1
00:00:17,910 --> 00:00:10,960
between countries

2
00:00:30,310 --> 00:00:20,870
discovery clears the tower

3
00:00:30,320 --> 00:00:36,880
we have

4
00:00:48,069 --> 00:00:43,530
[Music]

5
00:00:49,590 --> 00:00:48,079
good afternoon or evening if you're

6
00:00:52,229 --> 00:00:49,600
watching from the east coast it's

7
00:00:54,389 --> 00:00:52,239
saturday may 1st here at spacex's

8
00:00:56,150 --> 00:00:54,399
headquarters in hawthorne california we

9
00:00:57,750 --> 00:00:56,160
are currently awaiting crew dragons

10
00:00:58,389 --> 00:00:57,760
departure from the international space

11
00:01:00,709 --> 00:00:58,399
station

12
00:01:02,630 --> 00:01:00,719
and make its way back to planet earth on

13
00:01:05,910 --> 00:01:02,640

screen is a view from johnson space

14
00:01:07,910 --> 00:01:05,920
center just right outside of houston

15
00:01:09,590 --> 00:01:07,920
we expect dragon resilience to push away

16
00:01:13,190 --> 00:01:09,600
from the space station at approximately

17
00:01:16,149 --> 00:01:13,200
5 35 pm pacific time with our crew one

18
00:01:18,390 --> 00:01:16,159
astronauts nasa uh crew on astronauts

19
00:01:21,109 --> 00:01:18,400
mike hopkins victor glover shannon

20
00:01:24,070 --> 00:01:21,119
walker and japan aerospace exploration

21
00:01:25,990 --> 00:01:24,080
agency astronaut so ichinoguchi

22
00:01:27,590 --> 00:01:26,000
right on screen is a view of dragon it

23
00:01:30,230 --> 00:01:27,600
is night time at the international space

24
00:01:32,230 --> 00:01:30,240
station so you can get i guess a half

25
00:01:34,149 --> 00:01:32,240
of the dragon right there if you joined

26
00:01:36,069 --> 00:01:34,159
us earlier you know that the crew is

27
00:01:38,230 --> 00:01:36,079
suited and the dragon and station

28
00:01:40,710 --> 00:01:38,240
hatches are sealed in preparation for

29
00:01:43,030 --> 00:01:40,720
departure my name is andy tran and i'm a

30
00:01:44,870 --> 00:01:43,040
production supervisor here at spacex i

31
00:01:46,789 --> 00:01:44,880
am super excited to bring you live

32
00:01:49,270 --> 00:01:46,799
coverage of crew dragon completing its

33
00:01:51,429 --> 00:01:49,280
second trip to space with people on

34
00:01:53,510 --> 00:01:51,439
board as part of nasa's first official

35
00:01:56,149 --> 00:01:53,520
long-duration mission for our commercial

36
00:01:58,630 --> 00:01:56,159
crew program joining me today is nasa

37
00:02:00,789 --> 00:01:58,640
public affairs officer leah cheshire

38
00:02:03,030 --> 00:02:00,799

thanks andy it's awesome to be here and

39
00:02:04,870 --> 00:02:03,040
we have got quite a night ahead of us so

40
00:02:06,870 --> 00:02:04,880
once dragon departs station the cruise

41
00:02:09,190 --> 00:02:06,880
flight home is expected to last roughly

42
00:02:11,190 --> 00:02:09,200
six and a half hours upon departure

43
00:02:13,430 --> 00:02:11,200
dragon will use its draco engines to

44
00:02:15,430 --> 00:02:13,440
thrust away from the station in a series

45
00:02:17,510 --> 00:02:15,440
of carefully choreographed maneuvers or

46
00:02:19,190 --> 00:02:17,520
four departure burns to increase the

47
00:02:20,869 --> 00:02:19,200
distance between the spacecraft and the

48
00:02:23,270 --> 00:02:20,879
space station

49
00:02:25,110 --> 00:02:23,280
after that comes deorbit entry and

50
00:02:27,270 --> 00:02:25,120
landing which covers all operations

51
00:02:30,309 --> 00:02:27,280
after the final departure maneuver that

52
00:02:32,949 --> 00:02:30,319
includes trunk separation a deorbit burn

53
00:02:35,350 --> 00:02:32,959
closure of the nose cone deployment of

54
00:02:37,190 --> 00:02:35,360
the drogue and then main parachutes and

55
00:02:39,270 --> 00:02:37,200
finally splash down off the florida

56
00:02:41,990 --> 00:02:39,280
coast at which point our teams will

57
00:02:43,990 --> 00:02:42,000
recover mike victor shannon and soichi

58
00:02:46,150 --> 00:02:44,000
dragon is targeted to splash down off

59
00:02:50,710 --> 00:02:46,160
the coast of panama city florida in the

60
00:02:52,630 --> 00:02:50,720
gulf of mexico at 11 57 pm pacific time

61
00:02:54,550 --> 00:02:52,640
followed by the crew getting picked up

62
00:02:55,589 --> 00:02:54,560
at sea by one of spacex's recovery

63
00:02:57,430 --> 00:02:55,599

vessels

64
00:03:00,630 --> 00:02:57,440
today on board the space station is the

65
00:03:03,110 --> 00:03:00,640
expedition 65 crew led by jaxa astronaut

66
00:03:04,949 --> 00:03:03,120
and crew 2 crew member aki hoshide who

67
00:03:06,550 --> 00:03:04,959
just arrived to station a week ago and

68
00:03:09,270 --> 00:03:06,560
took over a station commander from

69
00:03:10,630 --> 00:03:09,280
nasa's shannon walker as a reminder just

70
00:03:12,470 --> 00:03:10,640
like during its approach to the

71
00:03:14,309 --> 00:03:12,480
international space station dragon's

72
00:03:16,710 --> 00:03:14,319
departure and de-orbit is designed to be

73
00:03:19,030 --> 00:03:16,720
fully autonomous requiring no action

74
00:03:20,470 --> 00:03:19,040
from the crew on board nasa astronaut

75
00:03:22,470 --> 00:03:20,480
shane kimbrough will be watching the

76
00:03:24,309 --> 00:03:22,480
undocking and departure from the cupola

77
00:03:26,149 --> 00:03:24,319
but the prime departure monitoring role

78
00:03:28,550 --> 00:03:26,159
falls on mike hawkins and victor glover

79
00:03:30,470 --> 00:03:28,560
from inside dragon mission controllers

80
00:03:32,630 --> 00:03:30,480
in houston and hawthorne will back them

81
00:03:34,390 --> 00:03:32,640
up now let's go over to brandy dean at

82
00:03:35,990 --> 00:03:34,400
the johnson space center to talk a bit

83
00:03:38,070 --> 00:03:36,000
about how the station crew have been

84
00:03:39,750 --> 00:03:38,080
preparing to send the crew home and what

85
00:03:42,630 --> 00:03:39,760
we can expect from here until dragon

86
00:03:45,110 --> 00:03:42,640
departure station randy on the big loop

87
00:03:46,550 --> 00:03:45,120
for undocking briefing thanks leah with

88
00:03:48,390 --> 00:03:46,560

11 people on board the international

89
00:03:50,229 --> 00:03:48,400
space station it has been a busy few

90
00:03:52,149 --> 00:03:50,239
days although they got a few extra days

91
00:03:53,830 --> 00:03:52,159
with the delay and departure however

92
00:03:58,830 --> 00:03:53,840
they have made the most of it over the

93
00:04:14,630 --> 00:04:00,789
journey

94
00:04:20,390 --> 00:04:16,629
all of this will get unloaded after we

95
00:04:21,349 --> 00:04:20,400
get the crew out following smashdown

96
00:04:23,030 --> 00:04:21,359
from there it will be sent to

97
00:04:26,469 --> 00:04:23,040
researchers around the country for final

98
00:04:30,150 --> 00:04:28,150
crews also removed emergency hardware

99
00:04:31,830 --> 00:04:30,160
that was kept inside dragon

100
00:04:33,990 --> 00:04:31,840
during docked operations and transferred

101
00:04:36,950 --> 00:04:34,000
back to the space station and they took

102
00:04:39,430 --> 00:04:36,960
time to get their spacex suits unpacked

103
00:04:42,629 --> 00:04:39,440
for the start of the sequence

104
00:04:45,350 --> 00:04:42,639
visors are closed and secured and we are

105
00:04:47,510 --> 00:04:45,360
a go for the undock

106
00:04:51,270 --> 00:04:47,520
we copy your go and your visors are down

107
00:04:54,950 --> 00:04:53,110
station houston on the big loop perform

108
00:05:05,270 --> 00:04:54,960
steps two through end and one decimal

109
00:05:09,189 --> 00:05:07,510
heard commander mike hopkins there from

110
00:05:10,390 --> 00:05:09,199
the dragon letting the team on the

111
00:05:12,150 --> 00:05:10,400
ground know that they were ready for

112
00:05:13,749 --> 00:05:12,160
undock and had their visors down that is

113
00:05:15,670 --> 00:05:13,759

part of the procedure of getting ready

114
00:05:18,950 --> 00:05:15,680
for their departure from the space

115
00:05:23,189 --> 00:05:20,870
since getting the hatches closed uh mike

116
00:05:25,189 --> 00:05:23,199
hopkins and victor glover suited up and

117
00:05:27,830 --> 00:05:25,199
strapped in we saw some of suichi

118
00:05:30,710 --> 00:05:27,840
naguchi and shannon walker's suit up in

119
00:05:32,310 --> 00:05:30,720
real time earlier this afternoon

120
00:05:38,310 --> 00:05:32,320
but now all four astronauts are in their

121
00:05:41,830 --> 00:05:40,230
we've got a final go no go coming up in

122
00:05:43,590 --> 00:05:41,840
a few minutes where the joint spacex and

123
00:05:45,590 --> 00:05:43,600
nasa teams make their final call for

124
00:05:46,950 --> 00:05:45,600
dragon to depart the station

125
00:05:49,270 --> 00:05:46,960
that's one of many checkpoints the

126
00:05:51,110 --> 00:05:49,280
return that will continue all the way up

127
00:05:53,189 --> 00:05:51,120
until just before the duty orbit burn

128
00:05:54,870 --> 00:05:53,199
giving mission managers multiple chances

129
00:05:56,790 --> 00:05:54,880
to assess the weather at the splashdown

130
00:06:03,350 --> 00:05:56,800
zones and making sure everything is

131
00:06:06,550 --> 00:06:05,029
so we'll stand by for that final go no

132
00:06:08,469 --> 00:06:06,560
go but for now everything's continuing

133
00:06:09,830 --> 00:06:08,479
to look good for an on-time departure

134
00:06:13,110 --> 00:06:09,840
and with that i'll throw it back over to

135
00:06:15,189 --> 00:06:13,120
andy and leah and hawthorne

136
00:06:17,510 --> 00:06:15,199
thanks for the update brandi and as you

137
00:06:19,670 --> 00:06:17,520
heard we just got the confirmation that

138
00:06:22,150 --> 00:06:19,680

from mission control here in hawthorne

139
00:06:24,950 --> 00:06:22,160
and houston and the dragon crew

140
00:06:26,629 --> 00:06:24,960
crew dragon resilience is a go to undock

141
00:06:28,469 --> 00:06:26,639
so now we're waiting for the undocking

142
00:06:30,710 --> 00:06:28,479
sequence to begin and that'll happen

143
00:06:32,629 --> 00:06:30,720
it'll take about or less than five

144
00:06:34,629 --> 00:06:32,639
minutes for dragon to separate from the

145
00:06:37,510 --> 00:06:34,639
international space station where it has

146
00:06:39,590 --> 00:06:37,520
called home for almost six months

147
00:06:41,830 --> 00:06:39,600
the first step in the automated

148
00:06:43,830 --> 00:06:41,840
undocking sequence is for the umbilicals

149
00:06:45,909 --> 00:06:43,840
to retract these umbilicals connect

150
00:06:47,590 --> 00:06:45,919
dragon systems to the space station

151
00:06:49,029 --> 00:06:47,600
transferring power telemetry and

152
00:06:51,510 --> 00:06:49,039
commands between the two vehicles

153
00:06:53,430 --> 00:06:51,520
throughout dragon's stay now once that

154
00:06:55,350 --> 00:06:53,440
is complete dragon will unlatch itself

155
00:06:57,990 --> 00:06:55,360
from the space station by releasing the

156
00:06:59,990 --> 00:06:58,000
12 hard capture hooks in two separate

157
00:07:01,510 --> 00:07:00,000
phases all that combined will take

158
00:07:03,270 --> 00:07:01,520
roughly four and a half minutes and then

159
00:07:05,350 --> 00:07:03,280
dragon will be ready to depart from the

160
00:07:07,110 --> 00:07:05,360
station from the station and begin to

161
00:07:08,790 --> 00:07:07,120
push itself further and further away

162
00:07:10,710 --> 00:07:08,800
using its thrusters

163
00:07:12,230 --> 00:07:10,720

dragon's initial departure from station

164
00:07:14,629 --> 00:07:12,240
is a little different from any other

165
00:07:16,150 --> 00:07:14,639
docked vehicles like the soyuz that rely

166
00:07:18,550 --> 00:07:16,160
on springs to push them away from the

167
00:07:20,710 --> 00:07:18,560
docking port dragon will execute two

168
00:07:22,790 --> 00:07:20,720
short thruster firings to undock using a

169
00:07:24,710 --> 00:07:22,800
combination of the 12 draco engines

170
00:07:26,469 --> 00:07:24,720
around the base of the capsule with the

171
00:07:28,230 --> 00:07:26,479
first breaking any stiction between

172
00:07:30,150 --> 00:07:28,240
dragon and the docking port and the

173
00:07:31,430 --> 00:07:30,160
second slowly backing the spacecraft

174
00:07:32,629 --> 00:07:31,440
away

175
00:07:35,110 --> 00:07:32,639
we're expecting the call for the

176
00:07:37,990 --> 00:07:35,120
undocking sequence to begin at about 5

177
00:07:40,309 --> 00:07:38,000
30 pm pacific time

178
00:07:42,710 --> 00:07:40,319
and once it's time for the four crew one

179
00:07:44,390 --> 00:07:42,720
astronauts to do the orbit and splash

180
00:07:46,629 --> 00:07:44,400
down back on planet earth they'll be

181
00:07:49,189 --> 00:07:46,639
heading to one of seven targeted sites

182
00:07:50,950 --> 00:07:49,199
supported by spacex and nasa all these

183
00:07:53,670 --> 00:07:50,960
sites are located off the coast of

184
00:07:56,469 --> 00:07:53,680
florida either in the gulf of mexico or

185
00:07:57,909 --> 00:07:56,479
in the atlantic ocean spreading the

186
00:07:59,909 --> 00:07:57,919
supported sites across multiple

187
00:08:01,749 --> 00:07:59,919
locations helps to maximize the return

188
00:08:03,670 --> 00:08:01,759

opportunities for this mission and

189
00:08:05,029 --> 00:08:03,680
future crews lowering the chance that

190
00:08:05,909 --> 00:08:05,039
we'll have to wave off due to bad

191
00:08:08,150 --> 00:08:05,919
weather

192
00:08:10,230 --> 00:08:08,160
in the lead up to today nasa and spacex

193
00:08:12,150 --> 00:08:10,240
jointly selected primary and alternate

194
00:08:14,550 --> 00:08:12,160
splashdown locations off the coast of

195
00:08:16,950 --> 00:08:14,560
panama city our primary location and

196
00:08:18,390 --> 00:08:16,960
tampa as the alternate the selection

197
00:08:20,230 --> 00:08:18,400
process works with a lot of different

198
00:08:22,309 --> 00:08:20,240
variables including the space station's

199
00:08:24,390 --> 00:08:22,319
orbital trajectory what landing sites

200
00:08:26,469 --> 00:08:24,400
are available and have favorable weather

201
00:08:28,309 --> 00:08:26,479
how much free flight capability dragon

202
00:08:30,710 --> 00:08:28,319
has for the trip home and the sleep

203
00:08:32,469 --> 00:08:30,720
schedule for the returning crew members

204
00:08:34,469 --> 00:08:32,479
we'll start with calculating daily

205
00:08:36,310 --> 00:08:34,479
return options based off of the space

206
00:08:38,389 --> 00:08:36,320
station's current orbit and dragon's

207
00:08:41,269 --> 00:08:38,399
capabilities to maneuver and line up for

208
00:08:42,949 --> 00:08:41,279
re-entry the time from undock to landing

209
00:08:45,750 --> 00:08:42,959
at the primary site can vary from less

210
00:08:47,750 --> 00:08:45,760
than 6 hours to more than 39 today our

211
00:08:49,110 --> 00:08:47,760
primary landing site gets the crew home

212
00:08:50,230 --> 00:08:49,120
in about six and a half hours from

213
00:08:52,470 --> 00:08:50,240

undocking

214
00:08:54,630 --> 00:08:52,480
certainly getting home the quickest

215
00:08:56,070 --> 00:08:54,640
comes with some obvious benefits but we

216
00:08:57,750 --> 00:08:56,080
always have to make sure that the crew

217
00:08:59,750 --> 00:08:57,760
is properly rested for dynamic

218
00:09:02,470 --> 00:08:59,760
operations preventing us from scheduling

219
00:09:04,790 --> 00:09:02,480
20 plus hour days for them trajectory

220
00:09:06,790 --> 00:09:04,800
and ballistics experts provide the daily

221
00:09:08,630 --> 00:09:06,800
opportunities that would line up dragon

222
00:09:10,310 --> 00:09:08,640
with seven landing zones and split them

223
00:09:12,870 --> 00:09:10,320
into what we call ascending and

224
00:09:15,110 --> 00:09:12,880
descending opportunities dragon uses its

225
00:09:17,110 --> 00:09:15,120
draco thrusters after leaving station to

226
00:09:18,710 --> 00:09:17,120
execute a series of altitude lowering

227
00:09:21,190 --> 00:09:18,720
maneuvers and to line up with the

228
00:09:22,870 --> 00:09:21,200
selected primary site it can also change

229
00:09:24,550 --> 00:09:22,880
to different alternate sites while in

230
00:09:26,070 --> 00:09:24,560
free flight if sudden weather moves in

231
00:09:27,430 --> 00:09:26,080
that we want to avoid

232
00:09:29,350 --> 00:09:27,440
and weather is something we're

233
00:09:31,110 --> 00:09:29,360
constantly looking at making the final

234
00:09:33,750 --> 00:09:31,120
call to proceed about two and a half

235
00:09:35,350 --> 00:09:33,760
hours before the crew undocks for the

236
00:09:37,350 --> 00:09:35,360
crew one return we'll be looking at a

237
00:09:39,350 --> 00:09:37,360
number of weather items some of the

238
00:09:41,350 --> 00:09:39,360

obvious ones are no rain or chance of

239
00:09:42,710 --> 00:09:41,360
lightning in the recovery zone both for

240
00:09:44,630 --> 00:09:42,720
the safety of the crew inside the

241
00:09:46,870 --> 00:09:44,640
capsule and the recovery teams on the

242
00:09:48,870 --> 00:09:46,880
water we're also looking for wind speeds

243
00:09:51,350 --> 00:09:48,880
less than 15 feet a second or about 10

244
00:09:53,190 --> 00:09:51,360
miles an hour and relatively calm seas

245
00:09:54,949 --> 00:09:53,200
so we can safely execute recovery

246
00:09:57,190 --> 00:09:54,959
operations which includes landing a

247
00:09:59,269 --> 00:09:57,200
helicopter on the recovery ship to fly

248
00:10:00,310 --> 00:09:59,279
mike victor shannon and suici back to

249
00:10:01,990 --> 00:10:00,320
florida

250
00:10:03,509 --> 00:10:02,000
once dragon is flying free we'll have a

251
00:10:05,110 --> 00:10:03,519
number of additional checkpoints to

252
00:10:07,110 --> 00:10:05,120
either proceed towards the primary

253
00:10:09,030 --> 00:10:07,120
landing site head to the alternate or

254
00:10:10,949 --> 00:10:09,040
select a new zone based on real-time

255
00:10:12,630 --> 00:10:10,959
weather data these checks are happening

256
00:10:14,550 --> 00:10:12,640
all the way up until we are in the final

257
00:10:16,150 --> 00:10:14,560
hours before the deorbit burn which is

258
00:10:17,509 --> 00:10:16,160
the last burn in the trip home and

259
00:10:20,230 --> 00:10:17,519
commits the dragon capsule to

260
00:10:21,590 --> 00:10:20,240
re-entering the earth's atmosphere

261
00:10:23,350 --> 00:10:21,600
and if you've been following along the

262
00:10:25,509 --> 00:10:23,360
teams have been looking

263
00:10:27,829 --> 00:10:25,519

at return opportunities since wednesday

264
00:10:29,670 --> 00:10:27,839
april 28th with weather being the major

265
00:10:31,990 --> 00:10:29,680
factor we waived off our initial

266
00:10:33,990 --> 00:10:32,000
opportunities to undock on the 28th and

267
00:10:35,829 --> 00:10:34,000
on the 30th with teams making the

268
00:10:39,030 --> 00:10:35,839
decision to pursue our current undocking

269
00:10:40,389 --> 00:10:39,040
and splashdown plan just yesterday the

270
00:10:42,870 --> 00:10:40,399
weather conditions in the goal for

271
00:10:44,790 --> 00:10:42,880
tonight's attempt are ideal for splash

272
00:10:47,430 --> 00:10:44,800
down and recovery with very low wind

273
00:10:49,509 --> 00:10:47,440
speeds and almost glass-like sea states

274
00:10:51,030 --> 00:10:49,519
this will be the first time we're

275
00:10:53,750 --> 00:10:51,040
bringing crew back in a nighttime

276
00:10:55,590 --> 00:10:53,760
splashdown but we are well prepared

277
00:10:57,470 --> 00:10:55,600
spacex was able to practice for this

278
00:11:00,470 --> 00:10:57,480
very scenario with the return of the

279
00:11:02,310 --> 00:11:00,480
crs-21 cargo mission returning a similar

280
00:11:04,389 --> 00:11:02,320
dragon capsule with a nighttime splash

281
00:11:05,750 --> 00:11:04,399
down off the florida coast all of our

282
00:11:07,829 --> 00:11:05,760
recovery teams have practiced for

283
00:11:09,910 --> 00:11:07,839
recovery conditions at night giving us

284
00:11:12,949 --> 00:11:09,920
confidence to carry this out out this

285
00:11:15,190 --> 00:11:12,959
operation and bring the crew home safely

286
00:11:16,949 --> 00:11:15,200
spacex also has additional personnel on

287
00:11:18,949 --> 00:11:16,959
the recovery ship to recover dragon's

288
00:11:20,470 --> 00:11:18,959

parachutes and our standard set of

289
00:11:22,550 --> 00:11:20,480
medical professionals and dragon

290
00:11:24,949 --> 00:11:22,560
technicians to secure the capsule and

291
00:11:27,030 --> 00:11:24,959
get the crew out quickly and safely

292
00:11:29,110 --> 00:11:27,040
and another fun history fact for this

293
00:11:31,110 --> 00:11:29,120
return this will be the first night

294
00:11:33,430 --> 00:11:31,120
splashdown of a u.s crude spacecraft

295
00:11:37,269 --> 00:11:33,440
since apollo 8's pre-dawn return in the

296
00:11:39,430 --> 00:11:37,279
pacific ocean on december 27 1968 with

297
00:11:40,829 --> 00:11:39,440
nasa astronauts frank gorman jim lovell

298
00:11:42,949 --> 00:11:40,839
and bill

299
00:11:44,949 --> 00:11:42,959
anders uh it's quite a while since we've

300
00:11:46,790 --> 00:11:44,959
had a nighttime splashdown with crew

301
00:11:49,269 --> 00:11:46,800
members on it but again like leah said

302
00:11:51,590 --> 00:11:49,279
we've been practicing this for years and

303
00:11:53,910 --> 00:11:51,600
have done extensive amounts of testing

304
00:11:55,910 --> 00:11:53,920
if the mission teams were to wave off

305
00:11:58,230 --> 00:11:55,920
after undocking prior to the deorbit

306
00:12:00,230 --> 00:11:58,240
burn the crew can remain on orbit for

307
00:12:02,069 --> 00:12:00,240
more than 60 hours before they have to

308
00:12:03,829 --> 00:12:02,079
come home and after undocking the trip

309
00:12:05,990 --> 00:12:03,839
home will take less than three days to

310
00:12:07,829 --> 00:12:06,000
either our prime or primary or alternate

311
00:12:10,310 --> 00:12:07,839
locations so the crew have three days

312
00:12:12,069 --> 00:12:10,320
worth of food and snacks on board along

313
00:12:13,829 --> 00:12:12,079

with plenty of water

314
00:12:15,750 --> 00:12:13,839
and as andy just mentioned for today's

315
00:12:17,990 --> 00:12:15,760
undocking panama city is the prime slash

316
00:12:20,629 --> 00:12:18,000
down location and tampa is the current

317
00:12:22,310 --> 00:12:20,639
the backup location for splashdown

318
00:12:24,470 --> 00:12:22,320
and as a reminder dragon does have the

319
00:12:26,310 --> 00:12:24,480
capability to change alternate locations

320
00:12:29,590 --> 00:12:26,320
after undocking from station if bad

321
00:12:32,470 --> 00:12:29,600
weather happens to move in

322
00:12:34,550 --> 00:12:32,480
and we are waiting for that uh that call

323
00:12:36,790 --> 00:12:34,560
to begin undocking in about three

324
00:12:38,870 --> 00:12:36,800
minutes well two minutes from now and as

325
00:12:40,550 --> 00:12:38,880
we mentioned it should take under five

326
00:12:42,310 --> 00:12:40,560
minutes for that undocking sequence to

327
00:12:44,150 --> 00:12:42,320
actually occur so we won't see any

328
00:12:46,150 --> 00:12:44,160
movement right away at first from crew

329
00:12:48,389 --> 00:12:46,160
dragon uh if we're able to get a view of

330
00:12:51,190 --> 00:12:48,399
it i know it's still there in a night

331
00:12:52,790 --> 00:12:51,200
pass in their orbit around the earth so

332
00:12:54,470 --> 00:12:52,800
we'll be waiting and we won't see that

333
00:12:55,269 --> 00:12:54,480
initial movement but we have to see

334
00:12:59,190 --> 00:12:55,279
those

335
00:13:01,110 --> 00:12:59,200
two short burns

336
00:13:02,790 --> 00:13:01,120
yeah we should be hearing the call outs

337
00:13:04,949 --> 00:13:02,800
again in a couple minutes here and that

338
00:13:06,790 --> 00:13:04,959

will begin the sequence to

339
00:13:08,629 --> 00:13:06,800
start to pull away those hooks and

340
00:13:11,030 --> 00:13:08,639
eventually dragon will fire its

341
00:13:14,230 --> 00:13:11,040
thrusters to remove the stiction from

342
00:13:15,990 --> 00:13:14,240
its uh forward bulkhead and the station

343
00:13:17,750 --> 00:13:16,000
and begin to make its journey all the

344
00:13:19,670 --> 00:13:17,760
way back home to earth

345
00:13:21,910 --> 00:13:19,680
and if you've been listening we got our

346
00:13:23,750 --> 00:13:21,920
goat four undock from the team here as

347
00:13:26,790 --> 00:13:23,760
you can see in mission control houston

348
00:13:28,870 --> 00:13:26,800
as well the team here in hawthorne uh

349
00:13:31,030 --> 00:13:28,880
about 10 minutes ago got that final go

350
00:13:38,870 --> 00:13:31,040
to undock and crew dragon resilience

351
00:13:43,350 --> 00:13:41,189
oh go ahead no i was going to say we

352
00:13:44,949 --> 00:13:43,360
have some precious cargo on board with

353
00:13:47,910 --> 00:13:44,959
the four astronauts but they're also

354
00:13:49,710 --> 00:13:47,920
bringing home quite a bit of uh cargo

355
00:13:53,189 --> 00:13:49,720
additional cargo as well over

356
00:13:55,750 --> 00:13:53,199
250 kilograms worth of supplies

357
00:13:58,389 --> 00:13:55,760
food and stuff as well and experiments

358
00:14:00,629 --> 00:13:58,399
to bring back um with the return to

359
00:14:02,870 --> 00:14:00,639
earth we heard them addressing in the

360
00:14:04,710 --> 00:14:02,880
previous show we were watching hatch

361
00:14:07,110 --> 00:14:04,720
closure they addressed the polar

362
00:14:08,389 --> 00:14:07,120
lockers and those help us bring home uh

363
00:14:09,829 --> 00:14:08,399

science and research that's been

364
00:14:11,990 --> 00:14:09,839
conducted on station that needs to be

365
00:14:14,310 --> 00:14:12,000
refrigerated and so it's a it's a

366
00:14:16,069 --> 00:14:14,320
wonderful capability of crew dragon that

367
00:14:18,629 --> 00:14:16,079
we're able to get that back to earth to

368
00:14:20,550 --> 00:14:18,639
be analyzed um and so that the teams

369
00:14:23,350 --> 00:14:20,560
here on earth that put together those

370
00:14:25,430 --> 00:14:23,360
those uh investigations can take a look

371
00:14:27,189 --> 00:14:25,440
and all that cargo is being stored in

372
00:14:29,110 --> 00:14:27,199
the pressurized section or sort of the

373
00:14:30,790 --> 00:14:29,120
capsule section of dragon

374
00:14:33,110 --> 00:14:30,800
sometimes we can store

375
00:14:34,790 --> 00:14:33,120
objects in the trunk but later on you'll

376
00:14:37,829 --> 00:14:34,800
see that we actually eject the trunk

377
00:14:40,470 --> 00:14:37,839
spacex undock sequence commanded

378
00:14:47,430 --> 00:14:40,480
we actually undock the trunk uh in

379
00:14:52,150 --> 00:14:48,790
that's the call we were looking for

380
00:14:54,310 --> 00:14:52,160
right on time at 5 30 pm pacific time

381
00:14:55,829 --> 00:14:54,320
crew dragon and the international space

382
00:14:57,430 --> 00:14:55,839
station flying

383
00:14:59,509 --> 00:14:57,440
260

384
00:15:09,189 --> 00:14:59,519
statute miles

385
00:15:13,670 --> 00:15:10,710
you can see a picture of crew dragon

386
00:15:16,470 --> 00:15:13,680
there in the center of the screen dragon

387
00:15:22,629 --> 00:15:16,480
spacex on the big loop umbilical demate

388
00:15:22,639 --> 00:15:32,150

resistance copy

389
00:15:35,990 --> 00:15:33,829
and the first step has been complete

390
00:15:39,189 --> 00:15:36,000
that umbilical demating

391
00:15:42,310 --> 00:15:39,199
that provided power and data from

392
00:15:43,829 --> 00:15:42,320
international space station two dragon

393
00:15:45,670 --> 00:15:43,839
so now with dragon getting ready to

394
00:15:48,230 --> 00:15:45,680
undock and the umbilicals have separated

395
00:15:53,269 --> 00:15:48,240
let's go to brandy in mission control at

396
00:15:57,509 --> 00:15:55,749
thanks andy that uh that uh confirm

397
00:15:59,590 --> 00:15:57,519
confirmation of the umbilical retraction

398
00:16:02,310 --> 00:15:59,600
means that a series of steps have been

399
00:16:05,110 --> 00:16:02,320
set off um right now the first

400
00:16:06,389 --> 00:16:05,120
uh set of six out of 12 hooks should be

401
00:16:08,550 --> 00:16:06,399
retracting

402
00:16:10,710 --> 00:16:08,560
that starts just a split second after

403
00:16:14,550 --> 00:16:10,720
the undock command is sent there are two

404
00:16:15,910 --> 00:16:14,560
sets of six for 12 and total

405
00:16:18,389 --> 00:16:15,920
take about four and a half minutes and

406
00:16:19,430 --> 00:16:18,399
all to

407
00:16:21,509 --> 00:16:19,440
unhook

408
00:16:23,670 --> 00:16:21,519
after which time they uh

409
00:16:25,350 --> 00:16:23,680
dragon will be able to begin performing

410
00:16:31,430 --> 00:16:25,360
a series of undocking burns to move

411
00:17:03,509 --> 00:16:33,509
again that first set of six hooks should

412
00:17:07,590 --> 00:17:05,990
well if you hear of the dragon from the

413
00:17:09,189 --> 00:17:07,600

cameras on board the international space

414
00:17:10,710 --> 00:17:09,199
station when it does move away from the

415
00:17:13,829 --> 00:17:10,720
space station you should be able to see

416
00:17:16,470 --> 00:17:13,839
that in real time again waiting uh

417
00:17:17,990 --> 00:17:16,480
as the 12 hooks that are holding the

418
00:17:25,909 --> 00:17:18,000
dragon to the space station begin to

419
00:17:37,669 --> 00:17:28,150
dragon spacex on the big loop first set

420
00:17:41,350 --> 00:17:39,190
confirmation there

421
00:17:43,110 --> 00:17:41,360
from uh the core in hawthorne that the

422
00:17:45,029 --> 00:17:43,120
first set of hooks

423
00:17:47,590 --> 00:17:45,039
was able to unlatch as expected now

424
00:17:49,669 --> 00:17:47,600
working on that second set of six hooks

425
00:17:51,590 --> 00:17:49,679
those 12 hooks have been holding the

426
00:17:53,669 --> 00:17:51,600
dragon to the space station

427
00:17:55,430 --> 00:17:53,679
and once they've all retracted the

428
00:17:57,430 --> 00:17:55,440
dragon will begin to

429
00:17:59,270 --> 00:17:57,440
perform a series of burns that will move

430
00:18:02,070 --> 00:17:59,280
it away

431
00:18:04,789 --> 00:18:02,080
that's still about a minute or so away

432
00:18:10,390 --> 00:18:04,799
first undocking burn should come at 7 30

433
00:18:13,590 --> 00:18:11,990
first burn is only a minute and a half

434
00:18:15,669 --> 00:18:13,600
or second and a half long and will be

435
00:18:17,110 --> 00:18:15,679
quickly followed by a five second burn

436
00:18:21,350 --> 00:18:17,120
undock burn two

437
00:18:25,909 --> 00:18:22,950
and then almost immediately after that a

438
00:18:52,549 --> 00:18:25,919

16 second departure zero departure burn

439
00:18:52,559 --> 00:19:33,110
halfway through that second set of hooks

440
00:19:45,110 --> 00:19:35,110
dragon spacex on the big loop all hooks

441
00:19:47,909 --> 00:19:46,310
mike hopkins they're confirming what

442
00:19:49,510 --> 00:19:47,919
you're seeing on the screen dragon

443
00:19:51,430 --> 00:19:49,520
moving away from the international space

444
00:19:52,950 --> 00:19:51,440
station dragon separation visually

445
00:19:59,990 --> 00:19:52,960
confirmed

446
00:20:06,070 --> 00:20:03,029
that undead docking taking place at 7 35

447
00:20:09,350 --> 00:20:06,080
pm central time 5 35 pm pacific while

448
00:20:12,310 --> 00:20:09,360
the station and dragon were 260 miles

449
00:20:16,870 --> 00:20:14,789
that wraps up crew ones stay on the

450
00:20:28,149 --> 00:20:16,880
international space station begun in

451
00:20:28,159 --> 00:20:32,830
we see the

452
00:20:37,350 --> 00:20:35,350
same confirmation there of the first of

453
00:20:39,990 --> 00:20:37,360
several good burns taking place again

454
00:20:41,669 --> 00:20:40,000
there are two undocking burns that

455
00:20:44,470 --> 00:20:41,679
occur almost back to back and those will

456
00:20:46,070 --> 00:20:44,480
be followed by departure burn zero

457
00:20:47,830 --> 00:20:46,080
that's the first of four departure burns

458
00:20:49,909 --> 00:20:47,840
known as

459
00:20:52,149 --> 00:20:49,919
again departure burn zero it's a short

460
00:20:54,470 --> 00:20:52,159
firing of the draco of the dragon's

461
00:20:56,390 --> 00:20:54,480
draco thrusters

462
00:20:58,070 --> 00:20:56,400
lasting 16 seconds increasing the

463
00:21:00,710 --> 00:20:58,080

dragons at speed by just under half a

464
00:21:03,190 --> 00:21:01,990
that gets dragon flying away from the

465
00:21:05,430 --> 00:21:03,200
space station and sends us on a

466
00:21:18,149 --> 00:21:05,440
trajectory that we'll take it up and

467
00:21:22,630 --> 00:21:19,990
resilience department

468
00:21:26,549 --> 00:21:22,640
have a safe trip back home and the soft

469
00:21:31,590 --> 00:21:28,950
mission farm resilience

470
00:21:34,390 --> 00:21:31,600
make sure your hospitality

471
00:21:40,149 --> 00:21:34,400
sorry we stayed a little bit longer

472
00:21:40,159 --> 00:21:48,230
be back in a couple months

473
00:21:53,909 --> 00:21:50,470
space station commander aki hoshide

474
00:21:55,350 --> 00:21:53,919
they're bidding crew one goodbye as they

475
00:21:57,190 --> 00:21:55,360
move away from the international space

476
00:21:59,990 --> 00:21:57,200
station again that departure burn zero

477
00:22:04,870 --> 00:22:00,000
was complete and nominal so that sets uh

478
00:22:10,789 --> 00:22:07,909
again we did have uh

479
00:22:14,070 --> 00:22:10,799
undocking right on time at 7 35 pm

480
00:22:18,470 --> 00:22:14,080
central time 5 35 pm pacific at the

481
00:22:19,909 --> 00:22:18,480
station was flying 260 miles over mali

482
00:22:21,430 --> 00:22:19,919
we're going to be monitoring a crew

483
00:22:22,470 --> 00:22:21,440
dragon throughout the departure sequence

484
00:22:24,549 --> 00:22:22,480
as it makes its way from the

485
00:22:27,270 --> 00:22:24,559
international space station

486
00:22:29,430 --> 00:22:27,280
so wishing mike victor shannon and suici

487
00:22:30,230 --> 00:22:29,440
safe travels on their way home but to

488
00:22:32,070 --> 00:22:30,240

take you through the rest of the

489
00:22:34,390 --> 00:22:32,080
departure sequence i'll be sending you

490
00:22:38,789 --> 00:22:34,400
back over to leah and indian hawthorne

491
00:22:42,710 --> 00:22:40,630
thanks brandi and great to see that

492
00:22:44,230 --> 00:22:42,720
successful undocking of crew dragon

493
00:22:46,470 --> 00:22:44,240
resilience you can still see it on your

494
00:22:47,750 --> 00:22:46,480
screen the station is in an orbital

495
00:22:50,230 --> 00:22:47,760
night time that's where this view is

496
00:23:00,230 --> 00:22:50,240
coming from but very cool on the right

497
00:23:04,630 --> 00:23:02,310
those two white dots on the spacecraft

498
00:23:06,710 --> 00:23:04,640
those are actually the windows so

499
00:23:08,870 --> 00:23:06,720
that is our crew of four inside now

500
00:23:11,990 --> 00:23:08,880
beginning their journey back to earth

501
00:23:13,430 --> 00:23:12,000
having departed right on time

502
00:23:15,350 --> 00:23:13,440
dragon ship resilience is now on a

503
00:23:17,270 --> 00:23:15,360
trajectory to move up and over the

504
00:23:19,430 --> 00:23:17,280
station before additional maneuvers will

505
00:23:21,830 --> 00:23:19,440
change its orbital path to take it below

506
00:23:23,590 --> 00:23:21,840
and in front of the station dragon will

507
00:23:25,430 --> 00:23:23,600
autonomously accomplish that through

508
00:23:27,990 --> 00:23:25,440
three additional departure burns to get

509
00:23:29,750 --> 00:23:28,000
the uh four astronauts of crew one well

510
00:23:31,830 --> 00:23:29,760
away from the space station and on their

511
00:23:33,750 --> 00:23:31,840
way home

512
00:23:35,990 --> 00:23:33,760
yeah it's quite interesting that um

513
00:23:37,430 --> 00:23:36,000

dragon decides to move up and over the

514
00:23:39,110 --> 00:23:37,440
way i like to think about it is if

515
00:23:41,430 --> 00:23:39,120
you're on if you've ever watched a track

516
00:23:43,909 --> 00:23:41,440
race when they start to track race they

517
00:23:46,230 --> 00:23:43,919
stagger the folks and the the the person

518
00:23:47,990 --> 00:23:46,240
in the outer lane is sort of gets a head

519
00:23:50,310 --> 00:23:48,000
start so to speak but that's because the

520
00:23:52,230 --> 00:23:50,320
distance it takes to travel around the

521
00:23:54,149 --> 00:23:52,240
lap is much greater for the person

522
00:23:56,789 --> 00:23:54,159
further away from the center and so with

523
00:23:57,909 --> 00:23:56,799
dragon what we do is uh dragon and

524
00:23:59,750 --> 00:23:57,919
international space station are

525
00:24:02,230 --> 00:23:59,760
generally speaking traveling at the same

526
00:24:04,149 --> 00:24:02,240
speed and so if we just move it up to a

527
00:24:05,669 --> 00:24:04,159
higher orbit it'll move relatively

528
00:24:07,350 --> 00:24:05,679
slower than the national international

529
00:24:09,990 --> 00:24:07,360
space station which would just clear it

530
00:24:11,590 --> 00:24:10,000
and then once it's clear it can start to

531
00:24:13,269 --> 00:24:11,600
fire those thrusters again and make its

532
00:24:14,149 --> 00:24:13,279
way underneath the international space

533
00:24:16,230 --> 00:24:14,159
station

534
00:24:18,549 --> 00:24:16,240
and be clear of any

535
00:24:21,029 --> 00:24:18,559
potential

536
00:24:22,549 --> 00:24:21,039
sort of collisions

537
00:24:25,110 --> 00:24:22,559
so uh

538
00:24:27,350 --> 00:24:25,120

you may have noticed that uh

539
00:24:28,870 --> 00:24:27,360
our average time for to

540
00:24:31,430 --> 00:24:28,880
from liftoff to the international space

541
00:24:33,110 --> 00:24:31,440
station is somewhere between 23 and 24

542
00:24:35,029 --> 00:24:33,120
hours but when we when we leave it's

543
00:24:36,789 --> 00:24:35,039
it's a lot quicker it's because we don't

544
00:24:39,590 --> 00:24:36,799
have any hold points during departure

545
00:24:41,590 --> 00:24:39,600
sequence right uh we can just kind of

546
00:24:43,669 --> 00:24:41,600
undock and start to head home with all

547
00:24:46,149 --> 00:24:43,679
of our burns it takes a lot less time to

548
00:24:48,630 --> 00:24:46,159
leave than arrive

549
00:24:51,029 --> 00:24:48,640
any second now we are expecting the next

550
00:24:52,870 --> 00:24:51,039
departure burn the second of four

551
00:24:55,350 --> 00:24:52,880
this burn will increase the initial

552
00:24:57,269 --> 00:24:55,360
opening rate between crew dragon and the

553
00:24:58,470 --> 00:24:57,279
space station

554
00:25:00,549 --> 00:24:58,480
and even though this is known as

555
00:25:02,549 --> 00:25:00,559
departure burn one like you mentioned is

556
00:25:05,350 --> 00:25:02,559
the second we just completed depart burn

557
00:25:07,909 --> 00:25:05,360
zero which was about 16 seconds and this

558
00:25:09,750 --> 00:25:07,919
one should be about 21 seconds long so

559
00:25:16,870 --> 00:25:09,760
we are standing by any moment now for

560
00:25:20,230 --> 00:25:19,029
and we are continuing to see a view from

561
00:25:24,390 --> 00:25:20,240
the international space station there

562
00:25:26,710 --> 00:25:24,400
goes the draco engines firing

563
00:25:28,789 --> 00:25:26,720

that is dragon and

564
00:25:30,310 --> 00:25:28,799
those two white lights the solid white

565
00:25:31,990 --> 00:25:30,320
lights again are the windows and i'm

566
00:25:34,149 --> 00:25:32,000
sure the crew is

567
00:25:37,510 --> 00:25:34,159
looking back at the international space

568
00:25:39,590 --> 00:25:37,520
station as they continue to depart

569
00:25:41,269 --> 00:25:39,600
and we just

570
00:25:43,190 --> 00:25:41,279
got a note that depart burn one has

571
00:25:45,750 --> 00:25:43,200
started as we mentioned this is dragon

572
00:25:48,789 --> 00:25:45,760
spacex on the big loop depart burn one

573
00:25:50,950 --> 00:25:48,799
is complete nominal burn you are go to

574
00:25:54,390 --> 00:25:50,960
dolph your suits per procedure for

575
00:25:55,590 --> 00:25:54,400
decimal zero one two cameras are already

576
00:25:57,190 --> 00:25:55,600
external

577
00:25:59,350 --> 00:25:57,200
reminder that ground will be

578
00:26:04,710 --> 00:25:59,360
deactivating the big loop following exit

579
00:26:10,070 --> 00:26:07,029
spacex resilience coffee is good to park

580
00:26:12,070 --> 00:26:10,080
one burn we have a go to drop the suit

581
00:26:13,190 --> 00:26:12,080
four decimal zero one

582
00:26:18,470 --> 00:26:13,200
two

583
00:26:22,470 --> 00:26:20,470
and it was over about as soon as it

584
00:26:25,350 --> 00:26:22,480
started that department one lasting

585
00:26:27,029 --> 00:26:25,360
about about 21 seconds

586
00:26:28,870 --> 00:26:27,039
and that came around five minutes after

587
00:26:30,310 --> 00:26:28,880
separation tonight this burn will

588
00:26:31,990 --> 00:26:30,320

increase the initial opening rate

589
00:26:34,310 --> 00:26:32,000
between crew dragon and the space

590
00:26:36,549 --> 00:26:34,320
station and we heard that the crew is

591
00:26:38,070 --> 00:26:36,559
now go to take off their spacesuits so

592
00:26:39,830 --> 00:26:38,080
they don't have to wear their suits

593
00:26:41,990 --> 00:26:39,840
until it's time to really start the

594
00:26:43,669 --> 00:26:42,000
deorbit procedures uh they can be in

595
00:26:45,830 --> 00:26:43,679
those comfort garments and and be

596
00:26:47,669 --> 00:26:45,840
comfortable inside the vehicle we really

597
00:26:50,549 --> 00:26:47,679
just want them to have those suits on

598
00:26:52,149 --> 00:26:50,559
and be in their seats for those first

599
00:26:53,430 --> 00:26:52,159
major burns as we leave the

600
00:26:54,950 --> 00:26:53,440
international space station and then

601
00:26:56,789 --> 00:26:54,960
once again when we come back into

602
00:26:59,590 --> 00:26:56,799
earth's atmosphere

603
00:27:02,789 --> 00:26:59,600
yep continuing to uh get good news all

604
00:27:06,870 --> 00:27:02,799
around with um undocking departure and

605
00:27:10,390 --> 00:27:08,870
we're now waiting for dragon to exit the

606
00:27:13,110 --> 00:27:10,400
keep out sphere and the approach

607
00:27:14,710 --> 00:27:13,120
ellipsoid the keepout sphere is an

608
00:27:16,630 --> 00:27:14,720
imaginary sphere

609
00:27:19,510 --> 00:27:16,640
200 meters in diameter around the

610
00:27:21,430 --> 00:27:19,520
station it's one of several safety zones

611
00:27:23,990 --> 00:27:21,440
set up to govern visiting spacecraft

612
00:27:25,110 --> 00:27:24,000
either arriving or departing the station

613
00:27:27,029 --> 00:27:25,120

the station

614
00:27:28,710 --> 00:27:27,039
before moving into the keep out sphere

615
00:27:30,789 --> 00:27:28,720
the spacecraft would have would have to

616
00:27:33,190 --> 00:27:30,799
be configured where they would not cross

617
00:27:34,950 --> 00:27:33,200
the imaginary boundary for at least four

618
00:27:41,350 --> 00:27:34,960
orbits even if the spacecraft were to

619
00:27:45,430 --> 00:27:43,750
the approach ellipsoid or ae is another

620
00:27:47,269 --> 00:27:45,440
imaginary shape this time a

621
00:27:49,110 --> 00:27:47,279
three-dimensional ellipsoid measuring

622
00:27:51,110 --> 00:27:49,120
four kilometers by two kilometers by two

623
00:27:52,950 --> 00:27:51,120
kilometers it's in the same family as

624
00:27:55,269 --> 00:27:52,960
the keep out sphere one of the key

625
00:27:56,870 --> 00:27:55,279
differences with the ae is that vehicles

626
00:27:59,990 --> 00:27:56,880
outside of it has to be on what we call

627
00:28:01,590 --> 00:28:00,000
the 24-hour safe free drift trajectory

628
00:28:03,029 --> 00:28:01,600
so similar but this means that the

629
00:28:05,190 --> 00:28:03,039
spacecraft would not cross into the

630
00:28:06,389 --> 00:28:05,200
approach ellipsoid for at least 24 hours

631
00:28:08,230 --> 00:28:06,399
again

632
00:28:15,350 --> 00:28:08,240
station houston on the big loop dragon

633
00:28:15,360 --> 00:28:21,750
fishy sphere thanks

634
00:28:24,950 --> 00:28:23,430
crew dragon now outside the keep out

635
00:28:26,870 --> 00:28:24,960
sphere still inside that approach

636
00:28:30,149 --> 00:28:26,880
ellipsoid and the next burn will be

637
00:28:32,630 --> 00:28:30,159
depart burn two bad comes up at 6 28

638
00:28:35,350 --> 00:28:32,640

pacific time so a little a little less

639
00:28:37,110 --> 00:28:35,360
than 45 minutes from now that's a 44

640
00:28:38,789 --> 00:28:37,120
second burn

641
00:28:40,710 --> 00:28:38,799
that keep out sphere as we mentioned one

642
00:28:42,470 --> 00:28:40,720
of several safety zones set up to govern

643
00:28:44,549 --> 00:28:42,480
visiting spacecraft either arriving or

644
00:28:46,389 --> 00:28:44,559
departing the station whether those have

645
00:28:48,310 --> 00:28:46,399
crew members on them or not we're always

646
00:28:50,710 --> 00:28:48,320
tracking what's in the vicinity or the

647
00:28:52,549 --> 00:28:50,720
neighborhood of our space station so

648
00:28:54,710 --> 00:28:52,559
before moving in the keep out sphere we

649
00:28:57,269 --> 00:28:54,720
had to uh know that the spacecraft is

650
00:28:59,350 --> 00:28:57,279
configured to not cross that imaginary

651
00:29:01,990 --> 00:28:59,360
boundary for at least four orbits even

652
00:29:04,310 --> 00:29:02,000
if it lost all control of its thrusters

653
00:29:06,470 --> 00:29:04,320
and uh that can be a hold point at some

654
00:29:09,430 --> 00:29:06,480
times on the way uphill or the way to

655
00:29:11,350 --> 00:29:09,440
station but as you've noticed on the way

656
00:29:13,190 --> 00:29:11,360
home it's not somewhere that we have to

657
00:29:17,990 --> 00:29:13,200
hold we can simply uh move right through

658
00:29:20,710 --> 00:29:18,789
and

659
00:29:22,310 --> 00:29:20,720
dragon continuing to distance itself

660
00:29:24,549 --> 00:29:22,320
from the international space station

661
00:29:26,470 --> 00:29:24,559
we'll hear a call here shortly that it

662
00:29:28,950 --> 00:29:26,480
has passed the approach ellipsoid a bit

663
00:29:31,190 --> 00:29:28,960

bigger of an imaginary uh shape around

664
00:29:32,950 --> 00:29:31,200
the international space station with

665
00:29:37,269 --> 00:29:32,960
an ellipsoid measuring four kilometers

666
00:29:42,230 --> 00:29:40,310
this is another view of dragon

667
00:29:43,909 --> 00:29:42,240
getting a little bit of light

668
00:29:48,149 --> 00:29:43,919
again you can see the windows right

669
00:29:52,710 --> 00:29:49,350
we are looking for that approach

670
00:29:54,710 --> 00:29:52,720
ellipsoid exit to come up around 5 54 pm

671
00:29:57,029 --> 00:29:54,720
pacific time so less than 10 minutes

672
00:29:59,190 --> 00:29:57,039
from now it is significantly bigger than

673
00:30:00,870 --> 00:29:59,200
the uh keep out sphere but this is a

674
00:30:02,630 --> 00:30:00,880
cool picture of dragon you can see the

675
00:30:04,870 --> 00:30:02,640
capsule down toward the bottom of your

676
00:30:06,230 --> 00:30:04,880
screen and then the trunk near the top

677
00:30:08,070 --> 00:30:06,240
and on the trunk on the right side

678
00:30:10,950 --> 00:30:08,080
that's the radiator it helps radiate

679
00:30:13,110 --> 00:30:10,960
heat and i love this glow right now the

680
00:30:15,190 --> 00:30:13,120
sun is uh coming up

681
00:30:18,230 --> 00:30:15,200
on the space station and

682
00:30:21,750 --> 00:30:18,240
on to crew dragon

683
00:30:27,789 --> 00:30:21,760
wow that is cool spacex resilience

684
00:30:31,269 --> 00:30:29,510
spacex

685
00:30:45,750 --> 00:30:31,279
on the big loop i hear you loud and

686
00:30:50,950 --> 00:30:48,310
the international space station

687
00:30:51,990 --> 00:30:50,960
and dragon are just over the black sea

688
00:30:54,470 --> 00:30:52,000

right now

689
00:30:56,470 --> 00:30:54,480
um they're moving so fast that they'll

690
00:31:02,549 --> 00:30:56,480
see

691
00:31:08,950 --> 00:31:04,950
17 500 miles per hour is how fast

692
00:31:14,230 --> 00:31:11,830
and these uh movements that we see

693
00:31:16,230 --> 00:31:14,240
are our camera moving dragon is moving

694
00:31:17,990 --> 00:31:16,240
itself but not quite as

695
00:31:20,630 --> 00:31:18,000
quickly as as we see these movements

696
00:31:22,470 --> 00:31:20,640
happening right now

697
00:31:24,549 --> 00:31:22,480
and uh just a few weeks ago they this

698
00:31:25,990 --> 00:31:24,559
crew and this vehicle had a bit of

699
00:31:28,470 --> 00:31:26,000
practice uh

700
00:31:32,149 --> 00:31:28,480
uh on the first week of april uh the

701
00:31:34,950 --> 00:31:32,159
crew was uh had donned their spacesuits

702
00:31:36,710 --> 00:31:34,960
um got entered the vehicle and undocked

703
00:31:37,909 --> 00:31:36,720
and relocated themselves from one port

704
00:31:39,190 --> 00:31:37,919
to another

705
00:31:41,190 --> 00:31:39,200
um

706
00:31:43,029 --> 00:31:41,200
so that while they didn't quite

707
00:31:44,870 --> 00:31:43,039
exit the approach ellipsoid they got

708
00:31:47,430 --> 00:31:44,880
pretty far out there where they had to

709
00:31:49,269 --> 00:31:47,440
turn on their lidar and re-dock with the

710
00:31:51,350 --> 00:31:49,279
international space station yeah it was

711
00:31:53,110 --> 00:31:51,360
definitely a dress rehearsal all four

712
00:31:54,789 --> 00:31:53,120
crew members got suited up got in their

713
00:31:58,070 --> 00:31:54,799

seats strapped in

714
00:32:00,389 --> 00:31:58,080
just in case that the reed dock was did

715
00:32:02,230 --> 00:32:00,399
not occur but as we saw everything

716
00:32:04,230 --> 00:32:02,240
worked well that was to move crew dragon

717
00:32:07,029 --> 00:32:04,240
from the forward-facing port on the

718
00:32:09,029 --> 00:32:07,039
harmony module to the space spacing port

719
00:32:11,669 --> 00:32:09,039
where it just undocked from and that

720
00:32:14,310 --> 00:32:11,679
leaves that space vacant crew 2 docked

721
00:32:16,470 --> 00:32:14,320
to the forward harmony port last week

722
00:32:19,350 --> 00:32:16,480
when they arrived aboard crew dragon

723
00:32:22,070 --> 00:32:19,360
endeavour and now that the zenith facing

724
00:32:25,190 --> 00:32:22,080
or space-facing port is empty

725
00:32:27,830 --> 00:32:25,200
spacex commercial resupply mission 22

726
00:32:29,750 --> 00:32:27,840
can move in later this summer and bring

727
00:32:31,990 --> 00:32:29,760
along with it some

728
00:32:33,990 --> 00:32:32,000
research for the crew food supplies as

729
00:32:42,230 --> 00:32:34,000
well as the new solar arrays that we'll

730
00:32:46,070 --> 00:32:43,750
it's going to be quite a busy year for

731
00:32:48,070 --> 00:32:46,080
the dragon program um it's been an

732
00:32:50,230 --> 00:32:48,080
exciting couple of weeks with

733
00:32:52,470 --> 00:32:50,240
the relocation crew 2 heading on up

734
00:32:54,230 --> 00:32:52,480
there now crew one departing and then

735
00:32:56,149 --> 00:32:54,240
like leah mentioned we have a crs

736
00:32:57,750 --> 00:32:56,159
mission in the summer as well as two

737
00:33:01,509 --> 00:32:57,760
more crude mission using the dragon

738
00:33:04,389 --> 00:33:01,519

vehicle um in uh the fall

739
00:33:07,669 --> 00:33:04,399
with um inspiration four as well as the

740
00:33:09,430 --> 00:33:07,679
crew two missio crew 3 mission sorry

741
00:33:10,470 --> 00:33:09,440
and before crew dragon came home today

742
00:33:13,110 --> 00:33:10,480
there were

743
00:33:15,830 --> 00:33:13,120
a long list of activities that needed to

744
00:33:17,750 --> 00:33:15,840
be checked off earlier this week it's a

745
00:33:19,430 --> 00:33:17,760
it's a very interesting thing to see and

746
00:33:21,509 --> 00:33:19,440
i believe that there was a photo shared

747
00:33:24,149 --> 00:33:21,519
of it i'm not sure by who but uh the

748
00:33:26,310 --> 00:33:24,159
canadarm2 was used to check out the

749
00:33:27,669 --> 00:33:26,320
exterior of the vehicle and

750
00:33:29,830 --> 00:33:27,679
look at the heat shield for any

751
00:33:31,750 --> 00:33:29,840
micrometeoroid or orbital debris

752
00:33:34,470 --> 00:33:31,760
obviously they got a green light because

753
00:33:36,870 --> 00:33:34,480
they have departed

754
00:33:38,630 --> 00:33:36,880
and we saw the crew suit up earlier

755
00:33:40,310 --> 00:33:38,640
closed their hatch

756
00:33:41,190 --> 00:33:40,320
they also had to conduct some leak

757
00:33:42,710 --> 00:33:41,200
checks

758
00:33:44,070 --> 00:33:42,720
with the

759
00:33:46,230 --> 00:33:44,080
crew members themselves in their

760
00:33:47,990 --> 00:33:46,240
spacesuits and as well as with the

761
00:33:49,990 --> 00:33:48,000
vestibule or the space between the

762
00:33:52,149 --> 00:33:50,000
international space station hatch and

763
00:33:54,070 --> 00:33:52,159

the hatch on crew dragon we want that to

764
00:33:56,470 --> 00:33:54,080
be down to a vacuum so that when the

765
00:33:57,909 --> 00:33:56,480
crew members depart it's uh it's an

766
00:34:03,190 --> 00:33:57,919
equal

767
00:34:05,110 --> 00:34:03,200
so we just have we're having a satellite

768
00:34:06,549 --> 00:34:05,120
handoff right now we should get

769
00:34:08,629 --> 00:34:06,559
visuals back

770
00:34:11,270 --> 00:34:08,639
shortly here but speaking of interesting

771
00:34:13,109 --> 00:34:11,280
photos i was browsing the astronauts

772
00:34:14,950 --> 00:34:13,119
twitter and uh as i mentioned earlier

773
00:34:17,510 --> 00:34:14,960
victor's victor glover's birthday was

774
00:34:20,310 --> 00:34:17,520
yesterday and uh seems like they had a

775
00:34:22,950 --> 00:34:20,320
great night there was a saxophone uh

776
00:34:25,349 --> 00:34:22,960
there was balloons cakes and a keyboard

777
00:34:27,510 --> 00:34:25,359
involved but all the astronauts uh seems

778
00:34:30,470 --> 00:34:27,520
like they are getting along very well

779
00:34:32,950 --> 00:34:30,480
with each other um up there in space

780
00:34:35,349 --> 00:34:32,960
yeah it's i love you know just seeing

781
00:34:36,629 --> 00:34:35,359
those real life pictures of what's

782
00:34:38,950 --> 00:34:36,639
happening on the international space

783
00:34:41,829 --> 00:34:38,960
station because we know that they devote

784
00:34:43,669 --> 00:34:41,839
so much time and and you know dedication

785
00:34:45,589 --> 00:34:43,679
to the science that's going on because

786
00:34:47,750 --> 00:34:45,599
that's really why why they are there

787
00:34:49,349 --> 00:34:47,760
it's an orbiting laboratory that you

788
00:34:51,510 --> 00:34:49,359

know does research that benefits not

789
00:34:54,389 --> 00:34:51,520
only our future space exploration goals

790
00:34:56,470 --> 00:34:54,399
but also all of us here on earth and so

791
00:34:57,670 --> 00:34:56,480
in their downtime when they get to relax

792
00:34:59,589 --> 00:34:57,680
you know some of them do play

793
00:35:02,310 --> 00:34:59,599
instruments i've seen videos of what

794
00:35:03,589 --> 00:35:02,320
looks like to be a little space band

795
00:35:05,190 --> 00:35:03,599
it's a lot of the things we like to do

796
00:35:08,470 --> 00:35:05,200
here on earth they they like to share

797
00:35:09,349 --> 00:35:08,480
meals together watch movies yeah they um

798
00:35:11,190 --> 00:35:09,359
it's

799
00:35:12,550 --> 00:35:11,200
you know watching them do the science

800
00:35:14,470 --> 00:35:12,560
experiments it does definitely looks

801
00:35:17,109 --> 00:35:14,480
like they're like kids in a candy store

802
00:35:19,510 --> 00:35:17,119
they they are absolutely ecstatic about

803
00:35:20,870 --> 00:35:19,520
sort of how the properties

804
00:35:23,589 --> 00:35:20,880
of experiments will change in the

805
00:35:25,430 --> 00:35:23,599
microgravity environment

806
00:35:28,390 --> 00:35:25,440
again we are waiting for the callout for

807
00:35:29,990 --> 00:35:28,400
dragon to continue to

808
00:35:32,310 --> 00:35:30,000
distance itself from the international

809
00:35:34,630 --> 00:35:32,320
space station and eventually exit the

810
00:35:36,310 --> 00:35:34,640
approach ellipsoid it's an imaginary

811
00:35:38,950 --> 00:35:36,320
ellipsoid around the international space

812
00:35:42,390 --> 00:35:38,960
station uh measuring four kilometers by

813
00:35:47,990 --> 00:35:43,990

we're looking for that to come up just a

814
00:35:49,349 --> 00:35:48,000
few minutes from now uh it says 5 54 on

815
00:35:51,670 --> 00:35:49,359
pacific time

816
00:35:53,270 --> 00:35:51,680
so we'll be standing by for that

817
00:35:54,550 --> 00:35:53,280
and this like we mentioned earlier with

818
00:35:56,950 --> 00:35:54,560
the keep out sphere this is another

819
00:35:58,710 --> 00:35:56,960
place that you might stop on the way up

820
00:36:01,750 --> 00:35:58,720
and perform any checkouts before the

821
00:36:04,550 --> 00:36:01,760
vehicle gets closer to the space station

822
00:36:06,550 --> 00:36:04,560
but on the way down smooth sailing we

823
00:36:08,310 --> 00:36:06,560
are clear to go so

824
00:36:10,310 --> 00:36:08,320
we also heard the astronauts are now out

825
00:36:12,710 --> 00:36:10,320
of their suits and i believe that was

826
00:36:14,310 --> 00:36:12,720
mike hopkins testing out the

827
00:36:16,069 --> 00:36:14,320
cabin microphone which means it's not

828
00:36:17,829 --> 00:36:16,079
the microphone that is built into their

829
00:36:20,550 --> 00:36:17,839
suits it's it's one that they're able to

830
00:36:21,910 --> 00:36:20,560
use and float around the capsule with so

831
00:36:23,829 --> 00:36:21,920
that means they're out of their seats as

832
00:36:25,670 --> 00:36:23,839
well i can only imagine they might be

833
00:36:27,670 --> 00:36:25,680
getting some views out the window of

834
00:36:30,950 --> 00:36:27,680
their home for the previous six months

835
00:36:32,710 --> 00:36:30,960
on the international space station

836
00:36:35,190 --> 00:36:32,720
it's going to be a very exciting couple

837
00:36:36,710 --> 00:36:35,200
of hours here coming up with

838
00:36:38,230 --> 00:36:36,720

the crew returning

839
00:36:40,870 --> 00:36:38,240
i should mention that throughout

840
00:36:43,270 --> 00:36:40,880
tonight's broadcast if you have any

841
00:36:45,829 --> 00:36:43,280
questions we are taking questions if you

842
00:36:47,589 --> 00:36:45,839
use the hashtag launchamerica we'll try

843
00:36:49,430 --> 00:36:47,599
to answer them here on air

844
00:36:51,270 --> 00:36:49,440
we have one right here will the will we

845
00:36:52,630 --> 00:36:51,280
be able to see the capsule re-enter the

846
00:36:56,390 --> 00:36:52,640
atmosphere from the ground here in

847
00:36:57,829 --> 00:36:56,400
florida since it will be dark

848
00:37:00,870 --> 00:36:57,839
i think so

849
00:37:03,109 --> 00:37:00,880
we were talking earlier with the

850
00:37:05,990 --> 00:37:03,119
commercial crew program manager and

851
00:37:08,230 --> 00:37:06,000
there's not a ton of clouds if you are

852
00:37:09,750 --> 00:37:08,240
near panama city or probably somewhere

853
00:37:11,910 --> 00:37:09,760
in florida you should be able to see a

854
00:37:13,670 --> 00:37:11,920
re-entry of the dragon depending on the

855
00:37:14,950 --> 00:37:13,680
cloud coverage

856
00:37:16,630 --> 00:37:14,960
when the capsule re-enters the

857
00:37:17,829 --> 00:37:16,640
atmosphere it'll largely be over the

858
00:37:19,990 --> 00:37:17,839
water so

859
00:37:21,910 --> 00:37:20,000
maybe a little out of sight for most

860
00:37:22,950 --> 00:37:21,920
people on land to see

861
00:37:24,390 --> 00:37:22,960
but

862
00:37:26,310 --> 00:37:24,400
we did hear that there will be a lot of

863
00:37:27,589 --> 00:37:26,320

moonlight so hopefully we get some good

864
00:37:29,670 --> 00:37:27,599
views the best views that you'll get

865
00:37:30,550 --> 00:37:29,680
will be on this broadcast we promise you

866
00:37:32,710 --> 00:37:30,560
that

867
00:37:35,910 --> 00:37:32,720
but it won't be the same as seeing those

868
00:37:37,990 --> 00:37:35,920
those four main parachutes billowing as

869
00:37:40,390 --> 00:37:38,000
the capsule comes down

870
00:37:43,109 --> 00:37:40,400
so we are targeting uh splashdown just

871
00:37:44,310 --> 00:37:43,119
before midnight pacific time so if you

872
00:37:46,790 --> 00:37:44,320
are on the

873
00:37:48,829 --> 00:37:46,800
east coast uh you might have to stay up

874
00:37:50,390 --> 00:37:48,839
a little bit in order to see the

875
00:37:51,670 --> 00:37:50,400
splashdown

876
00:37:52,950 --> 00:37:51,680
now this view on the right hand side of

877
00:37:54,870 --> 00:37:52,960
your screen that's mission control

878
00:37:56,710 --> 00:37:54,880
houston the international space station

879
00:37:58,630 --> 00:37:56,720
flight control center

880
00:38:02,069 --> 00:37:58,640
at johnson space center and so we are

881
00:38:04,630 --> 00:38:02,079
still in integrated operations now the

882
00:38:07,109 --> 00:38:04,640
spacecraft crew dragon is still in the

883
00:38:09,510 --> 00:38:07,119
neighborhood of the international space

884
00:38:12,390 --> 00:38:09,520
station so these teams work together in

885
00:38:14,870 --> 00:38:12,400
tandem to make sure all systems on both

886
00:38:16,790 --> 00:38:14,880
vehicles are set to what they need to be

887
00:38:17,589 --> 00:38:16,800
to make sure that these

888
00:38:20,150 --> 00:38:17,599

um

889
00:38:21,670 --> 00:38:20,160
procedures move smoothly as we've seen

890
00:38:23,829 --> 00:38:21,680
everything going well so far and we're

891
00:38:27,349 --> 00:38:23,839
looking at just a minute or two until

892
00:38:28,950 --> 00:38:27,359
they exit the approach ellipsoid

893
00:38:32,069 --> 00:38:28,960
and it really has been

894
00:38:34,950 --> 00:38:32,079
a joint effort from not just spacex and

895
00:38:36,790 --> 00:38:34,960
and nasa but the faa the the coast guard

896
00:38:40,390 --> 00:38:36,800
in order to make sure that the crew

897
00:38:41,910 --> 00:38:40,400
undocks safely returns home safely so um

898
00:38:43,349 --> 00:38:41,920
it cannot be stressed enough that it

899
00:38:45,670 --> 00:38:43,359
really is a team effort to make sure

900
00:38:47,190 --> 00:38:45,680
that everyone is doing the part and all

901
00:38:50,470 --> 00:38:47,200
these astronauts

902
00:38:56,150 --> 00:38:52,470
as we mentioned earlier this is nasa's

903
00:38:58,150 --> 00:38:56,160
first splashdown since 1968 with the

904
00:38:59,910 --> 00:38:58,160
apollo 8 crew which is one of my

905
00:39:02,150 --> 00:38:59,920
favorite missions

906
00:39:04,470 --> 00:39:02,160
and this splashdown tonight also breaks

907
00:39:06,870 --> 00:39:04,480
a record not only has it been that long

908
00:39:09,510 --> 00:39:06,880
since we did a nighttime splashdown but

909
00:39:11,910 --> 00:39:09,520
the capsule itself is now going to be

910
00:39:14,390 --> 00:39:11,920
the longest duration mission of an

911
00:39:16,390 --> 00:39:14,400
american crude capsule in space and

912
00:39:18,390 --> 00:39:16,400
they're beating out the sky lab record

913
00:39:21,510 --> 00:39:18,400

from the final skylab mission that was

914
00:39:24,470 --> 00:39:21,520
84 days one hour and 15 minutes and so

915
00:39:25,430 --> 00:39:24,480
we're coming home with 168 days here

916
00:39:28,310 --> 00:39:25,440
um

917
00:39:29,670 --> 00:39:28,320
i think they i think they passed it yeah

918
00:39:32,310 --> 00:39:29,680
um

919
00:39:33,349 --> 00:39:32,320
if you exclude demo 2

920
00:39:35,589 --> 00:39:33,359
uh

921
00:39:37,349 --> 00:39:35,599
splashdowns don't happen too often

922
00:39:38,790 --> 00:39:37,359
nowadays right most of the vehicles will

923
00:39:41,190 --> 00:39:38,800
land on land

924
00:39:43,990 --> 00:39:41,200
the space shuttle landed itself

925
00:39:46,230 --> 00:39:44,000
so you know while this may seem new and

926
00:39:48,950 --> 00:39:46,240
we haven't done this for decades we have

927
00:39:51,030 --> 00:39:48,960
rehearsed this many times and the dragon

928
00:39:52,550 --> 00:39:51,040
one program splashed down every one of

929
00:39:53,829 --> 00:39:52,560
its vehicles and we were able to recover

930
00:39:56,150 --> 00:39:53,839
most of it

931
00:39:57,829 --> 00:39:56,160
so you know we are definitely expecting

932
00:40:02,870 --> 00:39:57,839
a safe return for all of our astronauts

933
00:40:06,470 --> 00:40:04,790
and we should hear that call to exit the

934
00:40:08,150 --> 00:40:06,480
approach ellipsoid

935
00:40:10,790 --> 00:40:08,160
any minute now

936
00:40:14,550 --> 00:40:10,800
at 4 4 kilometer by two kilometer by two

937
00:40:17,109 --> 00:40:14,560
kilometer invisible shape invisible uh

938
00:40:19,750 --> 00:40:17,119

ellipse we should say imaginary sphere

939
00:40:21,510 --> 00:40:19,760
yes yes uh just helps us monitor

940
00:40:25,990 --> 00:40:21,520
vehicles as they arrive and they depart

941
00:40:27,430 --> 00:40:26,000
so crew dragon undocked dragon spacex on

942
00:40:29,349 --> 00:40:27,440
the big loop

943
00:40:31,270 --> 00:40:29,359
dragon has

944
00:40:33,430 --> 00:40:31,280
exited the approach ellipsoid and is on

945
00:40:35,670 --> 00:40:33,440
a safe free drift trajectory houston

946
00:40:38,550 --> 00:40:35,680
will be taking down the big loop shortly

947
00:40:40,550 --> 00:40:38,560
and expect iss audio traffic to cease

948
00:40:42,150 --> 00:40:40,560
please swap your audio destination to

949
00:41:04,470 --> 00:40:42,160
dragon to ground at your convenience and

950
00:41:04,480 --> 00:41:10,390
we get tracking

951
00:41:37,910 --> 00:41:12,630
dragon spacex on dragon to ground comb

952
00:41:41,589 --> 00:41:39,829
and spacex this is resilience on

953
00:41:48,390 --> 00:41:41,599
dragging around how copy

954
00:41:52,550 --> 00:41:50,790
and we've got you loud and clear as well

955
00:41:54,550 --> 00:41:52,560
and if you could pass along the folks we

956
00:41:57,270 --> 00:41:54,560
have a gorgeous view of the

957
00:41:59,589 --> 00:41:57,280
international space station

958
00:42:01,589 --> 00:41:59,599
ah that is great to hear wish we could

959
00:42:08,870 --> 00:42:01,599
see it too thanks for letting us know

960
00:42:14,390 --> 00:42:10,950
well when you guys get our tablets back

961
00:42:16,230 --> 00:42:14,400
you just might find some photos on it

962
00:42:38,710 --> 00:42:16,240
excellent to hear we look forward to it

963
00:42:42,550 --> 00:42:40,710

as you heard dragon resilience has now

964
00:42:44,870 --> 00:42:42,560
exited the approach ellipsoid that

965
00:42:46,550 --> 00:42:44,880
imaginary ellipsoid measuring four

966
00:42:48,309 --> 00:42:46,560
kilometers by two kilometers by two

967
00:42:50,150 --> 00:42:48,319
kilometers in the same family as the

968
00:42:51,109 --> 00:42:50,160
keep out sphere which we saw them depart

969
00:42:53,829 --> 00:42:51,119
earlier

970
00:42:55,109 --> 00:42:53,839
uh and we also heard them that they said

971
00:42:56,550 --> 00:42:55,119
they have a beautiful view of the

972
00:42:58,309 --> 00:42:56,560
international space station so our

973
00:43:00,550 --> 00:42:58,319
hypothesis was right they were

974
00:43:03,910 --> 00:43:00,560
definitely getting some last glimpses

975
00:43:07,510 --> 00:43:05,670
yeah i'm quite jealous uh they probably

976
00:43:10,230 --> 00:43:07,520
have the best views in town

977
00:43:12,630 --> 00:43:10,240
next up is the third departure burn and

978
00:43:13,910 --> 00:43:12,640
what we call departure burn 2

979
00:43:15,270 --> 00:43:13,920
that's coming up

980
00:43:19,750 --> 00:43:15,280
at about

981
00:43:21,750 --> 00:43:19,760
around 6 27 p.m pacific time

982
00:43:24,069 --> 00:43:21,760
um it's going to be 44 seconds in

983
00:43:25,829 --> 00:43:24,079
duration and it uses a combination of

984
00:43:28,710 --> 00:43:25,839
service section thrusters and forward

985
00:43:31,190 --> 00:43:28,720
bulkheads um

986
00:43:34,230 --> 00:43:31,200
so this is done at the orbital apogee

987
00:43:36,470 --> 00:43:34,240
the lowest uh point in dragon's lower to

988
00:43:37,829 --> 00:43:36,480

lower dragon's perigee to below the

989
00:43:40,390 --> 00:43:37,839
space station to start bringing it

990
00:43:41,670 --> 00:43:40,400
beneath and in front of the station's

991
00:43:43,349 --> 00:43:41,680
orbit

992
00:43:44,710 --> 00:43:43,359
and as you mentioned that'll be depart

993
00:43:46,550 --> 00:43:44,720
burn two

994
00:43:48,309 --> 00:43:46,560
but it's really the third departure burn

995
00:43:50,069 --> 00:43:48,319
that we've seen well we had two short on

996
00:43:51,750 --> 00:43:50,079
dock burns that helped us break the

997
00:43:53,750 --> 00:43:51,760
stiction and then begin moving away from

998
00:43:55,990 --> 00:43:53,760
the international space station

999
00:43:58,710 --> 00:43:56,000
and then afterward we had depart burn

1000
00:44:01,349 --> 00:43:58,720
zero lasting about 16 seconds and depart

1001
00:44:02,710 --> 00:44:01,359
burn one lasting 21 seconds those are

1002
00:44:04,630 --> 00:44:02,720
bringing these

1003
00:44:05,910 --> 00:44:04,640
vehicle up and over the international

1004
00:44:08,230 --> 00:44:05,920
space station

1005
00:44:12,550 --> 00:44:08,240
and then depart burn two as you

1006
00:44:16,309 --> 00:44:12,560
mentioned coming up at 6 28 pacific time

1007
00:44:18,309 --> 00:44:16,319
that should uh be about 44 seconds long

1008
00:44:20,710 --> 00:44:18,319
and then the final major departure burn

1009
00:44:24,630 --> 00:44:20,720
is depart burn three we'll expect to see

1010
00:44:29,750 --> 00:44:24,640
that at 7 14 p.m pacific or 21 or

1011
00:44:32,150 --> 00:44:29,760
214 gmt lasting just over a minute long

1012
00:44:36,069 --> 00:44:32,160
and spacex from resilience all four

1013
00:44:44,630 --> 00:44:36,079

suits are connected and in drying

1014
00:44:49,109 --> 00:44:46,950
and that was uh mike hopkins confirming

1015
00:44:51,190 --> 00:44:49,119
that they have doffed or taken off their

1016
00:44:52,870 --> 00:44:51,200
suits and currently drying again they

1017
00:44:54,230 --> 00:44:52,880
will be putting them back on in a few

1018
00:44:57,829 --> 00:44:54,240
hours from now in preparation for

1019
00:45:00,950 --> 00:44:57,839
deorbit but that graphic um so dear burn

1020
00:45:02,870 --> 00:45:00,960
3 the glass burn if you have joined us

1021
00:45:05,190 --> 00:45:02,880
for last week's

1022
00:45:07,190 --> 00:45:05,200
entry uh it's known as sort of a

1023
00:45:09,430 --> 00:45:07,200
co-elliptic burn what that means is

1024
00:45:11,510 --> 00:45:09,440
after that burn is done the dragon

1025
00:45:13,910 --> 00:45:11,520
vehicle will be at a constant 10

1026
00:45:15,589 --> 00:45:13,920
kilometers beneath the space station the

1027
00:45:17,829 --> 00:45:15,599
entire way around its orbit and then you

1028
00:45:19,510 --> 00:45:17,839
get to this final deorbit burn willow

1029
00:45:21,670 --> 00:45:19,520
where will start to decrease the

1030
00:45:23,349 --> 00:45:21,680
altitude and eventually uh re-enter the

1031
00:45:25,030 --> 00:45:23,359
earth's atmosphere and there are some

1032
00:45:27,190 --> 00:45:25,040
you know other sequences that the

1033
00:45:28,870 --> 00:45:27,200
vehicle will need to follow in order to

1034
00:45:30,870 --> 00:45:28,880
splash back down

1035
00:45:33,109 --> 00:45:30,880
the largest of these departure burns so

1036
00:45:34,870 --> 00:45:33,119
far have well the longest i should say

1037
00:45:36,790 --> 00:45:34,880
will be depart burn three and that's

1038
00:45:39,430 --> 00:45:36,800

coming in and just over a minute long

1039
00:45:42,790 --> 00:45:39,440
looks like 61 seconds but the deorbit

1040
00:45:45,190 --> 00:45:42,800
burn will last 16 minutes and 26 seconds

1041
00:45:47,349 --> 00:45:45,200
so about 16 and a half minutes of those

1042
00:45:49,270 --> 00:45:47,359
four forward bulkhead draco thrusters

1043
00:45:51,109 --> 00:45:49,280
slowing dragon down and that'll be a

1044
00:45:52,790 --> 00:45:51,119
retrograde firing so those are pointing

1045
00:45:54,630 --> 00:45:52,800
the thrusters in the direction that

1046
00:45:56,309 --> 00:45:54,640
they're traveling and this will change

1047
00:45:59,990 --> 00:45:56,319
the perigee or the lowest point of their

1048
00:46:01,829 --> 00:46:00,000
orbit and help them drop out of

1049
00:46:04,630 --> 00:46:01,839
orbit around the earth and so that's

1050
00:46:13,750 --> 00:46:04,640
what really commits them to their

1051
00:46:19,030 --> 00:46:16,550
so we're continuing to track dragon's

1052
00:46:22,790 --> 00:46:19,040
journey back to earth uh this is a view

1053
00:46:24,230 --> 00:46:22,800
of johnson's uh space center in houston

1054
00:46:26,069 --> 00:46:24,240
uh we have a couple more questions from

1055
00:46:29,030 --> 00:46:26,079
social media

1056
00:46:31,990 --> 00:46:29,040
do all astronauts at the iss keep on the

1057
00:46:34,470 --> 00:46:32,000
same time zone uh such as eastern time

1058
00:46:37,270 --> 00:46:34,480
zone or pacific time zone um

1059
00:46:39,510 --> 00:46:37,280
yes uh they follow a greenwich gmt

1060
00:46:41,430 --> 00:46:39,520
greenwich mean time so that is sort of

1061
00:46:43,750 --> 00:46:41,440
the nice halfway point between a bunch

1062
00:46:45,670 --> 00:46:43,760
of different space agencies so that is

1063
00:46:48,630 --> 00:46:45,680

the time that um you know they use and

1064
00:46:50,069 --> 00:46:48,640
you'll often see us referring uh calling

1065
00:46:51,349 --> 00:46:50,079
out timelines in pacific time zone

1066
00:46:53,190 --> 00:46:51,359
because that's where we're at but we

1067
00:46:54,550 --> 00:46:53,200
also try to throw in gmt

1068
00:46:57,109 --> 00:46:54,560
as well to make sure that the

1069
00:46:59,270 --> 00:46:57,119
international folks and the astronauts

1070
00:47:01,190 --> 00:46:59,280
also get their timelines correct

1071
00:47:02,790 --> 00:47:01,200
and this question from andrew along with

1072
00:47:04,390 --> 00:47:02,800
the members of crew one what items

1073
00:47:07,349 --> 00:47:04,400
returned with the crew dragon capsule

1074
00:47:11,030 --> 00:47:07,359
experiments garbage and space luggage

1075
00:47:13,589 --> 00:47:11,040
uh yes to those not necessarily garbage

1076
00:47:15,510 --> 00:47:13,599
uh we we have different

1077
00:47:17,030 --> 00:47:15,520
needs on our different vehicles and one

1078
00:47:18,790 --> 00:47:17,040
of the great things about crew dragon is

1079
00:47:21,750 --> 00:47:18,800
it allows us to bring home

1080
00:47:23,750 --> 00:47:21,760
cold science or cold stowage

1081
00:47:26,150 --> 00:47:23,760
things that need to be empowered lockers

1082
00:47:28,710 --> 00:47:26,160
refrigerators essentially that way they

1083
00:47:30,390 --> 00:47:28,720
can be delivered to earth and and given

1084
00:47:32,150 --> 00:47:30,400
quickly to the researchers here on the

1085
00:47:34,470 --> 00:47:32,160
ground that have developed these

1086
00:47:36,630 --> 00:47:34,480
investigations so that is a lot of what

1087
00:47:38,630 --> 00:47:36,640
returns with the crew dragon

1088
00:47:40,710 --> 00:47:38,640

as well as you mentioned the crew one

1089
00:47:42,309 --> 00:47:40,720
themselves and there might be a little

1090
00:47:44,630 --> 00:47:42,319
bit of space luggage in there each of

1091
00:47:47,109 --> 00:47:44,640
the crew members gets to take up some

1092
00:47:48,470 --> 00:47:47,119
personal items um and we don't

1093
00:47:50,630 --> 00:47:48,480
necessarily know what those are because

1094
00:47:53,109 --> 00:47:50,640
they are personal uh but those come home

1095
00:47:54,950 --> 00:47:53,119
with them as well and we saw earlier

1096
00:47:57,910 --> 00:47:54,960
today when the

1097
00:47:58,950 --> 00:47:57,920
astronauts were ingressing the capsule

1098
00:48:03,349 --> 00:47:58,960
the

1099
00:48:05,109 --> 00:48:03,359
trying to make a full use of you know

1100
00:48:06,710 --> 00:48:05,119
all the volume inside of the capsule

1101
00:48:09,190 --> 00:48:06,720
there is some storage space underneath

1102
00:48:11,910 --> 00:48:09,200
the seat at sort of the base of the

1103
00:48:16,630 --> 00:48:11,920
dragon vehicle where they can store some

1104
00:48:20,470 --> 00:48:18,230
so yeah so keep sending us these

1105
00:48:24,150 --> 00:48:20,480
questions i'm having a blast answering

1106
00:48:26,309 --> 00:48:24,160
them again the hashtag is launch america

1107
00:48:28,069 --> 00:48:26,319
and we have this one from corey will the

1108
00:48:30,790 --> 00:48:28,079
crew want astronauts be able to look out

1109
00:48:33,030 --> 00:48:30,800
the window as the capsule is returning

1110
00:48:35,750 --> 00:48:33,040
through the atmosphere well the windows

1111
00:48:37,349 --> 00:48:35,760
definitely don't close so the windows

1112
00:48:39,829 --> 00:48:37,359
they would be able to see out of them

1113
00:48:42,870 --> 00:48:39,839

but their seats will be actuated or

1114
00:48:45,430 --> 00:48:42,880
somewhat reclined uh to about 40 degrees

1115
00:48:48,549 --> 00:48:45,440
so they'll be more so facing that upper

1116
00:48:50,230 --> 00:48:48,559
hatch that we just saw them ingress or

1117
00:48:53,190 --> 00:48:50,240
enter whenever they prepared to leave

1118
00:48:55,190 --> 00:48:53,200
the space station and those windows are

1119
00:48:57,109 --> 00:48:55,200
on the sides of the forward hatch or

1120
00:48:59,750 --> 00:48:57,119
sorry the side hatch which is what they

1121
00:49:01,190 --> 00:48:59,760
will exit later so they won't really be

1122
00:49:04,150 --> 00:49:01,200
in the

1123
00:49:06,549 --> 00:49:04,160
peripheral maybe of the astronauts um

1124
00:49:08,309 --> 00:49:06,559
but who knows

1125
00:49:10,470 --> 00:49:08,319
really far down and see it through their

1126
00:49:12,309 --> 00:49:10,480
corner of their eye but uh as i

1127
00:49:13,670 --> 00:49:12,319
mentioned the seats actually actuate up

1128
00:49:15,670 --> 00:49:13,680
and so what's going to be in front of

1129
00:49:17,990 --> 00:49:15,680
them are those three touchscreen leds

1130
00:49:20,230 --> 00:49:18,000
with a ton of important information such

1131
00:49:21,990 --> 00:49:20,240
as telemetry entry angle and those are

1132
00:49:24,069 --> 00:49:22,000
all important things that i'm sure the

1133
00:49:25,910 --> 00:49:24,079
astronauts need to monitor to make sure

1134
00:49:27,030 --> 00:49:25,920
that the dragon vehicle is doing what it

1135
00:49:30,069 --> 00:49:27,040
needs to

1136
00:49:30,950 --> 00:49:30,079
for re-entry

1137
00:49:33,030 --> 00:49:30,960
uh

1138
00:49:34,309 --> 00:49:33,040

another question here are there xbox or

1139
00:49:35,829 --> 00:49:34,319
playstations

1140
00:49:37,829 --> 00:49:35,839
on the international space station so

1141
00:49:38,870 --> 00:49:37,839
astronauts can be gamers i love this

1142
00:49:40,790 --> 00:49:38,880
question

1143
00:49:45,589 --> 00:49:40,800
um i don't know if there are

1144
00:49:51,270 --> 00:49:48,309
but i i mentioned this uh last week but

1145
00:49:53,270 --> 00:49:51,280
there is an experiment and i hope you

1146
00:49:55,030 --> 00:49:53,280
like this decisive tv there's an

1147
00:49:57,589 --> 00:49:55,040
experiment where they're taking a high

1148
00:49:59,349 --> 00:49:57,599
performance computer and bringing it to

1149
00:50:01,109 --> 00:49:59,359
the space station and essentially what

1150
00:50:03,750 --> 00:50:01,119
they're doing is powering it on for a

1151
00:50:05,750 --> 00:50:03,760
year and seeing if radiation will affect

1152
00:50:08,150 --> 00:50:05,760
its performance so i don't know if

1153
00:50:09,990 --> 00:50:08,160
that's a precursor to

1154
00:50:12,549 --> 00:50:10,000
space gaming in the future that would be

1155
00:50:14,309 --> 00:50:12,559
very cool

1156
00:50:16,230 --> 00:50:14,319
but we'll see we'll see a year from now

1157
00:50:18,230 --> 00:50:16,240
how that experiment turns out yeah we

1158
00:50:19,750 --> 00:50:18,240
unfortunately don't have any gaming

1159
00:50:21,349 --> 00:50:19,760
consoles for them on the international

1160
00:50:23,109 --> 00:50:21,359
space station that sounds pretty fun

1161
00:50:24,230 --> 00:50:23,119
though but like we mentioned they do

1162
00:50:26,309 --> 00:50:24,240
have other things to do in their

1163
00:50:27,750 --> 00:50:26,319

downtime some like to continue working

1164
00:50:29,510 --> 00:50:27,760
on science

1165
00:50:31,030 --> 00:50:29,520
i think one of the most popular and

1166
00:50:33,589 --> 00:50:31,040
favorite pastimes is looking out the

1167
00:50:35,270 --> 00:50:33,599
window because who could blame them

1168
00:50:37,430 --> 00:50:35,280
as well as sometimes they watch movies

1169
00:50:39,510 --> 00:50:37,440
they share meals and we even know that

1170
00:50:41,030 --> 00:50:39,520
they play instruments as well

1171
00:50:43,270 --> 00:50:41,040
yeah that would be cool you have you

1172
00:50:44,230 --> 00:50:43,280
know west coast servers east coast

1173
00:50:46,230 --> 00:50:44,240
servers

1174
00:50:47,510 --> 00:50:46,240
then you have a space server

1175
00:50:49,750 --> 00:50:47,520
and you're gaming with astronauts that

1176
00:50:51,510 --> 00:50:49,760
could be the future that'd be so cool

1177
00:50:52,870 --> 00:50:51,520
this next question from daniel how do

1178
00:50:54,630 --> 00:50:52,880
astronauts do laundry on the

1179
00:50:55,430 --> 00:50:54,640
international space station

1180
00:50:56,790 --> 00:50:55,440
well

1181
00:50:58,630 --> 00:50:56,800
this should be encouragement for anyone

1182
00:51:00,710 --> 00:50:58,640
who hates doing laundry you don't have

1183
00:51:01,750 --> 00:51:00,720
to do laundry on the international space

1184
00:51:03,589 --> 00:51:01,760
station

1185
00:51:05,589 --> 00:51:03,599
you can actually just throw your clothes

1186
00:51:08,390 --> 00:51:05,599
away so they don't throw them away after

1187
00:51:09,589 --> 00:51:08,400
one wear they do try to reuse their

1188
00:51:11,910 --> 00:51:09,599

clothing

1189
00:51:14,549 --> 00:51:11,920
but because you know we don't really

1190
00:51:16,150 --> 00:51:14,559
have water that can be disposed of in

1191
00:51:17,829 --> 00:51:16,160
that in that amount

1192
00:51:21,030 --> 00:51:17,839
we recycle all of our water on the

1193
00:51:23,270 --> 00:51:21,040
international space station and so we we

1194
00:51:25,430 --> 00:51:23,280
don't have the opportunity to do laundry

1195
00:51:27,750 --> 00:51:25,440
so those burn up upon re-entry on the

1196
00:51:29,589 --> 00:51:27,760
earth's atmosphere when we pack them

1197
00:51:31,750 --> 00:51:29,599
along with other trash

1198
00:51:33,990 --> 00:51:31,760
and garbage inside

1199
00:51:35,270 --> 00:51:34,000
other vehicles like the northrop grumman

1200
00:51:36,470 --> 00:51:35,280
cygnus

1201
00:51:38,790 --> 00:51:36,480
and we just send that back and it

1202
00:51:40,790 --> 00:51:38,800
disintegrates in the earth's atmosphere

1203
00:51:42,069 --> 00:51:40,800
that's kind of cool taking out the trash

1204
00:51:43,589 --> 00:51:42,079
if you don't want to do laundry just

1205
00:51:45,430 --> 00:51:43,599
become an astronaut exactly that's

1206
00:51:46,710 --> 00:51:45,440
that's simple and i love this little

1207
00:51:48,710 --> 00:51:46,720
view you can see

1208
00:51:50,950 --> 00:51:48,720
a crew dragon there on the right side of

1209
00:51:52,309 --> 00:51:50,960
your screen just a point of light

1210
00:51:53,750 --> 00:51:52,319
continuing to move away from the

1211
00:51:56,069 --> 00:51:53,760
international space station with the

1212
00:51:58,790 --> 00:51:56,079
next burn coming up in about 20 minutes

1213
00:52:11,589 --> 00:51:58,800

depart burn two which should last 44

1214
00:52:15,430 --> 00:52:13,990
so again that is the dragon capsule it

1215
00:52:16,870 --> 00:52:15,440
is

1216
00:52:18,870 --> 00:52:16,880
quite far from the international space

1217
00:52:21,190 --> 00:52:18,880
station at this point again it passed

1218
00:52:23,430 --> 00:52:21,200
the imagine the two imaginary

1219
00:52:27,109 --> 00:52:23,440
areas the keypad sphere and the approach

1220
00:52:31,349 --> 00:52:27,119
ellipsoid continuing to distance itself

1221
00:52:36,630 --> 00:52:33,510
and we had an on time undocking today

1222
00:52:38,710 --> 00:52:36,640
the command being sent right at 5 30 pm

1223
00:52:41,109 --> 00:52:38,720
pacific time and then undocking coming

1224
00:52:43,510 --> 00:52:41,119
around five minutes later

1225
00:52:45,829 --> 00:52:43,520
those hooks opening umbilical detaching

1226
00:52:47,510 --> 00:52:45,839
and two short burns separating crew

1227
00:52:49,430 --> 00:52:47,520
dragon resilience from the international

1228
00:52:54,790 --> 00:52:49,440
space station where it has called home

1229
00:52:57,670 --> 00:52:56,230
teams here in mission control houston

1230
00:53:00,230 --> 00:52:57,680
you can see flight controllers at their

1231
00:53:01,910 --> 00:53:00,240
consoles monitoring all the systems

1232
00:53:06,230 --> 00:53:01,920
aboard the international space station

1233
00:53:08,549 --> 00:53:06,240
that's a 24 hour 365 day a year job

1234
00:53:10,309 --> 00:53:08,559
and that has been for over 20 years now

1235
00:53:11,990 --> 00:53:10,319
because that's the amount of time that

1236
00:53:14,390 --> 00:53:12,000
we've had people

1237
00:53:16,309 --> 00:53:14,400
living in space so if you are

1238
00:53:18,630 --> 00:53:16,319

under 20 years old

1239
00:53:20,069 --> 00:53:18,640
there has never been a day that

1240
00:53:21,910 --> 00:53:20,079
you've been alive without humans in

1241
00:53:23,829 --> 00:53:21,920
space yeah i believe the international

1242
00:53:25,910 --> 00:53:23,839
space station just had its 20th

1243
00:53:27,589 --> 00:53:25,920
anniversary last year and celebrated

1244
00:53:30,790 --> 00:53:27,599
that

1245
00:53:33,430 --> 00:53:30,800
saw some flags from previous um

1246
00:53:34,870 --> 00:53:33,440
views of you know the 20th anniversary

1247
00:53:36,790 --> 00:53:34,880
of the international space station quite

1248
00:53:38,790 --> 00:53:36,800
a long time it's been orbiting the earth

1249
00:53:39,829 --> 00:53:38,800
over and over and over again

1250
00:53:40,829 --> 00:53:39,839
um

1251
00:53:43,589 --> 00:53:40,839
you know when it was initially

1252
00:53:46,309 --> 00:53:43,599
conceptualized uh the space station was

1253
00:53:48,309 --> 00:53:46,319
essentially built by sending you know a

1254
00:53:50,950 --> 00:53:48,319
piece at a time and attaching it uh one

1255
00:53:52,790 --> 00:53:50,960
piece at a time and it's sort of become

1256
00:53:54,230 --> 00:53:52,800
uh you know the orbiting laboratory that

1257
00:53:56,069 --> 00:53:54,240
it is now

1258
00:53:58,390 --> 00:53:56,079
over 300 feet

1259
00:54:00,069 --> 00:53:58,400
long and

1260
00:54:03,829 --> 00:54:00,079
if you look at the solar arrays they're

1261
00:54:05,589 --> 00:54:03,839
over 110 feet wide so to speak but it is

1262
00:54:07,910 --> 00:54:05,599
quite a large laboratory with a lot of

1263
00:54:09,190 --> 00:54:07,920

modules and a lot of science happening

1264
00:54:11,589 --> 00:54:09,200
onboard it

1265
00:54:12,870 --> 00:54:11,599
and a good way to uh

1266
00:54:15,030 --> 00:54:12,880
to make it

1267
00:54:16,549 --> 00:54:15,040
visual is if you put the international

1268
00:54:18,870 --> 00:54:16,559
space station on top of american

1269
00:54:20,549 --> 00:54:18,880
football field it would reach from end

1270
00:54:24,069 --> 00:54:20,559
zone to end zone

1271
00:54:25,510 --> 00:54:24,079
so that that shows just how big it is i

1272
00:54:27,750 --> 00:54:25,520
love when the astronauts are outside on

1273
00:54:30,390 --> 00:54:27,760
a spacewalk and they are so small in

1274
00:54:32,470 --> 00:54:30,400
comparison to the uh

1275
00:54:34,630 --> 00:54:32,480
to the solar rays in the background it's

1276
00:54:37,910 --> 00:54:34,640
fascinating and crew dragon is now

1277
00:54:40,069 --> 00:54:37,920
approximately 3.3 kilometers away from

1278
00:54:41,990 --> 00:54:40,079
the international space station

1279
00:54:44,309 --> 00:54:42,000
still has quite a ways to go home but

1280
00:54:45,750 --> 00:54:44,319
everything going well so far with two of

1281
00:54:49,109 --> 00:54:45,760
those departure burns having been

1282
00:54:53,430 --> 00:54:51,510
and as we mentioned before

1283
00:54:55,750 --> 00:54:53,440
since undocking we're going to be live

1284
00:54:58,390 --> 00:54:55,760
with you the entire way to splash down

1285
00:54:59,270 --> 00:54:58,400
and crew recovery so um

1286
00:55:00,630 --> 00:54:59,280
you know

1287
00:55:02,150 --> 00:55:00,640
a couple of sequences coming up here in

1288
00:55:04,390 --> 00:55:02,160

the next couple hours but it'll

1289
00:55:06,710 --> 00:55:04,400
definitely get exciting towards the last

1290
00:55:08,230 --> 00:55:06,720
couple hours with the parachutes

1291
00:55:10,549 --> 00:55:08,240
deploying and the you know trunk

1292
00:55:12,230 --> 00:55:10,559
jettison and dealer and all that

1293
00:55:13,589 --> 00:55:12,240
um

1294
00:55:15,990 --> 00:55:13,599
and if you're wondering what the crew

1295
00:55:17,990 --> 00:55:16,000
themselves are doing inside the crew

1296
00:55:19,910 --> 00:55:18,000
dragon right now as we mentioned this is

1297
00:55:21,349 --> 00:55:19,920
a completely autonomous vehicle so they

1298
00:55:23,430 --> 00:55:21,359
shouldn't have to do

1299
00:55:25,829 --> 00:55:23,440
really anything they should get the

1300
00:55:27,430 --> 00:55:25,839
opportunity to sit back as we heard

1301
00:55:28,710 --> 00:55:27,440
they're getting some last views of the

1302
00:55:30,309 --> 00:55:28,720
international space station which

1303
00:55:31,349 --> 00:55:30,319
they've called home for the past several

1304
00:55:33,349 --> 00:55:31,359
months

1305
00:55:36,150 --> 00:55:33,359
i'm sure maybe we'll try a couple of

1306
00:55:38,470 --> 00:55:36,160
extra back flips in microgravity

1307
00:55:40,549 --> 00:55:38,480
but they are out of their suits and

1308
00:55:42,150 --> 00:55:40,559
should get the chance to relax and

1309
00:55:43,750 --> 00:55:42,160
monitor that data

1310
00:55:45,910 --> 00:55:43,760
they may not make any commands of the

1311
00:55:47,829 --> 00:55:45,920
vehicle and they shouldn't have to

1312
00:55:51,190 --> 00:55:47,839
because it is autonomous but they can

1313
00:55:53,109 --> 00:55:51,200

watch those three touch screen displays

1314
00:55:55,589 --> 00:55:53,119
and see how everything is performing how

1315
00:55:57,750 --> 00:55:55,599
they uh where they are in relativity to

1316
00:56:00,390 --> 00:55:57,760
the international space station yeah i

1317
00:56:01,589 --> 00:56:00,400
mean uh the dragon vehicle does the bulk

1318
00:56:04,390 --> 00:56:01,599
of the heavy lifting and this is

1319
00:56:05,990 --> 00:56:04,400
especially important because later on as

1320
00:56:07,510 --> 00:56:06,000
part of their journey home

1321
00:56:09,190 --> 00:56:07,520
we'll we'll be entering sort of a

1322
00:56:11,670 --> 00:56:09,200
communications blackout period where the

1323
00:56:13,829 --> 00:56:11,680
plasma buildup on the bottom of the

1324
00:56:16,150 --> 00:56:13,839
capsule will sort of interfere prevent

1325
00:56:18,150 --> 00:56:16,160
communications to and from dragon but

1326
00:56:19,990 --> 00:56:18,160
have no fear the dragon is essentially

1327
00:56:22,150 --> 00:56:20,000
flying itself at that at that point and

1328
00:56:24,630 --> 00:56:22,160
the crew can again just monitor the data

1329
00:56:26,150 --> 00:56:24,640
that's being fed uh to them and the

1330
00:56:27,270 --> 00:56:26,160
dragon vehicle could really take care of

1331
00:56:28,950 --> 00:56:27,280
itself and

1332
00:56:30,230 --> 00:56:28,960
knows where it wants to go and can make

1333
00:56:32,710 --> 00:56:30,240
those adjustments to make sure that it's

1334
00:56:33,990 --> 00:56:32,720
hitting its targeted landing site

1335
00:56:35,589 --> 00:56:34,000
we just talked about they're out of

1336
00:56:37,990 --> 00:56:35,599
their suits they're not having to wear

1337
00:56:39,670 --> 00:56:38,000
them right now um and i thought about it

1338
00:56:40,870 --> 00:56:39,680

we mentioned spacewalks for a second so

1339
00:56:42,549 --> 00:56:40,880
we could talk a little bit about how

1340
00:56:43,990 --> 00:56:42,559
these suits are different

1341
00:56:46,470 --> 00:56:44,000
than the ones that they put on for

1342
00:56:48,470 --> 00:56:46,480
spacewalks this crew completed or was

1343
00:56:50,150 --> 00:56:48,480
part of five spacewalks while they were

1344
00:56:52,710 --> 00:56:50,160
on the international space station all

1345
00:56:54,470 --> 00:56:52,720
taking place earlier this year and we're

1346
00:56:56,829 --> 00:56:54,480
very familiar with seeing those what

1347
00:56:58,390 --> 00:56:56,839
appear to be very

1348
00:57:00,390 --> 00:56:58,400
large

1349
00:57:02,549 --> 00:57:00,400
yeah the classic white space here we

1350
00:57:04,630 --> 00:57:02,559
call those extra vehicular mobility

1351
00:57:06,470 --> 00:57:04,640
units and they're essentially their own

1352
00:57:09,990 --> 00:57:06,480
little spacecraft because they have

1353
00:57:12,069 --> 00:57:10,000
comms they have uh cooling and they have

1354
00:57:15,190 --> 00:57:12,079
you know mobility and astronauts can all

1355
00:57:17,589 --> 00:57:15,200
control that on the suit um and these

1356
00:57:18,309 --> 00:57:17,599
are these spacex suits are not meant to

1357
00:57:20,069 --> 00:57:18,319
be

1358
00:57:22,549 --> 00:57:20,079
extra vehicular suits but more

1359
00:57:24,630 --> 00:57:22,559
intravehicular uh they can protect the

1360
00:57:27,030 --> 00:57:24,640
crew in the event of a depressurization

1361
00:57:29,910 --> 00:57:27,040
or even a fire but

1362
00:57:31,190 --> 00:57:29,920
they are not the same as going out and

1363
00:57:32,789 --> 00:57:31,200

moving around the international space

1364
00:57:34,470 --> 00:57:32,799
station for several hours at a time in

1365
00:57:36,470 --> 00:57:34,480
the vacuum of space right they really

1366
00:57:38,390 --> 00:57:36,480
served to protect the crew inside the

1367
00:57:40,710 --> 00:57:38,400
vehicle in case there was a

1368
00:57:42,390 --> 00:57:40,720
depressurization event you know there's

1369
00:57:44,230 --> 00:57:42,400
air being fed and the suit will get

1370
00:57:47,270 --> 00:57:44,240
pressurized and server can detect that

1371
00:57:48,470 --> 00:57:47,280
on its own um outside of vehicles

1372
00:57:50,390 --> 00:57:48,480
outside of the international space

1373
00:57:51,990 --> 00:57:50,400
station the environment is quite harsh

1374
00:57:53,589 --> 00:57:52,000
extremely cold

1375
00:57:55,910 --> 00:57:53,599
you have radiation from the sun and

1376
00:57:57,510 --> 00:57:55,920
that's where those emu's are are

1377
00:58:00,470 --> 00:57:57,520
necessary with those you know really

1378
00:58:02,150 --> 00:58:00,480
cool visors um in order to

1379
00:58:04,630 --> 00:58:02,160
perform the work that needs to get done

1380
00:58:06,789 --> 00:58:04,640
on those extensive um spacewalks so the

1381
00:58:09,349 --> 00:58:06,799
suits while cool really serve a function

1382
00:58:12,710 --> 00:58:09,359
inside the vehicle

1383
00:58:15,589 --> 00:58:12,720
another view of crude dragon

1384
00:58:19,589 --> 00:58:15,599
and now uh looking 4.2 kilometers away

1385
00:58:23,589 --> 00:58:21,510
very very

1386
00:58:25,589 --> 00:58:23,599
looks a bit lonely right yeah

1387
00:58:27,190 --> 00:58:25,599
it's just it's just this speck in in

1388
00:58:29,589 --> 00:58:27,200

this blackness

1389
00:58:32,309 --> 00:58:29,599
um and we're under 15 minutes away from

1390
00:58:34,950 --> 00:58:32,319
their next burn depart burn two actually

1391
00:58:37,190 --> 00:58:34,960
14 minutes to be specific

1392
00:58:39,670 --> 00:58:37,200
but it does it looks very small when you

1393
00:58:41,990 --> 00:58:39,680
think about uh the scope of the earth i

1394
00:58:43,910 --> 00:58:42,000
think about that sometimes yeah

1395
00:58:47,430 --> 00:58:43,920
and as we mentioned earlier that bottom

1396
00:58:49,270 --> 00:58:47,440
portion is not returning to earth um

1397
00:58:50,789 --> 00:58:49,280
the top portion the capsule that's the

1398
00:58:52,549 --> 00:58:50,799
pressurized section and where all of our

1399
00:58:54,309 --> 00:58:52,559
crew members are seated

1400
00:58:56,470 --> 00:58:54,319
um and then that's just us moving the

1401
00:58:58,870 --> 00:58:56,480
cameras on the space station again these

1402
00:59:01,270 --> 00:58:58,880
that's not a crude dragon making any

1403
00:59:03,910 --> 00:59:01,280
super sudden movement very quick if it

1404
00:59:06,390 --> 00:59:03,920
did that um but that that trunk at the

1405
00:59:08,150 --> 00:59:06,400
bottom will be jettisoned and will burn

1406
00:59:11,829 --> 00:59:08,160
up in the earth's atmosphere and that's

1407
00:59:14,710 --> 00:59:11,839
a great space for bringing up things uh

1408
00:59:16,390 --> 00:59:14,720
you know upon launch the crew or the

1409
00:59:19,030 --> 00:59:16,400
cargo dragon vehicle now looks very

1410
00:59:21,270 --> 00:59:19,040
similar to this vehicle and

1411
00:59:23,190 --> 00:59:21,280
so we can expect to see solar arrays in

1412
00:59:24,950 --> 00:59:23,200
that trunk portion later this summer

1413
00:59:27,030 --> 00:59:24,960

yeah the trunk right now there's an

1414
00:59:29,349 --> 00:59:27,040
umbilical that feeds power and telemetry

1415
00:59:30,630 --> 00:59:29,359
from the trunk to the capsule and so it

1416
00:59:32,630 --> 00:59:30,640
is

1417
00:59:35,030 --> 00:59:32,640
it still serves a purpose right now but

1418
00:59:37,910 --> 00:59:35,040
later on again uh it is important that

1419
00:59:40,390 --> 00:59:37,920
we expose the uh heat shield at the base

1420
00:59:42,230 --> 00:59:40,400
of the capsule of dragon prior to

1421
00:59:43,430 --> 00:59:42,240
re-entry into the earth's atmosphere so

1422
00:59:45,829 --> 00:59:43,440
the way that that

1423
00:59:48,630 --> 00:59:45,839
pica material can start to absorb and

1424
00:59:52,789 --> 00:59:48,640
protect the capsule from the extreme

1425
00:59:56,950 --> 00:59:55,030
everything has moved along

1426
00:59:58,309 --> 00:59:56,960
right on the timeline for crew dragon

1427
01:00:00,230 --> 00:59:58,319
today

1428
01:00:01,510 --> 01:00:00,240
we saw hatch closure earlier and then

1429
01:00:03,589 --> 01:00:01,520
undocking

1430
01:00:05,190 --> 01:00:03,599
the command being sent at 5 30 p.m

1431
01:00:06,789 --> 01:00:05,200
pacific

1432
01:00:08,630 --> 01:00:06,799
separation coming just a few minutes

1433
01:00:10,230 --> 01:00:08,640
later

1434
01:00:12,950 --> 01:00:10,240
two departure burns having already been

1435
01:00:14,390 --> 01:00:12,960
completed and the crew dragon outside of

1436
01:00:16,470 --> 01:00:14,400
the keypad sphere and the approach

1437
01:00:21,589 --> 01:00:16,480
ellipsoid

1438
01:00:23,829 --> 01:00:21,599

now coming up on 4.6 4.7 kilometers away

1439
01:00:25,510 --> 01:00:23,839
from the international space station and

1440
01:00:28,230 --> 01:00:25,520
as we mentioned

1441
01:00:31,430 --> 01:00:28,240
we are coming up on the second or i

1442
01:00:33,750 --> 01:00:31,440
should say the third deorbit burn or

1443
01:00:35,589 --> 01:00:33,760
not do your burn departure burn

1444
01:00:37,430 --> 01:00:35,599
only one of those deorbit burns but that

1445
01:00:39,990 --> 01:00:37,440
third departure burn

1446
01:00:42,069 --> 01:00:40,000
will last 44 seconds

1447
01:00:43,190 --> 01:00:42,079
and speaking of deorbit burns we have a

1448
01:00:45,750 --> 01:00:43,200
question here

1449
01:00:48,470 --> 01:00:45,760
does crude dragon utilize super draco

1450
01:00:50,150 --> 01:00:48,480
engines to perform the orbit burn and

1451
01:00:52,150 --> 01:00:50,160
also in what type of scenario can super

1452
01:00:53,670 --> 01:00:52,160
draco be used other than the abort

1453
01:00:56,150 --> 01:00:53,680
scenario

1454
01:00:57,829 --> 01:00:56,160
right now the super draco is mainly used

1455
01:00:59,270 --> 01:00:57,839
for an abort scenario right luckily for

1456
01:01:01,750 --> 01:00:59,280
us we've never had to use it although

1457
01:01:03,270 --> 01:01:01,760
we've tested it extensively as for the

1458
01:01:05,109 --> 01:01:03,280
first question does crew dragon use the

1459
01:01:06,630 --> 01:01:05,119
super draco engines to perform the orbit

1460
01:01:09,030 --> 01:01:06,640
burn it does not

1461
01:01:11,510 --> 01:01:09,040
it's the draco engines there's 12 of

1462
01:01:13,190 --> 01:01:11,520
them at the service section and then an

1463
01:01:15,190 --> 01:01:13,200

additional four

1464
01:01:16,789 --> 01:01:15,200
sort of at the bottom of the nose cone

1465
01:01:18,069 --> 01:01:16,799
which is currently open right now in the

1466
01:01:19,750 --> 01:01:18,079
in the bulkhead

1467
01:01:22,230 --> 01:01:19,760
those four thrusters at the top of

1468
01:01:25,750 --> 01:01:22,240
dragon so to speak will be what

1469
01:01:28,230 --> 01:01:25,760
initiates uh the deorbit burn so no to

1470
01:01:31,109 --> 01:01:28,240
the super draco um engines we just use

1471
01:01:32,950 --> 01:01:31,119
the 16 dracos um in order to maneuver

1472
01:01:35,589 --> 01:01:32,960
dragon not only from for the deorbit

1473
01:01:38,230 --> 01:01:35,599
burn but for all the undocking sequences

1474
01:01:40,630 --> 01:01:38,240
um as well and after we complete that

1475
01:01:42,150 --> 01:01:40,640
deorbit burn uh as andy mentioned those

1476
01:01:43,510 --> 01:01:42,160
thrusters under the nose cone that's

1477
01:01:46,069 --> 01:01:43,520
what's going to be used for the orbit

1478
01:01:47,829 --> 01:01:46,079
burn we will close the nose cone

1479
01:01:50,549 --> 01:01:47,839
and protect the hatch that the crew

1480
01:01:51,990 --> 01:01:50,559
members have ingressed and egressed from

1481
01:01:53,190 --> 01:01:52,000
to and from the international space

1482
01:01:55,430 --> 01:01:53,200
station

1483
01:01:57,589 --> 01:01:55,440
so we can protect that and for future

1484
01:01:58,950 --> 01:01:57,599
reusability of this capsule

1485
01:02:01,190 --> 01:01:58,960
and we are continuing to answer your

1486
01:02:03,190 --> 01:02:01,200
questions with the hashtag launchamerica

1487
01:02:04,630 --> 01:02:03,200
so keep sending those in if you're on

1488
01:02:08,870 --> 01:02:04,640

twitter and we will do our very best to

1489
01:02:11,670 --> 01:02:10,470
coming up now

1490
01:02:14,150 --> 01:02:11,680
about

1491
01:02:16,309 --> 01:02:14,160
nine minutes away from

1492
01:02:18,630 --> 01:02:16,319
to part burn two

1493
01:02:21,829 --> 01:02:18,640
so the crew after depart burn two is

1494
01:02:25,270 --> 01:02:21,839
done around uh 7 p.m pst they will have

1495
01:02:27,589 --> 01:02:25,280
a meal uh their sort of single and um

1496
01:02:29,990 --> 01:02:27,599
last meal to on spay in space so to

1497
01:02:31,750 --> 01:02:30,000
speak um they'll have that around 7 p.m

1498
01:02:33,990 --> 01:02:31,760
and do an inventory of dragon before

1499
01:02:36,470 --> 01:02:34,000
again we get to that final phase

1500
01:02:38,630 --> 01:02:36,480
where we start to do the dior burn and

1501
01:02:40,069 --> 01:02:38,640
um splash down later and off the coast

1502
01:02:42,390 --> 01:02:40,079
of panama city

1503
01:02:43,670 --> 01:02:42,400
sounds pretty fun to have a picnic in

1504
01:02:45,190 --> 01:02:43,680
crew dragon

1505
01:02:47,670 --> 01:02:45,200
right they already have the cool views

1506
01:02:49,990 --> 01:02:47,680
as they've told us and now they get

1507
01:02:51,990 --> 01:02:50,000
catered meals too i'm again becoming

1508
01:02:53,270 --> 01:02:52,000
increasingly jealous of the astronauts

1509
01:02:55,190 --> 01:02:53,280
and these are a little bit different

1510
01:02:56,950 --> 01:02:55,200
than what they've been dining on for the

1511
01:02:58,470 --> 01:02:56,960
last few months aboard

1512
01:03:01,589 --> 01:02:58,480
the international space station these

1513
01:03:03,589 --> 01:03:01,599

are mres essentially meals ready to eat

1514
01:03:05,670 --> 01:03:03,599
meaning that you can open the package

1515
01:03:07,990 --> 01:03:05,680
and and it's there it's ready stick a

1516
01:03:09,750 --> 01:03:08,000
spoon in it no heating it up nothing

1517
01:03:12,390 --> 01:03:09,760
needed but on the international space

1518
01:03:13,990 --> 01:03:12,400
station they do have a lot of thermal

1519
01:03:17,910 --> 01:03:14,000
stabilized food

1520
01:03:18,789 --> 01:03:17,920
that they are able to re-rehydrate

1521
01:03:21,190 --> 01:03:18,799
and

1522
01:03:23,990 --> 01:03:21,200
put water in to to

1523
01:03:25,990 --> 01:03:24,000
re-stabilize it i guess you can say um

1524
01:03:27,910 --> 01:03:26,000
and that gives them the hot meals that

1525
01:03:31,190 --> 01:03:27,920
we think are so important while they're

1526
01:03:33,990 --> 01:03:31,200
in space to uh keep them enjoying

1527
01:03:35,670 --> 01:03:34,000
breakfast lunch and dinner

1528
01:03:38,150 --> 01:03:35,680
a quick question from melissa how long

1529
01:03:42,710 --> 01:03:38,160
until splashdown so it is currently

1530
01:03:44,710 --> 01:03:42,720
targeted for 11 56 p.m pacific time so

1531
01:03:46,549 --> 01:03:44,720
depending where you're at melissa

1532
01:03:48,950 --> 01:03:46,559
it could be very late tonight or very

1533
01:03:51,190 --> 01:03:48,960
early in the morning so either way it's

1534
01:03:53,829 --> 01:03:51,200
about five and a half hours from now but

1535
01:03:55,829 --> 01:03:53,839
uh don't worry spacex on dragon to

1536
01:04:07,430 --> 01:03:55,839
ground the ground is go for depart burn

1537
01:04:11,589 --> 01:04:09,349
and spacex from resilience we copy go

1538
01:04:13,270 --> 01:04:11,599

for department

1539
01:04:14,710 --> 01:04:13,280
and please let us know when you are

1540
01:04:31,510 --> 01:04:14,720
ready for us to come back on board with

1541
01:04:35,670 --> 01:04:33,510
okay spacex from resilience you're going

1542
01:04:37,430 --> 01:04:35,680
to come on board and

1543
01:04:38,950 --> 01:04:37,440
we've turned the suit fan off suit train

1544
01:04:40,549 --> 01:04:38,960
is complete

1545
01:04:44,390 --> 01:04:40,559
happy suit drying complete and we'll

1546
01:04:49,670 --> 01:04:46,630
these views of crude dragon

1547
01:04:51,109 --> 01:04:49,680
now 5.8 kilometers away from the

1548
01:04:53,190 --> 01:04:51,119
international space station a little

1549
01:04:55,109 --> 01:04:53,200
over three and a half miles

1550
01:04:56,710 --> 01:04:55,119
and we just heard them discussing with

1551
01:04:58,789 --> 01:04:56,720
the core the crew operations and

1552
01:05:00,390 --> 01:04:58,799
resource engineer here at spacex in

1553
01:05:03,109 --> 01:05:00,400
hawthorne california

1554
01:05:05,670 --> 01:05:03,119
about coming back on the vehicle so we

1555
01:05:07,430 --> 01:05:05,680
have not had views inside the vehicle

1556
01:05:09,510 --> 01:05:07,440
since they really began doffing or

1557
01:05:11,430 --> 01:05:09,520
taking off their suits we do like to

1558
01:05:13,190 --> 01:05:11,440
give them that privacy so they gave them

1559
01:05:15,349 --> 01:05:13,200
permission to come back on board the

1560
01:05:16,470 --> 01:05:15,359
vehicle meaning we might get some views

1561
01:05:17,750 --> 01:05:16,480
inside

1562
01:05:20,549 --> 01:05:17,760
but right now this is a pretty

1563
01:05:22,230 --> 01:05:20,559

spectacular view of crew dragon

1564
01:05:27,510 --> 01:05:22,240
now separated from the international

1565
01:05:31,910 --> 01:05:29,510
and we're looking for that to part burn

1566
01:05:35,589 --> 01:05:31,920
two we heard teams are go for that

1567
01:05:49,349 --> 01:05:35,599
coming up around 6 28 pacific time

1568
01:05:52,950 --> 01:05:51,430
the heartburn ii even though

1569
01:05:55,349 --> 01:05:52,960
has the number two it is the third

1570
01:05:57,670 --> 01:05:55,359
depart burn so far things really seem to

1571
01:06:00,150 --> 01:05:57,680
have been moving quickly uh crew dragon

1572
01:06:02,710 --> 01:06:00,160
undocked about fifty five zero minutes

1573
01:06:04,950 --> 01:06:02,720
ago and so far we've had those three or

1574
01:06:06,870 --> 01:06:04,960
two depart burns this will be the third

1575
01:06:09,270 --> 01:06:06,880
coming up shortly it'll be using a

1576
01:06:11,510 --> 01:06:09,280
combination of those service section

1577
01:06:13,990 --> 01:06:11,520
thrusters around the base of the capsule

1578
01:06:16,230 --> 01:06:14,000
and those forward bulkhead thrusters

1579
01:06:18,710 --> 01:06:16,240
which are underneath the nose cone and i

1580
01:06:21,430 --> 01:06:18,720
think i can see the nose cone open just

1581
01:06:23,349 --> 01:06:21,440
a little bit uh it's that circular i

1582
01:06:25,670 --> 01:06:23,359
think it's a circular piece right on top

1583
01:06:27,510 --> 01:06:25,680
right that's exactly it and it's just

1584
01:06:28,870 --> 01:06:27,520
fascinating that even from that distance

1585
01:06:30,950 --> 01:06:28,880
we can still get

1586
01:06:33,109 --> 01:06:30,960
a good view that'll remain open as we

1587
01:06:34,230 --> 01:06:33,119
mentioned until it's time

1588
01:06:36,549 --> 01:06:34,240

for

1589
01:06:44,950 --> 01:06:36,559
until afterward the orbit burn is

1590
01:06:49,109 --> 01:06:47,349
so we are continuing to track dragon as

1591
01:06:51,430 --> 01:06:49,119
seen on screen

1592
01:06:54,150 --> 01:06:51,440
uh today the splashdown will be at

1593
01:06:56,950 --> 01:06:54,160
nighttime off the coast of panama city

1594
01:06:57,829 --> 01:06:56,960
florida again that is the

1595
01:07:00,710 --> 01:06:57,839
first

1596
01:07:04,630 --> 01:07:00,720
nighttime splashdown since the apollo 8

1597
01:07:07,349 --> 01:07:04,640
mission uh in 1975 the first trip of

1598
01:07:09,670 --> 01:07:07,359
humans around the moon yes fascinating

1599
01:07:10,710 --> 01:07:09,680
uh it's been quite a while so very

1600
01:07:12,150 --> 01:07:10,720
excited

1601
01:07:14,390 --> 01:07:12,160
um to see

1602
01:07:16,549 --> 01:07:14,400
a dragon returning back to earth

1603
01:07:18,789 --> 01:07:16,559
and in in moonlight

1604
01:07:21,670 --> 01:07:18,799
and you might be able to tell but it

1605
01:07:25,029 --> 01:07:21,680
looks like crew dragon has moved a

1606
01:07:29,029 --> 01:07:25,039
position a little bit uh it has it is

1607
01:07:31,910 --> 01:07:29,039
maneuvering to the next altitude for

1608
01:07:34,230 --> 01:07:31,920
this upcoming uh to part burn ii

1609
01:07:35,910 --> 01:07:34,240
making sure it's in the or i should say

1610
01:07:38,470 --> 01:07:35,920
burn attitude it's in the proper

1611
01:07:41,109 --> 01:07:38,480
position for those thrusters to fire and

1612
01:07:43,510 --> 01:07:41,119
keep it on track for that splashdown off

1613
01:07:45,270 --> 01:07:43,520

the coast of panama city florida and now

1614
01:07:55,109 --> 01:07:45,280
we are looking at about five minutes

1615
01:08:05,029 --> 01:07:56,710
now we've got a really zoomed in view

1616
01:08:15,430 --> 01:08:08,390
crew dragon 6.5 kilometers away from the

1617
01:08:19,510 --> 01:08:16,149
so

1618
01:08:21,590 --> 01:08:19,520
preparing

1619
01:08:23,590 --> 01:08:21,600
and performing a bunch of checks to make

1620
01:08:26,470 --> 01:08:23,600
sure that they are on docking in

1621
01:08:27,829 --> 01:08:26,480
undocking on time but dragon itself also

1622
01:08:29,990 --> 01:08:27,839
when it's stocked at the international

1623
01:08:32,950 --> 01:08:30,000
space station often spends time in sort

1624
01:08:35,030 --> 01:08:32,960
of a low-power mode and so dragon also

1625
01:08:37,189 --> 01:08:35,040
had a wake-up call a few days ago and

1626
01:08:38,550 --> 01:08:37,199
had its own system checkouts

1627
01:08:40,789 --> 01:08:38,560
to make sure that everything was a go

1628
01:08:43,269 --> 01:08:40,799
the life support systems were good

1629
01:08:45,030 --> 01:08:43,279
the gnc the coms were good

1630
01:08:46,470 --> 01:08:45,040
so it's been

1631
01:08:48,950 --> 01:08:46,480
quite a journey

1632
01:09:02,870 --> 01:08:48,960
station houston on two for tomah for

1633
01:09:02,880 --> 01:09:05,510
and

1634
01:09:08,709 --> 01:09:06,789
so i was saying it's been quite a

1635
01:09:12,149 --> 01:09:08,719
journey for not just the crew but dragon

1636
01:09:12,950 --> 01:09:12,159
but uh we have video back on board the

1637
01:09:16,309 --> 01:09:12,960
uh

1638
01:09:17,590 --> 01:09:16,319

crew one capsule capsule brazilians

1639
01:09:19,829 --> 01:09:17,600
though again those are the three

1640
01:09:21,590 --> 01:09:19,839
touchscreen um

1641
01:09:23,590 --> 01:09:21,600
that i mentioned earlier you'll notice

1642
01:09:25,749 --> 01:09:23,600
at the bottom there are a bunch of

1643
01:09:27,749 --> 01:09:25,759
dedicated buttons so very important

1644
01:09:29,590 --> 01:09:27,759
functions like deploying shoots or

1645
01:09:31,510 --> 01:09:29,600
cutting the shoots after deployment have

1646
01:09:33,910 --> 01:09:31,520
a dedicated button to them and then

1647
01:09:37,030 --> 01:09:33,920
there are a bunch of displays and views

1648
01:09:39,590 --> 01:09:37,040
that the astronauts themselves can use

1649
01:09:41,669 --> 01:09:39,600
to get information on their journey home

1650
01:09:43,669 --> 01:09:41,679
and as we uh

1651
01:09:46,070 --> 01:09:43,679
as we know all of those things are

1652
01:09:48,550 --> 01:09:46,080
autonomous uh those shoots should deploy

1653
01:09:51,189 --> 01:09:48,560
on their own and the shoots should be

1654
01:09:53,510 --> 01:09:51,199
cut as well on their own to prevent the

1655
01:09:55,350 --> 01:09:53,520
capsule from moving anymore in the water

1656
01:09:57,030 --> 01:09:55,360
however those buttons are there just in

1657
01:09:58,790 --> 01:09:57,040
case we always like to have backups we

1658
01:10:01,990 --> 01:09:58,800
call it fault tolerance

1659
01:10:03,990 --> 01:10:02,000
so the crew is able to initiate both

1660
01:10:07,189 --> 01:10:04,000
shoot deployment and cutting those

1661
01:10:09,750 --> 01:10:07,199
shoots if necessary

1662
01:10:10,950 --> 01:10:09,760
this view inside crew dragon resilience

1663
01:10:13,270 --> 01:10:10,960

looks like victor glover's in the

1664
01:10:14,470 --> 01:10:13,280
background over there getting a bite to

1665
01:10:15,189 --> 01:10:14,480
eat

1666
01:10:16,470 --> 01:10:15,199
and

1667
01:10:18,790 --> 01:10:16,480
it looks like we have people in the

1668
01:10:22,310 --> 01:10:18,800
seats but not quite those are just the

1669
01:10:24,470 --> 01:10:22,320
suits i had to take a second look

1670
01:10:26,950 --> 01:10:24,480
they were also in the suits as well um

1671
01:10:29,110 --> 01:10:26,960
they are uh hooked up to the umbilicals

1672
01:10:30,470 --> 01:10:29,120
and we're drying and we got confirmation

1673
01:10:32,630 --> 01:10:30,480
a few minutes ago that the drawing has

1674
01:10:34,870 --> 01:10:32,640
been complete but yes they had to i took

1675
01:10:37,030 --> 01:10:34,880
a a quick second because one of them had

1676
01:10:39,430 --> 01:10:37,040
the visors down um

1677
01:10:41,590 --> 01:10:39,440
i saw maybe it was the backdrop of the

1678
01:10:43,270 --> 01:10:41,600
the back of the helmet but

1679
01:10:44,950 --> 01:10:43,280
the suits are in place there's no one in

1680
01:10:46,229 --> 01:10:44,960
them right now the crew is

1681
01:10:48,870 --> 01:10:46,239
um

1682
01:10:51,189 --> 01:10:48,880
looks like they are

1683
01:10:53,350 --> 01:10:51,199
chatting about and or

1684
01:10:56,550 --> 01:10:53,360
getting ready for the next departure

1685
01:11:00,550 --> 01:10:57,990
yes that's very funny i mean that's the

1686
01:11:03,990 --> 01:11:00,560
best place to store the suits absolutely

1687
01:11:06,950 --> 01:11:05,590
and those are the three displays that we

1688
01:11:08,390 --> 01:11:06,960

were talking about those are touch

1689
01:11:09,270 --> 01:11:08,400
screens and in the center one you can

1690
01:11:11,510 --> 01:11:09,280
see

1691
01:11:15,270 --> 01:11:11,520
the earth and they are able to monitor

1692
01:11:17,669 --> 01:11:15,280
where crew dragon is in relativity to

1693
01:11:20,229 --> 01:11:17,679
the international space station uh in

1694
01:11:22,149 --> 01:11:20,239
relation to their splashdown splashdown

1695
01:11:24,070 --> 01:11:22,159
location

1696
01:11:25,510 --> 01:11:24,080
they're able to monitor the burns and as

1697
01:11:27,750 --> 01:11:25,520
we mentioned we've got one coming up in

1698
01:11:30,550 --> 01:11:27,760
just about two minutes

1699
01:11:34,390 --> 01:11:30,560
that'll be depart burn two lasting

1700
01:11:38,310 --> 01:11:36,390
and that is the dragon vehicle that

1701
01:11:41,510 --> 01:11:38,320
again the crew members that we just saw

1702
01:11:43,669 --> 01:11:41,520
they are in that vehicle and are

1703
01:11:45,110 --> 01:11:43,679
in space right now

1704
01:11:49,430 --> 01:11:45,120
continuing to make their way back to

1705
01:11:55,189 --> 01:11:51,669
this vehicle has been in space

1706
01:11:56,950 --> 01:11:55,199
since november 15th of last year

1707
01:12:02,229 --> 01:11:56,960
and after about a six month stay it's

1708
01:12:05,910 --> 01:12:03,910
we have about one minute until depart

1709
01:12:08,390 --> 01:12:05,920
burn two the international space station

1710
01:12:10,709 --> 01:12:08,400
that's where the view was coming from

1711
01:12:12,470 --> 01:12:10,719
this one back inside the capsule but

1712
01:12:13,350 --> 01:12:12,480
they are both flying

1713
01:12:19,189 --> 01:12:13,360

about

1714
01:12:22,310 --> 01:12:19,199
statute miles of course crew dragon just

1715
01:12:25,910 --> 01:12:22,320
a few miles off of that

1716
01:12:27,350 --> 01:12:25,920
we are standing by for depart burn too

1717
01:12:29,270 --> 01:12:27,360
and there's so ichinoguchi in the

1718
01:12:31,590 --> 01:12:29,280
background looks like this might be

1719
01:12:34,550 --> 01:12:31,600
their dinner their evening meal or

1720
01:12:38,790 --> 01:12:34,560
snack at least

1721
01:12:40,550 --> 01:12:38,800
oh we just saw that last uh shot was um

1722
01:12:42,149 --> 01:12:40,560
mike hopkins and then right before him

1723
01:12:43,830 --> 01:12:42,159
we saw victor glover to the right-hand

1724
01:12:46,310 --> 01:12:43,840
side

1725
01:12:48,950 --> 01:12:46,320
interesting thing about this vehicle um

1726
01:12:50,630 --> 01:12:48,960
later on this year we'll launch

1727
01:12:51,669 --> 01:12:50,640
the astronauts as part of the crew 3

1728
01:12:53,910 --> 01:12:51,679
program

1729
01:12:55,110 --> 01:12:53,920
this capsule will be the capsule that

1730
01:12:56,950 --> 01:12:55,120
they will be sitting in so it'll be

1731
01:13:00,229 --> 01:12:56,960
refurbished when it lands

1732
01:13:02,310 --> 01:13:00,239
make sure that everything is working as

1733
01:13:06,709 --> 01:13:02,320
as planned and then we will send this

1734
01:13:11,430 --> 01:13:09,510
and as you saw with crew dragon endeavor

1735
01:13:13,590 --> 01:13:11,440
the capsule does not change its name

1736
01:13:15,430 --> 01:13:13,600
once it has been named

1737
01:13:18,149 --> 01:13:15,440
it crew 2

1738
01:13:20,070 --> 01:13:18,159

their capsule was dubbed endeavor by bob

1739
01:13:23,030 --> 01:13:20,080
bankin and doug hurley last year on the

1740
01:13:25,350 --> 01:13:23,040
demo 2 mission and crew one named this

1741
01:13:28,070 --> 01:13:25,360
capsule resilience so those names will

1742
01:13:34,870 --> 01:13:28,080
live along with the vehicles dragon

1743
01:13:34,880 --> 01:13:41,510
and spacex resumes copies

1744
01:13:47,270 --> 01:13:44,310
that was depart burn 2 a 44 second burn

1745
01:13:50,229 --> 01:13:47,280
exactly where we needed to be coming at

1746
01:13:51,990 --> 01:13:50,239
6 28 p.m pacific time using a

1747
01:13:59,990 --> 01:13:52,000
combination of those service section and

1748
01:14:03,510 --> 01:14:01,910
was done at the orbital after apogee

1749
01:14:05,510 --> 01:14:03,520
which is the highest point in dragon's

1750
01:14:07,669 --> 01:14:05,520
orbit and it's low lower ring the

1751
01:14:09,669 --> 01:14:07,679
perigee the lowest part in the orbit to

1752
01:14:11,270 --> 01:14:09,679
below the space station so those first

1753
01:14:13,590 --> 01:14:11,280
burns took us up and over the space

1754
01:14:15,750 --> 01:14:13,600
station this will take us down and under

1755
01:14:18,550 --> 01:14:15,760
it this will start bringing it beneath

1756
01:14:21,110 --> 01:14:18,560
and in front of the station's orbit and

1757
01:14:24,550 --> 01:14:21,120
then as we've seen the crew has begun

1758
01:14:26,790 --> 01:14:24,560
having their last meal on dragon a bit

1759
01:14:28,950 --> 01:14:26,800
early a bit early before returning to

1760
01:14:31,350 --> 01:14:28,960
earth but how can you tell somebody when

1761
01:14:32,709 --> 01:14:31,360
they're hungry not to eat they have mres

1762
01:14:34,070 --> 01:14:32,719
but they also have some snacks on board

1763
01:14:37,189 --> 01:14:34,080

as well i'm not sure what the snacks are

1764
01:14:39,830 --> 01:14:37,199
but they must be good

1765
01:14:42,870 --> 01:14:39,840
at about 7 14 p.m pacific time we'll

1766
01:14:45,350 --> 01:14:42,880
have the fourth and final departure burn

1767
01:14:46,950 --> 01:14:45,360
um it's called departure and burn three

1768
01:14:48,070 --> 01:14:46,960
but it is the fourth one

1769
01:14:49,910 --> 01:14:48,080
um

1770
01:14:51,669 --> 01:14:49,920
and that will put the dragon roughly

1771
01:14:54,149 --> 01:14:51,679
co-elliptic with the international space

1772
01:14:56,630 --> 01:14:54,159
station uh just 10 kilometers beneath it

1773
01:14:59,110 --> 01:14:56,640
the entire way around the earth and it's

1774
01:15:01,030 --> 01:14:59,120
now 6 30 p.m

1775
01:15:04,149 --> 01:15:01,040
pacific time meaning it has been exactly

1776
01:15:06,550 --> 01:15:04,159
one hour since the undock command was

1777
01:15:08,310 --> 01:15:06,560
issued to crew dragon

1778
01:15:11,430 --> 01:15:08,320
everything moving on time and on

1779
01:15:14,390 --> 01:15:11,440
schedule so far with crew dragons

1780
01:15:16,229 --> 01:15:14,400
undocking and those two short burns to

1781
01:15:17,910 --> 01:15:16,239
break the stiction

1782
01:15:20,950 --> 01:15:17,920
and then three departure burns having

1783
01:15:23,189 --> 01:15:20,960
been completed so far with the fourth

1784
01:15:25,110 --> 01:15:23,199
which is known as departure burn three

1785
01:15:27,830 --> 01:15:25,120
uh left to go that's coming up as you

1786
01:15:30,390 --> 01:15:27,840
mentioned andy at 7 14 p.m pacific time

1787
01:15:32,310 --> 01:15:30,400
so we've got about 45 minutes until that

1788
01:15:34,630 --> 01:15:32,320

depart burn three it'll be the longest

1789
01:15:37,590 --> 01:15:34,640
of the burns that we've seen so far at

1790
01:15:39,430 --> 01:15:37,600
61 seconds just over a minute

1791
01:15:41,750 --> 01:15:39,440
but it's nothing in comparison to that

1792
01:15:44,870 --> 01:15:41,760
16 and a half minute de-orbit burn that

1793
01:15:49,750 --> 01:15:47,590
and and once we start that d orbit burn

1794
01:15:52,630 --> 01:15:49,760
we're committed to making sure that

1795
01:15:55,669 --> 01:15:52,640
dragon is splashing down safely we have

1796
01:15:57,830 --> 01:15:55,679
a primary site panama city off the coast

1797
01:16:00,870 --> 01:15:57,840
of panama city we also have the

1798
01:16:03,030 --> 01:16:00,880
alternate site off the coast of tampa so

1799
01:16:05,189 --> 01:16:03,040
you have we have personnel and ships and

1800
01:16:07,110 --> 01:16:05,199
boats standing by to make sure that you

1801
01:16:10,149 --> 01:16:07,120
know all of the recovery operations are

1802
01:16:11,590 --> 01:16:10,159
done smoothly and quickly to make sure

1803
01:16:15,830 --> 01:16:11,600
that the crew

1804
01:16:17,750 --> 01:16:15,840
is safely egressed from the capsule and

1805
01:16:19,750 --> 01:16:17,760
attended to and

1806
01:16:21,510 --> 01:16:19,760
make their journey back to earth a very

1807
01:16:23,910 --> 01:16:21,520
pleasant one

1808
01:16:26,149 --> 01:16:23,920
this view of crew dragon resilience

1809
01:16:27,830 --> 01:16:26,159
floating in space

1810
01:16:29,430 --> 01:16:27,840
targeted for a splashdown off the coast

1811
01:16:31,189 --> 01:16:29,440
of panama city florida and these views

1812
01:16:33,510 --> 01:16:31,199
are coming from the international space

1813
01:16:35,590 --> 01:16:33,520

station

1814
01:16:38,390 --> 01:16:35,600
and now that the

1815
01:16:40,470 --> 01:16:38,400
crew dragon has departed we had 11

1816
01:16:42,630 --> 01:16:40,480
astronauts and cosmonauts on board for a

1817
01:16:44,070 --> 01:16:42,640
week there and we're back down to seven

1818
01:16:45,270 --> 01:16:44,080
crew members aboard the orbiting

1819
01:16:47,830 --> 01:16:45,280
laboratory

1820
01:16:51,030 --> 01:16:47,840
that's nasa's mark vanda high cosmos

1821
01:16:52,550 --> 01:16:51,040
oleg novitskiy and piotr dubrov as well

1822
01:16:54,870 --> 01:16:52,560
as the crew 2 astronauts who just

1823
01:16:56,709 --> 01:16:54,880
arrived last week that's shane kimbrough

1824
01:16:58,630 --> 01:16:56,719
megan macarthur

1825
01:17:00,149 --> 01:16:58,640
of nasa

1826
01:17:02,229 --> 01:17:00,159
um

1827
01:17:05,189 --> 01:17:02,239
aki hoshide of japan aerospace

1828
01:17:07,910 --> 01:17:05,199
exploration agency and tamapesque of the

1829
01:17:09,750 --> 01:17:07,920
european space agency so

1830
01:17:15,030 --> 01:17:09,760
nothing short of an international space

1831
01:17:18,790 --> 01:17:17,430
the international space station is just

1832
01:17:20,950 --> 01:17:18,800
to the east

1833
01:17:23,750 --> 01:17:20,960
of new zealand right now

1834
01:17:25,110 --> 01:17:23,760
it continues to orbit at over 17 000

1835
01:17:29,669 --> 01:17:25,120
miles per hour

1836
01:17:33,669 --> 01:17:31,189
now as we mentioned that the orbit burn

1837
01:17:35,030 --> 01:17:33,679
is what really brings us home commits us

1838
01:17:37,270 --> 01:17:35,040

to coming home and splashing down at

1839
01:17:39,030 --> 01:17:37,280
that very specific location off the

1840
01:17:41,590 --> 01:17:39,040
coast of panama city but at this point

1841
01:17:44,229 --> 01:17:41,600
in the orbit uh we could change that if

1842
01:17:46,630 --> 01:17:44,239
we needed to the

1843
01:17:48,790 --> 01:17:46,640
crew dragon can be reprogrammed with the

1844
01:17:50,950 --> 01:17:48,800
burns necessary in case we needed to go

1845
01:17:53,110 --> 01:17:50,960
to our alternate splashdown site which

1846
01:17:54,870 --> 01:17:53,120
currently is tampa or off the coast of

1847
01:17:57,110 --> 01:17:54,880
tampa i should say

1848
01:17:58,630 --> 01:17:57,120
or any other splash on sites if if

1849
01:18:01,030 --> 01:17:58,640
necessary

1850
01:18:03,110 --> 01:18:01,040
if some weather were to move in so it's

1851
01:18:05,590 --> 01:18:03,120
nice to have that flexibility with crew

1852
01:18:07,910 --> 01:18:05,600
dragon on these deorbits but everything

1853
01:18:09,990 --> 01:18:07,920
looking good in that primary splashdown

1854
01:18:12,229 --> 01:18:10,000
site again as we mentioned the first

1855
01:18:14,070 --> 01:18:12,239
nighttime splashdown of a commercial

1856
01:18:16,709 --> 01:18:14,080
crew mission and the first for nasa

1857
01:18:19,669 --> 01:18:16,719
since 1968 right

1858
01:18:23,110 --> 01:18:19,679
and uh you bring up an important part

1859
01:18:25,270 --> 01:18:23,120
the constant monitoring of weather and

1860
01:18:26,630 --> 01:18:25,280
you know the landing sites we talked to

1861
01:18:28,870 --> 01:18:26,640
nasa's

1862
01:18:30,870 --> 01:18:28,880
commercial crew program manager steve

1863
01:18:32,870 --> 01:18:30,880

stitch earlier and one of the things he

1864
01:18:35,110 --> 01:18:32,880
was emphasizing was it's constantly

1865
01:18:37,910 --> 01:18:35,120
monitoring weather we tried we looked at

1866
01:18:39,350 --> 01:18:37,920
weather on the 28th and decided to wave

1867
01:18:41,510 --> 01:18:39,360
off we looked at weather yesterday on

1868
01:18:43,510 --> 01:18:41,520
the 30th decided to wave off until the

1869
01:18:45,750 --> 01:18:43,520
sea states and winds were in an ideal

1870
01:18:47,990 --> 01:18:45,760
condition for the crew to return safely

1871
01:18:49,590 --> 01:18:48,000
so that is something that again we are

1872
01:18:52,310 --> 01:18:49,600
in space right now orbiting the earth

1873
01:18:54,709 --> 01:18:52,320
and we can make decisions to potentially

1874
01:18:56,390 --> 01:18:54,719
switch up landing sites if needed

1875
01:18:57,669 --> 01:18:56,400
but again we are going to be monitoring

1876
01:19:00,149 --> 01:18:57,679
all the way down to the wire to make

1877
01:19:02,070 --> 01:19:00,159
sure that this crew and the capsule have

1878
01:19:03,669 --> 01:19:02,080
the safest possible return even though

1879
01:19:11,510 --> 01:19:03,679
it is a nighttime

1880
01:19:15,510 --> 01:19:13,830
so uh the crew has again begun eating

1881
01:19:17,510 --> 01:19:15,520
their last meal in space before

1882
01:19:19,669 --> 01:19:17,520
returning home uh next up we are

1883
01:19:21,990 --> 01:19:19,679
awaiting the fourth and final departure

1884
01:19:23,510 --> 01:19:22,000
burn departure burn three

1885
01:19:25,830 --> 01:19:23,520
called departure burn three the

1886
01:19:27,669 --> 01:19:25,840
thrusters uh we used a combination of

1887
01:19:30,070 --> 01:19:27,679
service section and the forward bulkhead

1888
01:19:33,270 --> 01:19:30,080

thrusters again lasting about a minute

1889
01:19:35,350 --> 01:19:33,280
61 seconds uh this will circularize

1890
01:19:37,189 --> 01:19:35,360
circularize dragon's orbit and put it

1891
01:19:39,110 --> 01:19:37,199
roughly coaleptic with the station

1892
01:19:40,149 --> 01:19:39,120
approximately 10 kilometers lower in

1893
01:19:41,990 --> 01:19:40,159
altitude

1894
01:19:43,830 --> 01:19:42,000
and while we wait let's check in with

1895
01:19:49,750 --> 01:19:43,840
brandy dean at the johnson flight

1896
01:19:53,189 --> 01:19:51,350
thanks so much andy things have quieted

1897
01:19:55,270 --> 01:19:53,199
down a little bit around here but the

1898
01:19:57,669 --> 01:19:55,280
team is still watching following along

1899
01:19:59,189 --> 01:19:57,679
with the dragon as it makes its way away

1900
01:20:00,950 --> 01:19:59,199
from the international space station

1901
01:20:03,270 --> 01:20:00,960
they're led tonight by flight director

1902
01:20:05,510 --> 01:20:03,280
anthony varia

1903
01:20:07,750 --> 01:20:05,520
since the dragon's departure uh the team

1904
01:20:09,990 --> 01:20:07,760
here in houston uh does have a few roles

1905
01:20:12,070 --> 01:20:10,000
to play uh the topo or trajectory

1906
01:20:13,830 --> 01:20:12,080
operations and planning officer is

1907
01:20:16,070 --> 01:20:13,840
continuing to monitor dragon's path on

1908
01:20:18,229 --> 01:20:16,080
the lookout for any conjunctions that's

1909
01:20:19,750 --> 01:20:18,239
chance of any space debris crossing the

1910
01:20:21,910 --> 01:20:19,760
dragon's path and

1911
01:20:22,870 --> 01:20:21,920
causing a an issue during their flight

1912
01:20:24,470 --> 01:20:22,880
home

1913
01:20:26,149 --> 01:20:24,480

we also have a representatives from

1914
01:20:28,229 --> 01:20:26,159
nasa's flight operations directorate on

1915
01:20:29,990 --> 01:20:28,239
console they serve as an information

1916
01:20:32,390 --> 01:20:30,000
clearinghouse for all nasa's personnel

1917
01:20:34,229 --> 01:20:32,400
who are supporting splashdown

1918
01:20:36,629 --> 01:20:34,239
and they also provide uh input should

1919
01:20:39,030 --> 01:20:36,639
any changes be needed to make be needed

1920
01:20:41,270 --> 01:20:39,040
to be made to the cruise plan

1921
01:20:43,270 --> 01:20:41,280
there's also our spaceflight meteorology

1922
01:20:45,669 --> 01:20:43,280
group they're actively providing weather

1923
01:20:47,350 --> 01:20:45,679
data to the joint nasa and spacex teams

1924
01:20:50,229 --> 01:20:47,360
as we keep an eye

1925
01:20:51,430 --> 01:20:50,239
on the area for splashdown today and

1926
01:20:54,310 --> 01:20:51,440
finally our

1927
01:20:55,910 --> 01:20:54,320
lso or landing support officer is on

1928
01:20:57,669 --> 01:20:55,920
standby in the event we run into any

1929
01:21:00,790 --> 01:20:57,679
major issues that would cause dragon to

1930
01:21:02,310 --> 01:21:00,800
end up at an unsupported uh splashdown

1931
01:21:04,070 --> 01:21:02,320
location

1932
01:21:06,229 --> 01:21:04,080
where we'd call up support from our

1933
01:21:07,990 --> 01:21:06,239
department of defense colleagues so

1934
01:21:09,510 --> 01:21:08,000
we'll continue to monitor from here in

1935
01:21:13,669 --> 01:21:09,520
mission control houston and i'll send it

1936
01:21:17,830 --> 01:21:15,910
and thank you for the update brandy

1937
01:21:19,270 --> 01:21:17,840
while the crew eats and we await the

1938
01:21:21,110 --> 01:21:19,280

final departure burn we'd like to give

1939
01:21:23,830 --> 01:21:21,120
you a quick overview of what entry would

1940
01:21:25,669 --> 01:21:23,840
look like for the crew one astronauts so

1941
01:21:27,270 --> 01:21:25,679
after crew dragon resilience has

1942
01:21:29,590 --> 01:21:27,280
re-entered the earth's atmosphere a

1943
01:21:31,590 --> 01:21:29,600
series of parachutes will deploy to slow

1944
01:21:33,910 --> 01:21:31,600
the spacecraft's descent first will be

1945
01:21:36,870 --> 01:21:33,920
the two drogue shoots followed by the

1946
01:21:38,790 --> 01:21:36,880
four main shoots to guide crew dragon to

1947
01:21:42,310 --> 01:21:38,800
its first contact with earth since

1948
01:21:44,229 --> 01:21:42,320
launching on november 15th of last year

1949
01:21:46,790 --> 01:21:44,239
the two drove shoots are sort of conical

1950
01:21:48,550 --> 01:21:46,800
in nature and then the main shoots are

1951
01:21:50,229 --> 01:21:48,560
orange and white

1952
01:21:52,070 --> 01:21:50,239
dragon will automatically deploy these

1953
01:21:54,390 --> 01:21:52,080
parachutes when different pressures and

1954
01:21:57,110 --> 01:21:54,400
position sensors on the capsule detect

1955
01:21:59,270 --> 01:21:57,120
they are at the right speed and altitude

1956
01:22:02,229 --> 01:21:59,280
vehicle velocity at drogue deploys

1957
01:22:05,270 --> 01:22:02,239
approximately 350 miles per hour and

1958
01:22:07,350 --> 01:22:05,280
deploy at about 18 000 feet vehicle

1959
01:22:09,669 --> 01:22:07,360
velocity at the main parachute deploys

1960
01:22:11,350 --> 01:22:09,679
approximately 119 miles per hour so you

1961
01:22:13,270 --> 01:22:11,360
can see those drugs have already done

1962
01:22:16,310 --> 01:22:13,280
quite a good job at slowing it down and

1963
01:22:18,310 --> 01:22:16,320

they deploy at about 6500 feet

1964
01:22:20,310 --> 01:22:18,320
and when the crew dragon splashes down

1965
01:22:22,550 --> 01:22:20,320
in the water the velocity of the vehicle

1966
01:22:24,709 --> 01:22:22,560
should be approximately 16 miles per

1967
01:22:26,870 --> 01:22:24,719
hour so the highest g-load the crew will

1968
01:22:28,790 --> 01:22:26,880
experience during re-entry is around

1969
01:22:30,950 --> 01:22:28,800
three to five g's

1970
01:22:34,310 --> 01:22:30,960
that's about uh what they experience on

1971
01:22:36,310 --> 01:22:34,320
ascent as well so crew dragon's primary

1972
01:22:38,390 --> 01:22:36,320
heat shield is comprised of a material

1973
01:22:40,870 --> 01:22:38,400
known as pica 3.0

1974
01:22:41,990 --> 01:22:40,880
which stands for phenolic impregnated

1975
01:22:43,189 --> 01:22:42,000
carbon

1976
01:22:46,229 --> 01:22:43,199
ablator

1977
01:22:48,310 --> 01:22:46,239
first gen pico was developed by nasa for

1978
01:22:50,470 --> 01:22:48,320
studying and sample sampling comets

1979
01:22:52,709 --> 01:22:50,480
within our solar systems spacex

1980
01:22:54,950 --> 01:22:52,719
partnered with nasa to develop pica x

1981
01:22:57,270 --> 01:22:54,960
which was the second generation product

1982
01:22:59,030 --> 01:22:57,280
used on all of dragon 1 crs missions

1983
01:23:02,070 --> 01:22:59,040
that successfully resupplied the space

1984
01:23:04,310 --> 01:23:02,080
station on 20 missions pica 3.0 was

1985
01:23:05,270 --> 01:23:04,320
developed specifically for use on dragon

1986
01:23:07,189 --> 01:23:05,280
2

1987
01:23:08,790 --> 01:23:07,199
the crew and the cargo versions with

1988
01:23:10,550 --> 01:23:08,800

enhanced structural and thermal

1989
01:23:13,110 --> 01:23:10,560
properties that optimize the heat shield

1990
01:23:15,350 --> 01:23:13,120
and drove down cost and mass

1991
01:23:18,310 --> 01:23:15,360
the remainder of crew dragon capsule is

1992
01:23:20,709 --> 01:23:18,320
comprised primarily of spacex

1993
01:23:22,390 --> 01:23:20,719
proprietary ablative material it's

1994
01:23:24,629 --> 01:23:22,400
another class of thermal protection

1995
01:23:26,229 --> 01:23:24,639
which is lighter weight versus pica and

1996
01:23:28,070 --> 01:23:26,239
protects the underlying composite

1997
01:23:30,709 --> 01:23:28,080
structure during re-entry to ensure the

1998
01:23:32,149 --> 01:23:30,719
structural capabilities are maintained

1999
01:23:34,629 --> 01:23:32,159
and while crew dragon will experience

2000
01:23:36,070 --> 01:23:34,639
temperatures well over 3000 degrees

2001
01:23:38,149 --> 01:23:36,080
fahrenheit during peak reentry

2002
01:23:40,470 --> 01:23:38,159
conditions the characteristics of the

2003
01:23:42,070 --> 01:23:40,480
tps or the thermal protection systems

2004
01:23:43,830 --> 01:23:42,080
coupled with the eclipse which is the

2005
01:23:45,990 --> 01:23:43,840
environmental cooling and life support

2006
01:23:47,910 --> 01:23:46,000
system in the pressurized interior will

2007
01:23:50,149 --> 01:23:47,920
ensure that mike victor shannon and

2008
01:23:51,910 --> 01:23:50,159
suici stay cool and comfortable during

2009
01:23:53,110 --> 01:23:51,920
all phases of re-entry through

2010
01:23:55,189 --> 01:23:53,120
splashdown

2011
01:23:57,669 --> 01:23:55,199
yeah the pico material is quite

2012
01:23:59,750 --> 01:23:57,679
interesting it's it has the density of

2013
01:24:01,669 --> 01:23:59,760

about balsa wood and and for those that

2014
01:24:04,229 --> 01:24:01,679
have taken any type of martial arts

2015
01:24:06,070 --> 01:24:04,239
balsa wood is that very lightweight um

2016
01:24:07,590 --> 01:24:06,080
sort of training board that you know you

2017
01:24:09,750 --> 01:24:07,600
start to break when you're you're first

2018
01:24:11,590 --> 01:24:09,760
entering martial arts so that material

2019
01:24:13,110 --> 01:24:11,600
that very um

2020
01:24:15,350 --> 01:24:13,120
not very dense material is able to

2021
01:24:17,189 --> 01:24:15,360
shield and protect the capsule and the

2022
01:24:19,910 --> 01:24:17,199
astronauts from over three thousand

2023
01:24:23,110 --> 01:24:19,920
degrees fahrenheit of um you know entry

2024
01:24:24,470 --> 01:24:23,120
temperatures it's pretty pretty wild

2025
01:24:26,070 --> 01:24:24,480
uh

2026
01:24:28,310 --> 01:24:26,080
i had the opportunity to hold one of

2027
01:24:29,830 --> 01:24:28,320
those uh tiles when i was at kennedy

2028
01:24:32,709 --> 01:24:29,840
space center one time and it was

2029
01:24:34,149 --> 01:24:32,719
surprisingly very light i was shocked uh

2030
01:24:36,149 --> 01:24:34,159
and i saw a demonstration of someone

2031
01:24:37,350 --> 01:24:36,159
with a blowtorch and had their hand on

2032
01:24:40,310 --> 01:24:37,360
the other side

2033
01:24:42,870 --> 01:24:40,320
uh and and heating up the tile and were

2034
01:24:45,110 --> 01:24:42,880
perfectly fine so it's fascinating

2035
01:24:47,189 --> 01:24:45,120
so the the the way that that's comprised

2036
01:24:49,669 --> 01:24:47,199
is the the base of the capsule is made

2037
01:24:52,310 --> 01:24:49,679
of carbon fiber and then there is an

2038
01:24:53,990 --> 01:24:52,320

epoxy or um sort of an adhesive and then

2039
01:24:56,070 --> 01:24:54,000
you're you're putting these pico tiles

2040
01:24:59,350 --> 01:24:56,080
on the bottom of it and so that that is

2041
01:25:01,910 --> 01:24:59,360
what uh will enter first uh sort of so

2042
01:25:02,950 --> 01:25:01,920
to speak when we have the dragon capsule

2043
01:25:05,669 --> 01:25:02,960
re-enter the earth's atmosphere and

2044
01:25:09,510 --> 01:25:05,679
that's taking the bulk of the friction

2045
01:25:12,470 --> 01:25:09,520
and heat um as the dragon capsule

2046
01:25:15,189 --> 01:25:12,480
interacts with the atmosphere

2047
01:25:17,910 --> 01:25:15,199
so following crew one return spacex will

2048
01:25:20,709 --> 01:25:17,920
launch commercial race by mission 22 or

2049
01:25:22,390 --> 01:25:20,719
crs 22 uh to the space station to the

2050
01:25:26,229 --> 01:25:22,400
space station to deliver cargo and

2051
01:25:28,629 --> 01:25:26,239
supplies to the crew 2 crew which uh

2052
01:25:30,390 --> 01:25:28,639
were sent up there just a week ago

2053
01:25:32,149 --> 01:25:30,400
it will automatically dock to the

2054
01:25:34,470 --> 01:25:32,159
international docking adapter 3 at the

2055
01:25:36,629 --> 01:25:34,480
zenith port of the harmony module again

2056
01:25:38,149 --> 01:25:36,639
that's where this crew 1 capsule just

2057
01:25:40,310 --> 01:25:38,159
left from

2058
01:25:42,870 --> 01:25:40,320
as mentioned earlier crew 2 lifted off

2059
01:25:45,590 --> 01:25:42,880
from the coast of florida on april 22nd

2060
01:25:48,149 --> 01:25:45,600
just a few days ago and before crew 2

2061
01:25:50,390 --> 01:25:48,159
returns home they will have um to hand

2062
01:25:52,629 --> 01:25:50,400
off the baton to the next crew arriving

2063
01:25:55,430 --> 01:25:52,639

at the orbiting lab on crew dragon the

2064
01:25:57,270 --> 01:25:55,440
crew 3 crew that mission is targeted to

2065
01:25:59,750 --> 01:25:57,280
launch this fall and will carry crew

2066
01:26:02,149 --> 01:25:59,760
dragon commander raja shari on his first

2067
01:26:04,149 --> 01:26:02,159
space flight pilot tom marshburn and who

2068
01:26:06,550 --> 01:26:04,159
they are both of nasa and mission

2069
01:26:08,470 --> 01:26:06,560
specialist matthias maurer of the

2070
01:26:10,310 --> 01:26:08,480
european space agency

2071
01:26:13,110 --> 01:26:10,320
as well as a fourth crew member who will

2072
01:26:14,470 --> 01:26:13,120
we will be adding soon these crew three

2073
01:26:16,550 --> 01:26:14,480
astronauts will also complete a

2074
01:26:18,629 --> 01:26:16,560
six-month mission as expedition crew

2075
01:26:20,070 --> 01:26:18,639
members aboard the space station they'll

2076
01:26:21,510 --> 01:26:20,080
be joined there by three additional

2077
01:26:23,510 --> 01:26:21,520
crewmates who will launch on a russian

2078
01:26:25,510 --> 01:26:23,520
soyuz spacecraft which means seven

2079
01:26:28,070 --> 01:26:25,520
people will be on the station at one

2080
01:26:31,110 --> 01:26:28,080
time allowing us to effectively double

2081
01:26:33,990 --> 01:26:31,120
the amount of science conducted in space

2082
01:26:37,669 --> 01:26:34,000
so uh this will be char shari's first

2083
01:26:40,550 --> 01:26:37,679
trip to space but he has more than 2 500

2084
01:26:42,550 --> 01:26:40,560
hours of flight time as a test pilot the

2085
01:26:45,669 --> 01:26:42,560
u.s air force colonel is also a member

2086
01:26:47,110 --> 01:26:45,679
of nasa's artemis team and is eligible

2087
01:26:48,149 --> 01:26:47,120
for assignment to a future mission to

2088
01:26:50,550 --> 01:26:48,159

the moon

2089
01:26:52,310 --> 01:26:50,560
crew 3 will be marshburn's third visit

2090
01:26:55,830 --> 01:26:52,320
to the space station and his second

2091
01:26:58,709 --> 01:26:55,840
long-duration mission he flew on sts-127

2092
01:27:00,550 --> 01:26:58,719
and expedition 34 and 35. marshburn is

2093
01:27:02,470 --> 01:27:00,560
also a medical doctor who once served as

2094
01:27:04,550 --> 01:27:02,480
a flight surgeon and medical operations

2095
01:27:07,750 --> 01:27:04,560
lead for the space station

2096
01:27:10,070 --> 01:27:07,760
and like uh chari maurer will be making

2097
01:27:12,709 --> 01:27:10,080
his first trip to space with the crew 3

2098
01:27:14,790 --> 01:27:12,719
mission he has extensive experience in

2099
01:27:17,189 --> 01:27:14,800
engineering and research and he has

2100
01:27:19,110 --> 01:27:17,199
spent 16 consecutive days in an

2101
01:27:22,310 --> 01:27:19,120
underwater laboratory as part of nasa's

2102
01:27:24,550 --> 01:27:22,320
extreme environment missions operations

2103
01:27:25,669 --> 01:27:24,560
again that is a preview of crew 3 which

2104
01:27:27,910 --> 01:27:25,679
will launch

2105
01:27:30,070 --> 01:27:27,920
later on this fall

2106
01:27:31,910 --> 01:27:30,080
and as we saw recently those views

2107
01:27:34,950 --> 01:27:31,920
inside the capsule the crew is currently

2108
01:27:41,990 --> 01:27:34,960
eating their last meal in space

2109
01:27:45,830 --> 01:27:44,310
so our next burn coming up and our final

2110
01:27:48,629 --> 01:27:45,840
departure burn that's departure burn

2111
01:27:50,950 --> 01:27:48,639
three that'll be at 7 14 p.m pacific

2112
01:27:52,470 --> 01:27:50,960
time so about 30 minutes from now

2113
01:27:53,830 --> 01:27:52,480

uh that'll be another combination of

2114
01:27:56,709 --> 01:27:53,840
those service section and forward

2115
01:27:59,510 --> 01:27:56,719
bulkhead thrusters propelling dragon and

2116
01:28:02,709 --> 01:27:59,520
it should last about 61 seconds so this

2117
01:28:04,870 --> 01:28:02,719
will circular circularize dragon's orbit

2118
01:28:09,110 --> 01:28:04,880
and put it roughly co-elliptic with the

2119
01:28:14,149 --> 01:28:11,830
and for those just joining us

2120
01:28:15,430 --> 01:28:14,159
on screen is a view of johnson space

2121
01:28:18,229 --> 01:28:15,440
center

2122
01:28:21,430 --> 01:28:18,239
we are in the middle of crew one

2123
01:28:23,910 --> 01:28:21,440
departure and return back to earth

2124
01:28:25,189 --> 01:28:23,920
we are waiting on that fourth and final

2125
01:28:27,270 --> 01:28:25,199
departure burn

2126
01:28:29,350 --> 01:28:27,280
we are also taking questions throughout

2127
01:28:31,830 --> 01:28:29,360
the night so if you have any questions

2128
01:28:34,070 --> 01:28:31,840
use the hashtag launchamerica

2129
01:28:38,070 --> 01:28:34,080
we have one here how many draco engines

2130
01:28:40,229 --> 01:28:38,080
are there on crew dragon so there are 16

2131
01:28:42,149 --> 01:28:40,239
total draco engines there's 12 in the

2132
01:28:44,950 --> 01:28:42,159
service sections and there's an

2133
01:28:47,270 --> 01:28:44,960
additional four on the forward bulkhead

2134
01:28:49,750 --> 01:28:47,280
there's also eight super draco engines

2135
01:28:52,629 --> 01:28:49,760
not used in today's missions that can be

2136
01:28:54,149 --> 01:28:52,639
used for in-fighter boards and those are

2137
01:28:56,550 --> 01:28:54,159
a bit stronger and will protect the

2138
01:28:58,870 --> 01:28:56,560

astronauts in case of an anomaly on the

2139
01:29:00,470 --> 01:28:58,880
pad during liftoff

2140
01:29:02,550 --> 01:29:00,480
and ethan wants to know if there are any

2141
01:29:04,950 --> 01:29:02,560
cameras on the exterior of the dragon

2142
01:29:07,110 --> 01:29:04,960
capsule there is a camera underneath the

2143
01:29:09,910 --> 01:29:07,120
nose cone as well it's a centerline

2144
01:29:12,229 --> 01:29:09,920
camera essentially and that helps us

2145
01:29:15,110 --> 01:29:12,239
line up directly with the international

2146
01:29:16,310 --> 01:29:15,120
docking adapter on that docking port

2147
01:29:18,310 --> 01:29:16,320
and so

2148
01:29:19,910 --> 01:29:18,320
we use that on the way up we haven't

2149
01:29:21,430 --> 01:29:19,920
seen any views of it tonight though if

2150
01:29:24,149 --> 01:29:21,440
you are wondering the views that we've

2151
01:29:26,149 --> 01:29:24,159
seen of the capsule uh from the exterior

2152
01:29:28,390 --> 01:29:26,159
are from the international space station

2153
01:29:30,870 --> 01:29:28,400
yeah one thing to note as part of the

2154
01:29:32,950 --> 01:29:30,880
undocking sequence after we close

2155
01:29:36,470 --> 01:29:32,960
dragon's hatch and before we close the

2156
01:29:40,950 --> 01:29:38,470
the crew 2 commander shane kimbrough

2157
01:29:42,950 --> 01:29:40,960
affixed a docking target to the opposite

2158
01:29:44,870 --> 01:29:42,960
side of the apas hatch so not

2159
01:29:47,110 --> 01:29:44,880
necessarily important for the undocking

2160
01:29:48,790 --> 01:29:47,120
portion of crew but uh definitely

2161
01:29:51,350 --> 01:29:48,800
important for v for the next vehicle

2162
01:29:53,590 --> 01:29:51,360
coming on board so that way they know

2163
01:29:56,149 --> 01:29:53,600

it's essentially like a cross hatch or a

2164
01:29:57,830 --> 01:29:56,159
target so that way their cameras can

2165
01:29:59,350 --> 01:29:57,840
align up and know exactly where they are

2166
01:30:01,110 --> 01:29:59,360
in relative position to the

2167
01:30:03,510 --> 01:30:01,120
international space station and get a

2168
01:30:05,430 --> 01:30:03,520
good docking procedure

2169
01:30:06,950 --> 01:30:05,440
will wants to know how hot does the

2170
01:30:08,550 --> 01:30:06,960
inside of the capsule get during

2171
01:30:10,229 --> 01:30:08,560
re-entry which is a great question

2172
01:30:13,510 --> 01:30:10,239
because we've talked about how the

2173
01:30:15,350 --> 01:30:13,520
outside reaches it can be up to 3500

2174
01:30:18,229 --> 01:30:15,360
degrees fahrenheit

2175
01:30:19,510 --> 01:30:18,239
so the inside is kept nice and cool

2176
01:30:21,510 --> 01:30:19,520
the astronauts are in their suits at

2177
01:30:23,590 --> 01:30:21,520
that time as well so they also have cool

2178
01:30:26,070 --> 01:30:23,600
air flowing through their suits and the

2179
01:30:27,669 --> 01:30:26,080
inside of the cabin also has cool air um

2180
01:30:30,550 --> 01:30:27,679
having been disconnected from that

2181
01:30:33,669 --> 01:30:30,560
external radiator and so i think it's

2182
01:30:35,910 --> 01:30:33,679
around 85 degrees inside yeah the uh

2183
01:30:38,550 --> 01:30:35,920
certainly upon re-entry when the outside

2184
01:30:41,510 --> 01:30:38,560
temperatures can get upwards of 3000 or

2185
01:30:43,669 --> 01:30:41,520
3500 degrees fahrenheit the inside is

2186
01:30:45,510 --> 01:30:43,679
expected to to warm up a little bit one

2187
01:30:47,030 --> 01:30:45,520
of the cool things is the suit itself

2188
01:30:49,669 --> 01:30:47,040

and again it's hooked up to an umbilical

2189
01:30:52,070 --> 01:30:49,679
that provides

2190
01:30:54,629 --> 01:30:52,080
electric electronics and

2191
01:30:57,110 --> 01:30:54,639
also nitrox or a combination of nitrogen

2192
01:30:58,870 --> 01:30:57,120
and oxygen for the astronauts to have a

2193
01:31:00,629 --> 01:30:58,880
habitable environment that will

2194
01:31:03,270 --> 01:31:00,639
automatically detect if temperatures get

2195
01:31:06,950 --> 01:31:03,280
too high and start to purge the suit

2196
01:31:08,550 --> 01:31:06,960
keeping the astronauts nice and cool

2197
01:31:10,629 --> 01:31:08,560
that way you know they're not sweating

2198
01:31:11,990 --> 01:31:10,639
on re-entry so

2199
01:31:14,950 --> 01:31:12,000
they they should be very comfortable

2200
01:31:21,030 --> 01:31:18,550
next question um from ty hill how does

2201
01:31:21,990 --> 01:31:21,040
orbit how does the orbit burn feel on

2202
01:31:24,070 --> 01:31:22,000
the

2203
01:31:26,629 --> 01:31:24,080
dragon capsule

2204
01:31:30,470 --> 01:31:28,390
well for these burns as we've seen the

2205
01:31:32,229 --> 01:31:30,480
crew are out of their seats

2206
01:31:34,470 --> 01:31:32,239
and out of their suits so it really

2207
01:31:35,590 --> 01:31:34,480
doesn't feel like much is happening for

2208
01:31:37,350 --> 01:31:35,600
them

2209
01:31:39,510 --> 01:31:37,360
it might feel like if you were in a car

2210
01:31:40,550 --> 01:31:39,520
and the car started moving a little bit

2211
01:31:42,310 --> 01:31:40,560
faster

2212
01:31:44,470 --> 01:31:42,320
but not necessarily so much that you'd

2213
01:31:46,310 --> 01:31:44,480

be thrown back in your seat otherwise we

2214
01:31:48,070 --> 01:31:46,320
would have the astronauts moving in the

2215
01:31:49,830 --> 01:31:48,080
capsule so uh

2216
01:31:51,990 --> 01:31:49,840
so they they don't typically feel really

2217
01:31:53,750 --> 01:31:52,000
anything during these burns one thing to

2218
01:31:57,030 --> 01:31:53,760
note uh particularly about the deorbit

2219
01:31:58,310 --> 01:31:57,040
burn so once we start it it will at the

2220
01:31:59,910 --> 01:31:58,320
end of it we'll be entering the earth's

2221
01:32:02,390 --> 01:31:59,920
atmosphere and once we get into the

2222
01:32:04,709 --> 01:32:02,400
atmosphere um you know bob and doug have

2223
01:32:06,790 --> 01:32:04,719
described the dragons are coming to life

2224
01:32:08,310 --> 01:32:06,800
and so uh when you get to the atmosphere

2225
01:32:10,550 --> 01:32:08,320
you start to hear those sounds again

2226
01:32:12,470 --> 01:32:10,560
there's a lot of friction and heat

2227
01:32:13,910 --> 01:32:12,480
but in space the

2228
01:32:15,110 --> 01:32:13,920
engines work a little bit differently

2229
01:32:17,189 --> 01:32:15,120
they sound a little bit differently it's

2230
01:32:19,669 --> 01:32:17,199
not very it's not like the typical

2231
01:32:22,550 --> 01:32:19,679
combustion engine that you would um

2232
01:32:24,390 --> 01:32:22,560
hear or experience here on earth um you

2233
01:32:26,709 --> 01:32:24,400
actually hear sort of a clicking and

2234
01:32:29,830 --> 01:32:26,719
that's just the hypergolic fuel being

2235
01:32:31,350 --> 01:32:29,840
fed into the motors um and so

2236
01:32:33,510 --> 01:32:31,360
when the engines and these departure

2237
01:32:35,430 --> 01:32:33,520
burns are active the astronauts should

2238
01:32:37,590 --> 01:32:35,440

hear sort of a clicking and that like

2239
01:32:39,270 --> 01:32:37,600
leah said they'll they'll feel the

2240
01:32:40,709 --> 01:32:39,280
change in velocity but not necessarily

2241
01:32:43,189 --> 01:32:40,719
this sort of like roaring engine that

2242
01:32:45,110 --> 01:32:43,199
you would expect um like a falcon 9

2243
01:32:46,950 --> 01:32:45,120
liftoff or something like that

2244
01:32:49,030 --> 01:32:46,960
and it's also not as noisy as you might

2245
01:32:51,110 --> 01:32:49,040
expect on an airplane because like we

2246
01:32:53,110 --> 01:32:51,120
said there's there's not really air

2247
01:32:54,390 --> 01:32:53,120
that's being processed or

2248
01:32:56,310 --> 01:32:54,400
pushed against

2249
01:32:57,910 --> 01:32:56,320
when we have these burns

2250
01:32:59,830 --> 01:32:57,920
so this question from autumn how quickly

2251
01:33:01,910 --> 01:32:59,840
do the astronauts family members get to

2252
01:33:03,750 --> 01:33:01,920
see them after landing that has been a

2253
01:33:06,550 --> 01:33:03,760
long-awaited moment for these family

2254
01:33:08,390 --> 01:33:06,560
members and for the astronauts as well

2255
01:33:10,629 --> 01:33:08,400
it's very it's really a quick turnaround

2256
01:33:13,270 --> 01:33:10,639
they should get to see them tomorrow

2257
01:33:15,910 --> 01:33:13,280
morning at ellington field in houston

2258
01:33:18,709 --> 01:33:15,920
texas uh the crew members will ride a

2259
01:33:21,350 --> 01:33:18,719
helicopter after being loaded onto the

2260
01:33:23,110 --> 01:33:21,360
recovery ship and uh they'll be taken

2261
01:33:25,110 --> 01:33:23,120
back to florida

2262
01:33:27,270 --> 01:33:25,120
and then board that nasa plane to

2263
01:33:29,350 --> 01:33:27,280

ellington field so we expect them to get

2264
01:33:31,350 --> 01:33:29,360
in early tomorrow morning and be able to

2265
01:33:35,350 --> 01:33:31,360
see their family members and one

2266
01:33:39,510 --> 01:33:37,350
the astronauts from crew 2 at the

2267
01:33:41,590 --> 01:33:39,520
international space station uh this

2268
01:33:43,910 --> 01:33:41,600
morning or this afternoon helping the

2269
01:33:45,669 --> 01:33:43,920
crew on members get into dragon and they

2270
01:33:47,350 --> 01:33:45,679
were sort of zipping around and remember

2271
01:33:49,430 --> 01:33:47,360
they've only been there for about a week

2272
01:33:50,870 --> 01:33:49,440
and so they described that although it's

2273
01:33:53,030 --> 01:33:50,880
it's sort of like learning to walk again

2274
01:33:54,790 --> 01:33:53,040
you get used to it very quickly well the

2275
01:33:57,030 --> 01:33:54,800
same will happen when the astronauts

2276
01:33:59,669 --> 01:33:57,040
return back to earth so they've been in

2277
01:34:02,629 --> 01:33:59,679
microgravity for six months the body

2278
01:34:05,270 --> 01:34:02,639
will likely need some time to adjust um

2279
01:34:07,750 --> 01:34:05,280
uh not only to gravity but also the

2280
01:34:10,070 --> 01:34:07,760
equilibrium uh microgravity does some

2281
01:34:11,750 --> 01:34:10,080
funky things with your equilibrium so uh

2282
01:34:13,750 --> 01:34:11,760
one thing after splashdown and we do

2283
01:34:16,070 --> 01:34:13,760
recover the crew you'll notice that they

2284
01:34:17,910 --> 01:34:16,080
will be tended to by medical staff and

2285
01:34:20,149 --> 01:34:17,920
that's to make sure everything is okay

2286
01:34:22,149 --> 01:34:20,159
because you know after spending such a

2287
01:34:25,189 --> 01:34:22,159
long time in space the gravity can feel

2288
01:34:27,590 --> 01:34:25,199

quite uh like quite heavy and that's a

2289
01:34:29,750 --> 01:34:27,600
great intro into this next question from

2290
01:34:32,470 --> 01:34:29,760
ezra eight years old hi ezra thank you

2291
01:34:34,870 --> 01:34:32,480
so much for watching uh wanting to know

2292
01:34:38,550 --> 01:34:34,880
how stressful it is to be in space for

2293
01:34:40,550 --> 01:34:38,560
so long and that's a really interesting

2294
01:34:42,310 --> 01:34:40,560
um question and it's something that we

2295
01:34:44,229 --> 01:34:42,320
have to think about more and more as we

2296
01:34:45,669 --> 01:34:44,239
send crew members on long duration

2297
01:34:47,669 --> 01:34:45,679
missions obviously here on the

2298
01:34:49,350 --> 01:34:47,679
international space station but as well

2299
01:34:51,430 --> 01:34:49,360
as we think about going to the moon and

2300
01:34:54,390 --> 01:34:51,440
mars so things that are very important

2301
01:34:56,390 --> 01:34:54,400
are pmcs or private medical conferences

2302
01:34:57,910 --> 01:34:56,400
and it's very common for the astronauts

2303
01:34:59,750 --> 01:34:57,920
it's actually uh

2304
01:35:01,270 --> 01:34:59,760
on their timelines

2305
01:35:03,109 --> 01:35:01,280
multiple times

2306
01:35:05,109 --> 01:35:03,119
and even on the way uphill last week

2307
01:35:06,790 --> 01:35:05,119
with crew 2 they had a private medical

2308
01:35:08,470 --> 01:35:06,800
conference just to check in on how

2309
01:35:11,189 --> 01:35:08,480
they're feeling and so they get the

2310
01:35:13,990 --> 01:35:11,199
opportunity to talk with a doctor here

2311
01:35:16,550 --> 01:35:14,000
on the ground a flight surgeon and and

2312
01:35:18,310 --> 01:35:16,560
relay any concerns that they have either

2313
01:35:20,550 --> 01:35:18,320

about stresses on their body and how

2314
01:35:22,310 --> 01:35:20,560
they're feeling or uh just mentally as

2315
01:35:24,709 --> 01:35:22,320
well just making sure that you know

2316
01:35:26,790 --> 01:35:24,719
being away from home so long

2317
01:35:29,830 --> 01:35:26,800
they are still feeling good and able to

2318
01:35:31,189 --> 01:35:29,840
uh fully give their off to the mission

2319
01:35:33,109 --> 01:35:31,199
and it

2320
01:35:35,510 --> 01:35:33,119
would be good to mention too

2321
01:35:37,590 --> 01:35:35,520
the astronauts have to follow a very

2322
01:35:40,550 --> 01:35:37,600
strict schedule right so every day is

2323
01:35:42,470 --> 01:35:40,560
two hours of exercise every five minutes

2324
01:35:44,229 --> 01:35:42,480
are essentially planned for

2325
01:35:46,070 --> 01:35:44,239
the astronauts and

2326
01:35:47,590 --> 01:35:46,080
they have they're supporting hundreds if

2327
01:35:50,149 --> 01:35:47,600
not thousands of different types of

2328
01:35:51,350 --> 01:35:50,159
experiments um and on top of that you

2329
01:35:54,310 --> 01:35:51,360
know they're in getting used to the

2330
01:35:56,950 --> 01:35:54,320
microgravity environment of space

2331
01:36:00,149 --> 01:35:56,960
so they are quite busy uh but you know

2332
01:36:02,310 --> 01:36:00,159
if if the images on social media tell uh

2333
01:36:04,790 --> 01:36:02,320
will tell anything they seem to be very

2334
01:36:06,629 --> 01:36:04,800
happy there um seems like they're

2335
01:36:09,189 --> 01:36:06,639
really happy to support all these you

2336
01:36:10,470 --> 01:36:09,199
know different scientific endeavors and

2337
01:36:11,669 --> 01:36:10,480
um

2338
01:36:13,590 --> 01:36:11,679

seems like they're just having a blast

2339
01:36:16,470 --> 01:36:13,600
so it i'm sure it balances each other

2340
01:36:17,990 --> 01:36:16,480
out the sort of rigorous schedule with

2341
01:36:19,750 --> 01:36:18,000
you know the other side of like you get

2342
01:36:20,790 --> 01:36:19,760
to do stuff that really no one else gets

2343
01:36:22,790 --> 01:36:20,800
to do

2344
01:36:24,390 --> 01:36:22,800
and mentally as well you know we want to

2345
01:36:26,629 --> 01:36:24,400
make sure that the astronauts still have

2346
01:36:28,950 --> 01:36:26,639
communication with their families and so

2347
01:36:31,590 --> 01:36:28,960
they have the opportunity uh weekly and

2348
01:36:33,350 --> 01:36:31,600
multiple times a week to either do a

2349
01:36:35,109 --> 01:36:33,360
video conference with their families as

2350
01:36:36,310 --> 01:36:35,119
well as give them a call

2351
01:36:38,149 --> 01:36:36,320
so they're able to keep up with

2352
01:36:39,750 --> 01:36:38,159
everything that's going on here on earth

2353
01:36:42,310 --> 01:36:39,760
actually heard one time about one

2354
01:36:44,550 --> 01:36:42,320
astronaut whose son was playing hockey

2355
01:36:45,910 --> 01:36:44,560
and so they took the tablet to the

2356
01:36:47,510 --> 01:36:45,920
hockey game and were recording the

2357
01:36:48,950 --> 01:36:47,520
hockey game for the astronaut on the

2358
01:36:51,430 --> 01:36:48,960
space station who was getting to watch

2359
01:36:55,510 --> 01:36:51,440
it so i love that they're able to to

2360
01:37:00,310 --> 01:36:57,910
um next question for matt

2361
01:37:02,709 --> 01:37:00,320
what purpose do the crew ipads or

2362
01:37:04,470 --> 01:37:02,719
tablets serve um so

2363
01:37:06,390 --> 01:37:04,480

a lot of the things it's it's their

2364
01:37:08,550 --> 01:37:06,400
schedule they can also take pictures and

2365
01:37:10,870 --> 01:37:08,560
record a bunch of data on there to send

2366
01:37:13,109 --> 01:37:10,880
to ground um in case they need support

2367
01:37:15,590 --> 01:37:13,119
in any in any type of way but it's

2368
01:37:16,390 --> 01:37:15,600
really you know if you think about um

2369
01:37:21,030 --> 01:37:16,400
you know

2370
01:37:23,510 --> 01:37:21,040
or pencil and pad so to speak so this is

2371
01:37:25,669 --> 01:37:23,520
the new pencil patties it's how they

2372
01:37:27,350 --> 01:37:25,679
they really do work and and and get you

2373
01:37:29,030 --> 01:37:27,360
know the schedule for the next uh

2374
01:37:31,030 --> 01:37:29,040
upcoming milestones for their mission

2375
01:37:33,669 --> 01:37:31,040
and even less than 80 you know 30 years

2376
01:37:36,629 --> 01:37:33,679
ago flying the the space shuttle we had

2377
01:37:39,189 --> 01:37:36,639
just stacks of paper uh that had the

2378
01:37:41,189 --> 01:37:39,199
information for the crew and so for this

2379
01:37:43,189 --> 01:37:41,199
one you know we can see them on the

2380
01:37:44,870 --> 01:37:43,199
thighs of the astronauts sometimes and

2381
01:37:47,030 --> 01:37:44,880
that gives them the opportunity to keep

2382
01:37:51,830 --> 01:37:47,040
up with what's next in the mission um

2383
01:37:56,229 --> 01:37:54,390
um we have a next question here it says

2384
01:37:58,709 --> 01:37:56,239
this is so fascinating

2385
01:38:00,470 --> 01:37:58,719
how many crew members are on board the

2386
01:38:03,030 --> 01:38:00,480
dragon so there's currently four there

2387
01:38:04,950 --> 01:38:03,040
is the commander mike hopkins at the

2388
01:38:07,109 --> 01:38:04,960

pilot victor glover and we have two

2389
01:38:10,550 --> 01:38:07,119
mission specialists shannon walker and

2390
01:38:12,229 --> 01:38:10,560
soichi noguchi um

2391
01:38:14,470 --> 01:38:12,239
so these four are returning home after

2392
01:38:16,629 --> 01:38:14,480
their six-month journey we also sent

2393
01:38:19,990 --> 01:38:16,639
four as part of the crew program last

2394
01:38:21,910 --> 01:38:20,000
week the dragon capsule itself can fit

2395
01:38:24,550 --> 01:38:21,920
up to seven although we've never

2396
01:38:27,350 --> 01:38:24,560
launched that many people um as part of

2397
01:38:29,510 --> 01:38:27,360
the uh capsule program uh when we did

2398
01:38:31,270 --> 01:38:29,520
the demo two mission with bob and doug

2399
01:38:36,390 --> 01:38:31,280
we just sent them and so there was some

2400
01:38:39,910 --> 01:38:38,470
casara asks what is the big loop that's

2401
01:38:41,430 --> 01:38:39,920
a great question we've heard a lot of

2402
01:38:44,070 --> 01:38:41,440
that talk

2403
01:38:47,350 --> 01:38:44,080
from the corps here reporting to dragon

2404
01:38:48,950 --> 01:38:47,360
on the big loop or reporting to uh or

2405
01:38:50,790 --> 01:38:48,960
the crew members reporting back on the

2406
01:38:52,790 --> 01:38:50,800
big loop and that's when the

2407
01:38:54,470 --> 01:38:52,800
communication is being routed through

2408
01:38:57,189 --> 01:38:54,480
the international space station as well

2409
01:38:58,550 --> 01:38:57,199
so we heard that that big loop was

2410
01:39:00,870 --> 01:38:58,560
recently uh

2411
01:39:04,629 --> 01:39:00,880
cut and so crew dragon is speaking

2412
01:39:06,070 --> 01:39:04,639
directly to the ground now and not uh

2413
01:39:07,669 --> 01:39:06,080

really using the international space

2414
01:39:09,430 --> 01:39:07,679
station for that

2415
01:39:11,350 --> 01:39:09,440
they're not in the mix anymore i guess i

2416
01:39:13,669 --> 01:39:11,360
should say on that specific

2417
01:39:14,790 --> 01:39:13,679
loop or a chat line

2418
01:39:16,470 --> 01:39:14,800
yeah and you'll hear a lot of

2419
01:39:19,669 --> 01:39:16,480
communications back and forth between

2420
01:39:21,430 --> 01:39:19,679
the ground team and the astronauts um

2421
01:39:22,550 --> 01:39:21,440
you know there are a lot of milestones

2422
01:39:24,310 --> 01:39:22,560
and checkpoints to make sure that

2423
01:39:26,470 --> 01:39:24,320
everything goes smoothly so over

2424
01:39:28,149 --> 01:39:26,480
communication certainly good and you'll

2425
01:39:31,910 --> 01:39:28,159
you hear the beeps too and those are

2426
01:39:33,430 --> 01:39:31,920
quindar tones um uh for the core to

2427
01:39:35,350 --> 01:39:33,440
communicate with the astronauts and we

2428
01:39:36,950 --> 01:39:35,360
we try our best to pause and make sure

2429
01:39:40,070 --> 01:39:36,960
that everyone can listen to the messages

2430
01:39:41,350 --> 01:39:40,080
being relayed back and forth

2431
01:39:43,189 --> 01:39:41,360
um so

2432
01:39:46,470 --> 01:39:43,199
next question is at what point in the

2433
01:39:48,390 --> 01:39:46,480
mission is the trunk jettisoned that is

2434
01:39:50,149 --> 01:39:48,400
a great question so currently it's

2435
01:39:53,430 --> 01:39:50,159
scheduled for

2436
01:39:54,790 --> 01:39:53,440
10 58 pm pacific time so

2437
01:39:57,350 --> 01:39:54,800
just about

2438
01:39:58,229 --> 01:39:57,360

four hours from now so

2439
01:40:01,030 --> 01:39:58,239
after

2440
01:40:03,030 --> 01:40:01,040
we complete our departure burns the

2441
01:40:04,470 --> 01:40:03,040
astronauts will don their suits again

2442
01:40:07,350 --> 01:40:04,480
and prepare for

2443
01:40:09,510 --> 01:40:07,360
re-entry so the um

2444
01:40:11,270 --> 01:40:09,520
there's an umbilical that connects the

2445
01:40:13,590 --> 01:40:11,280
trunk uh

2446
01:40:15,750 --> 01:40:13,600
to the capsule and routes telemetry and

2447
01:40:17,990 --> 01:40:15,760
power and uh one of the things that we

2448
01:40:20,550 --> 01:40:18,000
want to make sure happens before we

2449
01:40:24,310 --> 01:40:20,560
re-enter is we want to shed as much

2450
01:40:27,270 --> 01:40:24,320
unneeded weight as as as possible

2451
01:40:28,870 --> 01:40:27,280
to give the parachutes an easier time to

2452
01:40:29,590 --> 01:40:28,880
do their job and slow the vehicle down

2453
01:40:31,669 --> 01:40:29,600
so

2454
01:40:35,109 --> 01:40:31,679
we'll start to

2455
01:40:36,709 --> 01:40:35,119
burn up unnecessary fuel we'll

2456
01:40:39,510 --> 01:40:36,719
uh and then we'll also jettison the

2457
01:40:43,109 --> 01:40:39,520
trunk and after the deorbit burn we're

2458
01:40:45,990 --> 01:40:43,119
burning the the extra propellant and the

2459
01:40:47,510 --> 01:40:46,000
um trunk is jettison the weight of the

2460
01:40:50,390 --> 01:40:47,520
vehicle the mass of the vehicle actually

2461
01:40:52,550 --> 01:40:50,400
goes from 27 thousand pounds

2462
01:40:54,390 --> 01:40:52,560
to twenty twenty one thousand pounds so

2463
01:40:57,109 --> 01:40:54,400

that's six thousand pounds that you know

2464
01:40:59,189 --> 01:40:57,119
the the um the dro shoots in the main

2465
01:41:02,550 --> 01:40:59,199
shoots don't have to sort of uh slow

2466
01:41:04,950 --> 01:41:02,560
down so that is important for us

2467
01:41:07,350 --> 01:41:04,960
and uh to be specific as you mentioned

2468
01:41:10,310 --> 01:41:07,360
that that umbilical uh we call it claw

2469
01:41:12,390 --> 01:41:10,320
separation and so that disconnects the

2470
01:41:15,270 --> 01:41:12,400
thermal control power into telemetry

2471
01:41:16,709 --> 01:41:15,280
from dragon uh to the trunk

2472
01:41:17,990 --> 01:41:16,719
and then the

2473
01:41:19,430 --> 01:41:18,000
spacecraft the capsule itself will

2474
01:41:22,310 --> 01:41:19,440
separate from the trunk and this all

2475
01:41:23,830 --> 01:41:22,320
happens before the deorbit burn um so so

2476
01:41:28,149 --> 01:41:23,840
that comes on later in the mission but

2477
01:41:32,229 --> 01:41:29,350
and we're continuing to take your

2478
01:41:33,990 --> 01:41:32,239
questions with the hashtag ask nasa just

2479
01:41:36,950 --> 01:41:34,000
a little look back on the things that

2480
01:41:39,910 --> 01:41:36,960
we've seen so far uh the

2481
01:41:42,790 --> 01:41:39,920
call to or the uh command for undocking

2482
01:41:44,229 --> 01:41:42,800
came right on time at 5 30 pm pacific

2483
01:41:46,470 --> 01:41:44,239
time so just about an hour and a half

2484
01:41:48,870 --> 01:41:46,480
ago and we had physical separation of

2485
01:41:50,310 --> 01:41:48,880
the vehicle just a few minutes later

2486
01:41:52,149 --> 01:41:50,320
everything has been really on the

2487
01:41:54,149 --> 01:41:52,159
timeline since then we've completed

2488
01:41:55,830 --> 01:41:54,159

three of those departure burns and we're

2489
01:41:58,149 --> 01:41:55,840
now waiting for the fourth which should

2490
01:42:03,350 --> 01:41:58,159
come in less than 20 minutes from now

2491
01:42:05,350 --> 01:42:03,360
around 7 14 p.m pacific time

2492
01:42:06,550 --> 01:42:05,360
so this is an animation of the four

2493
01:42:08,950 --> 01:42:06,560
burns

2494
01:42:11,350 --> 01:42:08,960
so we've completed three so far and

2495
01:42:13,510 --> 01:42:11,360
again waiting on the fourth one uh once

2496
01:42:15,669 --> 01:42:13,520
we get uh to the fourth one we're

2497
01:42:18,870 --> 01:42:15,679
basically going to be co-elliptic with

2498
01:42:20,390 --> 01:42:18,880
the um space station about 10 kilometers

2499
01:42:22,550 --> 01:42:20,400
beneath it

2500
01:42:24,629 --> 01:42:22,560
and then we'll move on to the deorbit

2501
01:42:26,950 --> 01:42:24,639
burn in a couple hours and that will

2502
01:42:28,470 --> 01:42:26,960
lower the orbit altitude enough where

2503
01:42:30,790 --> 01:42:28,480
dragon will start to re-enter the

2504
01:42:33,990 --> 01:42:30,800
earth's atmosphere eventually make its

2505
01:42:36,709 --> 01:42:34,000
way through the atmosphere

2506
01:42:38,390 --> 01:42:36,719
deploy its drogue shoots first slowing

2507
01:42:40,390 --> 01:42:38,400
the vehicle and stabilizing it then

2508
01:42:42,070 --> 01:42:40,400
eventually the main shoots

2509
01:42:44,709 --> 01:42:42,080
and then we'll have splashdown off the

2510
01:42:46,870 --> 01:42:44,719
coast of uh right now the primary side

2511
01:42:48,790 --> 01:42:46,880
of panama city florida so when crew

2512
01:42:51,830 --> 01:42:48,800
dragon begins that orbit burn it'll

2513
01:42:54,870 --> 01:42:51,840

still be traveling about 17 500 miles an

2514
01:42:57,270 --> 01:42:54,880
hour orbital velocity uh and that burn

2515
01:42:59,030 --> 01:42:57,280
will help it drop out of orbit and into

2516
01:43:02,629 --> 01:42:59,040
the earth's atmosphere slowing it down

2517
01:43:04,310 --> 01:43:02,639
to about 350 miles per hour at that

2518
01:43:06,550 --> 01:43:04,320
point is when those drogue shoots will

2519
01:43:08,790 --> 01:43:06,560
deploy once crew dragon reaches 18 000

2520
01:43:11,270 --> 01:43:08,800
feet above the earth and those drogue

2521
01:43:13,430 --> 01:43:11,280
shoots uh slowly deploy will slow crew

2522
01:43:15,669 --> 01:43:13,440
dragon down to about 119

2523
01:43:18,149 --> 01:43:15,679
uh miles per hour and then we'll see

2524
01:43:20,229 --> 01:43:18,159
those four main shoots and those main

2525
01:43:21,910 --> 01:43:20,239
shoots don't inflate right away uh same

2526
01:43:23,510 --> 01:43:21,920
thing with those drogue shoots we'll see

2527
01:43:25,189 --> 01:43:23,520
it take just a few seconds for them to

2528
01:43:27,270 --> 01:43:25,199
fully inflate and we don't want to cause

2529
01:43:29,750 --> 01:43:27,280
any shock to the vehicle or the

2530
01:43:32,390 --> 01:43:29,760
parachute system so so it takes its time

2531
01:43:34,790 --> 01:43:32,400
to inflate a little bit but after that

2532
01:43:37,590 --> 01:43:34,800
the crew dragon should be sailing about

2533
01:43:39,430 --> 01:43:37,600
16 miles per hour for a nice calm

2534
01:43:41,109 --> 01:43:39,440
splashdown just off the coast of panama

2535
01:43:43,590 --> 01:43:41,119
city florida

2536
01:43:45,669 --> 01:43:43,600
after splashdown recovery operations

2537
01:43:48,870 --> 01:43:45,679
begin so a couple of things will happen

2538
01:43:50,470 --> 01:43:48,880

there are two fast boats and they they

2539
01:43:52,390 --> 01:43:50,480
move pretty quickly

2540
01:43:55,669 --> 01:43:52,400
that will head to the vehicle

2541
01:43:57,990 --> 01:43:55,679
the first one's job is to make sure that

2542
01:44:00,070 --> 01:43:58,000
the vehicle integrity is generally safe

2543
01:44:03,270 --> 01:44:00,080
and also start to detect for any

2544
01:44:06,390 --> 01:44:03,280
residual hypergolic vapors which can be

2545
01:44:08,790 --> 01:44:06,400
toxic to people once that is all cleared

2546
01:44:11,109 --> 01:44:08,800
the second boat will come in and make

2547
01:44:12,310 --> 01:44:11,119
sure that the chutes are no longer

2548
01:44:16,550 --> 01:44:12,320
attached

2549
01:44:18,229 --> 01:44:16,560
run the risk of the winds pulling the

2550
01:44:19,990 --> 01:44:18,239
the vehicles in the ocean just like a

2551
01:44:21,830 --> 01:44:20,000
sailboat and so they'll make sure that

2552
01:44:24,550 --> 01:44:21,840
is good and then we have a recovery

2553
01:44:27,510 --> 01:44:24,560
vessel come in and it essentially has a

2554
01:44:30,550 --> 01:44:27,520
giant crane on it it will hook the top

2555
01:44:31,910 --> 01:44:30,560
of dragon and basically hoist it onto

2556
01:44:33,830 --> 01:44:31,920
the back of the boat

2557
01:44:36,629 --> 01:44:33,840
more checkouts will happen and then

2558
01:44:38,709 --> 01:44:36,639
eventually the crew will open the hatch

2559
01:44:41,270 --> 01:44:38,719
and say hi to the crew one of the first

2560
01:44:42,950 --> 01:44:41,280
people that will talk to the crew is uh

2561
01:44:44,790 --> 01:44:42,960
medical staff and make sure that

2562
01:44:46,790 --> 01:44:44,800
everything is is good from that

2563
01:44:48,790 --> 01:44:46,800

standpoint

2564
01:45:04,470 --> 01:44:48,800
and then they'll uh be

2565
01:45:21,510 --> 01:45:06,550
that was the ping from the core

2566
01:45:26,229 --> 01:45:23,109
go ahead

2567
01:45:28,550 --> 01:45:26,239
the ground is go for department three

2568
01:45:30,149 --> 01:45:28,560
also friendly reminder that you may now

2569
01:45:32,550 --> 01:45:30,159
begin your fluid loading per your

2570
01:45:34,950 --> 01:45:32,560
timeline and you may also complete

2571
01:45:37,270 --> 01:45:34,960
sections three and four of procedure

2572
01:45:42,149 --> 01:45:37,280
four decimal seven zero zero at your

2573
01:45:47,510 --> 01:45:44,790
okay go for the burn to part three burn

2574
01:45:49,590 --> 01:45:47,520
we are go to start fluid loading and go

2575
01:46:00,310 --> 01:45:49,600
for sections three and four or four dot

2576
01:46:04,310 --> 01:46:01,990
we heard the crew members get the go for

2577
01:46:06,310 --> 01:46:04,320
depart burn three that's the final of

2578
01:46:08,709 --> 01:46:06,320
these four departure burns but certainly

2579
01:46:10,149 --> 01:46:08,719
not the last burn we'll see today and we

2580
01:46:12,229 --> 01:46:10,159
expect to see departure burn three

2581
01:46:21,109 --> 01:46:12,239
coming up in about 13 minutes from now

2582
01:46:26,390 --> 01:46:24,229
we also oh sorry so sorry i was

2583
01:46:28,790 --> 01:46:26,400
trying to finish my thoughts uh so after

2584
01:46:30,790 --> 01:46:28,800
the um the medical staff says hi to the

2585
01:46:33,830 --> 01:46:30,800
crew there's actually a medical um

2586
01:46:36,550 --> 01:46:33,840
portion of the medical section dedicated

2587
01:46:38,629 --> 01:46:36,560
uh on the portion of the vessel and the

2588
01:46:40,709 --> 01:46:38,639

crew will continue further checkouts to

2589
01:46:42,070 --> 01:46:40,719
make sure everything is good and then

2590
01:46:43,430 --> 01:46:42,080
you know start to make their way back to

2591
01:46:45,510 --> 01:46:43,440
land that's going to be the first time

2592
01:46:47,830 --> 01:46:45,520
they're getting a breath of fresh air in

2593
01:46:49,750 --> 01:46:47,840
over six months uh which is probably

2594
01:46:52,149 --> 01:46:49,760
certainly pretty exciting for them and

2595
01:46:55,189 --> 01:46:52,159
when we had uh three crew members return

2596
01:46:56,790 --> 01:46:55,199
earlier this month on soyuz it's i love

2597
01:46:58,149 --> 01:46:56,800
the look on their faces whenever they

2598
01:46:59,510 --> 01:46:58,159
are pulled out of the capsule for the

2599
01:47:00,950 --> 01:46:59,520
first time and they have sunlight on

2600
01:47:03,109 --> 01:47:00,960
their face and

2601
01:47:05,990 --> 01:47:03,119
fresh air from from the world around

2602
01:47:07,590 --> 01:47:06,000
them so i know it has to be exciting and

2603
01:47:09,270 --> 01:47:07,600
once as you mentioned

2604
01:47:10,790 --> 01:47:09,280
the first people to really speak with

2605
01:47:13,990 --> 01:47:10,800
the crew members face to face once they

2606
01:47:15,669 --> 01:47:14,000
return will be medical personnel and as

2607
01:47:17,590 --> 01:47:15,679
we've seen with all of our space

2608
01:47:19,430 --> 01:47:17,600
missions once the crew members are

2609
01:47:21,830 --> 01:47:19,440
retrieved from the capsule they will be

2610
01:47:23,750 --> 01:47:21,840
loaded onto stretchers

2611
01:47:25,430 --> 01:47:23,760
this is because they have been in space

2612
01:47:27,590 --> 01:47:25,440
for the past six months and it can be a

2613
01:47:28,950 --> 01:47:27,600

little bit difficult to walk it's not

2614
01:47:31,189 --> 01:47:28,960
that they couldn't but we want to make

2615
01:47:32,070 --> 01:47:31,199
sure especially while on a boat that

2616
01:47:33,750 --> 01:47:32,080
they

2617
01:47:35,830 --> 01:47:33,760
are stable and

2618
01:47:37,990 --> 01:47:35,840
that they're comfortable so they will

2619
01:47:39,430 --> 01:47:38,000
get some medical checkouts aboard the

2620
01:47:41,350 --> 01:47:39,440
boat itself and then take that

2621
01:47:43,430 --> 01:47:41,360
helicopter back to florida before

2622
01:47:46,390 --> 01:47:43,440
boarding a nasa plane for houston right

2623
01:47:48,709 --> 01:47:46,400
the the stretcher um is very similar to

2624
01:47:51,350 --> 01:47:48,719
like the chairs that um you'll see

2625
01:47:53,669 --> 01:47:51,360
propped up after a land landing for a

2626
01:47:55,990 --> 01:47:53,679
spacecraft like the soyuz uh it is sort

2627
01:47:57,830 --> 01:47:56,000
of standard right we want to make sure

2628
01:47:59,750 --> 01:47:57,840
that um even though the astronauts might

2629
01:48:01,350 --> 01:47:59,760
feel like they're strong enough we're

2630
01:48:02,550 --> 01:48:01,360
taking all precautions to make sure that

2631
01:48:05,189 --> 01:48:02,560
you know they get checked out everything

2632
01:48:11,430 --> 01:48:05,199
before they start to you know become

2633
01:48:16,790 --> 01:48:14,229
so we are waiting depart burn three

2634
01:48:21,830 --> 01:48:16,800
coming up at 7 14 p.m pacific time the

2635
01:48:25,109 --> 01:48:23,590
the astronauts as we mentioned they're

2636
01:48:26,709 --> 01:48:25,119
having they've probably finished their

2637
01:48:28,790 --> 01:48:26,719
dinner by now

2638
01:48:31,510 --> 01:48:28,800

they are out of their suits out of their

2639
01:48:33,750 --> 01:48:31,520
seats they are able to monitor the

2640
01:48:35,109 --> 01:48:33,760
journey of crew dragon but they will

2641
01:48:41,510 --> 01:48:35,119
need to get back in those suits and

2642
01:48:46,550 --> 01:48:44,149
we have another question here from greg

2643
01:48:49,510 --> 01:48:46,560
how many g's do the astronauts feel when

2644
01:48:51,910 --> 01:48:49,520
entering the earth's atmosphere

2645
01:48:54,709 --> 01:48:51,920
so we uh expect them to feel about three

2646
01:48:56,390 --> 01:48:54,719
to five g's so nothing unbearable maybe

2647
01:48:59,109 --> 01:48:56,400
even three g's maybe you've felt it on a

2648
01:49:00,709 --> 01:48:59,119
roller coaster before um and as andy

2649
01:49:02,709 --> 01:49:00,719
mentioned is pretty similar to what they

2650
01:49:04,870 --> 01:49:02,719
experience on ascent as well but of

2651
01:49:07,830 --> 01:49:04,880
course having experienced practically

2652
01:49:09,189 --> 01:49:07,840
zero g's over the last few months

2653
01:49:12,149 --> 01:49:09,199
that can be

2654
01:49:14,310 --> 01:49:12,159
a little taxing and so we heard them

2655
01:49:16,950 --> 01:49:14,320
discuss fluid loading and how they're go

2656
01:49:18,870 --> 01:49:16,960
for fluid loading and this helps combat

2657
01:49:21,109 --> 01:49:18,880
any maybe potential orthostatic

2658
01:49:23,109 --> 01:49:21,119
intolerance or essentially dizziness

2659
01:49:25,030 --> 01:49:23,119
that can occur as the blood rushes away

2660
01:49:26,950 --> 01:49:25,040
from the head once you return to a

2661
01:49:28,550 --> 01:49:26,960
gravity environment we also got to look

2662
01:49:30,310 --> 01:49:28,560
at the crew in those comfort garments

2663
01:49:31,669 --> 01:49:30,320

which are also

2664
01:49:34,149 --> 01:49:31,679
compression garments essentially

2665
01:49:35,830 --> 01:49:34,159
orthostatic garments those squeeze the

2666
01:49:38,550 --> 01:49:35,840
legs and the lower half of the body to

2667
01:49:40,310 --> 01:49:38,560
keep fluids moving um into the upper

2668
01:49:43,430 --> 01:49:40,320
part of the body so it all helps our

2669
01:49:45,510 --> 01:49:43,440
crew members feel better on the way down

2670
01:49:48,149 --> 01:49:45,520
i i just i just looked up the highest

2671
01:49:49,510 --> 01:49:48,159
g-force experience on a roller coaster

2672
01:49:51,669 --> 01:49:49,520
it's 12.

2673
01:49:52,390 --> 01:49:51,679
so actually if you've ridden the

2674
01:49:53,830 --> 01:49:52,400
some

2675
01:49:55,669 --> 01:49:53,840
really intense roller coasters you're

2676
01:49:57,270 --> 01:49:55,679
probably going to experience more g's

2677
01:50:00,870 --> 01:49:57,280
wow than what the astronaut experience

2678
01:50:02,709 --> 01:50:00,880
maybe for a shorter duration um

2679
01:50:04,629 --> 01:50:02,719
but yeah i was not expecting that answer

2680
01:50:07,750 --> 01:50:04,639
so 12 g's out there is the record for

2681
01:50:10,229 --> 01:50:07,760
highest g forces in a roller coaster

2682
01:50:12,149 --> 01:50:10,239
we have a question from jamie asking the

2683
01:50:14,229 --> 01:50:12,159
astronauts usually have to sleep shift

2684
01:50:16,149 --> 01:50:14,239
for the trip up did they have to sleep

2685
01:50:19,030 --> 01:50:16,159
shift for the trip home great question

2686
01:50:19,830 --> 01:50:19,040
it all depends on really the timeline

2687
01:50:22,229 --> 01:50:19,840
for

2688
01:50:23,750 --> 01:50:22,239

undocking and splashdown because we want

2689
01:50:25,830 --> 01:50:23,760
to work in the

2690
01:50:28,310 --> 01:50:25,840
ability for the crew to sleep while

2691
01:50:30,229 --> 01:50:28,320
they're on crew dragon if need be we're

2692
01:50:32,229 --> 01:50:30,239
not seeing that today because it is a

2693
01:50:34,550 --> 01:50:32,239
shorter undock to splash down timeline

2694
01:50:37,030 --> 01:50:34,560
so the crew for this mission did have to

2695
01:50:39,750 --> 01:50:37,040
sleep shift they they took about a 60

2696
01:50:42,070 --> 01:50:39,760
hour nap outside of their

2697
01:50:44,229 --> 01:50:42,080
normal sleep time yesterday

2698
01:50:47,109 --> 01:50:44,239
and then had their sleep overnight as

2699
01:50:48,870 --> 01:50:47,119
well waking up at about 7 45 a.m pacific

2700
01:50:51,589 --> 01:50:48,880
time this morning

2701
01:50:52,790 --> 01:50:51,599
before boarding crew dragon and coming

2702
01:50:55,430 --> 01:50:52,800
home

2703
01:50:58,709 --> 01:50:55,440
and we mentioned um

2704
01:51:00,950 --> 01:50:58,719
departure and re-entry that that process

2705
01:51:03,350 --> 01:51:00,960
can take anywhere from you know six

2706
01:51:05,270 --> 01:51:03,360
hours to 39 hours so

2707
01:51:06,870 --> 01:51:05,280
we're definitely on the lower end of the

2708
01:51:08,470 --> 01:51:06,880
duration i'm sure the crew is super

2709
01:51:10,790 --> 01:51:08,480
happy that you know instead of spending

2710
01:51:12,629 --> 01:51:10,800
39 hours although the the dragon

2711
01:51:14,950 --> 01:51:12,639
spacecraft is very cool with some really

2712
01:51:16,790 --> 01:51:14,960
cool technologies i'm sure six and a

2713
01:51:20,390 --> 01:51:16,800

half hours is the preferred duration

2714
01:51:22,390 --> 01:51:20,400
over 39 hours and again they do have we

2715
01:51:25,350 --> 01:51:22,400
are again monitoring weather

2716
01:51:27,189 --> 01:51:25,360
in the event that we do need to uh wave

2717
01:51:30,229 --> 01:51:27,199
off today's um

2718
01:51:33,270 --> 01:51:30,239
uh return they do have enough food and

2719
01:51:35,430 --> 01:51:33,280
water up there to last three days and

2720
01:51:38,070 --> 01:51:35,440
you know sort of retarget another

2721
01:51:40,550 --> 01:51:38,080
landing in that in that time period so

2722
01:51:42,070 --> 01:51:40,560
even though things continue to look good

2723
01:51:44,629 --> 01:51:42,080
and as

2724
01:51:46,070 --> 01:51:44,639
steve stitch had said earlier the winds

2725
01:51:47,910 --> 01:51:46,080
are about three miles an hour at the

2726
01:51:50,790 --> 01:51:47,920
primary landing site and

2727
01:51:53,830 --> 01:51:50,800
the seas are uh in a glass light state

2728
01:51:55,430 --> 01:51:53,840
so waves are just about one feet tall

2729
01:51:57,270 --> 01:51:55,440
uh pretty much ideal conditions things

2730
01:51:59,990 --> 01:51:57,280
continue to look good uh but you know

2731
01:52:02,629 --> 01:52:00,000
weather is weather so um in the event

2732
01:52:04,790 --> 01:52:02,639
that things do shift the we do have some

2733
01:52:06,070 --> 01:52:04,800
um you know potential alternate paths

2734
01:52:08,550 --> 01:52:06,080
that the crew could take and there are

2735
01:52:11,270 --> 01:52:08,560
supplies on board the dragon spacecraft

2736
01:52:13,830 --> 01:52:11,280
for them to um you know be fine uh while

2737
01:52:15,750 --> 01:52:13,840
orbiting the earth for that duration

2738
01:52:17,750 --> 01:52:15,760

next question is from james do they keep

2739
01:52:19,990 --> 01:52:17,760
a medical person continuously on the

2740
01:52:21,830 --> 01:52:20,000
space station uh and you can ask these

2741
01:52:24,310 --> 01:52:21,840
questions with the hashtag launchamerica

2742
01:52:26,310 --> 01:52:24,320
if you're on twitter and i'm sure that

2743
01:52:28,950 --> 01:52:26,320
they would love to have a medical person

2744
01:52:30,550 --> 01:52:28,960
continuously on the space station but

2745
01:52:32,550 --> 01:52:30,560
that's that's just not the case

2746
01:52:34,790 --> 01:52:32,560
unfortunately however they do have

2747
01:52:36,550 --> 01:52:34,800
constant communications with the ground

2748
01:52:39,270 --> 01:52:36,560
as we mentioned uh mission control is

2749
01:52:40,790 --> 01:52:39,280
staffed 365 days a year and part of

2750
01:52:42,870 --> 01:52:40,800
those times we have a flight surgeon in

2751
01:52:44,629 --> 01:52:42,880
the room and they are always on call if

2752
01:52:46,149 --> 01:52:44,639
the crew were to need to speak with

2753
01:52:48,550 --> 01:52:46,159
someone so

2754
01:52:50,950 --> 01:52:48,560
they have all had training for various

2755
01:52:53,189 --> 01:52:50,960
medical conditions but there is not a

2756
01:52:54,870 --> 01:52:53,199
specific designated medical person on

2757
01:52:57,030 --> 01:52:54,880
board

2758
01:52:59,830 --> 01:52:57,040
as we did see though

2759
01:53:02,070 --> 01:52:59,840
maurer who's flying this fall was a

2760
01:53:03,990 --> 01:53:02,080
medical doctor first and so uh

2761
01:53:05,189 --> 01:53:04,000
essentially that is like having a doctor

2762
01:53:07,030 --> 01:53:05,199
on board

2763
01:53:09,189 --> 01:53:07,040

um

2764
01:53:10,390 --> 01:53:09,199
the each of the astronauts do get

2765
01:53:11,750 --> 01:53:10,400
assigned

2766
01:53:13,750 --> 01:53:11,760
you know specific medical staff for

2767
01:53:14,870 --> 01:53:13,760
their duration and their mission so you

2768
01:53:17,270 --> 01:53:14,880
know when we're talking about the

2769
01:53:19,109 --> 01:53:17,280
private medical conferences or the pmcs

2770
01:53:22,070 --> 01:53:19,119
that they that all the astronauts have

2771
01:53:23,669 --> 01:53:22,080
regularly um it is in the same person so

2772
01:53:26,790 --> 01:53:23,679
they they can assess their health from

2773
01:53:28,629 --> 01:53:26,800
you know last week to uh for to now and

2774
01:53:29,830 --> 01:53:28,639
and so on and so forth to make sure that

2775
01:53:32,310 --> 01:53:29,840
you know there aren't any negative

2776
01:53:34,229 --> 01:53:32,320
trends and and they can be treated um if

2777
01:53:35,990 --> 01:53:34,239
needed appropriately

2778
01:53:38,629 --> 01:53:36,000
and i just misspoke i have to correct

2779
01:53:40,629 --> 01:53:38,639
myself it was uh tom marshburn is the

2780
01:53:43,030 --> 01:53:40,639
medical doctor so

2781
01:53:45,430 --> 01:53:43,040
yeah that is quite nice to um

2782
01:53:47,830 --> 01:53:45,440
sort of uh

2783
01:53:48,550 --> 01:53:47,840
be an astronaut and also be a doctor

2784
01:53:50,470 --> 01:53:48,560
right

2785
01:53:51,270 --> 01:53:50,480
very accomplished people

2786
01:53:53,430 --> 01:53:51,280
um

2787
01:53:54,950 --> 01:53:53,440
i would probably ask too many questions

2788
01:53:56,390 --> 01:53:54,960

though always thinking there's something

2789
01:53:59,030 --> 01:53:56,400
wrong with me when it's just normal

2790
01:54:03,830 --> 01:54:01,350
so again we are about five minutes away

2791
01:54:05,510 --> 01:54:03,840
from the fourth and final departure burn

2792
01:54:07,830 --> 01:54:05,520
it's called departure burn three but it

2793
01:54:10,709 --> 01:54:07,840
is the fourth burn it will place the

2794
01:54:13,189 --> 01:54:10,719
dragon spacecraft roughly coalitic with

2795
01:54:15,030 --> 01:54:13,199
the international space station about 10

2796
01:54:17,189 --> 01:54:15,040
kilometers lower than it the entire way

2797
01:54:19,669 --> 01:54:17,199
around the earth and then a few hours

2798
01:54:21,189 --> 01:54:19,679
after that we'll have

2799
01:54:24,550 --> 01:54:21,199
claw separation

2800
01:54:27,109 --> 01:54:24,560
trunk uh separation and then

2801
01:54:30,070 --> 01:54:27,119
the uh deorbit burn which is a beefy

2802
01:54:32,070 --> 01:54:30,080
burn lasting 16 minutes these these

2803
01:54:33,589 --> 01:54:32,080
departure burns that we've had have been

2804
01:54:35,510 --> 01:54:33,599
sub one minute and i think this last

2805
01:54:36,470 --> 01:54:35,520
one's the longest with just being one

2806
01:54:37,830 --> 01:54:36,480
second

2807
01:54:40,070 --> 01:54:37,840
over a minute

2808
01:54:43,270 --> 01:54:40,080
but that deorbit burn to get us

2809
01:54:45,510 --> 01:54:43,280
back to earth's atmosphere will be 16

2810
01:54:49,830 --> 01:54:45,520
over 16 minutes and that burn should

2811
01:54:50,790 --> 01:54:49,840
begin at 1103 pacific time

2812
01:54:55,910 --> 01:54:50,800
that's

2813
01:54:59,830 --> 01:54:58,310

we have another question

2814
01:55:01,510 --> 01:54:59,840
do the astronauts have different

2815
01:55:02,870 --> 01:55:01,520
spacesuits for different scenarios or is

2816
01:55:05,189 --> 01:55:02,880
it just one suit

2817
01:55:07,430 --> 01:55:05,199
i love this question because i

2818
01:55:09,189 --> 01:55:07,440
i just love the spacesuits and

2819
01:55:11,270 --> 01:55:09,199
we've seen those really sleek suits that

2820
01:55:13,109 --> 01:55:11,280
are now in the seats of crew dragon

2821
01:55:15,109 --> 01:55:13,119
resilience on their way home the crew

2822
01:55:18,470 --> 01:55:15,119
wears those for dynamic phases of the

2823
01:55:21,990 --> 01:55:18,480
operation like launch docking undocking

2824
01:55:24,149 --> 01:55:22,000
and return to earth and so uh those can

2825
01:55:26,470 --> 01:55:24,159
protect the astronauts in case of a fire

2826
01:55:27,510 --> 01:55:26,480
they also provide communications and

2827
01:55:30,310 --> 01:55:27,520
cooling

2828
01:55:31,589 --> 01:55:30,320
to the suits as well as they can protect

2829
01:55:33,750 --> 01:55:31,599
the astronauts in the event of a

2830
01:55:35,430 --> 01:55:33,760
depressurization but they are different

2831
01:55:36,950 --> 01:55:35,440
than the suits that we would use on a

2832
01:55:39,189 --> 01:55:36,960
spacewalk and that some of those crew

2833
01:55:41,669 --> 01:55:39,199
members did use on a spacewalk those are

2834
01:55:43,109 --> 01:55:41,679
the bulkier the bigger white suits that

2835
01:55:45,990 --> 01:55:43,119
you're used to seeing those are extra

2836
01:55:48,629 --> 01:55:46,000
vehicular mobility units or emus and

2837
01:55:51,030 --> 01:55:48,639
those are specifically designed for long

2838
01:55:52,870 --> 01:55:51,040

durations outside of the international

2839
01:55:54,870 --> 01:55:52,880
space station they serve essentially as

2840
01:55:56,629 --> 01:55:54,880
their own little spacecraft

2841
01:55:59,510 --> 01:55:56,639
and so those cannot be used

2842
01:56:00,550 --> 01:55:59,520
interchangeably but both have very vital

2843
01:56:03,030 --> 01:56:00,560
purposes

2844
01:56:04,709 --> 01:56:03,040
yeah the um spacesuits that you saw the

2845
01:56:07,589 --> 01:56:04,719
astronauts getting out of and i guess

2846
01:56:10,070 --> 01:56:07,599
getting in to they're all custom made

2847
01:56:12,709 --> 01:56:10,080
for each of the astronauts and designed

2848
01:56:14,229 --> 01:56:12,719
and created in-house here at spacex they

2849
01:56:17,109 --> 01:56:14,239
are a one-piece suit everything is

2850
01:56:18,470 --> 01:56:17,119
integrated from the gloves the boots and

2851
01:56:22,149 --> 01:56:18,480
the helmet

2852
01:56:24,870 --> 01:56:22,159
so the astronauts basically uh go into

2853
01:56:27,109 --> 01:56:24,880
it and start zipping uh everything up

2854
01:56:28,709 --> 01:56:27,119
and then there is an umbilical that is

2855
01:56:31,030 --> 01:56:28,719
on the right

2856
01:56:34,070 --> 01:56:31,040
leg that will connect the suit with

2857
01:56:37,109 --> 01:56:34,080
communications electronics and also

2858
01:56:39,350 --> 01:56:37,119
send gases and nitrox to

2859
01:56:41,189 --> 01:56:39,360
the suit to make it a habitable

2860
01:56:43,750 --> 01:56:41,199
habitable and comfortable environment

2861
01:56:46,229 --> 01:56:43,760
for the astronauts again as leah

2862
01:56:49,589 --> 01:56:46,239
mentioned if there is a depressurization

2863
01:56:52,070 --> 01:56:49,599

event the suit has a sort of flame

2864
01:56:53,109 --> 01:56:52,080
retardant is flame retardant and can

2865
01:56:57,910 --> 01:56:53,119
also

2866
01:57:01,430 --> 01:56:59,589
brian asks if the crew is having

2867
01:57:03,030 --> 01:57:01,440
anything to eat before they return or do

2868
01:57:05,510 --> 01:57:03,040
they eat afterward

2869
01:57:07,430 --> 01:57:05,520
they have just had their only scheduled

2870
01:57:08,950 --> 01:57:07,440
meal on crew dragon they do have

2871
01:57:11,109 --> 01:57:08,960
multiple meals there and they have some

2872
01:57:13,510 --> 01:57:11,119
snacks as well and later on tonight we

2873
01:57:16,790 --> 01:57:13,520
may hear them call up or call down to

2874
01:57:18,550 --> 01:57:16,800
the crew here in hawthorne exactly what

2875
01:57:20,709 --> 01:57:18,560
they maybe uh

2876
01:57:22,390 --> 01:57:20,719
ate or where they got it from in the

2877
01:57:25,669 --> 01:57:22,400
castle everything is very carefully

2878
01:57:27,350 --> 01:57:25,679
tracked and once they return i am sure

2879
01:57:29,189 --> 01:57:27,360
that they have already let their friends

2880
01:57:32,470 --> 01:57:29,199
and family know what they would like to

2881
01:57:34,470 --> 01:57:32,480
eat first uh having been stuck on the

2882
01:57:36,629 --> 01:57:34,480
space station uh

2883
01:57:38,870 --> 01:57:36,639
menu for the past six months so they've

2884
01:57:40,470 --> 01:57:38,880
got a lot of good stuff up there but

2885
01:57:43,189 --> 01:57:40,480
some things are a little harder to get

2886
01:57:45,350 --> 01:57:43,199
like maybe a fresh salad or uh fruit

2887
01:57:47,750 --> 01:57:45,360
comes up every now and then but

2888
01:57:49,510 --> 01:57:47,760

although i did see they they do grow

2889
01:57:52,629 --> 01:57:49,520
quite a bit of their own plants and

2890
01:57:57,910 --> 01:57:55,270
when the crew 2 astronauts were going up

2891
01:57:59,750 --> 01:57:57,920
and they were taking inventory uh i

2892
01:58:01,990 --> 01:57:59,760
remember most of the snacks were

2893
01:58:03,270 --> 01:58:02,000
depleted so i'm very curious what snacks

2894
01:58:07,189 --> 01:58:03,280
they brought on board because it seems

2895
01:58:11,270 --> 01:58:08,950
yeah they have plenty of food

2896
01:58:12,870 --> 01:58:11,280
in case they need to be in orbit for

2897
01:58:13,910 --> 01:58:12,880
longer than you know what is planned

2898
01:58:15,910 --> 01:58:13,920
today

2899
01:58:18,149 --> 01:58:15,920
so the astronauts are cozy up there with

2900
01:58:20,950 --> 01:58:18,159
plenty of resources

2901
01:58:22,550 --> 01:58:20,960
we are coming up on depart burn three uh

2902
01:58:25,189 --> 01:58:22,560
despite the name it is the fourth of

2903
01:58:28,070 --> 01:58:25,199
these depart burns today and the final

2904
01:58:31,189 --> 01:58:28,080
of these departments looking at that at

2905
01:58:33,669 --> 01:58:31,199
7 14 pm pacific time this will be the

2906
01:58:37,990 --> 01:58:33,679
longest depart burn we've seen so far

2907
01:58:40,629 --> 01:58:38,000
should last 61 seconds

2908
01:58:42,629 --> 01:58:40,639
and again this is using a combination of

2909
01:58:44,470 --> 01:58:42,639
different thrusters on board dragon it's

2910
01:58:45,910 --> 01:58:44,480
got those service section as well as

2911
01:58:49,030 --> 01:58:45,920
forward

2912
01:58:50,790 --> 01:58:49,040
bulkhead thrusters and it just continues

2913
01:58:53,109 --> 01:58:50,800

to take dragon and put it in the

2914
01:58:55,589 --> 01:58:53,119
trajectory necessary to

2915
01:58:57,030 --> 01:58:55,599
splash down later tonight or early

2916
01:58:59,589 --> 01:58:57,040
tomorrow morning if you're on the east

2917
01:59:07,109 --> 01:58:59,599
coast uh just off the coast of panama

2918
01:59:10,390 --> 01:59:08,550
so the crew members are not in their

2919
01:59:12,870 --> 01:59:10,400
seats for this they they may not even

2920
01:59:15,109 --> 01:59:12,880
know that the burn has happened uh that

2921
01:59:16,470 --> 01:59:15,119
they may hear a call from the crew or

2922
01:59:18,310 --> 01:59:16,480
from the core i should say the crew

2923
01:59:20,550 --> 01:59:18,320
operations and resource engineer to let

2924
01:59:22,229 --> 01:59:20,560
them know what's going on

2925
01:59:24,870 --> 01:59:22,239
and it's just been

2926
01:59:26,790 --> 01:59:24,880
um over an hour and a half since we've

2927
01:59:28,709 --> 01:59:26,800
undocked from the international space

2928
01:59:30,470 --> 01:59:28,719
station and it sure does feel like a lot

2929
01:59:31,750 --> 01:59:30,480
of events have happened

2930
01:59:34,550 --> 01:59:31,760
um

2931
01:59:35,910 --> 01:59:34,560
you know the primary uh

2932
01:59:38,629 --> 01:59:35,920
sort of function for the dragon was to

2933
01:59:40,470 --> 01:59:38,639
make sure that it was clear of the

2934
01:59:42,870 --> 01:59:40,480
international space station and wouldn't

2935
01:59:44,149 --> 01:59:42,880
put itself into a cross orbit

2936
01:59:45,430 --> 01:59:44,159
but you know now we're finishing the

2937
01:59:46,629 --> 01:59:45,440
fourth burn

2938
01:59:48,950 --> 01:59:46,639

in about

2939
01:59:50,550 --> 01:59:48,960
an hour here the astronauts will put

2940
01:59:52,390 --> 01:59:50,560
their suits back on

2941
01:59:56,070 --> 01:59:52,400
and do some leak checks and then start

2942
01:59:58,390 --> 01:59:56,080
to prepare for de-orbit and uh eventual

2943
02:00:00,870 --> 01:59:58,400
rendezvous and return back to earth and

2944
02:00:03,030 --> 02:00:00,880
depart burn 3 is underway

2945
02:00:05,510 --> 02:00:03,040
and we are waiting for a confirmation of

2946
02:00:08,950 --> 02:00:05,520
a successful burn the fourth and final

2947
02:00:18,629 --> 02:00:08,960
to part burn this evening

2948
02:00:23,510 --> 02:00:21,830
okay and resilience copies nominal burn

2949
02:00:25,830 --> 02:00:23,520
and that went a little bit longer than

2950
02:00:27,830 --> 02:00:25,840
expected that was uh that was what you

2951
02:00:30,550 --> 02:00:27,840
guys were expecting huh

2952
02:00:30,560 --> 02:00:37,990
yep that was just as we expected

2953
02:00:38,000 --> 02:00:54,229
okay

2954
02:00:59,030 --> 02:00:56,470
as we mentioned that fourth to part burn

2955
02:01:01,430 --> 02:00:59,040
department three as it as no as it is

2956
02:01:02,950 --> 02:01:01,440
known uh having been completed and the

2957
02:01:04,950 --> 02:01:02,960
crew confirming that it lasted a little

2958
02:01:07,430 --> 02:01:04,960
bit longer than was initially planned

2959
02:01:09,109 --> 02:01:07,440
and that is crew dragon knowing exactly

2960
02:01:10,950 --> 02:01:09,119
how long the burn needs to be to put us

2961
02:01:13,750 --> 02:01:10,960
in the proper position for our deorbit

2962
02:01:15,910 --> 02:01:13,760
burn coming later tonight but everything

2963
02:01:18,629 --> 02:01:15,920

has continued on schedule

2964
02:01:20,870 --> 02:01:18,639
flawlessly for crew dragons so far today

2965
02:01:22,870 --> 02:01:20,880
that burn specifically circularizes

2966
02:01:24,950 --> 02:01:22,880
dragon's orbit putting it in a roughly

2967
02:01:27,510 --> 02:01:24,960
coalitic orbit with the station

2968
02:01:31,430 --> 02:01:27,520
approximately 10 kilometers lower and at

2969
02:01:32,950 --> 02:01:31,440
an altitude so it should be the same uh

2970
02:01:34,870 --> 02:01:32,960
same orbit as the space station all the

2971
02:01:37,830 --> 02:01:34,880
way around the earth rather than at

2972
02:01:39,669 --> 02:01:37,840
perigee or apogee a specific distance

2973
02:01:41,510 --> 02:01:39,679
the next major event is suit donning

2974
02:01:45,270 --> 02:01:41,520
that's coming up in about an hour and 15

2975
02:01:47,589 --> 02:01:45,280
minutes at 8 30 pm pacific time

2976
02:01:48,550 --> 02:01:47,599
and we will be live with you all the way

2977
02:01:52,149 --> 02:01:48,560
from

2978
02:01:53,510 --> 02:01:52,159
through splashdown and recovery so

2979
02:01:55,270 --> 02:01:53,520
please stick around keep sending in

2980
02:02:26,629 --> 02:01:55,280
those questions with the hashtag launch

2981
02:02:31,510 --> 02:02:29,189
dragon spacex

2982
02:02:33,270 --> 02:02:31,520
on dragon to ground manual control of

2983
02:02:47,830 --> 02:02:33,280
cabin temperature is about to be