



1
00:00:06,389 --> 00:00:02,629
station this is houston are you ready

2
00:00:11,270 --> 00:00:08,549
houston this is space station we are

3
00:00:13,270 --> 00:00:11,280
ready for the event

4
00:00:15,749 --> 00:00:13,280
at talbot innovation middle school this

5
00:00:19,029 --> 00:00:15,759
is mission control in houston please

6
00:00:21,189 --> 00:00:19,039
call station for a voice check

7
00:00:22,790 --> 00:00:21,199
station this is ben squire at talbot

8
00:00:26,550 --> 00:00:22,800
innovation middle school how do you hear

9
00:00:31,029 --> 00:00:28,790
ben i'm so glad to finally talk to you

10
00:00:31,750 --> 00:00:31,039
from space i've been looking forward to

11
00:00:33,270 --> 00:00:31,760
to

12
00:00:35,190 --> 00:00:33,280
talking with you and your school for

13
00:00:36,790 --> 00:00:35,200

quite a while good morning it's great to

14

00:00:40,150 --> 00:00:36,800

be with you from the international space

15

00:00:57,430 --> 00:00:41,510

thank you very much chris we'll get

16

00:01:02,470 --> 00:01:00,790

hello miss hello mr cassidy my name is

17

00:01:03,189 --> 00:01:02,480

i'm interested in knowing what is it

18

00:01:09,190 --> 00:01:03,199

like

19

00:01:13,830 --> 00:01:11,590

oh the feeling of zero gravity is is

20

00:01:16,550 --> 00:01:13,840

just tremendous and yes it's very easy

21

00:01:18,070 --> 00:01:16,560

for to do a flip uh and i can do it with

22

00:01:19,749 --> 00:01:18,080

uh

23

00:01:21,429 --> 00:01:19,759

hopefully not crashing my head into the

24

00:01:23,109 --> 00:01:21,439

ceiling but it feels just tremendous

25

00:01:24,149 --> 00:01:23,119

imagine if you were in your classroom

26

00:01:25,910 --> 00:01:24,159

right there

27

00:01:27,749 --> 00:01:25,920

and instead of sitting in the chairs

28

00:01:28,870 --> 00:01:27,759

that you are everybody was floating in

29

00:01:30,310 --> 00:01:28,880

the middle of the room and having a

30

00:01:32,710 --> 00:01:30,320

discussion that's what it's like every

31

00:01:46,230 --> 00:01:32,720

time we have dinner together on board

32

00:01:53,190 --> 00:01:48,469

hello

33

00:01:58,630 --> 00:01:53,200

you think that humans losing mars is

34

00:02:01,990 --> 00:01:59,749

madison

35

00:02:04,950 --> 00:02:02,000

that's a really intriguing question

36

00:02:07,910 --> 00:02:04,960

i definitely think humans going to mars

37

00:02:10,150 --> 00:02:07,920

is realistic and in fact um when one of

38

00:02:12,710 --> 00:02:10,160

you guys is an astronaut it i really

39

00:02:14,550 --> 00:02:12,720

believe it'll happen uh maybe not in the

40

00:02:17,430 --> 00:02:14,560

time while i'm an active

41

00:02:19,030 --> 00:02:17,440

active astronaut but what um

42

00:02:21,589 --> 00:02:19,040

myself and the others that are working

43

00:02:23,430 --> 00:02:21,599

at nasa right now are paving the way to

44

00:02:25,430 --> 00:02:23,440

so that all the support systems and

45

00:02:27,589 --> 00:02:25,440

things like this uh will be in place

46

00:02:30,790 --> 00:02:27,599

that you know you can rely reliably

47

00:02:33,509 --> 00:02:30,800

trust those uh those systems as you

48

00:02:35,350 --> 00:02:33,519

travel on to mars it's a long way as you

49

00:02:37,030 --> 00:02:35,360

know to get there and given the current

50

00:02:39,750 --> 00:02:37,040

propulsion technology it would take a

51
00:02:41,990 --> 00:02:39,760
significant amount of time and i'd have

52
00:02:45,110 --> 00:02:42,000
to think long and hard about going

53
00:02:46,790 --> 00:02:45,120
because it's a long time away from

54
00:02:49,270 --> 00:02:46,800
family and friends and loved ones but

55
00:02:51,830 --> 00:02:49,280
it's a great goal to have to get to mars

56
00:02:53,589 --> 00:02:51,840
so i'd really think think about that if

57
00:02:55,670 --> 00:02:53,599
we deve as we're developing new

58
00:02:56,390 --> 00:02:55,680
technologies which are uh

59
00:03:00,390 --> 00:02:56,400
in

60
00:03:02,470 --> 00:03:00,400
serious uh this a serious process of

61
00:03:05,509 --> 00:03:02,480
development right now that could get us

62
00:03:07,910 --> 00:03:05,519
there in much much shorter of a time

63
00:03:09,589 --> 00:03:07,920

with a constant low thrust constant

64

00:03:11,750 --> 00:03:09,599

propulsion that can get us to mars much

65

00:03:15,030 --> 00:03:11,760

more quickly so that's exciting for me

66

00:03:17,270 --> 00:03:15,040

to think about to pave the way for folks

67

00:03:24,630 --> 00:03:17,280

like you to be walking on mars and not

68

00:03:28,390 --> 00:03:26,710

hello mr cassidy my name is kenneth and

69

00:03:30,229 --> 00:03:28,400

i'm in the sixth grade i was wondering

70

00:03:35,110 --> 00:03:30,239

what kind of projects is rover not used

71

00:03:38,949 --> 00:03:37,270

our buddy robonaut is an interesting

72

00:03:41,350 --> 00:03:38,959

crewmate

73

00:03:43,190 --> 00:03:41,360

he doesn't take up

74

00:03:45,110 --> 00:03:43,200

much space when he's packed away in his

75

00:03:47,350 --> 00:03:45,120

in his side he's very quiet and minds

76
00:03:48,390 --> 00:03:47,360
his manners so we love having him on

77
00:03:50,949 --> 00:03:48,400
board

78
00:03:52,550 --> 00:03:50,959
now what he's used for right now is

79
00:03:53,509 --> 00:03:52,560
figuring out

80
00:03:56,229 --> 00:03:53,519
how

81
00:03:57,910 --> 00:03:56,239
to function and the ground teams are

82
00:04:00,470 --> 00:03:57,920
running through their test programs to

83
00:04:02,869 --> 00:04:00,480
make sure that he's safe and we can

84
00:04:04,710 --> 00:04:02,879
trust him to do tasks and things like

85
00:04:07,110 --> 00:04:04,720
this in the in the in the

86
00:04:09,270 --> 00:04:07,120
not too distant future

87
00:04:11,830 --> 00:04:09,280
he can be programmed to do certain

88
00:04:13,589 --> 00:04:11,840

procedures and to ten to ten perhaps to

89

00:04:15,110 --> 00:04:13,599

certain experiments right now he's not

90

00:04:19,430 --> 00:04:15,120

quite ready for that

91

00:04:22,710 --> 00:04:21,030

the test program

92

00:04:24,390 --> 00:04:22,720

making sure that everything is sorted

93

00:04:25,670 --> 00:04:24,400

out and squared away but it's pretty

94

00:04:27,350 --> 00:04:25,680

neat to see him

95

00:04:29,270 --> 00:04:27,360

and when you put on the virtual reality

96

00:04:31,590 --> 00:04:29,280

glasses it's as if you

97

00:04:33,590 --> 00:04:31,600

are robonaut looking through his vision

98

00:04:35,909 --> 00:04:33,600

and your hands can move and his hands

99

00:04:38,710 --> 00:04:35,919

respond so it's a really really fun

100

00:04:40,870 --> 00:04:38,720

experiment for us to try and uh and work

101
00:04:45,990 --> 00:04:40,880
with robot robonaut it's it's a lot of

102
00:04:51,270 --> 00:04:48,629
hello my name is joseph and i wanted to

103
00:04:53,749 --> 00:04:51,280
know how do gases and liquids move

104
00:04:59,350 --> 00:04:53,759
differently in space with with zero

105
00:05:05,270 --> 00:05:02,629
joseph you have good insight

106
00:05:07,350 --> 00:05:05,280
so liquids as a matter of fact i could i

107
00:05:09,430 --> 00:05:07,360
could show you what liquids do that the

108
00:05:10,950 --> 00:05:09,440
surface tension of the of the liquids

109
00:05:11,830 --> 00:05:10,960
particularly water is what i'm using

110
00:05:14,550 --> 00:05:11,840
right now

111
00:05:17,189 --> 00:05:14,560
keeps keeps it together quite well

112
00:05:18,310 --> 00:05:17,199
and they form nice little bubbles

113
00:05:19,590 --> 00:05:18,320

and uh

114

00:05:21,670 --> 00:05:19,600

i don't know if you can see that in the

115

00:05:24,390 --> 00:05:21,680

camera very well but

116

00:05:26,790 --> 00:05:24,400

those bubbles uh

117

00:05:28,629 --> 00:05:26,800

float around and if it's not water

118

00:05:30,469 --> 00:05:28,639

it can get on our walls and on saturday

119

00:05:31,830 --> 00:05:30,479

mornings we have to clean that up but

120

00:05:33,830 --> 00:05:31,840

that's how

121

00:05:34,550 --> 00:05:33,840

how the liquid behaves really just sort

122

00:05:35,909 --> 00:05:34,560

of

123

00:05:37,270 --> 00:05:35,919

wobbles around one interesting

124

00:05:38,469 --> 00:05:37,280

experiment

125

00:05:40,390 --> 00:05:38,479

a part of

126

00:05:42,710 --> 00:05:40,400

is

127

00:05:44,790 --> 00:05:42,720

designing certain

128

00:05:48,150 --> 00:05:44,800

certain vessels to hold those those

129

00:05:50,469 --> 00:05:48,160

liquids such that

130

00:05:52,230 --> 00:05:50,479

the shape of the vessel forces the fluid

131

00:05:55,110 --> 00:05:52,240

to go in a certain way and the use for

132

00:05:57,270 --> 00:05:55,120

that would be having fuel tanks without

133

00:05:58,230 --> 00:05:57,280

pumps to move that fluid around so the

134

00:06:00,230 --> 00:05:58,240

natural

135

00:06:01,670 --> 00:06:00,240

surface tension forces will get those

136

00:06:04,150 --> 00:06:01,680

the fluid to go where you want that's

137

00:06:05,590 --> 00:06:04,160

really interesting now gases on the

138

00:06:07,189 --> 00:06:05,600

other hand

139

00:06:08,950 --> 00:06:07,199

they don't really spread that well so

140

00:06:11,670 --> 00:06:08,960

what we need is a lot of fans our air

141

00:06:14,390 --> 00:06:11,680

conditioning system up here

142

00:06:16,390 --> 00:06:14,400

is working all the time not only to keep

143

00:06:19,029 --> 00:06:16,400

us keep the temperature well that's only

144

00:06:21,270 --> 00:06:19,039

part of the the story it's to circulate

145

00:06:24,150 --> 00:06:21,280

all this air as i exhale right now the

146

00:06:26,390 --> 00:06:24,160

co2 if i didn't the co2 around me would

147

00:06:28,629 --> 00:06:26,400

just form a bubble around my head if the

148

00:06:30,950 --> 00:06:28,639

air conditioning system wasn't working

149

00:06:32,550 --> 00:06:30,960

the way it is to circulate that air and

150

00:06:35,029 --> 00:06:32,560

get everything flowing around so we have

151

00:06:41,350 --> 00:06:35,039

a nice mixture of all the gases that we

152

00:06:45,350 --> 00:06:43,749

hello mr cassie my name is haley i'm in

153

00:06:46,710 --> 00:06:45,360

sixth grade i was wondering what would

154

00:06:52,790 --> 00:06:46,720

happen if you went outside the space

155

00:06:58,309 --> 00:06:56,070

well the short answer is uh my wife and

156

00:07:00,790 --> 00:06:58,319

kids and mom and dad and brother would

157

00:07:02,790 --> 00:07:00,800

not be too happy because i wouldn't last

158

00:07:05,110 --> 00:07:02,800

very long

159

00:07:07,510 --> 00:07:05,120

the more technical answer

160

00:07:11,670 --> 00:07:09,110

your the liquids in your body would

161

00:07:13,589 --> 00:07:11,680

basically boil away and it's much like

162

00:07:15,749 --> 00:07:13,599

imagine if you climb when you if you

163

00:07:18,629 --> 00:07:15,759

ever read about mount everest climbers

164

00:07:20,150 --> 00:07:18,639

if they climb without oxygen bottles as

165

00:07:21,589 --> 00:07:20,160

they climb up there is getting thinner

166

00:07:23,749 --> 00:07:21,599

and thinner and thinner it's harder and

167

00:07:25,909 --> 00:07:23,759

harder to breathe as we would be in the

168

00:07:28,710 --> 00:07:25,919

airlock without our spacesuit if we ever

169

00:07:30,390 --> 00:07:28,720

did that which we wouldn't

170

00:07:32,070 --> 00:07:30,400

it'd be harder and harder and harder to

171

00:07:34,309 --> 00:07:32,080

breathe because the air is thinner and

172

00:07:36,230 --> 00:07:34,319

thinner and less oxygen models molecules

173

00:07:37,830 --> 00:07:36,240

to work until you get to the vacuum of

174

00:07:39,749 --> 00:07:37,840

space and there's some number magic

175

00:07:42,309 --> 00:07:39,759

number where you wouldn't even reach the

176
00:07:44,469 --> 00:07:42,319
vacuum you would you'd be uh

177
00:07:53,830 --> 00:07:44,479
out before you got there

178
00:07:58,070 --> 00:07:56,070
hello mr cassidy my name is sadie and i

179
00:07:59,830 --> 00:07:58,080
am in seventh grade i was wondering what

180
00:08:05,670 --> 00:07:59,840
it feels like to experience earth from a

181
00:08:09,589 --> 00:08:06,469
well

182
00:08:11,670 --> 00:08:09,599
let me tell you it's hard to describe

183
00:08:13,110 --> 00:08:11,680
how beautiful the earth looks from up

184
00:08:14,390 --> 00:08:13,120
here and

185
00:08:16,629 --> 00:08:14,400
what we see

186
00:08:19,749 --> 00:08:16,639
we we're not high enough our altitude is

187
00:08:22,710 --> 00:08:19,759
about 250 miles uh so we can't see the

188
00:08:24,790 --> 00:08:22,720

whole globe at once imagine if you're

189

00:08:25,909 --> 00:08:24,800

you're in your mom and dad's car

190

00:08:28,790 --> 00:08:25,919

and

191

00:08:30,390 --> 00:08:28,800

the horizon kind of crossed over

192

00:08:32,949 --> 00:08:30,400

through the middle of the windshield of

193

00:08:35,430 --> 00:08:32,959

the car that's kind of what we see and

194

00:08:39,350 --> 00:08:35,440

we can see instead of just that we see

195

00:08:40,949 --> 00:08:39,360

that amount of a circle underneath us

196

00:08:42,870 --> 00:08:40,959

and for instance right now we just

197

00:08:44,790 --> 00:08:42,880

passed the coast of the east coast of

198

00:08:47,110 --> 00:08:44,800

south america and if i looked out the

199

00:08:49,910 --> 00:08:47,120

window i could see south america off to

200

00:08:52,790 --> 00:08:49,920

our right-hand side as we're passing and

201
00:08:55,030 --> 00:08:52,800
what what what does that appear it's the

202
00:08:57,190 --> 00:08:55,040
blues the really beautiful blues of the

203
00:09:00,070 --> 00:08:57,200
ocean and the white clouds

204
00:09:02,310 --> 00:09:00,080
and white mountain tops in some places

205
00:09:04,790 --> 00:09:02,320
and really plush green vegetation and

206
00:09:06,949 --> 00:09:04,800
really stark stark dark brown of the

207
00:09:08,630 --> 00:09:06,959
deserts and you mix all that together

208
00:09:10,710 --> 00:09:08,640
and and it makes me think what a

209
00:09:13,430 --> 00:09:10,720
wonderful spaceship we all have and

210
00:09:15,430 --> 00:09:13,440
share that uh as our home that we call

211
00:09:18,710 --> 00:09:15,440
earth and it makes me want to take care

212
00:09:24,070 --> 00:09:18,720
of it and enjoy every moment that we

213
00:09:28,470 --> 00:09:26,550

hello mr cassidy this is keith i am

214

00:09:30,310 --> 00:09:28,480

interested in knowing what would happen

215

00:09:36,310 --> 00:09:30,320

if a satellite or space debris were

216

00:09:40,710 --> 00:09:38,470

well keith that's a a real threat

217

00:09:42,949 --> 00:09:40,720

actually and the the way we mitigate

218

00:09:43,990 --> 00:09:42,959

that threat or lessen the risk for that

219

00:09:46,230 --> 00:09:44,000

happening

220

00:09:47,829 --> 00:09:46,240

is there are tracking stations around

221

00:09:48,710 --> 00:09:47,839

the world that can help

222

00:09:50,870 --> 00:09:48,720

track

223

00:09:53,030 --> 00:09:50,880

pieces of debris that we know

224

00:09:56,070 --> 00:09:53,040

the trajectory of those

225

00:09:59,110 --> 00:09:56,080

part particles and can kind of predict

226

00:10:00,630 --> 00:09:59,120
to a certain level of predictability

227

00:10:02,949 --> 00:10:00,640
when that

228

00:10:04,790 --> 00:10:02,959
intersect that predicted path might

229

00:10:07,350 --> 00:10:04,800
intersect with the space station's

230

00:10:09,750 --> 00:10:07,360
predicted path and we have really smart

231

00:10:12,069 --> 00:10:09,760
people that do that project that out

232

00:10:14,230 --> 00:10:12,079
several days and if it looks like it's

233

00:10:16,230 --> 00:10:14,240
going to be a problem what we can do is

234

00:10:19,110 --> 00:10:16,240
maneuver the space station basically

235

00:10:21,990 --> 00:10:19,120
increase its altitude

236

00:10:23,910 --> 00:10:22,000
and change slightly our orbit so that it

237

00:10:26,310 --> 00:10:23,920
it lessens the likelihood that that will

238

00:10:28,069 --> 00:10:26,320

happen now the unfortunate part is

239

00:10:30,550 --> 00:10:28,079

there's lots of tiny little particles

240

00:10:32,630 --> 00:10:30,560

that are untrackable and those could

241

00:10:34,710 --> 00:10:32,640

could it's always a risk that that they

242

00:10:37,030 --> 00:10:34,720

would hit and in the event that it hit

243

00:10:38,870 --> 00:10:37,040

the space station and penetrated a hole

244

00:10:41,030 --> 00:10:38,880

that's where we train for emergencies

245

00:10:43,990 --> 00:10:41,040

where we have the ability to close

246

00:10:45,990 --> 00:10:44,000

certain hatches and isolate that leak to

247

00:10:47,750 --> 00:10:46,000

just one compartment and we'd have the

248

00:10:50,069 --> 00:10:47,760

remainder of the space station to be

249

00:10:52,790 --> 00:10:50,079

safe in and in the worst case scenario

250

00:10:54,710 --> 00:10:52,800

we climb into our soyuz and

251
00:11:02,710 --> 00:10:54,720
undock from the space station and come

252
00:11:07,829 --> 00:11:06,150
hello mr cassidy my name is anastasia

253
00:11:13,190 --> 00:11:07,839
could you explain the difference between

254
00:11:15,910 --> 00:11:15,030
oh good question

255
00:11:17,030 --> 00:11:15,920
so

256
00:11:19,110 --> 00:11:17,040
um

257
00:11:20,230 --> 00:11:19,120
what gives you your weight

258
00:11:22,949 --> 00:11:20,240
on earth

259
00:11:24,470 --> 00:11:22,959
is your mass like how much mass is in

260
00:11:27,670 --> 00:11:24,480
your body

261
00:11:29,910 --> 00:11:27,680
times the gravity that we have on earth

262
00:11:31,030 --> 00:11:29,920
so that that number multiplied gives you

263
00:11:33,990 --> 00:11:31,040

your weight

264

00:11:35,110 --> 00:11:34,000

on up here i still have mass i still in

265

00:11:37,509 --> 00:11:35,120

the same

266

00:11:38,470 --> 00:11:37,519

about 200 pound person that i am on the

267

00:11:40,230 --> 00:11:38,480

ground

268

00:11:42,550 --> 00:11:40,240

but there's no

269

00:11:45,670 --> 00:11:42,560

number to multiply it by to give me my

270

00:11:48,550 --> 00:11:45,680

weight so you multiply zero times about

271

00:11:51,190 --> 00:11:48,560

200 and you get zero so that's how i

272

00:11:53,430 --> 00:11:51,200

have my weightlessness and on the ground

273

00:11:55,509 --> 00:11:53,440

when we put the gravity back into that

274

00:11:56,550 --> 00:11:55,519

math problem my weight will come right

275

00:12:01,990 --> 00:11:56,560

back

276

00:12:06,230 --> 00:12:04,470

hello mr cassidy this is kara and sarah

277

00:12:12,230 --> 00:12:06,240

we were wondering if it's scarier

278

00:12:16,470 --> 00:12:14,470

wow that's a really really neat question

279

00:12:17,750 --> 00:12:16,480

to ponder um

280

00:12:21,910 --> 00:12:17,760

i think

281

00:12:24,949 --> 00:12:21,920

the short answer would be coming home

282

00:12:27,030 --> 00:12:24,959

because we're we know we're already here

283

00:12:28,230 --> 00:12:27,040

and you still got to get back and if you

284

00:12:30,629 --> 00:12:28,240

think about it

285

00:12:33,430 --> 00:12:30,639

all of the energy all that fire and

286

00:12:36,629 --> 00:12:33,440

smoke and vibrations that goes into

287

00:12:37,590 --> 00:12:36,639

launch day that pushes us up to to uh to

288

00:12:39,990 --> 00:12:37,600

space

289

00:12:41,910 --> 00:12:40,000

all of that energy has to come back out

290

00:12:44,629 --> 00:12:41,920

and how does it come back out in the

291

00:12:46,949 --> 00:12:44,639

form of heat on the bottom of our space

292

00:12:48,710 --> 00:12:46,959

craft so

293

00:12:51,030 --> 00:12:48,720

and we have

294

00:12:53,110 --> 00:12:51,040

certain shields on the bottom that that

295

00:12:55,990 --> 00:12:53,120

prevent that heat from melting through

296

00:12:57,350 --> 00:12:56,000

the metal and once we get low enough

297

00:12:58,550 --> 00:12:57,360

those heat shields

298

00:13:00,949 --> 00:12:58,560

fall away

299

00:13:03,110 --> 00:13:00,959

and will come down under parachute but

300

00:13:06,230 --> 00:13:03,120

it's a really dynamic part coming back

301
00:13:08,870 --> 00:13:06,240
into re-entry to the atmosphere and uh

302
00:13:11,590 --> 00:13:08,880
for me that's part a part that

303
00:13:13,110 --> 00:13:11,600
we will be really focused on making sure

304
00:13:14,870 --> 00:13:13,120
we know how to safely respond to

305
00:13:21,590 --> 00:13:14,880
anything that goes wrong but it

306
00:13:26,550 --> 00:13:23,910
hello mr cassidy my name is rebecca i

307
00:13:32,949 --> 00:13:26,560
was wondering what safety procedures are

308
00:13:37,670 --> 00:13:35,509
well my last crewmate that just left

309
00:13:41,030 --> 00:13:37,680
last week tom marshburn he was a medical

310
00:13:42,629 --> 00:13:41,040
doctor so fortunately for us during my

311
00:13:44,150 --> 00:13:42,639
first two months on board if there was a

312
00:13:46,069 --> 00:13:44,160
medical problem then he would take care

313
00:13:48,389 --> 00:13:46,079

of it and he'd be right there his

314

00:13:50,310 --> 00:13:48,399

emergency medical physician but that's

315

00:13:52,710 --> 00:13:50,320

not the case all the time

316

00:13:55,509 --> 00:13:52,720

and what would be the situation if he

317

00:13:58,230 --> 00:13:55,519

was the one that was hurt so in order to

318

00:13:59,509 --> 00:13:58,240

protect for that all of us have a basic

319

00:14:02,150 --> 00:13:59,519

level of

320

00:14:04,230 --> 00:14:02,160

i would say emergency medicine of the

321

00:14:06,629 --> 00:14:04,240

airways and breathing and circulation

322

00:14:08,629 --> 00:14:06,639

kind of things for an immediate response

323

00:14:10,870 --> 00:14:08,639

how to deal with a choking victim and

324

00:14:13,990 --> 00:14:10,880

things like this

325

00:14:16,310 --> 00:14:14,000

unfortunately we have highly trained

326

00:14:19,030 --> 00:14:16,320

medical professionals and doctors who

327

00:14:21,829 --> 00:14:19,040

are on console in mission control and if

328

00:14:24,310 --> 00:14:21,839

we did have a problem like that um as

329

00:14:25,670 --> 00:14:24,320

soon as we get the person situated and

330

00:14:27,670 --> 00:14:25,680

start working on them we'd be

331

00:14:30,389 --> 00:14:27,680

immediately on the radio talking to

332

00:14:33,030 --> 00:14:30,399

those folks on the ground who in a form

333

00:14:34,870 --> 00:14:33,040

of telemedicine really would help us

334

00:14:36,790 --> 00:14:34,880

navigate our way through the the medical

335

00:14:39,030 --> 00:14:36,800

problem and make sure that person got

336

00:14:42,949 --> 00:14:39,040

the best care that they could get

337

00:14:46,629 --> 00:14:45,110

hello mr cassidy my name is hannah and

338

00:14:48,150 --> 00:14:46,639

i'm in seventh grade and i was wondering

339

00:14:53,030 --> 00:14:48,160

how often do you have to talk with your

340

00:14:58,790 --> 00:14:56,389

well once a week we have a scheduled

341

00:15:01,350 --> 00:14:58,800

video conference much like skype or

342

00:15:03,030 --> 00:15:01,360

facetime it's not those particular

343

00:15:05,030 --> 00:15:03,040

programs but

344

00:15:06,629 --> 00:15:05,040

the same type of thing where they can

345

00:15:09,110 --> 00:15:06,639

see me and i can see them and that's

346

00:15:11,110 --> 00:15:09,120

usually on the weekends

347

00:15:13,910 --> 00:15:11,120

we of course have email

348

00:15:15,750 --> 00:15:13,920

and and depending on where we are around

349

00:15:16,710 --> 00:15:15,760

the world and how the satellite coverage

350

00:15:19,269 --> 00:15:16,720

lines up

351

00:15:21,350 --> 00:15:19,279

we do have a program on our computers

352

00:15:23,430 --> 00:15:21,360

where we can

353

00:15:24,389 --> 00:15:23,440

basically dial a phone number and it'll

354

00:15:26,470 --> 00:15:24,399

ring

355

00:15:28,310 --> 00:15:26,480

on the phone on earth and we can talk

356

00:15:30,629 --> 00:15:28,320

for a little bit but the satellite

357

00:15:32,870 --> 00:15:30,639

coverage comes and goes so that's not uh

358

00:15:35,509 --> 00:15:32,880

a full-time thing that we can use but if

359

00:15:38,389 --> 00:15:35,519

the communication is really good in fact

360

00:15:40,550 --> 00:15:38,399

um you know i i sometimes feel like i'm

361

00:15:42,870 --> 00:15:40,560

more in touch with my family on the

362

00:15:45,030 --> 00:15:42,880

space station than when i was traveling

363

00:15:46,949 --> 00:15:45,040

back and forth to all the different

364

00:15:48,629 --> 00:15:46,959

training locations

365

00:15:52,710 --> 00:15:48,639

in the previous couple of years leading

366

00:15:57,430 --> 00:15:55,110

hello mr cassidy my name is connor and

367

00:15:59,110 --> 00:15:57,440

i'm in 6th grade i was wondering how

368

00:16:06,550 --> 00:15:59,120

much of your time during one day is

369

00:16:10,550 --> 00:16:09,110

well that's interesting because um if

370

00:16:12,629 --> 00:16:10,560

everything goes well with the space

371

00:16:15,350 --> 00:16:12,639

station which knock on wood has been

372

00:16:17,670 --> 00:16:15,360

going well for for us up here we had one

373

00:16:20,069 --> 00:16:17,680

small problem with an ammonia system but

374

00:16:22,069 --> 00:16:20,079

we have that fixed now if everything

375

00:16:24,949 --> 00:16:22,079

goes well we can devote a lot of time

376

00:16:27,590 --> 00:16:24,959

per day to science experiments let's

377

00:16:29,189 --> 00:16:27,600

take today in particular all morning

378

00:16:30,550 --> 00:16:29,199

from right after breakfast until right

379

00:16:33,030 --> 00:16:30,560

before lunch

380

00:16:35,269 --> 00:16:33,040

i was working on this really neat

381

00:16:37,829 --> 00:16:35,279

experiment called spheres and what they

382

00:16:39,829 --> 00:16:37,839

are are

383

00:16:42,949 --> 00:16:39,839

little small circular satellites about

384

00:16:45,030 --> 00:16:42,959

the size of a soccer ball with a way

385

00:16:46,710 --> 00:16:45,040

they have a way to navigate themselves

386

00:16:48,150 --> 00:16:46,720

inside our volume right where i'm

387

00:16:49,189 --> 00:16:48,160

standing actually is where they were

388

00:16:51,110 --> 00:16:49,199

where they were

389

00:16:52,710 --> 00:16:51,120

maneuvering around each other and

390

00:16:54,949 --> 00:16:52,720

creating a map

391

00:16:57,269 --> 00:16:54,959

of this environment and navigating with

392

00:16:58,790 --> 00:16:57,279

that map

393

00:17:01,590 --> 00:16:58,800

that's what those spheres were doing so

394

00:17:04,710 --> 00:17:01,600

i was part of really just setting up the

395

00:17:05,990 --> 00:17:04,720

experiment for the real uh scientists

396

00:17:07,909 --> 00:17:06,000

who are on the ground who are following

397

00:17:11,110 --> 00:17:07,919

along and helping me

398

00:17:14,150 --> 00:17:11,120

troubleshoot any things that arose

399

00:17:16,069 --> 00:17:14,160

that that was today so that was maybe

400

00:17:18,230 --> 00:17:16,079

four hours four and a half hours worth

401
00:17:20,230 --> 00:17:18,240
of science just today alone and then

402
00:17:22,230 --> 00:17:20,240
this afternoon i have some exercise and

403
00:17:24,549 --> 00:17:22,240
some more maintenance things

404
00:17:26,949 --> 00:17:24,559
so the short answer to your question is

405
00:17:28,870 --> 00:17:26,959
probably in a good day about four hours

406
00:17:30,830 --> 00:17:28,880
and if once we have multiple crew up

407
00:17:33,590 --> 00:17:30,840
here that number

408
00:17:35,430 --> 00:17:33,600
multiplies so it's really exciting place

409
00:17:40,789 --> 00:17:35,440
to be and to perform perform all this

410
00:17:45,510 --> 00:17:43,350
hello mr cassidy this is calvin and i

411
00:17:47,190 --> 00:17:45,520
was wondering why is middle school math

412
00:17:52,150 --> 00:17:47,200
and science important to learn and

413
00:17:56,870 --> 00:17:54,950

well calvin um

414

00:17:58,870 --> 00:17:56,880

math and science is not just important

415

00:18:01,110 --> 00:17:58,880

to become an astronaut it's important

416

00:18:03,350 --> 00:18:01,120

life skill in my opinion

417

00:18:07,110 --> 00:18:03,360

from simple things like knowing how to

418

00:18:10,789 --> 00:18:08,549

converting money when you travel

419

00:18:13,270 --> 00:18:10,799

overseas all those are small little math

420

00:18:14,789 --> 00:18:13,280

problems that you do every day that as

421

00:18:17,190 --> 00:18:14,799

you get older you don't really think

422

00:18:20,310 --> 00:18:17,200

about that you're doing math but you are

423

00:18:21,669 --> 00:18:20,320

and we have complicated complicated math

424

00:18:24,070 --> 00:18:21,679

problems that are happening up here on

425

00:18:26,870 --> 00:18:24,080

the space station such as those debris

426
00:18:28,870 --> 00:18:26,880
avoidance maneuvers the way i described

427
00:18:32,070 --> 00:18:28,880
how the space station has to

428
00:18:34,630 --> 00:18:32,080
calculate its uh its trajectory based on

429
00:18:36,870 --> 00:18:34,640
some other particles trajectory and move

430
00:18:40,549 --> 00:18:36,880
to a different position that is a really

431
00:18:42,390 --> 00:18:40,559
hard uh basically math problem where you

432
00:18:44,549 --> 00:18:42,400
have to figure out the angles and the

433
00:18:47,270 --> 00:18:44,559
geometry of all those

434
00:18:48,870 --> 00:18:47,280
particles down to simple math problems

435
00:18:49,830 --> 00:18:48,880
that we have up here

436
00:18:51,669 --> 00:18:49,840
like i

437
00:18:54,549 --> 00:18:51,679
said converting money is a small thing

438
00:18:57,590 --> 00:18:54,559

on on earth but up here we have to maybe

439

00:18:59,750 --> 00:18:57,600

calculate the time differences between

440

00:19:01,909 --> 00:18:59,760

experiments that we're conducting in

441

00:19:05,029 --> 00:19:01,919

things like this so

442

00:19:07,270 --> 00:19:05,039

math and science are fundamental

443

00:19:10,390 --> 00:19:07,280

things that we use throughout our day

444

00:19:12,630 --> 00:19:10,400

whether you're in space on the ground or

445

00:19:14,950 --> 00:19:12,640

somewhere in between

446

00:19:17,590 --> 00:19:14,960

i can't say enough how important it is

447

00:19:23,270 --> 00:19:17,600

to develop a strong foundation in that

448

00:19:27,669 --> 00:19:25,590

hello mr cassidy my name is morgan and i

449

00:19:29,510 --> 00:19:27,679

am in seventh grade i was wondering when

450

00:19:30,630 --> 00:19:29,520

you go to space about how long does it

451
00:19:37,110 --> 00:19:30,640
take you to get through earth's

452
00:19:42,310 --> 00:19:40,150
well once we climb into the rocket we

453
00:19:44,150 --> 00:19:42,320
get in we get in the rocket about two

454
00:19:46,549 --> 00:19:44,160
and a half hours before launch but that

455
00:19:49,270 --> 00:19:46,559
time doesn't count towards your answer

456
00:19:50,950 --> 00:19:49,280
once the once the rocket lights and we

457
00:19:52,710 --> 00:19:50,960
lift off the pad

458
00:19:55,029 --> 00:19:52,720
the rockets are burning for about eight

459
00:19:58,070 --> 00:19:55,039
and a half to nine minutes then the

460
00:20:00,710 --> 00:19:58,080
engine's cut off and we are safely in

461
00:20:03,029 --> 00:20:00,720
orbit we have to do a few small

462
00:20:05,190 --> 00:20:03,039
adjustments to be

463
00:20:07,350 --> 00:20:05,200

in a more stable orbit

464

00:20:09,430 --> 00:20:07,360

and if we're not going to rendezvous to

465

00:20:11,590 --> 00:20:09,440

the space station we would stay there

466

00:20:14,070 --> 00:20:11,600

and then the next day

467

00:20:15,669 --> 00:20:14,080

do a few maneuvers to catch up and align

468

00:20:17,510 --> 00:20:15,679

ourselves with the space station and on

469

00:20:19,830 --> 00:20:17,520

the third day we would rendezvous

470

00:20:23,029 --> 00:20:19,840

however

471

00:20:24,870 --> 00:20:23,039

we've tried a new technique which myself

472

00:20:27,110 --> 00:20:24,880

and my two russian crewmates pavel

473

00:20:29,029 --> 00:20:27,120

vinogradov and sasha misurkin had the

474

00:20:31,590 --> 00:20:29,039

honor and privilege of of trying out for

475

00:20:33,990 --> 00:20:31,600

the first time a few months ago and that

476

00:20:36,549 --> 00:20:34,000

was we rendezvoused to the space station

477

00:20:37,909 --> 00:20:36,559

six hours after liftoff so we did though

478

00:20:39,909 --> 00:20:37,919

that eight and a half minutes that i

479

00:20:42,390 --> 00:20:39,919

talked about and then over the course of

480

00:20:44,789 --> 00:20:42,400

the next five hours or so

481

00:20:46,950 --> 00:20:44,799

we did a series of maneuvers to catch up

482

00:20:49,990 --> 00:20:46,960

to the space station now

483

00:20:52,310 --> 00:20:50,000

speaking of math to let you appreciate

484

00:20:54,230 --> 00:20:52,320

how complicated all of that that that's

485

00:20:56,390 --> 00:20:54,240

going on the scientists that and

486

00:20:59,750 --> 00:20:56,400

engineers that calculate those maneuvers

487

00:21:03,110 --> 00:20:59,760

the space station is traveling 17 500

488

00:21:03,990 --> 00:21:03,120

miles an hour or five miles every second

489

00:21:05,669 --> 00:21:04,000

and

490

00:21:10,230 --> 00:21:05,679

the

491

00:21:12,149 --> 00:21:10,240

in has to rendezvous with that imagine a

492

00:21:14,310 --> 00:21:12,159

quarterback on a football team throwing

493

00:21:16,549 --> 00:21:14,320

a ball to a receiver who was running

494

00:21:18,230 --> 00:21:16,559

five miles a second across the field and

495

00:21:20,710 --> 00:21:18,240

you have to throw that pass and hit him

496

00:21:22,710 --> 00:21:20,720

perfectly and that's how these engineers

497

00:21:24,549 --> 00:21:22,720

calculate the the maneuver of our

498

00:21:26,630 --> 00:21:24,559

spacecraft and so over the course of

499

00:21:29,110 --> 00:21:26,640

those six hours we successfully caught

500

00:21:41,110 --> 00:21:29,120

up to the space station going 17 500

501
00:21:47,510 --> 00:21:43,590
hello

502
00:21:48,789 --> 00:21:47,520
was wondering how was launching with the

503
00:21:54,230 --> 00:21:48,799
russians different than watching with

504
00:21:58,390 --> 00:21:56,630
well the most notable noticeable thing

505
00:22:00,390 --> 00:21:58,400
for me was all the books that i had in

506
00:22:02,149 --> 00:22:00,400
front of me were written in a language

507
00:22:03,669 --> 00:22:02,159
that i'm not familiar with

508
00:22:04,630 --> 00:22:03,679
i'm familiar with it now i'm sort of

509
00:22:06,149 --> 00:22:04,640
joking

510
00:22:08,710 --> 00:22:06,159
because of all the training and russian

511
00:22:11,510 --> 00:22:08,720
language training that i've had

512
00:22:14,070 --> 00:22:11,520
but it's very comfortable in the shuttle

513
00:22:15,750 --> 00:22:14,080

as a native english speaker to have all

514

00:22:18,390 --> 00:22:15,760

the procedure books written in your

515

00:22:21,669 --> 00:22:18,400

native language it's quite different uh

516

00:22:23,590 --> 00:22:21,679

in in the in the soyuz for me but we do

517

00:22:25,669 --> 00:22:23,600

so much training and i'm very familiar

518

00:22:29,029 --> 00:22:25,679

with pablo and sasha that within our

519

00:22:31,990 --> 00:22:29,039

cockpit we all knew the roles and things

520

00:22:33,830 --> 00:22:32,000

that had to happen much like uh with our

521

00:22:37,190 --> 00:22:33,840

shuttle crew the same sort of feeling i

522

00:22:40,149 --> 00:22:37,200

had a true sense of confidence that we

523

00:22:41,510 --> 00:22:40,159

could accomplish any malfunction

524

00:22:44,230 --> 00:22:41,520

that that

525

00:22:45,430 --> 00:22:44,240

that arose and we would do our best to

526
00:22:47,909 --> 00:22:45,440
solve it

527
00:22:49,590 --> 00:22:47,919
the other noticeable difference is size

528
00:22:50,950 --> 00:22:49,600
the soyuz is more

529
00:22:52,549 --> 00:22:50,960
i don't know if you know these cars are

530
00:22:54,390 --> 00:22:52,559
called a mini cooper

531
00:22:55,990 --> 00:22:54,400
but the soyuz is more like that just a

532
00:22:57,830 --> 00:22:56,000
couple of people really kind of squished

533
00:22:59,830 --> 00:22:57,840
in there in a few bags whereas the

534
00:23:01,590 --> 00:22:59,840
shuttle is a larger like pickup truck

535
00:23:04,149 --> 00:23:01,600
kind of thing where you get a lot of

536
00:23:06,789 --> 00:23:04,159
cargo and you have bigger seats

537
00:23:09,510 --> 00:23:06,799
so it's two different styles and not

538
00:23:11,830 --> 00:23:09,520

not it does neither one's right or wrong

539

00:23:14,070 --> 00:23:11,840

it's just that uh it's different design

540

00:23:16,470 --> 00:23:14,080

on what what it needs to do

541

00:23:17,909 --> 00:23:16,480

so it's much more small and compact

542

00:23:20,630 --> 00:23:17,919

inside the soyuz and the shuttle is a

543

00:23:22,789 --> 00:23:20,640

little bit larger but both uh the ride

544

00:23:26,149 --> 00:23:22,799

to space on either vehicle is a

545

00:23:32,390 --> 00:23:26,159

tremendous experience and uh one that i

546

00:23:35,909 --> 00:23:34,310

chris it's ben squire again i just want

547

00:23:37,830 --> 00:23:35,919

to thank you very much from all the

548

00:23:39,270 --> 00:23:37,840

students at talbot for this great

549

00:23:46,390 --> 00:23:39,280

experience and

550

00:23:50,230 --> 00:23:48,070

well ben thanks thanks so much for

551
00:23:51,510 --> 00:23:50,240
arranging this what a treat it is to be

552
00:23:53,990 --> 00:23:51,520
with you there in fall river

553
00:23:55,830 --> 00:23:54,000
massachusetts and uh

554
00:23:58,789 --> 00:23:55,840
when i get back on earth i'll eventually

555
00:24:01,830 --> 00:23:58,799
be in new england and maybe in the early

556
00:24:04,390 --> 00:24:01,840
spring of 2014 we can arrange

557
00:24:06,470 --> 00:24:04,400
an in-person visit so thanks thanks very

558
00:24:15,269 --> 00:24:06,480
much ben take care and all of you

559
00:24:19,669 --> 00:24:17,909
houston acr thank you that concludes the

560
00:24:21,190 --> 00:24:19,679
event

561
00:24:22,070 --> 00:24:21,200
thank you talbot's innovation middle

562
00:24:23,909 --> 00:24:22,080
school