
PAO

1
00:00:09,990 --> 00:00:05,670
alicia simpson and happy holidays from

2
00:00:10,000 --> 00:00:15,589
happy holidays

3
00:00:18,950 --> 00:00:17,109
we're ready for your questions whenever

4
00:00:20,710 --> 00:00:18,960
you are questions whenever you are sure

5
00:00:23,429 --> 00:00:20,720
we'll i'll have our first student come

6
00:00:24,269 --> 00:00:23,439
up and our first student is olivia

7
00:00:25,990 --> 00:00:24,279
hi

8
00:00:36,870 --> 00:00:26,000
olivia

9
00:00:39,910 --> 00:00:38,470
we're having a hard time hearing you so

10
00:00:41,910 --> 00:00:39,920
you guys need to speak up a little bit

11
00:00:43,350 --> 00:00:41,920
we can see you here as well but i think

12
00:00:49,190 --> 00:00:43,360
we already know what your question was

13
00:00:54,310 --> 00:00:51,910

olivia did you ask me about their family

14
00:00:56,790 --> 00:00:54,320
about their family

15
00:00:58,790 --> 00:00:56,800
yes i did

16
00:01:00,790 --> 00:00:58,800
okay um

17
00:01:02,470 --> 00:01:00,800
it's it's kind of you know it's

18
00:01:04,070 --> 00:01:02,480
challenging for them just imagine if you

19
00:01:06,550 --> 00:01:04,080
were away from your family for long

20
00:01:08,149 --> 00:01:06,560
periods of time so uh but we have really

21
00:01:09,990 --> 00:01:08,159
good things in place here at nasa for

22
00:01:11,510 --> 00:01:10,000
them to be able to uh do video

23
00:01:13,590 --> 00:01:11,520
conferences with them like you're doing

24
00:01:15,830 --> 00:01:13,600
with me to be able to call down and talk

25
00:01:17,670 --> 00:01:15,840
to them on the phone so they're they're

26
00:01:19,190 --> 00:01:17,680
always in contact with their family but

27
00:01:20,630 --> 00:01:19,200
you know no one wants to be away from

28
00:01:22,149 --> 00:01:20,640
their family for a long period of time

29
00:01:23,190 --> 00:01:22,159
but we make sure that they are able to

30
00:01:24,870 --> 00:01:23,200
do that

31
00:01:26,710 --> 00:01:24,880
the really cool thing is that we have so

32
00:01:29,910 --> 00:01:26,720
many different ways of communicating

33
00:01:31,190 --> 00:01:29,920
with the crews now on orbit that we have

34
00:01:32,390 --> 00:01:31,200
email

35
00:01:33,830 --> 00:01:32,400
which is a

36
00:01:34,870 --> 00:01:33,840
way a lot of parents keep in touch with

37
00:01:36,230 --> 00:01:34,880
their kids

38
00:01:37,270 --> 00:01:36,240

anyway these days especially when

39
00:01:38,870 --> 00:01:37,280
they've grown up and gone away to

40
00:01:41,350 --> 00:01:38,880
college and the like

41
00:01:43,990 --> 00:01:41,360
we've got special sessions where we use

42
00:01:47,190 --> 00:01:44,000
uh net meeting kind of uh like a

43
00:01:49,190 --> 00:01:47,200
facetime or a skype where they can talk

44
00:01:51,030 --> 00:01:49,200
directly and see each other in the in

45
00:01:52,789 --> 00:01:51,040
the time that they're doing that

46
00:01:54,710 --> 00:01:52,799
and they have a telephone up there that

47
00:01:56,149 --> 00:01:54,720
has an ip phone where they can actually

48
00:01:57,830 --> 00:01:56,159
call down and talk to their family

49
00:01:59,590 --> 00:01:57,840
members directly

50
00:02:02,550 --> 00:01:59,600
so there's all those different ways that

51
00:02:05,270 --> 00:02:02,560
they have chances to communicate both

52
00:02:07,350 --> 00:02:05,280
visually through writing and through

53
00:02:09,270 --> 00:02:07,360
audio means and so it's a little bit

54
00:02:11,270 --> 00:02:09,280
like being away on a long business trip

55
00:02:12,790 --> 00:02:11,280
for the crews and so they miss their

56
00:02:13,830 --> 00:02:12,800
families and their families miss them

57
00:02:18,949 --> 00:02:13,840
but they still have lots of

58
00:02:25,830 --> 00:02:22,710
thank you oh you're welcome

59
00:02:30,790 --> 00:02:25,840
we have our next uh student jordan perry

60
00:02:39,270 --> 00:02:31,990
i'm sorry i didn't hear you could you

61
00:02:42,710 --> 00:02:40,630
and i think she said how does the

62
00:02:43,830 --> 00:02:42,720
spacesuit work

63
00:02:47,350 --> 00:02:43,840

oh wow

64
00:02:49,430 --> 00:02:47,360
that's a fairly loaded question it uh

65
00:02:52,070 --> 00:02:49,440
kelly do you want to try to tackle well

66
00:02:52,949 --> 00:02:52,080
the spacesuits we use for the u.s

67
00:02:55,190 --> 00:02:52,959
there's two different kinds of

68
00:02:57,270 --> 00:02:55,200
spacesuits first of all there's a u.s

69
00:02:59,830 --> 00:02:57,280
spacesuit a nasa space suit we call the

70
00:03:02,309 --> 00:02:59,840
extravehicular mobility unit and there's

71
00:03:04,309 --> 00:03:02,319
a russian one that we call the orlon

72
00:03:06,949 --> 00:03:04,319
and they're very similar because

73
00:03:08,070 --> 00:03:06,959
essentially what they are is a personal

74
00:03:10,550 --> 00:03:08,080
spaceship

75
00:03:12,470 --> 00:03:10,560
and they provide all of the protection

76
00:03:14,630 --> 00:03:12,480
from the outside environment around

77
00:03:17,110 --> 00:03:14,640
space that you would need if you were

78
00:03:19,910 --> 00:03:17,120
actually in a spaceship but it allows

79
00:03:21,910 --> 00:03:19,920
you to move about and get use your arms

80
00:03:24,390 --> 00:03:21,920
and to do important tasks that we need

81
00:03:25,830 --> 00:03:24,400
to do to maintain the space station or

82
00:03:28,070 --> 00:03:25,840
they did a lot of it to assemble the

83
00:03:30,470 --> 00:03:28,080
space station in the first place and so

84
00:03:32,869 --> 00:03:30,480
what you've got is you've got a inside

85
00:03:35,430 --> 00:03:32,879
the space dude you have a liquid cooling

86
00:03:37,670 --> 00:03:35,440
garment because in spite of the fact you

87
00:03:39,430 --> 00:03:37,680
might think space is is cool

88
00:03:41,030 --> 00:03:39,440

actually all the work that you do in it

89
00:03:42,869 --> 00:03:41,040
can build up a lot of heat we've got

90
00:03:44,070 --> 00:03:42,879
really good insulation in the spacesuit

91
00:03:46,470 --> 00:03:44,080
and so one of the hardest things you

92
00:03:47,750 --> 00:03:46,480
have to do is get rid of all that excess

93
00:03:49,430 --> 00:03:47,760
heat and so

94
00:03:52,149 --> 00:03:49,440
there is a liquid coulee garment that

95
00:03:53,190 --> 00:03:52,159
has lots of tubing with water and they

96
00:03:55,190 --> 00:03:53,200
can

97
00:03:56,470 --> 00:03:55,200
with a little dial on the front of their

98
00:03:58,470 --> 00:03:56,480
space suit they can adjust the

99
00:04:01,350 --> 00:03:58,480
temperature of the spacesuit so they can

100
00:04:02,550 --> 00:04:01,360
stay comfortable and work they've got a

101
00:04:04,309 --> 00:04:02,560
little uh

102
00:04:05,910 --> 00:04:04,319
mouth water

103
00:04:07,589 --> 00:04:05,920
delivery system so that they can take a

104
00:04:10,309 --> 00:04:07,599
drink because they're usually out there

105
00:04:12,070 --> 00:04:10,319
for six and a half or more hours and so

106
00:04:13,830 --> 00:04:12,080
it's very important that they be able to

107
00:04:15,030 --> 00:04:13,840
stay rehydrated

108
00:04:17,749 --> 00:04:15,040
they have

109
00:04:19,830 --> 00:04:17,759
a multi-layer spacesuit that provides

110
00:04:21,270 --> 00:04:19,840
pressure for them and it also provides

111
00:04:24,629 --> 00:04:21,280
protection

112
00:04:26,550 --> 00:04:24,639
against the the thermal environment and

113
00:04:28,790 --> 00:04:26,560

to some level uh

114
00:04:32,310 --> 00:04:28,800
tiny pieces of space junk uh that sort

115
00:04:33,830 --> 00:04:32,320
of thing uh and then uh the gloves are

116
00:04:35,590 --> 00:04:33,840
really important on the spacesuits

117
00:04:37,590 --> 00:04:35,600
because when you're out there doing work

118
00:04:39,670 --> 00:04:37,600
your hands are your most important thing

119
00:04:41,510 --> 00:04:39,680
and engineers here at johnson space room

120
00:04:44,150 --> 00:04:41,520
done a lot of work over the years to

121
00:04:47,350 --> 00:04:44,160
make these gloves protective enough but

122
00:04:49,670 --> 00:04:47,360
also nimble enough that you can do a lot

123
00:04:51,990 --> 00:04:49,680
of the the tight work that you have to

124
00:04:54,550 --> 00:04:52,000
do when you're connecting connectors for

125
00:04:56,390 --> 00:04:54,560
electrical connections or connecting

126
00:04:59,030 --> 00:04:56,400
fluid connections are associated with

127
00:04:59,909 --> 00:04:59,040
the cooling systems on the space station

128
00:05:01,749 --> 00:04:59,919
so

129
00:05:03,110 --> 00:05:01,759
and and that's basically how it works

130
00:05:04,790 --> 00:05:03,120
you have your oxygen tanks you have

131
00:05:06,710 --> 00:05:04,800
electricity that powers the systems of

132
00:05:19,909 --> 00:05:06,720
the suit and once you go outside you're

133
00:05:36,390 --> 00:05:22,390
hi i'm caitlin and i have a question for

134
00:05:40,469 --> 00:05:39,110
regular routines follow-up yes okay yes

135
00:05:42,390 --> 00:05:40,479
there are um

136
00:05:44,390 --> 00:05:42,400
regular routines yes they're daily

137
00:05:46,070 --> 00:05:44,400
operations they have to get up they have

138
00:05:47,749 --> 00:05:46,080

to talk to the flight directors they

139
00:05:49,749 --> 00:05:47,759
have meetings and figure out what the

140
00:05:53,270 --> 00:05:49,759
tasks are for today

141
00:05:55,430 --> 00:05:53,280
and they are um

142
00:05:57,430 --> 00:05:55,440
and then they um

143
00:05:59,430 --> 00:05:57,440
go through what the plan is for the day

144
00:06:00,230 --> 00:05:59,440
the day is already planned out and so

145
00:06:10,070 --> 00:06:00,240
the

146
00:06:12,790 --> 00:06:10,080
follow a daily routine and it's planned

147
00:06:14,550 --> 00:06:12,800
out ahead of time for the most part

148
00:06:17,430 --> 00:06:14,560
yeah interestingly though we're working

149
00:06:19,749 --> 00:06:17,440
on new ways to keep from having to have

150
00:06:22,150 --> 00:06:19,759
mission control be so directly involved

151
00:06:23,990 --> 00:06:22,160
in everything that the crews do on orbit

152
00:06:25,510 --> 00:06:24,000
the crews like to be somewhat autonomous

153
00:06:27,110 --> 00:06:25,520
so they can choose when they get their

154
00:06:29,029 --> 00:06:27,120
work done

155
00:06:31,430 --> 00:06:29,039
and when to work on one thing versus

156
00:06:33,670 --> 00:06:31,440
another thing and and uh

157
00:06:35,830 --> 00:06:33,680
it's also important that we

158
00:06:37,590 --> 00:06:35,840
learn how to do that

159
00:06:39,350 --> 00:06:37,600
without having to have mission control

160
00:06:42,550 --> 00:06:39,360
there for everything because as we go

161
00:06:44,870 --> 00:06:42,560
farther out into space there are delays

162
00:06:46,550 --> 00:06:44,880
in communication that will occur

163
00:06:48,230 --> 00:06:46,560

and you don't want to have to wait half

164
00:06:49,589 --> 00:06:48,240
an hour when you're at mars to get an

165
00:06:52,309 --> 00:06:49,599
answer for mission control before you

166
00:06:54,230 --> 00:06:52,319
can go on to the next step and so

167
00:06:55,110 --> 00:06:54,240
lately they've been doing some special

168
00:06:59,909 --> 00:06:55,120
work

169
00:07:02,790 --> 00:06:59,919
treadmill system on board the space

170
00:07:04,550 --> 00:07:02,800
station and they updated the procedure

171
00:07:06,870 --> 00:07:04,560
so that kevin ford the commander right

172
00:07:08,950 --> 00:07:06,880
now could do it virtually on his own

173
00:07:10,550 --> 00:07:08,960
without having to ask mission control

174
00:07:12,629 --> 00:07:10,560
questions and like

175
00:07:15,749 --> 00:07:12,639
and so while there is a very uh

176
00:07:17,430 --> 00:07:15,759
structured routine for the crew on board

177
00:07:19,270 --> 00:07:17,440
they're also

178
00:07:21,830 --> 00:07:19,280
are looking at new opportunities where

179
00:07:22,550 --> 00:07:21,840
we can minimize that so that the crews

180
00:07:24,150 --> 00:07:22,560
can

181
00:07:26,150 --> 00:07:24,160
go to the office and do their job

182
00:07:28,629 --> 00:07:26,160
without having to have somebody explain

183
00:07:29,990 --> 00:07:28,639
how to do things all day long

184
00:07:31,589 --> 00:07:30,000
you know the other part of that is that

185
00:07:33,909 --> 00:07:31,599
the folks here in mission control have a

186
00:07:38,150 --> 00:07:33,919
schedule uh we work here in mission

187
00:07:39,510 --> 00:07:38,160
control 24 7 365 days a year and so that

188
00:07:41,909 --> 00:07:39,520

means that there are three shift to

189
00:07:44,230 --> 00:07:41,919
flight controllers that work every day

190
00:07:46,070 --> 00:07:44,240
and they cover about an eight-hour shift

191
00:07:48,390 --> 00:07:46,080
each one and then they have a handover

192
00:07:50,710 --> 00:07:48,400
period so that the folks who are leaving

193
00:07:53,189 --> 00:07:50,720
can tell the status of all the systems

194
00:07:56,629 --> 00:07:53,199
and things that we have to do uh to the

195
00:07:58,070 --> 00:07:56,639
folks that are coming on and then uh the

196
00:07:59,990 --> 00:07:58,080
then that crew member does the same

197
00:08:02,070 --> 00:08:00,000
thing for the oncoming crew and so we

198
00:08:03,830 --> 00:08:02,080
keep a rotating crew in it make sure

199
00:08:06,309 --> 00:08:03,840
everybody's up to date everybody knows

200
00:08:08,150 --> 00:08:06,319
the important items uh and that

201
00:08:11,990 --> 00:08:08,160
everybody's ready to support the crew on

202
00:08:15,189 --> 00:08:13,990
you you're welcome you're welcome

203
00:08:19,589 --> 00:08:15,199
welcome

204
00:08:36,070 --> 00:08:20,430
hi

205
00:08:40,790 --> 00:08:38,230
oh yeah they would love to get it more

206
00:08:42,149 --> 00:08:40,800
often but they can only get it

207
00:08:45,190 --> 00:08:42,159
when there's a vehicle that can bring it

208
00:08:47,030 --> 00:08:45,200
to them but as far as the food being on

209
00:08:49,590 --> 00:08:47,040
station they have some of the regular

210
00:08:51,590 --> 00:08:49,600
stuff that you eat here on earth granola

211
00:08:53,190 --> 00:08:51,600
bars m m's things like that and it

212
00:08:55,110 --> 00:08:53,200
doesn't require anything special for

213
00:08:56,470 --> 00:08:55,120

them to have that type of thing but they

214
00:08:57,910 --> 00:08:56,480
do also have

215
00:09:00,790 --> 00:08:57,920
food that's freeze-dried that they need

216
00:09:02,870 --> 00:09:00,800
to be rehydrated um when they're up

217
00:09:04,630 --> 00:09:02,880
there and so those uh have kind of a

218
00:09:05,430 --> 00:09:04,640
shelf life of about a year year and a

219
00:09:07,190 --> 00:09:05,440
half

220
00:09:08,949 --> 00:09:07,200
and

221
00:09:10,949 --> 00:09:08,959
they uh

222
00:09:12,550 --> 00:09:10,959
and really enjoy the food they get to

223
00:09:14,389 --> 00:09:12,560
taste it on the ground before they go up

224
00:09:16,070 --> 00:09:14,399
into space actually so they get to kind

225
00:09:16,790 --> 00:09:16,080
of pick out their menus and decide what

226
00:09:24,630 --> 00:09:16,800
they

227
00:09:26,949 --> 00:09:24,640
food tastings and and kind of pick their

228
00:09:28,870 --> 00:09:26,959
own menu yeah a lot of things they have

229
00:09:30,790 --> 00:09:28,880
on the space station to eat are the same

230
00:09:32,470 --> 00:09:30,800
kind of things that you could go to the

231
00:09:34,790 --> 00:09:32,480
grocery store and buy

232
00:09:36,150 --> 00:09:34,800
thermo stabilized meals i know there are

233
00:09:37,509 --> 00:09:36,160
some really good ones out there that you

234
00:09:38,710 --> 00:09:37,519
can just buy and you can stick them in

235
00:09:40,230 --> 00:09:38,720
your pantry and you don't have to

236
00:09:41,509 --> 00:09:40,240
refrigerate them or freeze or anything

237
00:09:43,030 --> 00:09:41,519
and you can heat them up on the

238
00:09:44,310 --> 00:09:43,040

microwave they have different ways of

239
00:09:46,790 --> 00:09:44,320
heating them on the space station they

240
00:09:49,430 --> 00:09:46,800
don't have a microwave but they they do

241
00:09:50,630 --> 00:09:49,440
have that capability to eat the same

242
00:09:53,350 --> 00:09:50,640
kind of things you would eat here on the

243
00:09:55,030 --> 00:09:53,360
ground but the the folks here in in

244
00:09:56,870 --> 00:09:55,040
mission control and in our food

245
00:09:59,590 --> 00:09:56,880
laboratory also do a lot of work to make

246
00:10:02,069 --> 00:09:59,600
sure that the nutritional components of

247
00:10:03,829 --> 00:10:02,079
the diet are really healthy uh and we're

248
00:10:06,069 --> 00:10:03,839
learning more and more there's a special

249
00:10:08,870 --> 00:10:06,079
experiment called pro-k right now where

250
00:10:12,069 --> 00:10:08,880
doctors on the ground are looking at how

251
00:10:13,829 --> 00:10:12,079
the nutritional components of their

252
00:10:16,550 --> 00:10:13,839
food that they eat affect their

253
00:10:18,790 --> 00:10:16,560
long-term health and their reaction to

254
00:10:20,630 --> 00:10:18,800
microgravity we're finding out that some

255
00:10:22,069 --> 00:10:20,640
of the things that you would think might

256
00:10:22,790 --> 00:10:22,079
be

257
00:10:25,030 --> 00:10:22,800
the

258
00:10:27,350 --> 00:10:25,040
expected behavior such as eating a lot

259
00:10:29,269 --> 00:10:27,360
of protein would be good for you when

260
00:10:31,910 --> 00:10:29,279
really it may end up not being as good

261
00:10:34,470 --> 00:10:31,920
for you and so we're working on how to

262
00:10:36,230 --> 00:10:34,480
fine-tune the diet so that

263
00:10:38,470 --> 00:10:36,240

they uh they can

264
00:10:39,829 --> 00:10:38,480
keep good muscle

265
00:10:41,750 --> 00:10:39,839
muscle uh

266
00:10:43,350 --> 00:10:41,760
health and that their bones don't

267
00:10:45,430 --> 00:10:43,360
deteriorate and

268
00:10:46,790 --> 00:10:45,440
that goes right along with exercise

269
00:10:48,389 --> 00:10:46,800
which is very important to make sure

270
00:10:50,230 --> 00:10:48,399
they stay healthy and they can return to

271
00:10:57,190 --> 00:10:50,240
one gravity and be able to be healthy

272
00:11:01,030 --> 00:10:59,670
and i should add that chris hadfield uh

273
00:11:03,430 --> 00:11:01,040
has said he's bringing some special

274
00:11:04,710 --> 00:11:03,440
treats up to the crew uh on his you know

275
00:11:07,110 --> 00:11:04,720
they're about ready to dock with the

276
00:11:08,870 --> 00:11:07,120
space station tomorrow and so whenever a

277
00:11:10,470 --> 00:11:08,880
new crew comes up they bring lots of

278
00:11:12,310 --> 00:11:10,480
special treats and some of those treats

279
00:11:14,069 --> 00:11:12,320
are fresh fruit and

280
00:11:15,269 --> 00:11:14,079
special things like chocolate and other

281
00:11:17,110 --> 00:11:15,279
things so we don't know exactly what

282
00:11:18,389 --> 00:11:17,120
they're bringing but we know that the

283
00:11:21,190 --> 00:11:18,399
crew that's on board is going to get

284
00:11:23,670 --> 00:11:21,200
some special holiday surprises

285
00:11:26,829 --> 00:11:23,680
yes i'm sure there'll be maple involved

286
00:11:28,790 --> 00:11:26,839
oh maple that's right he is from canada

287
00:11:32,310 --> 00:11:28,800
yes

288
00:11:36,470 --> 00:11:34,710

the question is how do you keep the

289
00:11:40,870 --> 00:11:36,480
astronauts from feeling lonely or

290
00:11:44,470 --> 00:11:42,870
oh wow yes they are because they are

291
00:11:45,829 --> 00:11:44,480
able to speak with their families and

292
00:11:47,110 --> 00:11:45,839
and there's more than one of them on

293
00:11:49,190 --> 00:11:47,120
board at all times you know there's

294
00:11:51,350 --> 00:11:49,200
always constant interaction with one

295
00:11:53,509 --> 00:11:51,360
another um they have what's called like

296
00:11:55,190 --> 00:11:53,519
a crew webpage and they're able to

297
00:11:56,629 --> 00:11:55,200
select movies and you know some of their

298
00:11:57,829 --> 00:11:56,639
favorite movies and television shows

299
00:11:59,670 --> 00:11:57,839
that they like to watch here on the

300
00:12:01,829 --> 00:11:59,680
ground they're able to do that and read

301
00:12:03,269 --> 00:12:01,839
you know newspapers and

302
00:12:04,949 --> 00:12:03,279
they're able to still kind of keep up

303
00:12:07,110 --> 00:12:04,959
with world events and everything so they

304
00:12:08,150 --> 00:12:07,120
don't feel you know too isolated you

305
00:12:09,670 --> 00:12:08,160
don't want them to feel like they're

306
00:12:11,350 --> 00:12:09,680
completely out of touch and so there are

307
00:12:13,269 --> 00:12:11,360
ways we have a group a whole team of

308
00:12:15,509 --> 00:12:13,279
people that their job is to make sure

309
00:12:17,750 --> 00:12:15,519
that the crew doesn't feel lonely or

310
00:12:19,990 --> 00:12:17,760
isolated while they're in space right

311
00:12:22,629 --> 00:12:20,000
and they also have regular conferences

312
00:12:25,030 --> 00:12:22,639
with for example their boss here at the

313
00:12:26,629 --> 00:12:25,040

ground bob bacon is the leaf

314
00:12:28,710 --> 00:12:26,639
astronaut and he has a regular

315
00:12:30,470 --> 00:12:28,720
conference with the crew and then you

316
00:12:32,550 --> 00:12:30,480
know we work

317
00:12:35,110 --> 00:12:32,560
in shifts here in mission control but

318
00:12:37,509 --> 00:12:35,120
for every expedition uh there is a lead

319
00:12:39,430 --> 00:12:37,519
flight director and chris edelen is the

320
00:12:41,670 --> 00:12:39,440
lead flight director for expedition 34

321
00:12:43,190 --> 00:12:41,680
right now and he has a weekly tag up

322
00:12:45,509 --> 00:12:43,200
with them and he can actually bring

323
00:12:47,190 --> 00:12:45,519
friends and and colleagues that are

324
00:12:49,350 --> 00:12:47,200
particularly close to the crew members

325
00:12:51,030 --> 00:12:49,360
in and they do a two-way conversation

326
00:12:53,110 --> 00:12:51,040
just like this where they can see and

327
00:12:54,949 --> 00:12:53,120
hear each other and do that so in

328
00:12:56,949 --> 00:12:54,959
addition to keeping them up together

329
00:12:58,230 --> 00:12:56,959
with their families they also have their

330
00:13:00,389 --> 00:12:58,240
friends and colleagues that they work

331
00:13:01,990 --> 00:13:00,399
with day to day an opportunity to get up

332
00:13:03,509 --> 00:13:02,000
there and one other thing they have is

333
00:13:04,870 --> 00:13:03,519
they do have access to the internet

334
00:13:07,990 --> 00:13:04,880
directly

335
00:13:08,790 --> 00:13:08,000
it is uh not the fastest uh uh

336
00:13:10,949 --> 00:13:08,800
uh

337
00:13:13,030 --> 00:13:10,959
communication line that you've ever seen

338
00:13:14,710 --> 00:13:13,040

uh but they can actually go out and look

339
00:13:16,710 --> 00:13:14,720
online and they could even

340
00:13:18,790 --> 00:13:16,720
order flowers for their wives uh for

341
00:13:20,710 --> 00:13:18,800
their anniversary or send down a special

342
00:13:21,990 --> 00:13:20,720
birthday present

343
00:13:28,389 --> 00:13:22,000
through one of the online ordering

344
00:13:32,470 --> 00:13:30,150
thank you

345
00:13:34,310 --> 00:13:32,480
you're welcome

346
00:13:35,750 --> 00:13:34,320
okay we're gonna have the students speak

347
00:13:37,030 --> 00:13:35,760
a little bit closer to the computer i

348
00:13:38,629 --> 00:13:37,040
think that will help you out a little

349
00:13:41,110 --> 00:13:38,639
bit

350
00:13:47,110 --> 00:13:41,120
hi my name's kristen and my question is

351
00:13:51,670 --> 00:13:48,629
oh gosh i don't know exactly how many

352
00:13:54,629 --> 00:13:51,680
okay generally there are about 20 or 30

353
00:13:57,269 --> 00:13:54,639
people in here uh during a normal work

354
00:14:00,150 --> 00:13:57,279
day shift for the crew uh the crew wakes

355
00:14:02,790 --> 00:14:00,160
up about midnight houston time

356
00:14:05,189 --> 00:14:02,800
uh and then they go to bed around 3 30

357
00:14:08,389 --> 00:14:05,199
in the afternoon houston time

358
00:14:10,550 --> 00:14:08,399
and so from those periods we have a full

359
00:14:12,069 --> 00:14:10,560
team of flight controllers here and

360
00:14:13,990 --> 00:14:12,079
that's around 20 or 30 people and then

361
00:14:16,710 --> 00:14:14,000
there are some additional folks that are

362
00:14:19,509 --> 00:14:16,720
in support rooms that are nearby here

363
00:14:20,949 --> 00:14:19,519

that provides specialized input to the

364
00:14:22,470 --> 00:14:20,959
team here that's in what we call the

365
00:14:24,310 --> 00:14:22,480
front room

366
00:14:25,590 --> 00:14:24,320
and then we also

367
00:14:28,150 --> 00:14:25,600
have

368
00:14:30,949 --> 00:14:28,160
an opportunity to pull in specialists

369
00:14:33,110 --> 00:14:30,959
from the research area and principal

370
00:14:35,110 --> 00:14:33,120
investigators and those folks mainly

371
00:14:37,829 --> 00:14:35,120
come in through the payload operations

372
00:14:39,350 --> 00:14:37,839
center in huntsville alabama where nasa

373
00:14:40,949 --> 00:14:39,360
has the marshall space flight center and

374
00:14:43,030 --> 00:14:40,959
they coordinate all the research

375
00:14:54,389 --> 00:14:43,040
activities so there's lots of different

376
00:14:57,750 --> 00:14:55,910
hi i'm matthew

377
00:15:03,670 --> 00:14:57,760
what type of experiments are done on the

378
00:15:09,670 --> 00:15:05,990
there are some you know there at any

379
00:15:11,269 --> 00:15:09,680
given time there are between 150 and 200

380
00:15:13,910 --> 00:15:11,279
different experiments going on the space

381
00:15:16,949 --> 00:15:13,920
station some of them involve crew

382
00:15:18,550 --> 00:15:16,959
involvement some of them are done by

383
00:15:19,910 --> 00:15:18,560
investigators here on the ground working

384
00:15:21,590 --> 00:15:19,920
remotely

385
00:15:23,430 --> 00:15:21,600
there are three different laboratories

386
00:15:26,069 --> 00:15:23,440
on the space station there's the nasa

387
00:15:29,030 --> 00:15:26,079
destiny laboratory there is the european

388
00:15:32,150 --> 00:15:29,040

space agency's columbus laboratory and

389
00:15:34,230 --> 00:15:32,160
there's the japanese space agency's kibo

390
00:15:36,470 --> 00:15:34,240
laboratory and kibo means hope in

391
00:15:38,870 --> 00:15:36,480
japanese and so we have all these

392
00:15:40,710 --> 00:15:38,880
different experiments and there's a an

393
00:15:43,110 --> 00:15:40,720
international space station program

394
00:15:45,350 --> 00:15:43,120
science office that is based here in

395
00:15:46,870 --> 00:15:45,360
houston and they work with the folks at

396
00:15:49,509 --> 00:15:46,880
the marshall

397
00:15:52,230 --> 00:15:49,519
in huntsville alabama to coordinate all

398
00:15:54,069 --> 00:15:52,240
the different experiments and among the

399
00:15:56,230 --> 00:15:54,079
experiments they do a lot of it is is

400
00:15:58,470 --> 00:15:56,240
biological experiments they use the crew

401
00:16:01,110 --> 00:15:58,480
members themselves as

402
00:16:05,430 --> 00:16:01,120
test subjects and so they will do

403
00:16:06,629 --> 00:16:05,440
different types of exercise or they will

404
00:16:09,269 --> 00:16:06,639
look at

405
00:16:11,749 --> 00:16:09,279
different displays on a laptop computer

406
00:16:14,389 --> 00:16:11,759
and have to respond to it

407
00:16:16,790 --> 00:16:14,399
they will record their daily intake of

408
00:16:19,670 --> 00:16:16,800
whatever foods they ate

409
00:16:22,550 --> 00:16:19,680
and keep journals of their moods and

410
00:16:24,710 --> 00:16:22,560
things that they feel and how they are

411
00:16:26,150 --> 00:16:24,720
and so they do all that and there's

412
00:16:29,189 --> 00:16:26,160
other biological experiments that

413
00:16:31,030 --> 00:16:29,199

involve things like fish and and mice

414
00:16:33,189 --> 00:16:31,040
spiders and butterflies right now

415
00:16:35,430 --> 00:16:33,199
they're working today kevin ford was

416
00:16:37,269 --> 00:16:35,440
working with the madoka fish experiment

417
00:16:38,790 --> 00:16:37,279
which is these tiny little fish and

418
00:16:40,389 --> 00:16:38,800
there's a

419
00:16:41,670 --> 00:16:40,399
small aquarium on board the space

420
00:16:44,310 --> 00:16:41,680
station

421
00:16:45,990 --> 00:16:44,320
and these little fish have uh of course

422
00:16:48,550 --> 00:16:46,000
skeletal systems because we all know if

423
00:16:51,350 --> 00:16:48,560
the fish have skeletons just like humans

424
00:16:53,990 --> 00:16:51,360
do they're just a lot smaller and so but

425
00:16:55,749 --> 00:16:54,000
because fish have faster metabolisms and

426
00:16:57,749 --> 00:16:55,759
don't live as long

427
00:17:00,230 --> 00:16:57,759
their the effects of microgravity on

428
00:17:01,430 --> 00:17:00,240
their bones are happens a lot faster

429
00:17:03,590 --> 00:17:01,440
than it does for us and so the

430
00:17:07,029 --> 00:17:03,600
researchers are looking at those fish

431
00:17:08,789 --> 00:17:07,039
bones to find out what longer duration

432
00:17:10,230 --> 00:17:08,799
space flight for humans how that might

433
00:17:11,590 --> 00:17:10,240
affect our skeleton systems because

434
00:17:13,829 --> 00:17:11,600
that's one of the things we've noticed

435
00:17:16,390 --> 00:17:13,839
is that when you live on board the space

436
00:17:18,630 --> 00:17:16,400
station for five six months

437
00:17:21,429 --> 00:17:18,640
you tend to lose bone mass now we're

438
00:17:23,590 --> 00:17:21,439

learning that certain types of exercise

439
00:17:25,350 --> 00:17:23,600
can really help us keep that from

440
00:17:27,510 --> 00:17:25,360
happening and we're actually getting

441
00:17:29,669 --> 00:17:27,520
really close to the point where we have

442
00:17:31,510 --> 00:17:29,679
zero loss of bone density on the space

443
00:17:33,029 --> 00:17:31,520
station but you can imagine

444
00:17:34,630 --> 00:17:33,039
a lot of people have a thing called

445
00:17:36,630 --> 00:17:34,640
osteoporosis when you get older i don't

446
00:17:37,990 --> 00:17:36,640
know if your grandparents may have any

447
00:17:39,510 --> 00:17:38,000
of this yet

448
00:17:41,270 --> 00:17:39,520
but but it means your skeleton is a

449
00:17:43,190 --> 00:17:41,280
little bit weaker and you tend to have

450
00:17:44,870 --> 00:17:43,200
broken bones or a lot of people have

451
00:17:46,470 --> 00:17:44,880
broken hips and things like that as they

452
00:17:48,950 --> 00:17:46,480
get older and

453
00:17:50,549 --> 00:17:48,960
we're working on learning how that

454
00:17:52,710 --> 00:17:50,559
affects astronauts because it happens at

455
00:17:54,150 --> 00:17:52,720
a lot faster rate we're hoping we can

456
00:17:55,990 --> 00:17:54,160
translate that to things that you can

457
00:17:57,990 --> 00:17:56,000
help people on the ground

458
00:17:59,830 --> 00:17:58,000
now there are plant experiments

459
00:18:01,830 --> 00:17:59,840
we were looking at the difference in the

460
00:18:03,830 --> 00:18:01,840
way plants grow

461
00:18:06,549 --> 00:18:03,840
on the ground and in space

462
00:18:07,669 --> 00:18:06,559
there are experiments as to how fire

463
00:18:09,830 --> 00:18:07,679

works

464
00:18:11,430 --> 00:18:09,840
and you know fire on a space station

465
00:18:13,110 --> 00:18:11,440
since it's an enclosed environment is a

466
00:18:14,710 --> 00:18:13,120
very dangerous thing and that's part of

467
00:18:17,909 --> 00:18:14,720
the thing you train them for is how to

468
00:18:20,870 --> 00:18:17,919
put out fires and how to react quickly

469
00:18:22,789 --> 00:18:20,880
but it also can help us make uh

470
00:18:25,029 --> 00:18:22,799
engines run more efficiently whether

471
00:18:26,310 --> 00:18:25,039
it's car engines or jet engines here on

472
00:18:27,270 --> 00:18:26,320
earth

473
00:18:30,150 --> 00:18:27,280
there's

474
00:18:32,150 --> 00:18:30,160
experiments into uh how to recycle

475
00:18:34,710 --> 00:18:32,160
things uh i don't know if you know this

476
00:18:36,310 --> 00:18:34,720
but the water that the crew members on

477
00:18:38,549 --> 00:18:36,320
the space station drink

478
00:18:40,310 --> 00:18:38,559
used to be their urine so they went to

479
00:18:42,390 --> 00:18:40,320
the bathroom and then that went through

480
00:18:44,789 --> 00:18:42,400
a special filtration system

481
00:18:46,710 --> 00:18:44,799
that does essentially what the earth

482
00:18:48,789 --> 00:18:46,720
itself does in about five thousand years

483
00:18:52,150 --> 00:18:48,799
but it takes about a week or two to

484
00:18:53,590 --> 00:18:52,160
recycle uh yesterday's coffee into

485
00:18:55,669 --> 00:18:53,600
tomorrow's coffee as one of our

486
00:18:57,510 --> 00:18:55,679
astronauts used to say and so we test

487
00:19:00,230 --> 00:18:57,520
things like that

488
00:19:02,870 --> 00:19:00,240

there are also important things

489
00:19:05,909 --> 00:19:02,880
looking at things like bacteria

490
00:19:08,870 --> 00:19:05,919
researchers have found out that there is

491
00:19:11,029 --> 00:19:08,880
a specific gene in some bacteria that

492
00:19:13,029 --> 00:19:11,039
turns on and off

493
00:19:15,190 --> 00:19:13,039
its ability to make you sick

494
00:19:17,029 --> 00:19:15,200
and so if we can apply that this

495
00:19:19,430 --> 00:19:17,039
particular one with salmonella which

496
00:19:22,070 --> 00:19:19,440
causes food poisoning if we can apply

497
00:19:23,830 --> 00:19:22,080
those lessons to treatments here on the

498
00:19:26,070 --> 00:19:23,840
ground we could

499
00:19:28,070 --> 00:19:26,080
virtually wipe out people getting food

500
00:19:29,510 --> 00:19:28,080
poisoning on earth

501
00:19:31,270 --> 00:19:29,520
and that would be a really help because

502
00:19:33,110 --> 00:19:31,280
a lot of people die or get very very

503
00:19:34,870 --> 00:19:33,120
sick every year

504
00:19:37,190 --> 00:19:34,880
around the world from that kind of a

505
00:19:39,750 --> 00:19:37,200
problem so very different lines of

506
00:19:41,830 --> 00:19:39,760
research ellen i should not

507
00:19:44,470 --> 00:19:41,840
i need to also look at astronomy because

508
00:19:47,669 --> 00:19:44,480
we have the alpha magnetic spectrometer

509
00:19:49,669 --> 00:19:47,679
that is collecting strange particles

510
00:19:51,350 --> 00:19:49,679
as the space station orbits the earth it

511
00:19:53,270 --> 00:19:51,360
takes advantage of the big solar rays

512
00:19:55,350 --> 00:19:53,280
and electricity to do that

513
00:19:57,270 --> 00:19:55,360

and we're expecting that to actually

514
00:19:59,029 --> 00:19:57,280
rewrite the astronomy textbooks here

515
00:20:00,870 --> 00:19:59,039
soon if you like to study the stars

516
00:20:11,669 --> 00:20:00,880
because it's going to teach us all about

517
00:20:14,789 --> 00:20:12,789
i don't want i don't want to take too

518
00:20:17,270 --> 00:20:14,799
much more time do you have time for

519
00:20:20,070 --> 00:20:17,280
another question or two or is this it

520
00:20:22,230 --> 00:20:20,080
we've got time for one more question

521
00:20:25,110 --> 00:20:22,240
we'll give you one last more question

522
00:20:31,510 --> 00:20:28,549
hi i'm jenna was working for nasa dream

523
00:20:34,149 --> 00:20:32,789
well you know it's very interesting that

524
00:20:36,149 --> 00:20:34,159
you asked that question because when i

525
00:20:39,190 --> 00:20:36,159
was a little girl i thought i would

526
00:20:41,190 --> 00:20:39,200
never be able to work at nasa because to

527
00:20:43,029 --> 00:20:41,200
me i thought it was unreachable

528
00:20:45,190 --> 00:20:43,039
but you know i was encouraged by my

529
00:20:47,190 --> 00:20:45,200
teachers especially and and by my

530
00:20:49,110 --> 00:20:47,200
parents that you know never say that

531
00:20:50,870 --> 00:20:49,120
anything is impossible as long as you

532
00:20:53,350 --> 00:20:50,880
try to do your best and i took a

533
00:20:55,510 --> 00:20:53,360
different avenue i didn't major

534
00:20:57,590 --> 00:20:55,520
in astronomy or anything like that but i

535
00:21:00,070 --> 00:20:57,600
did apply the knowledge that i did

536
00:21:02,470 --> 00:21:00,080
receive in school to what i do now and

537
00:21:04,710 --> 00:21:02,480
it and it's perfect and so i would just

538
00:21:06,950 --> 00:21:04,720

encourage you that don't limit yourself

539
00:21:09,510 --> 00:21:06,960
don't ever think that you know i'm not

540
00:21:11,510 --> 00:21:09,520
really into science or my strong point

541
00:21:13,510 --> 00:21:11,520
might be something else and so therefore

542
00:21:15,669 --> 00:21:13,520
i i would wouldn't make it in any

543
00:21:17,750 --> 00:21:15,679
particular field because you have so

544
00:21:20,149 --> 00:21:17,760
many talents inside of you that are just

545
00:21:22,390 --> 00:21:20,159
waiting to come out so for me

546
00:21:24,230 --> 00:21:22,400
i i thought i could never do it and here

547
00:21:25,990 --> 00:21:24,240
i am and i would never dream of being

548
00:21:27,510 --> 00:21:26,000
anywhere else i absolutely love being

549
00:21:29,350 --> 00:21:27,520
here to mona lisa you have to tell them

550
00:21:31,510 --> 00:21:29,360
what you studied okay

551
00:21:33,430 --> 00:21:31,520
so my my degree is actually in

552
00:21:35,029 --> 00:21:33,440
criminology so that just goes to show

553
00:21:37,909 --> 00:21:35,039
you here it is i thought i would be you

554
00:21:39,510 --> 00:21:37,919
know fbi cia and instead here i'm

555
00:21:40,710 --> 00:21:39,520
working with these great uh crew members

556
00:21:43,750 --> 00:21:40,720
and flight controllers and flight

557
00:21:45,990 --> 00:21:43,760
directors so you never know where your

558
00:21:48,070 --> 00:21:46,000
education will lead you that's right and

559
00:21:50,230 --> 00:21:48,080
you know i took a different path too

560
00:21:52,070 --> 00:21:50,240
i've been working at nasa for 26 years

561
00:21:54,149 --> 00:21:52,080
now

562
00:21:55,990 --> 00:21:54,159
i remember getting to stay home from

563
00:21:57,909 --> 00:21:56,000

kindergarten to watch alan shepard

564
00:21:59,029 --> 00:21:57,919
launch when the very first american went

565
00:22:00,950 --> 00:21:59,039
into space

566
00:22:02,630 --> 00:22:00,960
and i've always had a real interest in

567
00:22:04,149 --> 00:22:02,640
space but i never thought you know i

568
00:22:06,630 --> 00:22:04,159
want to be an astronaut and all that but

569
00:22:08,149 --> 00:22:06,640
i was too tall at the time and then i

570
00:22:09,909 --> 00:22:08,159
got needed to wear glasses of course

571
00:22:11,590 --> 00:22:09,919
wear contacts now and things like that

572
00:22:13,350 --> 00:22:11,600
so i never thought i could do it

573
00:22:14,950 --> 00:22:13,360
and i was a reporter and an editor for

574
00:22:16,630 --> 00:22:14,960
10 years before

575
00:22:18,870 --> 00:22:16,640
i got an opportunity to come work at

576
00:22:20,630 --> 00:22:18,880
nasa and now i've been here for 26 years

577
00:22:24,149 --> 00:22:20,640
and it's been a really rewarding career

578
00:22:26,870 --> 00:22:24,159
so my point is that a

579
00:22:29,669 --> 00:22:26,880
just study what you need your you get a

580
00:22:31,350 --> 00:22:29,679
good general education and that will set

581
00:22:33,430 --> 00:22:31,360
you up for just about anything you want

582
00:22:35,590 --> 00:22:33,440
to do in life and if it ends up being

583
00:22:38,230 --> 00:22:35,600
working at nasa remember that not

584
00:22:39,909 --> 00:22:38,240
everybody has to be an astronaut that

585
00:22:41,909 --> 00:22:39,919
there are all kinds of people that

586
00:22:44,149 --> 00:22:41,919
support in many different ways there are

587
00:22:45,590 --> 00:22:44,159
business people that keep the budgets

588
00:22:46,950 --> 00:22:45,600

running for us so that we can do the

589
00:22:49,110 --> 00:22:46,960
things we do there are flight

590
00:22:51,190 --> 00:22:49,120
controllers that support the crews here

591
00:22:53,029 --> 00:22:51,200
on the ground or people like alicia that

592
00:22:55,350 --> 00:22:53,039
help coordinate the training that's so

593
00:22:56,950 --> 00:22:55,360
important to them doing their jobs well

594
00:22:58,390 --> 00:22:56,960
for people like me that help share it

595
00:23:00,390 --> 00:22:58,400
with people like you and people like

596
00:23:03,350 --> 00:23:00,400
mike o'hare who's helping us do this

597
00:23:05,510 --> 00:23:03,360
telecon today uh who are useful and

598
00:23:06,789 --> 00:23:05,520
they're human resources people that make

599
00:23:08,950 --> 00:23:06,799
sure that we have all the right people

600
00:23:11,750 --> 00:23:08,960
to do the jobs that need to be done

601
00:23:14,789 --> 00:23:11,760
so just remember that you should follow

602
00:23:16,789 --> 00:23:14,799
what what you like to do because

603
00:23:18,390 --> 00:23:16,799
life is too short to be doing something

604
00:23:20,870 --> 00:23:18,400
just for the paycheck you should be

605
00:23:22,710 --> 00:23:20,880
doing something you enjoy doing and if

606
00:23:31,909 --> 00:23:22,720
that ends up being a nasa we would

607
00:23:36,549 --> 00:23:34,950
alicia thank you so very very much for

608
00:23:38,470 --> 00:23:36,559
giving us this time

609
00:23:40,149 --> 00:23:38,480
uh to spend with you we we know how

610
00:23:41,669 --> 00:23:40,159
vibrant your time is and i can't begin

611
00:23:44,070 --> 00:23:41,679
to tell you what a thrill it has been

612
00:23:46,070 --> 00:23:44,080
for us here at christ king school in our

613
00:23:47,590 --> 00:23:46,080

little town of robin vermont to to be

614
00:23:49,430 --> 00:23:47,600
able to have this opportunity to speak

615
00:23:50,470 --> 00:23:49,440
with people in mission control it really

616
00:23:52,549 --> 00:23:50,480
is uh

617
00:23:54,549 --> 00:23:52,559
very inspiring to all of us thank you

618
00:23:57,110 --> 00:23:54,559
very much ken everybody can be given all

619
00:23:59,029 --> 00:23:57,120
big uh thank you

620
00:24:00,870 --> 00:23:59,039
thank you thank you i've really enjoyed

621
00:24:03,029 --> 00:24:00,880
the time we've spent together today

622
00:24:04,390 --> 00:24:03,039
thanks a bunch to you guys and to also

623
00:24:05,990 --> 00:24:04,400
everybody on the digital learning

624
00:24:08,230 --> 00:24:06,000
network that helps make these

625
00:24:10,710 --> 00:24:08,240
connections possible we love doing it