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With Artemis missions, NASA will land the first woman and first person of color on the Moon, using innovative technologies to explore more of the lunar surface than ever before. We will collaborate with commercial and international partners and establish the first long-term presence on the Moon. Then, we will use what we learn on and around the Moon to take the next giant leap: sending the first astronauts to Mars. - NASA

Now going to mars? That is exciting… but you are probably thinking, “Why are we going back to the moon?” Didn’t we already travel to the moon? Well, Nasa plans to go back to the Moon for most importantly, scientific discovery, but also for economic benefits, and inspiration for a new generation of explorers, which they call “the Artemis Generation ". The Moon plan could be described as bipartite: it’s focused on achieving the goal of an initial human landing by 2024 while also working toward sustainable lunar exploration in the mid-to-late 2020s. 2024 is the most ambitious date possible because though the United States leads in space exploration now; however, as more countries and companies take aim at the Moon, America needs the earliest possible landing to maintain and build on that leadership, as well as to prepare for a historic first human mission to Mars. With the development and testing of the powerful Space Launch System rocket and the Orion spacecraft soon coming to a close, NASA is equipped with the foundation needed to resend Humans back into lunar orbit. As of now, the SLS rocket now is on its final tests, most recently the wet dress rehearsal, a test of the engines that involves the loading of cryogenic, or super cold, propellants, including the detanking of the propellants with the Artemis I rocket at the launch pad on the mobile launcher. After the last test came in, though there are a few minor issues needing to be resolved, NASA is confident this rocket will be ready soon. However, to start. Let's dive deeper into the technological wonders of this SLS Rocket.

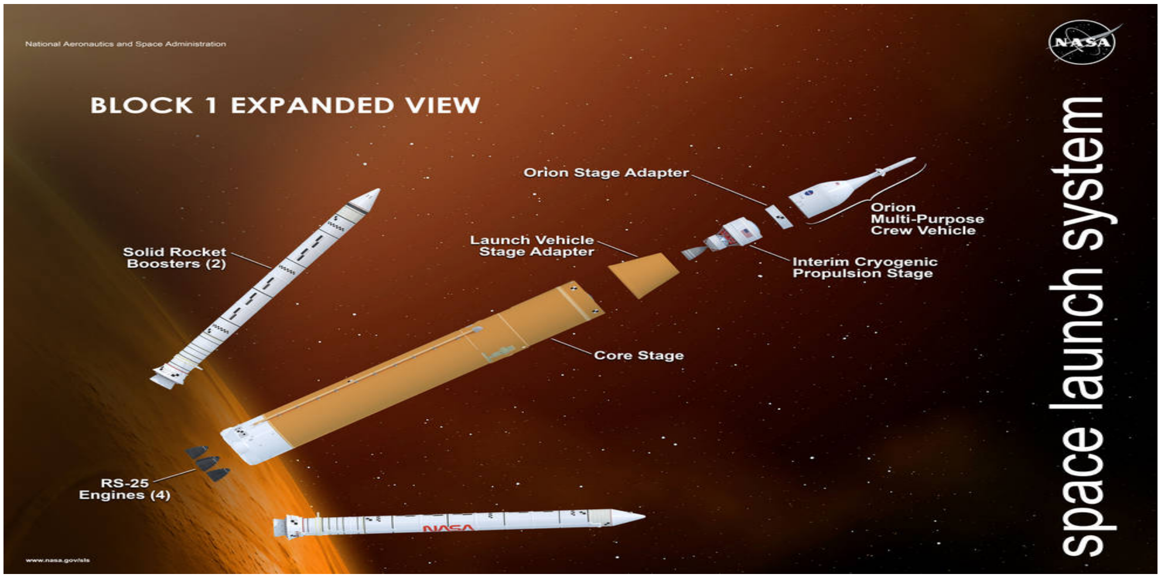
Technological innovations onboard the SLS rocket:

On this mission, the SLS rocket will carry a plethora of high-tech gadgets. For example, the BioSentinel mission was selected as one of the secondary payloads on this rocket. The primary objective of BioSentinel is to develop a biosensor instrument to detect and measure the impact of space radiation on living organisms over long durations beyond low-Earth Orbit. The Biosentinal biosensor utilizes the yeast *Saccharomyces cerevisiae* to determine the biological response to ambient deep-space radiation, including DNA damage like the formation of double-strand breaks (DSBs). The biosensor contains two genetically engineered yeast strains: a wild type strain that serves as a control for yeast health and “normal” DNA damage repair, and a *rad51* deletion strain, which is defective for DNA damage repair and will cause a change in growth and metabolism as it accumulates radiation damage. These changes will be detected by the biosensor payload. With this biosensor, BioSentinel will conduct the first study of the biological response to space radiation outside LEO(Low-Earth-Orbit) in almost 50 years, while also addressing strategic knowledge gaps related to the biological effects of space radiation. The biosensor will be an adaptable platform to perform human-relevant measurements in space in the future. Like the Biosentinel mission, The CubeSat, or

CuSP, will hitch a ride out of Earth orbit aboard the first flight of NASA's Space Launch System. Once the CubeSat, a device just a bit bigger than a box of cereal, is ejected, it will orbit around the sun in space, measuring incoming radiation which creates a wide variety of effects on Earth, such as interfering with radio communications to trip up satellite electronics to create electric currents in power grids. One of the first CubeSats to travel in interplanetary space will be NASA's miniature space science station, dedicated to studying the dynamic particles and magnetic fields that stream from the sun.

More on the SLS rocket:

In speaking of the technological invention of the SLS rocket, let's talk more about the components of a successful mission using an SLS rocket. At liftoff, the SLS core stage and twin solid rocket boosters will fire to thrust the 5.75 million pound rocket off the launch pad at Kennedy Space Center in Florida and send it into orbit, To do this, in a roughly eight minutes timespan, SLS's four RS-25 engines burn 735,000 gallons of liquid propellant to create two million pounds of thrust while the twin rocket boosters also



burn more than two million pounds of solid propellant. This creates a total of more than seven million pounds of thrust during its ascent, which rocket engineers often say feels like going uphill. However, the solid rocket boosters separate two minutes into the flight, and the core stage falls away around eight minutes after launch. More power is still needed to send the Orion spacecraft to the Moon. At this point, the upper part of the rocket and Orion are soaring almost 100 miles above Earth, accelerating at more than 17,500 miles per hour, and beginning a circular orbit around Earth. This is Low-Earth Orbit, often referred to as LEO. SLS can deliver more than 95 metric tons (209,439 pounds) to this orbit with a Block I configuration. However, a deep space mission requires a rocket that can travel beyond LEO with enough power and speed to overcome the pull of Earth's gravity and send the spacecraft even farther to reach the Moon. Without completing an orbit, we can do this due to TLI, or trans-lunar injection, which is the key maneuver that makes it possible to send Orion 280,000 miles beyond Earth and 40,000 miles beyond the Moon, farther than any spaceship qualified to safely carry humans has ever ventured. The amount of mass a rocket can send to the Moon is determined by its performance at TLI. The initial configuration of SLS can send more than 27 metric tons (59,000 pounds) to lunar orbits and future upgrades will enable the rocket to send at least 46 metric tons (101,000 pounds). For Artemis 1, the TLI maneuver will begin as the upper part of the rocket, fires one RL10 engine producing 24,750 pounds of thrust to accelerate the vehicle to more than 24,500 miles per hour, a velocity fast enough to overcome the pull of Earth's gravity and propel the Orion spacecraft out of LEO and send the spacecraft to the Moon. The TLI maneuver precisely targets a point about the Moon that will guide Orion close enough to be captured by the Moon’s gravity. Then everything but Orion separates and Orion heads to the Moon for its three-week mission, and the stage continues on a similar path, deploying several CubeSats and other secondary payloads along the way to study the Moon or head father out to deep space. The 10 small satellites continue their various missions, gathering information to help NASA in the future exploration of deep space.