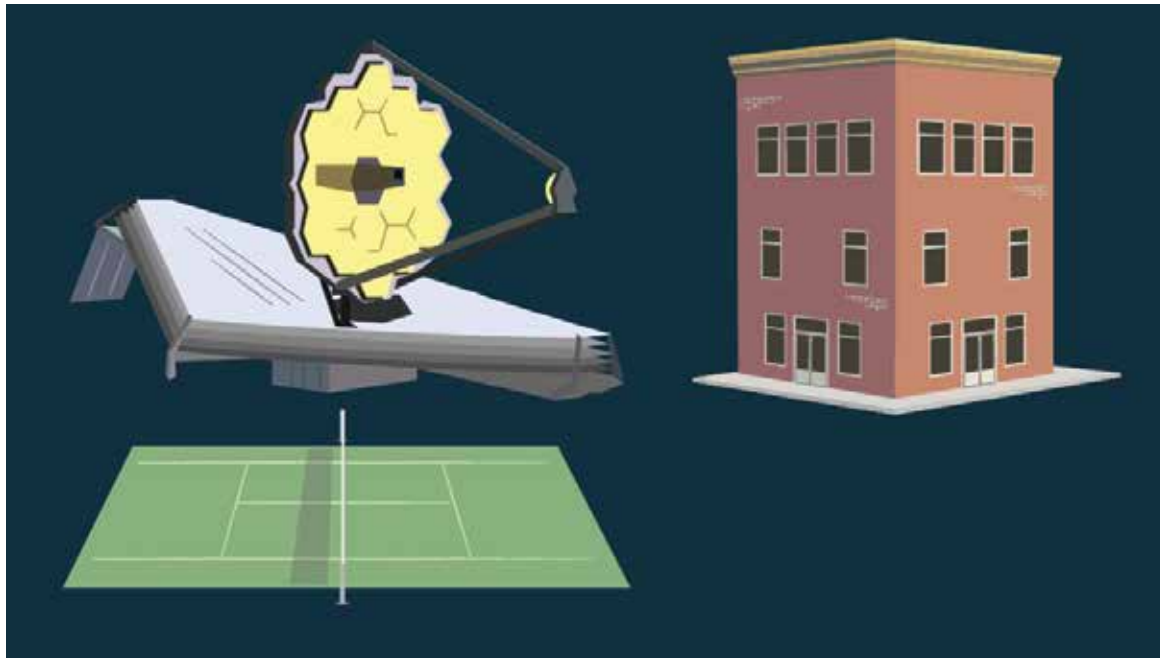


The James Webb Space Telescope

The James Webb Space Telescope is the most powerful and largest space telescope. Scientists can now look at what our Universe was like about 200 million years after the Universe was formed. The telescope can see some of the first galaxies ever formed and can look inside dust clouds to see where new stars and planets are forming. It can also see the atmospheres of planets that are orbiting other stars.

The telescope is very big.

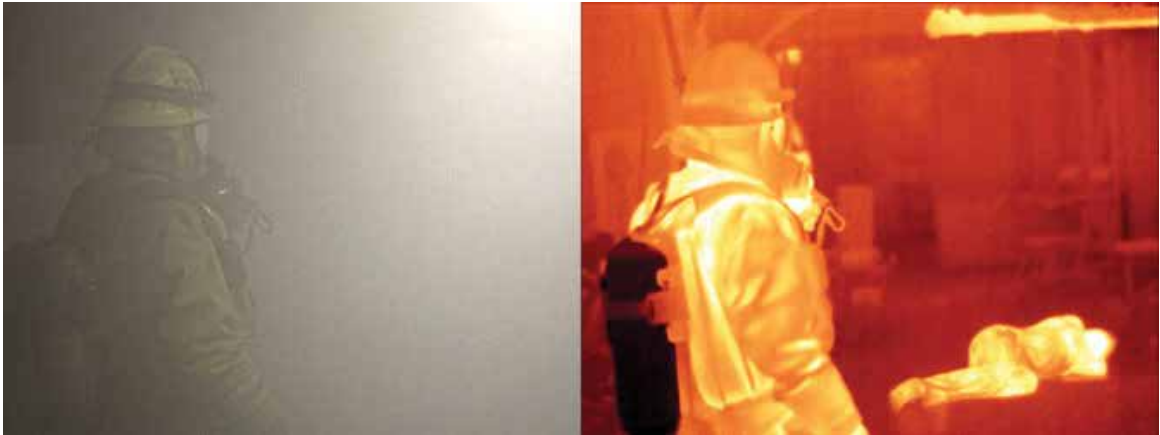
The James Webb Space Telescope is as tall as a 3-story building and as long as a tennis court! The mirrors of the telescope can fold up so that they can fit inside the rocket when it is launching. When in space, the mirrors unfolded.



Credit: NASA/JPL-Caltech

The James Webb Space Telescope is about the same size as a tennis court and about as tall as a 3-story building!
<https://spaceplace.nasa.gov/james-webb-space-telescope/en/>

1. Is there a building near you that is 3-stories tall?
2. What would it be like to see a telescope that big?



Credit: NASA/IPAC/Pasadena Fire Dept.

Infrared cameras can see through dust and smoke.

<https://spaceplace.nasa.gov/james-webb-space-telescope/en/>

It can see radiation that we cannot see.

The James Webb Space Telescope sees the Universe in a type of light called **infrared radiation**. We can feel it as heat. On Earth, firefighters use infrared cameras during a fire so that they can see through smoke and rescue people. Stars and planets form inside dust clouds and so the James Webb Space Telescope uses its infrared cameras to see through this dust. The light from galaxies that are far away and formed long ago have had their light shift from visible to infrared. The James Webb Space Telescope is able to see them.

3. What kinds of things could you see if you could see infrared radiation? (Think of places that are hot).



These are two Hubble images of the “Pillars of Creation” in the Eagle Nebula. The left image captures a visible light view, showing an opaque cloud of gas and dust. On the right, near-infrared light penetrates much of the gas and dust, revealing stars behind the nebula and hidden away inside the pillars. The image on the right provides an example of the types of images the Webb is capable of taking. The James Webb Space Telescope has not taken any images of the “Pillars of Creation” yet, but will be able to take these kinds of infrared images in greater detail and clarity in the future.

<https://webbtelescope.org/contents/media/images/4178-Image>

A sun shield protects the telescope.

The James Webb Space Telescope has a sun shield to protect its mirrors and instruments. They are sensitive to heat from the sun and work like a hat that blocks some sunlight from getting to your eyes. If the sun shield wasn't in place, the temperature would be more than 600 degrees Fahrenheit!



Credit: NASA

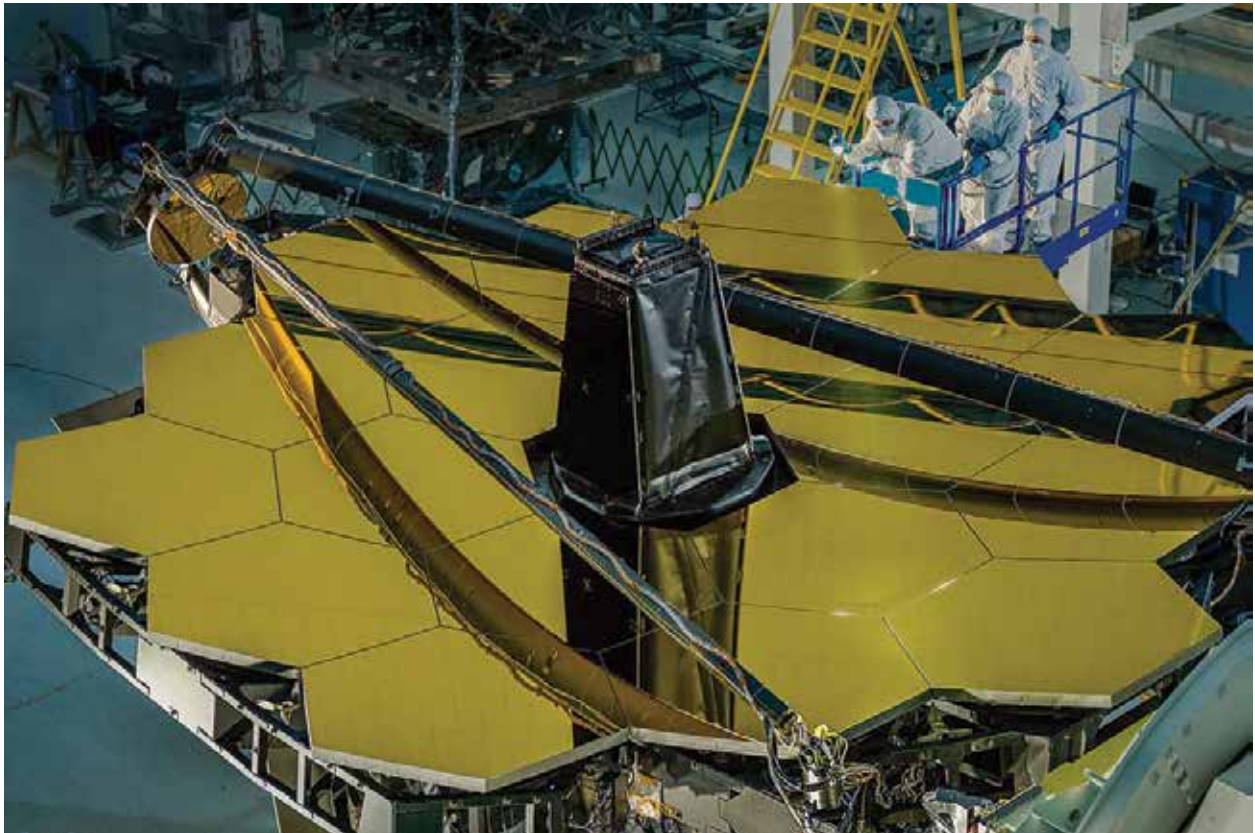
This image shows how the sunshield unfolded when the James Webb Space Telescope reached its home. <https://spaceplace.nasa.gov/james-webb-space-telescope/en/>

4. The sun shield blocks some sunlight from the telescope and keeps the telescope from getting too hot. What are some other things that block sunlight from getting to your eyes?

There are 18 mirrors that fold up to make the telescope smaller.

Mirrors are used by space telescopes to collect and focus light from distant stars. A bigger mirror sees more details. One big, heavy mirror is hard to get into space. So the designers of the James Webb Space Telescope made it from 18 smaller mirrors that fit together and fold up. They are connected and form one large mirror when it is in space. The mirrors have a thin layer of gold to help reflect infrared light.

5. How can the mirrors of the James Webb Space Telescope fit in a spaceship?



Engineers inspecting the James Webb Space Telescope's mirrors at NASA's Goddard Space Flight Center.
<https://spaceplace.nasa.gov/james-webb-space-telescope/en/>

Credit: NASA/Chris Gunn

It will be hunting for signs of life on other planets.

Our solar system isn't the only home for planets! Scientists have discovered thousands of planets orbiting stars other than our Sun. These are called exoplanets. The James Webb Space Telescope will help to study the atmospheres of exoplanets. The atmospheres of some exoplanets could hold the building blocks for life. The James Webb Space Telescope can also help us understand more about how stars and galaxies form.

6. How is the way that the James Webb Space Telescope sees objects in outer space different from other telescopes?