05,680
happen and

198
00:07:09,909 --> 00:07:07,199
there's all sorts of medical equipment

199
00:07:11,430 --> 00:07:09,919
as christie mentioned there is

200
00:07:12,790 --> 00:07:11,440
you know they can do blood tests on

201
00:07:14,390 --> 00:07:12,800
orbit they can

202
00:07:16,870 --> 00:07:14,400
have they have ultrasound so they can

203
00:07:18,070 --> 00:07:16,880
actually look inside their bodies

204
00:07:20,309 --> 00:07:18,080
like you might have done at your

205
00:07:22,309 --> 00:07:20,319
doctor's office or like your mom may

206
00:07:24,309 --> 00:07:22,319
have had done when you were inside of

207
00:07:25,430 --> 00:07:24,319
her and they had an ultrasound picture

208
00:07:27,350 --> 00:07:25,440
that you might have seen of yourself

209
00:07:29,029 --> 00:07:27,360
when you're real little so they can

210
00:07:30,629 --> 00:07:29,039
actually look inside and one of the

211
00:07:32,870 --> 00:07:30,639
things they look at more than things

212
00:07:34,469 --> 00:07:32,880
they've discovered recently is that

213
00:07:36,550 --> 00:07:34,479

the shape of your eye changes when

214
00:07:38,309 --> 00:07:36,560
you're in uh microgravity for a long

215
00:07:39,670 --> 00:07:38,319
period of time and sometimes it doesn't

216
00:07:41,430 --> 00:07:39,680
change all the way back when you come

217
00:07:43,510 --> 00:07:41,440
back down to the ground because and

218
00:07:45,270 --> 00:07:43,520
they're actually working on developing a

219
00:07:47,830 --> 00:07:45,280
special ultrasound device that would

220
00:07:49,110 --> 00:07:47,840
allow them to do specific examinations

221
00:07:51,189 --> 00:07:49,120
of their eyes so they can try and

222
00:07:52,790 --> 00:07:51,199
understand that problem better because

223
00:07:54,790 --> 00:07:52,800
when people start going places on the

224
00:07:56,390 --> 00:07:54,800
orion spacecraft that chrissy's working

225
00:07:57,749 --> 00:07:56,400
on they're going to be a lot farther

226
00:07:59,909 --> 00:07:57,759
away and it's going to be a lot more

227
00:08:02,869 --> 00:07:59,919
important even to have really good

228
00:08:04,150 --> 00:08:02,879
vision through a long trip to mars or an

229
00:08:05,830 --> 00:08:04,160
asteroid

230
00:08:07,589 --> 00:08:05,840
and so we want to learn more about that

231
00:08:09,589 --> 00:08:07,599
particular effect that we're learning

232
00:08:11,830 --> 00:08:09,599
about right and that's an area actually

233
00:08:12,710 --> 00:08:11,840
my team is working on

234
00:08:14,710 --> 00:08:12,720
you know

235
00:08:16,309 --> 00:08:14,720
the issues with the eye is that that

236
00:08:18,550 --> 00:08:16,319
feeds all the way back to the design of

237
00:08:20,790 --> 00:08:18,560
your spacecraft the pressure of your

238
00:08:22,629 --> 00:08:20,800

spacecraft whether you have a normoxic

239
00:08:23,990 --> 00:08:22,639
environment with the appropriate oxygen

240
00:08:25,350 --> 00:08:24,000
and pressure

241
00:08:26,629 --> 00:08:25,360
and so

242
00:08:29,430 --> 00:08:26,639
these types of things are considered

243
00:08:31,510 --> 00:08:29,440
very early on in a spacecraft design and

244
00:08:33,909 --> 00:08:31,520
are very critical to the the crew's

245
00:08:35,190 --> 00:08:33,919
health um i was also going to mention

246
00:08:36,550 --> 00:08:35,200
you know when we were talking about all

247
00:08:38,310 --> 00:08:36,560
of the medical hardware they have on

248
00:08:39,750 --> 00:08:38,320
board a number of years ago i was able

249
00:08:42,070 --> 00:08:39,760
to help with the design and

250
00:08:43,670 --> 00:08:42,080
certification of hardware for both space

251
00:08:46,150 --> 00:08:43,680
station and

252
00:08:48,150 --> 00:08:46,160
and the space shuttle and

253
00:08:50,150 --> 00:08:48,160
you know we try to use a lot of things

254
00:08:51,350 --> 00:08:50,160
that we have here on the ground that are

255
00:08:53,269 --> 00:08:51,360
common to you

256
00:08:54,710 --> 00:08:53,279
but going through certification of those

257
00:08:57,350 --> 00:08:54,720
for spaceflight and sometimes you have

258
00:09:00,550 --> 00:08:58,870
have a slightly modified version of

259
00:09:01,590 --> 00:09:00,560
things you know keeping in mind keeping

260
00:09:05,590 --> 00:09:01,600
the

261
00:09:07,590 --> 00:09:05,600
environment that you're working in in

262
00:09:09,190 --> 00:09:07,600
space so those are all types of things

263
00:09:10,870 --> 00:09:09,200

that our engineers here work on is

264
00:09:12,150 --> 00:09:10,880
getting that equipment ready for space

265
00:09:13,990 --> 00:09:12,160
yeah one of the ones i think christy

266
00:09:15,430 --> 00:09:14,000
worked on is the treadmill system that

267
00:09:17,190 --> 00:09:15,440
they're they have onboard the space

268
00:09:19,269 --> 00:09:17,200
station right now actually a

269
00:09:21,190 --> 00:09:19,279
commercially built treadmill that is

270
00:09:22,070 --> 00:09:21,200
used primarily by pro athletes here on

271
00:09:24,550 --> 00:09:22,080
the ground because it's kind of

272
00:09:26,150 --> 00:09:24,560
expensive but it was modified for use on

273
00:09:29,190 --> 00:09:26,160
the space station

274
00:09:35,509 --> 00:09:31,110
what is the hardest or most difficult

275
00:09:44,870 --> 00:09:38,630
hardest or most difficult job

276
00:09:49,030 --> 00:09:46,550
i'd say you know one of one of the

277
00:09:51,430 --> 00:09:49,040
challenging things around here is that

278
00:09:53,829 --> 00:09:51,440
we've got a lot of great work to do and

279
00:09:55,990 --> 00:09:53,839
sometimes um

280
00:09:58,230 --> 00:09:56,000
so much to do that you almost have to to

281
00:09:59,829 --> 00:09:58,240
turn away things and you know and bring

282
00:10:01,350 --> 00:09:59,839
bring other people on board to do things

283
00:10:03,509 --> 00:10:01,360
so i'll be honest that could be one of

284
00:10:05,430 --> 00:10:03,519
the hardest things is saying no to folks

285
00:10:07,190 --> 00:10:05,440
when they want you to be a part of

286
00:10:09,750 --> 00:10:07,200
an effort that they're doing with some

287
00:10:11,829 --> 00:10:09,760
exciting work around here

288
00:10:14,310 --> 00:10:11,839

other than that another thing more on a

289
00:10:16,069 --> 00:10:14,320
physical level that comes to mind

290
00:10:18,630 --> 00:10:16,079
i did have the chance to go in the

291
00:10:20,630 --> 00:10:18,640
zero-g aircraft a couple years back

292
00:10:22,550 --> 00:10:20,640
where you fly the parabolas and and we

293
00:10:24,150 --> 00:10:22,560
were testing some hardware for orion we

294
00:10:26,630 --> 00:10:24,160
wanted to see for

295
00:10:28,710 --> 00:10:26,640
our seats there at our

296
00:10:30,310 --> 00:10:28,720
control station

297
00:10:33,030 --> 00:10:30,320
how would we be able to get into those

298
00:10:35,430 --> 00:10:33,040
seats in in zero gravity and so um i was

299
00:10:36,949 --> 00:10:35,440
able to fly on that flight and and you

300
00:10:38,230 --> 00:10:36,959
know got to experience that the

301
00:10:39,829 --> 00:10:38,240
challenges of going through those

302
00:10:41,829 --> 00:10:39,839
parabolas and the

303
00:10:44,150 --> 00:10:41,839
the tendency to want to get sick and

304
00:10:45,910 --> 00:10:44,160
managed to to hang in there for that

305
00:10:47,670 --> 00:10:45,920
flight we got a lot of great test data

306
00:10:50,230 --> 00:10:47,680
out of that but that was physically a

307
00:10:51,670 --> 00:10:50,240
challenging day um one one last thing

308
00:10:53,829 --> 00:10:51,680
i'll mention i had an opportunity to get

309
00:10:55,430 --> 00:10:53,839
in a russian orlan suit a while back and

310
00:10:57,670 --> 00:10:55,440
you know i didn't appreciate until doing

311
00:10:59,910 --> 00:10:57,680
that the challenge of being in a suit

312
00:11:01,990 --> 00:10:59,920
that's pressurized when they closed that

313
00:11:03,829 --> 00:11:02,000

that hatch and and you're

314
00:11:05,590 --> 00:11:03,839
just in a closed system there within

315
00:11:07,110 --> 00:11:05,600
your suit

316
00:11:10,230 --> 00:11:07,120
that

317
00:11:13,030 --> 00:11:10,240
start

318
00:11:14,470 --> 00:11:13,040
for my heart to stop racing as i got

319
00:11:16,069 --> 00:11:14,480
used to that environment and and

320
00:11:17,990 --> 00:11:16,079
although quickly you do get used to it

321
00:11:19,110 --> 00:11:18,000
and um and that's what the astronauts go

322
00:11:21,030 --> 00:11:19,120
through a lot there's a lot of tough

323
00:11:23,350 --> 00:11:21,040
stuff but with training uh you quickly

324
00:11:24,949 --> 00:11:23,360
become adapted and uh ready to do that

325
00:11:26,150 --> 00:11:24,959
in the challenging environment well

326
00:11:27,590 --> 00:11:26,160
christie's talking about there's the

327
00:11:29,590 --> 00:11:27,600
spacesuits they wear when they go

328
00:11:31,269 --> 00:11:29,600
outside to do construction tests on the

329
00:11:32,550 --> 00:11:31,279
outside of the space station there's two

330
00:11:34,150 --> 00:11:32,560
different kinds of those there's an

331
00:11:36,150 --> 00:11:34,160
american spacesuit that's called the

332
00:11:37,670 --> 00:11:36,160
extra-vehicular mobility unit and then

333
00:11:40,710 --> 00:11:37,680
there's the russian version of that

334
00:11:42,550 --> 00:11:40,720
which is called as she said the

335
00:11:43,990 --> 00:11:42,560
orlan suit so

336
00:11:46,150 --> 00:11:44,000
that's what she was talking about there

337
00:11:48,630 --> 00:11:46,160
now there's a couple of other big issues

338
00:11:50,949 --> 00:11:48,640

that space station astronauts deal with

339
00:11:53,509 --> 00:11:50,959
and one of them is

340
00:11:55,670 --> 00:11:53,519
cooperation the space station is an

341
00:11:56,790 --> 00:11:55,680
international effort and you have people

342
00:11:59,670 --> 00:11:56,800
from

343
00:12:01,190 --> 00:11:59,680
15 different countries and cultures all

344
00:12:03,030 --> 00:12:01,200
working together whether it's on the

345
00:12:06,710 --> 00:12:03,040
ground to support the astronauts in

346
00:12:07,990 --> 00:12:06,720
orbit or the they're on on orbit working

347
00:12:09,509 --> 00:12:08,000
together

348
00:12:11,829 --> 00:12:09,519
using different languages different

349
00:12:14,470 --> 00:12:11,839
cultures and yet we make it all work and

350
00:12:16,550 --> 00:12:14,480
so it can be hard to do that sometimes

351
00:12:19,190 --> 00:12:16,560
to overcome a

352
00:12:22,230 --> 00:12:19,200
a difference of the way you perceive

353
00:12:24,150 --> 00:12:22,240
something because of the way you grew up

354
00:12:25,509 --> 00:12:24,160
but yesterday we had a briefing for one

355
00:12:27,269 --> 00:12:25,519
of the upcoming crews and one of our

356
00:12:28,949 --> 00:12:27,279
italian crew members had a great great

357
00:12:32,069 --> 00:12:28,959
line i thought they said we are the

358
00:12:33,990 --> 00:12:32,079
world champions in cooperation uh and i

359
00:12:36,150 --> 00:12:34,000
think that's really true because uh the

360
00:12:38,870 --> 00:12:36,160
space station is a multinational effort

361
00:12:40,870 --> 00:12:38,880
and it takes people of all kinds to work

362
00:12:42,310 --> 00:12:40,880
together and make it happen and do all

363
00:12:44,230 --> 00:12:42,320

these great things are doing for us here

364
00:12:45,829 --> 00:12:44,240
on the ground in earth and so i think

365
00:12:47,910 --> 00:12:45,839
that's a really neat aspect of space

366
00:12:49,750 --> 00:12:47,920
station

367
00:12:51,110 --> 00:12:49,760
well the next question is coming up if i

368
00:12:53,110 --> 00:12:51,120
could

369
00:12:55,190 --> 00:12:53,120
add in for just a second i

370
00:12:55,910 --> 00:12:55,200
i know we've got a bunch of

371
00:13:01,350 --> 00:12:55,920
uh

372
00:13:03,350 --> 00:13:01,360
today and you know i know that um

373
00:13:05,030 --> 00:13:03,360
you guys are probably thinking about

374
00:13:06,710 --> 00:13:05,040
your next steps beyond high school and

375
00:13:08,470 --> 00:13:06,720
just wanted to throw out some ideas real

376
00:13:10,389 --> 00:13:08,480
quick about

377
00:13:12,069 --> 00:13:10,399
what to be looking towards

378
00:13:13,750 --> 00:13:12,079
if you're interested in in the stem

379
00:13:16,710 --> 00:13:13,760
areas of science technology engineering

380
00:13:18,629 --> 00:13:16,720
math you know it is never too early to

381
00:13:20,389 --> 00:13:18,639
start looking for those opportunities to

382
00:13:22,470 --> 00:13:20,399
branch into stem

383
00:13:24,470 --> 00:13:22,480
i know nasa has a lot of opportunities

384
00:13:26,870 --> 00:13:24,480
starting as early as the junior high

385
00:13:30,790 --> 00:13:26,880
level where you can find competitions

386
00:13:32,949 --> 00:13:30,800
online just recently last week orion

387
00:13:34,230 --> 00:13:32,959
announced a new radiation student

388
00:13:35,750 --> 00:13:34,240

program that really starts all the way

389
00:13:37,590 --> 00:13:35,760
from kindergarten all the way through

390
00:13:39,110 --> 00:13:37,600
high school so you know you're able to

391
00:13:41,509 --> 00:13:39,120
go through the nasa website and look for

392
00:13:45,030 --> 00:13:41,519
things like that to to get those first

393
00:13:47,509 --> 00:13:45,040
opportunities to look at at engineering

394
00:13:49,189 --> 00:13:47,519
and science and so then

395
00:13:50,710 --> 00:13:49,199
as you get more into the high school

396
00:13:54,150 --> 00:13:50,720
ages you know obviously you're starting

397
00:13:56,150 --> 00:13:54,160
to look at what college to go to and um

398
00:13:58,629 --> 00:13:56,160
one of the biggest pieces of advice i

399
00:14:00,949 --> 00:13:58,639
can give there is

400
00:14:03,590 --> 00:14:00,959
to look for those opportunities

401
00:14:05,269 --> 00:14:03,600
in college for interning or co-opting

402
00:14:07,509 --> 00:14:05,279
with companies whether it's with nasa or

403
00:14:09,350 --> 00:14:07,519
some other group

404
00:14:11,350 --> 00:14:09,360
and and even as you search for a college

405
00:14:13,590 --> 00:14:11,360
you can find colleges that

406
00:14:16,629 --> 00:14:13,600
that embrace that more and provide

407
00:14:19,990 --> 00:14:16,639
you know a strong co-op environment and

408
00:14:21,110 --> 00:14:20,000
that's how i came to be here at nasa i

409
00:14:23,030 --> 00:14:21,120
went to georgia tech for my

410
00:14:25,110 --> 00:14:23,040
undergraduate and university of colorado

411
00:14:26,629 --> 00:14:25,120
for my graduate school but at

412
00:14:29,590 --> 00:14:26,639
georgia tech i didn't even know about

413
00:14:31,430 --> 00:14:29,600

co-oping coming into this and they had a

414
00:14:33,670 --> 00:14:31,440
strong program and was able to find out

415
00:14:35,269 --> 00:14:33,680
about the ties already there to nasa and

416
00:14:37,590 --> 00:14:35,279
was blessed to get a job here and that

417
00:14:39,509 --> 00:14:37,600
that led me to where i am today but

418
00:14:41,110 --> 00:14:39,519
it's not too early to be thinking about

419
00:14:42,389 --> 00:14:41,120
those things because honestly if i

420
00:14:43,910 --> 00:14:42,399
hadn't

421
00:14:45,670 --> 00:14:43,920
ended up in that co-op program i

422
00:14:48,470 --> 00:14:45,680
wouldn't be sitting here today because

423
00:14:49,350 --> 00:14:48,480
that is um our main avenue for hiring

424
00:14:51,590 --> 00:14:49,360
people

425
00:14:53,829 --> 00:14:51,600
uh at nasa so

426
00:14:56,870 --> 00:14:53,839
so be proactive in looking for those

427
00:14:58,790 --> 00:14:56,880
opportunities to to get ties to whatever

428
00:15:00,230 --> 00:14:58,800
your industry is that you're interested

429
00:15:02,629 --> 00:15:00,240
in early

430
00:15:04,949 --> 00:15:02,639
do those internships or or

431
00:15:06,150 --> 00:15:04,959
shadowing different different

432
00:15:07,829 --> 00:15:06,160
disciplines

433
00:15:10,389 --> 00:15:07,839
and i'll add that you know i'm not a

434
00:15:12,949 --> 00:15:10,399
scientist or an engineer like christy is

435
00:15:14,870 --> 00:15:12,959
but i was an intern at nasa too and so

436
00:15:16,629 --> 00:15:14,880
even if your interests don't lie in

437
00:15:18,629 --> 00:15:16,639
science and engineering nasa needs

438
00:15:20,870 --> 00:15:18,639

people from all different walks of life

439
00:15:23,030 --> 00:15:20,880
to do the things that we do uh we need

440
00:15:25,750 --> 00:15:23,040
people that know how to do budgets and

441
00:15:27,990 --> 00:15:25,760
billing and things like that we need

442
00:15:30,470 --> 00:15:28,000
doctors we need uh

443
00:15:32,870 --> 00:15:30,480
people who help with human relation

444
00:15:34,389 --> 00:15:32,880
human resources for hiring and that kind

445
00:15:35,670 --> 00:15:34,399
of thing so there's all kinds of

446
00:15:37,430 --> 00:15:35,680
different career options if you want to

447
00:15:39,590 --> 00:15:37,440
get involved in the space

448
00:15:41,590 --> 00:15:39,600
industry and even if you're not a

449
00:15:43,350 --> 00:15:41,600
scientist or an engineer or that doesn't

450
00:15:44,870 --> 00:15:43,360
uh float your boat there's other ways

451
00:15:49,430 --> 00:15:44,880
that you can get involved just if you're

452
00:15:49,440 --> 00:15:54,389
um my name is rebecca and i was

453
00:16:00,710 --> 00:15:56,310
what kind of training did you need for

454
00:16:03,749 --> 00:16:02,069
what kind of training do you need for

455
00:16:05,269 --> 00:16:03,759
your job

456
00:16:06,949 --> 00:16:05,279
great question

457
00:16:08,710 --> 00:16:06,959
so you know

458
00:16:10,790 --> 00:16:08,720
really nasa will help

459
00:16:12,389 --> 00:16:10,800
train you along the way to get

460
00:16:14,470 --> 00:16:12,399
to where you need to be for your job

461
00:16:16,069 --> 00:16:14,480
assignment so that's a great thing but

462
00:16:17,990 --> 00:16:16,079
the types of training that i have found

463
00:16:20,230 --> 00:16:18,000

that i need

464
00:16:21,590 --> 00:16:20,240
you know very much leadership skills to

465
00:16:24,389 --> 00:16:21,600
be able to

466
00:16:26,069 --> 00:16:24,399
to lead my projects um

467
00:16:27,749 --> 00:16:26,079
being able to

468
00:16:30,629 --> 00:16:27,759
interact well with others i mean

469
00:16:32,710 --> 00:16:30,639
everything we do is done through teams

470
00:16:35,430 --> 00:16:32,720
very seldom are you on your own

471
00:16:39,590 --> 00:16:35,440
tackling a task so um that's a huge part

472
00:16:41,509 --> 00:16:39,600
of what we do and what we train for also

473
00:16:43,110 --> 00:16:41,519
training also is very helpful

474
00:16:45,269 --> 00:16:43,120
in the areas of like computer-aided

475
00:16:47,910 --> 00:16:45,279
design to be able to

476
00:16:49,189 --> 00:16:47,920
bring your ideas into a cad environment

477
00:16:50,710 --> 00:16:49,199
start to create those and be able to

478
00:16:52,230 --> 00:16:50,720
build those you know

479
00:16:53,990 --> 00:16:52,240
one of my main tasks right now is

480
00:16:56,790 --> 00:16:54,000
developing the mock-ups that we work on

481
00:16:59,189 --> 00:16:56,800
for orion and we use these to flush out

482
00:17:02,150 --> 00:16:59,199
the design eventually to to certify the

483
00:17:03,910 --> 00:17:02,160
design and eventually train the crew and

484
00:17:05,750 --> 00:17:03,920
you know we are constantly designing

485
00:17:07,669 --> 00:17:05,760
hardware to put into those mock-ups same

486
00:17:10,230 --> 00:17:07,679
thing if you know for those working on

487
00:17:13,829 --> 00:17:10,240
the flight vehicle and um

488
00:17:14,789 --> 00:17:13,839

you know so things like cad and um

489
00:17:17,429 --> 00:17:14,799
you know

490
00:17:19,350 --> 00:17:17,439
powerpoint and things like that that you

491
00:17:21,829 --> 00:17:19,360
guys probably already know well that

492
00:17:22,870 --> 00:17:21,839
help you communicate your design ideas

493
00:17:24,630 --> 00:17:22,880
you know there's other things we get

494
00:17:26,309 --> 00:17:24,640
training in too uh some things that you

495
00:17:28,309 --> 00:17:26,319
wouldn't necessarily think

496
00:17:29,750 --> 00:17:28,319
of in nasa but

497
00:17:31,430 --> 00:17:29,760
one of the things we've added on to our

498
00:17:32,390 --> 00:17:31,440
training recently is inclusion and

499
00:17:35,590 --> 00:17:32,400
innovation

500
00:17:38,470 --> 00:17:35,600
uh and that's the whole idea of of not

501
00:17:40,549 --> 00:17:38,480
uh excluding somebody because of their

502
00:17:43,110 --> 00:17:40,559
race or their religion or any of their

503
00:17:44,710 --> 00:17:43,120
preferences uh so you embrace those

504
00:17:47,750 --> 00:17:44,720
folks and and you're able to work

505
00:17:49,830 --> 00:17:47,760
together with them on a regular basis

506
00:17:50,870 --> 00:17:49,840
no matter what your backgrounds are and

507
00:17:52,630 --> 00:17:50,880
that goes along with the whole

508
00:17:54,070 --> 00:17:52,640
cooperation scheme so that's an

509
00:17:55,590 --> 00:17:54,080
interesting part and we also like to try

510
00:17:58,310 --> 00:17:55,600
and make sure people try and think

511
00:18:00,070 --> 00:17:58,320
differently and try to innovate and and

512
00:18:01,669 --> 00:18:00,080
look at new ways of doing things so that

513
00:18:05,190 --> 00:18:01,679

we can improve our efficiency and our

514
00:18:09,029 --> 00:18:06,630
so

515
00:18:10,390 --> 00:18:09,039
my name is vivia volvic and i was

516
00:18:12,230 --> 00:18:10,400
wondering

517
00:18:14,710 --> 00:18:12,240
what would you say is the most important

518
00:18:20,150 --> 00:18:14,720
scientific discovery made so far from

519
00:18:23,430 --> 00:18:21,990
i i'm sure that that is a matter of

520
00:18:25,750 --> 00:18:23,440
opinion and i don't think i'm going to

521
00:18:27,590 --> 00:18:25,760
even begin to to try to tackle that one

522
00:18:29,669 --> 00:18:27,600
kelly i don't know if you want to

523
00:18:31,750 --> 00:18:29,679
well i'll just say that there is

524
00:18:35,110 --> 00:18:31,760
research going on in so many different

525
00:18:36,870 --> 00:18:35,120
areas from biology to human physiology

526
00:18:40,830 --> 00:18:36,880
in our bodies to

527
00:18:43,909 --> 00:18:40,840
uh how materials can be formed in

528
00:18:45,909 --> 00:18:43,919
microgravity to even looking at the

529
00:18:47,909 --> 00:18:45,919
cosmos

530
00:18:49,590 --> 00:18:47,919
because we've got an amazing instrument

531
00:18:51,750 --> 00:18:49,600
on board the space station called the

532
00:18:54,470 --> 00:18:51,760
alpha magnetic spectrometer

533
00:18:56,950 --> 00:18:54,480
that is looking for that dark matter

534
00:18:58,630 --> 00:18:56,960
that all the physicists have theorized

535
00:19:00,310 --> 00:18:58,640
is out there

536
00:19:01,830 --> 00:19:00,320
we know that there's matter and there's

537
00:19:03,990 --> 00:19:01,840
antimatter but there's a whole bunch of

538
00:19:06,230 --> 00:19:04,000

stuff in the universe that we don't know

539
00:19:08,870 --> 00:19:06,240
exactly what it is and we theorize it's

540
00:19:10,470 --> 00:19:08,880
this thing called dark matter and we're

541
00:19:11,669 --> 00:19:10,480
looking forward hopefully this year to

542
00:19:13,669 --> 00:19:11,679
getting some results from that

543
00:19:16,390 --> 00:19:13,679
experiment it's been collecting billions

544
00:19:18,310 --> 00:19:16,400
of particles for the last year since it

545
00:19:20,230 --> 00:19:18,320
was last on the launch on the next last

546
00:19:22,310 --> 00:19:20,240
shuttle mission and so that could

547
00:19:23,750 --> 00:19:22,320
actually change our understanding of the

548
00:19:24,789 --> 00:19:23,760
universe and that's the kind of things

549
00:19:30,230 --> 00:19:24,799
that

550
00:19:32,070 --> 00:19:30,240
coming

551
00:19:33,350 --> 00:19:32,080
down the road from you

552
00:19:35,750 --> 00:19:33,360
but but a lot of the things we're

553
00:19:37,350 --> 00:19:35,760
working on have everyday applications i

554
00:19:39,270 --> 00:19:37,360
had a guy in here yesterday who's an

555
00:19:42,630 --> 00:19:39,280
experimenter working on

556
00:19:48,390 --> 00:19:45,830
chondrites or or dendrites and when you

557
00:19:50,390 --> 00:19:48,400
make metals uh on the earth you have all

558
00:19:52,470 --> 00:19:50,400
these little crystals that forms as part

559
00:19:54,710 --> 00:19:52,480
of the alloy process where you mix two

560
00:19:56,789 --> 00:19:54,720
metals together to make a stronger metal

561
00:19:58,789 --> 00:19:56,799
thing kind of things are used in engines

562
00:20:00,789 --> 00:19:58,799
and things like that uh and they're

563
00:20:03,029 --> 00:20:00,799

looking at those on the international

564
00:20:06,070 --> 00:20:03,039
space station here's an example here's

565
00:20:08,549 --> 00:20:06,080
an example from the uh coarsening of

566
00:20:10,390 --> 00:20:08,559
solid and liquid mixtures experiment

567
00:20:12,310 --> 00:20:10,400
that shows you that on the ground all of

568
00:20:14,470 --> 00:20:12,320
the particles that are solids and the

569
00:20:15,909 --> 00:20:14,480
crystals tend to

570
00:20:17,669 --> 00:20:15,919
float up to the top but in the

571
00:20:20,789 --> 00:20:17,679
microgravity environment and space

572
00:20:23,190 --> 00:20:20,799
station they're dispersed uh uniformly

573
00:20:25,510 --> 00:20:23,200
throughout the sample the idea there is

574
00:20:27,590 --> 00:20:25,520
we can make stronger better metals and

575
00:20:29,430 --> 00:20:27,600
other materials that will help us here

576
00:20:31,190 --> 00:20:29,440
on the ground and so that's a really

577
00:20:33,669 --> 00:20:31,200
important discovery

578
00:20:36,230 --> 00:20:33,679
another one is the discovery that we can

579
00:20:38,630 --> 00:20:36,240
monitor our planet from the earth uh

580
00:20:40,470 --> 00:20:38,640
with photography and other kinds of

581
00:20:42,630 --> 00:20:40,480
instruments and those are helping us

582
00:20:45,350 --> 00:20:42,640
learn more about how humans affect the

583
00:20:47,350 --> 00:20:45,360
environment and how it's changing

584
00:20:48,950 --> 00:20:47,360
letting us look at

585
00:20:51,190 --> 00:20:48,960
you know changes in the world's

586
00:20:53,909 --> 00:20:51,200
environment and

587
00:20:55,190 --> 00:20:53,919
we've also got tom marshburn working on

588
00:20:57,510 --> 00:20:55,200

experiment you can see right here on

589
00:20:59,510 --> 00:20:57,520
some live tv from the space station and

590
00:21:03,110 --> 00:20:59,520
he's working on a thing called the

591
00:21:05,590 --> 00:21:03,120
marangoni experiment that looks at how

592
00:21:07,430 --> 00:21:05,600
fluids react to microgravity and those

593
00:21:09,350 --> 00:21:07,440
will help us build better engines on the

594
00:21:11,590 --> 00:21:09,360
ground and things so all those

595
00:21:13,110 --> 00:21:11,600
discoveries will add up to improvements

596
00:21:14,630 --> 00:21:13,120
in our everyday lives and i don't know

597
00:21:16,390 --> 00:21:14,640
that anybody can come up as christie

598
00:21:17,190 --> 00:21:16,400
said with what the most important one is

599
00:21:20,070 --> 00:21:17,200
yet

600
00:21:22,789 --> 00:21:20,080
i think it's the cumulative growth in

601
00:21:25,190 --> 00:21:22,799
our scientific knowledge uh in all these

602
00:21:28,230 --> 00:21:25,200
different fields that is is really going

603
00:21:30,630 --> 00:21:28,240
to help propel us into the next era of

604
00:21:32,149 --> 00:21:30,640
exploration and discovery

605
00:21:35,190 --> 00:21:32,159
and we want you to be along for that

606
00:21:38,710 --> 00:21:37,110
all right in ann richards school um

607
00:21:40,789 --> 00:21:38,720
we're just about at the end of our

608
00:21:42,390 --> 00:21:40,799
window so we have time for one final

609
00:21:45,430 --> 00:21:42,400
quick question and then we're going to

610
00:21:50,310 --> 00:21:45,440
wrap up

611
00:21:56,149 --> 00:21:53,750
hi i'm isabelle with milo and my doctor

612
00:21:58,630 --> 00:21:56,159
mr m got a question that picked up here

613
00:22:00,549 --> 00:21:58,640

today so i can ask for him so what are

614
00:22:05,590 --> 00:22:00,559
the goals for the orion project this is

615
00:22:09,270 --> 00:22:07,750
i think you know that one christie i i

616
00:22:11,510 --> 00:22:09,280
just heard the last part of the question

617
00:22:12,549 --> 00:22:11,520
goals for the orion program absolutely

618
00:22:15,029 --> 00:22:12,559
right so

619
00:22:16,789 --> 00:22:15,039
you know um we've obviously got our iss

620
00:22:19,669 --> 00:22:16,799
presence today and and we've got

621
00:22:21,270 --> 00:22:19,679
commercial entities that are working to

622
00:22:24,549 --> 00:22:21,280
give us a back and forth capability at

623
00:22:26,950 --> 00:22:24,559
iss so orion our main mission is to go

624
00:22:28,950 --> 00:22:26,960
beyond low earth orbit

625
00:22:30,630 --> 00:22:28,960
we want to explore explore further we

626
00:22:31,669 --> 00:22:30,640
want to go back to the moon we want to

627
00:22:34,070 --> 00:22:31,679
go

628
00:22:35,350 --> 00:22:34,080
possibly to an asteroid or to a lagrange

629
00:22:36,549 --> 00:22:35,360
point if you're not familiar with those

630
00:22:39,430 --> 00:22:36,559
you'll have to look that up but those

631
00:22:41,110 --> 00:22:39,440
are points out in space

632
00:22:43,029 --> 00:22:41,120
that are more stable so a vehicle is

633
00:22:44,710 --> 00:22:43,039
going to stay there more easily with

634
00:22:46,390 --> 00:22:44,720
very little propellant

635
00:22:49,430 --> 00:22:46,400
allowing it to stay there

636
00:22:51,029 --> 00:22:49,440
you know with little mass so

637
00:22:53,029 --> 00:22:51,039
there's a great advantage in going to a

638
00:22:55,669 --> 00:22:53,039

place like that as a stepping stone

639
00:22:56,710 --> 00:22:55,679
towards the moon or to

640
00:22:58,630 --> 00:22:56,720
mars

641
00:23:00,230 --> 00:22:58,640
and then ultimately of course our main

642
00:23:02,390 --> 00:23:00,240
destination we want to be getting to is

643
00:23:04,950 --> 00:23:02,400
to mars so all these other destinations

644
00:23:06,870 --> 00:23:04,960
that we could go to will

645
00:23:09,830 --> 00:23:06,880
be an opportunity for us to test out our

646
00:23:11,669 --> 00:23:09,840
technologies a little closer to home um

647
00:23:13,669 --> 00:23:11,679
and then venture out you know looking in

648
00:23:14,789 --> 00:23:13,679
that maybe 20 30-ish time frame for

649
00:23:15,990 --> 00:23:14,799
being on

650
00:23:18,390 --> 00:23:16,000
on mars with

651
00:23:21,029 --> 00:23:18,400
with our crew so a lot of exciting

652
00:23:23,750 --> 00:23:21,039
places to go and and so our orion

653
00:23:25,590 --> 00:23:23,760
vehicle you know the main

654
00:23:28,710 --> 00:23:25,600
portion that the crew in is in is a

655
00:23:30,630 --> 00:23:28,720
capsule and it's very uh similar in in

656
00:23:32,230 --> 00:23:30,640
shape to

657
00:23:34,549 --> 00:23:32,240
apollo capsule although it's a bit

658
00:23:36,950 --> 00:23:34,559
bigger we can hold four crew members in

659
00:23:38,710 --> 00:23:36,960
that and of course they've got

660
00:23:40,789 --> 00:23:38,720
some of the comforts of home having a

661
00:23:44,390 --> 00:23:40,799
hygiene area with potty and a galley for

662
00:23:46,070 --> 00:23:44,400
food preparation but obviously

663
00:23:48,870 --> 00:23:46,080

simplified food preparation and things

664
00:23:50,549 --> 00:23:48,880
like that to keep mass down

665
00:23:52,950 --> 00:23:50,559
they would have sleeping bags on there

666
00:23:54,549 --> 00:23:52,960
and and you know a typical mission on

667
00:23:55,590 --> 00:23:54,559
there would probably be about two weeks

668
00:23:57,029 --> 00:23:55,600
long

669
00:23:58,230 --> 00:23:57,039
for missions where you need to go beyond

670
00:23:59,909 --> 00:23:58,240
that where you're going to maybe stay at

671
00:24:01,990 --> 00:23:59,919
a lagrange point for a while you would

672
00:24:04,149 --> 00:24:02,000
mate with another vehicle and have extra

673
00:24:06,789 --> 00:24:04,159
living space to be in and extra supplies

674
00:24:09,190 --> 00:24:06,799
you know we found out um that you know

675
00:24:10,789 --> 00:24:09,200
it's very expensive to human rate a

676
00:24:13,029 --> 00:24:10,799
vehicle and so you want that vehicle

677
00:24:14,149 --> 00:24:13,039
that the crew is in to be

678
00:24:17,269 --> 00:24:14,159
as

679
00:24:19,510 --> 00:24:17,279
getting the crew to and from its

680
00:24:21,110 --> 00:24:19,520
destinations and then the other living

681
00:24:23,190 --> 00:24:21,120
space or other payloads that you want to

682
00:24:26,789 --> 00:24:23,200
take up you we want to take those up on

683
00:24:28,710 --> 00:24:26,799
a unmanned mission unmanned launch

684
00:24:30,630 --> 00:24:28,720
just because we can get that to orbit

685
00:24:33,909 --> 00:24:30,640
much cheaper in a vehicle that's not

686
00:24:36,070 --> 00:24:33,919
human rated so that's why you see uh not

687
00:24:37,590 --> 00:24:36,080
a super spacecraft with with all the

688
00:24:39,510 --> 00:24:37,600

bells and whistles in that but but a

689
00:24:41,669 --> 00:24:39,520
combination of multiple spacecraft that

690
00:24:42,950 --> 00:24:41,679
come together to get the whole job done

691
00:24:44,630 --> 00:24:42,960
well one thing i don't think you did

692
00:24:46,549 --> 00:24:44,640
mention christy is the other thing is as

693
00:24:48,630 --> 00:24:46,559
people may think about the space shuttle

694
00:24:49,909 --> 00:24:48,640
and how cool it was and it came back but

695
00:24:51,350 --> 00:24:49,919
the one thing the shuttle couldn't do is

696
00:24:52,950 --> 00:24:51,360
it couldn't go as far as orion's being

697
00:24:54,950 --> 00:24:52,960
planned to go and the main reason for

698
00:24:57,830 --> 00:24:54,960
that is because when you're coming back

699
00:25:00,070 --> 00:24:57,840
to earth from distances that far away

700
00:25:02,470 --> 00:25:00,080
you're coming back a lot faster and it

701
00:25:05,590 --> 00:25:02,480
increases the heat that the spacecraft

702
00:25:07,510 --> 00:25:05,600
has to be able to survive

703
00:25:08,870 --> 00:25:07,520
i think it's about 10 times the heating

704
00:25:11,190 --> 00:25:08,880
of a shuttle

705
00:25:13,190 --> 00:25:11,200
and so you've got to make sure that the

706
00:25:15,590 --> 00:25:13,200
heat shield for that capsule and that

707
00:25:17,750 --> 00:25:15,600
the capsule shape itself is something

708
00:25:19,269 --> 00:25:17,760
that is better suited toward those high

709
00:25:21,350 --> 00:25:19,279
speed reentries

710
00:25:22,950 --> 00:25:21,360
right and so the orion spacecraft does

711
00:25:25,669 --> 00:25:22,960
enter with its heat shield and then

712
00:25:27,269 --> 00:25:25,679
deploys shoots to allow it to land soft

713
00:25:28,950 --> 00:25:27,279

enough that you wouldn't have injury to

714
00:25:31,029 --> 00:25:28,960
the crew on landing and

715
00:25:33,669 --> 00:25:31,039
nominally we land in the water and you

716
00:25:35,269 --> 00:25:33,679
would have a ship right nearby to pluck

717
00:25:38,070 --> 00:25:35,279
that vehicle out up onto the ship and

718
00:25:39,269 --> 00:25:38,080
then the crew would get out there

719
00:25:41,269 --> 00:25:39,279
a lot of

720
00:25:43,269 --> 00:25:41,279
desirable aspects about

721
00:25:44,710 --> 00:25:43,279
the water landing and that we have so

722
00:25:46,230 --> 00:25:44,720
many opportunities

723
00:25:48,070 --> 00:25:46,240
different locations to land on the earth

724
00:25:49,029 --> 00:25:48,080
that gives you a chance to return to

725
00:25:52,149 --> 00:25:49,039
earth

726
00:25:56,549 --> 00:25:53,990
all right kelly humphries from the

727
00:25:58,870 --> 00:25:56,559
public affairs office and christy sowers

728
00:26:01,510 --> 00:25:58,880
thank you so much for answering

729
00:26:03,510 --> 00:26:01,520
questions from ann richards school for

730
00:26:05,190 --> 00:26:03,520
young women leaders

731
00:26:10,070 --> 00:26:05,200
for the school itself do you want to say

732
00:26:15,750 --> 00:26:12,630
thank you so much this has been mr m's

733
00:26:17,190 --> 00:26:15,760
um sixth grade gen class and we were so

734
00:26:20,149 --> 00:26:17,200
excited to talk to you today thank you

735
00:26:21,990 --> 00:26:20,159
so much to everyone for your time