

# ENGELSK

## *Space exploration*

### SPACE EXPLORATIONS BY THE CHINA

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#### **Velkommen til School To Go og dagens undervisning!**

Dette er et forløb i faget "Engelsk" om "Space exploration" i tre episoder, med de tre temaer: "Space explorations by the USA", "Space explorations by the China", og til sidst "Space explorations by Russia". Der vil både være lytte-tekster og øvelser i episoderne.

#### **Introduction**

Today, we're going to embark on an exciting journey into space, focusing on the incredible strides made by China in exploring the great unknown. Imagine towering rockets launching into the sky, sophisticated robots roaming distant planets, and

astronauts working in a space station orbiting Earth. This is the world of China's space exploration, a realm where science fiction turns into reality.

China's journey into space is relatively recent compared to some other countries, but it has quickly become one of the leaders in space exploration. From sending astronauts into space to exploring the Moon and even Mars, China is pushing the boundaries of what we know about space and how we can explore it.

One of China's most notable achievements is the Chang'e lunar exploration program. Named after the mythical Chinese moon goddess, Chang'e, these missions have sent orbiters, landers, and rovers to the Moon. They've made groundbreaking discoveries, such as finding water ice in permanently shadowed craters and successfully bringing lunar samples back to Earth for the first time in decades.

But the Moon isn't China's only interest. The Tianwen-1 mission marked China's first venture to Mars, successfully placing a rover on the Martian surface to study the planet's geology and climate. This makes China one of the few countries to explore our neighboring planet.

And let's not forget about the Tiangong space station. This ambitious project is China's step towards having a permanent presence in space, where astronauts can live and conduct experiments that could benefit life on Earth and our future in space.

China's space exploration efforts are not just about reaching new places in the solar system. They're also about advancing technology, from rocketry to robotics, and contributing to our global understanding of space. These missions inspire scientists and dreamers alike, showing us that with curiosity and determination, the sky is not the limit.

### **Learning objectives and goals:**

- I should be able to name the major Chinese space missions and describe their primary objectives.
- I should be able to explain how China's space exploration efforts have contributed to our knowledge of the Moon and Mars.
- I should be able to use a map of the solar system to locate Earth, the Moon, and Mars, and illustrate the path of Chinese missions to these celestial bodies.

## **What are the key achievements of China's space exploration program, and how have these missions contributed to our understanding of the Moon and Mars?**

China's space exploration program has achieved remarkable milestones in recent years, significantly enhancing our knowledge of both the Moon and Mars. Let's take a closer look at these key achievements and their contributions to space science.

### **Achievements on the Moon**

**Chang'e Missions:** China's lunar exploration program, named after the mythical Chinese moon goddess Chang'e, has been a cornerstone of its space exploration efforts. These missions include orbiters, landers, and rovers designed to study the Moon in detail.

**Chang'e 3:** Launched in 2013, this mission successfully deployed a rover, Yutu ("Jade Rabbit"), making China the third country to achieve a soft landing on the Moon. Yutu explored the lunar surface, analyzing soil and rocks, which helped scientists understand the Moon's composition and geological history.

**Chang'e 4:** This mission made history in 2019 by landing on the far side of the Moon, a first for humanity. Its rover, Yutu-2, has been studying the Moon's surface composition and structure, providing valuable data on this previously unexplored region.

**Chang'e 5:** In 2020, Chang'e 5 successfully returned lunar samples to Earth, marking the first time in over 40 years that materials from the Moon were brought back for study. This mission has offered scientists new insights into the Moon's volcanic activity and its age, helping to refine our understanding of the Moon's development over billions of years.

### **Achievements on Mars**

**Tianwen-1:** Launched in 2020, Tianwen-1 is China's first mission to Mars, consisting of an orbiter, lander, and rover (Zhurong). This mission aims to study the Martian surface, geology, atmosphere, and environment.

**Zhurong Rover:** Successfully landing on Mars in 2021, Zhurong has been exploring the Martian surface, investigating soil characteristics, and searching for evidence of water ice. These studies are crucial for understanding Mars' climate and geological history, and they lay the groundwork for future manned missions to the Red Planet.

### **Contributions to Space Science**

China's lunar and Martian missions have significantly expanded our knowledge of these celestial bodies.

**On the Moon:** The data collected by the Chang'e missions have provided detailed information about the Moon's mineral composition, surface processes, and the

presence of water ice in shadowed craters. These discoveries are vital for future lunar exploration and potential human settlement, as they identify resources that could support human life.

On Mars: Tianwen-1 and the Zhurong rover have contributed to our understanding of Mars by studying its surface features, climate, and potential for past life. The mission's findings are helping scientists piece together the planet's environmental history and assess its habitability.

In summary, China's space exploration program has played a significant role in advancing our knowledge of the Moon and Mars. By successfully conducting complex missions, China has not only demonstrated its technological capabilities but also contributed valuable scientific data that benefits the global community's efforts to explore and understand our solar system.

## **How does China's development of its own space station, Tiangong, demonstrate its capabilities and goals in space exploration?**

China's development of its own space station, known as Tiangong, which means "Heavenly Palace" in English, is a major achievement in space exploration. This project shows China's growing abilities in space technology and its long-term goals for exploring space. Let's dive into how Tiangong highlights China's capabilities and aims in the realm of space exploration.

### Showcasing Technological Capabilities

Building and maintaining a space station is a complex and challenging task that requires advanced technology and expertise. China's success in launching Tiangong demonstrates its significant progress in space engineering, robotics, and life support systems. For example, Tiangong is equipped with state-of-the-art laboratories where astronauts can conduct scientific experiments in microgravity, a condition where things seem to float because the pull of gravity is very weak. This ability to build such a sophisticated structure in space shows that China has mastered critical technologies needed for living and working in space.

### Long-Term Goals in Space Exploration

Tiangong is more than just a space station; it represents China's ambitious plans for the future of space exploration. By establishing Tiangong, China aims to have a continuous human presence in space, similar to the role the International Space Station (ISS) plays for other spacefaring nations. This presence will allow China to conduct long-term scientific research that can provide valuable insights into human health in space, the behavior of materials in microgravity, and other phenomena that can only be studied outside of Earth's atmosphere.

Furthermore, Tiangong is a stepping stone for even more ambitious goals. China envisions using its space station as a base for launching missions further into space, such as to the Moon and potentially to Mars in the future. The experience and knowledge gained from operating Tiangong will be invaluable for planning and executing these more distant explorations.

### International Collaboration and Prestige

While Tiangong is a national project, it also opens up opportunities for international collaboration in space science and technology. By inviting scientists from around the world to conduct experiments aboard Tiangong, China is positioning itself as a major player in the international space community. This collaboration not only advances scientific knowledge but also enhances China's prestige and influence in global space exploration efforts.

In summary, the development of the Tiangong space station is a clear demonstration of China's advanced capabilities in space technology and its ambitious goals for future space exploration. It highlights China's commitment to establishing a human presence in space, advancing scientific research, and playing a leading role in the international space exploration community.

## **In what ways does China's space exploration program contribute to international scientific knowledge and cooperation in space research?**

China's space exploration program has made significant strides in contributing to international scientific knowledge and fostering cooperation in space research. Let's explore how this program is helping the global community learn more about space and work together in its exploration.

### Sharing Scientific Discoveries

One of the main ways China's space program contributes to international scientific knowledge is by sharing the data and discoveries from its missions. For example, China's lunar missions, like the Chang'e series, have gathered important information about the Moon's surface, composition, and history. By sharing these findings with scientists around the world, China helps increase our understanding of the Moon, which is valuable for future lunar exploration and research.

Similarly, the Tianwen-1 mission to Mars has provided detailed observations of the Martian atmosphere, landscape, and geology. These insights are crucial for the global scientific community as they offer new perspectives on Mars' climate, weather patterns, and potential for past life. Sharing this data allows scientists from different countries to analyze and interpret the information, contributing to a more comprehensive understanding of Mars.

## Collaboration on Space Missions

China's space program has also opened doors for international collaboration on space missions. While China operates its own space station, Tiangong, it has expressed interest in welcoming astronauts and scientists from other countries to conduct experiments aboard. This opportunity for collaboration provides a platform for researchers from around the world to work together on scientific studies in microgravity, which can lead to breakthroughs in medicine, materials science, and other fields.

Additionally, China has been involved in joint missions and projects with other countries. These collaborations often focus on sharing technology, expertise, and resources for mutual benefit. By working together on space missions, countries can achieve objectives that might be too costly or complex to accomplish alone.

## Contributing to Global Space Safety and Sustainability

China's space exploration program also plays a role in initiatives aimed at ensuring the safety and sustainability of space activities. This includes participating in international discussions about space traffic management, the peaceful use of space, and the mitigation of space debris. By engaging in these conversations, China contributes to developing guidelines and practices that help make space exploration safer and more sustainable for all countries involved.

## Educational and Inspirational Impact

Finally, China's achievements in space exploration have an educational and inspirational impact on the international community. By successfully completing complex missions, China demonstrates what can be achieved through dedication, innovation, and collaboration. This inspires young people around the world to pursue careers in science, technology, engineering, and mathematics (STEM) and fosters a global culture of curiosity and exploration.

In summary, China's space exploration program contributes to international scientific knowledge and cooperation in several ways, including sharing scientific discoveries, collaborating on space missions, participating in global space safety initiatives, and inspiring the next generation of scientists and explorers. These contributions are vital for advancing our collective understanding of space and working together toward common goals in space exploration.

**What technological innovations have emerged from China's space exploration efforts, and how might these advancements benefit life on Earth?**

China's space exploration efforts have led to several technological innovations that are not only important for space travel but also offer significant benefits for everyday life on Earth. Let's explore some of these innovations and their potential impacts.

### Satellite Technology

One of the key areas where China has made significant advancements is in satellite technology. China has launched satellites for communication, Earth observation, and navigation. For example, the Beidou Navigation Satellite System, developed by China, provides global navigation services similar to the GPS system. This technology is used in smartphones, cars for navigation, and by fishermen to navigate the seas. It's also crucial for emergency rescue operations, making it easier to locate people in need of help.

### Telecommunication Advances

China's work in space has also contributed to advancements in telecommunication technologies. High-speed data transmission from space to Earth has led to improvements in internet and communication services, making it possible to connect remote areas of the world. This means that people in rural or isolated locations can access the internet, improving education, healthcare, and business opportunities.

### Environmental Monitoring

Through its Earth observation satellites, China has developed technologies that allow for better monitoring of the environment. These satellites can track changes in climate, vegetation, and water bodies, providing valuable data for managing natural resources and responding to natural disasters. For example, satellite images can help predict floods or monitor air pollution levels, leading to more effective responses to environmental challenges.

### Material Science

The harsh conditions of space require materials that are lightweight, durable, and resistant to extreme temperatures. Research and development in material science for space exploration have led to new materials that are now used in various industries on Earth. For instance, materials developed for spacecraft insulation can be used for energy-efficient buildings, and materials resistant to wear and tear can improve the durability of consumer products.

### Medical Innovations

Space exploration requires solving unique medical challenges, such as monitoring astronauts' health in microgravity. Innovations in this area include portable medical devices and telemedicine technologies, which have applications on Earth, especially in remote or underserved areas. For example, compact and efficient diagnostic

equipment developed for space missions can be used in rural clinics, improving healthcare access and outcomes.

### Robotics and Automation

China's use of rovers for lunar and Mars exploration has advanced robotics and automation technologies. These advancements have applications in industries such as manufacturing, where robots can perform precise tasks, and in disaster response, where robots can go into dangerous environments that are unsafe for humans.

In summary, technological innovations from China's space exploration efforts have wide-ranging benefits for life on Earth. From improving navigation and communication to enhancing environmental monitoring and healthcare, these advancements show how exploring space can lead to practical solutions for challenges we face on our planet.

### **Let us hear 5 to 10 new words about the topic to expand vocabulary**

- **Satellite:** An object that has been placed into orbit by human endeavor to collect information or for communication.
- **Navigation:** The process or activity of accurately ascertaining one's position and planning and following a route.
- **Telecommunication:** The transmission of signs, signals, messages, words, writings, images, and sounds or information of any nature by wire, radio, optical or other electromagnetic systems.
- **Environmental Monitoring:** The systematic sampling of air, water, soil, or other natural resources to observe and study the environment.
- **Material Science:** The scientific study of the properties and applications of materials of construction or manufacture (such as ceramics, metals, polymers, and composites).
- **Diagnostic Equipment:** Tools and devices used for identifying the nature or cause of a certain phenomenon, typically related to medical conditions.
- **Telemedicine:** The remote diagnosis and treatment of patients by means of telecommunications technology.
- **Robotics:** The branch of technology that deals with the design, construction, operation, and application of robots.
- **Automation:** The use of largely automatic equipment in a system of manufacturing or other production process.
- **Microgravity:** A very small or negligible amount of gravity, such as the condition of free fall toward or in orbit around Earth, where the force of gravity is much weaker than on Earth's surface.

Let's try using these new words in sentences to see how they help us talk about the topic.

Now it's time to do a few tasks and think about what we just learned.



## Tasks:

1. Mission Fact Sheet Creation: "Research one of China's space missions, like the Chang'e lunar missions or the Tianwen-1 Mars mission. Create a fact sheet that includes the mission's goals, achievements, and any interesting facts. Share your fact sheet with the class."
2. Technology Comparison Chart: "Work with a partner to create a chart comparing the technologies used in Chinese space missions with those used by another country's space program. Focus on satellites, rovers, or space stations. Present your findings to the class."
3. Impact on Earth Discussion: "Form small groups to discuss how specific technologies developed for China's space program, such as satellite navigation systems or environmental monitoring satellites, have impacted life on Earth. Prepare a short presentation summarizing your discussion."
4. Space Exploration Timeline: "Create a timeline that includes key milestones in China's space exploration history. Use visuals and brief descriptions to highlight each milestone. Display your timelines around the classroom for a gallery walk."

Once you have answered the tasks, this episode ends.

Here start the ideas for the teachers:

## Ideas for the teacher

- Virtual Tour of the Moon/Mars: "Use online tools or apps to take students on a virtual tour of the Moon or Mars, focusing on the areas explored by Chinese missions. Discuss the significance of the findings from these missions."
- Space Exploration Debate: "Organize a debate on the pros and cons of investing in space exploration. Use China's space program as a case study, encouraging students to consider both scientific benefits and the cost."
- Innovations Inspired by Space Exploration: "Host a 'science fair' where students can display projects inspired by innovations from China's space exploration, such as materials developed for spacecraft that are now used in consumer products."
- Guest Speaker: "Invite a scientist or educator with expertise in space exploration to talk about the latest developments in China's space program and answer students' questions."