Satellite Gazing

Currently there are over 6000 artificial satellites orbiting Earth (Mohanta, 2021). Artificial meaning, they were created on Earth by a company and launched into orbit as opposed to natural satellites like moons. Each one of these satellites uses radio waves to send signals to Earth.

These satellites are not all the same. They differ in size, orbit and task. You are going to investigate these artificial satellites in order to gain an understanding of what we put into space, where we put it and why.

Activities

1. Go to the following web page and read about satellites of different sizes. https://news.viasat.com/blog/scn/how-big-is-that-satellite-a-primer-on-satellite-categories
2. Many of those in the US struggle to understand metric units. Therefore, please convert each of the weights from the article into pounds.

Category	Weight
Large	
Medium	
Mini	
Micro	
Nano	

Next, we are going to investigate the different orbits satellites can occupy.

3. Go to this web page,
4. Read the page, answering these questions as you read. https://earthobservatory.nasa.gov/features/OrbitsCatalog
   a. What two things control a satellite's orbit?

   b. What are the typical uses of satellites with a geosynchronous orbit?

   c. Why is the third Lagrange point not useable for satellites?

   d. Why is a medium Earth orbit appropriate for GPS satellites?

   e. Why is it important for a satellite collecting scientific data to be in a low Earth orbit?

Next, we are going to investigate the satellites that are currently in orbit.

5. Go to the webpage, https://geoxc-apps.bd.esri.com/space/satellite-explorer/

Each line on the image represents an artificial satellite.

6. Take a close look at the animation, be sure to zoom in and out to get a different perspective. Describe what you see in a detailed paragraph.

7. You are going to work with your classmates to determine why satellites are in space, who launched them, and their orbital level. Each person is going to research three satellites. Follow your teacher's instructions to be sure you are not replicating the work of another student. To find the information below simply click on one of the lines. Some of that information you will find in the box that pops up. However, other elements will be found after you click on go to satellite.

Satellite name	Purpose	Country	Orbital parameters

8. Once you have collected your data follow your teacher's instructions to combine it with that of your classmates.
9. Use your class data to complete the tables below.

Classification of Satellite data

Purpose	# identified in class sample	% of class sample	% of satellites in orbit (found by clicking on Purpose on the webpage)
Location			
Communication			
Earth Observation			
Space Observation			

Orbits	# identified in class sample	% of class sample	% of satellites in orbit (found by clicking on Purpose on the webpage)
LEO (Low Earth Orbit)			
MEO (Medium Earth Orbit)			
GEO (Geosynchronous Orbit)			

Country of ownership	# identified in class sample	% of class sample	% of satellites in orbit (found by clicking on Purpose on the webpage)
USA			
China			
UK			
Russia			
Japan			

10. Did your class percentages match those found on the webpage? Please indicate which percentages did and did not match.

11. If some of the percentages were different answer the following questions.
   a. Why do you think some of your percentages were different?

   b. What could you have done differently to improve your class data collection?

Last, we are going to investigate how satellites affect other users of the spectrum.

In the last activity you learned about the purposes of satellites. While a lot of people appreciate having satellites to carry out these tasks that sentiment is not shared by everyone. With the ever-increasing number of satellites some people are becoming concerned about interference with other uses of the spectrum. You are going to work in a group of three. Each of you will investigate one of the topics below. Use an internet search engine to locate a reputable article on your topic.

Read your article and then write a summary paragraph of 5 to 7 sentences. Your paragraph should contain the following information: main idea, evidence from the article that supports the main idea, and an interesting fact or two.

Interference topics:

Radio Astronomy
Weather forecasting
Stargazing (amateurs looking at the night sky)

When your teacher instructs you to, take turns telling your group about your article. After your small group has discussed your teacher will bring you back together for a whole group discussion. Be sure to have something on your topic to share with the larger group.