

WE ARE GOING To the Moon with NASA

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- NASA / Jet Propulsion
Laboratory, Project Manager
(Retired) and
- Volunteer Solar System
Ambassador



Facts About The Moon



- To date no astronauts have surfed on the Moon
- The Moon is 239,000 miles from Earth
- The Moon is $\frac{1}{4}$ the width of Earth's and its gravity is 17% of Earth's
- You can't breathe on the Moon
- The Moon was formed when a rock smashed into Earth.
- There is water on the Moon!

The 8 Phases of the Moon

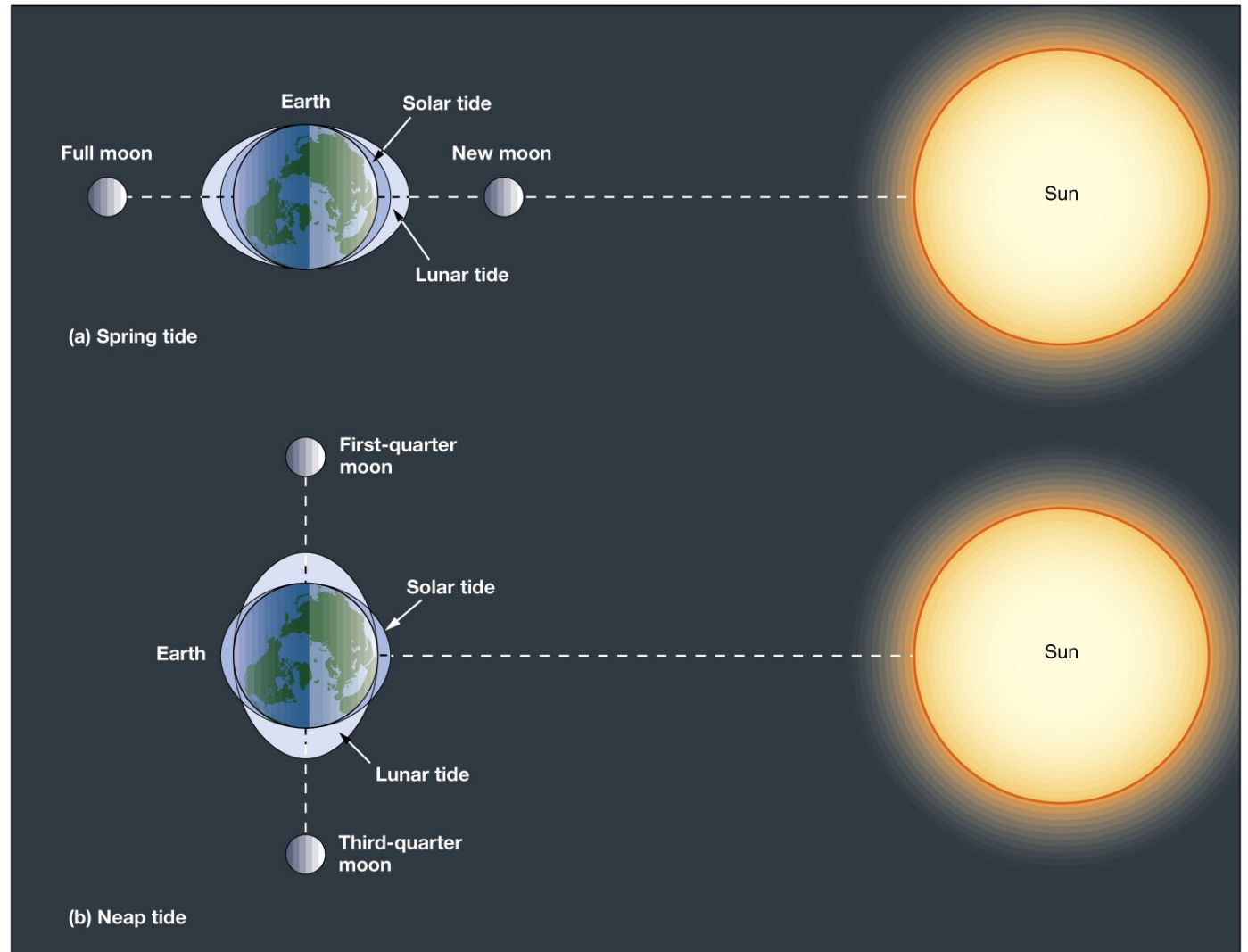


How much time elapses from a Full Moon to the next Full Moon?

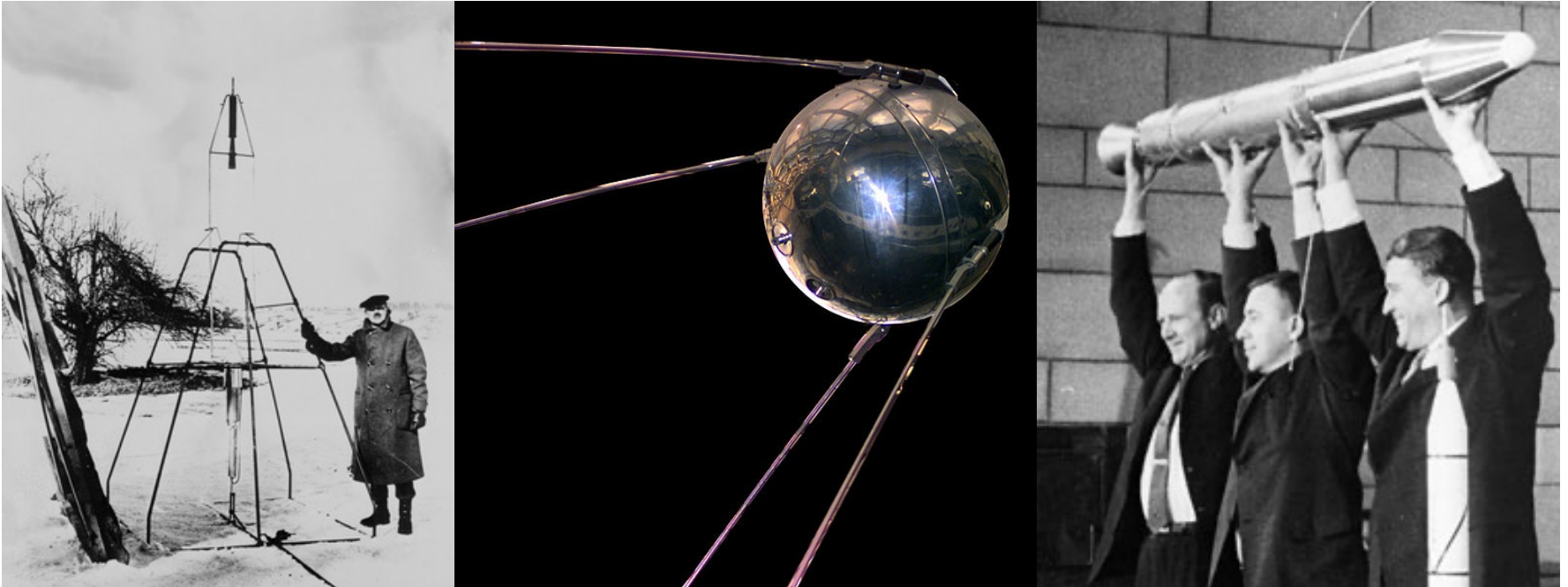
Is the far side of the Moon always dark?

Frequency of Tides

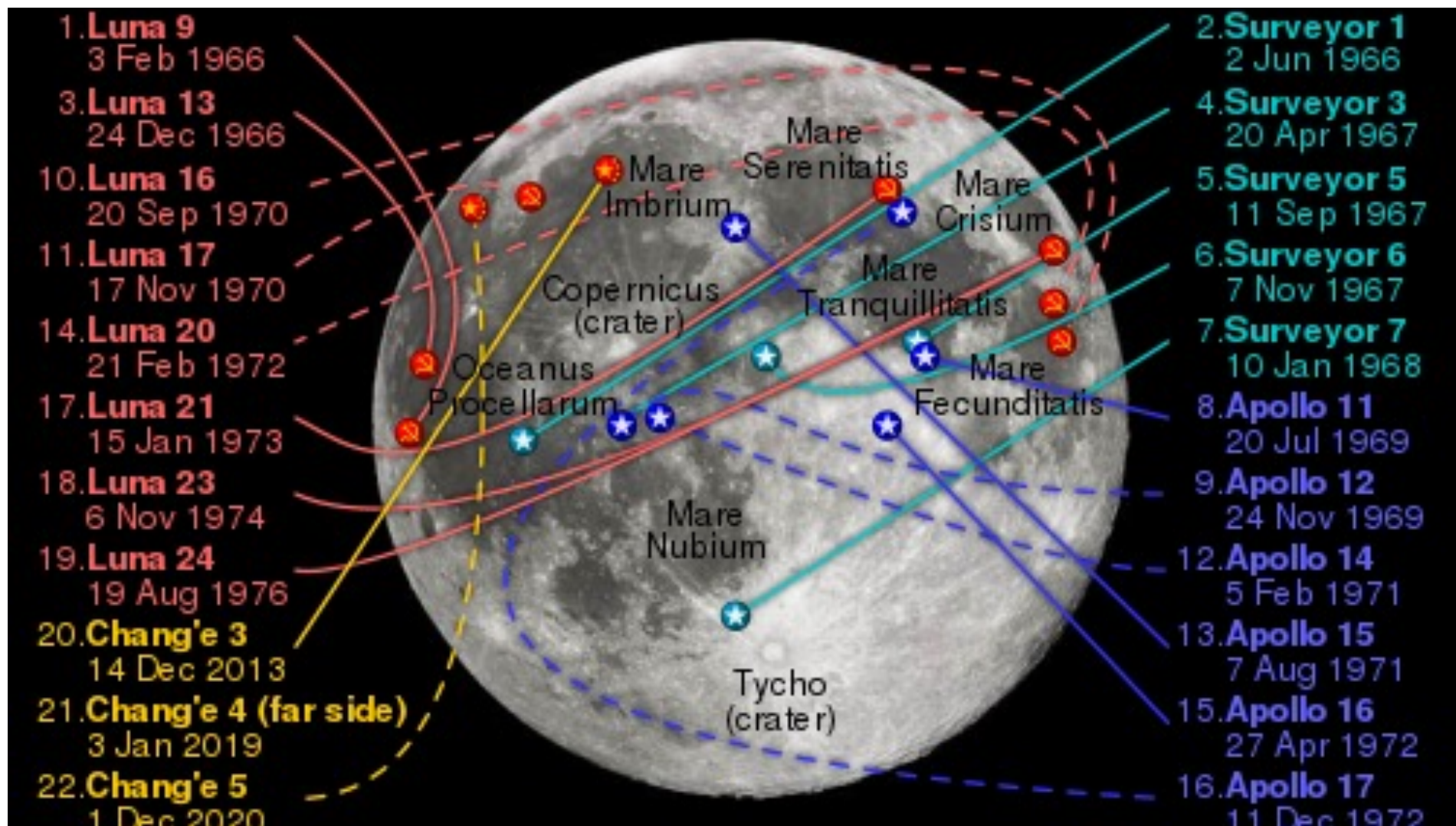
Most coastal areas experience two low tides and two high tides every lunar day, or 24 hours and 50 minutes.



Beginnings of the Space Age *



* Reference: From page 2 of a presentation by JPLer Brian Muirhead entitled *"Take Risk Don't Fail - Challenges and Power of Exploration from Space"* on March 18, 2023.



**India's
Chandrayan -3
spacecraft
landed near
the south pole
of the
Moon on Aug.
23, 2023**

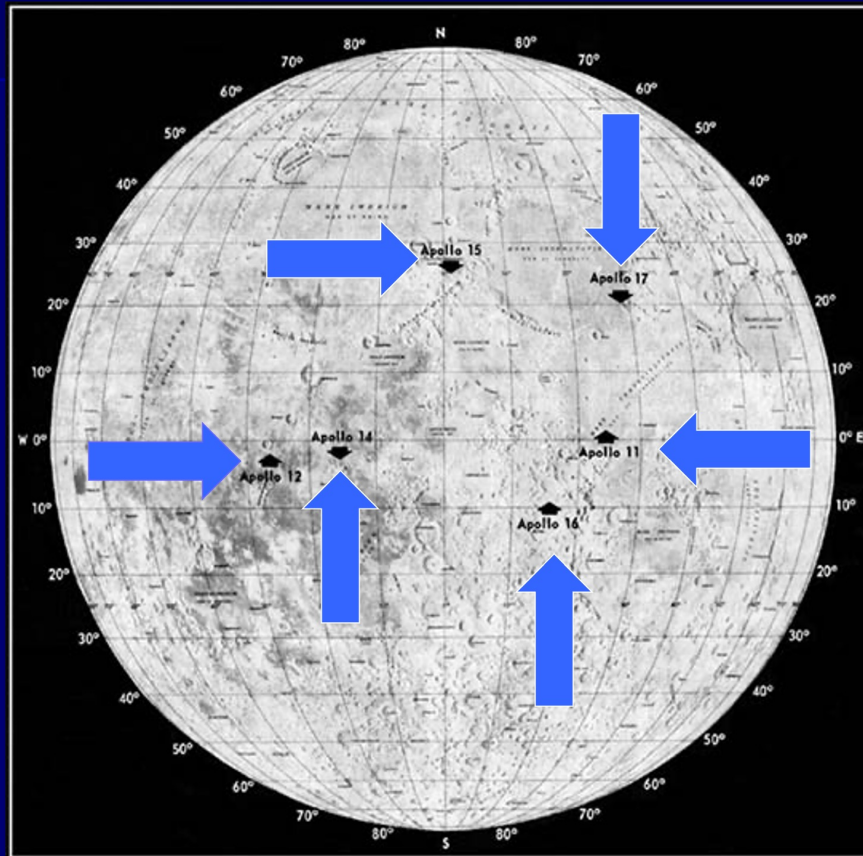




Apollo Moon Exploration



The Apollo missions all landed near the equator of the Moon.



*In Apollo missions
the Astronauts
blasted off atop the
Saturn V Rocket
built at Michoud
Assembly Facility in
New Orleans East.*

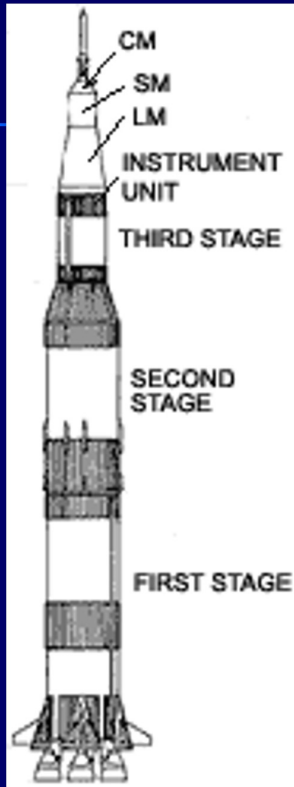


The Saturn V Launch Vehicle

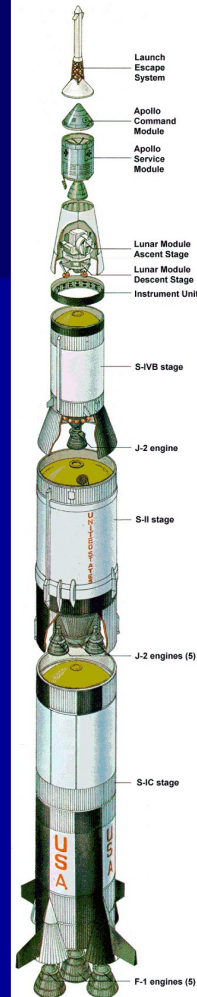
*The Saturn V launch vehicle stood
363 feet tall - - - 36 stories high.*



*Fully fueled for liftoff, the **Saturn V** weighed 6.2 million pounds, the weight of about 400 elephants. At takeoff, the rocket thrust was 7.653 million pounds of thrust and used 3 tones of liquid oxygen per second. It consisted of three thrust stages and the Instrument Unit, the Lunar Module, the Service Module and the Command Module.*



COMMAND MODULE
 SERVICE MODULE
 LUNAR MODULE
 INSTRUMENT RING
 THIRD STAGE
 SECOND STAGE
 FIRST STAGE



Saturn V Facts
 Overall height complete with Apollo Spacecraft and launch escape system was 363 ft. (over twice as tall as a Space Shuttle and its launch support components). Liftoff weight was 6.4



1.



2.



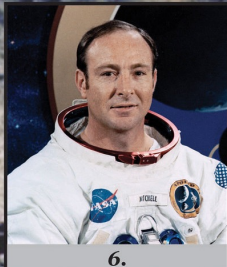
3.



4.



5.



6.



7.



8.



9.



10.



11.



12.

**Joann
Morgan
in firing
room.**





ARTEMIS

Twin sister of Apollo and goddess of the Moon in Greek mythology. With Artemis missions, NASA will:

- Collaborate with international and commercial partners to establish the first long-term presence on the Moon,
- Land the first woman and first person of color on the Moon, and
- Use what we learn on and around the Moon to take the next giant leap: sending the first astronauts to Mars.

This slide is adapted from slides by NASA ARTEMIS Chief Nujoud Merancy, dated Oct. 21, 2021.

Charlie Blackwell-Thompson served as the ARTEMIS I launch director



ARTEMIS DEEP SPACE TRANSPORTATION SYSTEMS

- The Orion Spacecraft System
- Space Launch System
- Exploration Ground Systems



This slide is from a slide by NASA ARTEMIS Chief Nujoud Merancy, dated Oct. 21, 2021.

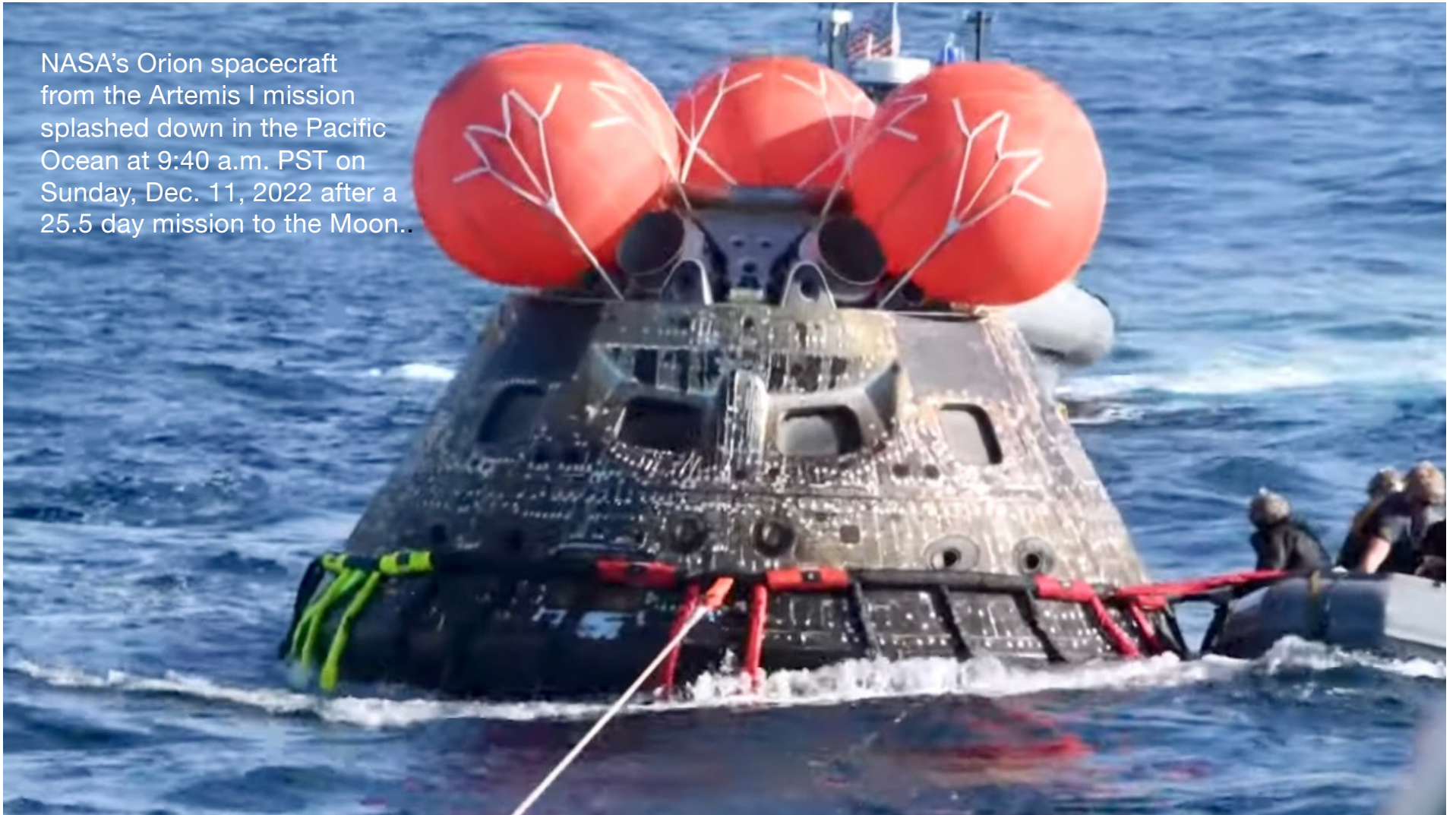
NASA's Space Launch System rocket carrying the Orion spacecraft launches on the Artemis I flight test, Wednesday, Nov. 16, 2022, from Launch Complex 39B at NASA's Kennedy Space Center .



**Why is it against
the law for
elephants to
use elevators in
Glendora?**



NASA's Orion spacecraft from the Artemis I mission splashed down in the Pacific Ocean at 9:40 a.m. PST on Sunday, Dec. 11, 2022 after a 25.5 day mission to the Moon..



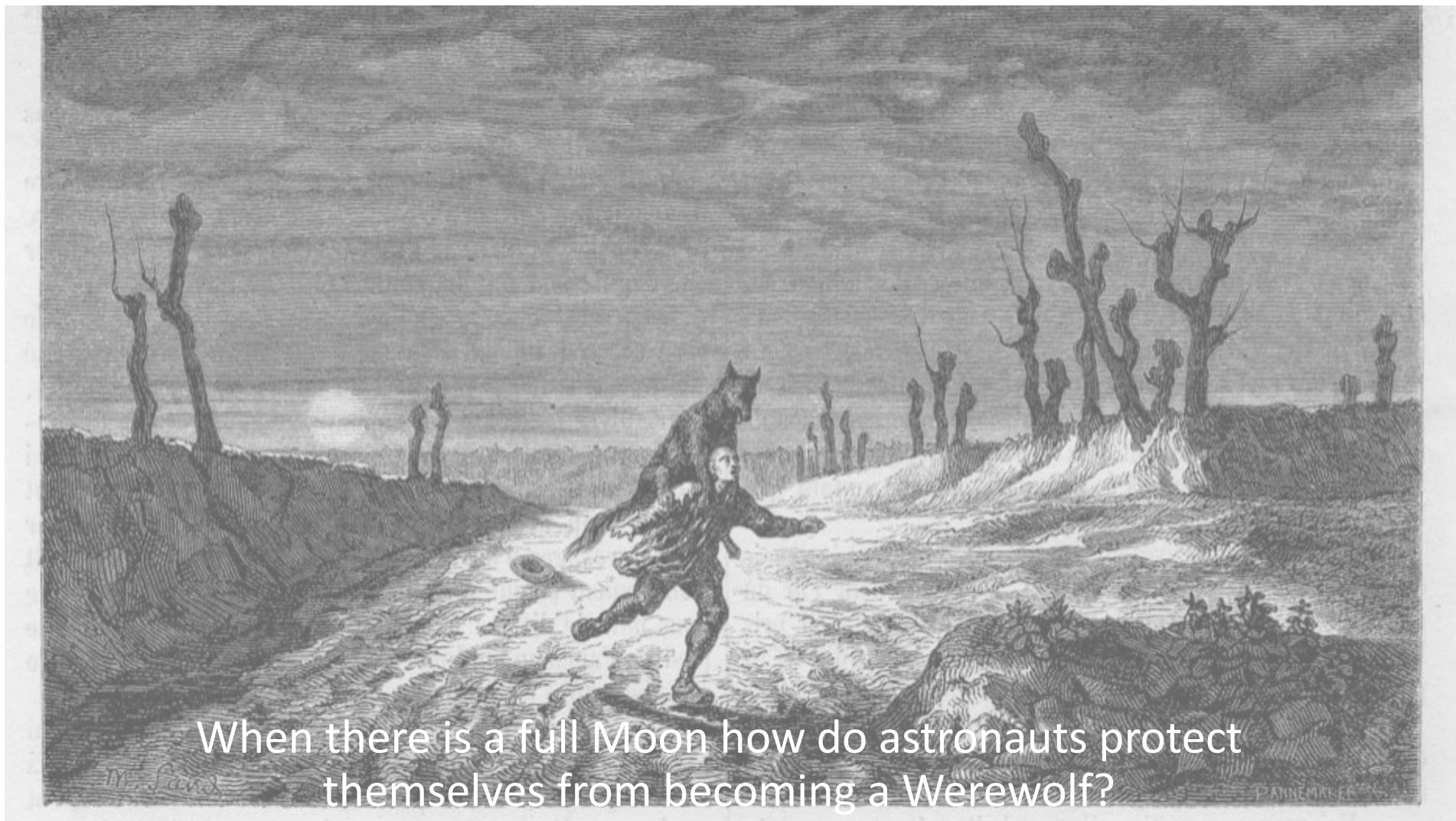


NASA's Orion spacecraft from the Artemis I mission aboard the USS Portland at Naval Base San Diego on Tuesday, Dec. 13, 2022.





ARTEMIS II



When there is a full Moon how do astronauts protect themselves from becoming a Werewolf?

The Artemis II Lunar Flyby Mission Crew Members announced on April 3, 2023
Include (from left): NASA astronauts Christina Koch, Victor Glover, Reid Wiseman (foreground)
and Canadian Space Agency astronaut Jeremy Hansen.







☰ DO YOU HAVE ☰ WHAT IT TAKES TO #BeAnAstronaut?




- ☑ U.S. citizen
- ☑ Master's degree in STEM field
- ☑ Two years related, professional experience
- ☑ Pass NASA astronaut physical

zoom.us Meeting View Edit Window Help 01:15:33 Mon Apr 24 12:56 PM

Zoom Webinar

Recording


Live Transcription (Closed Captioning) has been enabled Who can see this transcript? Recording On



The Sky's Not the Limit: My Journey into Space Exploration and STEM

Kim and Judy Davis Dean's Lecture
in the Sciences

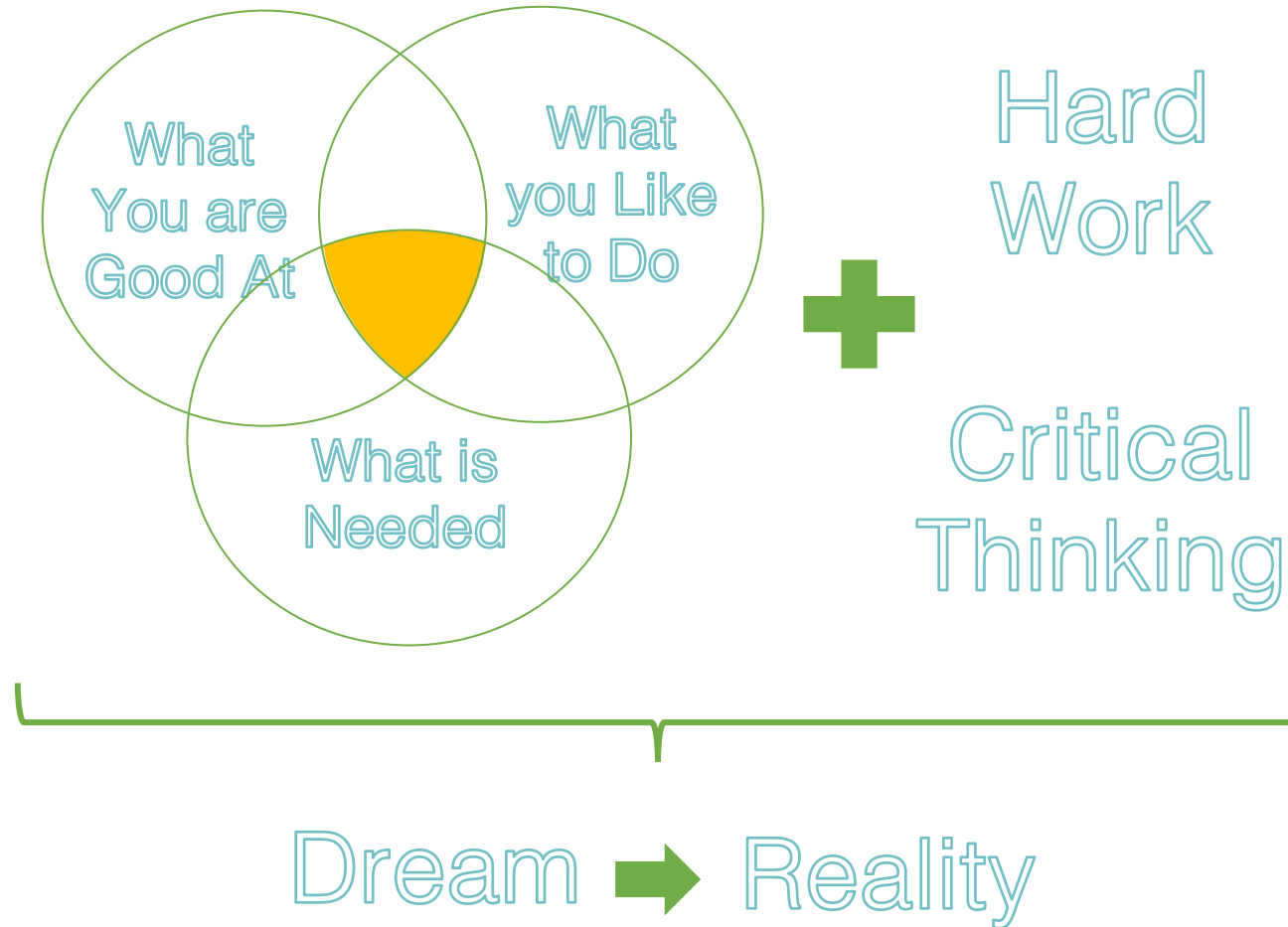
The program will begin momentarily.



Harvard
Radcliffe
Institute

macOS dock with various application icons including Safari, Mail, Photos, and Zoom.

Idea to “How to Reach for the Stars!” Based on Graphic from MiMi Aung*



* Former Mars Helicopter Project Manager



ARTEMIS III



Artemis: Landing Humans On the Moon



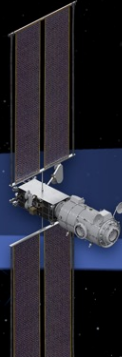
Lunar Reconnaissance Orbiter: Continued surface and landing site investigation



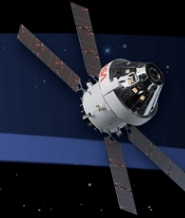
Artemis I: First human spacecraft to the Moon in the 21st century



Artemis II: First humans to orbit the Moon and rendezvous in deep space in the 21st Century



Gateway begins science operations with launch of Power and Propulsion Element and Habitation and Logistics Outpost



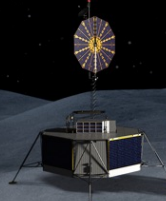
Artemis III-V: Deep space crew missions; cislunar buildup and initial crew demonstration landing with Human Landing System



Early South Pole Robotic Landings
Science and technology payloads delivered by Commercial Lunar Payload Services providers



Volatiles Investigating Polar Exploration Rover
First mobility-enhanced lunar volatiles survey



Uncrewed HLS Demonstration



Humans on the Moon - 21st Century
First crew expedition to the lunar surface



LUNAR SOUTH POLE TARGET SITE

This slide is from from the slide deck provided by NSA ARTEMIS Chief Nujoud Merancy, dated Oct. 21, 2021

20210528

An artistic rendering of the Artemis Base Camp on the lunar surface. The scene is set against a black background with a starry sky. In the foreground, two astronauts in white suits with gold visors are kneeling on the dark, rocky ground, examining a piece of equipment. To their right, a lunar rover with a large satellite dish antenna is parked. In the background, a large, white, spherical habitat module with 'NASA' written on it stands on a tripod-like base. The overall atmosphere is one of a futuristic, sustainable lunar base.

ARTEMIS

Base Camp

A truly sustainable infrastructure on the lunar surface

This slide is from from the slide deck provided by NSA ARTEMIS Chief Nujoud Merancy, dated Oct. 21, 2021

P R E S S U R I Z E D R O V E R

Why did the Astronaut from PEO take a ladder with her when she went to the Moon?

This slide is adapted from the slide deck provided by NASA Manager Erika Alvarez, dated Nov. 2021 in a presentation titled "What happens after Artemis III?..."

We are going to the Moon

and we need your help.

More about Artemis:

www.nasa.gov/artemis

NASA Pathways Internships:

www.nasa.gov/careers/pathways

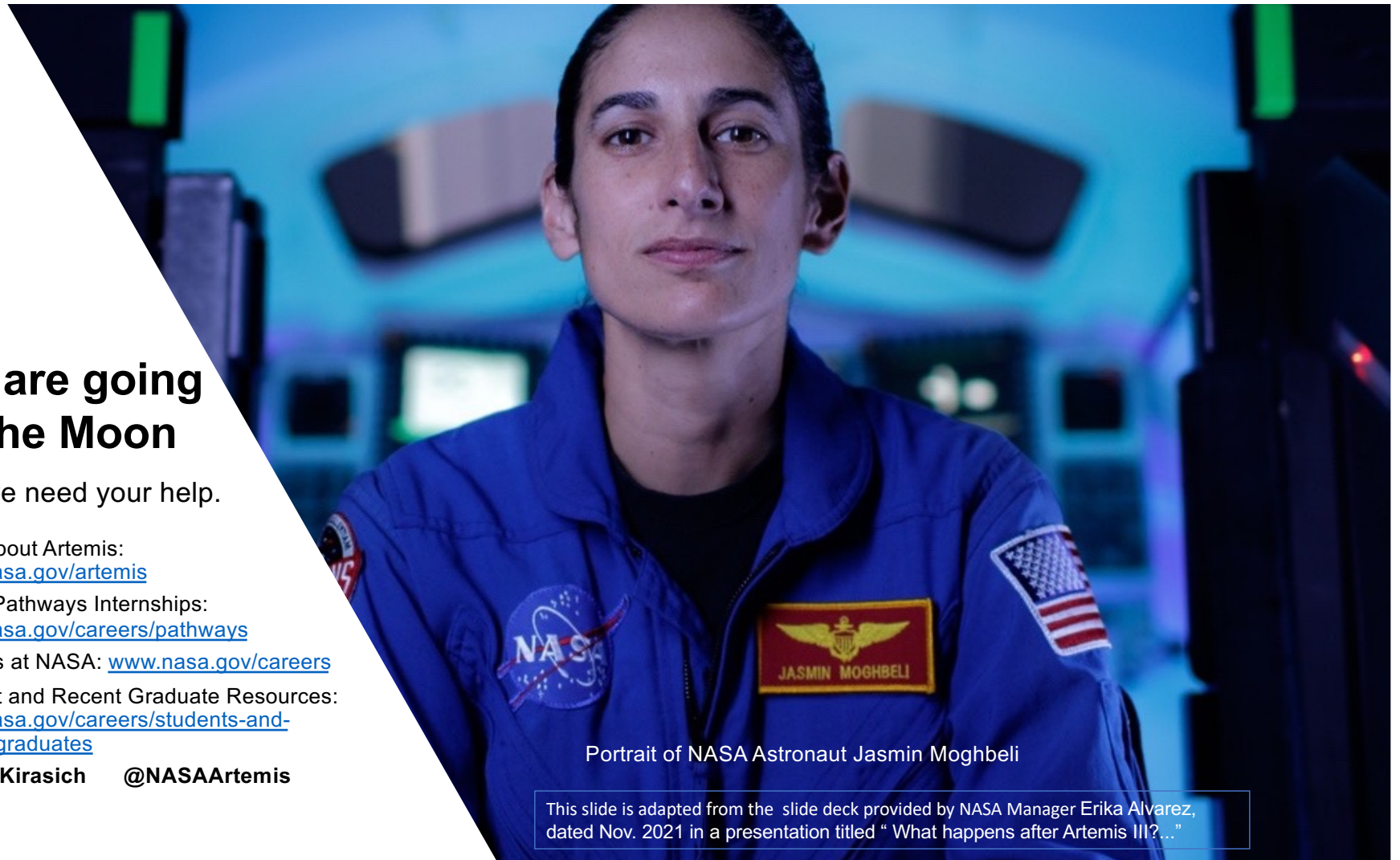
Careers at NASA: www.nasa.gov/careers

Student and Recent Graduate Resources:

www.nasa.gov/careers/students-and-recent-graduates

@MarkKirasich

@NASAArtemis



Portrait of NASA Astronaut Jasmin Moghbeli

This slide is adapted from the slide deck provided by NASA Manager Erika Alvarez, dated Nov. 2021 in a presentation titled "What happens after Artemis III?..."

Backup Charts

- Astronaut's Biography
- Gateway

Astronaut Reid Wiseman

Reid Wiseman, 47, is from Baltimore, Maryland. He earned a bachelor's degree in engineering from Rensselaer Polytechnic Institute in New York and an engineering master's from Johns Hopkins University in Baltimore.

Wiseman is a military man. He was designated a Naval Aviator in 1999 and was deployed twice to the Middle East as a fighter pilot, with the second deployment occurring in 2003, according to his official [NASA biography](#) (opens in new tab). He has two children with his wife Carol, who died of cancer in May 2020.

NASA selected Wiseman as one of the nine members of its 2009 astronaut class. He finished training in 2011 and in May 2014 launched on his first and (to date) only spaceflight, a 165-day mission to the [International Space Station](#) (ISS). He served as a crewmember on the orbiting lab's Expedition 40 and Expedition 41 missions before returning to Earth in November 2014.

Wiseman served as chief of NASA's astronaut office from December 2020 to November 2022. And now he can start training for Artemis 2, the first-ever crewed mission of NASA's new deep-space transportation system, which consists of the Orion capsule and [Space Launch System](#) rocket.

"This is a global effort, Artemis 2, and it's only going to get larger with Artemis 3 and beyond as we get private spaceflight involved; [SpaceX](#) is building our lander for Artemis 3," Wiseman said during the crew announcement ceremony on Monday. ([Artemis 3](#) will land astronauts near the moon's south pole, perhaps as soon as 2025.)

"So to the NASA workforce, to our program managers, our center directors that are here, the amazing political support that we feel right now to bring our country together, to bring our entire world together to go explore to get to [Mars](#) and beyond, we say a huge thank you," Wiseman said.

Astronaut Victor Glover

Victor Glover, 46, is from Pomona, California. He received a bachelor's degree in engineering from California Polytechnic State University in San Luis Obispo and then earned three engineering master's degrees — one apiece from Air University at Edwards Air Force Base in California, the Naval Postgraduate School and Air University in Montgomery, Alabama.

Glover was a fighter pilot in the U.S. Navy and was deployed multiple times. According to his [NASA biography](#) (opens in new tab), Glover logged "3,000 flight hours in more than 40 aircraft, over 400 carrier arrested landings and 24 combat missions." He and his wife Dionna have four children.

Glover was chosen in NASA's 2013 astronaut class, the next one after Wiseman's, and finished training two years later. He has one spaceflight under his belt — [Crew-1](#), the first operational mission to the International Space Station that SpaceX flew for NASA.

Crew-1 launched in November 2020 and returned to Earth in May 2021, spending a total of 168 days in orbit. Glover participated in four spacewalks during that stretch.

"We need to celebrate this moment in human history," Glover said of Artemis 2 on Monday.

"Because Artemis 2 is more than a mission to the moon, and it's more than a mission that has to happen before we send people to the surface of the moon. It is the next step on the journey that gets humanity to Mars."

NASA aims to put boots on the Red Planet in the late 2030s to early 2040s. It views the moon as a stepping stone along this ambitious path; the skills and knowledge gained via the [Artemis program](#) will help humanity make the leap to Mars, agency officials have said.

Astronaut Christina Koch

Christina Koch, 44, grew up in Jacksonville, North Carolina and earned bachelor's and master's degrees in engineering from North Carolina State University.

She worked as an electrical engineer at NASA's Goddard Space Flight Center in Maryland and the Johns Hopkins University Applied Physics Laboratory, contributing to the development of science instruments for multiple robotic NASA missions, including the [Juno](#) Jupiter orbiter and the Van Allen Probes, which studied the radiation environment near Earth. She is married to husband Robert Koch.

Koch also performed scientific field work in remote locations such as Antarctica, Greenland and far northern Alaska, as a research associate in the U.S. Antarctic Program and a field engineer for the National Oceanic and Atmospheric Administration.

She joined NASA as a member of the 2013 astronaut class. She finished training in 2015 and a few years later was assigned to her first spaceflight, a long-duration mission to the ISS.

"Long-duration" is an understatement, in fact: The mission launched in March 2019 and didn't return to Earth until the following February. Koch spent 328 days aboard the orbiting lab, [longer than any other woman](#) has on a single mission. And in October 2019, Koch and Jessica Meir performed the first-ever [all-female spacewalk outside the ISS](#). That pioneering excursion was one of six that Koch conducted during her time aboard the orbiting lab.

Artemis 2 will be Koch's second spaceflight.

"Am I excited? Absolutely. But my real question is, Are you excited?" Koch said during Monday's, April 3, 2023 announcement event, which was broadcast live on NASA TV. "And I ask that because the one thing I'm most excited about is that we are going to carry your excitement, your aspirations, your dreams with us on this mission. Artemis 2: your mission."

Astronaut Jeremy Hansen

Jeremy Hansen, 47, is from London, Ontario. He earned a bachelor's degree in honours space science and a master's degree in physics from the Royal Military College of Canada in Kingston, Ontario.

He's a colonel in the Royal Canadian Air Force who served as a fighter pilot from 2004 to 2009, according to his official [Canadian Space Agency \(CSA\) biography](#) (opens in new tab). He is married to wife Catherine and has three children.

Hansen was one of two people chosen as a CSA astronaut in 2009, in the agency's third recruitment campaign. He completed astronaut training in 2011 and prepped for spaceflight further by participating in a subterranean expedition of the European Space Agency's CAVES program in 2013 and an underwater excursion in 2014 via NASA's NEEMO program. In 2017, Hansen was selected to lead the training of NASA and CSA astronaut candidates, becoming the first Canadian to hold this post.

GATEWAY Integrated Spacecraft Configuration

