1
00:00:01,319 --> 00:00:03,120
Hey, guys.

2
00:00:03,120 --> 00:00:07,320
Good morning from the International Space
Station and from the Space Shuttle Endeavour,

3
00:00:07,320 --> 00:00:08,800
Mr. President.

4
00:00:08,800 --> 00:00:15,950
Well, it's great to talk to you guys. I wanted
to, first of all, just say that we've got

5
00:00:15,950 --> 00:00:23,840
a bunch of very excited young people here
with us, along with a bunch of somewhat excited

6
00:00:23,840 --> 00:00:33,460
teachers. We have one engineer and one member
of Congress, so you've got a -- and a whole

7
00:00:33,460 --> 00:00:40,079
bunch of press here, so it's a pretty motley
crew. And one President.

8
00:00:40,079 --> 00:00:47,500
But I just wanted to let you guys know how
proud we are of all of you at what you guys

9
00:00:47,500 --> 00:00:55,539
have been accomplishing. I've had a chance
to take a look at what Tranquility Module

10
00:00:55,539 --> 00:01:04,960
is doing. Everybody here back home is excited
about this bay on the world that you guys

11
00:01:04,960 --> 00:01:11,820

are opening up, and Stephen Colbert at least
is excited about his treadmill.

12
00:01:11,820 --> 00:01:19,130
And so we just wanted to let you know that
the amazing work that's being done on the

13
00:01:19,130 --> 00:01:27,720
International Space Station not only by our
American astronauts but also our colleagues

14
00:01:27,720 --> 00:01:37,430
from Japan and Russia is just a testimony
to the human ingenuity; a testimony to extraordinary

15
00:01:37,430 --> 00:01:47,250
skill and courage that you guys bring to bear;
and is also a testimony to why continued space

16
00:01:47,250 --> 00:01:54,899
exploration is so important, and is part of
the reason why my commitment to NASA is unwavering.

17
00:01:54,899 --> 00:02:02,020
But instead of me doing all the talking, I
wanted you guys to maybe let us know what

18
00:02:02,020 --> 00:02:10,540
this new Tranquility Module will help you
accomplish. One of the things that we've done

19
00:02:10,540 --> 00:02:15,880
with our NASA "Vision for the Future" is to
extend the life of our participation in the

20
00:02:15,880 --> 00:02:20,990
Space Station. And so we just want to get
a sense of the kind of research that you guys

21
00:02:20,990 --> 00:02:24,190

are doing, and then maybe I'll turn it over
to some young people to see if they've got

22
00:02:24,190 --> 00:02:25,300
any questions.

23
00:02:25,300 --> 00:02:29,320
Well, thank you very much, Mr. President.
It is a large team effort. In front of you,

24
00:02:29,320 --> 00:02:35,910
you have the joint crew of Endeavour and the
Space Station, and we are the ones that are

25
00:02:35,910 --> 00:02:41,520
fortunate enough to be able to accomplish
this great mission together in space. But

26
00:02:41,520 --> 00:02:45,900
there are many thousands of people around
the world that gave the best of themselves

27
00:02:45,900 --> 00:02:50,360
over many years in order to have the days
that we've been having up here.

28
00:02:50,360 --> 00:02:56,060
For your question, I'm going to turn it over
to ISS Commander Jeff Williams.

29
00:02:56,060 --> 00:03:00,550
Well, Mr. President, as you know, the ISS
has been under assembly for many years, over

30
00:03:00,550 --> 00:03:06,070
a decade now. And as George said, it's because
of the efforts of thousands of people around

31
00:03:06,070 --> 00:03:09,070
the world among the international partnerships.

32
00:03:09,070 --> 00:03:15,520
The arrival of this module means several things.
It means, of course, that we -- everybody

33
00:03:15,520 --> 00:03:22,380
is aware of this new grand view that we have
of the world below us, and that brings a special

34
00:03:22,380 --> 00:03:31,490
significance. But the Tranquility Module also
is going to serve as a gym, as a hygiene area,

35
00:03:31,490 --> 00:03:38,040
as a place a crew can maintain themselves
for a long duration. And a long duration living

36
00:03:38,040 --> 00:03:44,960
and working in space is what the Space Station
is all about -- to do the research and the

37
00:03:44,960 --> 00:03:48,120
science necessary to take us beyond Earth
orbit.

38
00:03:48,120 --> 00:03:53,980
That was the ultimate purpose of the Space
Station, and the arrival of this module will

39
00:03:53,980 --> 00:03:59,560
enable us to do that. And it really marks
the end of the major assembly of at least

40
00:03:59,560 --> 00:04:05,620
the U.S. orbiting segment to -- as we transition
into full utilization of this magnificent

41
00:04:05,620 --> 00:04:06,620
orbiting laboratory.

42
00:04:06,620 --> 00:04:17,370
Do you guys want to just mention some of the research and experiments that you can conduct

43
00:04:17,370 --> 00:04:22,879
on the Space Station that you could not be doing back here at home?

44
00:04:22,879 --> 00:04:26,910
That's a great question, Mr. President. Let me start off by saying one of the nice things

45
00:04:26,910 --> 00:04:31,130
about where we physically are right now is that we remove the effects of gravity, so

46
00:04:31,130 --> 00:04:37,390
we're able to do experiments that involve the effect of gravity basically on Earth as

47
00:04:37,390 --> 00:04:39,740
we look at what happens with the absence of it.

48
00:04:39,740 --> 00:04:45,290
For instance, when you do combustion studies, flames on Earth burn in a teardrop fashion

49
00:04:45,290 --> 00:04:49,281
because the air comes in from underneath it and feeds the flame, but we can't do that

50
00:04:49,281 --> 00:04:54,130
here since the air doesn't know where up is, there's no convection. So the flames burn

51
00:04:54,130 --> 00:04:55,350
very purely in a ball.

52

00:04:55,350 --> 00:05:01,480
In a similar sense, when we do cellular research
for even -- like for cancer research, for

53
00:05:01,480 --> 00:05:06,440
instance, on Earth the cells actually collapse
under their own weight and so their growth

54
00:05:06,440 --> 00:05:10,830
on Earth are a little bit distorted. Here,
without the gravity effect, we can grow cells

55
00:05:10,830 --> 00:05:15,240
very purely and understand the mechanisms
by which they are replicating.

56
00:05:15,240 --> 00:05:21,930
We're also doing metallic research and materials
research to help us understand how to make

57
00:05:21,930 --> 00:05:26,300
materials on Earth better, but also to find
out what materials are better for long-duration

58
00:05:26,300 --> 00:05:29,420
missions and traveling beyond Earth's orbit.

59
00:05:29,420 --> 00:05:34,610
Some of the other experiments involve biological,
where we actually have, for instance, butterflies

60
00:05:34,610 --> 00:05:39,520
up here and we watch the life process of the
butterflies. Many, many experiments up and

61
00:05:39,520 --> 00:05:44,500
down the stack are quite exciting when we
are able to remove the variable of gravity.

62
00:05:44,500 --> 00:05:53,280

Well, some of the things that you talked about
are in line with where we want to see NASA

63
00:05:53,280 --> 00:06:00,139
going increasingly: What are those transformational
technologies that would allow us to potentially

64
00:06:00,139 --> 00:06:05,740
see space travel of longer durations? If we
want to get to Mars, if we want to get beyond

65
00:06:05,740 --> 00:06:14,250
that, what kinds of technologies are going
to be necessary in order for us to make sure

66
00:06:14,250 --> 00:06:21,380
that folks can get there in one piece and
get back in one piece and that -- the kinds

67
00:06:21,380 --> 00:06:27,670
of fuels that we use and the technologies
we use are going to facilitate something that

68
00:06:27,670 --> 00:06:33,300
is actually feasible? And we're very excited
about the possibilities of putting more research

69
00:06:33,300 --> 00:06:36,620
dollars into some of these transformational
technologies.

70
00:06:36,620 --> 00:06:44,380
So we're excited about what you're doing and
what folks back on Earth as part of NASA's

71
00:06:44,380 --> 00:06:47,660
engineering teams and scientific teams are
doing.

72
00:06:47,660 --> 00:06:52,780

What I want to do is give some of these young people a chance to ask a couple of questions,

73
00:06:52,780 --> 00:06:58,800
but I'm not sure I've got any volunteers so I'm going to have to turn around -- oh, look.

74
00:06:58,800 --> 00:07:01,450
(Laughter.) This is a serious bunch here, I can tell. So I'm going to hand the phone

75
00:07:01,450 --> 00:07:04,860
over to the first one -- hold on -- what's your name?

76
00:07:04,860 --> 00:07:07,450
This is Ruth, coming from North Carolina.

77
00:07:07,450 --> 00:07:19,940
What are some of the benefits of exploring space as opposed to exploring other places

78
00:07:19,940 --> 00:07:20,940
on Earth?

79
00:07:20,940 --> 00:07:24,800
Okay. A pretty serious question, guys. You better have a good answer -- the NASA folks

80
00:07:24,800 --> 00:07:26,770
are sitting here listening.

81
00:07:26,770 --> 00:07:32,680
Ruth, I can tell you your curiosity reaches far, and so does ours. And that's sort of

82
00:07:32,680 --> 00:07:36,010
the human spirit, to find out what can humans really do.

83
00:07:36,010 --> 00:07:40,290
One thing that's always been I think amazing
to every person who travels in space is that

84
00:07:40,290 --> 00:07:47,180
the human body is adaptable to this environment.
But adaptable in what way, and how does the

85
00:07:47,180 --> 00:07:52,960
human body and even the human brain adapt
to this very, very different environment?

86
00:07:52,960 --> 00:07:59,120
Learning about how we, ourselves, work and
how we can handle changes if we go somewhere

87
00:07:59,120 --> 00:08:04,110
very different than what we're used to is
something that's valuable also on Earth, because

88
00:08:04,110 --> 00:08:09,580
our environment changes on Earth, too -- and
in terms of health and medicine, we understand

89
00:08:09,580 --> 00:08:12,290
better how our own bodies work. So there’s
a lot to be learned.

90
00:08:12,290 --> 00:08:13,290
All right, who's next?

91
00:08:13,290 --> 00:08:15,250
All right, this is Mary coming at you.

92
00:08:15,250 --> 00:08:18,010
What inspired you to become an astronaut?

93
00:08:18,010 --> 00:08:21,960
Got any takers on that one?

94
00:08:21,960 --> 00:08:26,410
Mary, hello. This is Nick Patrick. The thing
that inspired me to become an astronaut was

95
00:08:26,410 --> 00:08:31,240
watching the Apollo moon landings many, many
years ago with my parents. I thought I wanted

96
00:08:31,240 --> 00:08:37,210
to be a space explorer then and I stuck to
my dream. I stayed in school and I studied

97
00:08:37,210 --> 00:08:46,890
hard, and through schoolwork and also an interest
in things like sailing and flying I was able

98
00:08:46,890 --> 00:08:48,390
to realize my dream.

99
00:08:48,390 --> 00:08:53,170
So I would have some advice to all of you
there, which is study really hard in school,

100
00:08:53,170 --> 00:08:59,260
listen to your teachers. They’re full of
knowledge and experience that you really can

101
00:08:59,260 --> 00:09:07,089
use in whatever path your future life takes
you along -- whether it be engineering, science,

102
00:09:07,089 --> 00:09:09,940
a job in business, or even space exploration.

103
00:09:09,940 --> 00:09:18,680
All right, let’s get -- we have one of our
young people from --

104

00:09:18,680 --> 00:09:19,680
From Nebraska.

105
00:09:19,680 --> 00:09:20,680
And what’s your name?

106
00:09:20,680 --> 00:09:21,680
Jordan.

107
00:09:21,680 --> 00:09:22,680
This is Jordan from Nebraska.

108
00:09:22,680 --> 00:09:28,880
Do you think it will ever be possible to create
artificial gravity in space?

109
00:09:28,880 --> 00:09:38,380
That's a big physics question there, guys.
Anybody want to tackle that one?

110
00:09:38,380 --> 00:09:43,130
Hi, Jordan, this is Terry Virts here. And
that's a great question because one of the

111
00:09:43,130 --> 00:09:47,860
hard things about long-duration space flight
is the human body dealing with weightlessness

112
00:09:47,860 --> 00:09:49,190
and a lack of gravity.

113
00:09:49,190 --> 00:09:55,490
And one way you can create gravity is to spin
things. If you take a bucket of water or paint

114
00:09:55,490 --> 00:09:59,300
you can spin it around and you’ll notice
that the water stays pressed up against the

115

00:09:59,300 --> 00:10:04,370
bucket because you're accelerating it. And
so you can artificially create that acceleration

116
00:10:04,370 --> 00:10:08,600
that makes you feel like you're in gravity
just by rotating something like a centrifuge.

117
00:10:08,600 --> 00:10:15,830
So it is possible, but to do that it requires
a really large structure. And so that's something

118
00:10:15,830 --> 00:10:18,980
that we haven’t done here on the Space Station,
but that's one way you can do it.

119
00:10:18,980 --> 00:10:34,640
That was a great question. All right, we need
a Michigan -- we’ve got to make sure every

120
00:10:34,640 --> 00:10:38,640
state is represented here. What’s your name?

121
00:10:38,640 --> 00:10:39,640
Shanae.

122
00:10:39,640 --> 00:10:40,640
Okay, go ahead and introduce yourself.

123
00:10:40,640 --> 00:10:41,640
I was just wondering, what kind of training
did you have to go through before you were

124
00:10:41,640 --> 00:10:42,640
able to get into space?

125
00:10:42,640 --> 00:10:43,640
That was Shanae from Michigan.

126

00:10:43,640 --> 00:10:46,060
Well, that's a great question. You know, it
takes a lot of experience to be an astronaut

127
00:10:46,060 --> 00:10:52,440
and it’s not just in one field. We’ve
all been through many, many years of school,

128
00:10:52,440 --> 00:10:59,440
but also experience in our own fields. So
we have engineers, scientists, mathematicians,

129
00:10:59,440 --> 00:11:07,550
medical doctors and physicists. We have quite
a range of experience that become astronauts.

130
00:11:07,550 --> 00:11:13,100
And the important thing is that you have a
good, solid background in the technical fields

131
00:11:13,100 --> 00:11:18,470
-- the science, the technology, the engineering
and the math -- to build on that, because

132
00:11:18,470 --> 00:11:24,590
once everyone comes and is selected as an
astronaut, we all train generically for space

133
00:11:24,590 --> 00:11:28,279
flight, and then we train specifically for
our mission.

134
00:11:28,279 --> 00:11:33,010
For the International Space Station it's a
very complicated and very large spacecraft,

135
00:11:33,010 --> 00:11:39,221
so the training is over multiple years just
for a specific flight. For the Space Shuttle,

136

00:11:39,221 --> 00:11:44,630
being a shorter-duration flight of just a
couple of weeks, we still train for over one

137
00:11:44,630 --> 00:11:48,550
year just specifically on the task that we'll
accomplish on our mission.

138
00:11:48,550 --> 00:11:54,680
So it's quite a bit of time, but it certainly
is worth it. It's quite rewarding to us to

139
00:11:54,680 --> 00:11:58,510
be able to execute the mission that we've
been training for, for so long.

140
00:11:58,510 --> 00:12:06,050
And I think we need to have at least one Floridian
-- is that right? We already had a Floridian?

141
00:12:06,050 --> 00:12:08,330
Do we have every state covered so far?

142
00:12:08,330 --> 00:12:13,440
All right, we've got time for a couple more
questions. We were going to get a little gender

143
00:12:13,440 --> 00:12:15,740
balance here. (Laughter.) This young man back
here, what's your name?

144
00:12:15,740 --> 00:12:16,740
Joseph.

145
00:12:16,740 --> 00:12:19,930
Hold on one second. You've got a question
from Joseph from Nebraska.

146
00:12:19,930 --> 00:12:27,700
Are there any recognizable landmarks that

you can see from space?

147
00:12:27,700 --> 00:12:34,371
Yes, the rumor was, is that you can see the Great Wall from space, but I'm not sure that's

148
00:12:34,371 --> 00:12:42,720
true. So are there at least -- if there aren't manmade landmarks, are there some natural

149
00:12:42,720 --> 00:12:45,611
landmarks other than continents that you can see?

150
00:12:45,611 --> 00:12:52,450
Yes, Mr. President and Joseph, that's a great question. Actually, one of the great -- in

151
00:12:52,450 --> 00:12:57,380
this mission, we have a great window, big window, that we are really fascinated by the

152
00:12:57,380 --> 00:13:02,770
great view of the Earth. And, yes, we can see a lot of great landmarks. We can see the

153
00:13:02,770 --> 00:13:08,840
Golden Gate Bridge, the great skyscrapers in New York. And the Grand Canyon is just

154
00:13:08,840 --> 00:13:15,080
breathtaking. And also while in the night pass we can see all the lights -- that means

155
00:13:15,080 --> 00:13:24,280
that the humans are active even in the night. And this is a great benefit that we all benefit

156
00:13:24,280 --> 00:13:26,020
from, being in space.

157
00:13:26,020 --> 00:13:27,380
Well, there you go.

158
00:13:27,380 --> 00:13:31,670
All right, we've got -- looks like I've got
a couple more questions. Hold on. What's your

159
00:13:31,670 --> 00:13:32,670
name?

160
00:13:32,670 --> 00:13:33,970
This is Barbara. From?

161
00:13:35,970 --> 00:13:34,970
From Florida.

162
00:13:35,970 --> 00:13:46,140
Hi, I'm curious about the thoughts and emotions
that you guys feel when you're in space.

163
00:13:46,140 --> 00:13:49,430
There you go. Do you start getting lonely?
Do you feel a little claustrophobic?

164
00:13:49,430 --> 00:13:55,230
That's an excellent question, and I think
that probably it ranges quite a bit over the

165
00:13:55,230 --> 00:13:59,740
period of a space shuttle mission, And I expect
it probably varies quite a bit over the range

166
00:13:59,740 --> 00:14:01,110
of a long-duration mission.

167
00:14:01,110 --> 00:14:07,550
Kind of starting off, for the shuttle mission,
at least for me, I've done that twice now;

168
00:14:07,550 --> 00:14:11,470
you kind of get into orbit, and you're just
kind of finding the equivalent of your sea

169
00:14:11,470 --> 00:14:16,800
legs, if you will. And so you're -- you've
arrived on orbit and you kind of have a feeling

170
00:14:16,800 --> 00:14:21,950
of joy, having accomplished it. Your body
has just gone through kind of a little bit

171
00:14:21,950 --> 00:14:26,800
of a violent experience through the launch,
and you have a little bit of adrenaline probably

172
00:14:26,800 --> 00:14:31,019
getting out of your system. So it's a little
bit of a joyous, giddy moment, at the same

173
00:14:31,019 --> 00:14:37,090
time that you're disoriented as you deal with
the first couple of hours of actually being

174
00:14:37,090 --> 00:14:39,060
on orbit.

175
00:14:39,060 --> 00:14:44,670
After that passes, after a couple of days,
for me it was kind of a sense of wonder as

176
00:14:44,670 --> 00:14:51,310
you explore what you can do in zero gravity
and the things that you can see out the window

177
00:14:51,310 --> 00:14:56,580
and just how the entire complex works together
to make it happen. So it's just a sense of

178
00:14:56,580 --> 00:14:57,580
wonder.

179
00:14:57,580 --> 00:15:01,240
After -- a little while after that, I think
you start to think a little bit about the

180
00:15:01,240 --> 00:15:06,080
people who are back on Earth that are most
precious to you, and then that little bit

181
00:15:06,080 --> 00:15:11,330
of loneliness can kick in. And one of the
really nice things that we have and the long-duration

182
00:15:11,330 --> 00:15:16,990
crews have is the opportunity to use a telephone
or to perform a videoconference similar to

183
00:15:16,990 --> 00:15:23,300
like we're doing with you guys with our families.
And I think that's really important for folks

184
00:15:23,300 --> 00:15:26,959
to maintain that contact when you're up here
on orbit.

185
00:15:26,959 --> 00:15:31,260
Of course, you have your crew members, but
you do really want to maintain those precious

186
00:15:31,260 --> 00:15:36,149
relationships with all your family members
and friends that are on the ground. And they

187
00:15:36,149 --> 00:15:41,370
do a remarkable job actually supporting us
while we're in space to make sure that we

188

00:15:41,370 --> 00:15:46,870
can still speak with our families and that
our families are informed and able to stay

189
00:15:46,870 --> 00:15:48,040
in contact with us.

190
00:15:48,040 --> 00:15:54,041
But all those emotions kind of wrap up together.
Kind of the final one is kind of when you

191
00:15:54,041 --> 00:15:59,080
do return to Earth and kick off all those
relationships that, whether they were two

192
00:15:59,080 --> 00:16:04,220
weeks or six months later, have -- time has
passed and you have to kind of rebuild them

193
00:16:04,220 --> 00:16:12,490
a little bit. But it's a very joyous experience,
and something that you can share with both

194
00:16:12,490 --> 00:16:17,790
the people on the ground and the people who
are part of your crew throughout the entire

195
00:16:17,790 --> 00:16:18,890
mission.

196
00:16:18,890 --> 00:16:19,890
Great question.

197
00:16:19,890 --> 00:16:24,320
All right. So I think we're going to make
this the last question. We've been keeping

198
00:16:24,320 --> 00:16:28,769
you guys overtime. So what's your name?

199
00:16:28,769 --> 00:16:31,360
This is Alex. Hold on one sec.

200
00:16:31,360 --> 00:16:40,410
Does being up in space allow you to see things
such as the weather? Like could you see the

201
00:16:40,410 --> 00:16:41,839
storm over Washington?

202
00:16:41,839 --> 00:16:46,290
That's a good point. Obviously we're using
a lot of satellite imagery these days, and

203
00:16:46,290 --> 00:16:52,800
this is going to be a major focus of some
of the work NASA is doing here at home, thinking

204
00:16:52,800 --> 00:16:58,851
about how we can get better information about
our own climate. Is that something that you

205
00:16:58,851 --> 00:17:01,910
guys are tracking from the Space Station?

206
00:17:01,910 --> 00:17:10,559
Well, we view a lot of the weather phenomena.
We've seen many hurricanes and typhoons and

207
00:17:10,559 --> 00:17:16,959
whatnot around the world. We can see fronts
crossing continents. We see the whole variety

208
00:17:16,959 --> 00:17:27,999
of cloud formations. We sometimes can see
the aftermath of a storm or other major impact

209
00:17:27,999 --> 00:17:30,470
on the Earth after the sky clears.

210
00:17:30,470 --> 00:17:35,009
So there's a whole lot of details that we
can see here from the Space Station -- and

211
00:17:35,009 --> 00:17:40,340
observe every day. We can see things -- we
pass over the same portion of the Earth every

212
00:17:40,340 --> 00:17:46,539
day, so it's a regular observation that we
can make over a long period of time, as well.

213
00:17:46,539 --> 00:17:52,309
You guys have been extraordinarily generous
with your time, and I just want to repeat,

214
00:17:52,309 --> 00:17:58,010
and I think I speak for all the young people
here, everybody back home, how proud we are

215
00:17:58,010 --> 00:18:05,480
of you, how excited we are about the work
that's being done on the Space Station, and

216
00:18:05,480 --> 00:18:11,739
how committed we are to continuing human space
exploration in the future.

217
00:18:11,739 --> 00:18:17,440
So you guys continue to be great pioneers
and great role models for all of us, and we

218
00:18:17,440 --> 00:18:23,739
thank you for your courage. And tell your
families we appreciate them letting you float