Definition: **space shuttle** from *Collins English Dictionary*

1 any of a series of reusable US space vehicles (*Columbia* (exploded 2003), *Challenger* (exploded 1986), *Discovery, Atlantis, Endeavour*) that can be launched into earth orbit transporting astronauts and equipment for a period of observation, research, etc, before re-entry and an unpowered landing on a runway. The first operational flight took place in 1981 and it was taken out of service in 2011

Summary Article: **space shuttle**

From *The Columbia Encyclopedia*

reusable U.S. space vehicle (1981–2011). Developed by the National Aeronautics and Space Administration (NASA) and officially known as the Space Transportation System (STS), it was the world's first reusable spacecraft that carried human beings into earth orbit. It consisted of a winged orbiter (122 ft/37 m long, with a 78-ft/24-m wingspan), two solid-rocket boosters, and a large external fuel tank. As with previous spacecraft, the shuttle was launched from a vertical position. Liftoff thrust was derived from the orbiter's three main liquid-propellant engines and the boosters. After 2 min the boosters used up their fuel and separated from the spacecraft, and—after deployment of parachutes—they were recovered following splashdown in the Atlantic Ocean and reused. After about 8 min of flight, the orbiter's main engines shut down; the external tank was then jettisoned and burned up as it reentered the atmosphere. The orbiter entered orbit after a short burn of its two small Orbiting Maneuvering System (OMS) engines. To return to earth, the orbiter turned around, fired its OMS engines to reduce speed, and, after descending through the atmosphere, landed like a glider. Five different orbiters—*Columbia, Challenger, Atlantis, Discovery, and Endeavour*—saw service; two were lost in accidents.

Following four orbital test flights (1981–82) of the space shuttle *Columbia*, operational flights began in Nov., 1982. On Jan. 28, 1986, the Challenger exploded shortly after takeoff, killing all seven astronauts. The commission that investigated the disaster determined that the failure of the O-ring seal in one of the solid fuel rockets was responsible. Shuttle flights were halted until Sept., 1988, while design problems were corrected, and then resumed on a more conservative schedule. NASA was forced to reemphasize expendable rockets to reduce the cost of placing payloads in space.

A second disaster struck the shuttle program on Feb. 1, 2003, when the Columbia broke up during reentry, killing the seven astronauts on board. NASA again halted shuttle launches, and a special commission was appointed to investigate the accident. It is believed that damage to the left wing, which could have been caused by insulation that separated from the external fuel tank during launch, ultimately permitted superheated gas to flow into the wing, weaken it, and cause its failure. Modifications were made to external fuel tank and other parts of the shuttle, and shuttle flights resumed in July, 2005. Further problems with fuel tank insulation that developed during that launch led to the suspension of additional flights for a year while the problems were corrected.

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Missions of the space shuttle included the transport of the Spacelab scientific workshop and the insertion into orbit of the Hubble Space Telescope (1990), the Galileo space probe (1989), the Chandra X-Ray Observatory (1999), and a wide variety of communications, weather, scientific, and defense-related satellites. Other notable achievements of the shuttle program included the rescue and repair of disabled satellites (including the Hubble Space Telescope in 1993 and 1999) and the first three-person spacewalk (1992). In 1996 the Columbia's mission of Nov. 19–Dec. 7 set the record for the longest shuttle flight.

In 1995 that the crew of Atlantis accomplished the first of nine shuttle-Mir (Russian space station) docking maneuvers and crew transfers, which were designed to pave the way for the assembly of the International Space Station (ISS). The crew of Discovery made the ninth and final docking in 1998, five months before the Russians orbited Zarya, the first ISS module. A month later the astronauts aboard Endeavour initiated the first assembly sequence of the ISS, linking the Unity module, a passageway that connects living and work areas of the station, to Zarya. In 1999 the Discovery crew accomplished the first docking of a shuttle with the ISS during a mission to supply the two modules with tools and cranes. Shuttle flights continued to bring supplies and components to the station, including the Destiny (2001, United States) and Columbus (2008, ESA) laboratories. The Atlantis flew the last shuttle mission, to the ISS, in July, 2011.

A number of nations and organizations developed proposals for shuttle-like space vehicles, but only one, the Soviet-Russian Buran, ever made it into orbital flight. A crewless Buran underwent a successful orbital test flight in 1988. Unlike the shuttle, the Buran did not incorporate main engines used during liftoff, only maneuvering engines, but otherwise the overall design was similar. The program was suspended in 1993 before a flight with a crew had been undertaken. The U.S. Air Force's X-37, whose development was begun by NASA, is a reusable, unmanned vehicle that was first launched in 2010. It is largely similar in general appearance to the space shuttle but is much smaller (29 ft/9 m long, with a 15-ft (4.5-m) wingspan).


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