

First person in space



Yuri Gagarin, in full **Yuri Alekseyevich Gagarin**, (born March 9, 1934, near Gzhatsk, Russia, U.S.S.R. [now Gagarin, Russia]—died March 27, 1968, near Moscow), Soviet cosmonaut who in 1961 became the first man to travel into space. Gagarin's 4 $\frac{3}{4}$ -ton Vostok 1 spacecraft was launched at 9:07 AM Moscow time on April 12, 1961, orbited Earth once in 1 hour 29 minutes at a maximum altitude of 187 miles (301 km), and land-ed at 10:55 AM in the Soviet Union. His spaceflight brought him immediate worldwide fame. He was awarded the Order of Lenin and given the titles of Hero of the Soviet Union and Pilot Cosmonaut of the Soviet Union. Monuments were raised to him, and streets were renamed in his honour across the Soviet Union.

Vostok had a diameter of 2.43m and was 4.55m long. It was a single person spacecraft built for a low-Earth orbit. On re-entry to earth's atmosphere, Gagarin ejected at 7000m and descended via parachute. This is because the Vostok made very rough landings during test flights, and Gagarin would have been badly injured.

Gagarin never went into space again but took an active part in training other cosmonauts. He made several tours to other nations following his historic flight, and from 1962 he served as a deputy to the Supreme Soviet. Gagarin was killed with another pilot in the crash of a two-seat jet aircraft while on what was described as a routine training flight. His ashes were placed in a niche in the Kremlin wall. After his death in 1968 the town of Gzhatsk was renamed Gagarin.

Questions:

1. How long ago was Gagarin's space flight?
2. He launched from Moscow, which country is this in?
3. Gagarin's flight took 1 hour and 29 minutes. Write this as a mixed number.
4. Vostok had a mass of 4 $\frac{3}{4}$ tonnes. What is this a decimal?
5. Would Vostok fit into your classroom?
6. Why did Gagarin eject rather than stay in Vostok and land?
7. Gagarin ejected at 7000m; how many kilometres is this?
8. Gagarin was deputy to the Supreme Soviet. What does this mean?
9. His ashes were placed in the Kremlin; where is this and what purpose does it have?
10. What did his home town do to honour him?





The Lunar Landing

A **Moon landing, or lunar landing** is the arrival of a spacecraft on the surface of the Moon. The word lunar means moon in Latin. This includes both crewed and robotic missions. The first human-made object to touch the Moon was the Soviet Union's Luna 2, on 13 September 1959.

The United States' Apollo 11 was the first crewed mission to land on the Moon, on 20 July 1969. There were six crewed U.S. landings between 1969 and 1972, and numerous uncrewed landings, with no soft landings happening between 22 August 1976 and 14 December 2013. The United States is the only country to have successfully conducted crewed missions to the Moon, with the last departing the lunar surface in December 1972. All soft landings took place on the near side of the Moon until 3 January 2019, when the Chinese Chang'e 4 spacecraft made the first landing on the far side of the Moon.

A total of twelve men have landed on the Moon. This was accomplished with two US pilot-astronauts flying a Lunar Module on each of six NASA missions across a 41-month period starting 20 July 1969, with Neil Armstrong and Buzz Aldrin on Apollo 11, and ending on 14 December 1972 with Gene Cernan and Jack Schmitt on Apollo 17. Cernan was the last man to step off the lunar surface. All Apollo lunar missions had a third crew member who remained on board the command module. The last three missions included a drivable lunar rover, the Lunar Roving Vehicle, for increased mobility.

To get to the Moon, a spacecraft must first leave Earth's gravity well; currently, the only practical means is a rocket. Unlike air-borne vehicles such as balloons and jets, a rocket can continue accelerating in the vacuum outside the atmosphere. Upon approach of the target moon, a spacecraft will be drawn ever closer to its surface at increasing speeds due to gravity. In order to land intact it must decelerate to less than about 160 kilometres per hour (99 mph) and be ruggedized to withstand a "hard landing" impact, or it must decelerate to negligible speed at contact for a "soft landing" (the only option for humans).

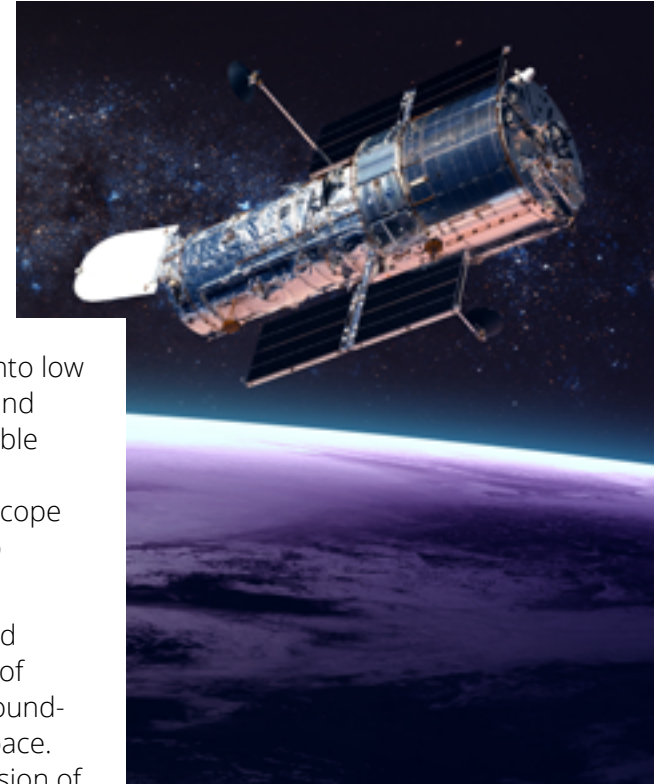
Questions:

1. Why are Moon landings sometimes referred to as Lunar landings?
2. When was the first crewed mission to the Moon? How long ago was this?
3. Who were the first two people to walk on the Moon?
4. What does NASA stand for?
5. Would walking on the Moon look and feel the same as walking on Earth? If not, why not?
6. What does the spacecraft need in order to escape Earth's gravity?
7. What does vacuum mean?
8. What does accelerate mean?
9. What must the speed be in order to achieve a 'soft landing'?
10. What does 'soft landing' mean?





The Hubble Space Telescope



The **Hubble Space Telescope** (often referred to as **HST** or **Hubble**) is a space telescope that was launched into low Earth orbit in 1990 and remains in operation. It was not the first space telescope, but it is one of the largest and most versatile, renowned both as a vital research tool and as a public relations boon for astronomy. The Hubble telescope is named after astronomer Edwin Hubble and is one of NASA's Great Observatories, along with the Compton Gamma Ray Observatory (1991–2000), the Chandra X-ray Observatory, and the Spitzer Space Telescope (2003–2020).[7] At the time of its launch in 1990, the Hubble Space Telescope cost \$4.7 billion (equivalent to \$9,310,000,000 in 2020).

Hubble features a 2.4 m (7 ft 10 in) mirror, and its four main instruments observe in the ultraviolet, visible, and near-infrared regions of the electromagnetic spectrum. Hubble's orbit outside the distortion of atmosphere of Earth allows it to capture extremely high-resolution images with substantially lower background light than ground-based telescopes. It has recorded some of the most detailed visible light images, allowing a deep view into space. Many Hubble observations have led to breakthroughs in astrophysics, such as determining the rate of expansion of the universe.


Images taken by Hubble have helped scientists estimate the age and size of the universe. Scientists believe the universe is almost 14 billion years old. Hubble has helped scientists understand how planets and galaxies form. An image called "Hubble Ultra Deep Field" shows the farthest galaxies ever seen.

Questions:

1. When was Hubble launched? How long is this before you were born?
2. It is renowned for what two main purposes?
3. Who is the telescope named after?
4. What did the telescope cost?
5. Why is this equivalent to so much more today?
6. What are Hubble's main features?
7. Which regions of the electromagnetic spectrum can be observed by Hubble?
8. It can capture images with lower background light. How?
9. Hubble has helped scientists estimate the age and size of the universe. How old is it?
10. What is the name of the famous image showing the farthest galaxies?



The Flight of the first private spacecraft



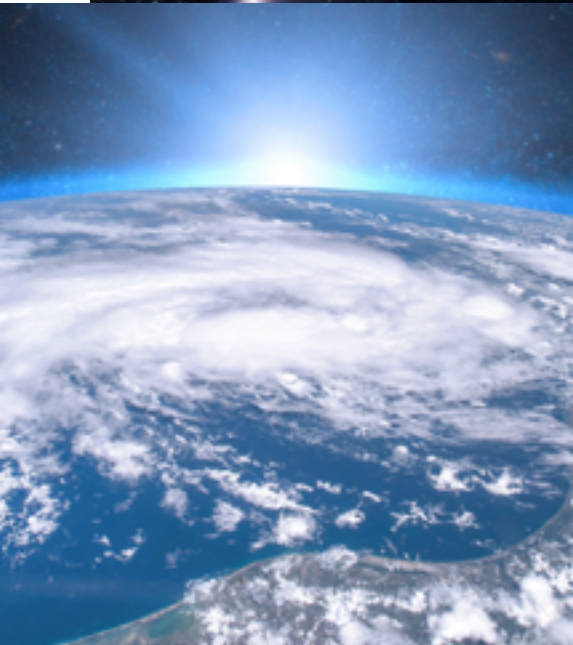
On 11 July 2021 company founder Richard Branson and three other employees rode on a flight as passengers, marking the first time a spaceflight company founder has travelled on his own ship into outer space (according to the NASA definition of outer space beginning at 50 miles above the Earth). Regular paid passenger service flights are scheduled to begin in 2022 after two more test flights have been completed. It's been a long road for Sir Richard to get to this point. He first announced his intention to make a space plane in 2004, with the expectation he'd have a commercial service available by 2007.

"I've wanted to go to space since I was a kid, and I want to enable hopefully hundreds of thousands of other people over the next 100 years to be able to go to space," Sir Richard told the BBC. The vehicle, known as Unity, will be carried by a much bigger aeroplane to an altitude of about 15km (50,000ft), where it will be released.

A rocket motor in the back of Unity will then ignite and blast the ship skyward. The motor will burn for 60 seconds, by which time Sir Richard, his three crewmates and the two pilots up front, will have a remarkable view of the planet below. The maximum height achievable by Unity is roughly 90km (55 miles, or 295,000ft), but towards the top of the climb Sir Richard will start to enjoy a few minutes of weightlessness and he'll be able to float around the cabin and to look out of the window.

Sir Richard will be taking instruction throughout the flight from Beth Moses. She's the chief astronaut instructor at the businessman's Virgin Galactic company. Apart from the firm's cadre of test pilots, Moses is the only person who's so far experienced the exhilaration of an ascent. The view out of the window, she says, is "just phenomenal".

Questions:

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1. When did Richard Branson complete the first private spacecraft flight?
 2. What is the NASA definition of outer space?
 3. What was his vehicle called?
 4. His spacecraft was carried by a larger aeroplane to 15km? What is this in metres?
 5. What propels Unity on after the larger aeroplane has released it?
 6. The motor burned for 60 seconds. Write this in minutes.
 7. What is Unity's maximum height? What is this in metres?
 8. Why did the astronauts feel weightless?
 9. What can you do when you're weightless?
 10. What will start to happen in 2022?