1
00:00:07,829 --> 00:00:05,510
it's a very extraordinary day for us

2
00:00:10,070 --> 00:00:07,839
here at winter school not only will our

3
00:00:12,870 --> 00:00:10,080
students have the opportunity

4
00:00:15,589 --> 00:00:12,880
to ask questions of the astronauts

5
00:00:18,230 --> 00:00:15,599
at the international space station

6
00:00:20,630 --> 00:00:18,240
but we will also have the opportunity to

7
00:00:21,990 --> 00:00:20,640
connect with a former winter high school

8
00:00:24,470 --> 00:00:22,000
graduate

9
00:00:26,470 --> 00:00:24,480
jeff williams who is the son of eunice

10
00:00:27,589 --> 00:00:26,480
and jake williams who are here with us

11
00:00:30,230 --> 00:00:27,599
today

12
00:00:31,910 --> 00:00:30,240
is an astronaut with nasa and he

13
00:00:33,590 --> 00:00:31,920

graduated from winter high school in

14
00:00:36,069 --> 00:00:33,600
1976

15
00:00:38,549 --> 00:00:36,079
so we're very excited to have him share

16
00:00:40,709 --> 00:00:38,559
a little bit of his career which started

17
00:00:41,990 --> 00:00:40,719
with his education right here in winter

18
00:00:43,910 --> 00:00:42,000
school

19
00:00:45,990 --> 00:00:43,920
so our students are ready for their

20
00:00:48,950 --> 00:00:46,000
questions we're ready to begin i would

21
00:00:51,350 --> 00:00:48,960
like to invite mr zap up he is going to

22
00:00:57,110 --> 00:00:51,360
introduce the students as they prepare

23
00:01:02,549 --> 00:01:00,069
thank you dr boilo

24
00:01:04,789 --> 00:01:02,559
and in the interest of time we're going

25
00:01:06,950 --> 00:01:04,799
to get right to the questions can i

26
00:01:11,270 --> 00:01:06,960
bring our first ask her up she is a

27
00:01:15,190 --> 00:01:13,109
this question is for jeff

28
00:01:20,230 --> 00:01:15,200
how is carbon dioxide removed from the

29
00:01:23,670 --> 00:01:21,749
liz that's a great question because you

30
00:01:25,670 --> 00:01:23,680
know we live in an enclosed environment

31
00:01:28,070 --> 00:01:25,680
here and every time we exhale we exhale

32
00:01:29,830 --> 00:01:28,080
carbon dioxide so we have to remove it

33
00:01:32,630 --> 00:01:29,840
in order to maintain a healthy

34
00:01:35,190 --> 00:01:32,640
atmosphere we have two uh machines you

35
00:01:36,950 --> 00:01:35,200
could say or two things on board that

36
00:01:38,550 --> 00:01:36,960
scrub the air and they run the air

37
00:01:41,030 --> 00:01:38,560
basically through it one in the russian

38
00:01:42,950 --> 00:01:41,040

segment and one in the u.s segment

39
00:01:45,270 --> 00:01:42,960
and there's a chemical

40
00:01:47,670 --> 00:01:45,280
absorbent bed inside that machine that

41
00:01:48,950 --> 00:01:47,680
takes out the co2 as the air

42
00:02:05,109 --> 00:01:48,960
flows through it and that's how we

43
00:02:09,430 --> 00:02:06,789
thank you jeff

44
00:02:15,110 --> 00:02:09,440
our next asker is an 8th grade student

45
00:02:23,110 --> 00:02:17,350
this question is for suici

46
00:02:27,830 --> 00:02:25,589
hello brianna uh that's a great question

47
00:02:29,990 --> 00:02:27,840
uh sure i'd like to go to mars and the

48
00:02:32,869 --> 00:02:30,000
moon may be a fun place but the the

49
00:02:35,270 --> 00:02:32,879
planet i want to go to right now is the

50
00:02:37,670 --> 00:02:35,280
earth actually i'm looking at the earth

51
00:02:39,990 --> 00:02:37,680
every day it's just a beautiful place

52
00:02:41,030 --> 00:02:40,000
and you guys are lucky to be there

53
00:02:42,949 --> 00:02:41,040
actually

54
00:02:45,830 --> 00:02:42,959
i'm i will be here for six months i'll

55
00:02:59,830 --> 00:02:45,840
be now uh wanting to go back to

56
00:03:04,949 --> 00:03:02,390
thank you so we t our next question is

57
00:03:13,110 --> 00:03:04,959
from an 11th grader at lco ojibwa school

58
00:03:16,550 --> 00:03:14,790
this question is for jeff

59
00:03:22,070 --> 00:03:16,560
could you please explain what handheld

60
00:03:25,509 --> 00:03:23,750
well it's a very technical term it

61
00:03:27,350 --> 00:03:25,519
sounds technical but it's actually very

62
00:03:29,270 --> 00:03:27,360
simple if you were to for example be at

63
00:03:31,190 --> 00:03:29,280

a race track watching a race car go by

64
00:03:33,110 --> 00:03:31,200
and trying to take a picture of it you

65
00:03:34,869 --> 00:03:33,120
would track the race car with your

66
00:03:37,430 --> 00:03:34,879
camera so that it didn't end up being

67
00:03:38,710 --> 00:03:37,440
blurred on the uh on the image now the

68
00:03:40,309 --> 00:03:38,720
background might be blurred because

69
00:03:41,350 --> 00:03:40,319
you're you're panning across the the

70
00:03:43,670 --> 00:03:41,360
background

71
00:03:45,750 --> 00:03:43,680
but you'd get a clear picture of the of

72
00:03:48,149 --> 00:03:45,760
the race car we do the same thing

73
00:03:50,630 --> 00:03:48,159
because we're going 17 500 miles around

74
00:03:51,830 --> 00:03:50,640
the earth we're 220 miles above the

75
00:03:53,830 --> 00:03:51,840
earth's surface

76
00:03:56,390 --> 00:03:53,840
but the surface of the earth is moving

77
00:03:58,309 --> 00:03:56,400
fairly rapidly by the window so if we're

78
00:03:59,910 --> 00:03:58,319
using a camera like this and this is one

79
00:04:01,910 --> 00:03:59,920
we typically use it's got an 800

80
00:04:03,830 --> 00:04:01,920
millimeter lens all we do is look

81
00:04:05,350 --> 00:04:03,840
through the viewfinder uh track the

82
00:04:07,910 --> 00:04:05,360
object on the earth that we want to take

83
00:04:10,309 --> 00:04:07,920
pictures of and simply move the camera

84
00:04:11,990 --> 00:04:10,319
and that's uh what that it sounds like a

85
00:04:25,590 --> 00:04:12,000
very complicated term but but it's

86
00:04:29,110 --> 00:04:26,870
thank you jeff

87
00:04:34,469 --> 00:04:29,120
our next question to ask her is a senior

88
00:04:37,749 --> 00:04:36,150

this question is for jeff

89
00:04:39,590 --> 00:04:37,759
the handheld camera must take pictures

90
00:04:41,110 --> 00:04:39,600
through four panes of material why isn't

91
00:04:42,469 --> 00:04:41,120
there a camera outside the cabin that is

92
00:04:47,830 --> 00:04:42,479
remote controlled so there would be even

93
00:04:51,270 --> 00:04:49,670
well actually we do have video cameras

94
00:04:54,230 --> 00:04:51,280
outside we use those for robotic

95
00:04:56,870 --> 00:04:54,240
operations for following

96
00:04:58,310 --> 00:04:56,880
space walks for approaching

97
00:05:01,029 --> 00:04:58,320
vehicles like the space shuttle or the

98
00:05:02,710 --> 00:05:01,039
soyuz or progress cargo ship

99
00:05:04,310 --> 00:05:02,720
but you're right we don't as a rule have

100
00:05:05,990 --> 00:05:04,320
a still camera out there we take all of

101
00:05:08,310 --> 00:05:06,000
the still photography through the

102
00:05:10,230 --> 00:05:08,320
windows the windows are thick and as you

103
00:05:12,790 --> 00:05:10,240
said there are multiple panes but

104
00:05:14,950 --> 00:05:12,800
they're very high quality glass so even

105
00:05:16,870 --> 00:05:14,960
with the lens this big we don't get a

106
00:05:18,150 --> 00:05:16,880
whole lot of distortion in the imagery

107
00:05:20,310 --> 00:05:18,160
and i'm sure you've seen some of the

108
00:05:22,230 --> 00:05:20,320
imagery taken by astronauts from the

109
00:05:24,390 --> 00:05:22,240
space station and it's actually very

110
00:05:27,029 --> 00:05:24,400
clear and you can actually pick out the

111
00:05:28,870 --> 00:05:27,039
streets in in winter there and the

112
00:05:30,310 --> 00:05:28,880
school building that you're sitting in

113
00:05:43,110 --> 00:05:30,320

and the pictures that we take with this

114
00:05:46,469 --> 00:05:44,629
thanks jeff

115
00:05:47,990 --> 00:05:46,479
our next question is going to be asked

116
00:05:53,029 --> 00:05:48,000
by an 8th grade student here at winter

117
00:06:02,390 --> 00:05:55,830
this question is for tj has any space

118
00:06:05,749 --> 00:06:04,230
that's a not only an important question

119
00:06:06,870 --> 00:06:05,759
but also a bit of a tough question for

120
00:06:10,390 --> 00:06:06,880
us

121
00:06:13,029 --> 00:06:10,400
to the best of my awareness nothing

122
00:06:15,670 --> 00:06:13,039
huge nothing sizable has ever hit the

123
00:06:18,390 --> 00:06:15,680
station we do see some indications on

124
00:06:20,710 --> 00:06:18,400
our windows of tiny little pock marks so

125
00:06:22,870 --> 00:06:20,720
maybe some of the micro meteorite little

126
00:06:24,790 --> 00:06:22,880
visitors have come by and glanced off of

127
00:06:26,629 --> 00:06:24,800
us but since i mentioned that let me

128
00:06:28,390 --> 00:06:26,639
share two other thoughts

129
00:06:30,870 --> 00:06:28,400
we do have a little bit of shielding on

130
00:06:32,870 --> 00:06:30,880
our space station so that

131
00:06:34,629 --> 00:06:32,880
the micrometeorites if they hit us

132
00:06:36,469 --> 00:06:34,639
basically vaporize and don't do any

133
00:06:38,150 --> 00:06:36,479
damage and the second thing i'll tell

134
00:06:39,189 --> 00:06:38,160
you is if something sizeable is coming

135
00:06:41,350 --> 00:06:39,199
towards us

136
00:06:43,430 --> 00:06:41,360
we have radar systems around the world

137
00:06:45,029 --> 00:06:43,440
that track these these larger objects

138
00:06:46,950 --> 00:06:45,039

and if it gets looks like it's gonna be

139
00:06:50,629 --> 00:06:46,960
getting close enough to us

140
00:06:53,189 --> 00:06:50,639
we actually go into a a procedure a a

141
00:06:55,270 --> 00:06:53,199
a an action where we all go sit in our

142
00:06:57,270 --> 00:06:55,280
lifeboats and ready to immediately

143
00:06:59,270 --> 00:06:57,280
depart should something bad happen to

144
00:07:13,909 --> 00:06:59,280
the space station so we have ways of

145
00:07:18,230 --> 00:07:16,070
thanks tj our next question will be

146
00:07:23,430 --> 00:07:18,240
asked by a senior here at winter mr ryan

147
00:07:27,510 --> 00:07:25,510
this question is for suici

148
00:07:32,309 --> 00:07:27,520
how do you find the mass of an object at

149
00:07:36,390 --> 00:07:34,230
hey ryan that's a great questions uh

150
00:07:38,469 --> 00:07:36,400
it's a great question i like to do a

151
00:07:40,230 --> 00:07:38,479
small demonstration we have a winter

152
00:07:41,350 --> 00:07:40,240
high school graduate here we volunteered

153
00:07:44,070 --> 00:07:41,360
to help me

154
00:07:46,070 --> 00:07:44,080
here we have a water bag weighs about 90

155
00:07:48,309 --> 00:07:46,080
pounds on the ground of course here it's

156
00:07:51,510 --> 00:07:48,319
zero gravity it's like a feather but

157
00:07:52,469 --> 00:07:51,520
using the two uh springs and you can

158
00:07:53,830 --> 00:07:52,479
measure

159
00:07:56,469 --> 00:07:53,840
just like this

160
00:07:58,869 --> 00:07:56,479
measure the timing between this uh up

161
00:08:01,270 --> 00:07:58,879
position and down position with the

162
00:08:04,629 --> 00:08:01,280
known spring conditions we can get the

163
00:08:20,950 --> 00:08:04,639

mass by equation so uh this is the way

164
00:08:20,960 --> 00:08:25,990
thank you

165
00:08:29,909 --> 00:08:28,070
our next question will be asked by a 9th

166
00:08:36,389 --> 00:08:29,919
grade student here at winter mr devin

167
00:08:40,870 --> 00:08:38,870
this question is for tj have you ever

168
00:08:45,910 --> 00:08:40,880
had any technical difficulties on the

169
00:08:50,550 --> 00:08:48,230
thanks devin um yeah from time to time

170
00:08:52,550 --> 00:08:50,560
we do but the nice thing is our systems

171
00:08:54,550 --> 00:08:52,560
have redundancies

172
00:08:55,990 --> 00:08:54,560
for instance just the other day

173
00:08:58,230 --> 00:08:56,000
one of our two

174
00:08:59,910 --> 00:08:58,240
communication channels had a bit of a

175
00:09:01,190 --> 00:08:59,920
problem and we could hear the ground

176
00:09:02,150 --> 00:09:01,200
talking to us but the ground couldn't

177
00:09:04,389 --> 00:09:02,160
hear us

178
00:09:05,750 --> 00:09:04,399
so we swapped over to the second com

179
00:09:07,670 --> 00:09:05,760
channel while the ground worked on

180
00:09:09,110 --> 00:09:07,680
troubleshooting the the problem sure

181
00:09:12,150 --> 00:09:09,120
occasionally we have we have problems

182
00:09:13,750 --> 00:09:12,160
but we're not single string

183
00:09:15,110 --> 00:09:13,760
and such that one failure will take us

184
00:09:16,790 --> 00:09:15,120
out completely

185
00:09:18,150 --> 00:09:16,800
we use that redundancy to help us and

186
00:09:31,509 --> 00:09:18,160
get around the problem until we can fix

187
00:09:34,870 --> 00:09:32,949
thank you tj

188
00:09:36,470 --> 00:09:34,880

our next question will be asked by an

189
00:09:41,910 --> 00:09:36,480
11th grade student here at winter miss

190
00:09:46,470 --> 00:09:43,910
this question is for jeff

191
00:09:48,470 --> 00:09:46,480
is any research being done on long term

192
00:09:54,230 --> 00:09:48,480
space travel and the dangers of high

193
00:09:58,310 --> 00:09:56,389
well there's a lot of work that we

194
00:10:00,230 --> 00:09:58,320
do up here that

195
00:10:01,829 --> 00:10:00,240
will prepare us for

196
00:10:03,509 --> 00:10:01,839
leaving earth orbit for going back to

197
00:10:05,190 --> 00:10:03,519
the moon onto mars and whatnot one of

198
00:10:07,030 --> 00:10:05,200
the things as you point out that we're

199
00:10:09,590 --> 00:10:07,040
concerned about is a radiation

200
00:10:11,509 --> 00:10:09,600
protection we pretty much know about the

201
00:10:13,590 --> 00:10:11,519
what radiation can do and the damage

202
00:10:15,750 --> 00:10:13,600
that it can cause

203
00:10:16,870 --> 00:10:15,760
and we continually monitor the radiation

204
00:10:18,870 --> 00:10:16,880
environment here and there are

205
00:10:21,030 --> 00:10:18,880
scientists on the ground that predict

206
00:10:23,269 --> 00:10:21,040
higher levels of radiation for example

207
00:10:25,509 --> 00:10:23,279
from sun spots or whatnot and on

208
00:10:27,910 --> 00:10:25,519
occasion we will go to a portion of the

209
00:10:30,069 --> 00:10:27,920
space station that has more protection

210
00:10:31,750 --> 00:10:30,079
than other parts of the space station

211
00:10:34,310 --> 00:10:31,760
to protect us from that higher dose of

212
00:10:37,190 --> 00:10:34,320
radiation uh but again the uh the the

213
00:10:39,190 --> 00:10:37,200

big thing is protecting uh crews

214
00:10:41,910 --> 00:10:39,200
especially when we leave earth orbit and

215
00:10:44,790 --> 00:10:41,920
go to places like mars uh we're gonna

216
00:10:47,110 --> 00:10:44,800
have to uh have more protection there so

217
00:10:49,910 --> 00:10:47,120
yeah there is a lot of work going on

218
00:10:53,030 --> 00:10:49,920
on a broad spectrum of

219
00:10:55,670 --> 00:10:53,040
categories we are working to prepare

220
00:10:57,430 --> 00:10:55,680
for future space exploration onboard the

221
00:10:59,430 --> 00:10:57,440
international space station space

222
00:11:12,230 --> 00:10:59,440
station and that's just one topic that

223
00:11:16,069 --> 00:11:14,470
thank you jeff our next question will be

224
00:11:20,150 --> 00:11:16,079
asked by a senior here at winter miss

225
00:11:24,790 --> 00:11:22,630
this question is for jeff is time

226
00:11:30,230 --> 00:11:24,800
different on earth relative to the space

227
00:11:33,990 --> 00:11:31,590
well there's a couple ways to answer

228
00:11:36,069 --> 00:11:34,000
that if you were to uh to compare the

229
00:11:37,829 --> 00:11:36,079
time going on the on the clock you know

230
00:11:40,230 --> 00:11:37,839
watching the second hand go the seconds

231
00:11:41,670 --> 00:11:40,240
would pass at the same speed here as

232
00:11:44,230 --> 00:11:41,680
down there

233
00:11:46,470 --> 00:11:44,240
but subjectively we feel the passing of

234
00:11:48,790 --> 00:11:46,480
time differently up here you see the

235
00:11:50,389 --> 00:11:48,800
sunrise in the morning unless it's a

236
00:11:53,269 --> 00:11:50,399
cloudy day but you still see it get

237
00:11:54,470 --> 00:11:53,279
light and you see it get uh dark in the

238
00:11:56,230 --> 00:11:54,480

evening so

239
00:11:58,790 --> 00:11:56,240
there are a lot of cues on the earth

240
00:12:01,670 --> 00:11:58,800
when you're on the earth uh that tell

241
00:12:04,310 --> 00:12:01,680
you the passing of a day and we live our

242
00:12:06,470 --> 00:12:04,320
lives with that sense of time largely up

243
00:12:08,230 --> 00:12:06,480
here we don't have that as you know we

244
00:12:12,150 --> 00:12:08,240
go around the earth

245
00:12:14,790 --> 00:12:12,160
in 90 minutes 16 times a day so we can

246
00:12:18,629 --> 00:12:14,800
see lots of sunrises and sunsets

247
00:12:19,670 --> 00:12:18,639
so really we live on time according to

248
00:12:21,509 --> 00:12:19,680
our watch

249
00:12:23,430 --> 00:12:21,519
and the planners on the ground build a

250
00:12:25,509 --> 00:12:23,440
schedule for us we typically wake up at

251
00:12:27,750 --> 00:12:25,519
six o'clock in the morning and go to bed

252
00:12:29,670 --> 00:12:27,760
about 10 o'clock at night and the time

253
00:12:31,269 --> 00:12:29,680
zone that we use is greenwich mean time

254
00:12:32,870 --> 00:12:31,279
which of course is in

255
00:12:33,670 --> 00:12:32,880
england

256
00:12:35,350 --> 00:12:33,680
and

257
00:12:37,910 --> 00:12:35,360
occasionally will shift one way or

258
00:12:39,750 --> 00:12:37,920
another depending upon say a shuttle

259
00:12:41,670 --> 00:12:39,760
docking or a soyuz docking or a

260
00:12:44,389 --> 00:12:41,680
spacewalk or something like that but

261
00:12:46,629 --> 00:12:44,399
generally we live in the time for uh

262
00:12:48,470 --> 00:12:46,639
that is in england there's a couple

263
00:12:50,710 --> 00:12:48,480

reasons other reasons for that we work

264
00:12:52,389 --> 00:12:50,720
with the moscow mission control center

265
00:12:54,470 --> 00:12:52,399
as well as the houston mission control

266
00:12:56,949 --> 00:12:54,480
center and other mission control centers

267
00:12:59,110 --> 00:12:56,959
in japan and europe

268
00:13:01,190 --> 00:12:59,120
and that works out to be a convenient

269
00:13:14,790 --> 00:13:01,200
time for all of those locations around

270
00:13:17,829 --> 00:13:16,069
thank you sir

271
00:13:19,350 --> 00:13:17,839
our next question will be asked by an

272
00:13:23,350 --> 00:13:19,360
eighth grade student here miss veronica

273
00:13:31,910 --> 00:13:25,509
this question is for tj how long will

274
00:13:35,590 --> 00:13:34,069
that's a good question we keep asking

275
00:13:37,750 --> 00:13:35,600
that some people don't want me to come

276
00:13:38,629 --> 00:13:37,760
back they're happy that i'm gone

277
00:13:40,470 --> 00:13:38,639
um

278
00:13:42,150 --> 00:13:40,480
hey you know the the

279
00:13:43,750 --> 00:13:42,160
that's under debate i mean for me to

280
00:13:45,670 --> 00:13:43,760
give you a legal answer i i can't give

281
00:13:47,590 --> 00:13:45,680
you a number of days but it the maximum

282
00:13:49,030 --> 00:13:47,600
is somewhere between the uh

283
00:13:51,829 --> 00:13:49,040
i don't know just a little bit over a

284
00:13:54,150 --> 00:13:51,839
year and a half but before i

285
00:13:56,550 --> 00:13:54,160
answer that i should also tell you that

286
00:13:58,790 --> 00:13:56,560
the gentleman who's got the longest

287
00:14:00,710 --> 00:13:58,800
history or longest record of being in

288
00:14:03,110 --> 00:14:00,720

space was actually a russian that stayed

289
00:14:04,949 --> 00:14:03,120
over a year and and people are still

290
00:14:06,710 --> 00:14:04,959
gathering data on on how his bodies

291
00:14:08,310 --> 00:14:06,720
recover has been recovering over the

292
00:14:10,230 --> 00:14:08,320
over the years that he's since he's

293
00:14:11,590 --> 00:14:10,240
returned so to answer your question

294
00:14:14,069 --> 00:14:11,600
specifically about nasa it's a little

295
00:14:16,710 --> 00:14:14,079
bit over over a half a year and we're

296
00:14:28,829 --> 00:14:16,720
kind of targeting somewhere between 140

297
00:14:33,829 --> 00:14:32,310
missions thank you tj our next question

298
00:14:38,710 --> 00:14:33,839
will be asked by an 11th grade student

299
00:14:42,629 --> 00:14:40,790
this question is for suichi

300
00:14:48,389 --> 00:14:42,639
how would you escape the state space

301
00:14:53,990 --> 00:14:51,509
hey matthew uh yes uh like a big cruise

302
00:14:56,470 --> 00:14:54,000
ship we have a escape

303
00:14:58,870 --> 00:14:56,480
boat like a small tugboat attached to

304
00:15:01,030 --> 00:14:58,880
the space station right now we have five

305
00:15:04,310 --> 00:15:01,040
on board and we have a two escape

306
00:15:05,990 --> 00:15:04,320
vehicle each seat each vehicle has three

307
00:15:09,189 --> 00:15:06,000
seats so we don't have to fight for the

308
00:15:11,750 --> 00:15:09,199
seat actually and just in case i like

309
00:15:14,470 --> 00:15:11,760
emergency each of us has a designated

310
00:15:27,269 --> 00:15:14,480
seat in this escape vehicle and returned

311
00:15:30,389 --> 00:15:28,949
thank you suici

312
00:15:31,910 --> 00:15:30,399
our next question will be asked by an

313
00:15:34,949 --> 00:15:31,920

8th grade student here mr matthew

314
00:15:43,189 --> 00:15:36,870
this question is for jeff

315
00:15:47,829 --> 00:15:45,110
a good question matthew we actually have

316
00:15:49,670 --> 00:15:47,839
had several experiments uh involving

317
00:15:50,949 --> 00:15:49,680
plants to understand

318
00:15:52,790 --> 00:15:50,959
how they grow

319
00:15:54,710 --> 00:15:52,800
they grow actually pretty well they grow

320
00:15:56,389 --> 00:15:54,720
toward a light source so if you can have

321
00:15:58,150 --> 00:15:56,399
them upside down toward a light source

322
00:16:00,870 --> 00:15:58,160
and they'll grow upside down or sideways

323
00:16:02,790 --> 00:16:00,880
or or up toward the light source but i

324
00:16:04,710 --> 00:16:02,800
have an example

325
00:16:06,470 --> 00:16:04,720
right here of a plant experiment that we

326
00:16:07,910 --> 00:16:06,480
had as you know

327
00:16:09,189 --> 00:16:07,920
there are a lot of trees there around

328
00:16:11,990 --> 00:16:09,199
winter

329
00:16:15,749 --> 00:16:12,000
and in the north woods of wisconsin

330
00:16:17,030 --> 00:16:15,759
and trees generally grow up and

331
00:16:18,949 --> 00:16:17,040
when branches when there are big

332
00:16:20,710 --> 00:16:18,959
branches out hanging off the side of the

333
00:16:22,310 --> 00:16:20,720
tree they actually found that the wood

334
00:16:23,910 --> 00:16:22,320
is different on top of the branch than

335
00:16:26,870 --> 00:16:23,920
below the branch so we have a small

336
00:16:29,430 --> 00:16:26,880
willow tree here that we coiled up and

337
00:16:31,590 --> 00:16:29,440
let grow for a few weeks and then we we

338
00:16:34,150 --> 00:16:31,600

took samples and preserved the wood

339
00:16:35,910 --> 00:16:34,160
to see if we have the same effect

340
00:16:37,509 --> 00:16:35,920
because of a stress of bending on the

341
00:16:39,350 --> 00:16:37,519
wood so that's just one example at the

342
00:16:41,030 --> 00:16:39,360
other end of the space station in the

343
00:16:42,550 --> 00:16:41,040
russian segment we're growing wheat

344
00:16:43,350 --> 00:16:42,560
right now

345
00:16:45,110 --> 00:16:43,360
for

346
00:16:47,590 --> 00:16:45,120
many obvious reasons

347
00:16:49,829 --> 00:16:47,600
one is we would want to produce food if

348
00:16:51,350 --> 00:16:49,839
it became practical in the future for

349
00:17:03,269 --> 00:16:51,360
long duration space flight away from

350
00:17:05,990 --> 00:17:04,549
thank you jeff

351
00:17:07,590 --> 00:17:06,000
our next question will be asked by an

352
00:17:12,710 --> 00:17:07,600
11th grade student here at winter miss

353
00:17:18,150 --> 00:17:14,949
this question is for tj there is a

354
00:17:19,909 --> 00:17:18,160
research project called swab do you have

355
00:17:21,990 --> 00:17:19,919
the ability to study microscopic

356
00:17:30,070 --> 00:17:22,000
organisms in space or must all the

357
00:17:34,310 --> 00:17:31,830
thanks for that that wonderful question

358
00:17:36,310 --> 00:17:34,320
since we're in an enclosed vehicle

359
00:17:38,950 --> 00:17:36,320
there's a good chance that we can

360
00:17:40,150 --> 00:17:38,960
uh start getting microbes growing and we

361
00:17:41,270 --> 00:17:40,160
do in fact

362
00:17:44,150 --> 00:17:41,280
um

363
00:17:47,430 --> 00:17:44,160

the answer is best answered in two parts

364
00:17:49,669 --> 00:17:47,440
oftentimes and periodically we will take

365
00:17:51,669 --> 00:17:49,679
samples um of our environment around

366
00:17:53,590 --> 00:17:51,679
here and see what we can grow

367
00:17:55,830 --> 00:17:53,600
and then we report down to the ground

368
00:17:57,750 --> 00:17:55,840
how many colonies we have that that are

369
00:18:00,150 --> 00:17:57,760
growing together and what kind of

370
00:18:05,110 --> 00:18:00,160
colonies that they look like they are

371
00:18:06,870 --> 00:18:05,120
that's generally a gross estimate of how

372
00:18:09,029 --> 00:18:06,880
wonderful and how rich the microbes are

373
00:18:10,390 --> 00:18:09,039
on station which we don't always want

374
00:18:12,630 --> 00:18:10,400
the second part of the question the

375
00:18:14,549 --> 00:18:12,640
second part of the answer is there are

376
00:18:15,590 --> 00:18:14,559
samples that are specifically trying to

377
00:18:17,750 --> 00:18:15,600
target

378
00:18:19,669 --> 00:18:17,760
what is actually growing and after we

379
00:18:21,270 --> 00:18:19,679
take the samples and and we stop the

380
00:18:22,710 --> 00:18:21,280
growing process we can send those down

381
00:18:24,789 --> 00:18:22,720
for further study

382
00:18:39,190 --> 00:18:24,799
so we got we got both both halves of

383
00:18:44,070 --> 00:18:40,549
thank you tj

384
00:18:46,549 --> 00:18:44,950
oh

385
00:18:48,070 --> 00:18:46,559
i believe that was our last question

386
00:18:52,789 --> 00:18:48,080
jeff so i'm going to turn the microphone

387
00:18:56,390 --> 00:18:54,870
thank you everybody

388
00:18:57,669 --> 00:18:56,400

to all the students for our wonderful

389
00:19:00,549 --> 00:18:57,679
questions

390
00:19:03,110 --> 00:19:00,559
and jeff suici and tj thank you for the

391
00:19:09,270 --> 00:19:03,120
insightful answers what an educational

392
00:19:14,150 --> 00:19:11,190
we would like to wish jeff a happy

393
00:19:19,750 --> 00:19:14,160
birthday his birthday is january 19th so

394
00:19:19,760 --> 00:19:30,310
thank you

395
00:19:34,710 --> 00:19:32,870
so well wishes go out to you again thank

396
00:19:40,150 --> 00:19:34,720
you everybody for this wonderful

397
00:19:43,029 --> 00:19:41,510
thank you very much it was great to have

398
00:19:45,110 --> 00:19:43,039
you on board the international space

399
00:19:50,310 --> 00:19:45,120
station today and greetings to all my

400
00:19:53,430 --> 00:19:51,909
station this is houston acr that

401
00:19:55,029 --> 00:19:53,440
concludes the event

402
00:19:56,789 --> 00:19:55,039
thank you to all participants at winter