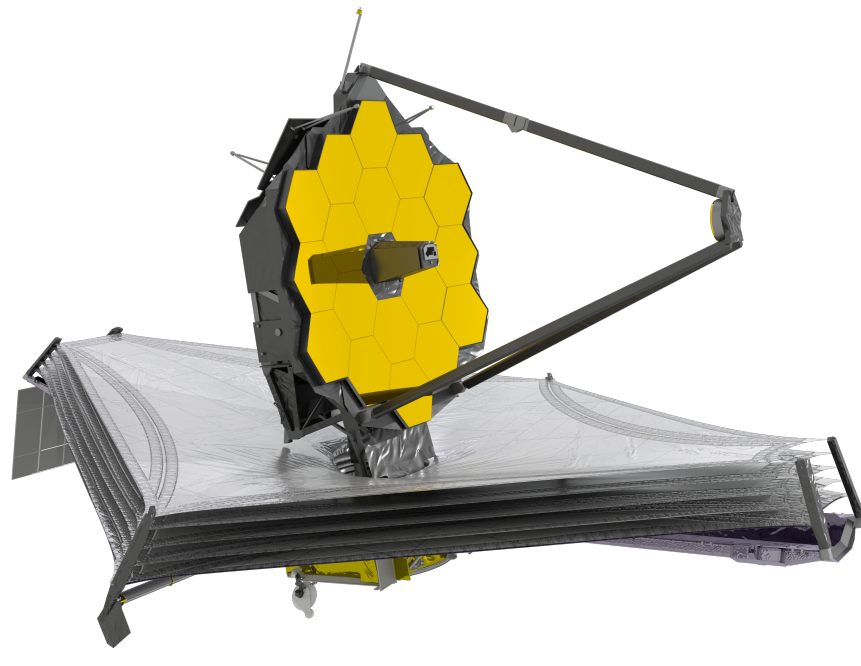


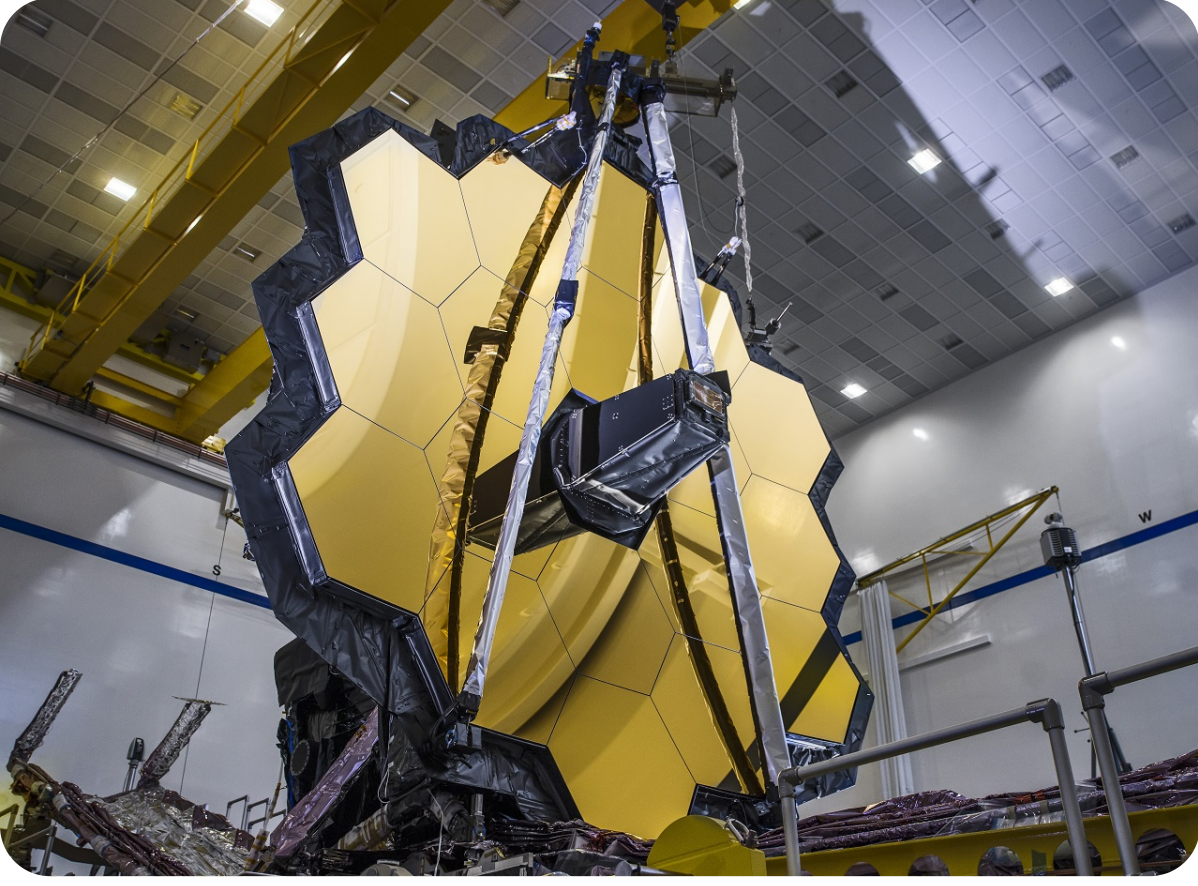
The James Webb Space Telescope will investigate the origins of life, the Universe, and everything



An artist has drawn this picture of what Webb will look like when in space. Copyright: ESA/ATG medialab

[Access the image](#)

In December this year, a powerful Ariane 5 rocket will blast off from Europe's Spaceport in French Guiana, carrying the largest, most powerful space telescope ever made! Called the James Webb Space Telescope – or Webb for short – this incredible invention will help us to answer fascinating questions about the cosmos, and our place in it. Webb is so advanced, it's the result of three space agencies teamed up to build it: NASA, ESA, and CSA (the Canadian Space Agency).



Deployment test of James Webb Space Telescope's primary mirror

[Access the image](#)

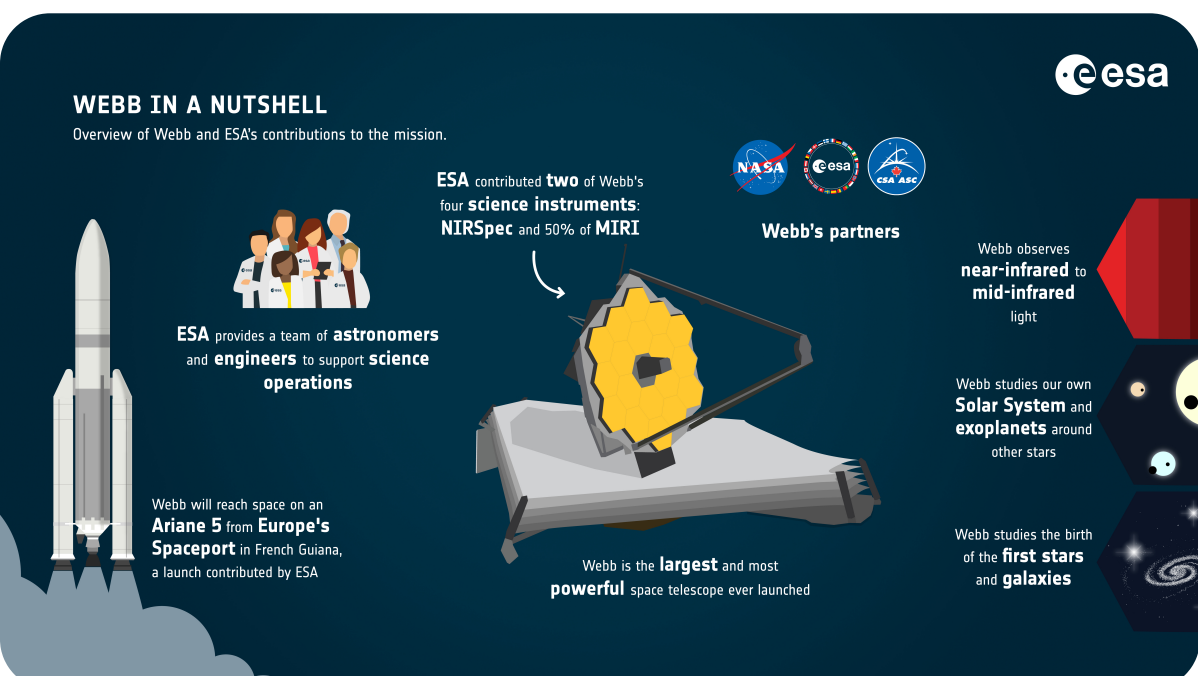
Webb is very special because it sees a type of light called infrared. We cannot see infrared with our eyes, but detecting it is useful to us. Infrared allows astronomers to peer through clouds of gas and dust that would normally block our view, explore the coolest stars, and even take photos of galaxies that are incredibly far away.

Observing infrared is difficult though, because lots of things on Earth emit this kind of light. So, for Webb to get clear views of infrared from space, it needs to travel far from Earth – 1.5 million km away, in fact! This is about four times further away from us than the Moon! For comparison, the Hubble Space Telescope orbits only around 550km above Earth.

To help Webb see faint objects in lots of detail, it has the biggest mirror ever to be flown into space. This mirror is 6.6 metres across, which is so large that it is made from 18 smaller sections that fit together in a honeycomb pattern. Webb's main mirror is actually coated with gold because this reflects infrared light really well. This super-mirror needs to be folded up during launch just so that it can fit into the rocket! Webb also has an advanced sunshield to protect it from the glare of the Sun, and to shield its instruments from the telescope's own infrared light.

All this impressive technology will help Webb to investigate some of the biggest topics in modern science, such as:

- What did the Universe look like when it was very young? When did the first stars and galaxies form? Light takes time to reach us from distant objects. As Webb can look further into space than we have before, it will be able to see the light from the earliest stars.
- How did the first galaxies change over time? What can we learn about mysterious dark matter and dark energy? Webb will take many images of the earliest galaxies and will detect distortions that could help us identify how dark matter is distributed throughout the Universe.
- How and where do stars form? What happens when stars reach the ends of their lives, and what impact does that have on material around them? Using infrared will allow Webb to peer through the gas and dust of star-forming nebulae to see what is happening inside as new stars form.
- Where and how do other solar systems form and change over time? What kinds of other planets are out there, and do any of them contain the building blocks of life? Is Earth unique? We already know that many other stars in our Galaxy have planets orbiting them. Called “exoplanets”, these worlds are so far away that we can only explore them with telescopes. Webb will be able to detect light from exoplanets to help identify the chemicals in their atmospheres.



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Webb's mission is expected to last between five and 10 years, which means it has enough time to send back lots of fascinating data and images! What questions about space would you like Webb to help answer?

Cool fact: Shielded from the Sun, Webb will operate at a temperature of -234 degrees Celsius. It needs to be this cold for clear infrared observations!