

Lesson plan title

Your ideal artificial satellite

Institution

JAXA Space Education Center

Subjects

Science / Social studies / Periods for integrated study

School Grade

Elementary / Junior high / High school

Learning Unit

Environmental studies

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
- Whiteboards for presentations (one for each group)

Lesson Summary

- Learning how artificial satellites help conduct earth observations
- Designing the participants' original artificial satellites for the future of the earth

Google Earth Usage Overview

- Google Earth Voyager "Riding a rocket," "Various "eyes" for measurement" and "Whole view of the earth"
- Google Earth Engine "Timelapse"

Learning Objects

- Learning how to determine what our society will need moving forward in order to solve environmental problems

Inquiry

- Look into artificial satellites to protect the earth

Culminating Task

- Whether or not the participants can think up specific features of artificial satellites to solve environmental problems

Lesson Outline with Estimated Time Allotment

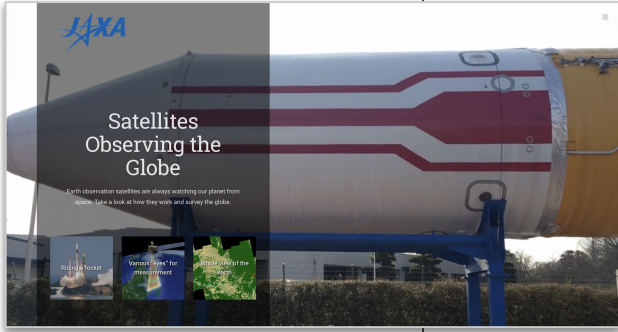
- Total time: 50 mins
 - Introduction - 10 mins
 - Development - 30 mins
 - Summary - 10 mins

Vocabulary

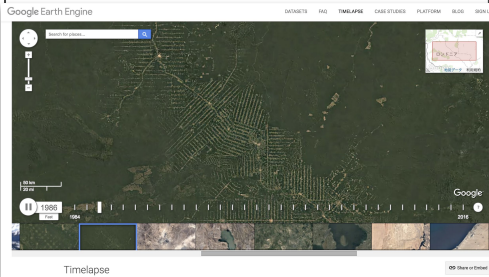
- ☐ [Earth observations](#)

Lesson Scenario

Introduction - 5 mins

Time	Path	Students' activities	Teacher's guide
5 mins	Understanding the process from the launch of artificial satellites to the earth observations	Google Earth Voyager "Riding a rocket," "Various "eyes" for measurement" and "Whole view of the earth"	Inquiry: "Do you know there is a correlation between rockets and the protection of the earth?"
			
5 mins	On artificial satellites	Understanding artificial satellites	Giving some explanations about the existing artificial satellites and what role they play ✖Mention there are multiple types: scientific satellites, manned satellites, telecommunications satellites, and earth observation satellites

Development - 30 mins

Time	Paths	Students' activities	Teacher's guide
25 mins	Thinking about the participants' original artificial satellites	Thinking about the participants' ideal artificial satellites ✖Different tasks can be assigned within each group, such as naming their artificial satellite and drawing the satellite. Use the Google Earth Engine Timelapse to see how the earth changes and to help the participants complete their tasks	Inquiry: "Think up artificial satellites to protect the earth"
			
5 mins	Sharing ideas	Sharing ideas with the rest of the group/class	

Summary - 10 mins

Time	Paths	Students' activities	Teacher's guide
5 mins	Reflecting on environmental problems	Developing the participants' own opinions on environmental problems	Inquiry: "What should we do to protect the earth moving forward?"
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

- [The website for Earth Observation Research Center, JAXA Space Technology Directorate I](#)
- [The website for Satellite Navigator, JAXA Space Technology Directorate I](#)

Options for Differentiation

- According to the age and developmental stages of the participants, it might be a good idea to set certain conditions in designing artificial satellites. For example, high school students could think about the advantages and disadvantages of their satellites or base their designs around previous research.

Connect

- It's important to connect ideas and develop them, regardless of their possibilities. It would be a good practice for developing the ability to work on something which has no answer.