1
00:08:35,190 --> 00:08:28,790
dragon is in countdown

2
00:09:00,630 --> 00:08:37,990
dragon spacex go for launch

3
00:09:02,870 --> 00:09:00,640
[Music]

4
00:09:05,269 --> 00:09:02,880
for about 24 minutes and counting from

5
00:09:07,990 --> 00:09:05,279
liftoff of this falcon 9 rocket for

6
00:09:10,070 --> 00:09:08,000
nasa's and spacex's 25th commercial

7
00:09:12,070 --> 00:09:10,080
resupply services mission the dragon

8
00:09:15,110 --> 00:09:12,080
spacecraft you see there will fly more

9
00:09:17,110 --> 00:09:15,120
than 5 800 pounds of science supplies

10
00:09:19,350 --> 00:09:17,120
and food for the astronauts aboard the

11
00:09:21,030 --> 00:09:19,360
international space station

12
00:09:23,829 --> 00:09:21,040
good evening and thank you for joining

13
00:09:26,230 --> 00:09:23,839

me for live launch coverage of crs 25

14
00:09:28,550 --> 00:09:26,240
i'm megan cruz you just saw falcon 9 and

15
00:09:30,870 --> 00:09:28,560
dragon on launch complex 39a here right

16
00:09:32,790 --> 00:09:30,880
behind me at kennedy space center

17
00:09:35,590 --> 00:09:32,800
fueling began about 10 minutes ago and

18
00:09:38,870 --> 00:09:35,600
we have an instantaneous opportunity to

19
00:09:41,030 --> 00:09:38,880
launch at 8 44 pm eastern time

20
00:09:43,190 --> 00:09:41,040
these resupply missions are important so

21
00:09:45,509 --> 00:09:43,200
nasa and its international partners can

22
00:09:47,590 --> 00:09:45,519
continue to conduct microgravity

23
00:09:49,670 --> 00:09:47,600
research aboard the space station over

24
00:09:51,430 --> 00:09:49,680
the last 21 years thousands of

25
00:09:53,910 --> 00:09:51,440
experiments have led to scientific

26
00:09:55,750 --> 00:09:53,920
advancements right here on earth

27
00:09:57,509 --> 00:09:55,760
today more than two dozen experiments

28
00:09:59,509 --> 00:09:57,519
including some that will study earth's

29
00:10:01,670 --> 00:09:59,519
climate are packed away in dragon

30
00:10:03,509 --> 00:10:01,680
awaiting launch let's go now to spacex

31
00:10:05,430 --> 00:10:03,519
headquarters in hawthorne california

32
00:10:07,750 --> 00:10:05,440
where we have shiva bhavadvaj to tell us

33
00:10:09,670 --> 00:10:07,760
more about this mission which shiva nasa

34
00:10:12,870 --> 00:10:09,680
and spacex were initially targeting last

35
00:10:16,710 --> 00:10:14,710
thanks megan it's great to be covering

36
00:10:18,470 --> 00:10:16,720
today's mission in partnership with nasa

37
00:10:20,790 --> 00:10:18,480
and like you just said we spent the last

38
00:10:23,190 --> 00:10:20,800

few weeks working through an issue on

39
00:10:25,590 --> 00:10:23,200
dragon after teams discovered a small

40
00:10:27,190 --> 00:10:25,600
vapor leak since then we've completed

41
00:10:28,710 --> 00:10:27,200
thorough inspections and replaced the

42
00:10:30,949 --> 00:10:28,720
components that could have been degraded

43
00:10:32,470 --> 00:10:30,959
by exposure to this vapor and we've been

44
00:10:34,710 --> 00:10:32,480
working hand in hand with nasa

45
00:10:36,230 --> 00:10:34,720
throughout the process and now we're

46
00:10:38,310 --> 00:10:36,240
ready to launch

47
00:10:40,870 --> 00:10:38,320
this year also is the 10-year

48
00:10:42,790 --> 00:10:40,880
anniversary of dragon becoming the first

49
00:10:44,710 --> 00:10:42,800
private spacecraft in history to visit

50
00:10:46,870 --> 00:10:44,720
the international space station deliver

51
00:10:48,630 --> 00:10:46,880
cargo and then return to earth five

52
00:10:51,030 --> 00:10:48,640
years ago was our first reflight of a

53
00:10:53,350 --> 00:10:51,040
dragon on the crs 11 mission and since

54
00:10:56,470 --> 00:10:53,360
then we've made 31 flights to the space

55
00:10:58,230 --> 00:10:56,480
station with 14 reflights of dragon

56
00:11:01,110 --> 00:10:58,240
today's mission adds to that tally and

57
00:11:03,269 --> 00:11:01,120
will mark spacex's 30th launch of 2022

58
00:11:04,949 --> 00:11:03,279
it'll also mark our third dragon flight

59
00:11:08,150 --> 00:11:04,959
this year following the crude launches

60
00:11:11,110 --> 00:11:08,160
of axiom 1 and crew 4 back in april

61
00:11:13,110 --> 00:11:11,120
now on screen is our falcon 9 rocket and

62
00:11:15,670 --> 00:11:13,120
the dragon spacecraft sitting at the

63
00:11:17,910 --> 00:11:15,680

very top the capsule flying today is our

64
00:11:19,910 --> 00:11:17,920
first third flight of a new cargo dragon

65
00:11:23,269 --> 00:11:19,920
which previously previously supported

66
00:11:25,269 --> 00:11:23,279
the crs 21 and 23 missions last year now

67
00:11:27,190 --> 00:11:25,279
this version of dragon is certified for

68
00:11:28,949 --> 00:11:27,200
up to five flights it'll be joining the

69
00:11:30,790 --> 00:11:28,959
crew 4 spacecraft which is currently

70
00:11:33,590 --> 00:11:30,800
docked at the station

71
00:11:35,350 --> 00:11:33,600
moving down is our falcon 9 our reusable

72
00:11:37,110 --> 00:11:35,360
two-stage rocket it's actually two

73
00:11:39,030 --> 00:11:37,120
rockets in one that lower part is called

74
00:11:41,350 --> 00:11:39,040
the first stage the upper the second

75
00:11:43,269 --> 00:11:41,360
stage today's falcon 9 will be flying

76
00:11:45,829 --> 00:11:43,279
for its fifth time and as that name

77
00:11:48,470 --> 00:11:45,839
suggests falcon 9 has nine merlin 1d

78
00:11:49,990 --> 00:11:48,480
engines at the bottom of the first stage

79
00:11:51,509 --> 00:11:50,000
they are what accelerate the vehicle

80
00:11:53,829 --> 00:11:51,519
through the earth's atmosphere

81
00:11:55,509 --> 00:11:53,839
atmosphere and to those various orbits

82
00:11:57,030 --> 00:11:55,519
in space and we've got a great photo of

83
00:11:59,509 --> 00:11:57,040
those nine engines before we roll them

84
00:12:00,870 --> 00:11:59,519
out to the pad on tuesday morning

85
00:12:02,710 --> 00:12:00,880
we're going to be attempting to recover

86
00:12:04,949 --> 00:12:02,720
this first stage on our drone ship named

87
00:12:06,710 --> 00:12:04,959
a shortfall of gravitas which is off the

88
00:12:07,990 --> 00:12:06,720

coast of florida out in the atlantic

89
00:12:11,269 --> 00:12:08,000
ocean

90
00:12:13,750 --> 00:12:11,279
now above the black inner stage of our

91
00:12:15,750 --> 00:12:13,760
first stage is the second stage the

92
00:12:17,590 --> 00:12:15,760
stages separate about two and a half

93
00:12:19,990 --> 00:12:17,600
minutes into the flight and then that

94
00:12:22,069 --> 00:12:20,000
second stage ignites its merlin vacuum

95
00:12:24,150 --> 00:12:22,079
engine to carry dragon to the targeted

96
00:12:25,430 --> 00:12:24,160
orbit a little later on in the show

97
00:12:27,670 --> 00:12:25,440
we're going to talk about how dragon

98
00:12:29,190 --> 00:12:27,680
navigates to the station after we

99
00:12:31,509 --> 00:12:29,200
separate from falcon but for now i'm

100
00:12:33,430 --> 00:12:31,519
going to turn it back over to you megan

101
00:12:35,350 --> 00:12:33,440
sounds good shiva thank you in addition

102
00:12:37,110 --> 00:12:35,360
to spacex nasa teams both here in

103
00:12:38,870 --> 00:12:37,120
florida and houston are monitoring

104
00:12:40,629 --> 00:12:38,880
today's launch you'll hear from sandra

105
00:12:42,470 --> 00:12:40,639
jones who you see in there inside with

106
00:12:43,910 --> 00:12:42,480
mission control in houston but first

107
00:12:45,190 --> 00:12:43,920
let's check in with daryl nail who's

108
00:12:47,350 --> 00:12:45,200
monitoring the launch team here at

109
00:12:49,829 --> 00:12:47,360
kennedy daryl yeah thanks megan

110
00:12:52,790 --> 00:12:49,839
everything looking good so far here from

111
00:12:55,430 --> 00:12:52,800
hangar ae at the space force

112
00:12:57,110 --> 00:12:55,440
side of things you can see behind me the

113
00:12:58,870 --> 00:12:57,120

data and telemetry flow through this

114
00:13:00,870 --> 00:12:58,880
building we're happy to be here and

115
00:13:02,870 --> 00:13:00,880
appreciate them having us here out to

116
00:13:05,110 --> 00:13:02,880
the rocket we go and you can see it is

117
00:13:09,430 --> 00:13:05,120
twilight here on the eastern coast of

118
00:13:11,590 --> 00:13:09,440
florida at historic launch complex 39 a

119
00:13:13,509 --> 00:13:11,600
you can see the rocket is being tanked

120
00:13:17,590 --> 00:13:13,519
the launch director gave the go around

121
00:13:19,509 --> 00:13:17,600
806 pm for tanking to begin and that rp1

122
00:13:21,430 --> 00:13:19,519
is now flowing into the first stage and

123
00:13:23,590 --> 00:13:21,440
the second stage along with the liquid

124
00:13:26,069 --> 00:13:23,600
oxygen which you can see

125
00:13:27,910 --> 00:13:26,079
along the rocket the center part of the

126
00:13:30,069 --> 00:13:27,920
first stage you can kind of see the fill

127
00:13:31,829 --> 00:13:30,079
line where it's at at the part that's

128
00:13:33,430 --> 00:13:31,839
chilling we do have a

129
00:13:34,550 --> 00:13:33,440
small issue with the weather we're

130
00:13:36,790 --> 00:13:34,560
currently

131
00:13:39,430 --> 00:13:36,800
70 percent go but the launch weather

132
00:13:41,350 --> 00:13:39,440
officer for the space force briefed the

133
00:13:42,790 --> 00:13:41,360
spacex's launch team about this right

134
00:13:44,870 --> 00:13:42,800
here you can see

135
00:13:47,910 --> 00:13:44,880
this is some weather imagery that we

136
00:13:50,790 --> 00:13:47,920
have here storms are bubbling up really

137
00:13:53,269 --> 00:13:50,800
heavy along the center part of the state

138
00:13:54,790 --> 00:13:53,279

you can see it's all pushing to the west

139
00:13:57,430 --> 00:13:54,800
which is good because there's some

140
00:13:59,509 --> 00:13:57,440
easterly flow however

141
00:14:02,389 --> 00:13:59,519
the space force is able to monitor

142
00:14:04,550 --> 00:14:02,399
what's called an outflow boundary

143
00:14:07,189 --> 00:14:04,560
that is coming back to the east and is

144
00:14:09,509 --> 00:14:07,199
scheduled to be here at the launch site

145
00:14:11,509 --> 00:14:09,519
right around t zero so as you can see

146
00:14:14,790 --> 00:14:11,519
from the graphic on your screen they're

147
00:14:16,870 --> 00:14:14,800
holding the percentage go at 70 percent

148
00:14:18,230 --> 00:14:16,880
normally this time it would uh be a

149
00:14:19,910 --> 00:14:18,240
little bit uh

150
00:14:21,829 --> 00:14:19,920
higher but they're going to hold it at

151
00:14:23,590 --> 00:14:21,839
70 percent the concerns are cumulus

152
00:14:26,470 --> 00:14:23,600
cloud rule and flight through

153
00:14:28,069 --> 00:14:26,480
precipitation winds are 15 to 20 miles

154
00:14:30,389 --> 00:14:28,079
per hour other than that we're looking

155
00:14:35,990 --> 00:14:30,399
good to go and let's head out to jsc in

156
00:14:40,389 --> 00:14:38,389
good evening i'm nasa's sandra jones

157
00:14:42,230 --> 00:14:40,399
here inside the international space

158
00:14:44,710 --> 00:14:42,240
station flight control room at the

159
00:14:46,790 --> 00:14:44,720
johnson space center in houston texas

160
00:14:49,430 --> 00:14:46,800
mission control houston is the nerve

161
00:14:51,750 --> 00:14:49,440
center for space station operations and

162
00:14:53,350 --> 00:14:51,760
our flight control team is on console

163
00:14:54,230 --> 00:14:53,360

and ready to support today's cargo

164
00:14:55,829 --> 00:14:54,240
launch

165
00:14:57,829 --> 00:14:55,839
leading the team in mission control

166
00:15:00,230 --> 00:14:57,839
during today's launch is nasa flight

167
00:15:01,670 --> 00:15:00,240
director scott stover

168
00:15:03,509 --> 00:15:01,680
you see him there on your screen right

169
00:15:05,910 --> 00:15:03,519
there and when dragon arrives to the

170
00:15:08,069 --> 00:15:05,920
international space station on saturday

171
00:15:10,069 --> 00:15:08,079
it will dock to the station's forward

172
00:15:12,550 --> 00:15:10,079
port of the harmony module

173
00:15:14,550 --> 00:15:12,560
nasa astronauts bob hines and jessica

174
00:15:15,590 --> 00:15:14,560
watkins will be on tap to monitor that

175
00:15:17,910 --> 00:15:15,600
approach

176
00:15:19,590 --> 00:15:17,920
dragon is slated to spend about one

177
00:15:21,990 --> 00:15:19,600
month attached to the international

178
00:15:24,550 --> 00:15:22,000
space station before it returns to earth

179
00:15:27,189 --> 00:15:24,560
with research and return cargo and

180
00:15:29,590 --> 00:15:27,199
splashes down off the coast of florida

181
00:15:31,509 --> 00:15:29,600
for now everything continuing to look

182
00:15:33,910 --> 00:15:31,519
good on the station side for today's

183
00:15:35,990 --> 00:15:33,920
launch so back over to you megan

184
00:15:38,150 --> 00:15:36,000
think it about sandra before that daryl

185
00:15:40,870 --> 00:15:38,160
we are now about 17 minutes and counting

186
00:15:42,550 --> 00:15:40,880
from liftoff of crs 25 let's check out

187
00:15:44,480 --> 00:15:42,560
some of the science flying on this

188
00:16:36,910 --> 00:15:44,490

mission

189
00:17:47,590 --> 00:17:45,750
[Music]

190
00:17:49,350 --> 00:17:47,600
a lot of impactful research going up

191
00:17:50,789 --> 00:17:49,360
with today's launch and let's take a

192
00:17:52,630 --> 00:17:50,799
closer look at some of those that you

193
00:17:55,430 --> 00:17:52,640
saw in that video starting first with

194
00:17:57,830 --> 00:17:55,440
emit which stands for earth surface

195
00:17:59,510 --> 00:17:57,840
mineral dust source investigation

196
00:18:01,830 --> 00:17:59,520
joining me now is emits principal

197
00:18:04,549 --> 00:18:01,840
investigator rob green and we also have

198
00:18:06,150 --> 00:18:04,559
nasa's senior climate advisor dr kate

199
00:18:08,070 --> 00:18:06,160
calvin great to have you here wonderful

200
00:18:11,029 --> 00:18:08,080
to be here perfect so let's take a look

201
00:18:13,430 --> 00:18:11,039
at some video of emit rob so emit is

202
00:18:15,270 --> 00:18:13,440
going to be attached to the outside of

203
00:18:17,190 --> 00:18:15,280
the space station and it's going to

204
00:18:19,110 --> 00:18:17,200
study mineral dust but what is mineral

205
00:18:21,590 --> 00:18:19,120
dust so mineral dust are the tiny

206
00:18:22,950 --> 00:18:21,600
particles of rocks in the dry land

207
00:18:25,190 --> 00:18:22,960
regions of our planet that under

208
00:18:27,270 --> 00:18:25,200
conditions of high winds are launched

209
00:18:28,230 --> 00:18:27,280
into the atmosphere in the atmosphere

210
00:18:30,789 --> 00:18:28,240
because they can be different

211
00:18:32,870 --> 00:18:30,799
composition they can heat or cool our

212
00:18:35,510 --> 00:18:32,880
planet play a role in cloud formation

213
00:18:37,909 --> 00:18:35,520

and many other impacts right now we know

214
00:18:39,029 --> 00:18:37,919
about mineral dust by about 5 000

215
00:18:41,110 --> 00:18:39,039
different measurements that have been

216
00:18:43,510 --> 00:18:41,120
analyzed around the earth when emit is

217
00:18:45,430 --> 00:18:43,520
done we will have a billion direct

218
00:18:48,310 --> 00:18:45,440
observations of the minerals in these

219
00:18:51,110 --> 00:18:48,320
dry land regions to advance the science

220
00:18:52,630 --> 00:18:51,120
of how mineral dust can heat or cool our

221
00:18:53,909 --> 00:18:52,640
planet and i think it's important to

222
00:18:55,590 --> 00:18:53,919
understand for people that you know

223
00:18:57,190 --> 00:18:55,600
we're not just focused on these arid

224
00:18:59,190 --> 00:18:57,200
regions when you have dust storms you

225
00:19:01,430 --> 00:18:59,200
can see a dust storm in africa end up

226
00:19:03,190 --> 00:19:01,440
affecting us in texas per se so why is

227
00:19:05,590 --> 00:19:03,200
it important to study these dust storms

228
00:19:07,830 --> 00:19:05,600
and in particular to understand how they

229
00:19:09,590 --> 00:19:07,840
might heat or cool the earth well as you

230
00:19:11,110 --> 00:19:09,600
point out it's a global phenomena on

231
00:19:13,590 --> 00:19:11,120
every continent except perhaps

232
00:19:15,669 --> 00:19:13,600
antarctica and that does can travel

233
00:19:16,789 --> 00:19:15,679
thousands of miles from africa to

234
00:19:18,950 --> 00:19:16,799
florida

235
00:19:21,350 --> 00:19:18,960
to texas and it has impacts throughout

236
00:19:22,549 --> 00:19:21,360
the earth system there and then heating

237
00:19:24,310 --> 00:19:22,559
or cooling when you have a global

238
00:19:26,150 --> 00:19:24,320

phenomenon you've got to take it into

239
00:19:28,870 --> 00:19:26,160
account are those dust particles

240
00:19:30,150 --> 00:19:28,880
absorbing energy heating our planet or

241
00:19:32,549 --> 00:19:30,160
are they scattering light back into

242
00:19:34,070 --> 00:19:32,559
space and cooling our planet so we need

243
00:19:35,669 --> 00:19:34,080
this information so that your system

244
00:19:37,669 --> 00:19:35,679
models become more accurate so we

245
00:19:39,430 --> 00:19:37,679
understand what's happening now and in

246
00:19:41,590 --> 00:19:39,440
the future and those are the two primary

247
00:19:43,830 --> 00:19:41,600
objectives of emit yeah so kate it

248
00:19:45,830 --> 00:19:43,840
sounds like emet is going to be a real

249
00:19:47,669 --> 00:19:45,840
tool for us when we're studying climate

250
00:19:49,510 --> 00:19:47,679
change and just the earth's climate and

251
00:19:52,470 --> 00:19:49,520
it's no surprise that emit is one of a

252
00:19:54,310 --> 00:19:52,480
fleet of earth-observing spacecraft yeah

253
00:19:55,830 --> 00:19:54,320
one of nasa's most important missions is

254
00:19:57,510 --> 00:19:55,840
our home planet we have more than two

255
00:19:58,950 --> 00:19:57,520
dozen satellites and instruments in

256
00:20:00,870 --> 00:19:58,960
orbit including several on the

257
00:20:02,230 --> 00:20:00,880
international space station that observe

258
00:20:05,190 --> 00:20:02,240
the earth so we can see things like

259
00:20:07,590 --> 00:20:05,200
carbon dioxide vegetation changes the

260
00:20:09,270 --> 00:20:07,600
mass of ice sheets and much more and

261
00:20:11,190 --> 00:20:09,280
once emit is put onto the international

262
00:20:13,430 --> 00:20:11,200
space station it will join that fleet

263
00:20:14,789 --> 00:20:13,440

wow and i do know that it's not just

264
00:20:16,470 --> 00:20:14,799
what we have orbiting the earth there's

265
00:20:18,230 --> 00:20:16,480
also a lot of research being done on the

266
00:20:20,549 --> 00:20:18,240
ground so when you consider this whole

267
00:20:22,630 --> 00:20:20,559
portfolio of climate research that we're

268
00:20:24,390 --> 00:20:22,640
doing how will this help us address

269
00:20:25,909 --> 00:20:24,400
climate change well the more we know

270
00:20:27,990 --> 00:20:25,919
about the planet the more we can use

271
00:20:30,230 --> 00:20:28,000
that um to provide the local decision

272
00:20:31,909 --> 00:20:30,240
makers stakeholders and the public about

273
00:20:33,190 --> 00:20:31,919
what's happening on earth

274
00:20:34,390 --> 00:20:33,200
awesome guys thank you so much i

275
00:20:35,430 --> 00:20:34,400
appreciate your time

276
00:20:37,350 --> 00:20:35,440
thank you

277
00:20:39,270 --> 00:20:37,360
and emed isn't the only experiment

278
00:20:41,590 --> 00:20:39,280
inside dragon that will study earth's

279
00:20:42,950 --> 00:20:41,600
climate students from mit

280
00:20:45,990 --> 00:20:42,960
built what you're about to see on the

281
00:20:48,230 --> 00:20:46,000
screen here this is called beaver cube

282
00:20:50,390 --> 00:20:48,240
and it's named after the school's mascot

283
00:20:52,549 --> 00:20:50,400
tim the beaver it's a small satellite

284
00:20:53,909 --> 00:20:52,559
about the size of a shoebox and once

285
00:20:56,470 --> 00:20:53,919
deployed it will measure cloud

286
00:20:58,630 --> 00:20:56,480
properties ocean surface temperatures

287
00:21:01,590 --> 00:20:58,640
and ocean color to analyze earth's

288
00:21:03,510 --> 00:21:01,600

climate and weather systems

289
00:21:06,390 --> 00:21:03,520
t-minus about 11 minutes and counting

290
00:21:08,470 --> 00:21:06,400
from liftoff of nasa's and spacex's 25th

291
00:21:10,230 --> 00:21:08,480
commercial resupply services mission to

292
00:21:11,590 --> 00:21:10,240
the international space station let's

293
00:21:15,029 --> 00:21:11,600
bring back shiva now to tell us more

294
00:21:19,029 --> 00:21:17,350
thanks megan now dragon is capable of

295
00:21:21,430 --> 00:21:19,039
transporting people as well as

296
00:21:23,510 --> 00:21:21,440
environmentally sensitive cargo to and

297
00:21:24,390 --> 00:21:23,520
from earth orbit like we are on today's

298
00:21:26,310 --> 00:21:24,400
mission

299
00:21:27,909 --> 00:21:26,320
starting from the top of the nose cone

300
00:21:30,630 --> 00:21:27,919
to the bottom of the trunk it stands

301
00:21:33,110 --> 00:21:30,640
about 27 feet tall and is made up of two

302
00:21:35,430 --> 00:21:33,120
main section sections the pressurized

303
00:21:37,350 --> 00:21:35,440
capsule and the trunk which is used for

304
00:21:39,830 --> 00:21:37,360
unpressurized cargo and supports the

305
00:21:41,990 --> 00:21:39,840
spacecraft on ascent and during on-orbit

306
00:21:44,230 --> 00:21:42,000
operations now after separating from

307
00:21:46,230 --> 00:21:44,240
falcon 9 dragon will autonomously make

308
00:21:48,630 --> 00:21:46,240
its way to the international space

309
00:21:51,510 --> 00:21:48,640
station using its navigation sensors and

310
00:21:52,870 --> 00:21:51,520
its engines the capsule has 16 draco

311
00:21:55,669 --> 00:21:52,880
engines which are used to get the

312
00:21:57,510 --> 00:21:55,679
spacecraft from one place to the next

313
00:21:59,830 --> 00:21:57,520

we've got 12 of those service section

314
00:22:02,630 --> 00:21:59,840
dracos near the bottom of the capsule

315
00:22:03,909 --> 00:22:02,640
and four near the top of the ford

316
00:22:05,990 --> 00:22:03,919
bulkhead

317
00:22:08,310 --> 00:22:06,000
underneath the nose cone those ford

318
00:22:10,149 --> 00:22:08,320
bulkhead dracos are primarily used for

319
00:22:11,750 --> 00:22:10,159
high thrust maneuvers like the orbit

320
00:22:13,830 --> 00:22:11,760
changes that we'll need to get to

321
00:22:15,909 --> 00:22:13,840
station and eventually in about a month

322
00:22:17,510 --> 00:22:15,919
to get back home to earth each of those

323
00:22:20,149 --> 00:22:17,520
thrusters are capable of generating

324
00:22:22,870 --> 00:22:20,159
about 90 pounds of force in the vacuum

325
00:22:25,350 --> 00:22:22,880
of space now the service section dracos

326
00:22:27,350 --> 00:22:25,360
are used primarily for pointing and for

327
00:22:29,590 --> 00:22:27,360
operations in proximity to the space

328
00:22:31,590 --> 00:22:29,600
station you can actually see them firing

329
00:22:33,590 --> 00:22:31,600
here in these clips taken from the

330
00:22:35,350 --> 00:22:33,600
international space station on various

331
00:22:38,149 --> 00:22:35,360
different dragon missions as they were

332
00:22:40,549 --> 00:22:38,159
approaching the orbiting laboratory

333
00:22:42,789 --> 00:22:40,559
and just like those merlin engines on

334
00:22:45,590 --> 00:22:42,799
falcon we also reuse the dragon

335
00:22:48,070 --> 00:22:45,600
thrusters uh the draco thrusters once

336
00:22:50,149 --> 00:22:48,080
that spacecraft returns to earth dragon

337
00:22:51,990 --> 00:22:50,159
and falcon continue to remain in good

338
00:22:54,710 --> 00:22:52,000

health and we're ready to support the on

339
00:22:57,270 --> 00:22:54,720
time liftoff around 8 44 pm

340
00:22:58,870 --> 00:22:57,280
with that back to you megan perfect news

341
00:23:00,630 --> 00:22:58,880
shiva that's what we like to hear and

342
00:23:02,230 --> 00:23:00,640
two people very excited about today's

343
00:23:04,870 --> 00:23:02,240
launch are right here next to me we have

344
00:23:06,549 --> 00:23:04,880
claire green and benjamin whitfield both

345
00:23:08,870 --> 00:23:06,559
of arkansas state university they

346
00:23:10,310 --> 00:23:08,880
actually have an experiment on board and

347
00:23:11,350 --> 00:23:10,320
are about to tell us about it great to

348
00:23:13,190 --> 00:23:11,360
have you here

349
00:23:14,710 --> 00:23:13,200
nice to be here all right you're so

350
00:23:16,070 --> 00:23:14,720
excited i love it so let's take a look

351
00:23:19,270 --> 00:23:16,080
at the screen we have some pictures of

352
00:23:20,549 --> 00:23:19,280
when the team was here uh uh earlier a

353
00:23:22,230 --> 00:23:20,559
couple of weeks ago and you guys were

354
00:23:25,029 --> 00:23:22,240
prepping your experiment what are you

355
00:23:27,350 --> 00:23:25,039
guys studying so we are studying wax

356
00:23:29,909 --> 00:23:27,360
worm larvae and their unique ability to

357
00:23:33,590 --> 00:23:29,919
break down thin plastics think plastic

358
00:23:35,350 --> 00:23:33,600
bags into a non-pollutive by-product

359
00:23:37,270 --> 00:23:35,360
and we're very curious to see if they

360
00:23:39,510 --> 00:23:37,280
can still do this process in

361
00:23:41,190 --> 00:23:39,520
microgravity or aboard the space station

362
00:23:43,190 --> 00:23:41,200
yeah so we know that

363
00:23:45,830 --> 00:23:43,200

this happens on earth why do you want to

364
00:23:48,549 --> 00:23:45,840
see if this happens in microgravity

365
00:23:51,430 --> 00:23:48,559
well the application of

366
00:23:54,230 --> 00:23:51,440
breaking down plastics is beneficial

367
00:23:56,870 --> 00:23:54,240
anywhere it's a problem that we're

368
00:23:59,350 --> 00:23:56,880
learning how to deal with so if we can

369
00:24:02,149 --> 00:23:59,360
learn how to deal with it on earth and

370
00:24:04,390 --> 00:24:02,159
in the space station then we can

371
00:24:05,190 --> 00:24:04,400
extrapolate that to

372
00:24:07,190 --> 00:24:05,200
other

373
00:24:09,990 --> 00:24:07,200
environments

374
00:24:12,470 --> 00:24:10,000
why are you guys interested to see how

375
00:24:14,149 --> 00:24:12,480
this will react in space is it because

376
00:24:15,750 --> 00:24:14,159
we as an organization nasa we are

377
00:24:17,669 --> 00:24:15,760
thinking about going farther than we've

378
00:24:19,750 --> 00:24:17,679
ever been before that's exactly what it

379
00:24:22,230 --> 00:24:19,760
is is we are proposing this as a

380
00:24:24,230 --> 00:24:22,240
long-term space travel waste management

381
00:24:26,390 --> 00:24:24,240
system because plastic it's lightweight

382
00:24:27,990 --> 00:24:26,400
it's cost effective it's not going

383
00:24:29,750 --> 00:24:28,000
anywhere and we don't want a pollution

384
00:24:32,390 --> 00:24:29,760
problem like we've had on earth yeah

385
00:24:33,830 --> 00:24:32,400
perfect so i know that this is the first

386
00:24:35,510 --> 00:24:33,840
launch for both of you why don't we take

387
00:24:38,390 --> 00:24:35,520
a look around really quick so there it

388
00:24:40,950 --> 00:24:38,400

is on the launch pad falcon 9 and dragon

389
00:24:42,260 --> 00:24:40,960
inside dragon is your experiment how are

390
00:24:43,990 --> 00:24:42,270
you guys feeling

391
00:24:45,029 --> 00:24:44,000
[Music]

392
00:24:47,909 --> 00:24:45,039
is

393
00:24:49,909 --> 00:24:47,919
uh

394
00:24:52,789 --> 00:24:49,919
it feels like a dream and

395
00:24:53,990 --> 00:24:52,799
it's about to be a dream come true not

396
00:24:57,110 --> 00:24:54,000
just for

397
00:24:58,149 --> 00:24:57,120
myself and claire but for our whole team

398
00:25:02,549 --> 00:24:58,159
for

399
00:25:05,110 --> 00:25:02,559
experiment going up and

400
00:25:06,870 --> 00:25:05,120
for all the students who assisted us in

401
00:25:08,230 --> 00:25:06,880
our citizen science perfect guys i

402
00:25:09,750 --> 00:25:08,240
cannot wait to see what you discover

403
00:25:11,190 --> 00:25:09,760
thank you so much for your time and i

404
00:25:12,549 --> 00:25:11,200
hope you enjoyed the launch thank you so

405
00:25:14,390 --> 00:25:12,559
much

406
00:25:17,190 --> 00:25:14,400
and we have another student experiment

407
00:25:18,950 --> 00:25:17,200
on board dragon today these guys are in

408
00:25:21,669 --> 00:25:18,960
college but we have a high schooler here

409
00:25:23,909 --> 00:25:21,679
you see celine cocolar she won the

410
00:25:26,470 --> 00:25:23,919
annual jeans in space research

411
00:25:28,549 --> 00:25:26,480
competition by designing a new method of

412
00:25:30,710 --> 00:25:28,559
detecting water contaminants if

413
00:25:33,190 --> 00:25:30,720

successful her work could be used to

414
00:25:35,669 --> 00:25:33,200
test water quality both in space and

415
00:25:37,430 --> 00:25:35,679
also remote parts of the earth genes in

416
00:25:40,070 --> 00:25:37,440
space is made possible through boeing a

417
00:25:42,470 --> 00:25:40,080
startup called mini pcr that makes

418
00:25:44,870 --> 00:25:42,480
equipment for biology research and the

419
00:25:46,470 --> 00:25:44,880
iss national lab

420
00:25:49,590 --> 00:25:46,480
all right we're just under six minutes

421
00:25:51,269 --> 00:25:49,600
till oh no seven six fifty six i am

422
00:25:53,350 --> 00:25:51,279
having a hard time guys but we're close

423
00:25:55,190 --> 00:25:53,360
to terminal count so let's bring back

424
00:25:57,350 --> 00:25:55,200
shiva live from spacex headquarters in

425
00:25:58,789 --> 00:25:57,360
hawthorne california and daryl here on

426
00:26:00,630 --> 00:25:58,799
florida space coast to walk us through

427
00:26:03,430 --> 00:26:00,640
the final moments of the countdown guys

428
00:26:08,390 --> 00:26:05,990
thanks megan now the spacex team is not

429
00:26:11,029 --> 00:26:08,400
working any significant issues with the

430
00:26:12,950 --> 00:26:11,039
falcon or dragon at the moment and the

431
00:26:14,710 --> 00:26:12,960
weather i hope is continuing to trend

432
00:26:16,549 --> 00:26:14,720
well like daryl had mentioned earlier

433
00:26:18,390 --> 00:26:16,559
we're keeping an eye on some clouds and

434
00:26:20,549 --> 00:26:18,400
potential precipitation and we're going

435
00:26:22,870 --> 00:26:20,559
to keep in our ear out to the loops to

436
00:26:25,350 --> 00:26:22,880
make sure we remain go for launch the

437
00:26:27,669 --> 00:26:25,360
range does remain go for launch at this

438
00:26:29,990 --> 00:26:27,679

time now at this point the rocket

439
00:26:31,990 --> 00:26:30,000
propellant one of fuel is completely

440
00:26:34,230 --> 00:26:32,000
loaded on the second stage

441
00:26:36,710 --> 00:26:34,240
and nearly fully loaded on the first

442
00:26:38,630 --> 00:26:36,720
stage liquid oxygen loading is underway

443
00:26:41,830 --> 00:26:38,640
on both the stages that'll complete at

444
00:26:43,990 --> 00:26:41,840
about t minus two minutes to launch at

445
00:26:46,230 --> 00:26:44,000
this point we're also loading helium gas

446
00:26:48,149 --> 00:26:46,240
into both the stages falcon 9 uses that

447
00:26:50,230 --> 00:26:48,159
helium as a pressure to backfill the

448
00:26:52,950 --> 00:26:50,240
propellant and as we consume that liquid

449
00:26:55,750 --> 00:26:52,960
oxygen and rp1 by the merlin engines

450
00:26:57,750 --> 00:26:55,760
during ascent pm load began before the

451
00:26:59,830 --> 00:26:57,760
broadcast went live and it'll continue

452
00:27:03,430 --> 00:26:59,840
to top up until about a minute and a

453
00:27:08,149 --> 00:27:05,190
to make sure engine startup goes well

454
00:27:09,350 --> 00:27:08,159
spacex performs an engine chill this

455
00:27:10,470 --> 00:27:09,360
happened

456
00:27:13,269 --> 00:27:10,480
will happen

457
00:27:14,870 --> 00:27:13,279
has happened at t-minus seven minutes

458
00:27:17,110 --> 00:27:14,880
flowed a small amount of the super

459
00:27:19,750 --> 00:27:17,120
chilled locks into the merlin engines

460
00:27:21,830 --> 00:27:19,760
turbo pumps and this is done to avoid a

461
00:27:23,909 --> 00:27:21,840
thermal shock to the system

462
00:27:26,630 --> 00:27:23,919
when that flow of super chilled liquid

463
00:27:28,310 --> 00:27:26,640

oxygen hits the prop system

464
00:27:31,029 --> 00:27:28,320
now dragon began

465
00:27:32,710 --> 00:27:31,039
its startup sequence at t minus 35

466
00:27:35,029 --> 00:27:32,720
minutes when it coordinated timing with

467
00:27:37,190 --> 00:27:35,039
the falcon 9 dragon now currently

468
00:27:40,070 --> 00:27:37,200
undergoing vehicle health checks with

469
00:27:42,389 --> 00:27:40,080
the next big step just before liftoff

470
00:27:46,149 --> 00:27:42,399
when the cargo spacecraft transitions to

471
00:27:50,630 --> 00:27:49,190
dragon is in terminal count

472
00:27:55,029 --> 00:27:50,640
and we just heard that call out for

473
00:27:58,230 --> 00:27:56,549
and the strong back retract that's

474
00:28:00,070 --> 00:27:58,240
perfect timing that large truss

475
00:28:02,149 --> 00:28:00,080
structure next to the vehicle is called

476
00:28:04,310 --> 00:28:02,159
the transporter erector or the strong

477
00:28:06,230 --> 00:28:04,320
back and as was called out on the loops

478
00:28:08,950 --> 00:28:06,240
it pulls away from the vehicle in

479
00:28:11,990 --> 00:28:08,960
preparation for liftoff we'll see those

480
00:28:14,549 --> 00:28:12,000
clamp arms around the body of the second

481
00:28:16,870 --> 00:28:14,559
stage start to retract and then shortly

482
00:28:20,149 --> 00:28:16,880
after that the whole structure will pull

483
00:28:22,549 --> 00:28:20,159
away from falcon 9. now in these last

484
00:28:24,389 --> 00:28:22,559
few minutes falcon 9 is performing a set

485
00:28:27,029 --> 00:28:24,399
of final health checks

486
00:28:29,430 --> 00:28:27,039
on its primary communications avionics

487
00:28:31,909 --> 00:28:29,440
and propulsion systems in preparation

488
00:28:33,909 --> 00:28:31,919

for liftoff just about four minutes away

489
00:28:35,430 --> 00:28:33,919
from now we're also going to continue to

490
00:28:37,750 --> 00:28:35,440
hear call-outs throughout that the

491
00:28:40,630 --> 00:28:37,760
engines are sufficiently sufficiently

492
00:28:42,470 --> 00:28:40,640
chilled in as we get closer to liftoff

493
00:28:44,950 --> 00:28:42,480
and on our screen right there you can

494
00:28:47,110 --> 00:28:44,960
see those clamp arms beginning to open

495
00:28:48,789 --> 00:28:47,120
around the second stage in between some

496
00:28:50,630 --> 00:28:48,799
of that uh

497
00:28:53,430 --> 00:28:50,640
cooling of the florida air around the

498
00:28:55,350 --> 00:28:53,440
second stage and shortly after we'll see

499
00:28:57,830 --> 00:28:55,360
the white truss structure on the right

500
00:28:59,190 --> 00:28:57,840
hand side of the vehicle to begin to

501
00:29:10,230 --> 00:28:59,200
pull away

502
00:29:14,630 --> 00:29:12,070
there you can start to see motion of the

503
00:29:18,310 --> 00:29:14,640
transporter erector away it'll recline a

504
00:29:20,310 --> 00:29:18,320
bit uh before we step further into the

505
00:29:21,909 --> 00:29:20,320
lift off

506
00:29:24,149 --> 00:29:21,919
and coming up in just about a minute

507
00:29:27,909 --> 00:29:24,159
shiva checkouts of the second stage

508
00:29:29,909 --> 00:29:27,919
thrust vector control actuators

509
00:29:32,710 --> 00:29:29,919
they are underway this is often referred

510
00:29:35,029 --> 00:29:32,720
to as the engine wiggle test

511
00:29:36,950 --> 00:29:35,039
this is when uh spacex moves the thrust

512
00:29:41,029 --> 00:29:36,960
novel nozzle slightly to make sure that

513
00:29:43,590 --> 00:29:41,039

the guidance hardware is go for flight

514
00:29:45,430 --> 00:29:43,600
again that was a great view of the

515
00:29:48,389 --> 00:29:45,440
transporter erector

516
00:29:52,389 --> 00:29:50,470
spacex does the exact same checkouts of

517
00:29:54,389 --> 00:29:52,399
the first stage engines

518
00:30:00,310 --> 00:29:54,399
and that happens just seconds

519
00:30:05,350 --> 00:30:03,190
at the time of launch 8 44 and 22

520
00:30:06,870 --> 00:30:05,360
seconds pm eastern time the

521
00:30:08,350 --> 00:30:06,880
international space station will be over

522
00:30:19,029 --> 00:30:08,360
the pacific ocean

523
00:30:22,950 --> 00:30:20,389
we actually heard

524
00:30:25,510 --> 00:30:22,960
just about 30 seconds ago that liquid

525
00:30:28,149 --> 00:30:25,520
oxygen loading is complete on the first

526
00:30:30,630 --> 00:30:28,159
stage and coming up here just under 20

527
00:30:33,190 --> 00:30:30,640
seconds we'll hear a similar call out on

528
00:30:35,350 --> 00:30:33,200
the second stage that will wrap up

529
00:30:37,750 --> 00:30:35,360
propellant loading on falcon 9 in

530
00:30:39,990 --> 00:30:37,760
preparation for launch at this point

531
00:30:41,990 --> 00:30:40,000
dragon is performing its final health

532
00:30:44,950 --> 00:30:42,000
checks to make sure we're ready to go

533
00:30:48,710 --> 00:30:44,960
for rendezvous with the space station

534
00:30:51,669 --> 00:30:48,720
about 38 hours from now i love the shot

535
00:30:55,590 --> 00:30:51,679
of the pad you can see the clouds uh

536
00:30:56,950 --> 00:30:55,600
forming around falcon 9. i'm not cooling

537
00:30:58,389 --> 00:30:56,960
uh

538
00:31:01,269 --> 00:30:58,399

there's a call out there for lux load

539
00:31:03,669 --> 00:31:01,279
complete you can hear or see the water

540
00:31:08,070 --> 00:31:03,679
vapor condensing and

541
00:31:12,870 --> 00:31:09,990
yeah you sure can

542
00:31:14,549 --> 00:31:12,880
just a few minutes left in twilight

543
00:31:15,750 --> 00:31:14,559
a little bit of illumination makes it

544
00:31:17,750 --> 00:31:15,760
nice

545
00:31:20,149 --> 00:31:17,760
at t minus one minute dragon will

546
00:31:22,070 --> 00:31:20,159
transition to internal power falcon 9

547
00:31:24,389 --> 00:31:22,080
computers will enter startup mode and

548
00:31:26,389 --> 00:31:24,399
begin final pre-launch checks guiding

549
00:31:38,070 --> 00:31:26,399
the rocket through the last seconds

550
00:31:38,080 --> 00:31:47,990
so

551
00:31:55,190 --> 00:31:49,990
falcon 9 is from startup

552
00:31:59,590 --> 00:31:57,269
both stages are now pressurizing for

553
00:32:14,470 --> 00:31:59,600
launch

554
00:32:14,480 --> 00:32:25,669
t minus 30 seconds

555
00:32:29,669 --> 00:32:27,509
a beautiful time of day to watch this

556
00:32:30,630 --> 00:32:29,679
launch if you're out on the beach minus

557
00:32:33,350 --> 00:32:30,640
15.

558
00:32:35,269 --> 00:32:34,389
10

559
00:32:36,230 --> 00:32:35,279
9

560
00:32:37,269 --> 00:32:36,240
8

561
00:32:38,070 --> 00:32:37,279
7

562
00:32:39,110 --> 00:32:38,080
6

563
00:32:40,070 --> 00:32:39,120

5

564
00:32:41,029 --> 00:32:40,080
4

565
00:32:42,230 --> 00:32:41,039
3

566
00:32:43,110 --> 00:32:42,240
two

567
00:32:47,430 --> 00:32:43,120
one

568
00:32:52,389 --> 00:32:49,430
and liftoff

569
00:32:54,710 --> 00:32:52,399
liftoff of spacex's falcon 9 rocket

570
00:32:57,269 --> 00:32:54,720
launching dragon on the 25th mission to

571
00:32:59,590 --> 00:32:57,279
resupply the international space station

572
00:33:01,830 --> 00:32:59,600
with cool science and a new advanced

573
00:33:07,360 --> 00:33:01,840
instrument to more effectively study our

574
00:33:38,549 --> 00:33:16,940
[Music]

575
00:33:53,990 --> 00:33:41,110
we are 50 seconds into flight successful

576
00:33:57,909 --> 00:33:56,230
for the point the highest stresses the

577
00:33:59,350 --> 00:33:57,919
vehicle you will experience during

578
00:34:01,590 --> 00:33:59,360
ascent

579
00:34:03,110 --> 00:34:01,600
there's the call out for maximum dynamic

580
00:34:04,710 --> 00:34:03,120
pressure

581
00:34:07,110 --> 00:34:04,720
so from here the stresses on the vehicle

582
00:34:09,829 --> 00:34:07,120
will get lower and lower as we raise our

583
00:34:12,149 --> 00:34:09,839
altitude coming up we've got five events

584
00:34:14,790 --> 00:34:12,159
back to back the first of those will be

585
00:34:17,270 --> 00:34:14,800
main engine cutoff or miko that's where

586
00:34:19,349 --> 00:34:17,280
all nine merlin 1d engines on the first

587
00:34:21,829 --> 00:34:19,359
stage will shut down

588
00:34:23,829 --> 00:34:21,839

following that will be stage separation

589
00:34:26,149 --> 00:34:23,839
where the first and second stages will

590
00:34:28,629 --> 00:34:26,159
separate the first stage will flip

591
00:34:30,389 --> 00:34:28,639
around to make sure it's headed back

592
00:34:32,470 --> 00:34:30,399
towards the landing site and our drone

593
00:34:34,550 --> 00:34:32,480
ship named a shortfall of gravitas and

594
00:34:36,950 --> 00:34:34,560
then the second stage will ignite its

595
00:34:38,710 --> 00:34:36,960
merlin vacuum engine to boost dragon

596
00:34:40,389 --> 00:34:38,720
into low earth orbit during second

597
00:34:41,990 --> 00:34:40,399
engine start number one we just heard

598
00:34:44,069 --> 00:34:42,000
the call out there for engine chill in

599
00:34:46,790 --> 00:34:44,079
on the second stage engine starting the

600
00:34:48,389 --> 00:34:46,800
last event is the boost back burn on the

601
00:34:51,270 --> 00:34:48,399
first stage that's to reduce the

602
00:34:53,589 --> 00:34:51,280
velocity of that vehicle as we prepare

603
00:34:56,470 --> 00:34:53,599
for atmospheric entry now all of those

604
00:34:58,390 --> 00:34:56,480
events happen over about 45 seconds and

605
00:35:00,870 --> 00:34:58,400
again they are main engine cut off

606
00:35:03,829 --> 00:35:00,880
followed by stage separation first stage

607
00:35:06,470 --> 00:35:03,839
flip second stage engine start and then

608
00:35:08,950 --> 00:35:06,480
boost back burn start

609
00:35:15,349 --> 00:35:08,960
all those happening in just about five

610
00:35:23,750 --> 00:35:17,750
miko

611
00:35:27,270 --> 00:35:25,510
fantastic site

612
00:35:29,690 --> 00:35:27,280
okay

613
00:35:33,670 --> 00:35:29,700

so the first three of those

614
00:35:38,550 --> 00:35:36,550
and now the boost back burn is underway

615
00:35:41,270 --> 00:35:38,560
the shot on our screen right now is of

616
00:35:44,069 --> 00:35:41,280
the merlin vacuum engine on the second

617
00:35:47,270 --> 00:35:44,079
stage and as this view toggles you may

618
00:35:49,510 --> 00:35:47,280
catch the first stage it is firing its

619
00:35:51,270 --> 00:35:49,520
merlin 1d engines that burn on the first

620
00:35:53,430 --> 00:35:51,280
stage lasting about

621
00:35:55,670 --> 00:35:53,440
30 seconds

622
00:35:57,190 --> 00:35:55,680
you can see the plume on the first stage

623
00:36:02,630 --> 00:35:57,200
on the left-hand side of your screen as

624
00:36:02,640 --> 00:36:07,430
stage one boost back shutdown

625
00:36:12,310 --> 00:36:10,470
successful shutdown of the first stage

626
00:36:14,550 --> 00:36:12,320
marilyn engines for the boost back burn

627
00:36:16,630 --> 00:36:14,560
second stage engine continuing to burn

628
00:36:20,230 --> 00:36:16,640
that'll continue to burn until about the

629
00:36:22,870 --> 00:36:20,240
t plus beat minutes and a 40 second mark

630
00:36:24,069 --> 00:36:22,880
into the mission

631
00:36:26,630 --> 00:36:24,079
now

632
00:36:28,790 --> 00:36:26,640
you're just joining us welcome to our

633
00:36:30,550 --> 00:36:28,800
25th commercial resupply mission to the

634
00:36:32,710 --> 00:36:30,560
international space station

635
00:36:35,750 --> 00:36:32,720
for our customer nasa

636
00:36:37,349 --> 00:36:35,760
you're watching our 30th mission of 2022

637
00:36:41,430 --> 00:36:37,359
and the third dragon flight to the

638
00:36:43,510 --> 00:36:41,440

international space station this year

639
00:36:45,349 --> 00:36:43,520
we left it off just about four minutes

640
00:36:48,390 --> 00:36:45,359
ago from the kennedy space center in

641
00:36:49,910 --> 00:36:48,400
florida on your screen our views of our

642
00:36:52,069 --> 00:36:49,920
first stage on the left hand side of

643
00:36:54,310 --> 00:36:52,079
your screen with its grid fins deployed

644
00:36:56,550 --> 00:36:54,320
periodically controlling its attitude to

645
00:36:58,390 --> 00:36:56,560
make its way back home on the right hand

646
00:37:01,190 --> 00:36:58,400
side of your screen is a shot of the

647
00:37:03,829 --> 00:37:01,200
merlin vacuum engine on the second stage

648
00:37:06,150 --> 00:37:03,839
performing its burn

649
00:37:08,390 --> 00:37:06,160
it'll continue to burn for about another

650
00:37:15,430 --> 00:37:08,400
four minutes to take dragon

651
00:37:20,069 --> 00:37:17,670
speaking of the entry sequence on the

652
00:37:21,190 --> 00:37:20,079
first stage to make its way back to that

653
00:37:23,030 --> 00:37:21,200
drone ship

654
00:37:25,430 --> 00:37:23,040
it's going to have to execute two more

655
00:37:26,310 --> 00:37:25,440
burns the first of those is the entry

656
00:37:28,069 --> 00:37:26,320
burn

657
00:37:30,069 --> 00:37:28,079
where we'll ignite three of the merlin

658
00:37:31,990 --> 00:37:30,079
engines and that helps slow down the

659
00:37:33,910 --> 00:37:32,000
stage as we enter the upper part of the

660
00:37:36,230 --> 00:37:33,920
earth's atmosphere following that there

661
00:37:38,790 --> 00:37:36,240
will be a second burn the landing burn

662
00:37:41,109 --> 00:37:38,800
and there will only ignite a single

663
00:37:43,270 --> 00:37:41,119

merlin and 1d engine

664
00:37:45,430 --> 00:37:43,280
that'll bring the vehicle speed down to

665
00:37:46,630 --> 00:37:45,440
zero for a soft touchdown on the drone

666
00:37:49,190 --> 00:37:46,640
ship

667
00:37:51,270 --> 00:37:49,200
we've got some great sunlight on the

668
00:37:54,069 --> 00:37:51,280
vehicle and you're periodically seeing

669
00:37:56,310 --> 00:37:54,079
some plumes of white that's actually

670
00:37:57,990 --> 00:37:56,320
from our nitrogen gas thrusters that are

671
00:38:01,030 --> 00:37:58,000
helping to keep the stage the first

672
00:38:02,950 --> 00:38:01,040
stage oriented engines down

673
00:38:04,870 --> 00:38:02,960
as we are in the vacuum of space at the

674
00:38:07,030 --> 00:38:04,880
moment but once we get through that

675
00:38:08,310 --> 00:38:07,040
entry burn the grid fins which are

676
00:38:09,510 --> 00:38:08,320
deployed you can see two of them on your

677
00:38:11,910 --> 00:38:09,520
screen

678
00:38:13,990 --> 00:38:11,920
will then take over control as we start

679
00:38:15,990 --> 00:38:14,000
to get atmospheric authority and then

680
00:38:18,470 --> 00:38:16,000
the states the first stage will only use

681
00:38:20,550 --> 00:38:18,480
those grid fins to steer back towards

682
00:38:22,710 --> 00:38:20,560
our drone ship

683
00:38:27,030 --> 00:38:22,720
so entry burn expected to start about 10

684
00:38:32,710 --> 00:38:29,829
just taking a quick look in stage

685
00:38:34,470 --> 00:38:32,720
2 engine performance

686
00:38:36,069 --> 00:38:34,480
about nominal

687
00:38:45,990 --> 00:38:36,079
continuing to burn we've got about three

688
00:38:49,430 --> 00:38:47,910

can see the velocity on the first stage

689
00:38:51,750 --> 00:38:49,440
bottom left-hand side of your screen

690
00:38:54,150 --> 00:38:51,760
rapidly slowing down

691
00:38:57,670 --> 00:38:54,160
shut down the entry burn

692
00:38:58,950 --> 00:38:57,680
that burn only lasting about 15 seconds

693
00:39:00,630 --> 00:38:58,960
and now we're doing a quick attitude

694
00:39:03,270 --> 00:39:00,640
correction to make sure we're pointing

695
00:39:05,510 --> 00:39:03,280
the heat shield down

696
00:39:08,069 --> 00:39:05,520
and that entry burn and the plume coming

697
00:39:09,829 --> 00:39:08,079
back on the stage ends up depositing a

698
00:39:11,829 --> 00:39:09,839
small layer of carbon on the vehicle

699
00:39:14,069 --> 00:39:11,839
which is what gives our first stages

700
00:39:16,310 --> 00:39:14,079
that awesome city look once we've

701
00:39:17,829 --> 00:39:16,320
reflown them

702
00:39:19,670 --> 00:39:17,839
the falcon 9

703
00:39:22,069 --> 00:39:19,680
also has four landing legs they're made

704
00:39:24,870 --> 00:39:22,079
of carbon fiber and aluminum honeycomb

705
00:39:26,710 --> 00:39:24,880
placed around the base of the rocket and

706
00:39:28,630 --> 00:39:26,720
they'll deploy just prior to landing

707
00:39:31,030 --> 00:39:28,640
during the landing burn

708
00:39:33,510 --> 00:39:31,040
if we're successful in recovering this

709
00:39:37,430 --> 00:39:33,520
falcon 9 it'll mark its fifth successful

710
00:39:39,910 --> 00:39:37,440
landing and our 130th landing overall of

711
00:39:46,550 --> 00:39:39,920
a falcon 9 including falcon heavy

712
00:39:46,560 --> 00:39:53,190
the landing burn coming up shortly

713
00:39:57,829 --> 00:39:56,230

stage one ladybird

714
00:39:58,950 --> 00:39:57,839
keep an eye out on the speed on the left

715
00:40:00,470 --> 00:39:58,960
hand side of your screen that's the

716
00:40:01,910 --> 00:40:00,480
velocity of the first stage we're going

717
00:40:03,670 --> 00:40:01,920
to see that come all the way down to

718
00:40:06,630 --> 00:40:03,680
zero on the right hand side of your

719
00:40:07,910 --> 00:40:06,640
screen is our drone ship

720
00:40:09,750 --> 00:40:07,920
and also keep an eye out on the left

721
00:40:15,829 --> 00:40:09,760
hand side of your screen for landing leg

722
00:40:15,839 --> 00:40:23,210
stage one landing went deploy

723
00:40:23,220 --> 00:40:26,790
[Music]

724
00:40:32,230 --> 00:40:30,230
people real excited behind me

725
00:40:35,829 --> 00:40:32,240
right in the middle sixth landing for

726
00:40:38,470 --> 00:40:35,839
this falcon 9 130th landing overall for

727
00:40:41,109 --> 00:40:38,480
an orbital class rocket

728
00:40:43,190 --> 00:40:41,119
beautiful sight to see

729
00:40:45,349 --> 00:40:43,200
now coming up next

730
00:40:46,790 --> 00:40:45,359
is the second engine cutoff number one

731
00:40:48,950 --> 00:40:46,800
or seago one

732
00:40:51,829 --> 00:40:48,960
we'll expect the merlin vacuum engine to

733
00:40:53,829 --> 00:40:51,839
stop firing just about 30 seconds from

734
00:40:55,670 --> 00:40:53,839
now

735
00:40:58,390 --> 00:40:55,680
it's carrying

736
00:41:01,510 --> 00:40:58,400
the dragon spacecraft to its drop off

737
00:41:02,790 --> 00:41:01,520
orbit around our planet

738
00:41:04,710 --> 00:41:02,800

after we

739
00:41:06,710 --> 00:41:04,720
complete second engine cut off number

740
00:41:09,190 --> 00:41:06,720
one we'll do a quick check to make sure

741
00:41:13,030 --> 00:41:09,200
that the burn performance is as exciting

742
00:41:17,670 --> 00:41:15,829
we usually hear that called out as a a

743
00:41:29,270 --> 00:41:17,680
nominal orbital insertion or a good

744
00:41:29,280 --> 00:41:38,230
and back shutdown

745
00:41:44,309 --> 00:41:39,750
so you heard a call out on the loops

746
00:41:48,470 --> 00:41:47,030
there's nominal orbital insertion so

747
00:41:50,870 --> 00:41:48,480
that means that the ground teams have

748
00:41:52,550 --> 00:41:50,880
assessed the orbit and stage two is

749
00:41:54,470 --> 00:41:52,560
right where we want it to be and of

750
00:41:55,910 --> 00:41:54,480
course that also means that dragon is

751
00:41:58,390 --> 00:41:55,920
right where we want it to be since it's

752
00:42:01,030 --> 00:41:58,400
been arriving on the first stage excuse

753
00:42:02,790 --> 00:42:01,040
me the second stage this whole time

754
00:42:05,349 --> 00:42:02,800
if you're just joining us we're about t

755
00:42:06,309 --> 00:42:05,359
plus nine minutes 20 seconds into the

756
00:42:07,589 --> 00:42:06,319
mission

757
00:42:09,349 --> 00:42:07,599
on uh

758
00:42:11,190 --> 00:42:09,359
the screen next to me is a view of the

759
00:42:13,589 --> 00:42:11,200
merlin vacuum engine with

760
00:42:15,510 --> 00:42:13,599
earth behind it on the second stage now

761
00:42:18,150 --> 00:42:15,520
the second stage has one major task

762
00:42:19,750 --> 00:42:18,160
remaining that is commanding separation

763
00:42:21,109 --> 00:42:19,760

of the dragon spacecraft just a few

764
00:42:23,270 --> 00:42:21,119
minutes from now

765
00:42:25,349 --> 00:42:23,280
we're hoping to have video of separation

766
00:42:27,589 --> 00:42:25,359
from the top of the second stage we

767
00:42:30,069 --> 00:42:27,599
actually got a quick glimpse of it uh

768
00:42:33,190 --> 00:42:30,079
before we've got a camera that looks up

769
00:42:35,430 --> 00:42:33,200
into the trunk of dragon and gives us a

770
00:42:37,190 --> 00:42:35,440
little peek at some of the cargo that

771
00:42:39,030 --> 00:42:37,200
we're taking in that unpressurized

772
00:42:39,750 --> 00:42:39,040
section you can see the emit payload

773
00:42:42,630 --> 00:42:39,760
there

774
00:42:45,270 --> 00:42:42,640
on the left hand side of the screen

775
00:42:48,069 --> 00:42:45,280
now the crs-25 capsule will be joining

776
00:42:50,230 --> 00:42:48,079
the crew 4 vehicle capsule freedom which

777
00:42:52,390 --> 00:42:50,240
is currently on orbit so we'll be back

778
00:42:54,950 --> 00:42:52,400
to dual dragons docked at the

779
00:42:57,750 --> 00:42:54,960
international space station crs-25 will

780
00:43:00,069 --> 00:42:57,760
be headed to the forward harmony port on

781
00:43:04,069 --> 00:43:00,079
node two we're expecting it to arrive on

782
00:43:06,390 --> 00:43:04,079
the 16th around 11 20 a.m eastern time

783
00:43:08,069 --> 00:43:06,400
there it'll spend about one month

784
00:43:09,750 --> 00:43:08,079
attached at the international space

785
00:43:12,069 --> 00:43:09,760
station

786
00:43:15,270 --> 00:43:12,079
as for the cargo today we are delivering

787
00:43:17,349 --> 00:43:15,280
more than 5 800 pounds of science

788
00:43:19,510 --> 00:43:17,359

research crew supplies as well as

789
00:43:21,670 --> 00:43:19,520
vehicle hardware to the orbiting lab and

790
00:43:24,870 --> 00:43:21,680
its crew

791
00:43:27,270 --> 00:43:24,880
and amazing more views inside the trunk

792
00:43:29,990 --> 00:43:27,280
at this point the second stage

793
00:43:31,990 --> 00:43:30,000
is performing its final checks to ensure

794
00:43:33,829 --> 00:43:32,000
that we're not imparting any unnecessary

795
00:43:35,829 --> 00:43:33,839
momentum or spin

796
00:43:38,069 --> 00:43:35,839
to the dragon spacecraft

797
00:43:40,470 --> 00:43:38,079
once those calculations are complete

798
00:43:42,790 --> 00:43:40,480
dragon uh and the state second stage

799
00:43:45,190 --> 00:43:42,800
will command separation and shortly

800
00:43:47,270 --> 00:43:45,200
following separation dragon will conduct

801
00:43:50,309 --> 00:43:47,280
a series of health checks on its

802
00:43:52,870 --> 00:43:50,319
thrusters its uh cabin thermal and solar

803
00:43:55,349 --> 00:43:52,880
systems navigation systems in

804
00:44:04,390 --> 00:43:55,359
preparation for the upcoming 38-hour

805
00:44:08,550 --> 00:44:06,710
we've got about 30 seconds to go

806
00:44:10,710 --> 00:44:08,560
if you're just joining us uh we're

807
00:44:13,190 --> 00:44:10,720
looking at the second stage

808
00:44:15,510 --> 00:44:13,200
coming up real shortly to dragon

809
00:44:18,550 --> 00:44:15,520
separation this particular dragon

810
00:44:21,349 --> 00:44:18,560
marking its third flight

811
00:44:25,109 --> 00:44:21,359
and then also the first third reuse of

812
00:44:29,190 --> 00:44:27,349
this view looking into the trunk of the

813
00:44:32,069 --> 00:44:29,200

dragon capsule that's our unpressurized

814
00:44:33,589 --> 00:44:32,079
portion of the vehicle and some of the

815
00:44:39,190 --> 00:44:33,599
payload that we're taking up to the

816
00:44:39,200 --> 00:44:44,230
dragon separation confirmed

817
00:44:44,240 --> 00:44:47,190
phenomenal

818
00:44:51,430 --> 00:44:49,910
so with that crs 25 gently floating

819
00:44:55,030 --> 00:44:51,440
around away

820
00:44:56,790 --> 00:44:55,040
from falcon 9's second stage

821
00:44:59,430 --> 00:44:56,800
again coming up next we've got some

822
00:45:01,349 --> 00:44:59,440
service section draco checkouts as well

823
00:45:03,589 --> 00:45:01,359
as nose cone opening

824
00:45:05,829 --> 00:45:03,599
but that's actually going to

825
00:45:07,589 --> 00:45:05,839
complete my coverage here from hawthorne

826
00:45:10,390 --> 00:45:07,599
so i'm going to pass it over to sandra

827
00:45:15,990 --> 00:45:10,400
at houston to check in with the team

828
00:45:19,750 --> 00:45:18,069
and thanks shiva welcome back into the

829
00:45:22,309 --> 00:45:19,760
international space station flight

830
00:45:24,790 --> 00:45:22,319
control room that was a beautiful launch

831
00:45:26,710 --> 00:45:24,800
from here in mission control houston

832
00:45:31,510 --> 00:45:26,720
right now we're just standing by for a

833
00:45:35,670 --> 00:45:33,430
and we did just get confirmation that

834
00:45:37,670 --> 00:45:35,680
the nosecone was successfully deployed

835
00:45:39,829 --> 00:45:37,680
that nosecone does cover the docking

836
00:45:41,990 --> 00:45:39,839
hardware the navigation rendezvous

837
00:45:45,030 --> 00:45:42,000
sensor and the four forward bulkhead

838
00:45:48,870 --> 00:45:47,030

the nose cone will stay open until the

839
00:45:53,670 --> 00:45:48,880
end of the mission until after deorbit

840
00:45:57,750 --> 00:45:55,349
if you are just joining us nasa and

841
00:46:00,550 --> 00:45:57,760
spacex's 25th commercial resupply

842
00:46:03,589 --> 00:46:00,560
mission launched from pad 39a at the

843
00:46:06,870 --> 00:46:03,599
kennedy space center in florida at 7 44

844
00:46:09,109 --> 00:46:06,880
pm central 8 44 pm eastern time this

845
00:46:10,710 --> 00:46:09,119
evening and is currently in orbit and

846
00:46:14,069 --> 00:46:10,720
heading to the international space

847
00:46:16,470 --> 00:46:14,079
station dragon is filled with over 5 800

848
00:46:18,550 --> 00:46:16,480
pounds of cargo and supplies including a

849
00:46:20,950 --> 00:46:18,560
variety of science investigations

850
00:46:23,670 --> 00:46:20,960
hardware and fresh food for the crew on

851
00:46:25,349 --> 00:46:23,680
station such as apples oranges cherry

852
00:46:28,309 --> 00:46:25,359
tomatoes onions

853
00:46:30,630 --> 00:46:28,319
carrot garlic tahini and even shelf

854
00:46:32,710 --> 00:46:30,640
stable cheese

855
00:46:35,270 --> 00:46:32,720
on board the international space station

856
00:46:37,910 --> 00:46:35,280
right now is the seven person expedition

857
00:46:39,750 --> 00:46:37,920
67 crew who i'm sure is looking forward

858
00:46:41,990 --> 00:46:39,760
to these fresh foods

859
00:46:44,710 --> 00:46:42,000
the crew includes nasa astronaut bob

860
00:46:47,190 --> 00:46:44,720
hines european space agency astronaut

861
00:46:50,470 --> 00:46:47,200
samantha christopher reddy roscosmos

862
00:46:52,870 --> 00:46:50,480
cosmonauts denise matveyev oleg artemyev

863
00:46:55,270 --> 00:46:52,880

and sergey korsikov as well as nasa

864
00:47:15,349 --> 00:46:55,280
astronauts jessica watkins and chell

865
00:47:31,510 --> 00:47:17,910
and we're just continuing to stand by on

866
00:47:35,829 --> 00:47:33,430
dragon is slated to dock to the

867
00:47:39,349 --> 00:47:35,839
international space station on saturday

868
00:47:41,750 --> 00:47:39,359
at approximately 10 20 am central time

869
00:47:44,069 --> 00:47:41,760
nasa astronauts bob hines and jessica

870
00:47:54,870 --> 00:47:44,079
watkins will be monitoring the approach

871
00:47:59,270 --> 00:47:57,030
earlier this week nasa astronaut bob

872
00:48:01,510 --> 00:47:59,280
hines and jessica watkins spent some

873
00:48:03,510 --> 00:48:01,520
time reviewing procedures on a computer

874
00:48:06,630 --> 00:48:03,520
ahead of dragon's automated rendezvous

875
00:48:08,549 --> 00:48:06,640
and docking

876
00:48:10,710 --> 00:48:08,559
and the two flight engineers were also

877
00:48:12,549 --> 00:48:10,720
joined by nasa astronaut chad lindgren

878
00:48:15,510 --> 00:48:12,559
who helped stage cargo that will be

879
00:48:30,069 --> 00:48:15,520
returned inside dragon at the end of its

880
00:48:34,309 --> 00:48:32,309
and we are continuing to stand by for

881
00:49:36,549 --> 00:48:34,319
confirmation that the nosecone checkouts

882
00:49:40,870 --> 00:49:38,309
and we did hear that the first set of

883
00:49:42,950 --> 00:49:40,880
hooks is already driven and the second

884
00:49:54,470 --> 00:49:42,960
hook set of hooks is currently driving

885
00:49:54,480 --> 00:50:25,109
all hooks are now open

886
00:50:28,950 --> 00:50:27,430
everything continuing to go smoothly we

887
00:50:30,230 --> 00:50:28,960
should have confirmation here just

888
00:51:32,470 --> 00:50:30,240

shortly that the nosecone is

889
00:52:15,910 --> 00:51:34,390
and we should have confirmation here

890
00:52:19,910 --> 00:52:18,230
and again this nose cone does cover the

891
00:52:22,069 --> 00:52:19,920
docking hardware as well as the

892
00:53:09,589 --> 00:52:22,079
navigation and rendezvous sensors and

893
00:53:29,190 --> 00:53:11,589
and we're continuing to stand by for

894
00:53:38,069 --> 00:53:31,270
and we did just hear confirmation that

895
00:53:42,870 --> 00:53:40,790
and with dragon now safely on its way to

896
00:53:45,349 --> 00:53:42,880
the international space station and the

897
00:53:47,190 --> 00:53:45,359
nosecone successfully deployed that will

898
00:53:49,910 --> 00:53:47,200
do it for us here in mission control

899
00:53:52,150 --> 00:53:49,920
houston thanks so much for joining

900
00:53:54,069 --> 00:53:52,160
tonight but i hope you'll tune in for

901
00:53:56,069 --> 00:53:54,079
the docking coverage on saturday

902
00:53:58,150 --> 00:53:56,079
beginning at 9 00 a.m central 10 a.m

903
00:53:59,829 --> 00:53:58,160
eastern time but for now i'll send it

904
00:54:02,150 --> 00:53:59,839
back over to the kennedy space center

905
00:54:03,750 --> 00:54:02,160
and megan

906
00:54:05,030 --> 00:54:03,760
sandra thanks so much for walking us

907
00:54:07,109 --> 00:54:05,040
through that that's going to wrap up our

908
00:54:09,349 --> 00:54:07,119
launch coverage of nasa's and spacex's

909
00:54:11,510 --> 00:54:09,359
25th commercial resupply services

910
00:54:13,190 --> 00:54:11,520
mission as sandra said dragon is on its

911
00:54:15,670 --> 00:54:13,200
way to dock to the international space

912
00:54:18,630 --> 00:54:15,680
station and is set to dock on saturday

913
00:54:21,030 --> 00:54:18,640

at 11 20 a.m eastern time we will have

914
00:54:22,390 --> 00:54:21,040
live coverage of that beginning at 10 am

915
00:54:24,390 --> 00:54:22,400
and if you're interested in tracking

916
00:54:26,150 --> 00:54:24,400
emit again one of those experiments on

917
00:54:28,069 --> 00:54:26,160
the mission that's studying the earth's

918
00:54:30,309 --> 00:54:28,079
climate you can do that by scanning this

919
00:54:31,829 --> 00:54:30,319
qr code you see on the bottom of your

920
00:54:36,710 --> 00:54:31,839
screen or just write down the website

921
00:54:40,549 --> 00:54:38,950
emit once attached to the space station

922
00:54:42,870 --> 00:54:40,559
emit will start collecting its first

923
00:54:44,390 --> 00:54:42,880
measurements by the end of this month

924
00:54:46,789 --> 00:54:44,400
again thanks for joining us we leave you

925
00:54:51,750 --> 00:54:46,799
with a replay of tonight's spectacular

926
00:54:53,589 --> 00:54:52,630
nine

927
00:54:54,630 --> 00:54:53,599
eight

928
00:54:55,510 --> 00:54:54,640
seven

929
00:54:56,470 --> 00:54:55,520
six

930
00:54:57,430 --> 00:54:56,480
five

931
00:54:58,470 --> 00:54:57,440
four

932
00:54:59,589 --> 00:54:58,480
three

933
00:55:00,470 --> 00:54:59,599
two

934
00:55:04,789 --> 00:55:00,480
one

935
00:55:09,750 --> 00:55:06,870
and liftoff

936
00:55:12,150 --> 00:55:09,760
liftoff of spacex's falcon 9 rocket

937
00:55:14,630 --> 00:55:12,160
launching dragon on the 25th mission to

938
00:55:17,030 --> 00:55:14,640

resupply the international space station

939
00:55:19,190 --> 00:55:17,040
with cool science and a new advanced

940
00:55:24,750 --> 00:55:19,200
instrument to more effectively study our

941
00:56:01,829 --> 00:55:53,980
[Music]