



## Venus? Maybe Later.

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### Article

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#### PART 1

**TOKYO, Japan.** A Japanese space probe was supposed to insert itself into orbit around Venus in December 2010. But it missed. Instead, the probe was captured by the sun's gravitational pull. This was a huge setback for Japan's space program. However, the probe may be able to continue the mission to Venus in six years.

The probe is named Akatsuki. It journeyed for nearly eight months to reach the second planet, Venus. Akatsuki was expected to enter an elliptical orbit around the planet. To do this, the probe needed to fire its engines as it neared Venus. This would have pushed Akatsuki into the proper orbit. Mission officials said they briefly lost contact with the probe. The next day, officials found that Akatsuki's engines failed to fire long enough. This prevented the probe from attaining the desired orbiting position around Venus.

Still, it wasn't all bad news. Officials said communication with the probe had been restored. Akatsuki appeared to be undamaged and working fine. The probe had passed Venus and headed off to orbit the sun. Officials hope that Akatsuki's engines will fire correctly when the probe nears Venus again.

"Unfortunately, [Akatsuki] did not attain an orbit [around Venus]," said Hitoshi Soeno. Soeno works for JAXA, which is Japan's space agency. "But it appears to be [working], and we may be able to try again when it passes by Venus six years from now."

Akatsuki was designed to monitor volcanic activity on Venus. In addition, it was to provide data on Venus' cloud cover and climate, including whether the planet has lightning. The probe has infrared cameras and other instruments to gather this information.

Why did scientists want to monitor the climate of Venus? They hoped that more could be learned about how climate change works. Climate change involves change in weather over long periods of time and is thought to affect the atmosphere. Looking at this process on another planet may give scientists clues about what is happening on Earth. It may help scientists know more about what is causing a gradual increase in temperatures on Earth.

The probe cost \$300 million. It would have been the first that Japan had put in orbit around another planet. Japanese scientists were extremely hopeful that the mission would be successful. Japan recently brought a probe back from a trip to an asteroid. The failure of the Venus probe, at least for now, was a big letdown for Japan and for scientists around the world.

"The Planetary Society regrets that the [creative] Akatsuki spacecraft seems to have missed its opportunity to lock into an orbit of Venus," said Bill Nye. Nye is the leader of the Planetary Society, which is a private group that supports space exploration. "Although Akatsuki has already accomplished some remarkable things on its voyage, this setback reminds

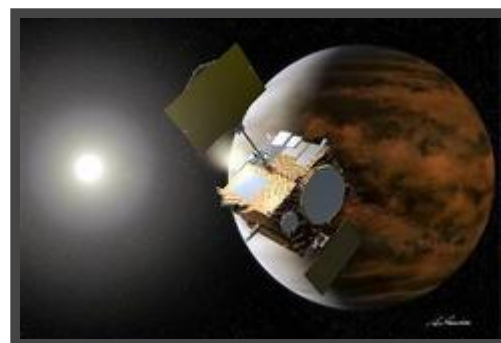


Photo credit and all related images:  
AP/Akihiro Ikeshita via JAXA

*Japan sent a space probe to study the planet Venus. It was not able to enter Venus' orbit and won't be able to try again for six years.*

us how difficult space exploration can be."

*The Associated Press contributed to this story.*

## **PART 2**

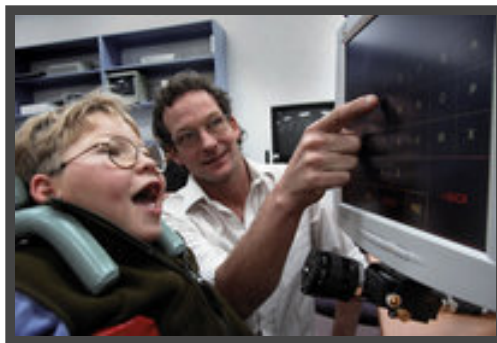
### **Dig Deeper**

The Akatsuki probe failed to enter Venus' orbit in 2010. Japan plans to try again in December 2015. Space exploration benefits us in many ways. Throughout history, the study of stars and planets has brought about new ideas. As we meet the challenges of space exploration, we gain valuable technology.

The study of other worlds can teach us about our own. Scientists believe that Earth has changed a great deal since it formed. Scientists compare Earth with other planets. In doing this, they learn more about the history of Earth's surface features and atmosphere. Scientists are hopeful that Akatsuki's second attempt will be able to study the climate on Venus. This could help them learn more about the changes in Earth's climate.

But space exploration has done more than add to our knowledge. It has also led to new technology. This technology makes life on Earth easier. You probably benefit every day from the space program. Most likely, you use some material or product that was first developed for space. What is one of the most important benefits of space exploration? It has been the development of satellite technology. Images and data from weather satellites have greatly improved weather forecasting. Other satellites collect images of Earth's surface. The images show how the surface is being changed. It is being changed by natural events. It is also being changed by human activity. The data can be used for things like wildlife preservation and conservation of natural resources.

Have you ever come up with a new way to use something? Many technologies have been created to meet space travel needs. Engineers at NASA, the U.S. space agency, often repurpose space technologies to improve life on Earth. Smoke detectors are spinoffs of space technology. Cold weather gloves are, too. Bed mattresses and ear thermometers are also spinoffs of space technology. Everything on a spacecraft must be small. It needs to be as lightweight as possible. Why? Because the heavier a spacecraft, the harder it is to launch. Engineering design techniques have been developed to meet this need. They have also improved devices used on Earth. Some tools for diagnosing diseases are examples; so are some devices that help people overcome disabilities.



Credit: NASA

*This boy is able to communicate by using eye movements. NASA engineers helped develop the system he is using.*

Materials and parts on a spacecraft have to handle harsh conditions. Extreme heat and cold are examples. Fire-resistant materials were developed for the space program. Now, many homes and buildings contain these materials. Firefighters wear protective suits. They are made from special fabric. The fabric was originally used in space suits. NASA engineers have also helped design other devices that help firefighters. These devices allow firefighters to avoid injury from inhaling smoke. Humans need a safe environment in spacecraft and space stations. NASA has developed systems for purifying air, water, and food. These systems now help protect people on Earth as well as in space.

**Dictionary**

**asteroid** (*noun*) a large rock that circles the sun

**elliptical** (*adjective*) oval-shaped

**gravitational pull** (*noun*) the force that pulls objects closer to a planet or star

**infrared** (*adjective*) having to do with invisible light that has a heating effect

**probe** (*noun*) a spacecraft that travels through space to collect information

**satellite** (*noun*) an object that orbits a larger object

**technology** (*noun*) the use of scientific knowledge to solve problems and make new things

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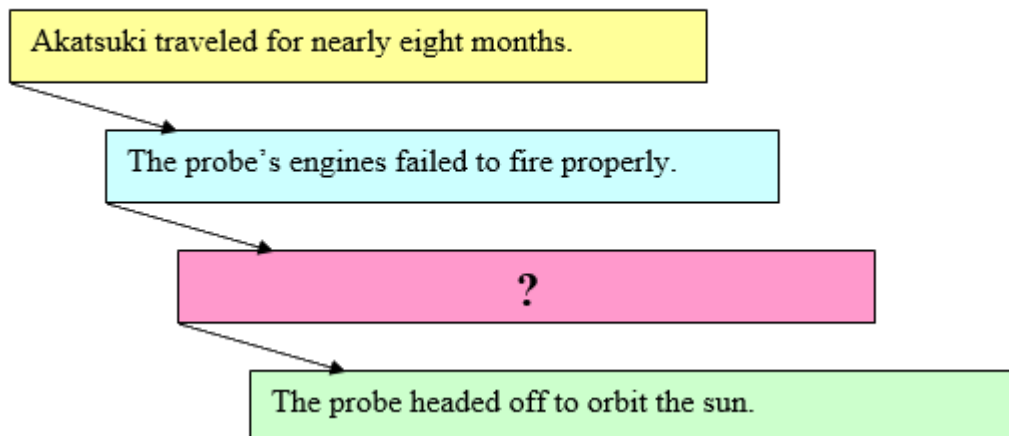
## Activity

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### PART 1

#### Question 1

### What Happened Next?



Based on the article, which best replaces the question mark in the diagram above?

*This question asks about when events happened. It does not ask where in the article the events appear. Look back at the article for clues, such as dates.*

- (A) Japanese officials were able to repair communication with the probe.
- (B) Japanese scientists designed Akatsuki to monitor volcanic activity on Venus.
- (C) Japan's space probe was built at a cost of \$300 million.
- (D) Japan designed a probe to send on a trip to an asteroid.

#### Question 2

What is this article mainly about?

- (A) Akatsuki cost \$300 million to build and was designed to orbit Venus.
- (B) Bill Nye is the leader of a private group called the Planetary Society.
- (C) Japan sent a space probe to study Venus, but the probe didn't work correctly.
- (D) Japanese scientists hope that the climate of Venus can teach us about Earth.

#### Question 3

The article states:

**Mission officials said they briefly lost contact with the probe. The next day, officials found that Akatsuki's engines failed to fire long enough. This prevented the probe from *attaining* the desired orbiting position around Venus.**

Which would be the closest **synonym** for the word *attaining*?

- (A) Reducing
- (B) Achieving
- (C) Observing
- (D) Budging

Question 4

According to the article, why did Akatsuki miss Venus?

- (A) The infrared cameras and other instruments suddenly quit working.
- (B) The engines did not fire long enough to push the probe into orbit.
- (C) The engines were not designed to monitor volcanic activity and provide data.
- (D) The climate changed when the engines were supposed to fire.

Question 5

Based on the article, which is most likely to happen next?

- (A) JAXA will stop all space exploration projects and focus instead on ocean exploration.
- (B) Japan will redirect its studies away from the climate of Venus and study the climate of the sun instead.
- (C) Japanese scientists will design a probe with better infrared cameras to replace Akatsuki.
- (D) Japanese scientists will keep track of Akatsuki and hope that it passes by Venus six years from now.

Question 6

Which two words from the article are the closest **synonyms**?

- (A) Mission and asteroid
- (B) Probe and engine
- (C) Contact and communication
- (D) Atmosphere and temperature

Question 7

Which question is **not** answered by the article?

- Ⓐ Why was Akatsuki sent to Venus?
- Ⓑ How much did Akatsuki cost?
- Ⓒ What does JAXA do?
- Ⓓ How far away is Venus from Earth?

Question 8

Which of these statements should **not** be included in a summary of this article?

- Ⓐ A Japanese space probe was supposed to orbit Venus, but it missed.
- Ⓑ Bill Nye is the leader of the Planetary Society.
- Ⓒ Instead of entering the orbit of Venus, the probe was pulled into the sun's orbit.
- Ⓓ Officials said that Akatsuki's engines did not fire long enough.