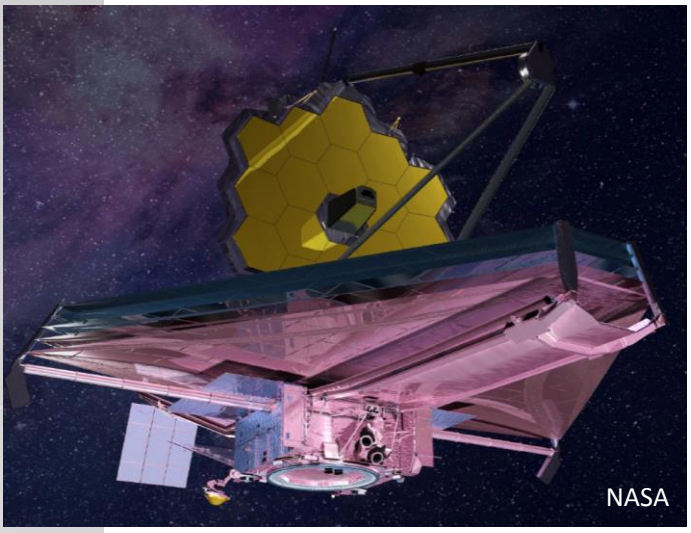


December 2021

James Webb Space Telescope Special



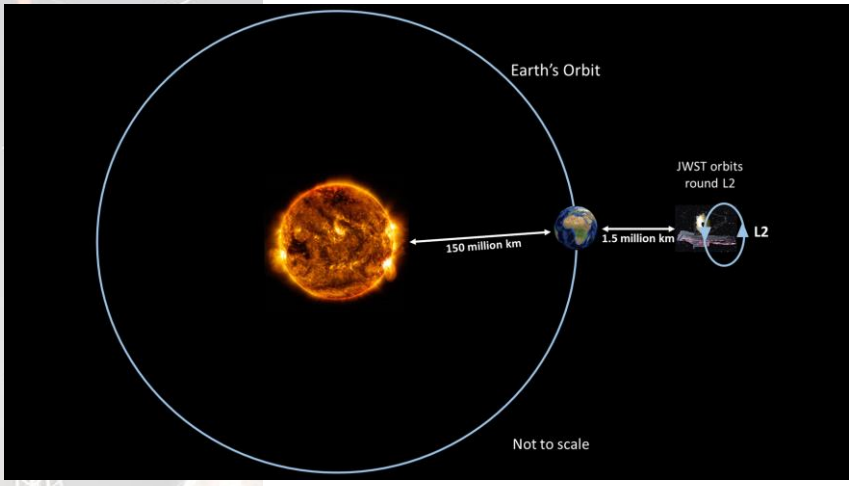
On 22nd December 2021 the James Webb Space Telescope (JWST) will be launched from French Guiana onboard an Ariane 5 rocket.

The project to launch a successor to Hubble started in 1996 and is a collaboration between NASA, ESA and the Canadian Space Agency.

Once launched the JWST will take about a month to travel 1.5 million km from Earth to it's orbit point at L2 where it will deploy.

The full deployment process will take about 14 days – a process described as 'Fourteen days of Terror'.

Every step of the deployment process has to work perfectly for the telescope to function.



JWST Deployment

Deployment step-by-step

Lagrange point 2, or L2, is a point in space where the gravitational pull of the Earth and the Sun are balanced to keep JWST in a stable orbit. It will also put the Earth between the JWST and the Sun making it easier to keep it at the cold temperatures required.

JWST Fast Facts

Proposed Launch Date:	December 22, 2021 07:20 EST
Launch Vehicle:	Ariane 5 ECA
Mission Duration	5 - 10 years
Diameter of primary Mirror:	6.5 m (21.3 ft) approximately
Primary mirror material:	beryllium coated with gold
Mass of primary mirror:	705 kg
Number of primary mirror segments:	18
Size of sun shield:	21.197 m x 14.162 m (69.5 ft x 46.5 ft)
Orbit:	1.5 million km from Earth orbiting the L2 Point
Operating Temperature:	- 223 degrees Celsius

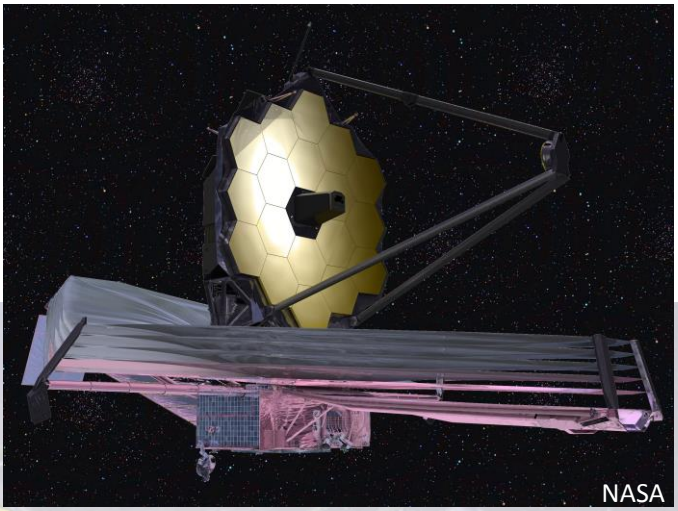


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What is the JWST going to do?

The JWST is the replacement for the Hubble Space Telescope which has been amazing us with it's images and discoveries for over 30 years.

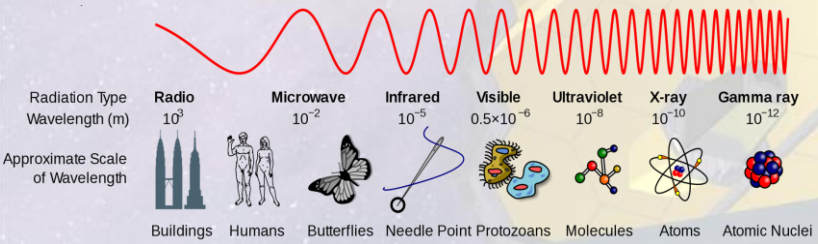
It will be able to show astronomers parts of the universe they have never been able to see. It will tell us about the origins of the universe, the first galaxies, how stars are born and help in the search for exoplanets that might harbour life.


NASA

Hubble Image Gallery Lifecycle of a star

Scale of the Universe Exoplanet Exploration

'Seeing' in Infra Red



Wikipedia Commons

Unlike conventional telescopes that see visible light the JWST sees Infra Red (IR) light – or heat.

This means it is able to see through clouds of gas and dust and closely observe what is happening inside. It also allows JWST to look further into the universe than ever before – the visible light from the earliest galaxies stretches the further it travels and reaches us as IR light.

Seeing in Infra Red Why Infra Red? Exploring Light


NASA

How do you get a 22m x 12m telescope into space?

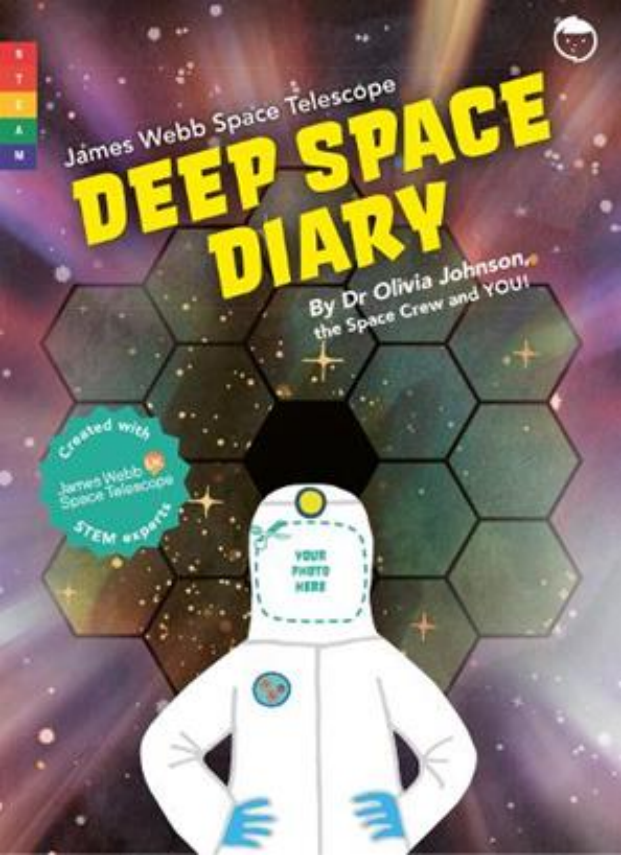
The JWST is huge, when fully deployed the primary mirror if 6m across and the multi-layered sunshield is 22m x 12m. For launch it has to fit inside the nose cone of the Ariene 5 rocket which has a diameter of about 5m.

The answer is that it has to be folded up – origami style!

NASA has been using the ancient art of paper folding for a number of years now to help fit large satellites and space probes inside rockets to get into space. The key is the unfolding process in space which has to work perfectly.

NASA's Origami Folding a satellite Make your own starshade

topicalscienceupdates@gmail.com



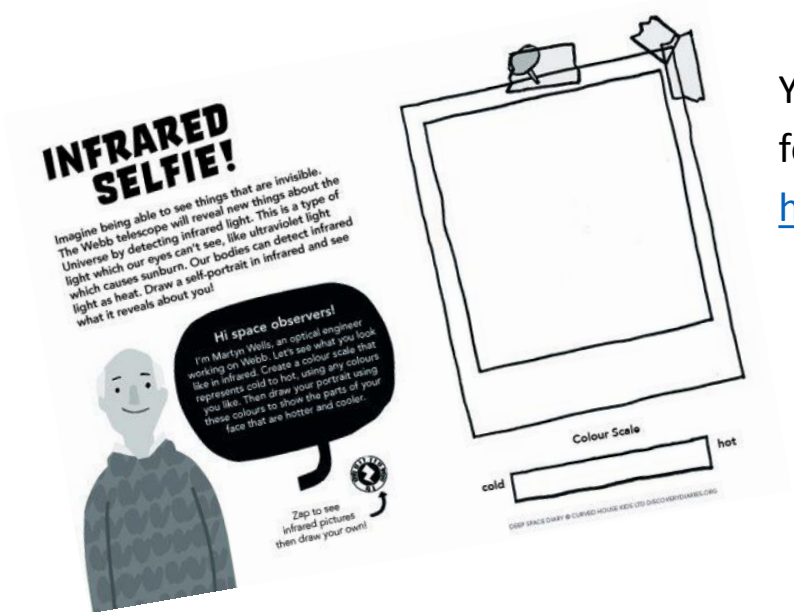
Deep Space Diaries

The Deep Space Diary was launched in 2019 and is the third space-linked Discovery Diary from Curved House Kids. This one focuses on the JWST mission and was written by Dr Olivia Johnson from the Royal Observatory in Edinburgh.

You can access digital versions of all the Deep Space Diary resources here: https://discoverydiaries.org/diary/deep-space-diary/

The Deep Space Diary is a 64-page STEAM activity book for upper primary school children. They design and deploy a powerful telescope, by working through a series of cross-curricular activities that combine STEM with the arts. There is a comprehensive teachers guide to go with the diaries.

The diary also contains unique 'Zap' codes that allow pupils and teachers to access extra content through smartphones and tablets.



You can buy Deep Space Diaries for your school here: https://discoverydiaries.org/shop/