

## Lesson plan title

# The launch of rockets and environmental issues

## Institution

JAXA Space Education Center

### Subjects

Science / Social studies / Home Economics

### School Grade

Elementary / Junior high / High school

### Learning Unit

Environmental issues

### Session No. / Total Session Times

1/1

### Materials & Equipments

- PCs (For using Google Earth. Installing Chrome browser is required.)
- A projector and a screen
- Internet access

### Lesson Summary

- Considering environmental issues with the topic of launching rockets
- Examining what we can do for the earth

### Google Earth Usage Overview

- Google Earth Voyager "Riding a rocket"

### Learning Objects

- Thinking about what kind of measures are taken for the environment and what we can do about it

### Inquiry

- Have we unintentionally been making a negative impact on the environment?

### Culminating Task

- Whether or not the participants can see environmental issues as their own

### Lesson Outline with Estimated Time Allotment

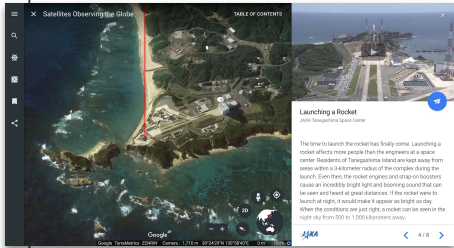
- Total time: 50 mins
  - Introduction - 15 mins
  - Development - 25 mins
  - Summary - 10 mins

### Vocabulary

- [Fairing](#)
- [Space debris](#)

# Lesson Scenario

## Introduction - 15 mins

Time	Path	Students' activities	Teacher's guide
5 mins	On earth observations	Understanding the fact that artificial satellites are used for the environment	Explaining what artificial satellites are doing
5 mins	Understanding the process of launching rockets	Watching the videos in "Riding a rocket" by Google Earth Voyager	Setting the PCs up and giving a brief explanation ✘Mention that artificial satellites have primarily been transported into space by rocket, and that they have not been reused as much as they should
5 mins		 <p>Expected ideas: Surprised to know artificial satellites have been transported into space by rocket; I did not know the purpose of artificial satellites; More artificial satellites should be launched for the global environment</p>	Understanding the impressions the participants have on artificial satellites and rockets after them learning about these

## Development - 25 mins

Time	Paths	Students' activities	Teacher's guide
5 mins	Considering the impact of rockets on the environment	Reflecting on rockets/artificial satellites and environmental issues Expected ideas: Where will rockets end up eventually?; Does rockets' fuel contaminate air?; What happens to the artificial satellites which are no longer needed?	Inquiry: "Rockets are launched for the earth, but what impact would they have on the global environment?"
5 mins	Understanding the process of launching rockets	Rewatching the videos in "Riding a rocket" by Google Earth Voyager	Rewatching the video, while thinking about the impact of rockets on the global environment ✘If the participants have any additional ideas, let them write these down at any time

Time	Paths	Students' activities	Teacher's guide
5 mins	Learning about the ingenious aspects of space development	Understanding that eco-friendly measures have already been taken, but that further improvements are needed	Giving a brief explanation about the launch of rockets and artificial satellites, mentioning their ingenious aspects and points to be improved ✘Refer to the recollection of rocket fairings, the use of liquid hydrogen/liquid oxygen fuel, and the fact that many artificial satellites which are no longer needed still remain in space as debris
10 mins	Thinking about ourselves	Thinking about the environment by paying attention to familiar things in daily lives Expected ideas: use of straws and disposable chopsticks; food loss; recycling; it's better to use bicycles rather than cars; we might be using electricity excessively	Inquiry: "Have we unintentionally been making a negative impact on the environment?" and "What can we do for the future of the earth?"

### Summary - 10 mins

Time	Paths	Students' activities	Teacher's guide
5 mins	Exchanging ideas	Sharing ideas with the rest of the group/class	Encouraging the participants to exchange ideas
5 mins	Impressions, self-assessment	Writing down the participants' impressions of the lesson and conducting self-assessment	

### Evaluate: Exemplar Response and/or Rubric

- Using self-assessments and group evaluation

### Additional Resources

- [JAXA Space Technology Directorate I on earth observations](#)

### Options for Differentiation

- This lesson can be delivered in a few hours by incorporating the time to examine rockets into learning.

### Connect

- It would be great if the participants could learn that eco-friendly actions might eventually end up having a negative impact on the environment.