Types of Artificial Satellites

Grade Range: Elementary School

Lesson Time: 40 minutes

Key Terms
- Antenna
- Artificial satellites
- Orbital velocity
- Satellite
- Solar panel

Materials and Resources
- zView

Activity Overview
Artificial satellites are man-made machines launched on rockets into space. While in space, these satellites orbit planet Earth or other celestial objects. There are several different types of artificial satellites designed for different purposes. In this activity, students will learn about the different types of man-made satellites and their purposes.

Essential Questions
1. What defines a satellite?
2. What are the purposes of man-made satellites?

Objectives
- Explain uses for man-made satellites
- Compare different artificial satellites

Introduction
Prior to this activity, students should have some knowledge of our solar system and the objects found there and should complete What Is a Satellite? in Studio. Using zView, introduce the activity to the students by reviewing models of the satellites. Discuss with the students what they are viewing.

zSpace Activity
Activity Questions Provided in Studio
Answers may vary. Sample answers are provided below.

1. Artificial satellites are man-made machines launched on rockets into space. While in space, these satellites orbit planet Earth or other objects. Which of these man-made objects orbiting Earth are satellites? Place the objects that are not satellites in the trash. Take a photo.

2. Satellites come in all shapes and sizes. Some satellites are as small as a watermelon or your lunch box, while others are as large as a small bus or a truck. The weight varies just as much. Satellites can weigh anywhere
from less than 10 lbs to 1000s of lbs. Smaller satellites are becoming more popular because they cost less compared with the larger satellites. Why do think it is the case that the smaller the satellite, the smaller the price tag?

*I think the smaller satellites are less expensive because they cost less to build and to launch into space.*

3. Satellites have to be able to work under very harsh conditions. These include extreme temperatures, high pressures from the launch, bumping into foreign objects, and intense radiation. Besides exposure to the Sun, when would the satellite encounter extreme heat?

*The satellite would experience extreme heat during the launch.*

4. Aluminum and Kevlar are two materials that are used in satellites. Kevlar is very lightweight, strong, and durable, and handles harsh weather conditions. Why would Kevlar be used to build satellites?

*Kevlar is used because satellites do not need extra weight, they need to be durable in case space debris crashes into them, and they need to be able to handle the extreme heat and cold.*

5. While in space, satellites have to travel more than 17,500 mph. This is called orbital velocity. Orbital velocity is the velocity at which an object must travel to stay in orbit. Do you think all objects in space have an orbital velocity? Why or why not?

*Yes, I think that all objects have an orbital velocity because if they did not, they would not continue to orbit.*

6. There are three types of orbits in which satellites travel. They are called high, medium, and low orbits. The higher the orbit, the slower the satellite travels. In which orbit would satellites travel the fastest?

*Satellites in the low orbit travel faster than those in the other orbits.*

7. Communication satellites are launched into space to help with radio, telephone, and television signals. The Telstar was launched in July of 1962 and was the first satellite to send a television signal across the Atlantic Ocean. Examine and make observations about this satellite.

*The Telstar resembles Earth. It is shaped like a sphere. It also looks like it has an equator. There are many panels that look different from each other.*

8. Weather satellites give us information about weather and climates on Earth. Examine and make observations about the weather satellites.

*The CALIPSO has a radiometer and a telescope.*

9. Scientific telescopes such as the Hubble telescope are also satellites. Scientific telescopes collect data and research about not only our planet, but the entire solar system. Examine and make observations about scientific telescopes.

*Satellites like the Cassini have a lot of instruments and cameras to collect data.*

10. Did you know that the International Space Station is a satellite? Why is it considered to be a satellite?

*It is a satellite because it is in orbit around Earth.*

11. These are different types of satellites. Examine and compare the satellites, using the Camera to look for details.

*All of these satellites are of different shapes and sizes and have different instruments.*

12. The International Space Station is a spacecraft in which astronauts live and work. They are conducting research that cannot be done on Earth. What would be something they could research on the International Space Station that they couldn’t research on Earth?

*How living in space affects the human body.*

13. There are also military satellites orbiting Earth, but there is not a lot of information available about these satellites. Why would this information be hidden?

*This information would be kept secret because our military doesn’t want other militaries to know about our satellites.*
14. If you had to choose 1 type of satellite that you consider the most important and/or useful, which one would you choose and why?
   *I would say that the communication satellite is the most important because it keeps us in contact with people who live far away.*

**Closing**

**Satellite vs Satellite**
Instruct students to compare two different artificial satellites. Explain that students will work with a partner to research two different types of artificial satellites. Once their research is complete, students will present to the class the information they learned about the satellites. Student presentations must include a visual that displays a picture of each of the satellites as well as detailed information.

Follow-up Activity: *Space Living and Research* - Studio
Follow-up Activity: *Super Solar System* - Studio
Follow-up Activity: *Micro Mercury* - Studio
Follow-up Activity: *Visible Venus* - Studio
Follow-up Activity: *Extraordinary Earth* - Studio
Follow-up Activity: *Marvelous Mars* - Studio
Follow-up Activity: *Jumbo Jupiter* - Studio
Follow-up Activity: *Stunning Saturn* - Studio
Follow-up Activity: *Unique Uranus* - Studio
Follow-up Activity: *Notable Neptune* - Studio

**Differentiation**

- Group students heterogeneously to allow students with a strong command of the English language to assist in reading or interpreting questions
- Provide paper copies of diagrams for students to use as a reference
- Provide a handout with a list of vocabulary terms and definitions that will appear in the activity
- Allow students to provide answers that are handwritten, typed, or verbal
- Give students a variety of presentation styles to choose from (using charts/graphs, PowerPoint, making 3D presentations, creating videos/movies, making posters)
- Have students work as partners or in small groups (younger children could partner with older buddies)
- Enrichment: Students could change an additional variable in the activity and look for patterns
- Enrichment: Students could find real-world problems involving the concept and design solutions to those problems
- Enrichment: Students could research similar topics and create presentations
- Enrichment: Students could build a model of a key concept

**Resources**

[http://www.sciencekids.co.nz/sciencefacts/space/satellites.html](http://www.sciencekids.co.nz/sciencefacts/space/satellites.html)
[http://www.nasa.gov/topics/technology/features/telstar.html](http://www.nasa.gov/topics/technology/features/telstar.html)