



Prize Winner

**Science Writing
Year 3-4**

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WHAT HAPPENS TO THE INTERNATIONAL SPACE STATION (ISS) AFTER 2024?

INFORMATION REPORT

Introduction

International Space Station (ISS) is a large space station made up of individual modules that provide a home for astronauts and a research laboratory in low earth orbit (LEO). The ISS was built and is used as a joint project between the United States, Japan, Russia, Canada and other European countries in the European Space Agency (ESA). It consists of 33,000 solar panels and has 16 pressurised modules. It orbits Earth every 90 minutes, sitting at approximately 400km from Earth and travelling 28,000km per hour. The ISS supports the life of 6 people and is the size of two Boeing 747 aeroplanes.

This year the ISS turned 21 years old. The ISS was originally built to last until 2024. So what will happen to the ISS after 2024? This report aims to discuss the future of the ISS after 2024.



Image 1: International Space Station (ISS) <http://www.space.com/how-to-destroy-a-space-station-safely>

Immediate Plans for the International Space Station (ISS)

The ISS was originally planned to last in LEO until 2024. NASA has reported that the ISS has been cleared to continue orbiting the Earth until the end of 2028. If the ISS continues to age well, there is the possibility to extend this timeframe further. To remain in LEO, the ISS needs regular boosts or fuel which it gets from visiting space craft. Without this regular refill the ISS will fail. NASA aims to ensure that the ISS receives these boosts until at least 2028.

What are the risks until 2028

While staying in LEO until 2028, the ISS faces many space hazards including fire which behaves differently in microgravity, burning bluer in colour and harder to see. Space debris is another hazard, with over 20,000 items of space debris tracked from Earth. Space debris can include old satellites, micrometeoroids, dust from comets and other space debris can put holes in the ISS that can lead to damaging equipment and oxygen being lost onboard. Toxic spills might also cause the ISS to lose altitude and burn up in the atmosphere.

Plans for the International Space Station (ISS) after 2028

After 2028, or before if the ISS is calculated to be unsafe, a commercial company called Axiom Space will repurpose the ISS to create its own space station in LEO. The new modules being developed by Axiom include (see Figure 1):

- Axiom Hub One (includes space for crew accommodation, research and manufacturing work)
- Axiom Hub Two (expanded crew accommodation and research area)
- Axiom Lab (research and manufacturing facility)
- Axiom Power Tower (room for environmental, life-support, storage and payload capabilities)



Image 2: Axiom Space commercial space station modules (www.space.com/axiom-space-commercial-station-modules-thales-alenia.html)

These additional modules being developed by Axiom Space will be attached to the ISS. When the ISS is decommissioned, Axiom's commercial station will "complete construction and detach to operate into the future as a free-flying complex for living and working in space – marking humankind's next stage of LEO settlement." (Axiom website: www.axiomspace.com)

NASA is working at building their own space station called Gateway that will orbit around the moon for moon missions.



Image 3: Gateway Space Station proposed by NASA ([Gateway | NASA](https://www.nasa.gov/gateway))

Bringing the International Space Station (ISS) Home

The Aerospace Safety Advisory Panel has discussed how NASA will de-orbit the ISS. One plan is to carefully time burns that would help to lower the ISS in its orbit which will help to make re-entry more planned and expected. The ISS should be able to be directed towards its target, the Southern Pacific Ocean. The rest of the manoeuvre is left up to the Earth's atmosphere and how destructive re-entry will be for the ISS. However, if the burn time is not perfect there is the chance that re-entry will become very dangerous and less expected. This may cause the ISS to break up with chunks of broken pieces landing over Australia and other countries in the South Pacific like the Skylab Space Station in 1979.

Conclusion

In the end, the ISS will be decommissioned and will de-orbit. When this occurs will depend on the condition of the ISS. It will also depend on the establishment of new space stations by NASA and commercial companies like Axiom Space.

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Submitted by F. Wroniak (Year 4)

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Reference List

Axiom space Website - <https://www.axiomspace.com>

NASA website – <https://www.nasa.gov>

Axiom Space Station – <https://www.axiomspace.com/axiom-station>

Skylab crash: <https://7news.com.au/technology/skylab-the-impact-nasas-space-station-has-on-the-small-wa-town-of-esperance-40-years-on-c-205700>

Image 1: <http://www.space.com/how-to-destroy-a-space-station-safely>

Image 2: [Axiom Space picks Thales Alenia to build commercial space station modules | Space](#)

Image 3: [Gateway | NASA](#)

Aerospace Safety Advisory Panel <https://oiiir.hq.nasa.gov/asap/>

Acknowledgement for Assistance

Help was provided by my parents with typing and editing due to some special needs that I have (Autism, speech and language disorder, and fine motor skill delays).