

# EXPLORING THE SOLAR SYSTEM

## Design, Build, Test

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### Try this!



**Build a container.** You'll need a container to hold all of the tools required for a successful mission.



**Add tools.** You'll need tools from these four categories: power, communication, navigation, and science.



**Test your spacecraft.** Use the test stations to see if your spacecraft is strong enough for launch and space travel. *Did it stay together? Or is it time to redesign?*

## *Scientists use spacecraft to explore Earth and space.*

### **Missions to space require large teams to design, build, and test spacecraft.**

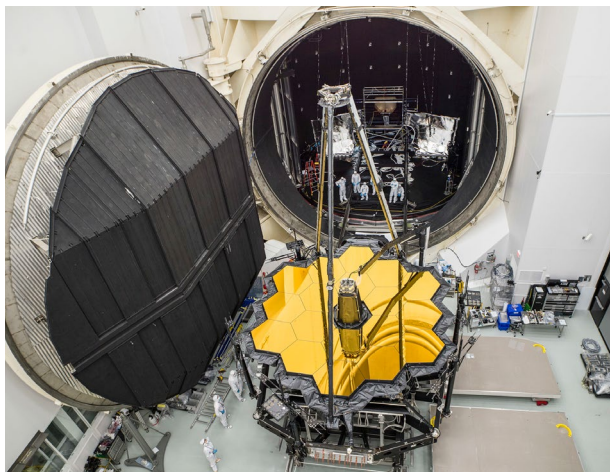
In order for mission teams to successfully explore and gather information about space, spacecraft needs to work exactly the way it was designed to function. Mission teams have diverse interests and expertise. Working together, they carefully **design, build, and test** each spacecraft before launching it into space.



Engineers install components to perform a test on NASA's Juno spacecraft.

Just like in this activity, scientists and engineers use different tests to make sure a spacecraft will remain structurally sturdy during launch and while traveling in space. A **spin test** helps engineers identify if a spacecraft is perfectly balanced for flight. A **shake test** helps engineers understand if a spacecraft can survive a launch into space. These tests help the team make changes to their plans and designs. Space exploration is complicated and can even be quite dangerous. Despite all these tests and careful evaluations, launch failures can still happen.

**Preparing to launch a spacecraft into space takes a lot of time.** It can take many years for a spacecraft to go from an idea to ready for launch. For example, the development of the James Webb Space Telescope began in 1996 and construction was completed in 2016.



NASA's James Webb Space Telescope exits a thermal vacuum testing chamber.

This powerful new telescope is equipped with high-tech instruments like foldable hexagonal mirror segments, sunshields, programmable microshutters, spectrometers, and a cryocooler. Because these instruments are so essential to our understanding of space, NASA decided to postpone the planned launch date to perform even more tests! That way, the \$10 billion spacecraft will have a better chance of a successful launch and mission.