
PAO

1
00:00:04,630 --> 00:00:02,790
all right welcome everybody to the

2
00:00:06,789 --> 00:00:04,640
digital learning network here at nasa's

3
00:00:08,390 --> 00:00:06,799
johnson space center we have endeavour

4
00:00:10,549 --> 00:00:08,400
elementary school

5
00:00:12,150 --> 00:00:10,559
from cocoa florida they're actually

6
00:00:14,390 --> 00:00:12,160
going to be connecting to mission

7
00:00:16,550 --> 00:00:14,400
control the international space station

8
00:00:19,269 --> 00:00:16,560
flight control room now i'd like to

9
00:00:21,990 --> 00:00:19,279
introduce folks inside mission control

10
00:00:23,029 --> 00:00:22,000
we have public affairs officer pat ryan

11
00:00:25,990 --> 00:00:23,039
and

12
00:00:28,390 --> 00:00:26,000
miss laura beachy who is an ethos

13
00:00:29,750 --> 00:00:28,400

officer inside mission control so now

14
00:00:31,429 --> 00:00:29,760
let's go ahead and take away go ahead

15
00:00:33,590 --> 00:00:31,439
and miss control and talk to the

16
00:00:35,510 --> 00:00:33,600
students thank you michael uh i'm pat

17
00:00:37,190 --> 00:00:35,520
ryan with the public affairs office here

18
00:00:39,510 --> 00:00:37,200
at the johnson space center in houston

19
00:00:41,990 --> 00:00:39,520
and with me is laura beachy she is one

20
00:00:44,389 --> 00:00:42,000
of the ethos officers who is a member of

21
00:00:46,150 --> 00:00:44,399
the flight control team that is watching

22
00:00:48,549 --> 00:00:46,160
over the international space station as

23
00:00:50,869 --> 00:00:48,559
it flies laura explain quickly for us

24
00:00:52,869 --> 00:00:50,879
what an ethos officer does what parts of

25
00:00:54,709 --> 00:00:52,879
the station are you are you working with

26
00:00:57,270 --> 00:00:54,719
so i'm working with the environmental

27
00:00:58,950 --> 00:00:57,280
and thermal aspects we keep the space

28
00:01:00,950 --> 00:00:58,960
station at a

29
00:01:02,470 --> 00:01:00,960
certain pressure and temperature for

30
00:01:04,469 --> 00:01:02,480
crew comfort

31
00:01:06,630 --> 00:01:04,479
all of the equipment that's power

32
00:01:09,190 --> 00:01:06,640
generates heat so we have a water

33
00:01:11,190 --> 00:01:09,200
cooling system that takes the heat away

34
00:01:14,469 --> 00:01:11,200
from all of that equipment

35
00:01:16,469 --> 00:01:14,479
we manage iss emergencies if a fire were

36
00:01:18,070 --> 00:01:16,479
to occur on board or let's say we were

37
00:01:20,789 --> 00:01:18,080
to get hit by a piece of space debris

38
00:01:23,350 --> 00:01:20,799

and start losing pressure then we help

39
00:01:26,149 --> 00:01:23,360
the crew safe themselves and potentially

40
00:01:28,630 --> 00:01:26,159
try to isolate the leaking module we

41
00:01:30,870 --> 00:01:28,640
take care of if a toxic spill occurs we

42
00:01:31,910 --> 00:01:30,880
help lead the crew to safety and guide

43
00:01:33,990 --> 00:01:31,920
the team

44
00:01:36,469 --> 00:01:34,000
on the right steps to take to keep the

45
00:01:39,030 --> 00:01:36,479
crew and the vehicle safe

46
00:01:40,550 --> 00:01:39,040
we we provide for experiments that come

47
00:01:42,389 --> 00:01:40,560
out of marshall we provide them with

48
00:01:43,830 --> 00:01:42,399
smoke detection

49
00:01:44,870 --> 00:01:43,840
access to

50
00:01:46,710 --> 00:01:44,880
space

51
00:01:48,230 --> 00:01:46,720
for any experiments that want the vet to

52
00:01:50,230 --> 00:01:48,240
use the vacuum system

53
00:01:51,910 --> 00:01:50,240
um it's a really cool job and we get to

54
00:01:53,990 --> 00:01:51,920
do a lot of coordinating with our ips a

55
00:01:56,550 --> 00:01:54,000
lot of different places uh so there's a

56
00:01:58,870 --> 00:01:56,560
good idea of what laura does here and i

57
00:02:00,870 --> 00:01:58,880
think we're ready to take your questions

58
00:02:04,069 --> 00:02:00,880
when the astronauts breathe on the space

59
00:02:07,749 --> 00:02:06,149
a little louder

60
00:02:09,430 --> 00:02:07,759
i think your question was what happens

61
00:02:11,110 --> 00:02:09,440
to the carbon dioxide when the

62
00:02:12,630 --> 00:02:11,120
astronauts breathe on the station but

63
00:02:14,309 --> 00:02:12,640

yeah a little louder the next will will

64
00:02:16,550 --> 00:02:14,319
help us what does happen to the carbon

65
00:02:18,229 --> 00:02:16,560
dioxide so we have two systems that

66
00:02:20,550 --> 00:02:18,239
collect the carbon dioxide there's one

67
00:02:22,630 --> 00:02:20,560
on the russian segment and one on the us

68
00:02:24,949 --> 00:02:22,640
on the russian segment we have the vas

69
00:02:27,430 --> 00:02:24,959
duke and on the u.s segment it's we call

70
00:02:29,750 --> 00:02:27,440
it this sidra so both of those systems

71
00:02:31,350 --> 00:02:29,760
can collect all the co2 out of the air

72
00:02:33,270 --> 00:02:31,360
that pass through them and then we hold

73
00:02:34,790 --> 00:02:33,280
on to them in these beds and then

74
00:02:37,990 --> 00:02:34,800
eventually it gets

75
00:02:40,550 --> 00:02:38,000
dumped overboard or on the u.s side we

76
00:02:42,710 --> 00:02:40,560
can actually take some of that co2 back

77
00:02:45,110 --> 00:02:42,720
and recombine it with hydrogen and make

78
00:02:45,120 --> 00:02:56,070
okay next question

79
00:02:57,990 --> 00:02:56,949
um

80
00:03:02,229 --> 00:02:58,000
wow

81
00:03:07,190 --> 00:03:04,550
do you work alone no i work with a lot

82
00:03:08,869 --> 00:03:07,200
of people so you can see um in in the

83
00:03:10,309 --> 00:03:08,879
videos of the control center there's a

84
00:03:13,430 --> 00:03:10,319
lot of people in the room that we all

85
00:03:15,350 --> 00:03:13,440
work together with and then even at my

86
00:03:17,670 --> 00:03:15,360
console there's i have a whole team of

87
00:03:19,589 --> 00:03:17,680
people that we take turns working at the

88
00:03:21,990 --> 00:03:19,599

console we take turns you know doing our

89
00:03:23,830 --> 00:03:22,000
paperwork and all our coordination so

90
00:03:25,110 --> 00:03:23,840
there in the view you can see

91
00:03:26,789 --> 00:03:25,120
gosh at least

92
00:03:28,550 --> 00:03:26,799
10 or 15 people that are in the room

93
00:03:30,789 --> 00:03:28,560
right now we're all working together for

94
00:03:32,390 --> 00:03:30,799
the same goal and each of those people

95
00:03:35,030 --> 00:03:32,400
that you see that are in this room right

96
00:03:36,710 --> 00:03:35,040
now are working on a different

97
00:03:38,550 --> 00:03:36,720
part of the space station working on

98
00:03:41,110 --> 00:03:38,560
watching different systems and each one

99
00:03:42,710 --> 00:03:41,120
of them has another team of people in

100
00:03:44,070 --> 00:03:42,720
another room in the building somewhere

101
00:03:56,949 --> 00:03:44,080
that are helping them keep up with

102
00:04:12,710 --> 00:04:06,550
how is the cabin atmosphere

103
00:04:14,710 --> 00:04:12,720
so we fly nitrogen and oxygen up to

104
00:04:16,069 --> 00:04:14,720
space station to keep this station

105
00:04:18,069 --> 00:04:16,079
pressurized

106
00:04:20,390 --> 00:04:18,079
and then we also have two pieces of

107
00:04:22,310 --> 00:04:20,400
equipment that can generate oxygen we've

108
00:04:25,590 --> 00:04:22,320
got the electron on the russian segment

109
00:04:27,510 --> 00:04:25,600
and the oga on the u.s segment so we can

110
00:04:29,430 --> 00:04:27,520
constantly make oxygen and then we've

111
00:04:31,270 --> 00:04:29,440
also got this stored nitrogen that we

112
00:04:32,710 --> 00:04:31,280
can add in when we need to

113
00:04:35,670 --> 00:04:32,720

we can bring

114
00:04:37,430 --> 00:04:35,680
oxygen up but that costs it's heavy and

115
00:04:39,110 --> 00:04:37,440
it costs a lot of money to fly things in

116
00:04:40,710 --> 00:04:39,120
space and that's why we have systems

117
00:04:54,790 --> 00:04:40,720
that can make it out of the things that

118
00:04:54,800 --> 00:04:58,950
how do they take showers in space

119
00:05:03,990 --> 00:05:00,550
so that's a really good question they

120
00:05:05,510 --> 00:05:04,000
don't yeah really they don't um most the

121
00:05:07,270 --> 00:05:05,520
crew members just sort of have to wipe

122
00:05:09,110 --> 00:05:07,280
themselves down with a cloth so it's

123
00:05:25,350 --> 00:05:09,120
just soap and water and you kind of just

124
00:05:30,390 --> 00:05:28,390
can they sweat in space

125
00:05:31,830 --> 00:05:30,400
yes the crew members can definitely

126
00:05:34,390 --> 00:05:31,840
sweat in space

127
00:05:36,390 --> 00:05:34,400
the sweat acts a little bit differently

128
00:05:37,909 --> 00:05:36,400
it kind of will stick to their skin

129
00:05:40,629 --> 00:05:37,919
because of all the surface tension and

130
00:05:41,990 --> 00:05:40,639
then can can all the water can collect

131
00:05:44,390 --> 00:05:42,000
and then they have to wipe themselves

132
00:05:45,430 --> 00:05:44,400
off with a towel to get it and then we

133
00:05:48,070 --> 00:05:45,440
actually

134
00:05:50,310 --> 00:05:48,080
take that sweat and collect it and then

135
00:06:07,350 --> 00:05:50,320
we can reprocess it into clean drinking

136
00:06:10,710 --> 00:06:09,029
why is the air taken out of the food

137
00:06:11,430 --> 00:06:10,720
packages

138
00:06:15,749 --> 00:06:11,440

so

139
00:06:18,790 --> 00:06:15,759
answer that question well the biggest

140
00:06:21,029 --> 00:06:18,800
reason is that that's how they can store

141
00:06:22,950 --> 00:06:21,039
it for a long period of time

142
00:06:24,070 --> 00:06:22,960
as i was saying before about oxygen

143
00:06:26,790 --> 00:06:24,080
anything that you bring up to the

144
00:06:28,870 --> 00:06:26,800
station it it's difficult to get things

145
00:06:30,550 --> 00:06:28,880
up in space and that includes the food

146
00:06:32,469 --> 00:06:30,560
but food is very important you have to

147
00:06:34,629 --> 00:06:32,479
have it so you

148
00:06:37,350 --> 00:06:34,639
send a lot of food that is made to be

149
00:06:39,110 --> 00:06:37,360
able to to last on board for a long

150
00:06:41,110 --> 00:06:39,120
period of time it can be up there for

151
00:06:43,270 --> 00:06:41,120
years before it's eaten and you take the

152
00:06:45,110 --> 00:06:43,280
air out of those packages so that it

153
00:06:47,029 --> 00:06:45,120
doesn't doesn't spoil while you're

154
00:06:48,790 --> 00:06:47,039
waiting for it to be eaten

155
00:06:50,230 --> 00:06:48,800
there's actually different kinds of food

156
00:06:52,070 --> 00:06:50,240
there's some of it that comes up in

157
00:06:54,950 --> 00:06:52,080
other kinds of packaging and they have a

158
00:06:55,909 --> 00:06:54,960
lot real variety of food but

159
00:07:10,790 --> 00:06:55,919
the

160
00:07:21,350 --> 00:07:12,469
why is it important for humans to

161
00:07:22,390 --> 00:07:21,360
explore space oh that's a great question

162
00:07:27,749 --> 00:07:22,400
so

163
00:07:30,550 --> 00:07:27,759

goal and drive to learn everything and

164
00:07:32,790 --> 00:07:30,560
all we can and i think space exploration

165
00:07:35,990 --> 00:07:32,800
just gives us an opportunity to satisfy

166
00:07:37,990 --> 00:07:36,000
that goal to learn as much as we can

167
00:07:39,990 --> 00:07:38,000
we're learning a lot about the history

168
00:07:42,390 --> 00:07:40,000
of the solar system and the history of

169
00:07:44,629 --> 00:07:42,400
our planet by exploring space

170
00:07:46,950 --> 00:07:44,639
just iss in particular gives us an

171
00:07:49,270 --> 00:07:46,960
opportunity to work with our

172
00:07:51,510 --> 00:07:49,280
international partners for a common goal

173
00:07:52,390 --> 00:07:51,520
and all work together for something

174
00:07:54,070 --> 00:07:52,400
um

175
00:07:56,309 --> 00:07:54,080
and on iss we're doing we're learning a

176
00:07:58,550 --> 00:07:56,319
lot about you know

177
00:08:01,110 --> 00:07:58,560
the way that humans adapt in extreme

178
00:08:03,830 --> 00:08:01,120
environments for the body and the mind

179
00:08:05,510 --> 00:08:03,840
and we're doing a lot of research on

180
00:08:08,390 --> 00:08:05,520
medicine

181
00:08:10,550 --> 00:08:08,400
how and how things like fire fire reacts

182
00:08:12,790 --> 00:08:10,560
in space and all of that is helping us

183
00:08:15,270 --> 00:08:12,800
to understand just

184
00:08:27,350 --> 00:08:15,280
our bodies and systems more even on

185
00:08:31,589 --> 00:08:29,350
why why is there a satellite on your

186
00:08:34,389 --> 00:08:31,599
mission path

187
00:08:39,269 --> 00:08:34,399
are you um which mission which mission

188
00:08:44,550 --> 00:08:42,149

and the one in space

189
00:08:46,470 --> 00:08:44,560
is that the expedition 39 patch because

190
00:08:48,949 --> 00:08:46,480
i know that there's a actually there's a

191
00:08:50,710 --> 00:08:48,959
star above the uh

192
00:08:51,990 --> 00:08:50,720
above the international space station on

193
00:08:53,430 --> 00:08:52,000
that patch

194
00:08:56,150 --> 00:08:53,440
patches has

195
00:08:58,070 --> 00:08:56,160
all the crew members names and it has

196
00:08:59,750 --> 00:08:58,080
an image of the station and the soyuz

197
00:09:02,310 --> 00:08:59,760
vehicle that takes them there and that

198
00:09:04,389 --> 00:09:02,320
star that's above it on that patch is

199
00:09:05,910 --> 00:09:04,399
meant to represent explorations of the

200
00:09:07,750 --> 00:09:05,920
future

201
00:09:09,829 --> 00:09:07,760
as laura was saying before we want to

202
00:09:11,269 --> 00:09:09,839
explore space to go find out what's out

203
00:09:14,389 --> 00:09:11,279
there and there are going to be future

204
00:09:16,150 --> 00:09:14,399
explorations that go beyond this space

205
00:09:17,750 --> 00:09:16,160
station go beyond

206
00:09:20,470 --> 00:09:17,760
they're going to go back to the moon and

207
00:09:22,150 --> 00:09:20,480
go to asteroids and go to mars and go to

208
00:09:23,590 --> 00:09:22,160
other places and all of that is

209
00:09:33,190 --> 00:09:23,600
represented by that star on the

210
00:09:33,200 --> 00:09:37,430
how can oxygen start a fiery

211
00:09:41,750 --> 00:09:38,630
so

212
00:09:44,150 --> 00:09:41,760
oxygen itself won't start the fire it

213
00:09:46,310 --> 00:09:44,160

also needs so we need the oxygen we need

214
00:09:48,150 --> 00:09:46,320
some kind of ignition source like a

215
00:09:49,910 --> 00:09:48,160
spark or a match

216
00:09:51,590 --> 00:09:49,920
and then we need something to fuel the

217
00:09:53,910 --> 00:09:51,600
fire that would actually burn like some

218
00:09:56,070 --> 00:09:53,920
clothing or what would act as as your

219
00:09:58,550 --> 00:09:56,080
wood in your fireplace on the ground

220
00:10:01,110 --> 00:09:58,560
so you need all those three pieces i

221
00:10:03,829 --> 00:10:01,120
mean we take a lot of precautions on

222
00:10:06,069 --> 00:10:03,839
board to make sure that those three legs

223
00:10:07,509 --> 00:10:06,079
of the fire triangle

224
00:10:09,990 --> 00:10:07,519
don't won't

225
00:10:12,949 --> 00:10:10,000
combine yeah and start a fire and then

226
00:10:15,590 --> 00:10:12,959
our fire fighting tactics involve trying

227
00:10:17,829 --> 00:10:15,600
to eliminate one of those three legs we

228
00:10:20,069 --> 00:10:17,839
can take out the oxygen source or we try

229
00:10:22,230 --> 00:10:20,079
to try to eliminate the spark or take

230
00:10:24,550 --> 00:10:22,240
away whatever it is that's burning

231
00:10:26,230 --> 00:10:24,560
oxygen could be a part of a fire in

232
00:10:28,710 --> 00:10:26,240
space just like it could be a part of a

233
00:10:30,150 --> 00:10:28,720
fire on earth but it doesn't burn just

234
00:10:31,990 --> 00:10:30,160
all by itself it has to be something

235
00:10:33,430 --> 00:10:32,000
else there that's right and we we take a

236
00:10:34,790 --> 00:10:33,440
lot of precautions with the materials

237
00:10:36,790 --> 00:10:34,800
that we fly on board to make sure that

238
00:10:38,550 --> 00:10:36,800

they're not fire propagating and

239
00:10:39,990 --> 00:10:38,560
managing our oxygen levels that they

240
00:10:44,550 --> 00:10:40,000
don't get too high

241
00:10:44,560 --> 00:10:50,470
why do astronauts train in space

242
00:10:54,870 --> 00:10:51,910
are they you want to ask the question

243
00:10:56,710 --> 00:10:54,880
again i mean training water

244
00:11:00,389 --> 00:10:56,720
that's training water

245
00:11:02,630 --> 00:11:00,399
yeah so um the crew trains at the nbl

246
00:11:05,190 --> 00:11:02,640
down here in houston and

247
00:11:07,590 --> 00:11:05,200
the training underwater gives them an

248
00:11:10,870 --> 00:11:07,600
opportunity to experience

249
00:11:13,590 --> 00:11:10,880
as close to weightlessness as possible

250
00:11:15,190 --> 00:11:13,600
so we've got this huge above

251
00:11:18,310 --> 00:11:15,200
for them to get in that they have enough

252
00:11:21,990 --> 00:11:18,320
space to put on their suits we've got a

253
00:11:23,430 --> 00:11:22,000
mock-up of iss under the water and so

254
00:11:25,910 --> 00:11:23,440
that's just that's as close as we can

255
00:11:27,750 --> 00:11:25,920
get here on earth where we have gravity

256
00:11:29,829 --> 00:11:27,760
to the feeling like there's no gravity

257
00:11:32,230 --> 00:11:29,839
it's a way to to make it feel like

258
00:11:34,069 --> 00:11:32,240
you're weightless for an extended period

259
00:11:36,150 --> 00:11:34,079
of time we have another way to make

260
00:11:39,110 --> 00:11:36,160
people feel weightless for really short

261
00:11:41,910 --> 00:11:39,120
periods of time when they fly on an

262
00:11:43,509 --> 00:11:41,920
airplane that does a parabola and at the

263
00:11:45,350 --> 00:11:43,519

top of that arc

264
00:11:47,030 --> 00:11:45,360
people inside it experience

265
00:11:49,590 --> 00:11:47,040
weightlessness but only for about 20

266
00:11:51,190 --> 00:11:49,600
seconds at a time or so under water they

267
00:11:56,629 --> 00:11:51,200
can feel pretty much like they're

268
00:12:03,190 --> 00:11:58,710
why does air pressure change when door

269
00:12:09,110 --> 00:12:07,350
so when when a door lock is opened um

270
00:12:10,470 --> 00:12:09,120
i think maybe what you're referring to

271
00:12:12,470 --> 00:12:10,480
is that there could be

272
00:12:16,710 --> 00:12:12,480
two different pressures on either side

273
00:12:20,470 --> 00:12:16,720
of a door so if a lock is open then you

274
00:12:22,310 --> 00:12:20,480
allow a pathway for air to pass through

275
00:12:24,550 --> 00:12:22,320
and then for the two

276
00:12:26,310 --> 00:12:24,560
pressures on either side to equalize so

277
00:12:28,389 --> 00:12:26,320
then you feel

278
00:12:29,829 --> 00:12:28,399
that feeling of of

279
00:12:31,269 --> 00:12:29,839
maybe if you're on the side of the door

280
00:12:32,790 --> 00:12:31,279
at the higher pressure

281
00:12:34,470 --> 00:12:32,800
you lose a little bit of pressure

282
00:12:36,069 --> 00:12:34,480
because it'll go down to the lower side

283
00:12:39,670 --> 00:12:36,079
or if you're on the side with the lower

284
00:12:41,509 --> 00:12:39,680
maybe you you feel that that burst or

285
00:12:43,030 --> 00:12:41,519
that moment where the the pressure is

286
00:12:44,710 --> 00:12:43,040
equalizing and your pressure on your

287
00:12:47,030 --> 00:12:44,720
side is getting a little higher

288
00:12:49,910 --> 00:12:47,040

but naturally the the air pressure is

289
00:12:51,670 --> 00:12:49,920
going to seek a lower it's going to it's

290
00:12:53,509 --> 00:12:51,680
going to try to even out i can't take

291
00:12:54,790 --> 00:12:53,519
the right scientific word for it

292
00:12:56,389 --> 00:12:54,800
equalize it's going to try to get

293
00:12:58,310 --> 00:12:56,399
equalized so if you have high and low

294
00:12:59,910 --> 00:12:58,320
pressures at this at the same place

295
00:13:05,110 --> 00:12:59,920
they're going to try to get back to the

296
00:13:10,389 --> 00:13:06,870
what does internal

297
00:13:14,150 --> 00:13:12,389
and so i think you might mean in

298
00:13:16,629 --> 00:13:14,160
reference to what i do the internal

299
00:13:19,509 --> 00:13:16,639
thermal control system so for the

300
00:13:20,949 --> 00:13:19,519
internal thermal control system um

301
00:13:22,710 --> 00:13:20,959
that system where we have all these

302
00:13:25,509 --> 00:13:22,720
water loops running through the space

303
00:13:27,190 --> 00:13:25,519
station and we collect the heat from all

304
00:13:29,430 --> 00:13:27,200
the batteries and all the equipment that

305
00:13:31,829 --> 00:13:29,440
generates heat on the space station so

306
00:13:34,790 --> 00:13:31,839
we collect it in our water loop

307
00:13:36,629 --> 00:13:34,800
and then it comes to

308
00:13:39,750 --> 00:13:36,639
we call it an interface heat exchanger

309
00:13:42,550 --> 00:13:39,760
but so our warmed up water lines will

310
00:13:45,509 --> 00:13:42,560
then flow past really cold ammonia lines

311
00:13:47,350 --> 00:13:45,519
and we transfer our heat to the external

312
00:13:57,990 --> 00:13:47,360
thermal control system where it'll then

313
00:14:04,870 --> 00:14:03,350

how do you stay warm or cool in space

314
00:14:05,990 --> 00:14:04,880
well it helps to be cool to start with

315
00:14:07,350 --> 00:14:06,000
it does

316
00:14:08,949 --> 00:14:07,360
and then on

317
00:14:10,550 --> 00:14:08,959
on the space station

318
00:14:12,310 --> 00:14:10,560
there's actually air conditioners in a

319
00:14:13,750 --> 00:14:12,320
lot of the modules just like

320
00:14:15,030 --> 00:14:13,760
you have at home

321
00:14:17,670 --> 00:14:15,040
well of course they're set up a little

322
00:14:19,910 --> 00:14:17,680
bit differently but so the the space

323
00:14:21,750 --> 00:14:19,920
station itself

324
00:14:23,670 --> 00:14:21,760
there's a lot of heat from the equipment

325
00:14:25,430 --> 00:14:23,680
that's running from the crew members

326
00:14:26,870 --> 00:14:25,440
just body heat

327
00:14:29,350 --> 00:14:26,880
and then we run

328
00:14:30,870 --> 00:14:29,360
our air conditioners and and collect all

329
00:14:33,030 --> 00:14:30,880
that heat to keep things cool for the

330
00:14:35,189 --> 00:14:33,040
astronauts and they can call down and

331
00:14:37,269 --> 00:14:35,199
tell us you know hey i'm too cold can

332
00:14:38,790 --> 00:14:37,279
you make it warmer in here um and we can

333
00:14:40,470 --> 00:14:38,800
we can send some commands and adjust

334
00:14:41,750 --> 00:14:40,480
things for them or they can you know

335
00:14:47,670 --> 00:14:41,760
tell us they're too

336
00:14:47,680 --> 00:14:52,870
what do you enjoy most about your job

337
00:14:57,590 --> 00:14:53,829
so

338
00:14:58,949 --> 00:14:57,600

for me i i love the opportunities to

339
00:15:00,710 --> 00:14:58,959
coordinate with the international

340
00:15:03,509 --> 00:15:00,720
partners so we work with the russians

341
00:15:05,590 --> 00:15:03,519
the europeans the japanese every day

342
00:15:07,030 --> 00:15:05,600
i really like that

343
00:15:09,590 --> 00:15:07,040
i also definitely work with some of the

344
00:15:12,150 --> 00:15:09,600
smartest people in the world and we get

345
00:15:13,509 --> 00:15:12,160
opportunities to be really creative and

346
00:15:15,269 --> 00:15:13,519
innovative if

347
00:15:16,790 --> 00:15:15,279
something breaks then we can all get

348
00:15:18,949 --> 00:15:16,800
together and

349
00:15:21,990 --> 00:15:18,959
you know think about the the coolest

350
00:15:24,069 --> 00:15:22,000
ideas to fix it and really we get a lot

351
00:15:27,990 --> 00:15:24,079
of opportunities to think outside the

352
00:15:30,150 --> 00:15:28,000
box and use equipment for things that it

353
00:15:31,910 --> 00:15:30,160
wasn't necessarily designed or created

354
00:15:33,990 --> 00:15:31,920
to do

355
00:15:36,230 --> 00:15:34,000
i just i really love that it's a really

356
00:15:37,670 --> 00:15:36,240
fun job it's really dynamic so it keeps

357
00:15:42,150 --> 00:15:37,680
you on your toes it's constantly

358
00:15:47,269 --> 00:15:44,470
who or what inspired you to pursue your

359
00:15:51,670 --> 00:15:50,550
so when i was in high school i had a

360
00:15:57,430 --> 00:15:51,680
really

361
00:16:01,990 --> 00:15:57,440
a lot of

362
00:16:03,189 --> 00:16:02,000
class to show us how fun physics could

363
00:16:06,790 --> 00:16:03,199

really be

364
00:16:10,150 --> 00:16:06,800
so i opted to pursue physics in college

365
00:16:12,550 --> 00:16:10,160
and while there i developed a strong

366
00:16:14,710 --> 00:16:12,560
interest in biophysics and also

367
00:16:17,110 --> 00:16:14,720
astrophysics so after graduating there

368
00:16:19,910 --> 00:16:17,120
was really no place else to go so here

369
00:16:22,150 --> 00:16:19,920
at nasa i can explore my you know my

370
00:16:25,030 --> 00:16:22,160
astrophysics interests and then for me

371
00:16:26,629 --> 00:16:25,040
ethos was kind of the perfect place to

372
00:16:32,389 --> 00:16:26,639
to learn a little bit about biophysics

373
00:16:37,030 --> 00:16:36,230
what is the average temperature in space

374
00:16:39,749 --> 00:16:37,040
so

375
00:16:41,269 --> 00:16:39,759
space can get really really cold and and

376
00:16:45,030 --> 00:16:41,279
really really hot i've heard it can get

377
00:16:47,509 --> 00:16:45,040
to negative 450 fahrenheit and up to 450

378
00:16:49,670 --> 00:16:47,519
or 350 fahrenheit

379
00:16:52,790 --> 00:16:49,680
so it really depends on

380
00:16:55,749 --> 00:16:52,800
where you are relative to the sun and

381
00:16:57,430 --> 00:16:55,759
whether or not the sun is shining on you

382
00:16:59,749 --> 00:16:57,440
at that moment we've even heard

383
00:17:01,749 --> 00:16:59,759
astronauts who are outside the station

384
00:17:03,189 --> 00:17:01,759
during spacewalks

385
00:17:05,590 --> 00:17:03,199
talk about how

386
00:17:08,309 --> 00:17:05,600
they can feel a dramatic change just as

387
00:17:12,069 --> 00:17:08,319
the station moves from in the sun to in

388
00:17:14,470 --> 00:17:12,079

the shade from from sun uh in sun to sun

389
00:17:16,470 --> 00:17:14,480
down where sunrise again in the morning

390
00:17:18,630 --> 00:17:16,480
and they have to have heaters in their

391
00:17:20,150 --> 00:17:18,640
gloves and then their suits turned on to

392
00:17:21,350 --> 00:17:20,160
to compensate for it because it can

393
00:17:22,870 --> 00:17:21,360
change

394
00:17:25,270 --> 00:17:22,880
temperature outside around them can

395
00:17:26,870 --> 00:17:25,280
change by about 600 degrees in a matter

396
00:17:28,230 --> 00:17:26,880
of just a few minutes yeah i've heard

397
00:17:29,830 --> 00:17:28,240
that too even with like with their eyes

398
00:17:33,510 --> 00:17:29,840
closed and their visors down you can

399
00:17:39,350 --> 00:17:35,990
how much does sunlight affect the

400
00:17:42,710 --> 00:17:41,029
yeah so that's a great follow-up

401
00:17:45,029 --> 00:17:42,720
question because the the sunlight is

402
00:17:47,190 --> 00:17:45,039
really what drastically makes an impact

403
00:17:49,909 --> 00:17:47,200
and and is really the only the only way

404
00:17:55,110 --> 00:17:49,919
to warm up this base around around the

405
00:18:00,870 --> 00:17:57,430
how much of wastewater are you able to

406
00:18:02,390 --> 00:18:00,880
reuse or recycle

407
00:18:06,150 --> 00:18:02,400
how much wastewater were we able to

408
00:18:08,390 --> 00:18:06,160
reuse ah yes so i've heard a stat that

409
00:18:10,390 --> 00:18:08,400
we are able to recycle

410
00:18:11,909 --> 00:18:10,400
more than 90 percent of our wastewater

411
00:18:14,630 --> 00:18:11,919
now and that's with all of our our

412
00:18:17,669 --> 00:18:14,640
systems operating properly so we have a

413
00:18:20,789 --> 00:18:17,679

system called the regenerative eclipse

414
00:18:23,669 --> 00:18:20,799
system and so we can collect urine and

415
00:18:26,070 --> 00:18:23,679
reprocess it into really clean water

416
00:18:28,470 --> 00:18:26,080
that sweat that we talked about earlier

417
00:18:31,669 --> 00:18:28,480
the carbon dioxide to make more water

418
00:18:33,750 --> 00:18:31,679
and make more solutions in the air

419
00:18:35,830 --> 00:18:33,760
bring out their towels

420
00:18:38,150 --> 00:18:35,840
yep everything yeah and that's really

421
00:18:40,150 --> 00:18:38,160
important um because we we end up saving

422
00:18:44,150 --> 00:18:40,160
a lot of money so we don't have to to

423
00:18:45,990 --> 00:18:44,160
fly up water and we save a lot of space

424
00:18:47,830 --> 00:18:46,000
the space is very limited on the space

425
00:18:49,909 --> 00:18:47,840
station so that way we don't have to

426
00:18:51,110 --> 00:18:49,919
store it and we can put other more

427
00:18:53,750 --> 00:18:51,120
important pieces of equipment there

428
00:18:55,669 --> 00:18:53,760
instead and and just as important for

429
00:18:57,750 --> 00:18:55,679
future missions when we're going to go

430
00:18:59,830 --> 00:18:57,760
far away from earth and can't keep

431
00:19:02,630 --> 00:18:59,840
sending up supplies we have to come up

432
00:19:04,870 --> 00:19:02,640
with a system in which we can reuse all

433
00:19:06,950 --> 00:19:04,880
the things that are there

434
00:19:08,870 --> 00:19:06,960
if a ship that's on its way to mars or

435
00:19:10,630 --> 00:19:08,880
someplace can't wait for another

436
00:19:11,909 --> 00:19:10,640
shipment of supplies from earth so

437
00:19:13,830 --> 00:19:11,919
that's why we're developing these

438
00:19:16,710 --> 00:19:13,840

systems on the space station in order to

439
00:19:19,029 --> 00:19:16,720
be able to have a way to keep astronauts

440
00:19:24,549 --> 00:19:19,039
safe and and well supplied when they

441
00:19:30,470 --> 00:19:26,630
how much water do they use

442
00:19:32,630 --> 00:19:30,480
on the iss each day

443
00:19:35,669 --> 00:19:32,640
so we use a lot of water

444
00:19:38,230 --> 00:19:35,679
as an ethos we try to take into account

445
00:19:40,549 --> 00:19:38,240
that on average a crew member may drink

446
00:19:41,430 --> 00:19:40,559
about two and a half liters of water a

447
00:19:42,470 --> 00:19:41,440
day

448
00:19:44,630 --> 00:19:42,480
so that's

449
00:19:46,549 --> 00:19:44,640
more than one of your soda bottles on

450
00:19:49,350 --> 00:19:46,559
the ground um

451
00:19:51,510 --> 00:19:49,360
so with with six people two and a half

452
00:19:52,950 --> 00:19:51,520
liters of water a day let's see that's

453
00:19:55,990 --> 00:19:52,960
what 12

454
00:19:58,870 --> 00:19:56,000
15 15 liters of water per day and then

455
00:20:00,470 --> 00:19:58,880
that's split between the us crew members

456
00:20:02,470 --> 00:20:00,480
and and the russian crew members so we

457
00:20:04,870 --> 00:20:02,480
work together to to make sure that all

458
00:20:07,990 --> 00:20:04,880
of our crew members have enough water

459
00:20:11,590 --> 00:20:08,000
always but in and then as you said

460
00:20:14,070 --> 00:20:11,600
90 percent or so of that 15 liters gets

461
00:20:16,870 --> 00:20:14,080
reused it gets recycled so we don't have

462
00:20:19,270 --> 00:20:16,880
to supply a new 15 liters every day

463
00:20:21,590 --> 00:20:19,280

right that's right we just got a new

464
00:20:23,990 --> 00:20:21,600
experiment on board the the veggie

465
00:20:26,630 --> 00:20:24,000
payload where the crew is growing

466
00:20:27,990 --> 00:20:26,640
food so now we're having to start

467
00:20:32,830 --> 00:20:28,000
accounting for a little bit more water

468
00:20:38,470 --> 00:20:35,350
plants we have one more question if it's

469
00:20:44,070 --> 00:20:40,390
if we have access to all these

470
00:20:45,990 --> 00:20:44,080
technologies in space to transfer waste

471
00:20:49,909 --> 00:20:46,000
into water and things like that why

472
00:20:54,230 --> 00:20:52,549
well we do use them on earth

473
00:20:55,590 --> 00:20:54,240
some of the special systems that have

474
00:20:58,230 --> 00:20:55,600
been developed on the international

475
00:20:59,190 --> 00:20:58,240
space station are in use on earth right

476
00:21:00,230 --> 00:20:59,200
now

477
00:21:02,149 --> 00:21:00,240
it's a

478
00:21:04,549 --> 00:21:02,159
different philosophical and in some

479
00:21:06,710 --> 00:21:04,559
cases a political question in different

480
00:21:09,750 --> 00:21:06,720
areas of the world about why they don't

481
00:21:11,110 --> 00:21:09,760
use them more than they do right now

482
00:21:13,430 --> 00:21:11,120
but in fact

483
00:21:15,110 --> 00:21:13,440
the the water purification system that

484
00:21:17,590 --> 00:21:15,120
laura was talking about

485
00:21:19,750 --> 00:21:17,600
is in use in in places on the earth

486
00:21:22,230 --> 00:21:19,760
right now and especially

487
00:21:23,750 --> 00:21:22,240
because it's a fairly compact system has

488
00:21:26,230 --> 00:21:23,760

been able to be

489
00:21:28,549 --> 00:21:26,240
distributed in areas of the world where

490
00:21:31,029 --> 00:21:28,559
they don't have and can't afford their

491
00:21:33,350 --> 00:21:31,039
own systems so that the station

492
00:21:35,190 --> 00:21:33,360
science and the station technology is

493
00:21:35,990 --> 00:21:35,200
being used to help people on earth right

494
00:21:37,830 --> 00:21:36,000
now

495
00:21:38,870 --> 00:21:37,840
yep that's right and some of our systems

496
00:21:40,310 --> 00:21:38,880
kind of do

497
00:21:42,630 --> 00:21:40,320
what our earth's atmosphere does in

498
00:21:45,110 --> 00:21:42,640
terms of evaporation and then it rains

499
00:21:47,750 --> 00:21:45,120
and condensation and we we package that

500
00:21:50,470 --> 00:21:47,760
into a small box

501
00:21:53,990 --> 00:21:50,480
and to make it do what our huge

502
00:21:56,870 --> 00:21:55,430
all right and this is michael here at

503
00:21:59,110 --> 00:21:56,880
the digital learning network again i

504
00:22:01,029 --> 00:21:59,120
want to thank you guys for joining us

505
00:22:02,470 --> 00:22:01,039
today and

506
00:22:04,390 --> 00:22:02,480
endeavor elementary school would you

507
00:22:08,470 --> 00:22:04,400
like to say bye to the folks at mission

508
00:22:11,190 --> 00:22:10,070
all right thanks