The Moon has long been part of our culture. Folk stories of werewolves are still told, superstitions say when to cut your hair, for instance, and they have given us the word 'lunatic'. Exploring is a basic human desire so once science and engineering stretched our boundary outside Earth's atmosphere, travelling to our natural satellite became a challenge.

Helen Sharman, the first Briton to travel to space, returning safely from her mission to the Mir Space Station.

The Moon is the furthest place from Earth that people have ever set foot. Compared to the International Space Station, which is about 400 km above the Earth's surface, the Moon is much further at around 400,000 km away. There were no guarantees the Apollo crews would return to Earth safely.

But what an adventure those astronauts had! On the journey, they experienced a wonderful, free, relaxing feeling of weightlessness. Views out of the window were awesome, especially when they saw our distant blue planet rise above the Moon. And just imagine what it was like to pad about on the dusty surface, bouncing around in one sixth of the gravity we have on Earth!

Blast Off to the Moon tells you exactly what all that was like. You can find out how the astronauts ate and what happened to their food, how the spacecraft worked and what the astronauts did when they were not busy navigating by the stars. You don't have to read the book from cover to cover (though you can if you like). You can dip in and out of the parts that interest you most and come back to the other sections later.

As space agencies consider using the Moon to get to Mars, people are applying what we learnt from Apollo to future space missions. Before I became an astronaut, I would have laughed if anyone suggested I might go into space. The first Mars crew could include one of your family and it might even be you. Happy reading!

Helen Sharman

Helen Sharman, Astronaut

Mission to the Moon

"If the mission - called Apollo 11 - is successful, man will accomplish his long-time dream of walking on another celestial body."
- statement of intent from the Apollo 11 Press Kit, 1969

The Apollo 11 mission aimed to land men on the Moon and return them to Earth safely. Once on the Moon, the astronauts would conduct various scientific experiments and collect samples of lunar surface material.

Why did the mission happen?

"We choose to go to the Moon in this decade and do the other things, not because they are easy, but because they are hard." John F. Kennedy

In 1961, President John F. Kennedy vowed that the United States would land a man on the Moon by the end of the 1960s. The result was the Apollo space programme.

The first Apollo mission, Apollo 1, ended in tragedy as all three astronauts were killed in a fire during a test. After extensive redesigning of equipment, the programme resumed. Apollo 11 was the fifth Apollo mission to carry astronauts.

This is a copy of the plaque which the Apollo 11 astronauts left behind on the Moon. It was made of stainless steel and was attached to the landing leg which supported the ladder on the Lunar Module's descent stage.

What did they want to achieve?

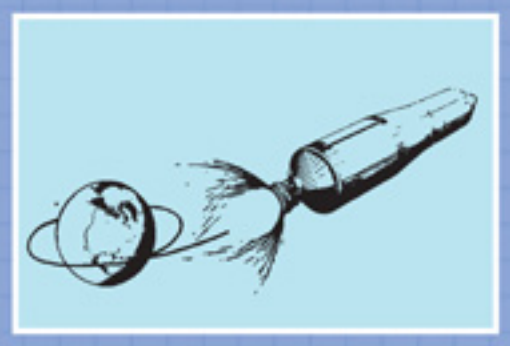
The main objective of the Apollo 11 mission was to perform a manned lunar landing and return safely to Earth. The mission also set 11 secondary objectives and five scientific experiments, all of which were completed apart from two (one scientific and one secondary). These investigated the makeup of the Moon and how humans can function when subject to the Moon's unfamiliar conditions. The astronauts also filmed television footage and took photographs, some of which are included in this book.

These illustrations are taken from the Apollo 11 Press Kit. They were created to send out to people before the mission so that they could see what was involved at each stage - from take off to getting the three astronauts home safely. You can find out more about these in the rest of this book!

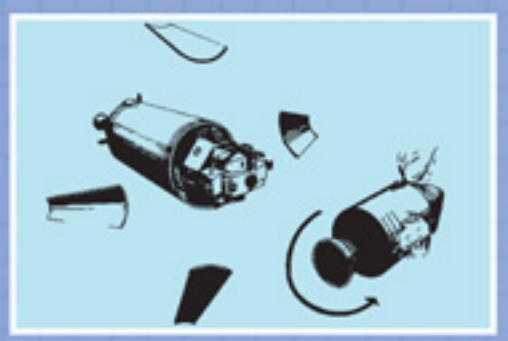
Astronsut insertion

Check of systems

Saturn staging



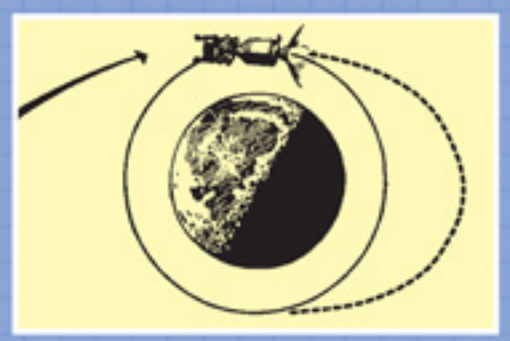
Translunar injection



Transposition manoeuvre

Extraction of Lunar Module

Navigation check



Lunar orbit insertion

Transfer to Lunar Module

Separation of Lunar Module from Command Service Module

Landing on the Moon

First step on the Moon

Commander on the Moon

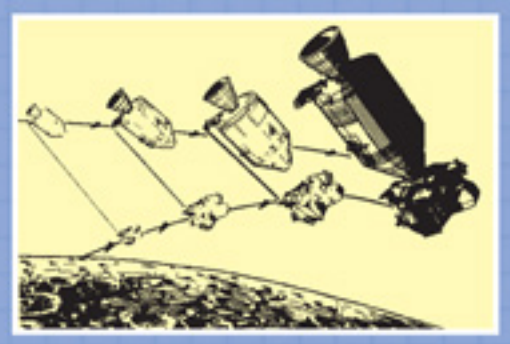
Collecting samples

Experiment placements

TV camera placement and alignment of passive seismometer

Bulk sample collection

Return to spacecraft and ascent stage launch



Rendezvous and docking

Lunar Module jettison

TransEarth injection

Command Module and Service Module separation

Re-entry and splash down

Recovery

Meet the Astronauts!

Neil Armstrong, Buzz Aldrin and Michael Collins were the three astronauts chosen for the Apollo 11 mission. They were all very experienced and had flown space missions before. Neil was the first human to actually set foot on the Moon and Buzz the second. Michael stayed in the Command Module with the important task of making sure the mission was a technical success and that his fellow astronauts were able to return safely.

Neil, Michael and Buzz posing for a pre-launch photoshoot

NAME: Commander Neil A. Armstrong

JOB: NASA astronaut

BIRTHDAY: 5 August 1930

BORN: Wapakoneta, Ohio, USA

DESCRIPTION: Blond hair, blue eyes, 5 feet 11 inches, 11 stone 11 pounds

EDUCATION: Attended high school in Wapakoneta and went on to complete a Bachelor of Science degree in Aeronautical Engineering at Purdue University in 1955

FAMILY: Married to Janet Shearon from Evanston, Illinois and has two children - Eric and Mark

HOBBIES: Include soaring, for which he is a Federation Aeronautique International gold badge holder

SALARY: $30,054 a year ($207,000 in 2019)

EXPERIENCE: He was a naval aviator from 1949-1952 and flew 78 combat missions during the Korean War

RANDOM FACT: Neil participated in the launch of over 100 rocket aeroplane flights

Neil had a talent and passion for performance. He wrote and co-directed two musicals whilst at university, and played the baritone horn.

NASA's Apollo 11 astronauts are all smiles having successfully returned home after being part of one of the greatest moments in history!

Training

How do you prepare for something that has never been done before? Neil, Buzz and Michael had to undergo more than 1,000 hours of intensive training before they could set off on their historic journey to the Moon. This ensured that in the months leading up to the mission, every second was practised over and over again.

The Apollo 11 astronauts trained alongside their backup crew - Jim Lovell, Fred Haise and Bill Anders - up until a few weeks before the launch. They learnt essential space survival skills, such as how to land the lunar module and manoeuvre in low and zero gravity conditions, as well as geology and rehearsing putting up the American flag. They also learnt how to withstand a much greater force of gravity (g force) than you would normally feel standing on Earth. This was something the astronauts experienced during launch and had to prepare for to ensure that they didn't pass out.

They trained indoors, outdoors, in spacesuits, underwater and in any other condition NASA thought beneficial. The crew also took part in spacecraft manufacturing and launch area testing to provide a thorough operational knowledge of the spacecraft. Contingency plans were also prepared for: although Apollo 11 was designed to land in the ocean, the astronauts received jungle and desert survival training in case they hit land instead.

Training aimed to replicate lunar conditions as much as possible on planet Earth with no definitive proof of what the surface of the Moon was like. Detailed simulators of the spacecraft and lunar surface were built to give the astronauts as much experience as possible.

In the photo above on the left, you can see Buzz practicing the Solar Wind Composition experiment during a training session. This took place on a mock up of the lunar surface in Building 9 at the Manned Spacecraft Center in Houston, Texas.

In the photo above on the right, Neil and Buzz are studying rock samples whilst on a geological field trip to the Quitman Mountains in Texas. The Texan desert was chosen for having a theorised similar geological makeup to the Moon. Here, the astronauts practiced collecting Moon rock samples using special lunar geological tools. Whilst Buzz and Neil rehearsed various lunar surface procedures, Michael practised various manoeuvres for his time alone in the Command Module. In the photo on the left, you can see him down beyond the couches with the navigation equipment to his back in the Command Module simulator.

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In the photos above, you can see a
range of the different things the three Apollo 11
astronauts had to complete as part of their training:

1: Buzz and Neil practice collecting lunar samples on a mock up of the Moon surface.
Buzz uses a scoop to collect the sample, whilst Neil holds a bag to receive it.
2: Neil sets up a lunar surface television camera during lunar surface simulation training.
3: Neil practices photographing the lunar surface. The Lunar Module simulator is behind him.
4: Buzz, Neil and Michael relax on the deck of the NASA Motor Vessel Retriever before taking
part in a training exercise in the Gulf of Mexico to prepare for the ocean landing
(also known as water egress) planned for their splash down back to Earth.
5: Neil flies the Lunar Landing Training Vehicle in a simulation of landing the Lunar Module.
6: Buzz gets used to weightless conditions on a KC-135 aircraft, which can mimic zero gravity.

Before the Launch

Preparations for the launch began five days beforehand. Tasks during this period included the mechanical build-up of the Command Service Module and Lunar Module, fuel cell activation and servicing and loading helium aboard the Lunar Module.

The Day before the Launch

The official launch countdown started at T-28 hours, the day before the launch date. T-xx, pronounced 'T minus', meant the time before the scheduled launch time of 9.32 am EDT (Eastern Daylight Time - the timezone used in Florida, where the launch took place) on 16 July 1969. This involved the build-up and loading of the rocket and spacecraft and pre-launch checks. One essential task was to load the huge amount of fuel needed to launch the Saturn V (pronounced 'Saturn five') and propel the spacecraft to Earth orbit. This took nearly five hours, throughout the night.

A few days before their mission, Neil, Buzz and Michael spent the night with their families at NASA's secluded beach house near the Kennedy Space Center in Florida.

This time away from the hectic pre-launch schedule allowed the astronauts time for contemplation with their wives and children, ahead of the possibility that they may never return.

The Night before the Launch

The Apollo 11 crew were fully immersed in the meticulously planned pre-launch timetable. Though they were not in quarantine - that came after getting back from the Moon - they did stay overnight at the Manned Spacecraft Operations Building, not far from the administrative headquarters of the Kennedy Space Center, and about eight miles from the launch pad. They revised several procedures before having a meal with friends on Cape Canaveral, where the Kennedy Space Center was situated, having said goodbye to their families the day before. They went to bed at 8.45 pm, getting an early night before the big day.

Neil and Michael in the hallway of the Manned Spacecraft Operations Building before being transported to Launch Complex 39A.