Hey, guys.

Good morning from the International Space Station and from the Space Shuttle Endeavour,

Mr. President.

Well, it's great to talk to you guys. I wanted to, first of all, just say that we've got a bunch of very excited young people here with us, along with a bunch of somewhat excited teachers. We have one engineer and one member of Congress, so you've got a -- and a whole bunch of press here, so it's a pretty motley crew. And one President.

But I just wanted to let you guys know how proud we are of all of you at what you guys have been accomplishing. I've had a chance to take a look at what Tranquility Module is doing. Everybody here back home is excited about this bay on the world that you guys are opening up, and Stephen Colbert at least is excited about his treadmill.

And so we just wanted to let you know that...
the amazing work that's being done on the
International Space Station not only by our American astronauts but also our colleagues

from Japan and Russia is just a testimony to the human ingenuity; a testimony to extraordinary skill and courage that you guys bring to bear; and is also a testimony to why continued space exploration is so important, and is part of the reason why my commitment to NASA is unwavering.

But instead of me doing all the talking, I wanted you guys to maybe let us know what this new Tranquility Module will help you accomplish. One of the things that we've done with our NASA "Vision for the Future" is to extend the life of our participation in the Space Station. And so we just want to get a sense of the kind of research that you guys are doing, and then maybe I'll turn it over to some young people to see if they've got any questions.

Well, thank you very much, Mr. President. It is a large team effort. In front of you,
you have the joint crew of Endeavour and the Space Station, and we are the ones that are fortunate enough to be able to accomplish this great mission together in space. But there are many thousands of people around the world that gave the best of themselves over many years in order to have the days that we've been having up here.

For your question, I'm going to turn it over to ISS Commander Jeff Williams.

Well, Mr. President, as you know, the ISS has been under assembly for many years, over a decade now. And as George said, it's because of the efforts of thousands of people around the world among the international partnerships.

The arrival of this module means several things. It means, of course, that we -- everybody is aware of this new grand view that we have of the world below us, and that brings a special significance. But the Tranquility Module also is going to serve as a gym, as a hygiene area, as a place a crew can maintain themselves for a long duration. And a long duration living
and working in space is what the Space Station is all about -- to do the research and the

science necessary to take us beyond Earth orbit.

That was the ultimate purpose of the Space Station, and the arrival of this module will enable us to do that. And it really marks the end of the major assembly of at least

the U.S. orbiting segment to -- as we transition into full utilization of this magnificent orbiting laboratory.

Do you guys want to just mention some of the research and experiments that you can conduct on the Space Station that you could not be doing back here at home?

That's a great question, Mr. President. Let me start off by saying one of the nice things about where we physically are right now is that we remove the effects of gravity, so we're able to do experiments that involve the effect of gravity basically on Earth as
we look at what happens with the absence of it.

For instance, when you do combustion studies, flames on Earth burn in a teardrop fashion because the air comes in from underneath it and feeds the flame, but we can't do that here since the air doesn't know where up is, there's no convection. So the flames burn very purely in a ball.

In a similar sense, when we do cellular research for even -- like for cancer research, for instance, on Earth the cells actually collapse under their own weight and so their growth are a little bit distorted. Here, without the gravity effect, we can grow cells very purely and understand the mechanisms by which they are replicating.

We're also doing metallic research and materials research to help us understand how to make materials on Earth better, but also to find out what materials are better for long-duration missions and traveling beyond Earth's orbit.
Some of the other experiments involve biological, where we actually have, for instance, butterflies up here and we watch the life process of the butterflies. Many, many experiments up and down the stack are quite exciting when we are able to remove the variable of gravity.

Well, some of the things that you talked about are in line with where we want to see NASA going increasingly: What are those transformational technologies that would allow us to potentially see space travel of longer durations? If we want to get to Mars, if we want to get beyond that, what kinds of technologies are going to be necessary in order for us to make sure that folks can get there in one piece and get back in one piece and that -- the kinds of fuels that we use and the technologies we use are going to facilitate something that is actually feasible? And we're very excited about the possibilities of putting more research dollars into some of these transformational technologies.

So we're excited about what you're doing and
what folks back on Earth as part of NASA's

eventing teams and scientific teams are
doing.

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

but I'm not sure I've got any volunteers so
I'm going to have to turn around -- oh, look.

(Laughter.) This is a serious bunch here,
I can tell. So I'm going to hand the phone

over to the first one -- hold on -- what's
your name?

This is Ruth, coming from North Carolina.

What are some of the benefits of exploring
space as opposed to exploring other places

on Earth?

Okay. A pretty serious question, guys. You
better have a good answer -- the NASA folks

are sitting here listening.

Ruth, I can tell you your curiosity reaches
far, and so does ours. And that's sort of

the human spirit, to find out what can humans
really do.

83
00:07:36,009 --> 00:07:40,289
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 --> 00:07:52,959
human body and even the human brain adapt
to this very, very different environment?

86
00:07:52,959 --> 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
00:08:09,579 --> 00:08:12,289
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 --> 00:08:18,009
What inspired you to become an astronaut?

93
00:08:18,009 --> 00:08:21,959
Got any takers on that one?

94
00:08:21,959 --> 00:08:26,409
Mary, hello. This is Nick Patrick. The thing
that inspired me to become an astronaut was
watching the Apollo moon landings many, many years ago with my parents. I thought I wanted to be a space explorer then and I stuck to my dream. I stayed in school and I studied hard, and through schoolwork and also an interest in things like sailing and flying I was able to realize my dream.

So I would have some advice to all of you there, which is study really hard in school, listen to your teachers. They're full of knowledge and experience that you really can use in whatever path your future life takes you along -- whether it be engineering, science, a job in business, or even space exploration.

All right, let's get -- we have one of our young people from -- From Nebraska.

And what's your name?

Jordan.
This is Jordan from Nebraska.

Do you think it will ever be possible to create artificial gravity in space?

That's a big physics question there, guys. Anybody want to tackle that one?

Hi, Jordan, this is Terry Virts here. And that's a great question because one of the hard things about long-duration space flight is the human body dealing with weightlessness and a lack of gravity.

And one way you can create gravity is to spin things. If you take a bucket of water or paint, you can spin it around and you'll notice that the water stays pressed up against the bucket because you're accelerating it. And so you can artificially create that acceleration that makes you feel like you're in gravity just by rotating something like a centrifuge.

So it is possible, but to do that it requires a really large structure. And so that's something that we haven't done here on the Space Station, but that's one way you can do it.
That was a great question. All right, we need a Michigan -- we've got to make sure every state is represented here. What's your name?

Shanae.

Okay, go ahead and introduce yourself.

I was just wondering, what kind of training did you have to go through before you were able to get into space?

That was Shanae from Michigan.

Well, that's a great question. You know, it takes a lot of experience to be an astronaut and it's not just in one field. We've all been through many, many years of school, but also experience in our own fields. So we have engineers, scientists, mathematicians, medical doctors and physicists. We have quite a range of experience that become astronauts.

And the important thing is that you have a good, solid background in the technical fields.
-- the science, the technology, the engineering
and the math -- to build on that, because

once everyone comes and is selected as an
astronaut, we all train generically for space

flight, and then we train specifically for
our mission.

For the International Space Station it's a
very complicated and very large spacecraft,

so the training is over multiple years just
for a specific flight. For the Space Shuttle,

being a shorter-duration flight of just a
couple of weeks, we still train for over one

year just specifically on the task that we'll
accomplish on our mission.

So it's quite a bit of time, but it certainly
is worth it. It's quite rewarding to us to

be able to execute the mission that we've
been training for, for so long.

And I think we need to have at least one Floridian
-- is that right? We already had a Floridian?

Do we have every state covered so far?

All right, we've got time for a couple more
questions. We were going to get a little gender
balance here. (Laughter.) This young man back here, what's your name?

Joseph.

Hold on one second. You've got a question from Joseph from Nebraska.

Are there any recognizable landmarks that you can see from space?

Yes, the rumor was, is that you can see the Great Wall from space, but I'm not sure that's true. So are there at least -- if there aren't manmade landmarks, are there some natural landmarks other than continents that you can see?

Yes, Mr. President and Joseph, that's a great question. Actually, one of the great -- in this mission, we have a great window, big window, that we are really fascinated by the great view of the Earth. And, yes, we can see a lot of great landmarks. We can see the Golden Gate Bridge, the great skyscrapers in New York. And the Grand Canyon is just breathtaking. And also while in the night
pass we can see all the lights -- that means

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

00:13:24,279 --> 00:13:26,019
from, being in space.

00:13:26,019 --> 00:13:27,379
Well, there you go.

00:13:27,379 --> 00:13:31,669
All right, we've got -- looks like I've got
a couple more questions. Hold on. What's your

00:13:31,669 --> 00:13:32,669
name?

00:13:32,669 --> 00:13:33,969
This is Barbara. From?

00:13:33,970 --> 00:13:34,970
From Florida.

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

00:13:35,970 --> 00:13:46,139
Hi, I'm curious about the thoughts and emotions
that you guys feel when you're in space.

00:13:46,139 --> 00:13:49,429
There you go. Do you start getting lonely?
Do you feel a little claustrophobic?

00:13:49,429 --> 00:13:55,229
That's an excellent question, and I think
that probably it ranges quite a bit over the

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
of a long-duration mission.

Kind of starting off, for the shuttle mission, at least for me, I've done that twice now;

you kind of get into orbit, and you're just kind of finding the equivalent of your sea legs, if you will. And so you're -- you've arrived on orbit and you kind of have a feeling of joy, having accomplished it. Your body has just gone through kind of a little bit of a violent experience through the launch, and you have a little bit of adrenaline probably getting out of your system. So it's a little bit of a joyous, giddy moment, at the same time that you're disoriented as you deal with the first couple of hours of actually being on orbit.

time that you're disoriented as you deal with the first couple of days, for me it was kind of a sense of wonder as you explore what you can do in zero gravity and the things that you can see out the window and just how the entire complex works together to make it happen. So it's just a sense of
wonder.

After a little while after that, I think you start to think a little bit about the people who are back on Earth that are most precious to you, and then that little bit of loneliness can kick in. And one of the really nice things that we have and the long-duration crews have is the opportunity to use a telephone or to perform a videoconference similar to like we're doing with you guys with our families. And I think that's really important for folks to maintain that contact when you're up here on orbit.

Of course, you have your crew members, but you do really want to maintain those precious relationships with all your family members and friends that are on the ground. And they do a remarkable job actually supporting us while we're in space to make sure that we can still speak with our families and that our families are informed and able to stay in contact with us.
But all those emotions kind of wrap up together. Kind of the final one is kind of when you do return to Earth and kick off all those relationships that, whether they were two weeks or six months later, have -- time has passed and you have to kind of rebuild them a little bit. But it's a very joyous experience, and something that you can share with both the people on the ground and the people who are part of your crew throughout the entire mission.

Great question.

All right. So I think we're going to make this the last question. We've been keeping you guys overtime. So what's your name?

This is Alex. Hold on one sec.

Does being up in space allow you to see things such as the weather? Like could you see the storm over Washington?
That's a good point. Obviously we're using a lot of satellite imagery these days, and this is going to be a major focus of some of the work NASA is doing here at home, thinking about how we can get better information about our own climate. Is that something that you guys are tracking from the Space Station?

Well, we view a lot of the weather phenomena. We've seen many hurricanes and typhoons and whatnot around the world. We can see fronts crossing continents. We see the whole variety of cloud formations. We sometimes can see the aftermath of a storm or other major impact on the Earth after the sky clears.

So there's a whole lot of details that we can see here from the Space Station -- and observe every day. We can see things -- we pass over the same portion of the Earth every day, so it's a regular observation that we can make over a long period of time, as well.

You guys have been extraordinarily generous with your time, and I just want to repeat,
and I think I speak for all the young people here, everybody back home, how proud we are of you, how excited we are about the work that's being done on the Space Station, and how committed we are to continuing human space exploration in the future.

So you guys continue to be great pioneers and great role models for all of us, and we thank you for your courage. And tell your families we appreciate them letting you float up into space like this. All right?

Bye-bye, guys.