Name: _____ Date: _____

How Did Neil Armstrong Become an Astronaut?

Reading level 11 (7th grade) · 1261 words

How does a person become an astronaut? For Neil Armstrong, the road began with engineering. He earned a degree in aeronautical engineering from Purdue University in 1955. That same year he joined the NACA at its lab in Cleveland, Ohio. The letters stand for the National Advisory Committee for Aeronautics, the agency that came before NASA. Later that year he moved to its High-Speed Flight Station in Edwards, California. He worked there first as a research scientist and then as a pilot. The job was to fly new aircraft and report exactly what they did.

A research pilot is not a stunt flyer. Engineers designed the plane, and the pilot found out whether the design worked. Armstrong flew the X-1B, the X-5, the F-105, the F-106, the B-47 and the KC-135, among others. By the time he left Edwards he had logged more than 2,450 flying hours. NASA says he took part in both the flying and the engineering of his projects. It adds that he worked closely with designers on a new self-adaptive flight control system.

At Edwards he also flew a rocket plane, the X-15. A B-52 carried it aloft and dropped it. Armstrong flew it seven times between late 1960 and July 1962. NASA's flight log lists his April 20, 1962 flight at Mach 5.31, or 3,789 miles an hour, and 207,500 feet. NASA says he accidentally tipped the nose up on the way down. The X-15 overshot Edwards. With the engine off, he turned it around over the Rose Bowl in Pasadena and glided it onto the south end of Rogers Dry Lake.

In 1962 NASA chose nine new astronauts for its second class, and Armstrong was one of them. The group was introduced to the public on September 17, 1962. On September 20, 1965, a NASA history says, the agency named him command pilot of Gemini 8, calling him "a civilian test pilot with long experience in the X-15 rocket research aircraft program." David Scott was the pilot. Armstrong had been on the backup crew for Gemini 5. Their goal was the first docking of two spacecraft in orbit.

Docking is harder than it sounds. The target was a rocket stage called Agena, and it was launched first. It reached a circular orbit 298 kilometers up. Then Gemini 8 lifted off on March 16, 1966, about 1,963 kilometers behind it. Thirty-four minutes into the flight the Sun set, and the crew could see fires streaming from their own thrusters in the dark. Over California, Armstrong looked down and spotted Rogers Dry Lake, the bed where he had landed the X-15. Hours later he brought the spacecraft to a stop just 46 meters from the Agena. Then he crept in to dock.

It worked. A communicator on a tracking ship, the Rose Knot Victor, said, "Go ahead and dock." Armstrong closed in at about three inches a second. "Flight, we are docked!" he

reported. "It's really a smoothie—no noticeable oscillations at all." In Houston, a NASA history says, the flight controllers cheered. But soon Scott noticed that the attitude ball showed a 30-degree roll. "Neil, we're in a bank," he said. They shut off the Agena's control system, and for four minutes things steadied. Then the roll began again.

Armstrong reported that the thruster propellant had dropped to 30 percent. That was a clue that something on the spacecraft itself was firing. The crew decided to break away to work out what was wrong. Armstrong said "Go," and Scott hit the undocking button. Armstrong gave the thrusters a long burst, and the spacecraft pulled straight back. Then it spun faster still. A NASA history says it whirled at one revolution per second. Scott told a tracking ship, "We have serious problems here ... we're tumbling end over end up here."

The trouble began where no ground station could hear them. Engineers said later that a station would have seen a thruster stuck on in the telemetry, the stream of radioed data. They could have told the crew what to do. Instead the two men had to work it out themselves. "All that we've got left is the reentry control system," Armstrong said. That system had its own small thrusters, meant for the trip home. They switched it on and tried the hand controllers. The spacecraft answered.

Armstrong steadied the spacecraft. He shut off one ring of reentry thrusters to save fuel. Then he carefully turned the others back on, one group at a time. That showed which one was at fault. Thruster number 8 had failed "on," meaning it had stuck open. A mission rule said that once the reentry thrusters were used, the flight must end as soon as possible. Those thrusters aim the spacecraft for the burn that brings it home, so they could not be risked.

Gemini 8 splashed down in the western Pacific after 10 hours, 41 minutes and 26 seconds. Rescue swimmers attached a flotation collar within 45 minutes. A Navy destroyer picked up the crew a few hours later. Investigators decided that an electrical short had probably opened the valves on thruster 8. McDonnell, which built the spacecraft, changed the circuit so that an "off" switch really cut power to the thrusters. The NASA history sums up the mission in three parts: the first space docking, a shortened flight, and a safe recovery.

The lessons went on to the Moon. A landing there would be flown by hand, so NASA built a strange practice machine, the Lunar Landing Research Vehicle. A jet engine pointed down held up five-sixths of its weight, which copied the Moon's lower gravity. On May 6, 1968, Armstrong's LLRV went out of control about five minutes into a flight. At about 200 feet up he ejected and parachuted down. NASA counts 21 flights in the LLRV and six in its successor, the LLTV.

He later called the machine "a contrary machine, and a risky machine, but a very useful one." The practice paid off on July 20, 1969. The lunar module Eagle was steering toward a field of boulders. Armstrong took over by hand and flew on. The powered descent took 12 minutes and 34 seconds, which was 36 seconds more than planned. He said the engine was still

running at touchdown. His radio call was, "Houston, Tranquility Base here. The Eagle has landed." Later he said that the lunar module "flew better than the LLTV."

Eagle had touched down at 20:17:40 Coordinated Universal Time, and about six and a half hours later Armstrong climbed down the ladder. The mission clock, which counts from liftoff, read about 109 hours and 24 minutes. The world heard him say, "That's one small step for man; one giant leap for mankind." He and his crewmate spent two hours and 14 minutes walking on the Moon, and across his two spaceflights Armstrong spent eight days and 14 hours in space. NASA's biography lists the Presidential Medal of Freedom and the Collier Trophy in 1969, and the Congressional Space Medal of Honor in 1978.

Armstrong left NASA in August 1971 and taught engineering at the University of Cincinnati until 1979, when he was a professor of engineering. In the early 1990s he hosted a television documentary series about aviation called "First Flights," NASA says. He died on August 25, 2012, at the age of 82. Years earlier, in a speech at the National Press Club on February 22, 2000, he had described himself this way: "I am, and ever will be, a white-socks, pocket-protector, nerdy engineer—born under the second law of thermodynamics."

Questions

1. What did a research pilot like Armstrong do at Edwards?

A. Flew stunts for crowds at air shows
B. Flew new aircraft and reported what they did
C. Built each plane by hand in a factory

2. Why did Armstrong and Scott undock from the Agena?

A. They had finished the docking test
B. The Agena had run out of fuel and had to stop
C. They needed to find out what was making them roll

3. Why did Gemini 8 end early even after Armstrong stopped the spin?

A. Using the reentry thrusters meant the flight had to end
B. The crew had run out of food and water
C. Houston had lost all radio contact with the ship

4. In this book, what does "ejected" mean?

A. Fell asleep
B. Was shot out of a vehicle
C. Landed softly

5. Why did NASA build the Lunar Landing Research Vehicle?

A. To carry rock samples back to Earth
B. To measure the thin air on the Moon

C. To let pilots practice a Moon landing

Words to know

docking: joining in space
thrusters: small rocket jets
telemetry: radioed data
oscillations: back-and-forth wobbles
ejected: was shot out

Answer key: How Did Neil Armstrong Become an Astronaut?

1. B. Flew new aircraft and reported what they did
2. C. They needed to find out what was making them roll
3. A. Using the reentry thrusters meant the flight had to end
4. B. Was shot out of a vehicle
5. C. To let pilots practice a Moon landing