

## Designing a Spacecraft Script (For Leader)

Today you are going to think like an engineer. Many of the people who work at NASA are engineers. It's the job of an engineering team to design and build a spacecraft to help answer the questions that scientists have.

Cassini is a one-of-a-kind spacecraft that was specifically designed to go to Saturn, to be able to travel the distance, to survive the risk and challenges of space, and to learn about Saturn, its rings, and its moons.

Here is your design challenge for today. How can you design your team's spacecraft to fly all the way to Saturn — about 800 million miles away from Earth? (Engineers often work in metric units — so Saturn is about 1,300 million kilometers away from Earth.)

A robotic spacecraft has to be able to do many of the same things we do as humans, while it is far away from our control:

- “See” to navigate and send back pictures
- “Touch” with special instruments that can take samples
- “Hear” from and “speak” to engineers on Earth, through the use of an antenna to communicate back and forth
- “Think” with computers that keep the spacecraft safe and take care of all the data from the instruments

To design your spacecraft, you and your design team are going to work together and make decisions about the following things.

- How will you protect the spacecraft in the icy cold temperature of deep space?
- How will you control and keep in touch with your spacecraft?
- How will you keep the spacecraft safe if it is hit by a space particle (a dust particle or ring particle)?
- What science question do you want the spacecraft to explore when it gets to Saturn?
- Do you think you should send humans on the spacecraft? If you think you should send humans, how will they survive? [Prompts: Food and water for 7 years? Bathroom/waste? Air?]
- What are some challenges that might be encountered with the spacecraft on the journey to Saturn?
- What will you name your spacecraft?
- Why did you choose that name?

It's the job of an engineering team to design and make a “built-to-order” spacecraft to help answer the questions that scientists have. Once you think of possible solutions to these design challenges, your design team will draw a sketch of your Saturn spacecraft. Remember to include everyone's ideas!

## Design Questions (For Students)

Here is your design challenge for today. How can you design a spacecraft that will make it all the way to Saturn — about 800 million miles away from Earth? To design your spacecraft, you and your design team are going to work together and make decisions about the following things.

- How will you protect the spacecraft in the icy cold temperature of deep space?
- How will you control and keep in touch with your spacecraft?
- How will you keep the spacecraft safe if it is hit by a space particle (a dust particle or ring particle)?
- What science question do you want the spacecraft to explore when it gets to Saturn?
- Do you think you should send humans on the spacecraft? If you think you should send humans, how will they survive?
- What are some challenges that might be encountered with the spacecraft on the journey to Saturn?
- What will you name your spacecraft?
- Why did you choose that name?

Once you think of possible solutions to these design challenges, your design team will draw a sketch of your Saturn spacecraft. Remember to include everyone's ideas!