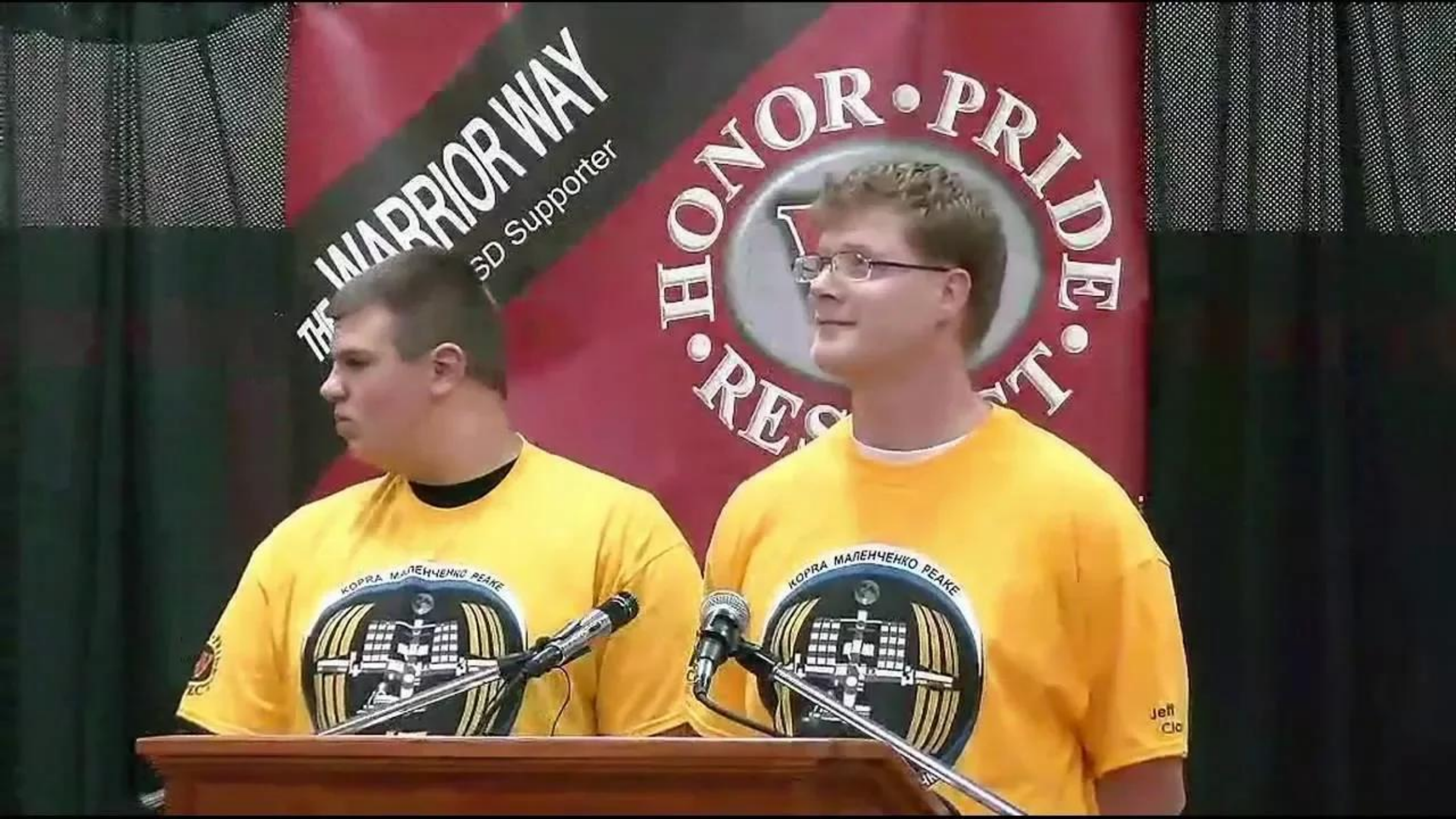
THE WARRIOR WAY
SD Supporter
HONOR · PRIDE ·
KOPRA MALENCHENKO PEAKE
KOPRA MALENCHENKO PEAKE

1
00:00:04,550 --> 00:00:01,829
station this is houston are you ready

2
00:00:04,560 --> 00:00:08,470
i'm ready for the event

3
00:00:12,390 --> 00:00:10,549
winter wisconsin school district this is

4
00:00:16,630 --> 00:00:12,400
mission control houston please call

5
00:00:23,429 --> 00:00:19,189
where'd you talk now

6
00:00:26,230 --> 00:00:24,630
no

7
00:00:28,710 --> 00:00:26,240
station

8
00:00:32,549 --> 00:00:28,720
this is winter wisconsin school district

9
00:00:36,229 --> 00:00:34,229
i've got you loud and clear and i'm

10
00:00:39,350 --> 00:00:36,239
looking forward to talking to uh to

11
00:00:45,029 --> 00:00:42,229
good i'm gonna hand it off to mr zop

12
00:00:46,549 --> 00:00:45,039
he'll introduce the students

13
00:00:51,189 --> 00:00:46,559

and their questions

14
00:00:55,510 --> 00:00:53,270
thank you mr eyed

15
00:01:01,910 --> 00:00:55,520
can we have our first student come up

16
00:01:06,630 --> 00:01:03,990
with regards to the rodent research and

17
00:01:10,310 --> 00:01:06,640
the scientific method is there similar

18
00:01:12,390 --> 00:01:10,320
research going on on earth or the iss

19
00:01:18,070 --> 00:01:12,400
that will be used as the control

20
00:01:21,429 --> 00:01:19,510
actually yes

21
00:01:24,230 --> 00:01:21,439
rodents and other animals have been used

22
00:01:27,030 --> 00:01:24,240
for research for years and most research

23
00:01:28,149 --> 00:01:27,040
hospitals have a program actually in the

24
00:01:29,270 --> 00:01:28,159
hospital

25
00:01:31,590 --> 00:01:29,280
where they're

26
00:01:33,830 --> 00:01:31,600
doing different kinds of medical tests

27
00:01:35,030 --> 00:01:33,840
in support of development for medical

28
00:01:38,230 --> 00:01:35,040
research

29
00:01:40,789 --> 00:01:38,240
for drugs for diseases for various

30
00:01:42,630 --> 00:01:40,799
things so we're using that technique as

31
00:01:44,550 --> 00:01:42,640
an analog up here

32
00:01:48,469 --> 00:01:44,560
to try to isolate the effects of

33
00:01:48,479 --> 00:01:53,590
jason nucky ninth grade

34
00:01:59,030 --> 00:01:56,310
with regards to the wettability study

35
00:02:01,749 --> 00:01:59,040
when measuring liquids in science class

36
00:02:04,230 --> 00:02:01,759
we learned to read the meniscus is there

37
00:02:09,669 --> 00:02:04,240
a meniscus in microgravity and how do

38
00:02:14,550 --> 00:02:12,229

oh absolutely in fact the meniscus is

39
00:02:17,110 --> 00:02:14,560
formed by the there's forces right uh

40
00:02:19,030 --> 00:02:17,120
you know gravity forces down there

41
00:02:20,150 --> 00:02:19,040
there's also surface tension forces

42
00:02:23,830 --> 00:02:20,160
cohesive

43
00:02:25,430 --> 00:02:23,840
adhesive forces adhesion cohesion

44
00:02:28,470 --> 00:02:25,440
and you're studying all of that we have

45
00:02:31,030 --> 00:02:28,480
the same forces up here absent gravity

46
00:02:32,390 --> 00:02:31,040
so liquids do behave

47
00:02:34,229 --> 00:02:32,400
with their properties and you take the

48
00:02:36,390 --> 00:02:34,239
gravity away so you can learn lots of

49
00:02:38,869 --> 00:02:36,400
things in fact we had an experiment

50
00:02:41,030 --> 00:02:38,879
that's been going on up here for years

51
00:02:44,630 --> 00:02:41,040
called capillary flow experiment which

52
00:02:46,309 --> 00:02:44,640
is studying uh the control of liquids

53
00:02:48,150 --> 00:02:46,319
through different shapes

54
00:02:50,390 --> 00:02:48,160
of

55
00:02:51,670 --> 00:02:50,400
using capillary forces

56
00:02:54,470 --> 00:02:51,680
so that we can

57
00:02:56,309 --> 00:02:54,480
control the liquid for example in fuel

58
00:02:58,470 --> 00:02:56,319
tanks of satellites and other liquid

59
00:03:03,110 --> 00:02:58,480
applications so it's got a lot of

60
00:03:03,120 --> 00:03:08,390
sage spinner fourth grade

61
00:03:12,390 --> 00:03:10,710
what kind of cage or enclosure is being

62
00:03:16,869 --> 00:03:12,400
used to house the mice used in the

63
00:03:20,630 --> 00:03:18,869

that's a great question in fact we in

64
00:03:22,390 --> 00:03:20,640
the crew we're in an enclosure called

65
00:03:25,190 --> 00:03:22,400
the international space station and we

66
00:03:27,830 --> 00:03:25,200
roam around inside but life support is

67
00:03:30,550 --> 00:03:27,840
provided for us inside mice of course

68
00:03:33,430 --> 00:03:30,560
are can be a little bit dirty so we

69
00:03:34,949 --> 00:03:33,440
have them inside their own habitat

70
00:03:37,589 --> 00:03:34,959
it's designed to keep them very

71
00:03:38,710 --> 00:03:37,599
comfortable and very safe it provides

72
00:03:40,710 --> 00:03:38,720
them

73
00:03:42,869 --> 00:03:40,720
the right atmosphere

74
00:03:45,350 --> 00:03:42,879
to breathe it also provides them food

75
00:03:47,509 --> 00:03:45,360
and water and it's designed also to be

76
00:03:49,509 --> 00:03:47,519
maintainable so we can clean it so they

77
00:03:52,869 --> 00:03:49,519
have their own little habitat

78
00:03:55,830 --> 00:03:52,879
boxes about this big a couple of them to

79
00:03:59,429 --> 00:03:55,840
keep the mice safe and

80
00:03:59,439 --> 00:04:04,550
cody coleman 11th grade

81
00:04:09,190 --> 00:04:07,350
what is the form of power on the iss is

82
00:04:14,470 --> 00:04:09,200
solar energy used to charge batteries

83
00:04:18,789 --> 00:04:16,150
that's a good question we have a very

84
00:04:20,710 --> 00:04:18,799
extensive power distribution system

85
00:04:23,749 --> 00:04:20,720
integrated into the international space

86
00:04:26,629 --> 00:04:23,759
station and we use the sun's energy

87
00:04:29,510 --> 00:04:26,639
which illuminates uh on solar arrays in

88
00:04:31,270 --> 00:04:29,520

fact when you watch the the iss fly over

89
00:04:33,830 --> 00:04:31,280
from the ground

90
00:04:35,670 --> 00:04:33,840
which many of you i know have it's very

91
00:04:38,150 --> 00:04:35,680
bright and it's so bright because of the

92
00:04:39,749 --> 00:04:38,160
sun's reflections off the solar arrays

93
00:04:42,629 --> 00:04:39,759
the sun's energy is collected in the

94
00:04:45,510 --> 00:04:42,639
solar rays and turned into electricity

95
00:04:48,070 --> 00:04:45,520
and charging charges batteries big large

96
00:04:49,749 --> 00:04:48,080
batteries that are mounted outside so

97
00:04:50,950 --> 00:04:49,759
that we can continue to have power

98
00:04:53,270 --> 00:04:50,960
inside when

99
00:04:55,110 --> 00:04:53,280
when we're in our orbital night time and

100
00:04:57,110 --> 00:04:55,120
then that power is distributed around

101
00:04:59,990 --> 00:04:57,120
the space station it's reduced in

102
00:05:02,230 --> 00:05:00,000
voltage but it's mostly direct current

103
00:05:04,790 --> 00:05:02,240
120 volt direct current through the

104
00:05:07,029 --> 00:05:04,800
station and then we have inverters

105
00:05:08,950 --> 00:05:07,039
on board the station to turn it into ac

106
00:05:10,870 --> 00:05:08,960
power for different users and we

107
00:05:13,270 --> 00:05:10,880
distribute the power you know to all the

108
00:05:15,510 --> 00:05:13,280
modules inside the space station to run

109
00:05:17,590 --> 00:05:15,520
the pumps to run the fans to run the

110
00:05:22,070 --> 00:05:17,600
experiments to run the lighting all of

111
00:05:22,080 --> 00:05:25,909
john larson 10th grade

112
00:05:29,830 --> 00:05:28,310
do the mice using the rodents

113
00:05:34,790 --> 00:05:29,840

research study just float around in

114
00:05:39,110 --> 00:05:36,469
i'm sorry could you repeat the question

115
00:05:41,110 --> 00:05:39,120
i didn't quite hear it

116
00:05:42,390 --> 00:05:41,120
do the mice used in the rodent research

117
00:05:46,230 --> 00:05:42,400
study just float around in their

118
00:05:50,070 --> 00:05:48,070
well the enclosure is not that big it's

119
00:05:51,749 --> 00:05:50,080
a box about like this and inside they

120
00:05:54,550 --> 00:05:51,759
have some

121
00:05:56,070 --> 00:05:54,560
wire mesh to be able to climb on and

122
00:05:58,309 --> 00:05:56,080
they actually spend a lot of time

123
00:05:59,510 --> 00:05:58,319
running around the outside of the of the

124
00:06:01,909 --> 00:05:59,520
enclosure

125
00:06:03,029 --> 00:06:01,919
so they're able to grab a hole just fine

126
00:06:05,990 --> 00:06:03,039
and they

127
00:06:09,350 --> 00:06:06,000
acclimate they have acclimated very well

128
00:06:12,469 --> 00:06:09,360
to uh to zero g uh and they do very well

129
00:06:16,230 --> 00:06:12,479
uh acting like uh like rodents do often

130
00:06:17,909 --> 00:06:16,240
just mostly running around on their own

131
00:06:21,670 --> 00:06:17,919
and interacting with one another as they

132
00:06:21,680 --> 00:06:25,430
jasmine gable eighth grade

133
00:06:33,270 --> 00:06:27,670
how long does it take to notice the loss

134
00:06:36,469 --> 00:06:35,029
well you go through an adaptation the

135
00:06:38,390 --> 00:06:36,479
first several days you're up here

136
00:06:41,270 --> 00:06:38,400
getting used to weightlessness and you

137
00:06:43,430 --> 00:06:41,280
um your your whole body goes through a

138
00:06:46,230 --> 00:06:43,440

little uh adjustment for example our

139
00:06:49,430 --> 00:06:46,240
spine stretches out so you might have a

140
00:06:51,110 --> 00:06:49,440
minor back ache your leg muscles are not

141
00:06:53,029 --> 00:06:51,120
being exercised the way they are in the

142
00:06:53,990 --> 00:06:53,039
ground just supporting their own body so

143
00:06:56,070 --> 00:06:54,000
they

144
00:06:59,110 --> 00:06:56,080
might get a little bit uncomfortable

145
00:07:01,430 --> 00:06:59,120
however we we exercise up here every day

146
00:07:03,189 --> 00:07:01,440
and over uh all the first two weeks or

147
00:07:05,189 --> 00:07:03,199
so you acclimate you go through that

148
00:07:07,350 --> 00:07:05,199
initial acclimation and then exercising

149
00:07:08,309 --> 00:07:07,360
every day we maintain our bone muscle

150
00:07:10,309 --> 00:07:08,319
and our

151
00:07:11,430 --> 00:07:10,319
bone and muscle strength

152
00:07:13,589 --> 00:07:11,440
uh so

153
00:07:15,510 --> 00:07:13,599
other than the acclimation to zero g you

154
00:07:18,150 --> 00:07:15,520
really don't notice it until after the

155
00:07:19,350 --> 00:07:18,160
flight when that we measure

156
00:07:23,350 --> 00:07:19,360
our

157
00:07:25,350 --> 00:07:23,360
bone density we've developed

158
00:07:27,830 --> 00:07:25,360
countermeasures over the years

159
00:07:30,150 --> 00:07:27,840
which will help mitigate the loss of

160
00:07:31,830 --> 00:07:30,160
both muscle and bone and those

161
00:07:34,150 --> 00:07:31,840
mitigation efforts have been very

162
00:07:39,029 --> 00:07:34,160
effective so i'm hoping to get back and

163
00:07:39,039 --> 00:07:43,029

brock a bear 8th grade

164
00:07:49,749 --> 00:07:45,350
how are the mice in the rodent research

165
00:07:54,390 --> 00:07:52,150
uh they're given food bars which are

166
00:07:56,710 --> 00:07:54,400
introduced inside the habitat and they

167
00:07:59,670 --> 00:07:56,720
have access to it and

168
00:08:01,830 --> 00:07:59,680
they they just feed off the bar

169
00:08:03,749 --> 00:08:01,840
in a similar way they have access to

170
00:08:05,430 --> 00:08:03,759
water so they're able to drink water as

171
00:08:07,189 --> 00:08:05,440
they please

172
00:08:10,070 --> 00:08:07,199
and then there's a ventilation system in

173
00:08:12,070 --> 00:08:10,080
it to help keep the habitat clean

174
00:08:14,469 --> 00:08:12,080
however there is some maintenance

175
00:08:16,790 --> 00:08:14,479
required to keep it clean

176
00:08:19,110 --> 00:08:16,800
just from the waste products but overall

177
00:08:22,629 --> 00:08:19,120
it's a the habitat is performing very

178
00:08:22,639 --> 00:08:27,430
max wiley ninth grade

179
00:08:31,749 --> 00:08:29,430
have you been able to offset the loss of

180
00:08:35,190 --> 00:08:31,759
muscle and bone mass and microgravity by

181
00:08:40,149 --> 00:08:35,200
exercise with the machines you now have

182
00:08:45,430 --> 00:08:40,159
on the iss or is that also a goal of the

183
00:08:48,230 --> 00:08:46,230
well

184
00:08:51,670 --> 00:08:48,240
we have many goals in terms of

185
00:08:53,590 --> 00:08:51,680
continuing to understand the environment

186
00:08:54,550 --> 00:08:53,600
and the effects on the human body to

187
00:08:56,949 --> 00:08:54,560
include

188
00:08:59,430 --> 00:08:56,959

bone and muscle loss over the years

189
00:09:01,430 --> 00:08:59,440
we've upgraded the equipment on board

190
00:09:03,990 --> 00:09:01,440
which has greatly improved our

191
00:09:05,910 --> 00:09:04,000
performance and our ability to maintain

192
00:09:07,829 --> 00:09:05,920
both muscle and bone

193
00:09:09,750 --> 00:09:07,839
we have a new treadmill that came up

194
00:09:12,710 --> 00:09:09,760
actually it's not so new anymore it came

195
00:09:14,790 --> 00:09:12,720
up about seven years ago or so

196
00:09:16,230 --> 00:09:14,800
and it performs very well we use a

197
00:09:18,230 --> 00:09:16,240
harness

198
00:09:20,070 --> 00:09:18,240
with bungees to pull us down into the

199
00:09:21,269 --> 00:09:20,080
treadmill to produce the

200
00:09:23,670 --> 00:09:21,279
load

201
00:09:26,870 --> 00:09:23,680
that's equivalent to gravity on earth we

202
00:09:28,389 --> 00:09:26,880
also have a resistive exercise device

203
00:09:29,829 --> 00:09:28,399
which is the equivalent of a weight

204
00:09:32,150 --> 00:09:29,839
lifting machine

205
00:09:34,630 --> 00:09:32,160
and that was upgraded about eight years

206
00:09:37,190 --> 00:09:34,640
ago we call it the a red or the advanced

207
00:09:39,190 --> 00:09:37,200
resistive exercise device and it has

208
00:09:41,110 --> 00:09:39,200
done very well much better than the

209
00:09:43,910 --> 00:09:41,120
earlier equipment that we had on board

210
00:09:46,470 --> 00:09:43,920
it's more robust it allows you to

211
00:09:47,430 --> 00:09:46,480
to carry to pick up more load heavier

212
00:09:49,509 --> 00:09:47,440
load

213
00:09:52,070 --> 00:09:49,519

which is more equivalent to the exercise

214
00:09:53,990 --> 00:09:52,080
you might get on the ground so but we

215
00:09:55,030 --> 00:09:54,000
still have research to do we still have

216
00:09:56,310 --> 00:09:55,040
answers

217
00:09:58,949 --> 00:09:56,320
to find

218
00:10:00,790 --> 00:09:58,959
to questions that both we already know

219
00:10:02,790 --> 00:10:00,800
and as well as i'm sure there will be

220
00:10:04,389 --> 00:10:02,800
future questions that come up

221
00:10:07,430 --> 00:10:04,399
that identify things we don't yet

222
00:10:07,440 --> 00:10:12,150
travis shanks 10th grade

223
00:10:18,790 --> 00:10:13,990
have you had any issues with the rodent

224
00:10:23,590 --> 00:10:21,190
no actually the the research program has

225
00:10:25,910 --> 00:10:23,600
gone very very well the high the mice

226
00:10:27,829 --> 00:10:25,920
have stayed healthy uh we watched them

227
00:10:29,910 --> 00:10:27,839
very closely in fact there's a camera

228
00:10:32,389 --> 00:10:29,920
inside the habitat so the the flight

229
00:10:34,949 --> 00:10:32,399
control team on the ground in huntsville

230
00:10:37,430 --> 00:10:34,959
alabama can also watch them

231
00:10:39,030 --> 00:10:37,440
we have sensors in there to keep

232
00:10:40,230 --> 00:10:39,040
track of the environment that they're

233
00:10:41,990 --> 00:10:40,240
living in

234
00:10:43,590 --> 00:10:42,000
and they have stayed very very healthy

235
00:10:45,350 --> 00:10:43,600
very lively

236
00:10:47,430 --> 00:10:45,360
and have supported the research program

237
00:10:49,990 --> 00:10:47,440
very well so no no issues really to

238
00:10:50,000 --> 00:10:54,150

blake martin fifth grade

239
00:11:00,790 --> 00:10:56,150
what is your favorite thing to do in

240
00:11:05,910 --> 00:11:02,949
well my favorite thing of course is to

241
00:11:07,590 --> 00:11:05,920
uh is to enjoy a weightless environment

242
00:11:10,630 --> 00:11:07,600
and to be able to do all those things

243
00:11:13,190 --> 00:11:10,640
that you can do as you might imagine uh

244
00:11:15,829 --> 00:11:13,200
without gravity so that's a lot of fun

245
00:11:18,310 --> 00:11:15,839
just uh with our you know with the the

246
00:11:21,030 --> 00:11:18,320
stuff that we have uh of course it can

247
00:11:22,550 --> 00:11:21,040
be a challenge too because everything

248
00:11:25,509 --> 00:11:22,560
i've got a little piece of velcro in

249
00:11:28,630 --> 00:11:25,519
this food package uh anything that's not

250
00:11:30,470 --> 00:11:28,640
attached to the wall or or isn't tied

251
00:11:32,790 --> 00:11:30,480
down somehow we'll drift away and float

252
00:11:35,269 --> 00:11:32,800
away so we're losing things all the time

253
00:11:36,870 --> 00:11:35,279
but eventually they're found one of my

254
00:11:38,949 --> 00:11:36,880
favorite things of course is to get in

255
00:11:41,350 --> 00:11:38,959
the window and view the earth and to

256
00:11:43,829 --> 00:11:41,360
take photography and this is an example

257
00:11:46,470 --> 00:11:43,839
of one of the cameras and a large lens

258
00:11:48,069 --> 00:11:46,480
this is a 400 millimeter lens

259
00:11:49,910 --> 00:11:48,079
and much of the photography which you

260
00:11:51,590 --> 00:11:49,920
might have seen that we've sent down is

261
00:11:52,389 --> 00:11:51,600
taken with the lens like this we also

262
00:11:54,150 --> 00:11:52,399
have

263
00:11:56,150 --> 00:11:54,160

wide angle lenses and then lenses in

264
00:11:58,550 --> 00:11:56,160
between and we even have one that's a

265
00:12:00,790 --> 00:11:58,560
bigger than this one an 800 millimeter

266
00:12:03,030 --> 00:12:00,800
lens so that becomes one of my favorite

267
00:12:04,389 --> 00:12:03,040
things to do up here is take pictures

268
00:12:06,870 --> 00:12:04,399
out the window

269
00:12:08,470 --> 00:12:06,880
just to capture the experience for you

270
00:12:11,350 --> 00:12:08,480
and everybody else on the planet to be

271
00:12:15,829 --> 00:12:11,360
able to enjoy

272
00:12:19,509 --> 00:12:17,829
did you bring any mousetraps with you

273
00:12:24,550 --> 00:12:19,519
just in case the mice in the rodent

274
00:12:28,550 --> 00:12:26,710
among the crew we've joked about that

275
00:12:30,150 --> 00:12:28,560
wondering if a mouse got out if we'd

276
00:12:32,389 --> 00:12:30,160
ever be able to find him because there's

277
00:12:33,910 --> 00:12:32,399
lots of nooks and crannies up here

278
00:12:35,910 --> 00:12:33,920
eventually we could probably lure him

279
00:12:38,550 --> 00:12:35,920
out with a little bit of food

280
00:12:41,190 --> 00:12:38,560
but the procedures that we have make it

281
00:12:44,310 --> 00:12:41,200
very very unlikely that a mouse could

282
00:12:46,470 --> 00:12:44,320
ever get out we they're always contained

283
00:12:48,310 --> 00:12:46,480
even when they're transferred from the

284
00:12:50,710 --> 00:12:48,320
habitat into the

285
00:12:51,430 --> 00:12:50,720
the work volume that we do the studies

286
00:12:58,790 --> 00:12:51,440
in

287
00:13:00,310 --> 00:12:58,800
from the habitat to the to the glove box

288
00:13:02,629 --> 00:13:00,320

so they're always contained we always

289
00:13:03,990 --> 00:13:02,639
have controls to make sure that they

290
00:13:05,829 --> 00:13:04,000
don't get away

291
00:13:09,190 --> 00:13:05,839
it would be very tough to find a mouse

292
00:13:14,069 --> 00:13:09,200
on board the space station i'm sure

293
00:13:22,949 --> 00:13:16,230
how do you know where to land when you

294
00:13:29,350 --> 00:13:25,030
i missed part of the question how do i

295
00:13:36,629 --> 00:13:30,150
how

296
00:13:41,269 --> 00:13:39,030
that's a great question

297
00:13:43,269 --> 00:13:41,279
actually the the flight control team in

298
00:13:45,430 --> 00:13:43,279
moscow the russian flight control team

299
00:13:48,150 --> 00:13:45,440
they do all the planning

300
00:13:49,350 --> 00:13:48,160
for the for all of the soyuz operations

301
00:13:51,350 --> 00:13:49,360
to include

302
00:13:54,310 --> 00:13:51,360
undocking from the space station and

303
00:13:56,629 --> 00:13:54,320
landing we land in a very specific area

304
00:13:58,870 --> 00:13:56,639
in central kazakhstan which is halfway

305
00:14:00,710 --> 00:13:58,880
around the world from where you are i

306
00:14:03,189 --> 00:14:00,720
say in the middle of nowhere because

307
00:14:05,350 --> 00:14:03,199
when in the landing site there's nothing

308
00:14:09,189 --> 00:14:05,360
as far as you can see in every direction

309
00:14:10,550 --> 00:14:09,199
except just flat fields open fields

310
00:14:12,710 --> 00:14:10,560
but they uh

311
00:14:16,230 --> 00:14:12,720
find out exactly when we fight need to

312
00:14:17,990 --> 00:14:16,240
fire the main engine of the soyuz we

313
00:14:20,710 --> 00:14:18,000

burn the main engine for a little over

314
00:14:22,710 --> 00:14:20,720
four minutes flying backwards so that we

315
00:14:24,710 --> 00:14:22,720
slow down we start that burn when we're

316
00:14:25,829 --> 00:14:24,720
flying over the southern tip of south

317
00:14:28,470 --> 00:14:25,839
america

318
00:14:31,030 --> 00:14:28,480
so that we will re-enter the atmosphere

319
00:14:33,509 --> 00:14:31,040
and then have the parachute open so that

320
00:14:34,790 --> 00:14:33,519
we end up right over central kazakhstan

321
00:14:36,790 --> 00:14:34,800
so we

322
00:14:39,590 --> 00:14:36,800
fire the engine over south america we

323
00:14:42,069 --> 00:14:39,600
fly across northern africa across the

324
00:14:43,750 --> 00:14:42,079
eastern part of the mediterranean sea

325
00:14:45,509 --> 00:14:43,760
across turkey

326
00:14:47,509 --> 00:14:45,519
then the parachute opens a little bit

327
00:14:49,430 --> 00:14:47,519
beyond that and we drift down and land

328
00:14:51,189 --> 00:14:49,440
in central kazakhstan it's all

329
00:14:52,550 --> 00:14:51,199
mathematics i know you're studying

330
00:14:54,949 --> 00:14:52,560
arithmetic

331
00:14:56,230 --> 00:14:54,959
and in advanced mathematics perhaps in

332
00:14:58,150 --> 00:14:56,240
high school

333
00:15:02,150 --> 00:14:58,160
that's what it takes to figure out how

334
00:15:02,160 --> 00:15:06,870
albert blair fifth grade

335
00:15:10,230 --> 00:15:08,710
what are you personally researching and

336
00:15:14,790 --> 00:15:10,240
what will be done with it when the

337
00:15:18,470 --> 00:15:16,550
we're doing a lot of different research

338
00:15:21,030 --> 00:15:18,480

on board every day just about we're

339
00:15:22,389 --> 00:15:21,040
doing some kind of an experiment and

340
00:15:24,550 --> 00:15:22,399
we on board

341
00:15:26,470 --> 00:15:24,560
we're not the researchers per se we're

342
00:15:28,470 --> 00:15:26,480
more like lab technicians so we will

343
00:15:31,430 --> 00:15:28,480
execute the experiment and we send the

344
00:15:33,430 --> 00:15:31,440
data that down to to earth

345
00:15:34,949 --> 00:15:33,440
where the the researchers for each

346
00:15:37,189 --> 00:15:34,959
experiment there's a team for each

347
00:15:39,749 --> 00:15:37,199
experiment and they take that data and

348
00:15:42,150 --> 00:15:39,759
they add that to to the data pool which

349
00:15:43,910 --> 00:15:42,160
might spread out over years

350
00:15:45,670 --> 00:15:43,920
to collect all the data to get the

351
00:15:47,189 --> 00:15:45,680
questions answered to their particular

352
00:15:49,110 --> 00:15:47,199
hypothesis

353
00:15:52,150 --> 00:15:49,120
uh the research that we do on board

354
00:15:54,310 --> 00:15:52,160
covers the whole spectrum of

355
00:15:55,670 --> 00:15:54,320
of science all the science topics that

356
00:15:58,790 --> 00:15:55,680
you can imagine

357
00:16:02,550 --> 00:15:58,800
material science fluid dynamics

358
00:16:05,509 --> 00:16:02,560
plant growth cell growth dna

359
00:16:07,189 --> 00:16:05,519
rna studies but perhaps the bulk of the

360
00:16:09,189 --> 00:16:07,199
studies

361
00:16:11,430 --> 00:16:09,199
or much of the study and the study

362
00:16:13,910 --> 00:16:11,440
that's most interesting to me

363
00:16:16,710 --> 00:16:13,920

is the study of the human body like this

364
00:16:18,069 --> 00:16:16,720
morning i was doing ultrasound scans of

365
00:16:20,150 --> 00:16:18,079
the legs and

366
00:16:23,110 --> 00:16:20,160
of the muscles in my legs

367
00:16:25,590 --> 00:16:23,120
trying to understand again uh the um the

368
00:16:27,829 --> 00:16:25,600
impact on the muscle muscle strength uh

369
00:16:31,110 --> 00:16:27,839
using our exercise protocol that we have

370
00:16:33,350 --> 00:16:31,120
on board so i see the data uh it might

371
00:16:35,670 --> 00:16:33,360
be years before i see the results but

372
00:16:38,949 --> 00:16:35,680
but very very interesting science we're

373
00:16:38,959 --> 00:16:42,389
macy miller fourth grade

374
00:16:50,870 --> 00:16:44,629
are they trying to find a way to put

375
00:16:56,870 --> 00:16:54,150
uh well the moon and sometimes we talk

376
00:16:59,030 --> 00:16:56,880
about mars the moon and the mars do not

377
00:17:00,550 --> 00:16:59,040
have an atmosphere that will support

378
00:17:02,150 --> 00:17:00,560
life in fact the moon doesn't have an

379
00:17:05,029 --> 00:17:02,160
atmosphere at all

380
00:17:07,029 --> 00:17:05,039
there's no ready source of

381
00:17:08,789 --> 00:17:07,039
of water

382
00:17:09,590 --> 00:17:08,799
there's no food

383
00:17:11,189 --> 00:17:09,600
there's

384
00:17:14,150 --> 00:17:11,199
none of the other things that it takes

385
00:17:16,549 --> 00:17:14,160
to support life for people and that's

386
00:17:18,309 --> 00:17:16,559
also true for animals so if we were

387
00:17:21,350 --> 00:17:18,319
going to take an animal to the moon for

388
00:17:23,750 --> 00:17:21,360

example a pet or any kind of an animal

389
00:17:27,029 --> 00:17:23,760
we would have to take everything that

390
00:17:29,590 --> 00:17:27,039
that animal needs to support its life to

391
00:17:31,669 --> 00:17:29,600
include a habitat just like this space

392
00:17:35,270 --> 00:17:31,679
station is for us

393
00:17:36,870 --> 00:17:35,280
and the to take an atmosphere

394
00:17:39,350 --> 00:17:36,880
and the equipment to maintain the

395
00:17:41,029 --> 00:17:39,360
atmosphere to remove the carbon dioxide

396
00:17:43,510 --> 00:17:41,039
to add oxygen

397
00:17:44,870 --> 00:17:43,520
to maintain a healthy atmosphere free of

398
00:17:46,870 --> 00:17:44,880
contaminants

399
00:17:49,270 --> 00:17:46,880
to remove the humidity

400
00:17:51,909 --> 00:17:49,280
and all of the food and water necessary

401
00:17:53,590 --> 00:17:51,919
so theoretically it's possible

402
00:17:57,110 --> 00:17:53,600
but we'll have to take all the support

403
00:18:02,789 --> 00:18:01,029
brooklyn pettit fifth grade

404
00:18:07,110 --> 00:18:02,799
what kind of training do you need to do

405
00:18:12,630 --> 00:18:09,510
oh my goodness the training goes on for

406
00:18:14,789 --> 00:18:12,640
years up here in fact it used to take

407
00:18:17,029 --> 00:18:14,799
about four years to prepare for a flight

408
00:18:19,270 --> 00:18:17,039
like this now we've gotten it down to

409
00:18:21,590 --> 00:18:19,280
about two and a half years or so with

410
00:18:23,990 --> 00:18:21,600
through efficiencies but it covers the

411
00:18:25,590 --> 00:18:24,000
whole spectrum we have to understand all

412
00:18:27,430 --> 00:18:25,600
of the systems on the international

413
00:18:28,470 --> 00:18:27,440

space station as well as the soyuz

414
00:18:30,470 --> 00:18:28,480
spacecraft

415
00:18:32,470 --> 00:18:30,480
we have to understand how to repair it

416
00:18:35,590 --> 00:18:32,480
when it breaks and and we have repair

417
00:18:38,230 --> 00:18:35,600
parts for all of the systems on board

418
00:18:39,669 --> 00:18:38,240
so maintenance and repair

419
00:18:43,190 --> 00:18:39,679
we have to

420
00:18:45,029 --> 00:18:43,200
train for to respond for emergencies we

421
00:18:46,870 --> 00:18:45,039
have to train for all of the science

422
00:18:49,590 --> 00:18:46,880
experiments that that we've already

423
00:18:51,990 --> 00:18:49,600
talked about and and many more

424
00:18:53,029 --> 00:18:52,000
we train we

425
00:18:56,870 --> 00:18:53,039
don't

426
00:18:59,029 --> 00:18:56,880
often have a doctor on board the crew so

427
00:19:00,870 --> 00:18:59,039
many of us have medical training so that

428
00:19:02,870 --> 00:19:00,880
if we have an emergency a medical

429
00:19:04,230 --> 00:19:02,880
emergency or a medical problem even a

430
00:19:05,270 --> 00:19:04,240
non-emergency

431
00:19:07,590 --> 00:19:05,280
we can

432
00:19:08,710 --> 00:19:07,600
respond to that emergency or treat that

433
00:19:09,830 --> 00:19:08,720
medical

434
00:19:12,549 --> 00:19:09,840
issue

435
00:19:14,549 --> 00:19:12,559
so we have all of the equipment that

436
00:19:16,630 --> 00:19:14,559
that you might imagine in a small

437
00:19:18,870 --> 00:19:16,640
emergency room

438
00:19:21,029 --> 00:19:18,880

and and then there's many other things

439
00:19:22,630 --> 00:19:21,039
all the other functions we can't call

440
00:19:25,190 --> 00:19:22,640
down the street and get an electrician

441
00:19:27,590 --> 00:19:25,200
or a plumber for example to come and fix

442
00:19:29,430 --> 00:19:27,600
something so we need the training for

443
00:19:31,669 --> 00:19:29,440
that as well and then there are many

444
00:19:34,549 --> 00:19:31,679
more topics that also we spend time

445
00:19:41,270 --> 00:19:36,150
jeff our last question is going to come

446
00:19:46,230 --> 00:19:43,750
what is one of the main projects our

447
00:19:51,510 --> 00:19:46,240
most impressed important projects you

448
00:19:55,110 --> 00:19:53,270
well from my point of view in the in

449
00:19:57,190 --> 00:19:55,120
terms of categories one of the main

450
00:19:59,590 --> 00:19:57,200
things that we're studying that's very

451
00:20:01,990 --> 00:19:59,600
important for future space exploration

452
00:20:03,909 --> 00:20:02,000
is what i've alluded to already the

453
00:20:05,990 --> 00:20:03,919
impacts on the human body in a

454
00:20:08,310 --> 00:20:06,000
weightless environment so that we can

455
00:20:10,149 --> 00:20:08,320
mitigate those impacts fully understand

456
00:20:11,029 --> 00:20:10,159
them and be prepared to leave earth

457
00:20:13,270 --> 00:20:11,039
orbit

458
00:20:14,230 --> 00:20:13,280
to another destination for a long period

459
00:20:16,950 --> 00:20:14,240
of time

460
00:20:19,430 --> 00:20:16,960
we've talked a lot about muscle and bone

461
00:20:21,270 --> 00:20:19,440
we also have an issue with eyesight some

462
00:20:23,990 --> 00:20:21,280
people have been impacted with their

463
00:20:26,149 --> 00:20:24,000

visual acuity we don't fully understand

464
00:20:28,630 --> 00:20:26,159
that so we're doing some studies to uh

465
00:20:30,870 --> 00:20:28,640
to try to understand that to try to come

466
00:20:32,950 --> 00:20:30,880
up with some answers to mitigate that so

467
00:20:35,750 --> 00:20:32,960
study of the human body is probably the

468
00:20:37,510 --> 00:20:35,760
most significant from my point of view

469
00:20:39,510 --> 00:20:37,520
because it's going to support future

470
00:20:43,110 --> 00:20:39,520
exploration in

471
00:20:46,950 --> 00:20:44,870
jeff that concludes it we'd like to

472
00:20:49,190 --> 00:20:46,960
thank you and nasa for continuing to do

473
00:20:51,430 --> 00:20:49,200
outreach like this it helps to inspire

474
00:20:52,870 --> 00:20:51,440
our next generation of scientists

475
00:20:54,789 --> 00:20:52,880
godspeed and we look forward to having

476
00:20:58,549 --> 00:20:54,799
you back on the having your feet back on

477
00:21:02,390 --> 00:21:00,230
thank you very much and thank you for

478
00:21:05,270 --> 00:21:02,400
your enthusiastic support i hope you're

479
00:21:06,870 --> 00:21:05,280
able to to follow along to see some of

480
00:21:09,669 --> 00:21:06,880
the photography and video that we're

481
00:21:11,830 --> 00:21:09,679
sending down and maybe see us fly over

482
00:21:14,710 --> 00:21:11,840
once in a while i know just this morning

483
00:21:17,110 --> 00:21:14,720
we flew over northern wisconsin

484
00:21:18,789 --> 00:21:17,120
and uh and i knew today was our

485
00:21:21,669 --> 00:21:18,799
conference was coming up today so that

486
00:21:22,630 --> 00:21:21,679
was a great uh timing for that passover

487
00:21:45,029 --> 00:21:22,640
i

488
00:21:45,039 --> 00:21:48,390

thank you very much

489
00:21:51,990 --> 00:21:49,990
and thank you to all the participants

490
00:21:53,350 --> 00:21:52,000
and guests at winter wisconsin school

491
00:21:55,110 --> 00:21:53,360
district you all had some great

492
00:21:57,750 --> 00:21:55,120
questions and we really enjoy listening

493
00:21:59,990 --> 00:21:57,760
to them here in mission control station