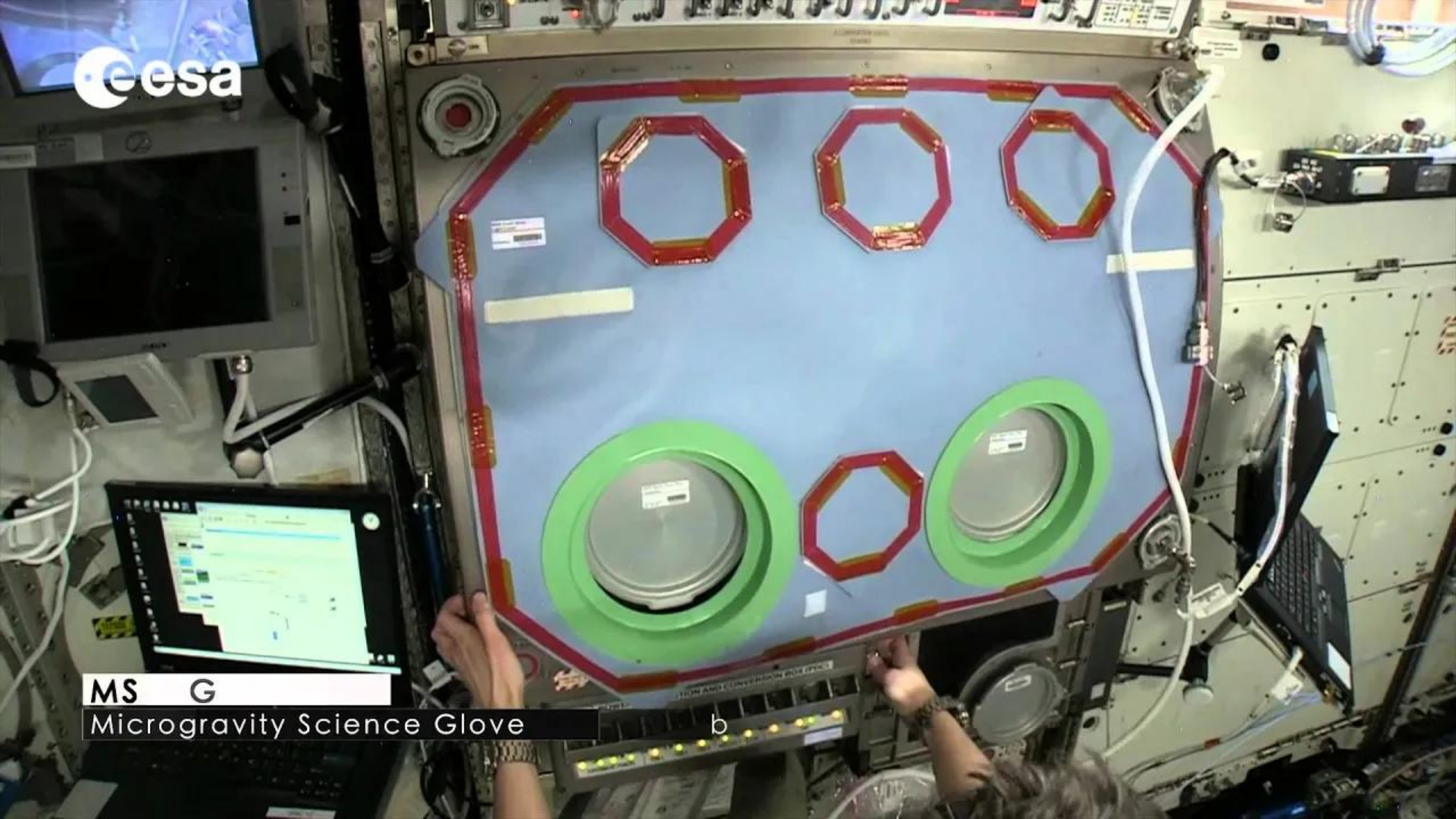
esa
MS G
Microgravity Science Glove
b

1
00:00:16,870 --> 00:00:15,030
what if there was a place where you

2
00:00:17,990 --> 00:00:16,880
could see things like you've never seen

3
00:00:19,510 --> 00:00:18,000
them before

4
00:00:21,670 --> 00:00:19,520
what if because you saw things in a

5
00:00:23,670 --> 00:00:21,680
different way you made all kinds of

6
00:00:25,750 --> 00:00:23,680
breakthroughs in science right here on

7
00:00:28,230 --> 00:00:25,760
earth well the international space

8
00:00:30,390 --> 00:00:28,240
station is just that place and it's open

9
00:00:32,790 --> 00:00:30,400
for business off the earth

10
00:00:43,110 --> 00:00:32,800
for the earth hi i'm nasa astronaut

11
00:00:43,120 --> 00:00:48,709
you okay

12
00:00:52,549 --> 00:00:50,630
i'm going to let you in on something

13
00:00:55,110 --> 00:00:52,559

while the international space station is

14
00:00:57,350 --> 00:00:55,120
a bold engineering feat and an awesome

15
00:00:59,510 --> 00:00:57,360
outpost in space the coolest thing about

16
00:01:01,670 --> 00:00:59,520
it is that it's one extraordinary space

17
00:01:04,070 --> 00:01:01,680
laboratory several things that make the

18
00:01:05,109 --> 00:01:04,080
iss a very special place for scientific

19
00:01:06,870 --> 00:01:05,119
research

20
00:01:08,390 --> 00:01:06,880
is microgravity

21
00:01:10,469 --> 00:01:08,400
space radiation

22
00:01:13,429 --> 00:01:10,479
extreme temperature exposure both hot

23
00:01:15,510 --> 00:01:13,439
and cold vast amounts of atomic oxygen

24
00:01:16,950 --> 00:01:15,520
and an earth observatory with a view

25
00:01:19,429 --> 00:01:16,960
like no other

26
00:01:21,510 --> 00:01:19,439
in fact the u.s congress designated the

27
00:01:24,870 --> 00:01:21,520
international space station as a u.s

28
00:01:26,710 --> 00:01:24,880
national laboratory in 2005. this opened

29
00:01:28,550 --> 00:01:26,720
up the space station to providing

30
00:01:30,469 --> 00:01:28,560
opportunities for additional research

31
00:01:32,710 --> 00:01:30,479
from other governmental agencies

32
00:01:35,190 --> 00:01:32,720
universities middle and high school

33
00:01:37,830 --> 00:01:35,200
students as well as private companies

34
00:01:40,390 --> 00:01:37,840
in 2011 nasa partnered with the center

35
00:01:41,510 --> 00:01:40,400
for the advancement of science and space

36
00:01:43,590 --> 00:01:41,520
cases

37
00:01:45,830 --> 00:01:43,600
this organization was awarded by nasa

38
00:01:47,590 --> 00:01:45,840

the responsibility of inciting the

39
00:01:50,069 --> 00:01:47,600
imagination of entrepreneurs and

40
00:01:52,469 --> 00:01:50,079
scientists alike we're accelerating and

41
00:01:54,630 --> 00:01:52,479
facilitating space-based research as

42
00:01:57,109 --> 00:01:54,640
well as creating public awareness of

43
00:01:59,030 --> 00:01:57,119
national lab research and making space

44
00:02:01,830 --> 00:01:59,040
science more accessible to the entire

45
00:02:07,670 --> 00:02:01,840
world for more information on science on

46
00:02:12,790 --> 00:02:09,990
our country has many national labs

47
00:02:15,750 --> 00:02:12,800
covering a landscape of scientific

48
00:02:17,990 --> 00:02:15,760
disciplines the iss national lab is the

49
00:02:20,390 --> 00:02:18,000
newest of our nation's labs and we can

50
00:02:23,030 --> 00:02:20,400
study things in space that we just can't

51
00:02:25,589 --> 00:02:23,040
study here on earth

52
00:02:27,510 --> 00:02:25,599
arc ii is our second suite of projects

53
00:02:30,390 --> 00:02:27,520
going to the international space station

54
00:02:31,990 --> 00:02:30,400
with drug development materials science

55
00:02:33,910 --> 00:02:32,000
all the way into the life sciences where

56
00:02:35,190 --> 00:02:33,920
we could improve human wellness here on

57
00:02:37,350 --> 00:02:35,200
the planet

58
00:02:39,430 --> 00:02:37,360
on this mission we're going to launch a

59
00:02:41,110 --> 00:02:39,440
very interesting new piece of hardware

60
00:02:50,630 --> 00:02:41,120
that will significantly enhance our

61
00:02:54,869 --> 00:02:52,470
now that the space station is complete

62
00:02:57,110 --> 00:02:54,879
we can move into the utilization phase

63
00:02:58,710 --> 00:02:57,120

and so nasa came to us and cases came to

64
00:03:01,190 --> 00:02:58,720
us and said look

65
00:03:04,229 --> 00:03:01,200
this would be a great tool to be able to

66
00:03:05,670 --> 00:03:04,239
study bone density in microgravity can

67
00:03:07,350 --> 00:03:05,680
you develop it and can you develop it

68
00:03:08,710 --> 00:03:07,360
quickly until you get world-class

69
00:03:10,390 --> 00:03:08,720
hardware you can't do world-class

70
00:03:12,229 --> 00:03:10,400
science so what we're doing is we're

71
00:03:18,229 --> 00:03:12,239
enabling capabilities that they never

72
00:03:22,949 --> 00:03:19,990
a bone densitometer

73
00:03:23,910 --> 00:03:22,959
basically measures the amount of bone

74
00:03:25,350 --> 00:03:23,920
loss

75
00:03:30,229 --> 00:03:25,360
that the mouse will see up in

76
00:03:36,309 --> 00:03:33,270
so if the goal and objective is to try

77
00:03:39,589 --> 00:03:36,319
to cure osteoporosis think about it if

78
00:03:41,430 --> 00:03:39,599
we have accelerated bone loss in space

79
00:03:44,070 --> 00:03:41,440
and we have a control group of animals

80
00:03:46,470 --> 00:03:44,080
in a group that we implant with a drug

81
00:03:49,110 --> 00:03:46,480
and we compare the two we can see is

82
00:03:53,429 --> 00:03:49,120
this drug effective at reducing or

83
00:03:55,589 --> 00:03:53,439
eliminating osteoporosis in in the bones

84
00:03:57,110 --> 00:03:55,599
osteoporosis is very widespread and i

85
00:03:59,509 --> 00:03:57,120
think it can this

86
00:04:01,910 --> 00:03:59,519
technology has a potential to have a

87
00:04:04,149 --> 00:04:01,920
huge impact on just the health and

88
00:04:06,149 --> 00:04:04,159

well-being of the older population the

89
00:04:08,229 --> 00:04:06,159
more experiments we get into space the

90
00:04:10,390 --> 00:04:08,239
more public that is the more people are

91
00:04:12,550 --> 00:04:10,400
going to realize that hey this is a very

92
00:04:14,630 --> 00:04:12,560
unique opportunity

93
00:04:16,949 --> 00:04:14,640
so many people have put blood sweat and

94
00:04:20,469 --> 00:04:16,959
tears to get the space station built now

95
00:04:23,510 --> 00:04:20,479
that's this makes some great discoveries

96
00:04:25,030 --> 00:04:23,520
ten years ago nasa was focused on

97
00:04:27,030 --> 00:04:25,040
completing the construction of the

98
00:04:29,670 --> 00:04:27,040
international space station now we're in

99
00:04:31,990 --> 00:04:29,680
the utilization era and so we're trying

100
00:04:39,189 --> 00:04:32,000
to attract those innovative

101
00:04:42,870 --> 00:04:41,110
cobra has a long history of developing

102
00:04:44,790 --> 00:04:42,880
new technologies and being some real

103
00:04:47,830 --> 00:04:44,800
game-changing moments from the very

104
00:04:49,670 --> 00:04:47,840
first baffler product in 1975 to putting

105
00:04:51,510 --> 00:04:49,680
graphite shelves in metals we have to

106
00:04:52,950 --> 00:04:51,520
come to market with the right product we

107
00:04:55,189 --> 00:04:52,960
cannot come to the market with something

108
00:04:56,390 --> 00:04:55,199
which is inferior it has to be bigger

109
00:04:58,310 --> 00:04:56,400
and better and stronger than the

110
00:05:00,550 --> 00:04:58,320
previous model that we have and this is

111
00:05:03,270 --> 00:05:00,560
just the next chapter

112
00:05:04,790 --> 00:05:03,280
cobra golf r d is working with cases to

113
00:05:06,550 --> 00:05:04,800

put an experiment on board the

114
00:05:07,990 --> 00:05:06,560
international space station that's going

115
00:05:10,870 --> 00:05:08,000
to investigate

116
00:05:13,510 --> 00:05:10,880
plating characteristics on metals to

117
00:05:15,430 --> 00:05:13,520
determine if we truly can make a better

118
00:05:18,230 --> 00:05:15,440
product

119
00:05:19,749 --> 00:05:18,240
i would say almost anything that is made

120
00:05:21,670 --> 00:05:19,759
anything where you'd like to be able to

121
00:05:24,310 --> 00:05:21,680
make a much more complex structure that

122
00:05:27,670 --> 00:05:24,320
you can't make here on earth huge leaps

123
00:05:29,909 --> 00:05:27,680
can be made in that environment

124
00:05:31,430 --> 00:05:29,919
not only can cobra puma golf learn

125
00:05:33,189 --> 00:05:31,440
something in microgravity about their

126
00:05:36,950 --> 00:05:33,199
golf clubs but they also can take

127
00:05:40,629 --> 00:05:36,960
advantage of our seal spaces in it

128
00:05:43,749 --> 00:05:40,639
the spaces in its seal is a logo created

129
00:05:46,870 --> 00:05:43,759
by cases that identifies the value of

130
00:05:51,029 --> 00:05:46,880
using this new environment to improve a

131
00:05:55,590 --> 00:05:53,029
it's just flat out cool and people

132
00:05:57,110 --> 00:05:55,600
understand that it's super high tech and

133
00:05:59,510 --> 00:05:57,120
if you look at the golf club and can

134
00:06:02,550 --> 00:05:59,520
imagine all of the stuff that it's taken

135
00:06:05,110 --> 00:06:02,560
to do to get us into space is in that

136
00:06:06,469 --> 00:06:05,120
golf club from a branding standpoint i

137
00:06:09,110 --> 00:06:06,479
can't see a better fit

138
00:06:10,710 --> 00:06:09,120

i really can't

139
00:06:13,430 --> 00:06:10,720
people have always been fascinated with

140
00:06:15,350 --> 00:06:13,440
space it's the unknown from the very

141
00:06:17,430 --> 00:06:15,360
first days of trying to put a man on the

142
00:06:19,189 --> 00:06:17,440
moon in the late 60s through to the

143
00:06:24,070 --> 00:06:19,199
international space station as it is

144
00:06:27,749 --> 00:06:25,990
this is an exciting period of time right

145
00:06:30,230 --> 00:06:27,759
now where we have the opportunity to

146
00:06:32,950 --> 00:06:30,240
join with non-traditional users not just

147
00:06:35,670 --> 00:06:32,960
researchers but commercial for-profit

148
00:06:49,110 --> 00:06:35,680
companies to improve life on earth and

149
00:06:52,870 --> 00:06:50,950
when you're up there for six months or

150
00:06:54,629 --> 00:06:52,880
in scott kelly's case an entire year

151
00:06:56,469 --> 00:06:54,639
it's really the working in space part

152
00:06:57,909 --> 00:06:56,479
that becomes kind of the thing you love

153
00:06:59,909 --> 00:06:57,919
the most it's the thing that gets you

154
00:07:01,430 --> 00:06:59,919
through the days you're working with

155
00:07:03,110 --> 00:07:01,440
these professionals on the ground and a

156
00:07:04,950 --> 00:07:03,120
lot of them have spent their entire

157
00:07:06,309 --> 00:07:04,960
lives working on these science

158
00:07:07,749 --> 00:07:06,319
experiments and here we are up there and

159
00:07:10,070 --> 00:07:07,759
we get to operate them and it's really

160
00:07:11,430 --> 00:07:10,080
an honor to get to do that and in many

161
00:07:14,230 --> 00:07:11,440
ways those are some of my fondest

162
00:07:15,749 --> 00:07:14,240
memories of being in space

163
00:07:17,749 --> 00:07:15,759

you get to you get to work these

164
00:07:19,029 --> 00:07:17,759
experiments and they're usually watching

165
00:07:20,870 --> 00:07:19,039
over your shoulder from the ground and

166
00:07:22,390 --> 00:07:20,880
there's a lot of times where i would do

167
00:07:24,550 --> 00:07:22,400
something whether it was fluids or with

168
00:07:26,629 --> 00:07:24,560
flame research it really didn't matter

169
00:07:28,309 --> 00:07:26,639
um the investigator would just say whoa

170
00:07:30,550 --> 00:07:28,319
whoa wait dude do that again that was

171
00:07:32,550 --> 00:07:30,560
incredible and totally unexpected and

172
00:07:34,230 --> 00:07:32,560
that was what just made you smile big up

173
00:07:36,309 --> 00:07:34,240
there when when hey we've been flying in

174
00:07:38,150 --> 00:07:36,319
space a long long time but we are still

175
00:07:39,990 --> 00:07:38,160
doing research that has unexpected

176
00:07:41,430 --> 00:07:40,000
results every single day on the space

177
00:07:51,589 --> 00:07:41,440
station and i really love that about

178
00:07:56,550 --> 00:07:54,710
well the the gee whiz thing is the

179
00:08:00,550 --> 00:07:56,560
zero gravity

180
00:08:02,629 --> 00:08:00,560
having a long-term laboratory

181
00:08:06,629 --> 00:08:02,639
with zero gravity

182
00:08:08,469 --> 00:08:06,639
is very unique and i think it's one that

183
00:08:10,550 --> 00:08:08,479
i hope that we will reap the benefits

184
00:08:12,469 --> 00:08:10,560
from in the future

185
00:08:16,230 --> 00:08:12,479
from a scientific perspective

186
00:08:20,869 --> 00:08:18,629
as soon as the station was habitable

187
00:08:23,830 --> 00:08:20,879
astronauts began to study the impact of

188
00:08:26,869 --> 00:08:23,840

microgravity and other space effects on

189
00:08:28,469 --> 00:08:26,879
the human body other life forms fluids

190
00:08:30,469 --> 00:08:28,479
and materials

191
00:08:32,790 --> 00:08:30,479
over fifteen years of continuous

192
00:08:34,709 --> 00:08:32,800
research and more than sixteen hundred

193
00:08:36,230 --> 00:08:34,719
experiments have been conducted on the

194
00:08:40,870 --> 00:08:36,240
space station

195
00:08:43,990 --> 00:08:40,880
research laboratory that advances our

196
00:08:46,630 --> 00:08:44,000
knowledge of human physiology biology

197
00:08:49,110 --> 00:08:46,640
and material and physical science

198
00:08:51,750 --> 00:08:49,120
this knowledge translates into medical

199
00:08:53,430 --> 00:08:51,760
economic and environmental benefits for

200
00:08:55,910 --> 00:08:53,440
the people of earth

201
00:08:58,790 --> 00:08:55,920
outside the station sustained by its

202
00:09:01,670 --> 00:08:58,800
large solar power supply is a silent

203
00:09:04,230 --> 00:09:01,680
explorer sifting through space

204
00:09:06,470 --> 00:09:04,240
called the alpha magnetic spectrometer

205
00:09:09,509 --> 00:09:06,480
it is finding and tracking exotic

206
00:09:11,509 --> 00:09:09,519
particles of anti-matter and dark matter

207
00:09:14,389 --> 00:09:11,519
found in cosmic rays from distant

208
00:09:17,110 --> 00:09:14,399
galaxies the results could change our

209
00:09:19,110 --> 00:09:17,120
basic understanding of the universe

210
00:09:21,269 --> 00:09:19,120
other research aboard the station has

211
00:09:23,269 --> 00:09:21,279
led to the design and development of

212
00:09:25,590 --> 00:09:23,279
tiny microbe balloons which will help

213
00:09:28,389 --> 00:09:25,600

get pharmaceutical drugs directly to

214
00:09:31,670 --> 00:09:28,399
specific cancer cells the station is

215
00:09:33,829 --> 00:09:31,680
also used as an education platform to

216
00:09:36,230 --> 00:09:33,839
encourage and motivate today's youth to

217
00:09:39,430 --> 00:09:36,240
pursue careers in math science

218
00:09:41,350 --> 00:09:39,440
engineering and technology in addition

219
00:09:43,110 --> 00:09:41,360
researchers aboard the space station

220
00:09:46,389 --> 00:09:43,120
will gain knowledge about human

221
00:09:49,670 --> 00:09:46,399
physiology radiation material science

222
00:09:51,750 --> 00:09:49,680
engineering biology fluid physics and

223
00:09:54,230 --> 00:09:51,760
technology that will help people on

224
00:09:55,990 --> 00:09:54,240
earth and enable future space

225
00:09:58,630 --> 00:09:56,000
exploration missions

226
00:10:01,030 --> 00:09:58,640
there is no single place on earth where

227
00:10:03,750 --> 00:10:01,040
a laboratory like this can be found and

228
00:10:04,470 --> 00:10:03,760
in 2005 congress designated the space

229
00:10:07,509 --> 00:10:04,480
station

230
00:10:09,670 --> 00:10:07,519
as an official u.s national laboratory

231
00:10:12,150 --> 00:10:09,680
this has opened up the station and

232
00:10:14,630 --> 00:10:12,160
provided opportunities for additional

233
00:10:16,870 --> 00:10:14,640
research from other agencies

234
00:10:20,550 --> 00:10:16,880
universities middle and high school

235
00:10:22,949 --> 00:10:20,560
students and private companies

236
00:10:25,670 --> 00:10:22,959
scientists from all over the world are

237
00:10:27,910 --> 00:10:25,680
using facilities aboard the station

238
00:10:29,829 --> 00:10:27,920

several patents and partnerships have

239
00:10:33,110 --> 00:10:29,839
already demonstrated the value and

240
00:10:35,350 --> 00:10:33,120
benefits of space-based research

241
00:10:37,670 --> 00:10:35,360
future space station experiments and

242
00:10:41,030 --> 00:10:37,680
their applications on earth are in the

243
00:10:47,030 --> 00:10:41,040
making and the promise and possibilities

244
00:10:51,590 --> 00:10:48,949
one aspect of the international space

245
00:10:53,670 --> 00:10:51,600
station program that makes it so unique

246
00:10:56,550 --> 00:10:53,680
is its international partners

247
00:10:59,190 --> 00:10:56,560
16 countries working together combining

248
00:11:02,150 --> 00:10:59,200
resources to make the iss the best it

249
00:11:04,150 --> 00:11:02,160
can be recently astronaut samantha

250
00:11:08,230 --> 00:11:04,160
christoferetti from the european space

251
00:11:09,509 --> 00:11:08,240
agency returned from her 199 day stay on

252
00:11:11,990 --> 00:11:09,519
board

253
00:11:14,389 --> 00:11:12,000
because the iss is a working active

254
00:11:16,870 --> 00:11:14,399
science laboratory the crew on board

255
00:11:18,790 --> 00:11:16,880
puts in a ton of work every day

256
00:11:20,710 --> 00:11:18,800
let's see some of what samantha was up

257
00:13:13,750 --> 00:11:20,720
to during her stay on the international

258
00:13:13,760 --> 00:14:30,230
so

259
00:14:34,870 --> 00:14:32,230
of course scientific research is the

260
00:14:36,629 --> 00:14:34,880
main area of focus on the iss but

261
00:14:38,069 --> 00:14:36,639
astronauts and cosmonauts they have to

262
00:14:40,949 --> 00:14:38,079
live there too

263
00:14:43,189 --> 00:14:40,959

normal daily routine activities can be

264
00:14:45,269 --> 00:14:43,199
way different in space and a bit

265
00:14:47,110 --> 00:14:45,279
challenging here's more on that topic

266
00:14:53,189 --> 00:14:47,120
from issa's samantha christopher reddy

267
00:14:58,069 --> 00:14:55,750
hello and welcome to my hygiene coroner

268
00:15:01,350 --> 00:14:58,079
here on the iss this is the place where

269
00:15:05,350 --> 00:15:01,360
i wash brush my teeth or after workouts

270
00:15:07,829 --> 00:15:05,360
take a shower iss style the heart of the

271
00:15:09,590 --> 00:15:07,839
hygiene corner is the

272
00:15:12,310 --> 00:15:09,600
toiletry pouch

273
00:15:14,870 --> 00:15:12,320
comfort 1m it's russian made and most

274
00:15:15,910 --> 00:15:14,880
crew members ask to have one sent up for

275
00:15:18,230 --> 00:15:15,920
them

276
00:15:20,389 --> 00:15:18,240
it's really useful to

277
00:15:22,710 --> 00:15:20,399
deploy your hygiene items and hygiene

278
00:15:24,870 --> 00:15:22,720
items come come up in a ziploc like this

279
00:15:27,269 --> 00:15:24,880
one this contains supplies that need to

280
00:15:29,110 --> 00:15:27,279
last for six months

281
00:15:31,350 --> 00:15:29,120
and they don't look much different from

282
00:15:33,590 --> 00:15:31,360
what your hygiene items look in your

283
00:15:35,829 --> 00:15:33,600
bathroom probably you can see a

284
00:15:37,509 --> 00:15:35,839
toothbrush here

285
00:15:39,590 --> 00:15:37,519
toothpaste tube

286
00:15:41,829 --> 00:15:39,600
deodorant

287
00:15:45,829 --> 00:15:41,839
and as far as towels are concerned we

288
00:15:48,069 --> 00:15:45,839

cannot wash stuff up here so

289
00:15:51,590 --> 00:15:48,079
we get a supply of towels

290
00:15:53,749 --> 00:15:51,600
every week we get a towel like this one

291
00:15:56,069 --> 00:15:53,759
and a smaller washcloth

292
00:15:58,629 --> 00:15:56,079
i usually take my new ones out on

293
00:16:00,230 --> 00:15:58,639
sundays so it's not quite time yet i put

294
00:16:01,269 --> 00:16:00,240
those back

295
00:16:03,030 --> 00:16:01,279
and

296
00:16:06,470 --> 00:16:03,040
for today i will use the ones that i

297
00:16:08,790 --> 00:16:06,480
have already deployed for the week

298
00:16:10,629 --> 00:16:08,800
every second day we can also take out a

299
00:16:12,550 --> 00:16:10,639
new um

300
00:16:15,590 --> 00:16:12,560
let's say camping town it's one of those

301
00:16:17,990 --> 00:16:15,600
uh light towels it comes in a foil like

302
00:16:20,710 --> 00:16:18,000
this it's dry and then we can add water

303
00:16:23,749 --> 00:16:20,720
wet it and it's really nice to to clean

304
00:16:26,310 --> 00:16:23,759
your skin

305
00:16:28,150 --> 00:16:26,320
in terms of brushing your teeth

306
00:16:29,509 --> 00:16:28,160
it's actually very similar to what you

307
00:16:32,629 --> 00:16:29,519
would do on earth

308
00:16:34,470 --> 00:16:32,639
as i said a toothbrush and toothpaste

309
00:16:36,949 --> 00:16:34,480
look just the same and you brush your

310
00:16:38,230 --> 00:16:36,959
teeth just the same the only difference

311
00:16:40,470 --> 00:16:38,240
of course is that

312
00:16:42,069 --> 00:16:40,480
we don't have a sink to spit in when

313
00:16:43,430 --> 00:16:42,079

we're done

314
00:16:46,870 --> 00:16:43,440
all that extra

315
00:16:47,990 --> 00:16:46,880
toothpaste so some astronauts just

316
00:16:50,629 --> 00:16:48,000
swallow it

317
00:16:52,629 --> 00:16:50,639
it's quick and easy i personally don't

318
00:16:53,590 --> 00:16:52,639
like to do that so i actually spit it in

319
00:16:55,749 --> 00:16:53,600
a towel

320
00:16:57,590 --> 00:16:55,759
it's not the most elegant thing but

321
00:17:00,150 --> 00:16:57,600
you have to do what you have to do

322
00:17:02,150 --> 00:17:00,160
as far as soap is concerned it comes up

323
00:17:05,189 --> 00:17:02,160
in in pouches like this one you need to

324
00:17:07,669 --> 00:17:05,199
add water and then you get a nice

325
00:17:10,069 --> 00:17:07,679
liquid soap pouch which needs to last

326
00:17:11,590 --> 00:17:10,079
for about two weeks and it's a no rains

327
00:17:13,270 --> 00:17:11,600
type of soap it doesn't make a lot of

328
00:17:14,710 --> 00:17:13,280
foam and it doesn't really need to be

329
00:17:16,309 --> 00:17:14,720
rinsed

330
00:17:19,590 --> 00:17:16,319
and of course we do not have any running

331
00:17:21,189 --> 00:17:19,600
water up here so we also need to fill up

332
00:17:23,270 --> 00:17:21,199
water pouches

333
00:17:25,029 --> 00:17:23,280
we can connect pouches like this one to

334
00:17:27,270 --> 00:17:25,039
the water dispenser which is in the

335
00:17:28,230 --> 00:17:27,280
nearby module in the us lab

336
00:17:30,549 --> 00:17:28,240
and

337
00:17:32,710 --> 00:17:30,559
i personally like to to fill it up with

338
00:17:34,390 --> 00:17:32,720

warm water when it's time to wash but

339
00:17:36,789 --> 00:17:34,400
you can also fill it up with ambient

340
00:17:38,630 --> 00:17:36,799
temperature water so i'll go ahead and

341
00:17:41,750 --> 00:17:38,640
do this right now and i'll see you in a

342
00:17:46,470 --> 00:17:44,230
here i am and i got my water

343
00:17:48,390 --> 00:17:46,480
so first of all i'd like to show you um

344
00:17:50,710 --> 00:17:48,400
how water behaves in weightlessness

345
00:17:52,789 --> 00:17:50,720
which is kind of uh interesting

346
00:17:54,630 --> 00:17:52,799
of course it doesn't fall down

347
00:17:56,950 --> 00:17:54,640
like it does on earth and it kind of

348
00:18:03,909 --> 00:17:56,960
tends to stick to your skin

349
00:18:03,919 --> 00:18:07,669
if you can see it

350
00:18:13,029 --> 00:18:09,190
see it doesn't really want to move away

351
00:18:16,070 --> 00:18:14,630
just because of that surface tension

352
00:18:18,310 --> 00:18:16,080
effect

353
00:18:19,830 --> 00:18:18,320
now of course i put a lot of water on my

354
00:18:22,310 --> 00:18:19,840
hand just to show you you wouldn't you

355
00:18:23,590 --> 00:18:22,320
wouldn't use all that water to wash um

356
00:18:25,990 --> 00:18:23,600
just because it's it's a little bit

357
00:18:33,909 --> 00:18:26,000
difficult to control

358
00:18:36,789 --> 00:18:34,789
but

359
00:18:38,549 --> 00:18:36,799
if you have some time

360
00:18:41,510 --> 00:18:38,559
to be you know to take your time and be

361
00:18:43,350 --> 00:18:41,520
careful you can you can do that i think

362
00:18:46,710 --> 00:18:43,360
i do it sometimes i really put some

363
00:18:51,750 --> 00:18:46,720

water on my skin like that

364
00:19:19,029 --> 00:18:55,110
and

365
00:19:22,470 --> 00:19:19,039
feeling of

366
00:19:26,870 --> 00:19:24,230
and then as i said i like to keep my

367
00:19:29,029 --> 00:19:26,880
actual towels here dry so you can use

368
00:19:35,990 --> 00:19:29,039
them to

369
00:19:39,510 --> 00:19:37,669
now of course you you don't always have

370
00:19:41,110 --> 00:19:39,520
the time to take it slowly and be so

371
00:19:43,350 --> 00:19:41,120
careful so if you're a little bit more

372
00:19:44,950 --> 00:19:43,360
in a rush let's say it's a it's a work

373
00:19:46,470 --> 00:19:44,960
day and you had your workout and then

374
00:19:50,870 --> 00:19:46,480
you have to rush off and do something

375
00:19:52,870 --> 00:19:50,880
else then you will simply um you know

376
00:19:55,190 --> 00:19:52,880
just squirt the water into your camping

377
00:19:57,190 --> 00:19:55,200
towel and add some soap and that's a lot

378
00:19:59,669 --> 00:19:57,200
easier to control because you can just

379
00:20:02,390 --> 00:19:59,679
rub your skin like that and uh i don't

380
00:20:04,789 --> 00:20:02,400
find it as pleasant but it's certainly a

381
00:20:09,430 --> 00:20:04,799
lot quicker and and easier to and easier

382
00:20:13,669 --> 00:20:11,590
now all the the water that you use

383
00:20:17,029 --> 00:20:13,679
eventually ends up in the towels that

384
00:20:18,789 --> 00:20:17,039
you use to dry and we leave those towels

385
00:20:20,390 --> 00:20:18,799
close to a ventilation grid like in this

386
00:20:23,510 --> 00:20:20,400
case you can see a ventilation grid

387
00:20:26,390 --> 00:20:23,520
right here so that they can dry off and

388
00:20:28,950 --> 00:20:26,400

all the water then is recuperated it

389
00:20:30,789 --> 00:20:28,960
evaporates in the air and then in the

390
00:20:33,190 --> 00:20:30,799
air conditioning system it condensates

391
00:20:35,350 --> 00:20:33,200
again and it goes into our

392
00:20:37,430 --> 00:20:35,360
water recreation bus and it actually

393
00:20:39,190 --> 00:20:37,440
gets turned into potable water again so

394
00:20:41,750 --> 00:20:39,200
we don't absolutely lose any of the

395
00:20:44,390 --> 00:20:41,760
water that we use to wash cutting your

396
00:20:46,310 --> 00:20:44,400
fingernails is not the easiest thing in

397
00:20:48,549 --> 00:20:46,320
weightlessness of course you um you

398
00:20:51,029 --> 00:20:48,559
don't want to lose any pieces of nails

399
00:20:53,510 --> 00:20:51,039
around the cabin so the best thing is

400
00:20:56,070 --> 00:20:53,520
actually to do it really close to a

401
00:20:57,830 --> 00:20:56,080
return grid of the ventilation system so

402
00:21:01,590 --> 00:20:57,840
that all the pieces of nails that you

403
00:21:03,990 --> 00:21:01,600
cut off get immediately attracted

404
00:21:14,070 --> 00:21:04,000
sucked towards the grid

405
00:21:17,430 --> 00:21:15,669
there you go and then when you're done

406
00:21:18,789 --> 00:21:17,440
of course you want to have a vacuum

407
00:21:24,870 --> 00:21:18,799
cleaner handy

408
00:21:27,669 --> 00:21:26,070
and to

409
00:21:32,230 --> 00:21:27,679
wash your hair

410
00:21:34,950 --> 00:21:32,240
um we have the special no-rinse shampoo

411
00:21:37,110 --> 00:21:34,960
that requires uh um theoretically no

412
00:21:38,710 --> 00:21:37,120
rinsing but at least very little rinsing

413
00:21:41,430 --> 00:21:38,720

so we just court

414
00:21:43,110 --> 00:21:41,440
water into our hair we add some shampoo

415
00:21:45,430 --> 00:21:43,120
we massage it just like we would on

416
00:21:47,510 --> 00:21:45,440
earth and then we kind of dry the excess

417
00:21:59,430 --> 00:21:47,520
water and shampoo off with the with a

418
00:22:05,270 --> 00:22:02,149
gravity the question of gravity and why

419
00:22:07,669 --> 00:22:05,280
do astronauts float around when they're

420
00:22:11,029 --> 00:22:07,679
in space and it's not because the

421
00:22:13,110 --> 00:22:11,039
gravity is gone it's because the

422
00:22:16,310 --> 00:22:13,120
spacecraft motion

423
00:22:19,990 --> 00:22:16,320
cancels out the relative effects of

424
00:22:22,710 --> 00:22:20,000
gravity that you experience when you are

425
00:22:25,669 --> 00:22:22,720
in an orbit around earth you are in a

426
00:22:28,870 --> 00:22:25,679
continuous state of free fall and this

427
00:22:32,390 --> 00:22:28,880
free fall is what knulls out the local

428
00:22:34,230 --> 00:22:32,400
effect of gravity so imagine

429
00:22:37,909 --> 00:22:34,240
space station and this is going to be

430
00:22:40,549 --> 00:22:37,919
exaggerated space station falls

431
00:22:42,390 --> 00:22:40,559
three centimeters towards earth okay

432
00:22:43,909 --> 00:22:42,400
it's closer to earth but at the same

433
00:22:47,029 --> 00:22:43,919
time if it moves

434
00:22:49,270 --> 00:22:47,039
three centimeters out that way its

435
00:22:51,990 --> 00:22:49,280
radial distance from earth remains

436
00:22:54,710 --> 00:22:52,000
constant and so you you keep doing this

437
00:22:58,070 --> 00:22:54,720
and you think of it as stair-stepping

438
00:23:02,470 --> 00:22:58,080

your way around earth so the result of

439
00:23:06,390 --> 00:23:02,480
this motion is moving in an arc around

440
00:23:08,230 --> 00:23:06,400
earth at constant distance so you're not

441
00:23:10,310 --> 00:23:08,240
really in zero gravity you're still

442
00:23:11,110 --> 00:23:10,320
under the influence of earth's gravity

443
00:23:14,870 --> 00:23:11,120
but

444
00:23:17,029 --> 00:23:14,880
nominally we will say you're in zero g

445
00:23:18,870 --> 00:23:17,039
which is technically not the correct way

446
00:23:22,230 --> 00:23:18,880
of saying it so you want to refer to it

447
00:23:24,070 --> 00:23:22,240
as being weightless

448
00:23:28,230 --> 00:23:24,080
progress cargo ship

449
00:23:30,230 --> 00:23:28,240
thrusters are boosting the space station

450
00:23:32,549 --> 00:23:30,240
feel my speed picking up

451
00:23:34,870 --> 00:23:32,559
okay this time i'm gonna just

452
00:23:37,669 --> 00:23:34,880
let go the camera and see how camera

453
00:23:40,470 --> 00:23:37,679
moves really really

454
00:23:42,950 --> 00:23:40,480
yeah yeah release the camera

455
00:23:46,149 --> 00:23:42,960
now it's all moving

456
00:23:48,310 --> 00:23:46,159
to control i'm not pushing this is the

457
00:23:52,470 --> 00:23:48,320
acceleration from the thrusters of the

458
00:23:56,549 --> 00:23:54,310
in the camera

459
00:23:58,870 --> 00:23:56,559
coming closer again it's just due to the

460
00:24:00,310 --> 00:23:58,880
acceleration constant acceleration it's

461
00:24:02,310 --> 00:24:00,320
an eight minute

462
00:24:03,830 --> 00:24:02,320
burn by the progress vehicle that means

463
00:24:05,430 --> 00:24:03,840

we'll have eight minutes of constant

464
00:24:07,190 --> 00:24:05,440
acceleration

465
00:24:09,430 --> 00:24:07,200
this pushes the space station to a

466
00:24:11,350 --> 00:24:09,440
higher orbit

467
00:24:13,110 --> 00:24:11,360
in this episode of station life we

468
00:24:15,830 --> 00:24:13,120
learned how the international space

469
00:24:17,909 --> 00:24:15,840
station is an astonishing u.s national

470
00:24:19,990 --> 00:24:17,919
laboratory and how scientific research

471
00:24:21,750 --> 00:24:20,000
is happening all the time

472
00:24:23,909 --> 00:24:21,760
some of the exciting experiments are

473
00:24:25,830 --> 00:24:23,919
fluid shifts in the human body so we can

474
00:24:27,590 --> 00:24:25,840
learn how to take care of our body on

475
00:24:29,430 --> 00:24:27,600
deep space missions

476
00:24:31,990 --> 00:24:29,440
studies in bone loss that could help

477
00:24:34,310 --> 00:24:32,000
lead to treatments for osteoporosis

478
00:24:36,310 --> 00:24:34,320
and joining forces with merck research

479
00:24:38,870 --> 00:24:36,320
labs on protein crystal growth

480
00:24:41,110 --> 00:24:38,880
investigations which crystallizes human

481
00:24:42,710 --> 00:24:41,120
antibodies that could help develop new

482
00:24:44,470 --> 00:24:42,720
clinical trials for the treatment of

483
00:24:46,950 --> 00:24:44,480
several diseases

484
00:24:48,870 --> 00:24:46,960
as you can see research on the iss

485
00:24:49,830 --> 00:24:48,880
continues to benefit us all here on

486
00:24:51,990 --> 00:24:49,840
earth

487
00:24:53,669 --> 00:24:52,000
be sure to stay in touch and follow us

488
00:24:55,510 --> 00:24:53,679

on facebook and twitter for the latest

489
00:24:57,110 --> 00:24:55,520
research news and don't forget to

490
00:24:59,909 --> 00:24:57,120
download our new app on your mobile

491
00:25:02,630 --> 00:24:59,919
device until next time we're working off