Protected inside a glass case are some precious boots. Technically called astronaut "overshoes," they seem perfectly preserved, almost pristine. But a closer look reveals bits of gray lunar dust embedded in the white fabric.These overshoes made the last human footprints in that gray dust, almost a half-century ago."They look like, you know, the winter moon boots that you've seen," says Teasel Muir-Harmony, curator of the Apollo collection at the Smithsonian's National Air and Space Museum, where this footwear is on display. "Yet they have those traces of the experience of walking on the lunar surface." Fifty years ago, on December 7, 1972, a powerful Saturn V rocket blasted off carrying three astronauts, including Apollo 17 Commander Eugene Cernan, who wore those overshoes.He knew that his crew would be the last lunar visitors for some time to come —but he had no idea how much time would pass.Now, as NASA commemorates the anniversary of its Apollo program's final mission, it's closer than ever to returning astronauts to the lunar surface. Its new, multi-billion-dollar moon rocket launched for the first time last month, sending up a crew capsule — with no astronauts on board — that's currently on its way home from a test flight around the moon. The spacecraft, called Orion, is due to splash down in the Pacific on December 11. If all goes well, NASA expects to fly astronauts on a trip around the moon in 2024. And soon after, the agency intends to take astronauts to the surface in a lunar lander being built by Elon Musk's company SpaceX.Although 2025 is the agency's target date for a landing near the lunar South Pole, most in the aerospace industry expect delays. NASA has vowed that this time around, moonwalkers will include a woman and a person of color.**Apollo 17's historic weight**On December 14, 1972, at the end of the final moonwalk of the Apollo 17 mission, Cernan spoke a few words from the surface of the moon before following astronaut Harrison Schmitt up a ladder into their ascent vehicle. "We leave as we came, and, God willing, we shall return, with peace and hope for all mankind," said Cernan.Being "the last man on the moon" was Cernan's claim to fame, but he seemed eager to shed the title."I'd like to be able to shake the hand of that young man or young woman who replaces me in that category," he told NPR in 2012, before his death five years later. "But unfortunately, the way things have gone and the way things are looking for the future, at least the near-term future, that won't happen in my lifetime." Only a dozen people have ever walked on the moon. During the three days they spent on its surface, Schmitt and Cernan traveled for over twenty miles, while crewmate Ronald Evans orbited above in a command module. "They knew the historic weight of that mission," says Muir-Harmony, who notes that other Apollo astronauts abandoned their overshoes on the moon, to avoid carrying too much cargo home other than lunar rocks. But Cernan packed his for the return trip. Another thing the astronauts brought home, and one of the most important legacies of the Apollo 17 mission, was a photograph of the entire round globe of the Earth, looking like a blue marble."That image was taken up by the environmental movement. It was on the Whole Earth Catalog," says Muir-Harmony, referring to the influential counterculture publication launched in 1968. "It's one of the most reproduced images in history." **"Apollo wasn't very popular"**Like the majority of Americans alive now, Muir-Harmony isn't old enough to remember the days of moonwalking, which ended before she was born.Her museum has just created a new lunar exploration hall, and it has to tell the story of the Apollo program to people with no personal memories of it. Back in the 1960's and 1970's, she notes, the Apollo program didn't have a tremendous amount of public support. "In general, Apollo wasn't very popular domestically," explains Muir-Harmony. "It was only around the Apollo 11 mission that more than half of Americans thought this should be a national priority."Many Americans resented the money devoted to moon exploration, and the nation also faced pressing challenges like the Vietnam War. Muir-Harmony notes that "major developments" in that war were happening during the Apollo 17 mission and generating competing headlines.She says the Apollo program ended because politicians like President Richard Nixon were no longer willing to shoulder its high costs and the risks to astronauts, given that the Cold War's race to the moon had been won.NASA shifted to building reusable space

shuttles. These vehicles flew for three decades and made it possible to construct the International Space Station, which is occupied 24/7 and orbits about 250 miles above the Earth. But all of that work kept astronauts close to home, rather than going back to the moon or on to Mars. President George H. W. Bush proposed a return to the moon, and President George W. Bush did as well. But each time, support waned when a new administration came in with a different agenda.That hasn't been true for NASA's current moonshot, which the agency calls Artemis, after the mythical Apollo's twin sister. "One of the things that bodes very well for Artemis," says Muir-Harmony, "is that this is a program that has had sustained support through multiple administrations."And even though humans have already walked on the moon, she says it's hard to predict what effect a moon landing would have on younger Americans seeing it for the first time.During the Apollo 11 landing, basically everyone on Earth stopped what they were doing to watch, coming together "in greater numbers than ever before in human history," she points out. "What would it mean to feel like a participant today?"