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International Space Programmes

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Five agencies shape the big space programmes: NASA, ESA, Roscosmos, CNSA and JAXA. This lesson covers who they are, what UPSC asked in 2024, the space stations, the Artemis plan, key missions and the rules of space.

Must know: the big agencies

1 Which agencies run the major space programmes?

Many countries have space agencies. Five of them shape most headlines. Each began in a different decade and in a different way.



Buzz Aldrin on the Moon, Apollo 11, July 1969. Photo: Neil Armstrong, NASA, public domain, via Wikimedia Commons.

When and how did each agency begin?

- **NASA (USA):** President Eisenhower signed the National Aeronautics and Space Act on 29 July 1958. The agency opened for business on 1 October 1958.
- **ESA (Europe):** ESA calls itself an intergovernmental organisation created in 1975. ESA's key-dates page lists ten states signing its

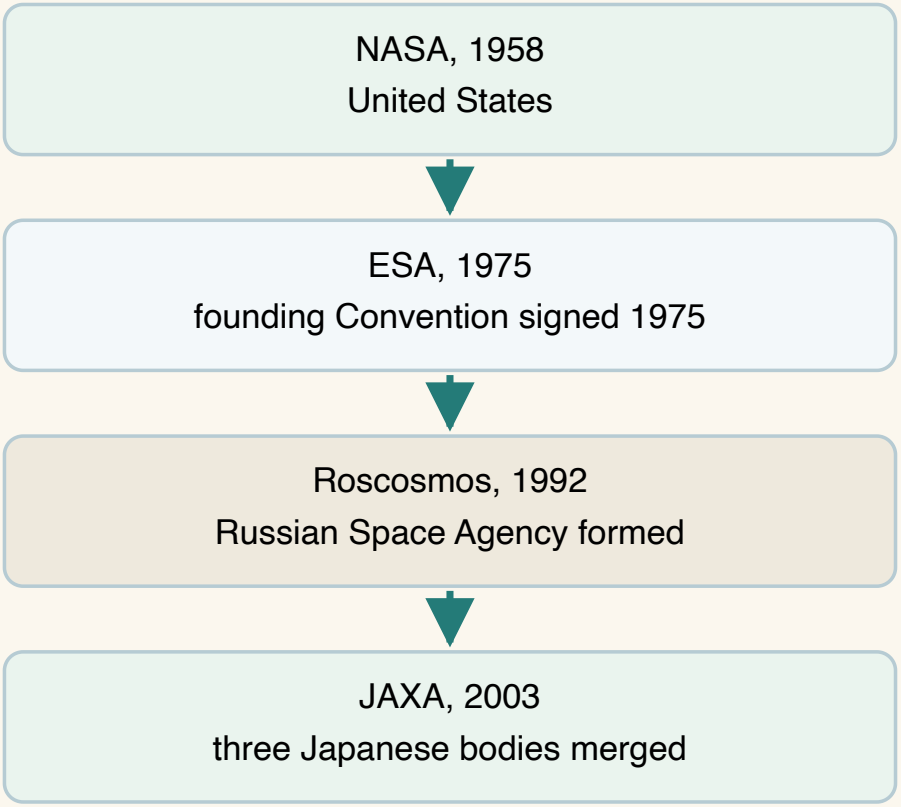
Convention on 30 May 1975, while its Convention page counts nine original Member States. It now has 23 Member States.

- **Roscosmos (Russia):** A 1992 decree formed the Russian Space Agency. It later became a state corporation in 2015.
- **CNSA (China):** The China National Space Administration is China's national space agency. It leads Chinese lunar missions such as Chang'e.
- **JAXA (Japan):** In October 2003 three bodies merged into JAXA. They were ISAS, the National Aerospace Laboratory and NASDA.

What came before these agencies?

- The Soviet Union put **Sputnik** in orbit on 4 October 1957. NASA opened a year later.
- **Yuri Gagarin** flew Vostok 1 on 12 April 1961. He was the first human in space.
- **Apollo 11** landed on the Moon on 20 July 1969.

> **Quick check 1.** NASA opened for business in 1958. *(True or False?)* See answer ↓



Founding years of the five agencies in this lesson. Original explanatory diagram.

Sources: nasa.gov; esa.int; unoosa.org; isas.jaxa.jp

2 What did UPSC ask about RTGs in 2024?

The Civil Services Preliminary Examination 2024 (General Studies Paper I, Q31) asked this question, word for word:

“With reference to radioisotope thermoelectric generators (RTGs), consider the following statements: 1. RTGs are miniature fission reactors. 2. RTGs are used for powering the onboard systems of

spacecrafts. 3. RTGs can use Plutonium-238, which is a by-product of weapons development. Which of the statements given above are correct ?"

The options were (a) "1 and 2 only", (b) "2 and 3 only", (c) "1 and 3 only", and (d) "1, 2 and 3". You can reach **(b)** by elimination: statement 1 is false and statement 2 is true.

What is an RTG?

- An **RTG** makes electricity from heat. The heat comes from the natural decay of **plutonium-238**.
- The heat flows across thermocouples. These are solid-state metal junctions that turn heat into current.
- NASA says it uses heat from natural radioactive decay.
- Voyager 1 and 2 used RTGs. So did Galileo, Ulysses, Cassini and New Horizons.

Why is (b) the answer?

- **Statement 1 is wrong.** NASA says an RTG uses heat from natural radioactive decay.
- **Statement 2 is right.** RTGs power spacecraft systems, as the missions above show.
- Options (a), (c) and (d) all contain statement 1. Only (b) drops it and keeps statement 2.
- **Statement 3 needs care.** NASA says Pu-238 is not the type used for weapons. It also says Pu-238 would not work well as reactor fuel.
- So statements 1 and 2 alone lead to (b).
- Pu-238 has a half-life of 88 years. That long life suits missions that last decades.

Quick check 2. An RTG is a miniature fission reactor. *(True or False?)* See answer ↓

Sources: upsc.gov.in; science.nasa.gov

Good to know: stations, Artemis and missions

3 Which space stations orbit Earth today?

Two crewed stations matter for exams. One is shared by many nations. The other is Chinese.

What is the International Space Station?

- Five space agencies run it. They are from the USA, Russia, Europe, Japan and Canada.
- Those agencies come from 15 countries.
- Crews have lived aboard continuously since November 2000.
- The US, Canada, Japan and ESA's member states have committed to run it until about 2030. Check NASA's transition plan for the latest.

What is Tiangong?

- **Tiangong** is China's own station.
- Its core module **Tianhe** launched on 29 April 2021 from Wenchang.
- Two lab modules, **Wentian** and **Mengtian**, joined it.
- Shenzhou-23 launched on 24 May 2026 and docked the next day.

Is China part of the ISS?

- No. China is not an ISS partner.

- A 2011 US law says no funds may be used for NASA's bilateral work with China, unless a later law allows it. This is the Wolf Amendment, covered in card 7.
- The law and Tiangong are separate facts. Treat them as separate.

> **Quick check 3.** The International Space Station is operated by five space agencies. *(True or False?)* See answer ↓

Sources: nasa.gov; english.www.gov.cn; english.news.cn

4 What is the Artemis plan for returning to the Moon?

Artemis is NASA's lunar programme. Its plan changed in 2026, so older notes are out of date.

What has happened so far?

- **Artemis II** was a crewed flyby of the Moon. It launched on 1 April 2026.
- It splashed down on 10 April 2026. The flight lasted 9 days, 1 hour and 32 minutes.
- Its crew was Wiseman, Glover, Koch and Hansen. Hansen is from the Canadian Space Agency.

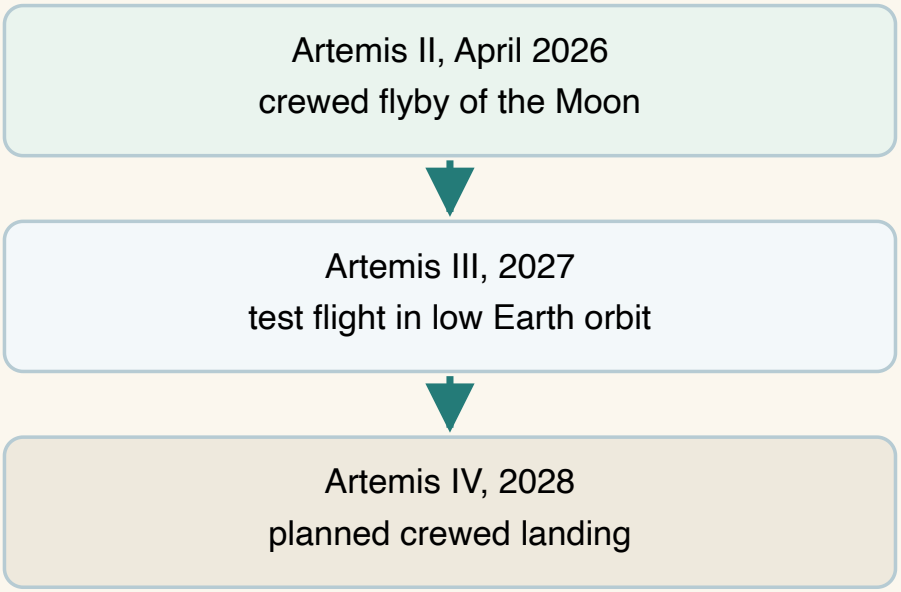
What comes next?

- **Artemis III**, now planned for 2027, will test systems in low Earth orbit.
- **Artemis IV**, planned for 2028, is the mission meant to land.
- On 24 March 2026 NASA said it would pause **Gateway** in its current form. It plans to focus on a Moon base.

What should you remember?

- Artemis III is no longer the first landing mission.

Quick check 4. Artemis III is planned as the mission that lands crew on the Moon. *(True or False?)* See answer ↓



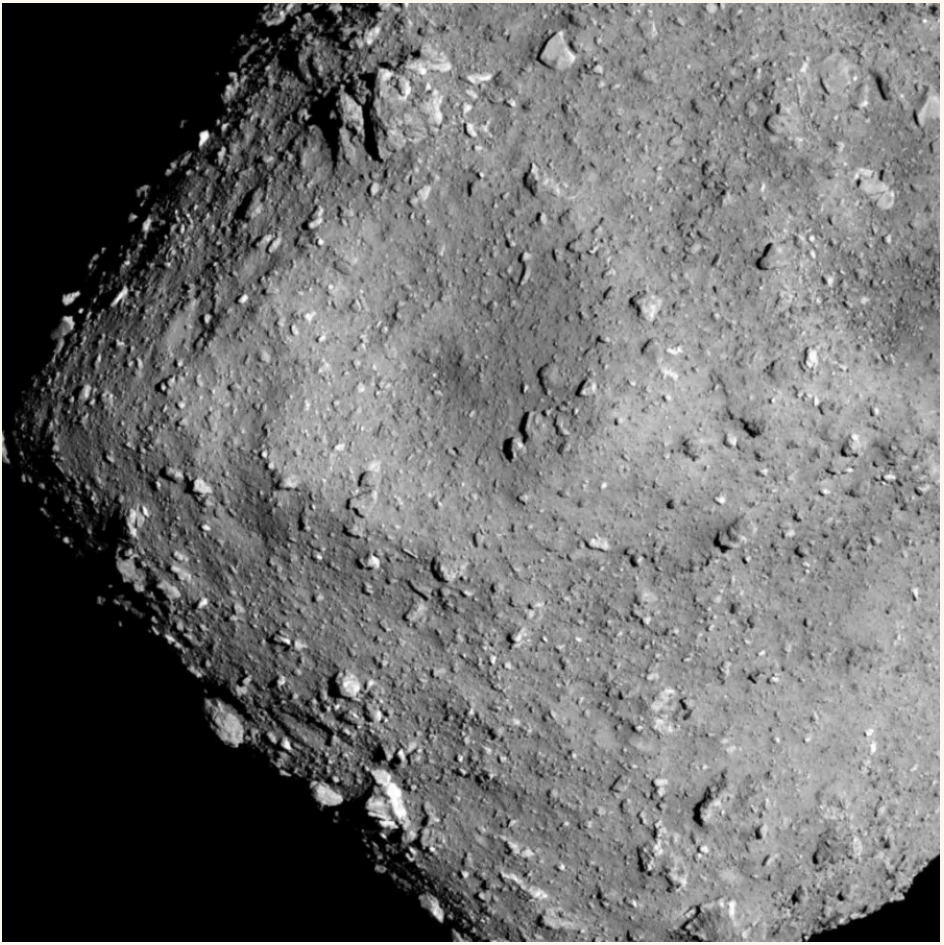
NASA plan as announced on 27 February 2026. Original explanatory diagram.

Sources: nasa.gov

Great to know: science, law and the timeline

5 Which Moon and asteroid missions should you know?

China and Japan have both achieved firsts since 2020. Note the dates carefully.



Asteroid Ryugu seen by Hayabusa2. Credit: JAXA, University of Tokyo and collaborators, CC BY 4.0, via Wikimedia Commons.

What did China do?

- **Chang'e-6** brought back the first samples from the far side of the Moon. It landed in the South Pole-Aitken Basin on 2 June 2024.
- The samples weighed 1,935.3 g. They reached Earth on 25 June 2024.

- **Chang'e-7** was due to launch in August 2026. It aims for the Moon's south pole region.
- On 23 August 2026 China postponed the launch. The rocket went back to its assembly building on 24 August.
- China said the mission cannot launch in this year's window. The notice gave no new date.

What did Japan do?

- **SLIM** landed on the Moon on 20 January 2024. Its landing accuracy was about 10 m or less. The goal was within 100 m.
- **Hayabusa2** returned a sample from asteroid Ryugu. The capsule was recovered at Woomera on 6 December 2020.
- JAXA confirmed the Ryugu sample on 15 December 2020.
- Hayabusa2 then went on to an extended mission. In June 2026 JAXA reported a sighting of asteroid Torifune, ahead of a planned flyby.

How do these missions compare?

- Chang'e-6: first far-side samples, from the Moon.
- Hayabusa2: samples from an asteroid, Ryugu.
- SLIM: a pinpoint Moon landing.

> **Quick check 5.** China launched Chang'e-7 in August 2026. *(True or False?)* See answer ↓

Sources: cnsa.gov.cn; chinadaily.com.cn; global.jaxa.jp; hayabusa2.jaxa.jp

6 What have ESA's science missions achieved?

ESA runs science missions on its own rockets and with partners.

What did Rosetta and Philae do?

- **Rosetta** launched on 2 March 2004 on an Ariane 5 rocket.
- It was the first mission to rendezvous with a comet. It was also the first to deploy a lander on a comet.
- The lander **Philae** soft-landed on comet 67P on 12 November 2014.

What are the newer missions?

- **Juice** launched on 14 April 2023 on an Ariane 5. It reaches Jupiter in July 2031.
- **Euclid** launched on 1 July 2023 on a Falcon 9. It flew from Cape Canaveral.
- **Gaia** flew on a Soyuz rocket from Kourou, not an Ariane. It observed the sky from 27 July 2014 to 15 January 2025.
- **Ariane 6** made its first launch on 9 July 2024.

What happened to ExoMars?

- In July 2022 ESA ended its Roscosmos partnership on the mission.
- In November 2022 ESA Member States funded a new mission, the **Rosalind Franklin** rover.
- NASA is helping. It has chosen SpaceX’s Falcon Heavy for the launch.
- The launch is targeted no earlier than late 2028.

Sources: esa.int; sci.esa.int; science.nasa.gov

7 What rules govern activity in space?

Three items come up often. They are different kinds of rules.

What is the Outer Space Treaty?

- The **Outer Space Treaty** opened for signature in January 1967. It entered into force in October 1967.
- Its depositaries are Russia, the UK and the USA.
- It is the basic framework of international space law.

What are the Artemis Accords?

- The **Artemis Accords** began in 2020. They are a set of principles for civil space exploration.
- Countries join the Accords by signing them.
- The number of signatories keeps growing. Check NASA's page for the current count.

What is the Wolf Amendment?

- It is Section 1340(a) of Public Law 112-10, passed in April 2011.
- It says no funds may be used for bilateral work with China by NASA or the White House science office.
- A later law can authorise such work.
- It limits NASA's own work with China. The restriction covers NASA and the White House science office.



The treaty, the US law and the Accords. Original explanatory diagram.

Sources: unoosa.org; nasa.gov; govinfo.gov

8 How do these events fit on one timeline?

Use this order to keep the dates straight.

- **1957:** Sputnik. **1958:** NASA opens. **1961:** Gagarin flies. **1967:** Outer Space Treaty. **1969:** Apollo 11.
- **1975:** ESA Convention signed. **1992:** Russian Space Agency.
- **2003:** JAXA formed. **2004:** Rosetta launched. **2011:** Wolf Amendment.
- **2014:** Philae lands. **2020:** Hayabusa2 sample. **2021:** Tianhe and Tianwen-1.
- **2024:** SLIM landing, Chang’e-6 samples, first Ariane 6 launch.
- **2026:** Artemis II flyby, Gateway pause, Chang’e-7 postponed.

How can you remember it?

- Agencies came in waves: 1958, 1975, 1992 and 2003.
- NASA is the 1958 agency. JAXA is the 2003 merger.
- Treat the 2026 items as live news and re-check them before an exam.

Sources: nasa.gov; esa.int

Review the feedback after each answer. The understanding-check score lasts for this page session.

Reset the checks when you want another attempt. This score is separate from the Native Practice score below.

Questions to think through

Why is Artemis III no longer the landing mission?

NASA restructured the plan in 2026. Artemis III will test systems in low Earth orbit, and Artemis IV is planned to land.

Why is an RTG not a reactor?

An RTG uses heat from natural decay of plutonium-238.

Why do ESA's own pages say nine and ten founding states?

ESA's key-dates page lists ten states signing the 1975 Convention. ESA's Convention page counts nine original Member States.

Why should you write a date next to Chang'e-7?

Its launch was postponed on 23 August 2026. News can change, so state "as of" a date.

Practice MCQs

1. In which year was NASA founded?

A. 1945

B. 1957

C. 1958

D. 1961

See answer ↓

2. With reference to radioisotope thermoelectric generators (RTGs), consider the following statements:

1. RTGs are miniature fission reactors.

2. RTGs are used for powering the onboard systems of spacecrafts.

3. RTGs can use Plutonium-238, which is a by-product of weapons development.

Which of the statements given above are correct ?

A. 1 and 2 only

B. 2 and 3 only

C. 1 and 3 only

D. 1, 2 and 3

See answer ↓

3. Which ESA mission soft-landed the Philae probe on a comet in November 2014?

A. Gaia

B. Juice

C. Euclid

D. Rosetta

See answer ↓

4. Which statement about JAXA is correct?

A. It was formed in October 2003 by merging three aerospace organisations

B. It was formed in 1975 when ten European states signed a Convention

C. Its Hayabusa2 mission returned the first Moon samples from the far side

D. It became a state corporation in 2015

See answer ↓

5. What is the plan for NASA's Artemis III mission, after the 2026 update?

A. Fly a crew around the Moon in April 2026

B. Test systems in low Earth orbit in 2027

C. Deliver the Gateway station to lunar orbit

D. Land a crew at the Moon's south pole in 2026

See answer ↓

6. As of 8 October 2026, what is the status of China's Chang'e-7 lunar mission?

A. It landed near the Moon's south pole in September 2026

B. It was cancelled for good in September 2026

C. Its launch was postponed on 23 August 2026, with no new date announced

D. It launched in August 2026 and is in lunar orbit

See answer ↓

7. Which statement about space law is correct?

A. The Outer Space Treaty opened in 1967 and set up the Artemis Accords

B. The Wolf Amendment is an ESA rule against European work with China

C. The Artemis Accords are a UN treaty that China signed in 1967

D. The Wolf Amendment, in a 2011 US law, says no funds may be used for NASA's bilateral work with China unless a later law allows it

See answer ↓

8. What did China's Chang'e-6 mission achieve in June 2024?

A. It returned the first samples from the Moon's far side

B. It landed a rover on Mars

C. It made a pinpoint landing accurate to about 10 m

D. It returned the first samples from asteroid Ryugu

See answer ↓

Answer Key

1. **C.** President Eisenhower signed the National Aeronautics and Space Act on 29 July 1958. NASA opened for business on 1 October 1958. The year 1957 is when Sputnik reached orbit. ↑ Q1
2. **B.** The answer is (b) by elimination. An RTG turns heat from natural plutonium-238 decay into electricity. NASA says the heat comes from natural radioactive decay, so statement 1 is wrong. Spacecraft such as Voyager and Cassini used RTGs, so statement 2 is right. NASA says Pu-238 is not weapons-type plutonium, so statement 3 is the loosest claim. ↑ Q2
3. **D.** Rosetta carried Philae to comet 67P. Philae soft-landed on 12 November 2014. Euclid studies the dark universe, Juice goes to Jupiter, and Gaia mapped stars. ↑ Q3
4. **A.** JAXA formed in October 2003 from ISAS, the National Aerospace Laboratory and NASDA. The 1975 Convention is ESA's. Hayabusa2 returned an asteroid sample from Ryugu. The 2015 change was Roscosmos. ↑ Q4
5. **B.** NASA now plans Artemis III as a low Earth orbit test in 2027. Artemis IV is planned to land in 2028. Artemis II already flew the lunar flyby in April 2026. NASA also said it would pause Gateway in its current form. ↑ Q5
6. **C.** China postponed the launch on 23 August 2026. The notice said the mission failed to meet launch criteria for this year's window. The rocket went back to its assembly building. The notice gave no new date 2026. ↑ Q6
7. **D.** Public Law 112-10 of 2011 holds the Wolf Amendment. It limits NASA's bilateral work with China unless a later law authorises it. The Outer Space Treaty did open in 1967, but the Artemis Accords began in 2020. They are not a UN treaty. ↑ Q7
8. **A.** Chang'e-6 landed in the South Pole-Aitken Basin on 2 June 2024. It brought back 1,935.3 g of far-side samples. Ryugu samples came from Hayabusa2. The pinpoint landing was JAXA's SLIM. ↑ Q8

Quick-check answers

1. **True.** The Act was signed on 29 July 1958 and NASA opened on 1 October 1958. ↑ 1

2. **False.** this is false. An RTG turns heat from natural plutonium-238 decay into electricity. ↑ 2
3. **True.** NASA lists five agencies from the USA, Russia, Europe, Japan and Canada. ↑ 3
4. **False.** this is false. Artemis III is now a low Earth orbit test in 2027. Artemis IV is planned to land. ↑ 4
5. **False.** this is false. China postponed the launch on 23 August 2026. The notice gave no new date. ↑ 5

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